WebBase User’s Guide

Changing the Way
the World Uses the Internet

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Chapter 1

What is WebBase?

"I don't want to teach myself PERL or other CGIs," said Matt McWhinney, technical architect at Ameritech Corp., a regional Bell operating company in Chicago. "WebBase is something I can pull out of a box and install myself. Besides, our Web has to be fast and maintainable. "
-- InfoWorld July 17, 1995

WebBase™ is a Web database server that allows you to easily integrate information from Open Database Connectivity (ODBC) databases into your Web site. It works in cooperation with any browser, allowing users to hypersearch a database as easily as they navigate hypertext links in a Web document. With **WebBase**, if it's contained in a database you can display it on a Web page!

WebBase provides solutions ranging from simple access, to a real estate listing, to a complex catalog ordering application. You can make the contents of your database available to anyone browsing your site, or limit access to a specific audience that you control through password protection. In addition, you can make existing databases more powerful by adding hypertext links into reports. This feature allows users to delve into a report in greater detail, while maintaining the simplicity of a high level view.

1.1 WebBase Features and Benefits

WebBase provides many features for the design and maintenance of Web forms. New features are also added to each new release of **WebBase** to improve its functionality; WebBase users often suggest these new features. The following list identifies some of the interesting features offered by **WebBase,** and how you can benefit from using **WebBase**.

Features	Benefits
WebBase is a full web server.	**WebBase** is all the software you need to connect your database to the web. No other software is required.
WebBase is ODBC compliant.	**WebBase** works with any ODBC-compliant database, including ORACLE, Sybase, SQL Server, and MS Access.

Easy automatic install.	You can have a web server running in minutes!
WebBase uses all the features of HTML (versions 1,2 and 3).	**WebBase** works with ALL Browsers and extensions and Internet file types, including JAVA.
WebBase WebWizard™	Utilities and tools to help you get started with **WebBase**, including setting up example web sites.
SQL statements of arbitrary complexity can be embedded anywhere in HTML documents.	No programming of ugly scripts. You can use SQL to populate pop-ups, fill lists, insert new data, and embed arbitrary SQL SELECT, JOIN, UPDATE, INSERT and DELETE. The possibilities are endless!
A full-featured macro language including if, case, forRow, forIndex statements as well as math, logic, comparisons, string manipulation, dates, and more functions.	No CGI code! Your Web pages are easily maintainable.
WebBase directly reads data in all Internet file formats.	You can include JAVA, movies, virtual HTML, pictures, etc. in your Web pages.
An ‘insert’ facility for easy maintenance.	Re-use of forms saves time and keeps you better organized.
User defined local and global variables.	You can store temporary state values, store form fields, and store query results.
Session variables that hold state between pages.	You can easily do online shopping applications using user variables.
Dozens of dynamic variables including %date%, %browserAddress%, %os%.	Provide access to predefined operating system routines that are normally difficult to access and use.
Supports multiple domains on the same machine.	One **WebBase** server can support many domains. For example, one machine can host 'www.yyyy.com' and 'www.xxxx.com', each configured to present information differently.
WebBase can interrogate the capabilities of the browser.	**WebBase** can dynamically decide to return GIF or JPEG or FRAMES or tables or JAVA, etc.
Password protection	Keep your databases secure with user ID and password protection...even down to security on a given field of a database!
Custom context sensitive database logging for each search form.	Know who your customers are or who is visiting your site including keeping track of what they wanted.
Can customize response by user/server IP address- 'Welcome Mr. Jones, you've visited our page # times'	Personalized pages generated on the fly by **WebBase** are displayed back to users' browsers.
No CGI **-- WebBase** is the only database web server that skips external script	The **WebBase** server connects directly to the database. With CGI, your server must

applications entirely!	launch a script every time a request is made, and then the script will launch a database query program. Only ASCII text is returned, not a list of rows. Another script must be used to massage the results into HTML.
Use **WebBase** intranet applications.	**WebBase** can be used within your company's network.
Online reference and documentation.	**WebBase** has its own home page, where you can get the latest documentation and newest releases.
WebBase is a 32-bit application	32 bit is the only way to go!
Desktop development	You can develop your **WebBase** applications ‘off-line’ **--** work on your laptop at home or anywhere.
Cache ODBC connections	You can directly control caching to provide very fast database accesses.
Online support forum	Benefit from the experience of existing **WebBase** users
Access multiple databases at the same time anywhere on the net.	Most real business applications use multiple databases.
WebBase is a multi-threaded application.	**WebBase** can handle multiple hits at the same time.

1.2 WebBase vs. CGI

As noted above, no CGI scripts are required in **WebBase**. Here are some more comparisons between CGI/PERL and **WebBase**.

CGI/PERL	WebBase
Very slow	Very fast
Must launch new process every hit	No processes need to get launched
Database connections need to be established EVERY hit	Database connections are cached by **WebBase**
State not retained (‘shopping basket’ apps are difficult)	State is retained implicitly by **WebBase** (‘shopping basket’ built in)
Scripts are complicated to maintain	No scripts; HTML files contain the embedded SQL
Database queries return only text, scripts massage the text results into HTML	Database queries return row objects, **WebBase** dynamically lays out HTML
Browser ‘cookie’ is tricky	Browser ‘cookie’ is automatic

Introduction

Chapter 2

This chapter presents introductory material about **WebBase**, including general terminology, so that the user has a better understanding of how **WebBase** can be used.

2.1 Basic Terminology

Before discussing the specific features of **WebBase**, it is necessary to define some special terminology. The section that follows identifies terms that are used in this manual. Review these definitions carefully and try to understand them completely before reading further in this manual.

Anchor-- A link from a portion of a web page (e.g., a word or phrase) to another location on the current web page or a totally different web page.

Browser -- A browser is a client-side program that allows a user to view the pages of information that others create and offer on the World Wide Web. The user identifies a web address to the browser, which then issues a request to the HTTP Server at the web address. The browser then displays the information returned from the server. Synonym: Web Browser.

CGI script -- The Common Gateway Interface, or CGI, is a standard for external gateway programs to interface with information servers such as HTTP or Web servers. A plain HTML document that the Web server retrieves is static, which means it exists in a constant state: a text file that does not change. A CGI program, or script, is executed in real-time, so that it can output dynamic information.

Cookie -- Cookies are a general mechanism which server side connections can use to both store and retrieve information on the client side of the connection. The addition of a simple, persistent, client-side state significantly extends the capabilities of Web-based client/server applications. When the server returns requested information to a client system, the server may also send a piece of state information that the client will store. Included in that state object is a description of the range of URLs for which that state is valid. Any future requests made by the client which fall in that range will include a transmittal of the current value of the state object from the client back to the server. The state object is called a *cookie*, for no compelling reason.

Database server -- A machine whose primary purpose is to run database software accessed by many other machines via some form of network connection.

Domains -- Domains are adminstrative entities that provide decentralized management of host naming and addressing. The Domain Name System (DNS) is arranged as a hierarchy, both from the perspective of the structure of the names maintained within the DNS, and in terms of the delegation of naming authorities. At the top of the hierarchy is the root domain ('.') which is administered by the Internet Assigned Numbers Authority (IANA). Administration of the root domain gives the IANA the authority to allocate domains beneath the root. The DNS is implemented as a collection of inter-communicating nameservers. At any given level of the DNS hierarchy, a nameserver for a domain has knowledge of all the immediate sub-domains of that domain. The Network Information Center (NIC) is designated by the Defense Communications Agency (DCA) to provide registry services for the domain-naming system on the DDN and DARPA portions of the Internet.

GET and POST requests -- A browser communicates with a server via either a GET or POST request. The string of characters sent to the server begins with the sequence GET or POST followed by specifics as to the web page being requested, any required parameters, and various header record information such as the identity of the browser issuing the request. The initial GET or POST character sequence defines the syntax of the remainder of the request - specifically the location and encoding of the optional parameters - and whether these optional parameters are visible to the user at the browser making the request. The author of an HTML web page has the ability to specify either a GET or POST request for a form while a default GET request is generated for anchors used in hypertext linking.

.htf files -- A file system extension that designates **WebBase** form files that contain standard HTML syntax plus **WebBase** macros and variables. Synonyms: **WebBase** output forms, **WebBase** macro forms.

HTML -- Hypertext Markup Language. Web pages are written in HTML so that the information they present will be displayed the same way by every browser available (in theory, at least).

HTTP server -- A computer system with a software package that responds to requests from browsers and returns the requested data. The data returned is generally a specifically addressed file that may include data generated real-time via a CGI script or the built-in capabilities of the server itself such as the macro language provided with **WebBase**. These software packages are called *HTTP servers* because their primary purpose is to serve data using the HTTP protocol. However, *Web server* is a better term because they often do much more than just speak a protocol. Synonym: Web server.

Hypertext searching & linking -- Marking portions of a web page with anchors. When a user selects the anchor, generally by clicking the mouse while over the marked anchor, another location on the current web page or a totally different web page will be made available to the user.

Input Forms -- A special type of HTML form. It allows the web page author to request input from the user via type-in fields, checkboxes, radio buttons, menu selections, buttons, etc.. It also includes information as to where the collected input is to be directed when the user is ready to submit his or her input.

IP Address -- An IP (Internet Protocol) address is a 4-byte number that uniquely identifies a host on the IP network. This address consists of a network number, which is always the same for every host on a network, and a host number, which must be unique for each host on a network. IP addresses are assigned to each computer by appending a unique host number to the network number. The first byte of an IP address determines the class of the network. IP addresses are divided into Class A, Class B, and Class C network numbers. The first byte of a Class A network is in the range of 1-127, and the network address is one byte in length. The first byte of a Class B network is in the range of 128-191, and the network address is two bytes in length. The first byte of a Class C network is in the range of 192-254, and the network address is three bytes in length. For example, 130.57.x.x is a Class B Internet number because the network number is two bytes in length, and the value of the first byte is between 128 and 191. When you assign an IP address to a device, you can append any host number that is not already in use by another device. The host number part of the IP address must be unique on the IP network. At most sites, a network administrator maintains and assigns IP addresses.

ISMAP Image --An image displayed on an HTML page that has the ISMAP attribute set. This attribute turns the image into a graphically active element in which the user can select regions of the image by clicking the mouse on them. Clicking on different regions will cause the server to take different actions.

ODBC database -- A database is ODBC (Open DataBase Connectivity) compliant if it has an ODBC driver through which one can issue SQL statements. ODBC provides an interface by which an application program can access any number of different databases via a common set of SQL statements. The ODBC driver handles the conversion of the SQL statement to whatever format statement the specific target database recognizes.

Records -- A collection of fields in a database. When one queries a database using an SQL SELECT statement, one expects to have returned zero, one, or more database records that match the selection parameters in the SELECT statement. Records can be updated using the SQL UPDATE statement, or deleted using the SQL DELETE statement. A new record is created using the SQL INSERT statement.

Splash Screen -- When an application starts up, it will frequently display a logo identifying the name of the product and possibly some copyright or company information. This screen is called a splash screen.

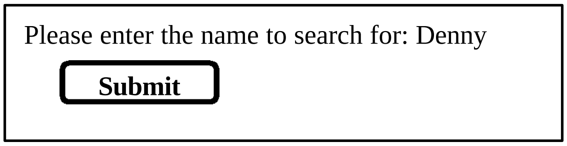
SQL -- a standardized query language used to access one of a number of databases which of themselves might have considerable differences in implementation.

URL -- Uniform Resource Locator. It can be considered a networked extension of the standard filename concept. Not only can you point to a file in a directory, but that file and that directory can exist on any machine on the network, can be served via any of several different methods, and might not even be something as simple as a file. URLs can also point to queries, documents stored deep within databases, or whatever.

Web page -- A document or file written in HTML that provides instructions to browsers on how to format and display the text and graphics included in the page. A Web page may include text, pictures, input forms, and anchors. Synonym: Web document.

2.2 A WebBase Example

WebBase allows your readers to interact with your databases from a Web browser. Since examples speak louder than words, let’s go step-by-step through a simple one. Suppose you have a Web page with an input form that looks like this:



Please enter the name to search for: Denny

When the user enters the desired search name (e.g., ‘Denny’) and clicks on the ‘Submit’ button, a GET request is sent from the browser that looks like:

```
http://<host-URL>:80/getname.htf?name=Denny
```

This request is sent to the **WebBase** server at http://<host-URL>/. The server is configured to accept requests on port 80, so that is included as part of the address. The **WebBase** server will access the form stored in the file getname.htf, and use the information found following the ‘?’ as parameters in the processing of the form.

The **getname.htf** form that is accessed looks like this:

Figure 2.1 The *getname.htf* form

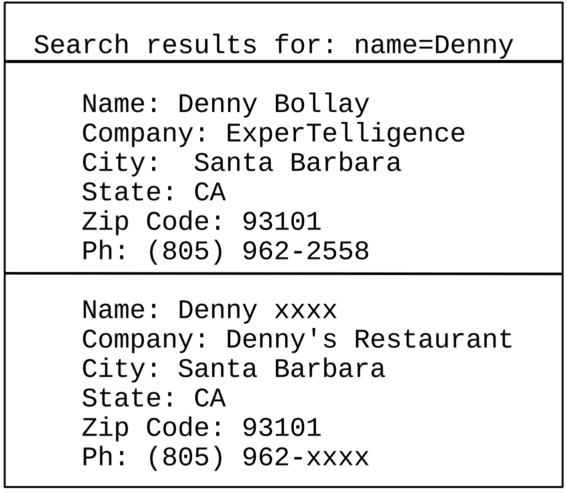
```
<HTML>
<HEAD>
{sql to answers source 'aSrc' user 'aUser' password 'aPwd' max 25 }
  SELECT * FROM Examples WHERE Name LIKE '%{name sql=true}%'
{/sql}
{if 0 answers size =}
  <TITLE> I'm sorry! </TITLE>
  </HEAD>
  <BODY>
  <H2> Search results for: {%search%} </H2>
  <HR SIZE=8>
  <H2> I'm sorry, I could not find any records that match in the
database.</H2>
{else}
  <TITLE> WebBase Demo Results </TITLE>
  </HEAD>
  <BODY>
  <H2> Search results for: {%search%} </H2>
  {forRow aRow on answers}<HR><PRE>
       Name: <B>{Name}</B>
    Company: <B>{Company}</B>
       City: <B>{City}</B>
      State: <B>{State}</B>
   Zip Code: <B>{Zip}</B>
         Ph: <B>{Phone}</B>
</PRE>
  {/forRow}
{/if}
</BODY>
</HTML>
```

There are three main sections in the form. The section between ‘{sql …}’ and ‘{/sql}’ is the **WebBase** *sql* macro. When the form is processed, **WebBase** replaces {name} with ‘Denny’, and then generates and performs an SQL SELECT statement to retrieve the first 25 records containing the name ‘Denny’ from the ‘Examples’ table. The returned records are stored in the **WebBase** variable {answers}.

Section 2 on the form starts with '{if …}' and ends with the line above '{forRow …}'; this is the **WebBase** *if* macro. The first line of this section -- *{if 0 answers size =}* -- tests the size of the {answers} variable. If there are 0 answers, the HTML immediately following the {if ...} statement is returned. If there is at least 1 record returned, the HTML immediately following the {else} statement is returned.

The **WebBase** *forRow* macro starts with '{forRow …}' and ends with '{/forRow}'. It is used to loop on the answers returned from the SELECT; the variable aRow takes on each of the returned results in turn. The fields from the returned record (e.g., {Name}, {Company}) are substituted where requested.

Here is what is displayed on the user's browser when 2 results are returned from the database:



```
Search results for: name=Denny

   Name: Denny Bollay
   Company: ExperTelligence
   City:  Santa Barbara
   State: CA
   Zip Code: 93101
   Ph: (805) 962-2558

   Name: Denny xxxx
   Company: Denny's Restaurant
   City: Santa Barbara
   State: CA
   Zip Code: 93101
   Ph: (805) 962-xxxx
```

2.3 Using the WebBase Language

WebBase can be used as a simple Web server, it can be used to provide easy database accesses, or it can be used to provide flexible and dynamic presentations to users. When developing the forms used within **WebBase**, you will be using the **WebBase** language that is made up of variables, macros, expressions and operators. These are described in detail in subsequent chapters.

The **WebBase** system has been developed to use object-oriented features. It is not necessary for users of **WebBase** to understand object-oriented technology. However, there are a number of object-oriented terms that are used throughout the remainder of this manual, so they will be covered here.

- **Class -** a template for defining the methods and data variables for a particular type of object. All objects of a given class are identical in form and behavior but contain different data in their variables.

- **Instance --** an object that belongs to a particular class. For example, 'abc' is an instance of the class String

- **Message --** a signal from one instance to another that requests the receiver object to carry out one of its methods. A message consists of three parts: the name of the receiver, the method it is to carry out, and any parameters (arguments) the method may require to fulfill its charge.

- **Method --** a procedure or operation that can be performed by an object. In some software environments, it is referred to as a function or subroutine.

- **Object --** a software packet containing a collection of related data and methods for operating on that data. Object and instance are used interchangeably.

- **Receiver --** an instance to which a message is sent. A sender object passes a message to the receiver object, which processes the message and then passes back a return value.

2.4 WebBase Server vs. HTTP Server

WebBase executes on a computer as a Web Server in a fashion similar to Windows-based servers such as the Netscape Communications Server or Microsoft Internet Information Server (IIS) with one major difference. Whereas traditional Web Servers are designed to handle HTML and do not interface with databases, **WebBase** is designed to interface to databases without the requirement of developing CGI scripts.

For this reason, many applications developed to take advantage of the database accessing capabilities of **WebBase** are, in fact, multiple Web Server applications. They are designed to use a traditional Web Server to present Home Page screens and top-level introductory information to the user while directing database queries to the **WebBase** Server.

WebBase is capable of handling all of the standard HTML features performed by other Web Servers. Depending on your application and anticipated load, you can have a single host machine configured with a single **WebBase** server, or you can have a single host machine with two servers and two ports, or you can have an extensive collection of hosts, some running traditional Web Servers and others running **WebBase**.

Installation

Chapter 3

This chapter describes the installation procedures for **WebBase**. The first section describes the necessary prerequisites that must be met before **WebBase** can be installed. Subsequent sections describe the installation of **WebBase**, the registry parameters required for **WebBase** to execute, ODBC installation and configuration, testing the **WebBase** installation using built-in commands, the optional configuration of **WebBase** as a Windows NT service, and how to get updates and support.

3.1 System Requirements

WebBase requires a computer with:

- An Intel processor
- One of the following operating systems:

```
Windows NT 3.51 or greater
Windows 95
Windows 3.1 (with Win32s[1])
Windows for Workgroups 3.11 (with Win32s[1])
```

- TCP/IP software installed and configured[2]
- At least 16MB of memory (32mb recommended)
- A network connection -- typically Ethernet
- An ODBC compliant database and appropriate ODBC driver(s). See chapter 6 for information on ODBC databases.

[1] WebBase is a 32-bit application primarily designed for 32-bit operating systems such as Windows NT and Windows 95. It will run on 16-bit systems (Windows 3.1 or Windows for Workgroups 3.11); however, some of the add-on features are not supported under 16-bit systems. All installation instructions are for 32-bit systems. Instructions for 16-bit systems are found in Appendix B.

[2] TCP/IP software is included with Windows NT and Windows-95 systems. For Windows 3.1 and Windows for Workgroup systems, you can get the Microsoft TCP/IP system files via anonymous ftp to ftp.microsoft.com and change to the softlib\mslfiles directory. The file wfwtcp.exe contains the updated Microsoft TCP/IP protocol for use with Microsoft Windows for Workgroups version 3.11. The file tcp32b.exe is a 32-bit TCP/IP network protocol for Windows for Workgroups only.

3.2 Installing WebBase

The files for installing **WebBase** are provided on a CD or on-line on the **WebBase** Web site at http://www.expertelligence.com/WebBase/. There are three sets of files provided as part of the installation:

1. Files to install **WebBase**
2. Files to install ODBC drivers
3. **WebBase** documentation files

WebBase Files on the CD

The CD includes a single top-level directory called *WebBase*. The files and subdirectories within this directory on the CD are:

- **WBSetup.exe** – This file is used to install **WebBase**. After it is executed, all of the necessary program files are generated. These files are described later in this section.

- **readme.txt** – This file describes the contents of this directory, as well as providing some general installation instructions.

- **docs\ --** This subdirectory contains documentation for both **WebBase** and **WebberActive**.

- **docs\webbase\ --** This subdirectory contains the documentation for **WebBase**. The associated readme.txt files describe each of the files in this directory as well as any subdirectories. A copy of this manual is included in this directory in Word 7.0 format. If you do not have Word, you can view this document using the Word Viewer program that is provided on the CD or is available as freeware from Microsoft's web site.

- **MSIE\ --** This subdirectory contains Microsoft Internet Explorer used with WebberActive. The files in this directory are not required to install or use **WebBase**.

- **ODBC\ --** This subdirectory contains the ODBC driver packs for the different operating systems supported by **WebBase**. ODBC driver installation is covered later in this chapter.

- **OFIP\ --** This subdirectory contains files used by the ExperForms add-on product to **WebBase**. The files in this directory are not required to install or use **WebBase**.

- **WebberA\ --** This subdirectory contains the installation files for the **WebberActive** HTML editor provided with **WebBase**.

WebBase Files on the Web

The installation, documentation and ODBC driver files are also available as downloads from the **WebBase** web site at:

```
http://www.expertelligence.com/WebBase/
```

Follow the links to the download, documentation or ODBC page and download the appropriate files. It is recommended that users frequently check the web pages for information on new features, new versions of **WebBase** or new add-on products.

WebBase Files Generated during Installation

After WBSetup.exe has been executed, the following files will be generated in the default **WebBase** directory.

- **V32BAS20.dll, V32THK20.dll, V32U202.dll, V32VM20.dll** – DLLs required by **WebBase**.
- **V32VM20.exe** – the 'Virtual Machine' code used by WebBase.exe.
- **WebBase.exe** – the **WebBase** executable application.
- **WebBase.ico** – the **WebBase** icon
- **WebBase.bmp** – the **WebBase** splash screen
- **WebBase.bat** – a batch file used to start **WebBase** on Windows NT 4.0 systems only.
- **License.wri** – the Software License Agreement for using **WebBase**
- **Install.log** – the results of the installation. This file must be maintained for use by the **WebBase** uninstall utility.
- **WebSvStart.bat** – a batch file used to start WebBase as a service under Windows NT. This file is only created on Windows-NT systems.
- **WebSvStop.bat** – a batch file used to stop WebBase as a service under Windows NT. This file is only created on Windows-NT systems.
- **WebSvDel.bat** – a batch file used to remove WebBase as a service under Windows NT. This file is only created on Windows-NT systems.
- **\Logs --** the subdirectory to contain log files. This entry is specified during installation and is optional.

During the installation process, you will be prompted for the name of the directory that **WebBase** will look at for forms, including the **WebBase WebWizard** forms. The default value for this directory is **HTTP** at the top level. The WBSetup.exe installation will place the following in this **HTTP** directory:

- **\WbWizard** – this subdirectory contains the **WebBase WebWizard**, which provides tools and utilities to help users learn about **WebBase** and speed up their forms development. The **WebBase WebWizard** features are described in a separate document.

3.3 Standard WebBase Installation

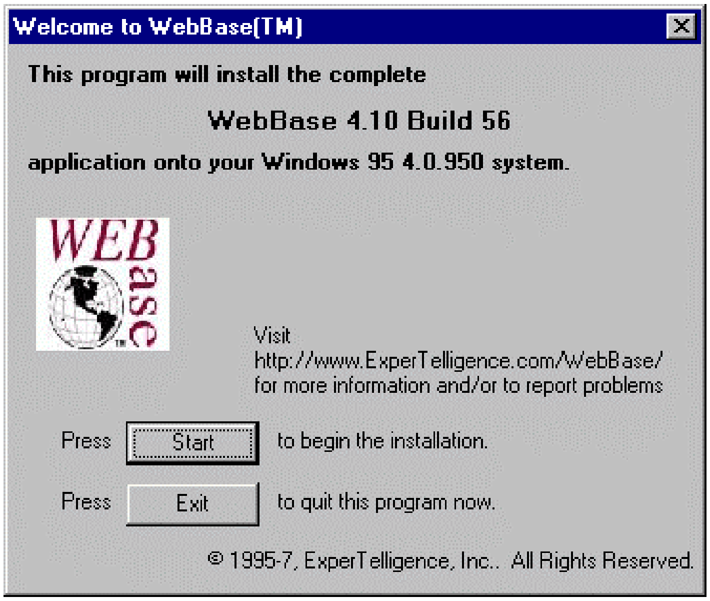
The WBSetup.exe installation program is designed to install all components of the **WebBase** application -- ideal for an initial installation -- or only those components you select during the process. This section describes the standard initial installation of **WebBase**.

It is recommended that you install **WebBase** into a 'WebBase' directory at the top level on your system's hard drive. This is the default assumed by the **WBSetup.exe installation program and this** documentation. If you choose to place the **WebBase** application into a different directory, please take this into account when reading the following.

The WBSetup.exe program will step you through the **WebBase** installation process with a series of dialogs requesting necessary information from you, providing you with suitable defaults for most installations, and providing Help facilities throughout the process should questions arise. At any stage of the installation process you can 'Abort' the installation -- the installer will remove any **WebBase** and/or temporary installer files it has already installed.

To start the installation of **WebBase**, double-click on the WBSetup.exe file. The screen shown in Fig. 3.1 identifies the current **WebBase** version and build numbers. A build number is simply a minor revision number. New builds are generated frequently and made available for download via the **WebBase** web site. The build distributed on the CD or currently available on the **WebBase** web site may not match the build number described in these instructions. Note that the installation process detects the type of computer system you are using and will occasionally display this information on the screens, as in the example below. The displays in this chapter were taken from a Windows-95 system.

Figure 3.1 Installation - Initial Screen



Welcome to WebBase(TM)

This program will install the complete

WebBase 4.10 Build 56

application onto your Windows 95 4.0.950 system.

Visit
http://www.ExperTelligence.com/WebBase/
for more information and/or to report problems

Press Start to begin the installation.

Press Exit to quit this program now.

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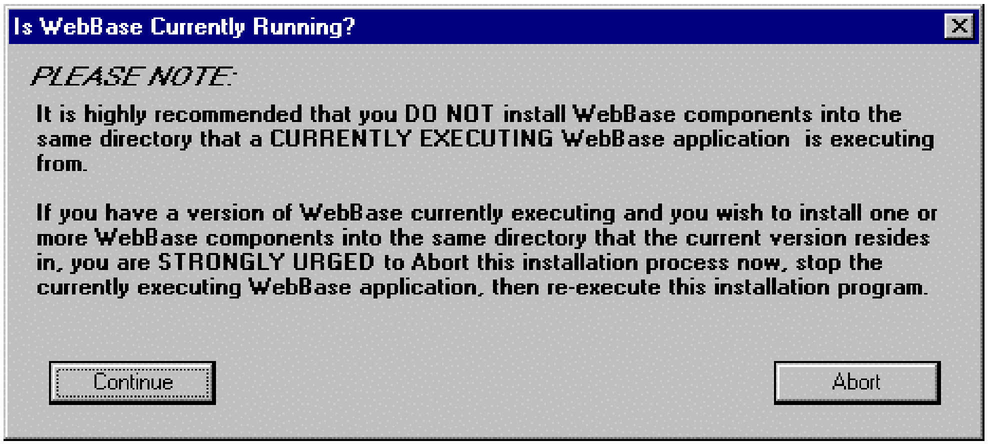
After pressing the 'Start' button, a warning screen is displayed as shown in Fig. 3.2. In an initial installation of **WebBase**, this screen can be ignored. Select the 'Continue' button to proceed with the installation.

Figure 3.2 WebBase Running Warning



Is WebBase Currently Running?

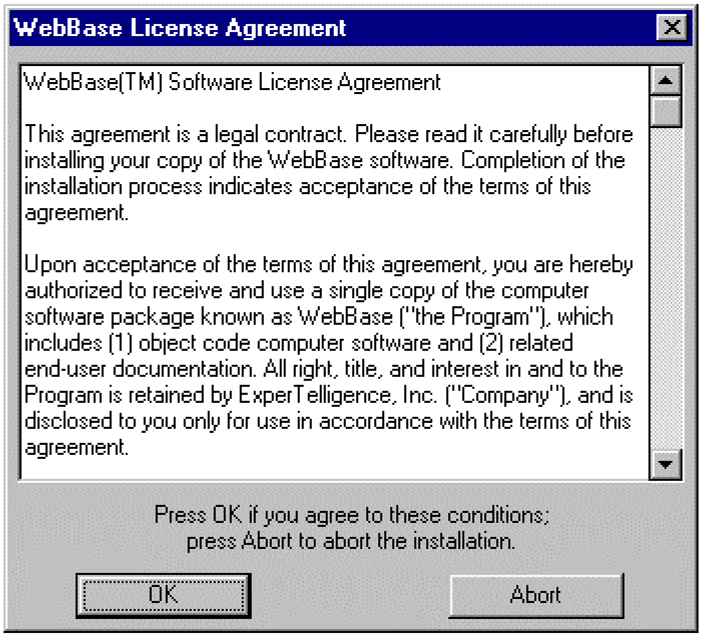
PLEASE NOTE:

It is highly recommended that you DO NOT install WebBase components into the same directory that a CURRENTLY EXECUTING WebBase application is executing from.

If you have a version of WebBase currently executing and you wish to install one or more WebBase components into the same directory that the current version resides in, you are STRONGLY URGED to Abort this installation process now, stop the currently executing WebBase application, then re-execute this installation program.

Before WebBase can be installed onto your system, you need to read the WebBase License Agreement. A copy of this agreement is found in Appendix A in this manual. This agreement is also in the License.wri file placed into the directory containing the WebBase application.

Figure 3.3 WebBase License Agreement



WebBase License Agreement

WebBase(TM) Software License Agreement

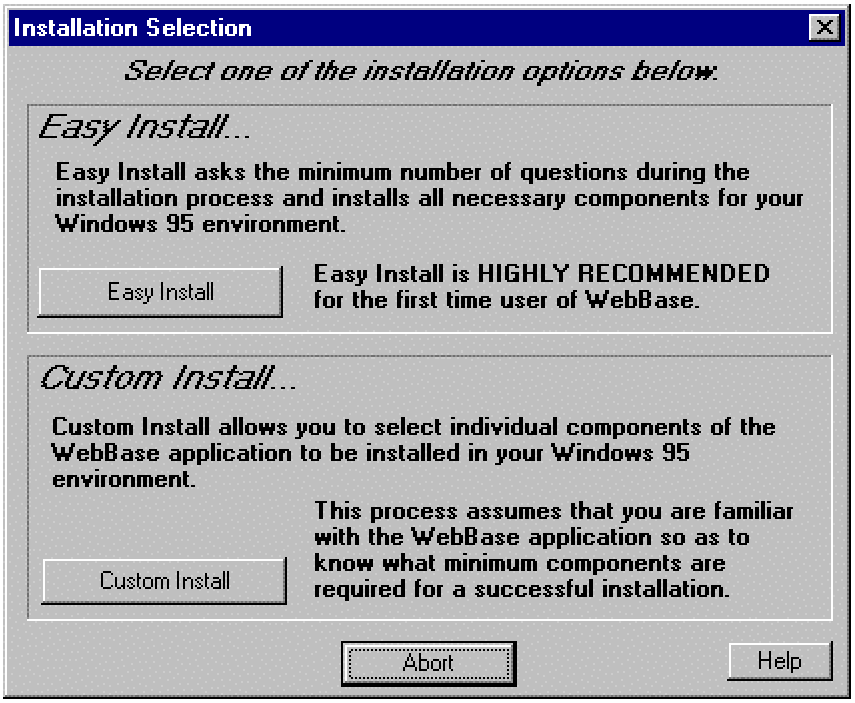
This agreement is a legal contract. Please read it carefully before installing your copy of the WebBase software. Completion of the installation process indicates acceptance of the terms of this agreement.

Upon acceptance of the terms of this agreement, you are hereby authorized to receive and use a single copy of the computer software package known as WebBase ("the Program"), which includes (1) object code computer software and (2) related end-user documentation. All right, title, and interest in and to the Program is retained by ExperTelligence, Inc. ("Company"), and is disclosed to you only for use in accordance with the terms of this agreement.

Press OK if you agree to these conditions;
press Abort to abort the installation.

As noted above, the WBSetup.exe program allows either a standard or ‘easy’ installation, and a custom installation. The dialog shown in Fig. 3.4 allows the user to identify which type of installation should be done. The ‘Easy Install’ will install all appropriate files for the given operating system as well as the **WebBase WebWizard**. The ‘Custom Install’ gives you the ability to select individual components to install as well as optionally installing the **WebBase WebWizard**. The Custom Installation is described later in this chapter.

Figure 3.4 Installation Option Dialog



Installation Selection

Select one of the installation options below:

Easy Install...

Easy Install asks the minimum number of questions during the installation process and installs all necessary components for your Windows 95 environment.

Easy Install is HIGHLY RECOMMENDED for the first time user of WebBase.

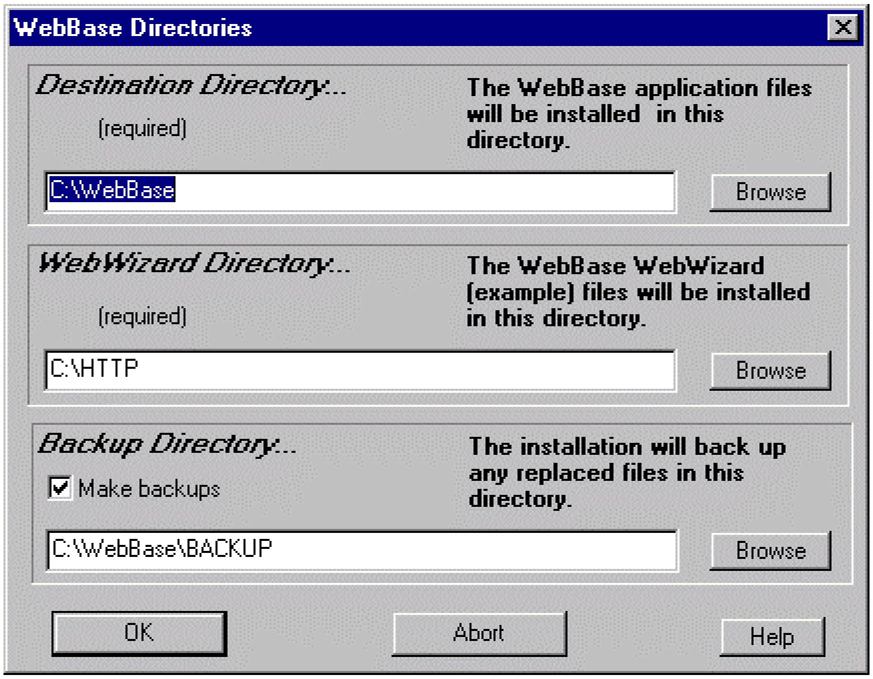
Custom Install...

Custom Install allows you to select individual components of the WebBase application to be installed in your Windows 95 environment.

This process assumes that you are familiar with the WebBase application so as to know what minimum components are required for a successful installation.

You are then asked to specify where the software is to be installed on the WebBase Directories Dialog shown in Fig. 3.5. The recommended defaults are displayed and you have the ability to use the ‘Browse’ button to locate and specify an appropriate directory if the default is not suitable.

Figure 3.5 WebBase Directories Dialog



WebBase Directories

Destination Directory...

(required)

The WebBase application files will be installed in this directory.

C:\WebBase

WebWizard Directory...

(required)

The WebBase WebWizard (example) files will be installed in this directory.

C:\HTTP

Backup Directory...

☑ Make backups

The installation will back up any replaced files in this directory.

C:\WebBase\BACKUP

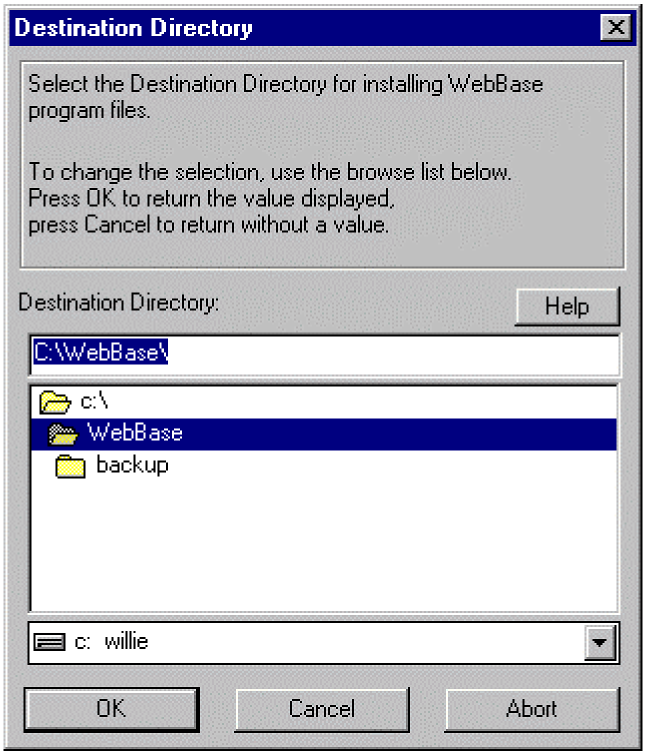
The ‘Destination Directory’ is where all the **WebBase** application files will be stored. This includes the executable programs, virtual machine components, and any utility files. It is recommended that this be a top-level directory[3]. All **WebBase** program components must be placed into the same directory for the application to execute successfully.

The ‘WebWizard Directory’ specifies where the subdirectory containing the **WebBase WebWizard** forms will be placed. This is generally the same directory where all forms are placed for access by browsers. It is possible to place the **WebBase WebWizard** forms into another subdirectory under the root forms directory.

If ‘Make Backups’ is checked, the identified directory is used to back up files that would otherwise be overwritten during the installation process. In an initial installation of **WebBase**, it is not necessary to make backups as there are no files to back up.

Figure 3.6 shows an example of the dialog invoked by the "Browse" button.

Figure 3.6 Example ‘Browse’ Dialog



Destination Directory

Select the Destination Directory for installing WebBase program files.

To change the selection, use the browse list below.
Press OK to return the value displayed,
press Cancel to return without a value.

Destination Directory: C:\WebBase\

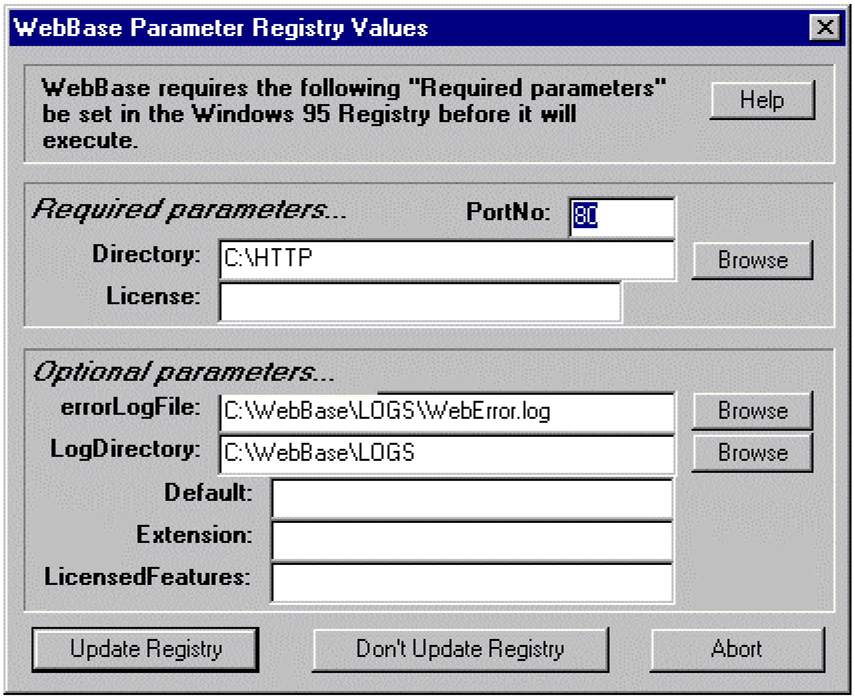
The drive selector at the bottom of the dialog and the directory listing in the center can be used to select an existing directory as the desired selection -- or you can type a directory into the text editor field above the directory list area. Clicking the ‘OK’ button returns the value in the text edit field while clicking on the ‘Cancel’ button returns no value and therefore leaves the calling dialog's field unchanged.

[3] Due to potential problems in some Windows-95 environments, this directory must be at the top level for the application to execute under Windows-95.

Parameter Definition

After the directory information has been entered, the **WebBase** initialization parameters must be defined and stored into the System Registry[4]. Figure 3.7 shows the dialog that prompts for these parameters and updates the Registry appropriately.

Figure 3.7 WebBase Parameter Registry Values Dialog



WebBase Parameter Registry Values

WebBase requires the following "Required parameters" be set in the Windows 95 Registry before it will execute.

Required parameters...

PortNo: 80

Directory: C:\HTTP

License:

Optional parameters...

errorLogFile: C:\WebBase\LOGS\WebError.log

LogDirectory: C:\WebBase\LOGS

Default:

Extension:

LicensedFeatures:

The **PortNo** parameter specifies which port **WebBase** will use to communicate with a browser. The default value is set to 80. If you have another Web Server installed and running on your system, you need to ensure that both **WebBase** and the other web server(s) have unique port numbers.

The **Directory** parameter specifies where in your local directory structure browsers can access forms via **WebBase**. This directory location corresponds to a browser referencing 'http://host-address/'. Placing a 'default.htf' or 'default.htm' file in this directory will cause **WebBase** to return that form if a browser references 'http://host-address/'. If you already have a Web Server running on your system, you may choose the same directory that server uses to be your WebBase Directory. It is strongly recommended you not use the 'Destination Directory' into which you installed your **WebBase** application files as this makes all these files potentially available to browsers accessing your system with **WebBase**.

The **License** parameter specifies the value of your license number. This parameter is required and must be entered here. If you do not have a license number, contact sale@expertelligence.com.

[4] Appendix B describes parameter specification for 16-bit systems.

The **errorLogFile** parameter specifies the name of a file that **WebBase** can create and write error messages into. These messages can be helpful in diagnosing problems you might encounter while **WebBase** executes. The file need not exist at this time, but the directory specified must exist before executing **WebBase** so the file can be created as specified. By default, the error log file is stored in the directory containing the **WebBase** log files.

The **LogDirectory** parameter specifies where in your local directory structure **WebBase** can write log files. **WebBase** creates a log file each day and records the requests it processes. These files are written into the directory you specify here. These log files can be used with web site analysis tools to acquire information about number of hits, location of requests, etc. Details on logging are presented in Chapter 12. You can specify this Log Directory and still disable logging via the **WebBase** Options menu if so desired. You cannot enable logging, however, if you have not specified a Log Directory here.

The **Default** parameter specifies the name of a file you wish to have displayed when a browser references your Directory without specifying a file pathname. Multiple defaults can be specified by entering filenames separated by a comma as in 'default.htf,default.htm'. When multiple entries are provided, **WebBase** will look for the files in the order entered. This is an optional parameter. If absent, 'default.htf,default.htm' is assumed. If you enter an empty string then no default file will be searched for.

The **Extension** parameter specifies the name of a file extension you wish **WebBase** to append to a filename a browser supplies that does not explicitly supply the extension. Multiple extensions can be specified by entering them separated by a comma as in 'htf,htm'. When multiple entries are provided, **WebBase** will look for files with the specified extension appended in the order entered. This is an optional Parameter. If absent, 'htf,htm' is assumed.

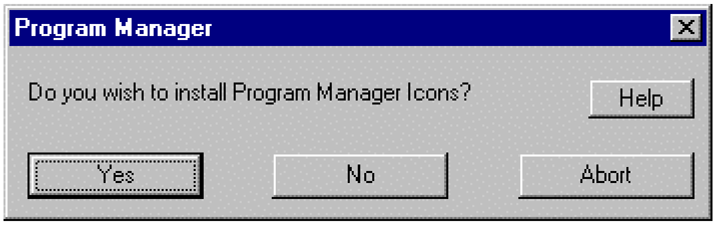
The **LicensedFeatures** parameter is an additional license number that enables **WebBase** add-on products. If you have purchased **WebBase** along with one or more add-on products (e.g., ExperForms), then you will also need to enter your LicensedFeatures number. If not specified, the add-on features will not be enabled.

At the bottom of the window is a button labeled 'Don't Update Registry'. This button should be selected only during an upgrade if you do not want your existing registry parameters modified. It is strongly recommended that the user allow the installation process to update the registry parameters during a new installation.

Completing the Installation

After the **WebBase** parameters are defined, the installation process continues by asking whether program manager icons should be created. Creating icons will allow you to conveniently execute these programs. In addition, the installation process will create an 'Uninstall' icon in the Program Manager Group you select to allow you to conveniently remove all the components installed during this process, should that be necessary in the future.

Figure 3.8 Program Manager Icon Creation

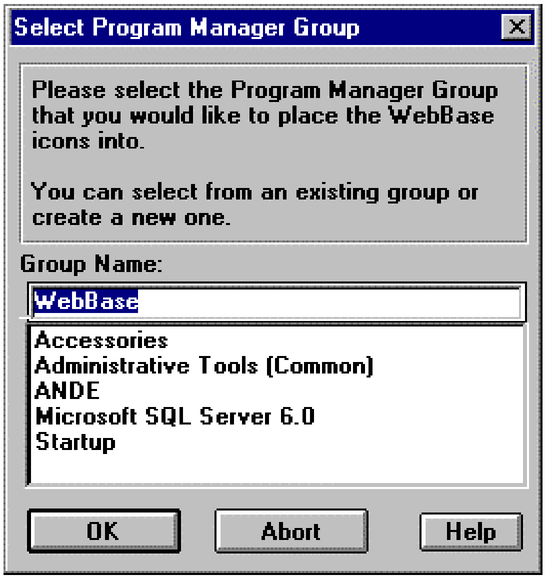


Program Manager

Do you wish to install Program Manager Icons?

If you select to have Program Manager Icons created, Fig. 3.9 shows the dialog on which can specify the desired name of the Program Manager Group in which the icon(s) will be created.

Figure 3.9 Program Manager Group Name



Please select the Program Manager Group that you would like to place the WebBase icons into.

You can select from an existing group or create a new one.

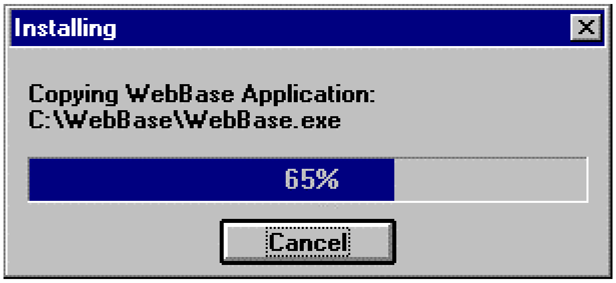
Group Name: WebBase

Following the specification of directories, components, **WebBase** parameters, and Program Manager information, the appropriate directories will be created as necessary and appropriate files for the given operating system and above selections will be installed onto the target computer. All parameters are entered into the System Registry in[5]:

```
HTTP_LOCAL_MACHINE/SOFTWARE/ExperTelligence, Inc./WebBase/4.10/
```

During this process, the progress bar shown in Fig. 3.10 is updated to show the files currently being installed and how much installation work remains to be completed.

Figure 3.10 Installation Progress Bar



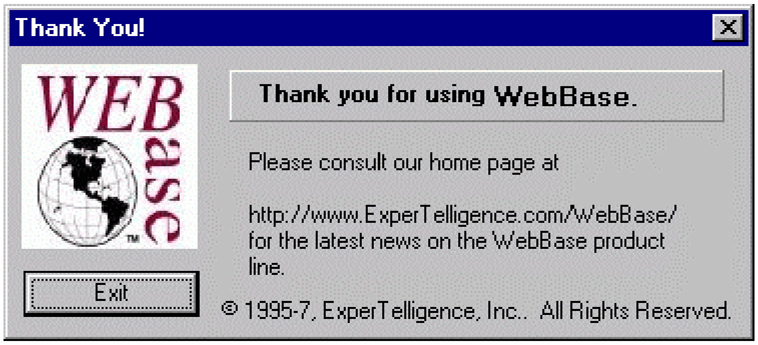
Copying WebBase Application:
C:\WebBase\WebBase.exe

If you selected to have Program Manager Icons installed, you will see a window created with the icons displayed within it. The installation window is then displayed over the program

[5] Prior to build 56, all WebBase entries in the System Registry were in HTTP_LOCAL_MACHINE/System/CurrentControlSet/ Services/HttpSQL. Effective with build 56, only the NT service parameters are located in this key. For users upgrading to build 56 or later from build 55 or earlier, the first time that WebBase is started, all information within the “old” WebBase location is copied to the “new” location. The information in the “old” location is not deleted; this action is left to each WebBase user.

manager window, and Fig. 3.11 shows the window indicating that the installation of **WebBase** was completed successfully.

Figure 3.11 Successful Installation Display



Thank you for using WebBase.

Please consult our home page at

http://www.ExperTelligence.com/WebBase/
for the latest news on the WebBase product line.

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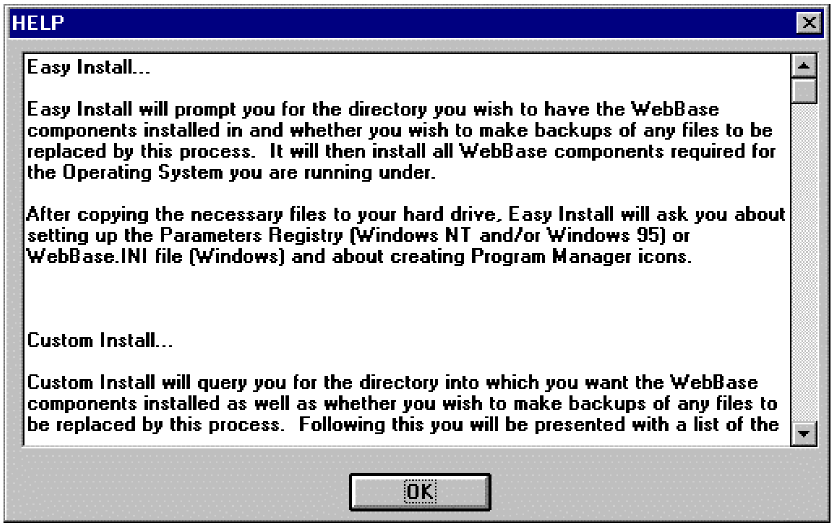
Many of the dialogs in the installation sequence have a 'Help' button on them. The following is an example of what one of the Help screens looks like. Each Help screen is tailored to the particular dialog that invoked it and contains information that we hope is helpful in your understanding of the dialog within the installation process.

Figure 3.12 Example Installation Help Window



Easy Install...

Easy Install will prompt you for the directory you wish to have the WebBase components installed in and whether you wish to make backups of any files to be replaced by this process. It will then install all WebBase components required for the Operating System you are running under.

After copying the necessary files to your hard drive, Easy Install will ask you about setting up the Parameters Registry (Windows NT and/or Windows 95) or WebBase.INI file (Windows) and about creating Program Manager icons.

Custom Install...

Custom Install will query you for the directory into which you want the WebBase components installed as well as whether you wish to make backups of any files to be replaced by this process. Following this you will be presented with a list of the

3.4 Custom WebBase Installation

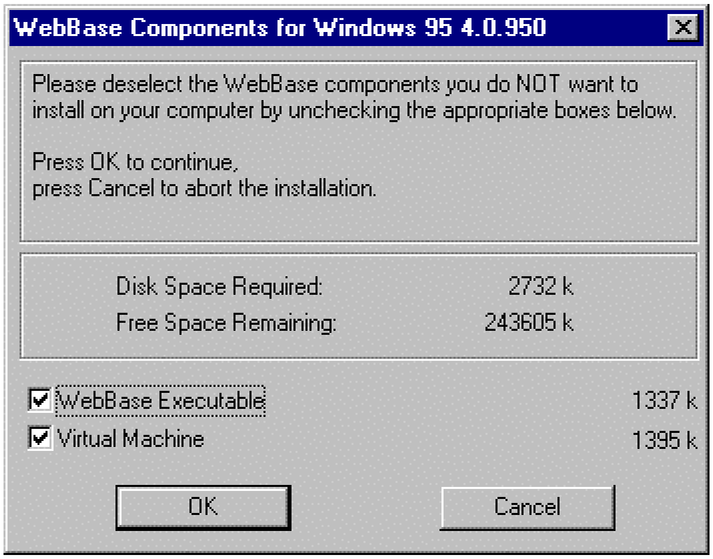
When initially installing **WebBase**, it is strongly recommended that you follow the standard **WebBase** installation described in the preceding section. After you have become familiar with the **WebBase** application and its components, you may want to perform a custom installation in which only selected individual components are installed. This section covers how to do a custom **WebBase** installation.

As in the standard **WebBase** installation, it is recommended that you install **WebBase** into a 'WebBase' directory at the top level on your system's hard drive. Once the installation is complete, make sure to install ODBC so that **WebBase** can communication with your database(s).

To start the custom installation of **WebBase**, double-click on the WBSetup.exe file. When you get to the 'Installation Selection' screen, select the 'Custom Install' button. You will be prompted to enter the directory information for the 'Destination Directory', 'WebWizard Directory' and 'Backup Directory' as described for the standard installation.

After the directory information is entered, the dialog shown in Fig. 3.13 is displayed. Note that by default all components are selected for installation. On Windows-NT systems only, there is an additional checkbox for 'Windows NT Service Support'. This option allows the utilities used to start and stop WebBase as a service to be installed.

Figure 3.13 Custom Installation Component Selection Dialog



WebBase Components for Windows 95 4.0.950

Please deselect the WebBase components you do NOT want to install on your computer by unchecking the appropriate boxes below.

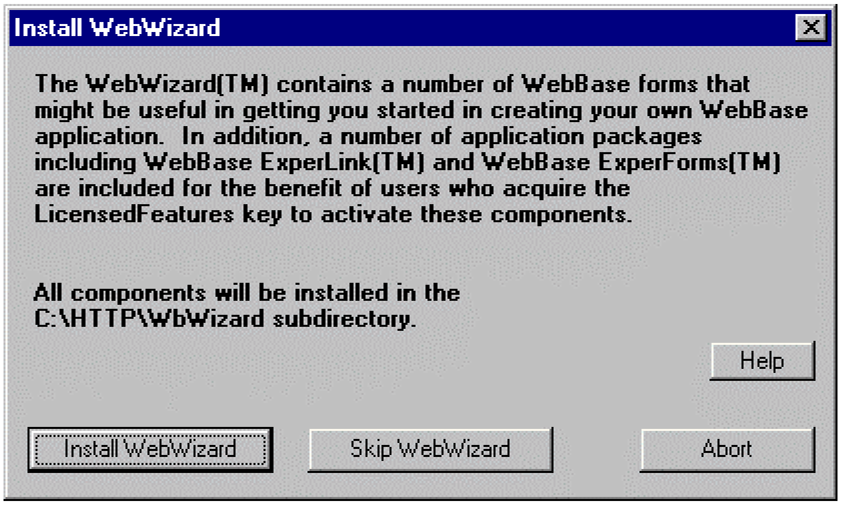
Press OK to continue,
press Cancel to abort the installation.

Disk Space Required:	2732 k
Free Space Remaining:	243605 k

☑ WebBase Executable	1337 k
☑ Virtual Machine	1395 k

In addition to allowing you to select specific program components, the custom installation also gives you the option of whether the **WebBase WebWizard** should be installed. The dialog shown in Fig. 3.14 gives you the option of whether they should be installed.

Figure 3.14 Custom Install WebWizard Option



Install WebWizard

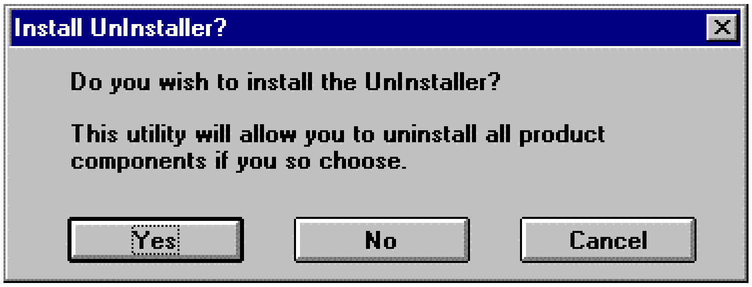
The WebWizard(TM) contains a number of WebBase forms that might be useful in getting you started in creating your own WebBase application. In addition, a number of application packages including WebBase ExperLink(TM) and WebBase ExperForms(TM) are included for the benefit of users who acquire the LicensedFeatures key to activate these components.

All components will be installed in the C:\HTTP\WbWizard subdirectory.

All the **WebBase WebWizard** forms and files are installed in the 'WbWizard' subdirectory within the directory specified as the **Directory** parameter. Details on the **WebBase WebWizard** tools and utilities can be found in the WebBase WebWizard User's Manual.

Another option provided within the custom installation is whether the 'Uninstall' option will be installed, as shown on the dialog below. This utility can be used to uninstall all of the **WebBase** product components.

Figure 3.15 Custom Installation UnInstaller Option



Install UnInstaller?

Do you wish to install the UnInstaller?

This utility will allow you to uninstall all product components if you so choose.

The remainder of the custom installation is the same as described above starting with the definition of the **WebBase** parameters.

3.5 Updating WebBase

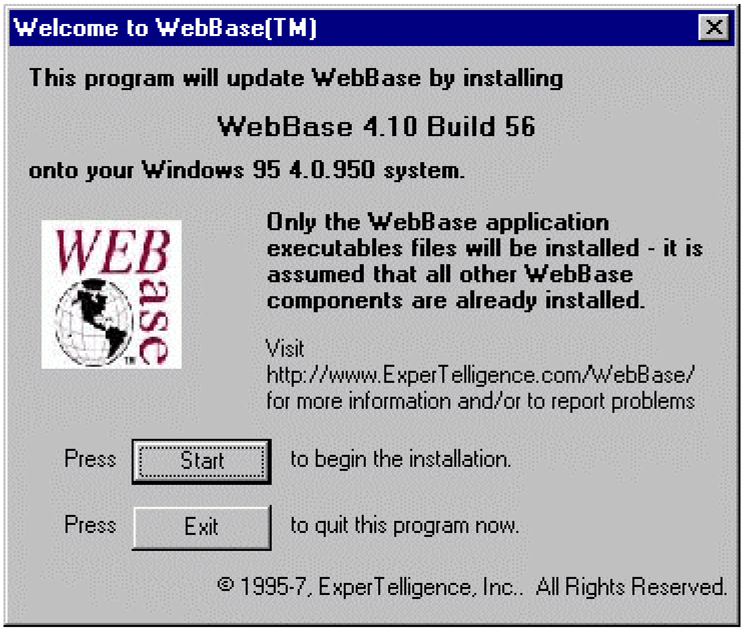
From time to time, updated minor releases of **WebBase** will be made available on the **WebBase** Web site. A build number identifies these releases. For example, the release occurring after build 56 will be build 57. The version number identifies major releases, and may require a full re-installation of **WebBase**.

To upgrade your version of **WebBase**, download the WBUpdate.exe file from the **WebBase** Web site. This file will install the set of application files that contains any improvements to **WebBase**. The WBUpdate.exe file is provided as a smaller file that reduces the amount of time required for downloading. However, it does just update the WebBase application, and not any of the associated applications. If changes have been made to any of the tools and utilities provided within the **WebBase WebWizard**, a full installation must be performed in order to install these updated forms.

To start the upgrade process, double-click on the WBUpdate.exe program. As in the initial installation of **WebBase**, the installation process includes a series of dialogs requesting necessary information from you, providing you with suitable defaults for most installations, and providing Help facilities throughout the process should questions arise. At any stage of the update process you can 'Abort' the update -- the installer will remove any **WebBase** and/or temporary installer files it has already installed leaving only the WBUpdate.exe file that you downloaded.

The **WebBase** update installation starts with a welcome screen very similar to that used in the standard installation, as shown in Fig. 3.16 below.

Figure 3.16 WebBase Upgrade Installation Screen



Welcome to WebBase(TM)

This program will update WebBase by installing

WebBase 4.10 Build 56

onto your Windows 95 4.0.950 system.

Only the WebBase application executables files will be installed - it is assumed that all other WebBase components are already installed.

Visit http://www.ExperTelligence.com/WebBase/ for more information and/or to report problems

Press [Start] to begin the installation.

Press [Exit] to quit this program now.

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Unlike in an initial installation of **WebBase**, it is important to understand the impact of the update installation on any currently executing version of **WebBase**. The warning screen that is displayed right after the welcome dialog (Fig. 3.2) reminds the user of these ramifications. If you are currently running **WebBase**, it is strongly recommended that you stop the currently executing **WebBase** application, perform the update installation, and then restart **WebBase**.

After the warning message and license agreement are displayed, you are given the option of specifying where the updated **WebBase** files should be placed. This dialog is very similar to the WebBase Directory dialog described as part of the initial installation except that the WebBase Directory is not specified. Default values are displayed. If the ‘Destination Directory’ entered is different than that currently used, the updated WebBase application files will be copied to the location but an error message will then be displayed indicating that one or more files required by WebBase cannot be located. If ‘Make Backups’ is checked, the corresponding directory is used to backup files that would otherwise be overwritten during the installation process.

After this directory information is entered, the updated files are copied to the appropriate directories and the update is complete.

3.6 Testing the WebBase Installation

After completing the above installation steps you are ready to test the new or updated **WebBase** application. Before you test an initial installation of **WebBase**, an excellent way to ensure you have all the necessary TCP/IP communications configuration in place is to install a copy of a browser such as Netscape or MSIE. You will need some form of Web browser to test your **WebBase** applications, and **WebBase** requires the same communications support as does a Netscape or MSIE browser. Being able to install and use a browser can help eliminate some possible problems with installing **WebBase**.

Start the **WebBase** application using the icon created during installation or using the 'Start->Program->WebBase' option[6]. A **WebBase** splash screen is initially displayed. If any of the **WebBase** required parameters were not entered during installation, then **WebBase** will shut down. The PortNo, Directory and License parameters must be entered either during installation or directly into the System Registry prior to being able to run **WebBase**.

If **WebBase** is started successfully, two windows will be displayed. The first window is titled '**Late breaking news from ExperTelligence'**. The second window that is displayed is the WebBase Server window. Both windows are described in detail in Chapter 5. If the second window is empty or does not open, review the information in the following section on installation problems. If the window does open, your **WebBase** application is up and running. You should continue to verify that the **WebBase** installation is correct by following the instructions in the section below on testing communications.

Error messages may also be displayed in the Late Breaking News window. These error messages may relate to attempting to access the server at ExperTelligence for news to display, or they may relate to a configuration problem on your system. Be sure to review this window for any possible error messages.

To quit **WebBase**, use the Exit command in the WebServer menu of the WebBase Server window. You will be prompted to confirm that you want to exit **WebBase**. If so confirmed, **WebBase** will terminate. The 'Late Breaking News' window will automatically be closed when you quit **WebBase**.

Possible Installation Problems

Many errors caused by improper installation will cause an error message to be generated and written to the file specified in the **errorLogFile** parameter and also echoed in the 'Late Breaking News' window as shown below.

```
" Starting WebBase 4.10 Build 56 Server..."
"ERROR: '<error message text>'"
"SERVER DID NOT START SUCCESSFULLY."
```

It is very important that you review the information presented in your 'Late Breaking News' window to diagnose any installation problems that may have occurred. Below are some possible installation problems. If you have a problem testing your **WebBase** installation, check the following list of symptoms to see if you can identify and correct the problem.

- **Symptom**: The launch executes as described above, but no WebBase Server window appears. The 'Late Breaking News' window and error log file specified in the **errorLogFile** parameter will typically have an entry of the form: "Error: 'Missing <xxxx> WebBase parameter(s).".
  Possible Solution*:* The indicated <xxxx> WebBase parameter entry is missing. Review the information in Chapter 4 about required **WebBase** parameters. Remember that parameter names are case sensitive.
- **Symptom**: The launch executes as described above, but the WebBase Server window is missing the 'Using port: ##' line and you are immediately presented with the dialog to exit

[6] You can also start WebBase by running the WebBase.exe file. However, this is not the recommended approach. On Windows NT 4.0 systems, the file WebBase.bat is used to start WebBase. Attempting to start WebBase by double clicking on or executing the program WebBase.exe will result in errors. It is strongly recommended that the WebBase icon be used to start the program as this icon references the appropriate file based on operating system type.

WebBase as shown in Fig. 5.10. The error log file will have an entry of the form: "Error 10048 WSAEADDRINUSE -- The specified address is already in use".
Possible Solution1: WebBase has determined that the port that it is attempting to communicate on, the PortNo parameter, is already in use. Assign a different, unique port number to **WebBase** and attempt to launch the application again.
Possible Solution2: If you did not explicitly quit the application with the Exit command or by closing the WebServer window, check the file specified in the **errorLogFile** parameter for a message that may indicate why the application shut down. There may be a copy of **WebBase** already up and running in your environment. Check the task list for V32VM20.exe and, if found, kill this task before trying to launch **WebBase** again.

- **Symptom**: As soon as **WebBase** is launched, it quits with an entry of the form: "Error 11003 WSANO_RECOVERY - No recoverable errors, FORMERR, REFUSED, NOTIMP
  Possible Solution: There is a problem with the TCP/IP or name service communications software. This problem is generally only seen on 16-bit systems and is due to a TCP/IP package that is not compatible with **WebBase**. The 32-bit systems supported by **WebBase** include TCP/IP as part of the default operating system, and they do not report this problem.

Testing WebBase Communications

Now that **WebBase** is running, you can check that it is communicating as a Web Server using one of the built-in commands. This can be done before you set up any database interfaces or begin designing any .htf files. An easy built-in command to use is *dateTime*. Additional built-in commands are described in the following section. From a browser, access **WebBase** by entering the following URL:

```
http://<your-host-address>:<your-port-number>/dateTime
```

where:

- **<your-host-url>** is the IP address of the **WebBase** server machine. You may also use 127.0.0.1 as the address that points to your local system. If you have set up the **hosts** file on your system to assign the name ‘localhost’ to the ‘127.0.0.1’ IP address, you may also substitute ‘localhost’ as the address.

- **<your-port-number>** is the port number you defined as your PortNo parameter.

- **dateTime** is the built-in **WebBase** command.

The **dateTime** query will return your server's current date and time in local format:

```
Date: Tue, 06 May 1997 09:07:12 PDT
```

If all appears as described here, your **WebBase** application is working! At this point, it is strongly recommended that you visit the **WebBase WebWizard** to find out about all the features of **WebBase**. You’ll also need to review the information presented later in this chapter about ODBC driver installation.

Built-in Commands

WebBase includes a number of built-in commands that can be sent from a browser. These commands are listed on the WebServer window that is displayed within **WebBase**. These commands are useful for determining whether **WebBase** is working after an installation.

The built-in commands are almost equivalent to simple .htf files. For example, one of the built-in commands is **dateTime** that displays the current date and time. It would be very trivial to create a .htf file that performed the same function. However, if a .htf file has been created with the same name as a built-in command, the .htf file will take precedence over the built-in command. If a user had created the file *dateTime.htf* and it was stored in the top-level forms directory, the file and not the built-in command would be invoked if the user issued a URL of the form:

```
http://127.0.0.1:80/dateTime
```

The following are the **WebBase** built-in commands and an example of what they display.

- **build** -- e.g., WebBase 4.10 build 56
  displays the current **WebBase** version and build number in bold

- **buildString** -- e.g., WebBase 4.10 build 56
  displays the current **WebBase** version and build number in standard font

- **dateTime** -- e.g., Date: Tue, 06 May 1997 09:07:12 PDT
  displays the current date and time

- **elapsedTime** -- e.g., Elapsed time: 60ms.
  displays the amount of time that has elapsed since processing was begun for this command by the server

- **gmt** -- e.g., Date: Tue, 30 Apr 1996 15:23:43 GMT
  displays the current date and time in GMT format

- **milliseconds** -- e.g., 30259110
  displays the total number of milliseconds since the previous midnight

- **seconds** -- e.g., 30312
  displays the total number of seconds since the previous midnight

- **title** -- e.g., WebBase 4.10
  displays the current **WebBase** version number in bold

- **titleString** -- e.g., WebBase 4.10
  displays the current **WebBase** version number in standard font

3.7 Installing ODBC Drivers

It is not required that you install ODBC when **WebBase** is installed. It is possible to install **WebBase**, get it up and running, and experiment with some of the forms and examples without having ODBC installed. However, before you can access a database, you will have to install ODBC drivers. It is recommended that you follow this installation procedure, even if you already have ODBC drivers installed, to ensure that the latest versions of all necessary ODBC files are available.

ODBC Drivers

The ODBC drivers are used by **WebBase** to communicate with a database application so that database information can be retrieved, updated or deleted using **WebBase** forms. The

WebBase CD and **WebBase** Web site both provide access to ODBC driver packs that include drivers for the Microsoft database applications (e.g., Access, SQL Server). There are many databases other than the Microsoft databases that also have ODBC drivers. These drivers are generally available from the database vendor or another third-party company.

The ODBC driver packs are operating system-dependent, not database application version-dependent. While it is generally possible to run the latest version of a database on an older operating system (e.g., Access 97 on NT 3.51), it is not possible to use the latest ODBC drivers on an older operating system. ODBC database drivers may be installed onto your system as part of a database installation. If you are running a newer database version with an older operating system version, it is critical that you re-install the ODBC drivers for your operating system version after the database installation. The ODBC drivers are not used by the actual database application; they are only used by secondary applications such as **WebBase** which are indirectly accessing the database.

The ODBC drivers on the **WebBase** CD are found in directories that specify the particular operating system (e.g., Win95, NT351). The ODBC driver packs on the **WebBase** web site are also similarly identified.

It cannot be stressed strongly enough that the proper ODBC drivers for the operating system version must be used. The majority of problems that users encounter with ODBC and **WebBase** are the result of an incorrect match between ODBC database driver and operating system version.

Installing the ODBC Drivers

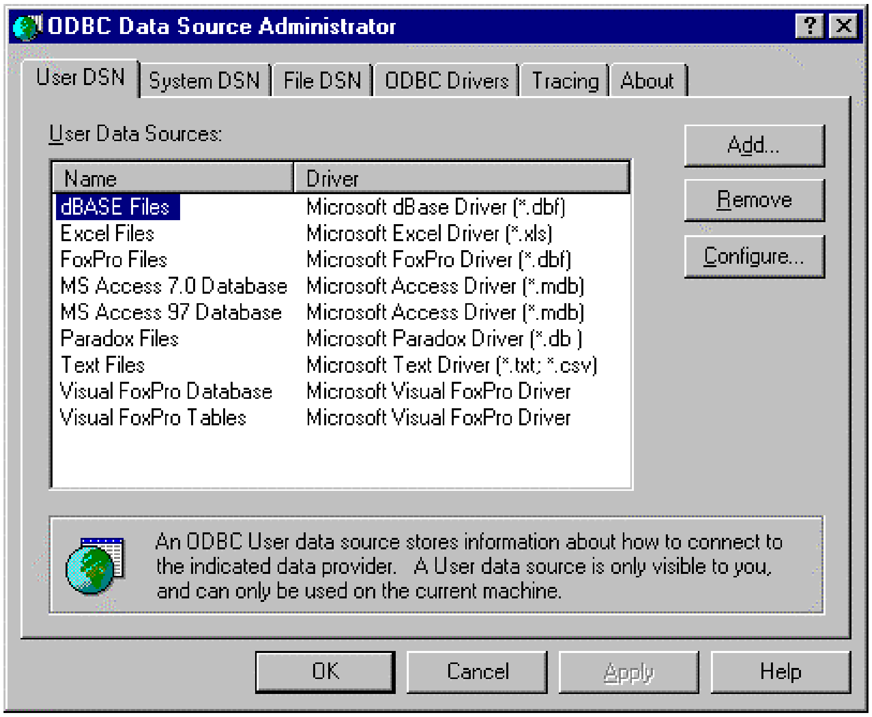
The ODBC driver packs included with **WebBase** include all of the drivers for the standard Microsoft applications. Before installing the ODBC Driver Packs, be sure to read the End User License Agreement distributed with the ODBC Driver packs. This document outlines the terms and conditions under which you may install and use the ODBC drivers. Installation instructions are also provided with each of the ODBC driver packs.

Setting the ODBC Sources

In order for **WebBase** to access a database, an ODBC source for that database must be created. An ODBC source assigns a name and optionally a username and password to a particular database file. This ODBC source name, username and password are then used by **WebBase** to access the database.

Once the ODBC drivers are installed, there will be an ODBC icon or program option that is used to access the ODBC Administrator. For example, on a Windows-95 system, the 32-bit ODBC Administrator is started via the ‘Start->Program’ menu. To set up an ODBC source, start up the ODBC Administrator. A window similar to that shown in Fig. 3.17 is displayed. The different ODBC driver packs available from Microsoft have each presented this information in a slightly different display format. However, the basic concepts described here are applicable to any ODBC source setup. The ODBC Administrator screens displayed in this section are from Microsoft’s ODBC Driver Pack 3.5.

Figure 3.17 **ODBC Administrator Screen**



User Data Sources:

Name	Driver
dBASE Files	Microsoft dBase Driver (*.dbf)
Excel Files	Microsoft Excel Driver (*.xls)
FoxPro Files	Microsoft FoxPro Driver (*.dbf)
MS Access 7.0 Database	Microsoft Access Driver (*.mdb)
MS Access 97 Database	Microsoft Access Driver (*.mdb)
Paradox Files	Microsoft Paradox Driver (*.db)
Text Files	Microsoft Text Driver (*.txt; *.csv)
Visual FoxPro Database	Microsoft Visual FoxPro Driver
Visual FoxPro Tables	Microsoft Visual FoxPro Driver

An ODBC User data source stores information about how to connect to the indicated data provider. A User data source is only visible to you, and can only be used on the current machine.

There are three types of data sources that can be set up:

- User DSN – A user data source is only visible to the specified user and only on the specified machine.

- System DSN – A system data source is visible to all users on the machine, including NT services.

- File DSN – A file data source allows you to connect to a data provider. File DSNs can be shared by users who have the same drivers installed.

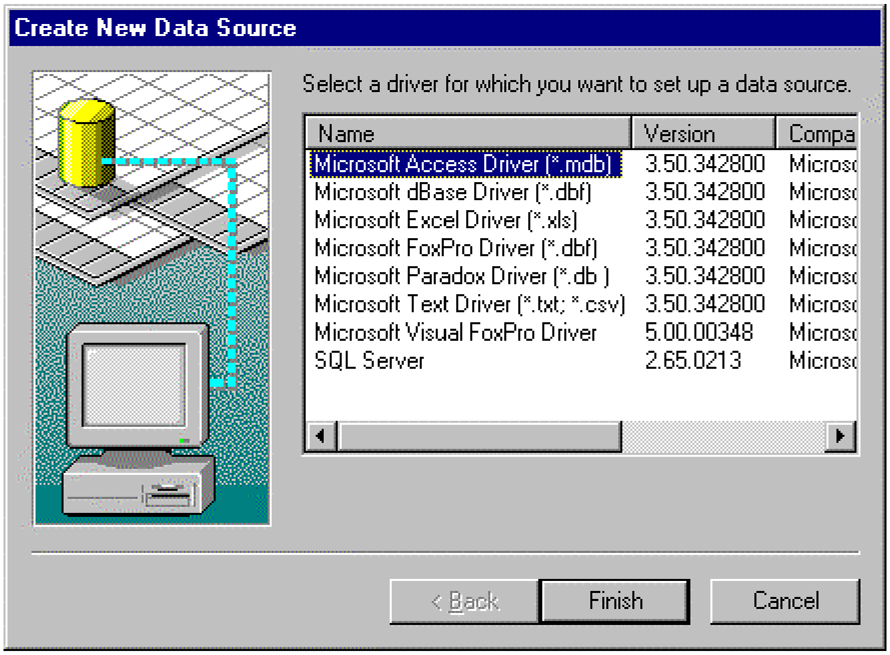
For **WebBase** applications, a System DSN is strongly recommended. If **WebBase** is to be run as a service, then any database must be set up using a System DSN. Even if **WebBase** is not to be run as a service, databases should be set up as System DSNs. If a user DSN is used, then only the user who created the DSN will be able to access the database. If another user starts **WebBase** and attempts to access a database via a .htf form, errors will result since that user will not have access to the initial user's User DSN.

To demonstrate how to create a System DSN, this section will cover the steps necessary to create and configure the source used to access the Cars Microsoft Access database used with the database examples accessed via the **WebBase WebWizard**[7]. To create a new System DSN, press the Add button. Figure 3.18 shows the display presented in which you are prompted to select the ODBC driver to use. Select the appropriate driver and press the

[7] This data source is automatically set up as a System DSN when running the database examples if not previously set up. It is used in this case as an example of how the user will configure their own data sources for their databases.

‘Finish’ button. For this example, the Cars database is an Access database, so the Microsoft Access Driver is selected.

Figure 3.18 ODBC Source Creation – Driver Selection



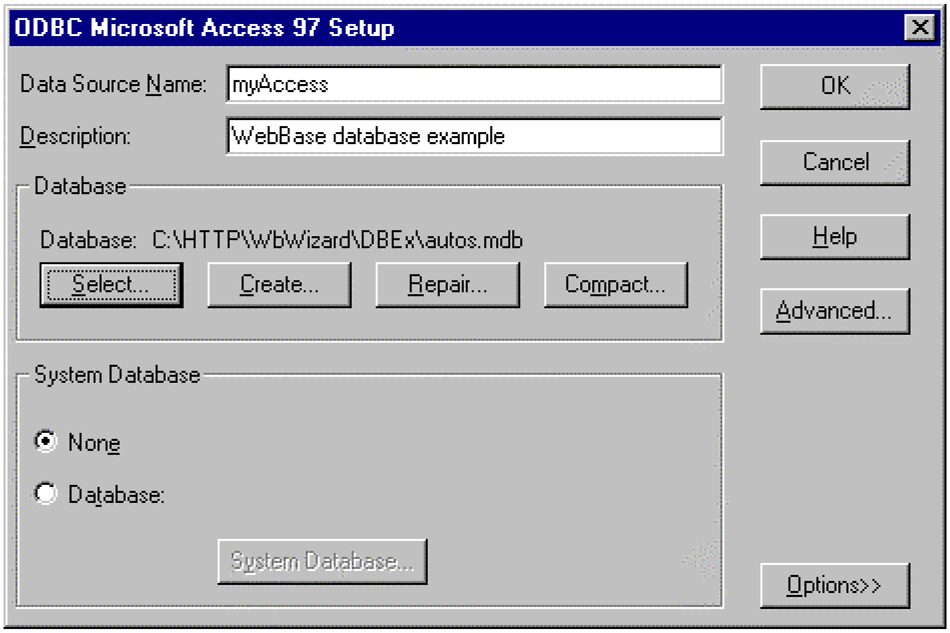
Create New Data Source

Select a driver for which you want to set up a data source.

Name	Version	Compa
Microsoft Access Driver (*.mdb)	3.50.342800	Microsc
Microsoft dBase Driver (*.dbf)	3.50.342800	Microsc
Microsoft Excel Driver (*.xls)	3.50.342800	Microsc
Microsoft FoxPro Driver (*.dbf)	3.50.342800	Microsc
Microsoft Paradox Driver (*.db)	3.50.342800	Microsc
Microsoft Text Driver (*.txt; *.csv)	3.50.342800	Microsc
Microsoft Visual FoxPro Driver	5.00.00348	Microsc
SQL Server	2.65.0213	Microsc

After the database driver is selected, it is necessary to specify the name to be assigned to the source as well as the database file to use. Figure 3.19 shows the screen on which this information is entered.

Figure 3.19 ODBC Source Name Definition



ODBC Microsoft Access 97 Setup

Data Source Name: myAccess

Description: WebBase database example

Database

Database: C:\HTTP\WbWizard\DBEx\autos.mdb

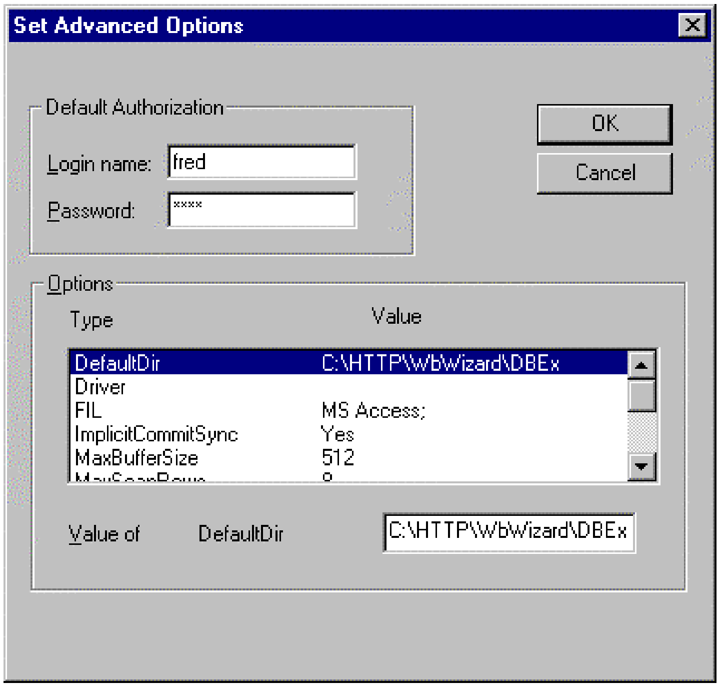
System Database

● None

○ Database:

The data source name used to access the database is required, and is entered on the top line. An optional description can be entered on the line below the database name. Select the database file that will be accessed. The **WebBase** database examples require the data source name to be 'myAccess'; this should be entered on the top line as in the display above. The database to use is Autos.mdb, which is provided as part of the **WebBase** installation. After this information is entered, press the 'Advanced' button to set up the username and password. The window shown below is displayed.

Figure 3.20 ODBC Source Advanced Options



Login name: fred

Password: ****

Type	Value
DefaultDir	C:\HTTP\WbWizard\DBEx
Driver	
FIL	MS Access;
ImplicitCommitSync	Yes
MaxBufferSize	512

Value of DefaultDir C:\HTTP\WbWizard\DBEx

For the **WebBase** database examples, the username should be 'fred' and the password is 'test'. Note that the password is hidden when it is entered. It is also important to remember that the data source name, username and password are case sensitive. When this source name is used within a **WebBase** form, it must be explicitly entered as 'myAccess'. If 'MyAccess' is entered, an error will be returned indicating that this is not a valid source.

After all the information has been entered, close the Advanced Options window and the Setup window. The list of System DSNs is updated to reflect the data source name just entered. A data source must be created for each database that you will be accessing using **WebBase**. These data sources may use the same driver or different drivers, depending on the type of database. Simply follow the above steps and give each database a unique data source name.

3.8 Installing WebBase as a Windows NT Service

On a Windows NT system, it is possible to set up **WebBase** as a service so that it will start automatically when the system is booted without requiring user logon or any other user action. It is strongly recommended that you first install **WebBase** according to the above instructions, and verify that it has been successfully installed and is communicating. Following this process will minimize problems in setting up **WebBase** as a service.

Installation as a Service

During the installation of WebBase under Windows NT, the parameters required to run WebBase as a service are automatically stored into the System Registry under:

```
HKEY_LOCAL_MACHINE/System/CurrentControlSet/Services/HttpSQL
```

The two parameters required to run WebBase as a service are AppDirectory and Application. These are described in Chapter 4. Note that this registry location is different than where all the other WebBase parameters are stored. This is to prevent the loss of WebBase parameters, global variables, extensions, aliases and/or multiple domain information if the user selects to remove WebBase as a service.

Also during installation, WebBase is assigned the service name of 'httpSQL' and is automatically created as a service that must be started manually[8]. If you want to have WebBase start each time your NT system starts up, you must modify the *httpSQL* service via the Services Control Panel. that starts when your NT system starts up. By default, the LocalSystem account is used which does not require a username/password. In addition, the option to 'Allow Service to Interact with Desktop' is also selected. This option will cause WebBase to start and also the WebBase Late Breaking News and WebBase Server windows will be opened. If this option is disabled, the windows will not be opened when WebBase is started.

WebBase as a Service and ODBC Configuration

When **WebBase** is installed as a service, the ODBC data sources must be specified as System DSNs. Start up the ODBC Administrator. Select the 'System DSN' option. Verify that all databases to be accessed using **WebBase** have been set up as System DSNs and not User DSNs.

Starting the Service

By default, WebBase is configured to automatically start when the Windows NT system is started. If it has been stopped or if it has been modified to start manually, WebBase can be started as a service using the file WebSvStart.bat. Simply execute this batch file and WebBase will start.

Stopping the Service

WebBase was not designed explicitly as a service application, and uses a Microsoft utility to run as a service. In order to stop WebBase when it is running as a service, you must use the WebSvStop.bat file that is provided with the WebBase installation. If you stop the *httpSQL* service from the Services Control Panel, only the Microsoft utility used to start WebBase is stopped – WebBase itself is not stopped. To stop WebBase, simply execute WebSvStop.bat and WebBase will properly terminate.

[8] If WebBase does not come up properly as a service and appears to hang, stop it using WebSvStop.bat. Delete the file WebBase.bmp from the directory in which the WebBase.exe program resides. This file is the splash screen displayed when WebBase launches. Under some circumstances, this file can cause WebBase to hang and not respond to communications commands although the Services control panel and task list show it to be running.

If your NT system goes down unexpectedly and auto-reboots, you do not have to stop and restart **WebBase** as a service. You only need to follow the above procedure if you are taking **WebBase** down and bringing it back up with the NT system continuing to run.

Removing the Service Entry

To remove **WebBase** as a service entry, the WebSvDel.bat file is used. This file first attempts to stop WebBase and then removes it as a service entry. The WebBase application itself is not affected, and can be started manually by selecting the WebBase icon. However, if you wish to have WebBase run as a service in the future, you must do another installation in order to set up the necessary service batch files.

Upgrading to Windows-NT

If you are already running WebBase on a non-Windows NT system and upgrade the operating system to Windows-NT and wish to run WebBase as a service, you must go through the installation procedure in order to have WebBase properly set up as a service and the necessary service batch files generated. Note that this only applies when upgrading to a Windows-NT environment. If you are already running Windows NT and simply upgrade versions of Windows-NT, it is not necessary to reinstall WebBase.

3.9 WebBase Support

You can get customer support for **WebBase** in any of these ways:

- Review the list of questions and answers at, and post your own questions in the **WebBase** Support Forum accessed via the **WebBase** Web site
- Read the latest documentation updates on the **WebBase** Web site
- Send email to support@expertelligence.com.
- Call ExperTelligence at 805/962-2558

When requesting support, please provide the following information:

- **WebBase** version and build numbers
- Your operating system and version
- If the question is database related, the database in use
- The source for the ODBC you are using (drivers/versions/dates)

Initialization

Chapter 4

WebBase uses a number of initialization parameters that are described in this chapter, and were previously referred to in the chapter on **WebBase** installation. In addition to these initialization parameters, **WebBase** also allows the user to define file extensions and their handling, directory aliases, and multiple domain support. All this information is stored in the System Registry on a Windows NT or Windows 95 system. On a Windows 3.1 or Windows for Workgroups system, *.INI files are used. Although the format is different between the System Registry and the *.INI files, the required entries are the same. This chapter presents details on how to modify the System Registry using the **WebBase WebWizard** Registration Database utility. Appendix B covers how to set up .INI files as well as how to directly modify entries in the System Registry.

4.1 Parameters

During the installation of **WebBase**, the default set of **WebBase** parameters is displayed and you are given the option of modifying the parameters. All **WebBase** parameters described in this section are extracted from the System Registry[9] when **WebBase** is launched. Changing the entry for any parameter will have no effect on a running **WebBase** application. To effect a change for any entry, you must stop and restart **WebBase** after editing the parameter.

The name of each parameter is case sensitive and must be entered exactly as shown below. If a parameter name is entered incorrectly, **WebBase** will not be able to use its value. The values for string input fields are not case sensitive.

The following are the **WebBase** parameters, whether they are required or optional, and their default value.

- **PortNo--** (required) -- the number (in decimal) of the port used by **WebBase** to communicate with browsers. This port number must be unique within your environment (i.e., not assigned to another application). The default for this parameter is 80, which is

[9] All WebBase-related information is stored in the System Registry in HKEY_LOCAL_MACHINE/SOFTWARE/ExperTelligence, Inc./WebBase/4.10. Prior to build 56, this information was stored in HKEY_LOCAL_MACHINE/System/CurrentControlSet/ Services/httpSQL. Effective with build 56, only the WebBase parameters required to run WebBase as a service on Windows NT are stored in the latter location.

the default port used by any HTTP Web server. If you will be running multiple web servers, each must be assigned a unique port number.

- **Directory** -- (required) -- the directory within which the form files are stored. The files may be within this specific directory, or they may be within subdirectories. During the **WebBase** installation, this directory is specified as the 'HTTP Root Directory'. This directory location corresponds to a browser referencing 'http://host-address/'. The default for this parameter is the device used during installation (e.g., 'C:\') and the directory 'http'.

- **License** -- (required) -- the value of your license number. There is no default for this parameter. The license number must be entered in the format ####-######. The hyphen in the center of the number is part of the license. If it is not specified, an error message will be displayed when you try to start **WebBase**.

- **LogDirectory** -- (optional) -- the full pathname of a directory into which **WebBase** will write log files for each query made of the system. Each day, **WebBase** will create a new log file named WByymmdd.log where yy=year, mm=month, and dd=day. For example, WB970504.log is the log file for May 4, 1997. These log files will contain one entry for each query made of **WebBase.** The format and contents of the file are determined by the LogFormat parameter described below. If the LogDirectory is not specified, **WebBase** will not perform any logging. It is recommended that this parameter always be specified; logging can then be enabled or disabled via the **WebBase** Options menu if so desired. It is not possible to enable logging if the LogDirectory parameter is not specified. During installation, the default for this parameter is the directory containing program files (e.g., 'C:\WebBase') and the subdirectory 'Logs'.

- **LogFormat** – (optional) –the type of log format records that will be generated in the log files. There are 5 types of log formats supported by **WebBase**. The following shows the LogFormat parameter (0-4) and the corresponding record format:

  ```
  4 – Extended Combined Log File Format
  3 – Common Log File Format
  2 - Extended Common Log File Format
  1 - Extended Original WebBase (EMWACS) Log File Format
  0 - Original WebBase (EMWACS) Log File Format
  ```

  If the LogFormat parameter is not specified but the user enables logging, all log records will be written using the Extended Common Log File Format. Details on logging can be found in Chapter 12.

- **errorLogFile** -- (optional) –the full pathname of the error log file created and maintained by **WebBase** for reporting operational errors. These messages can be helpful in diagnosing problems you might encounter while **WebBase** executes. WebBase will create the file, but the directory specified must exist before executing **WebBase**. During installation, the default for this parameter is the directory containing program files (e.g., 'C:\WebBase') and '\Logs\WebError.log'. If not specified, no error log files will be generated. It is strongly recommended that an error log file be maintained, as this can be useful information in determining the source of program and application errors. There is another error file -- error.log -- which may be created in the directory containing the WebBase.exe application if **WebBase** crashes due to a program error.

- **Default** -- (optional) -- the name of the default file when a directory is referenced. The defaults are 'default.htf' and 'default.htm' in that order. This parameter can be specified as a single file name or as a series of files to be searched for in the order presented (index.htm,index.html) separated by commas. If the parameter is specified with no filename, then no default file will be used.

- **Extension** -- (optional) -- the default extension (or extensions) to append to a file name should the user enter what appears to be a file reference without an extension. Default value is 'htf','htm' in that order. This parameter can be specified as a single extension or as a series of file extensions to be searched for in the order presented (htm, html) separated by commas. If the parameter is specified with no extension, then no default extension will be appended to the file name to attempt to resolve it for the user.

  Note:

  Only the extension characters are specified; the period preceding the extension is not included in this parameter.

- **HostName** – (optional) – the DNS name identifying the default host system. This is used to generate the %fullHostName% and %serverHostName% variables if the browser does not provide a Host header variable. The form designer can use these variables to do redirects using a DNS name instead of an IP address. It is important to remember that this name is NOT being used for name resolution of the host name used within a URL -- that is done by the TCP/IP configuration where the domain name (and possibly multiple domain names) are set up outside of **WebBase**. This HostName parameter is only used so that if the user wants to do a redirect to a particular domain that the name of the domain can be used in the URL instead of the IP address.

- **HostAddress** – (optional) – a string containing a dotted IP address to which the heartbeat command is to be sent (the heartbeat function is described in chapter 5). If not present, **WebBase** uses '127.0.0.1', which should correspond in most systems to the local host.

- **StartupForm** – (optional) -- a .htf form that **WebBase** will automatically run each time the server is started - and before it begins processing any browser commands. WebBase runs the Startup Form as if it had been CALLed by the *call* macro. The only difference is that the Startup Form is CALLed by the **WebBase** Server itself and NOT by another .htf form. This CALLed Startup Form is CALLed as if wait true were indicated - the server waits for the form to complete before going on to process other forms - and it accepts any number of returned parameters passed back from either a return or exit macro in the CALLed Startup Form. Since there is no browser involved in the running of this Startup Form the output returned from this form is displayed in the WebBase WebServer window. An example of such output is:

  ```
  Running StartupForm: 'Startup.htf'.
  01: 'OK'
  StartupForm: 'Startup.htf' complete.
  ```

  In the above the Startup Form is identified and the 01: 'OK' was the first (and only) parameter returned by this form. Additional returns would be displayed as 02: ..., 03: ... etc. If the CALLed Startup Form would have returned text to a browser (if CALLed from another .htf form initiated by a browser command) that text will be displayed following the above in the same WebBase WebServer window. This output can be used to visually verify that the Startup Form executed as expected. The workaround for Access databases described in Chapter 14 shows how the startup form can be used.

- **HTTP_Proxy** – (optional) – the name of the proxy host system. This parameter is only used when the user is behind a firewall and wants to receive the "Late Breaking News" from ExperTelligence when **WebBase** is started. This is the name or IP address of the firewall system that **WebBase** is able to access.

- **HTTP_ProxyPort** – (optional) – the port number of the proxy host system. This parameter is only used when the user is behind a firewall and wants to receive the "Late Breaking News" from ExperTelligence when **WebBase** is started.

Windows NT Service Parameters

The parameters described in this section are only required on Windows-NT systems when **WebBase** is to be set up to run as a service. They are automatically set up as part of the installation of WebBase on Windows-NT systems.

- **AppDirectory --** (required) -- the directory in which the application and related virtual machine and DLL files reside.

- **Application --** (required) **--** the full pathname of where the WebBase.exe file will be found when setting up **WebBase** to run as a service.

Editing WebBase Parameters

Adding new parameters or changing existing parameters is done using the **WebBase WebWizard** Registration Database utility. If **WebBase** will not start due to an incorrect parameter and it is not possible to use the **WebBase WebWizard**, or if a parameter is to be deleted, see Appendix B for details on how to directly edit the System Registry. This appendix also includes information on setting up the .INI files used on 16-bit systems. To edit **WebBase** parameters,

1. Start **WebBase** and open up the **WebBase WebWizard** by entering the URL:

   ```
   http://127.0.0.1:<port #>/wbwizard/
   ```

   The <port #> is the PortNo parameter. If port 80 is used, the ':<port #>' portion of the above URL can be dropped.
2. Select the Registration Database anchor.

3. From the pull-down list, select 'HKEY_LOCAL_MACHINE' and then press the 'OPEN' button.

4. Select the 'Open' anchor next to the 'SOFTWARE' key.

5. Select the 'Open' anchor next to the 'ExperTelligence, Inc.' key.

6. Select the 'Open' anchor next to the 'WebBase' key.

7. Select the 'Open' anchor next to the version number (e.g., '4.10')[10].

8. Select the 'Open' anchor next to the 'Parameters' key. All of the **WebBase** parameters currently defined and their values are displayed in the table.

[10] The keys specified in steps 5-8 will exist as long as the user selected to update the System Registry with the WebBase parameters entered during installation. If any of these keys are not found, select the 'Add New Key' anchor and enter the appropriate key name. Then proceed with the subsequent steps.

9. To add a new parameter, select the ‘Add new entry’ anchor and specify the parameter name and desired value. Remember that the parameter name is case sensitive.

10. To modify a parameter, select the ‘Edit’ anchor next to the parameter and specify the changed value.

11. Stop and restart **WebBase** so that the new/modified parameters will take effect.

4.2 Extensions

The user can specify how **WebBase** will handle different types of files, based on the file extension. There are three options for how a file will be handled by **WebBase**:

1. Process the file and return the results to the browser

2. Do not process the file; just return the file contents to the browser.

3. Return a ‘404 File Not Found’ error even if the file truly does exist. This is used for hiding files that one wants to have associated with the files invoking them but ones that make no sense for a user to try and address directly from a browser.

In addition to specifying whether the file will be processed or just returned by **WebBase**, the user also specifies the ‘mime type’. This is used to generate the Content-type header variable returned to the browser; the browser uses this to determine how to deal with the file upon receipt. For example, ‘Content-type: text/html’ tells a browser to handle HTML tags within the document while ‘Content-type: text/plain’ would cause everything to be displayed; i.e., the <H1> HTML tags would be printed and not processed.

The default file extensions and their mime types supported in **WebBase** are:

*	404
abs	audio/x-mpeg
ai	application/postscript
aif	audio/x-aiff
aifc	audio/x-aiff
aiff	audio/x-aiff
as	application/x-javascript
au	audio/basic
avi	video/x-msvideo
bin	application/octet-stream
bmp	image/x-MS-bmp
class	application/octet-stream
cpio	application/x-cpio
csh	application/x-sh
doc	application/msword
dvi	application/x-dvi
eps	application/postscript
exe	application/octet-stream
fif	application/fractals
gif	;image/gif
gtar	application/x-gtar
gz	application/x-gzip
hqx	application/mac-binhex40
htf	{text/html}
htm	{text/html}
html	{text/html}
ice	x-conference/x-cooltalk
ief	;image/ief
jpe	;image/jpeg
jpeg	;image/jpeg
jpg	;image/jpeg
js	application/x-javascript
latex	application/x-latex
ls	application/x-javascript
mocha	application/x-javascript
mov	video/quicktime
mpe	video/mpeg
mpeg	video/mpeg
mpg	video/mpeg
mp2v	video/x-mpeg2
mpv2	video/x-mpeg2
mp2	audio/x-mpeg
mpa	audio/x-mpeg
mpega	audio/x-mpeg
pac	application/x-ms-proxy-autoconfig
pbm	;image/x-portable-bitmap
pcd	;image/x-photo-cd
pdf	application/pdf
pgm	image/x-portable-graymap
pl	application/x-perl
png	;image/x-png
pnm	;image/x-portable-anymap
ppm	;image/x-portable-pixmap
ps	application/postscript
qt	video/quicktime
ra	audio/x-pn-realaudio
ram	audio/x-pn-realaudio
ras	image/x/cmu/raster
rgb	image/x-rgb
rtf	application/rtf
sh	application/x-sh
shar	application/x-shar
sit	application/x-stuffit
snd	audio/basic
tar	application/x-tar
tcl	application/x-tcl
tex	application/x-tex
texi	application/x-texinfo
text	text/plain
tif	image/tiff
tiff	image/tiff
txt	text/plain
wav	audio/x-wav
xbm	image/x-xbitmap
xpm	image/x-xpixmap
xwd	image/x-xwindowdump
z	application/x-compress
zip	application/x-zip-compressed

WebBase users can go with the defaults as shown above, totally override them with their own, or indicate they want to take the defaults but override individual entries - change them, delete them, and add to them.

To specify how a file extension type is to be handled, the user creates a key in the system registry identifying the file extension. The value of the extension is the mime-type. The default mime-type for returning an HTML form without **WebBase** processing would be ‘text/html’.

Any file containing **WebBase** macros or variables must be set up to be processed by the **WebBase** server. By default, **WebBase** will process any file with an extension of .htf, .htm or .html. To indicate a file extension that WebBase should processed, the mime-type is enclosed in { } characters. For example, .htf files have a mime-type of ‘text/html’ but use **WebBase** processing, so their mime-type would be defined as ‘{text/html}’.

To indicate an extension type is to be ignored and that **WebBase** is to return the 404 File Not Found error message for such a file, a mime-type of ‘404’ is specified.

If no extensions have been defined, all the default extensions listed previously are used. If the user wants to continue to use these system defaults but add or modify some additional file extensions, a file extension of ‘???’ whose value is ‘use all system defaults’ must be specified. If the user creates one or more extensions but does not include the ‘???’ extension, no default extensions will be used. If the ‘???’ entry is found, the default extensions are first loaded into the extensions dictionary, and then the registry entries are processed. If this entry is not found, only the registry entries are processed.

An extension that has no associated mime-type indicates that it is to be removed from the dictionary. If the key is not found in the dictionary, no error will result. For example, to ignore GIF files an extension of ‘gif’ would be created with no value.

The ‘*’ extension is used to specify how any extension not found is to be treated. By default, this will return the 404 error for any extension not otherwise encoded in the dictionary.

If logging is enabled, a log record is added for each command processed or returned by **WebBase**. It is possible to indicate that specific extension types are not to be logged. This is done by preceding the mime-type with a semicolon (;). For example,

```
htm = ;text/html     no WebBase processing, no logging
htf = ;{text/html}   WebBase process, no logging
htf = {;text/html}   WebBase process, no logging
```

Notice that the order of the ‘;’ and ‘{‘ characters do not matter. A number of extensions that return images are set up by default to not generate log records, including .gif and .jpg extensions.

Editing Extensions

WebBase only reads extensions at startup. If an extension is added, changed or deleted, **WebBase** must be stopped and restarted for the change to take effect. To create and/or edit the **WebBase** extensions, perform the following steps:

1. Start **WebBase** and open up the **WebBase WebWizard** by entering the URL:

   ```
   http://127.0.0.1:<port #>/wbwizard/
   ```

   The <port #> is the PortNo parameter. If port 80 is used, the ‘:<port #>’ portion of the above URL does not have to be used.
2. Select the Registration Database anchor.
3. From the pull-down list, select ‘HKEY_LOCAL_MACHINE’ and then press the ‘OPEN’ button.
4. Select the ‘Open’ anchor next to the ‘SOFTWARE’ key.
5. Select the ‘Open’ anchor next to the ‘ExperTelligence, Inc.’ key.
6. Select the ‘Open’ anchor next to the ‘WebBase’ key.
7. Select the ‘Open’ anchor next to the version number (e.g., ‘4.10’).

8. If the key ‘Extensions’ does not exist, create it by selecting the ‘Add New Key’ anchor and entering ‘Extensions’ as the key name. Remember that this name is case sensitive.

9. Select the ‘Open’ anchor next to the ‘Extensions’ key. All of the **WebBase** extensions currently defined and their mime-type values are displayed in the table.

10. To add a new extension, select the ‘Add new entry’ anchor and specify the extension name and desired mime-type value.

11. To modify an extension, select the ‘Edit’ anchor next to the extension and specify the changed value.

12. Stop and restart **WebBase** so that the new/modified extensions will take effect.

4.3 Aliases

WebBase includes the ability to handle directory aliases. When a URL is entered, the node name immediately following the host name can be an alias. For example, if the URL ‘www.expertelligence.com/foobar/filename.htf’ was entered, the ‘foobar’ is extracted from the URL and **WebBase** checks the Aliases for an entry whose name is ‘foobar’. If there is an alias that has been defined whose name is ‘foobar’ with a value of ‘f:\foo\bar\, then the above URL would translate to referencing a form at:

```
f:\foo\bar\filename.htf
```

and not in the default Directory (generally c:\http).

Note that <u>only</u> the first node of the URL beyond the host name is used to see if it matches an alias. The order for matching is:

1. Is there an alias for this name at this particular IP address?

2. Is there an alias for this name?

3. Is this a legitimate directory name within the default directory path?

Editing Aliases

WebBase only reads aliases, like extensions and parameters, at startup. If an alias is added, changed or deleted, **WebBase** must be stopped and restarted for the change to take effect. To create and/or edit the **WebBase** aliases, perform the following steps:

1. Start **WebBase** and open up the **WebBase WebWizard** by entering the URL:

   ```
   http://127.0.0.1:<port #>/wbwizard/
   ```

   The <port #> is the PortNo parameter. If port 80 is used, the ‘:<port #>’ portion of the above URL does not have to be used.

2. Select the Registration Database anchor.

3. From the pull-down list, select ‘HKEY_LOCAL_MACHINE’ and then press the ‘OPEN’ button.

4. Select the ‘Open’ anchor next to the ‘SOFTWARE’ key.

5. Select the ‘Open’ anchor next to the ‘ExperTelligence, Inc.’ key.

6. Select the ‘Open’ anchor next to the ‘WebBase’ key.

7. Select the ‘Open’ anchor next to the version number (e.g., ‘4.10’).

8. If the key ‘Aliases’ does not exist, create it by selecting the ‘Add New Key’ anchor and entering ‘Aliases’ as the key name. Remember that this name is case sensitive.

9. Select the ‘Open’ anchor next to the ‘Aliases’ key. All of the **WebBase** aliases currently defined and their values are displayed in the table.

10. To add a new alias, select the ‘Add new entry’ anchor and specify the alias name and desired value.

11. To modify an alias, select the ‘Edit’ anchor next to the extension and specify the changed value.

12. Stop and restart **WebBase** so that the new/modified aliases will take effect.

4.4 Multiple Domains

WebBase supports multiple domains. One can set up multiple IP addresses in the TCP interface to reference the same physical machine[11]. For example, a single machine may be configured to support addresses: 1.2.3.1, 1.2.3.2, 1.2.3.3 and 1.2.3.4. The machine may also be known by 127.0.0.1, which is the default ‘local host’ way of addressing the system, but only from itself. The **WebBase** %serverAddress% variable returns the IP address based on how the server was addressed.

Since different behavior may be desired depending on how the server is addressed, **WebBase** allows the user to define different domains. Within each domain, it is possible to define the desired behavior with respect to parameters, aliases and extensions.

The following parameters can be defined for each domain. If not explicitly specified, the default value of the parameter as described earlier in this chapter is used.

- **Directory --** the directory containing various form files, or subdirectories containing forms files. This directory is only relevant to a user coming in at this IP address or domain.

- **Default --** the name of the default file when a directory is referenced. The defaults are default.htf and default.htm in that order. This parameter can be specified as a single file name or as a series of files to be searched for in the order presented (index.htm,index.html) separated by commas. If the parameter is specified with no filename, then no default file will be used.

- **Extension --** the default extension (or extensions) to append to a file name should the user enter what appears to be a file reference without an extension. Defaults is ‘htf,htm’ in that order. This parameter can be specified as a single extension or as a series of file extensions to be searched for in the order presented (htm, html) separated by commas. If the

[11] Multiple domain support within the TCP/IP configuration is currently only supported under Windows NT systems. This is an operating system limitation, not a WebBase limitation.

parameter is specified with no extension, then no default extension will be appended to the file name to attempt to resolve it for the user.

- **HostName** -- the DNS name identifying the domain. This is used to generate the %fullHostName% and %serverHostName% variables if the browser does not provide a Host header variable. The form designer can use these variables to do redirects using a DNS name instead of an IP address. It is important to remember that this name is NOT being used for name resolution of the host name used within a URL -- that is done by the TCP/IP configuration where the domain name(s) are set up outside of **WebBase**. This HostName parameter is only used so that if the user wants to do a redirect to a particular domain that the name of the domain can be used in the URL instead of the IP address.

Creating and Editing Multiple Domains

Each domain to be serviced by **WebBase** is created as a separate entry within the System Registry. Under this key are additional subkeys to specify aliases, extensions and other parameters. If multiple domain information is modified, **WebBase** must be stopped and restarted for the change to take effect. To create and/or edit multiple domains in **WebBase**, perform the following steps:

1. Start **WebBase** and open up the **WebBase WebWizard** by entering the URL:

   ```
   http://127.0.0.1:<port #>/wbwizard/
   ```

   The <port #> is the PortNo parameter. If port 80 is used, the ':<port #>' portion of the above URL does not have to be used.
2. Select the Registration Database anchor.
3. From the pull-down list, select 'HKEY_LOCAL_MACHINE' and then press the 'OPEN' button.
4. Select the 'Open' anchor next to the 'SOFTWARE' key.
5. Select the 'Open' anchor next to the 'ExperTelligence, Inc.' key.
6. Select the 'Open' anchor next to the 'WebBase' key.
7. Select the 'Open' anchor next to the version number (e.g., '4.10').
8. If the key 'Domains' does not exist, create it by selecting the 'Add New Key' anchor and entering 'Domains' as the key name. Remember that this name is case sensitive.
9. Select the 'Open' anchor next to the 'Domains' key. All of the **WebBase** multiple domains are specified as subkeys in the displayed table.
10. To create a new multiple domain, select the 'Add New Key' anchor and enter the IP address of the domain. This domain must also be set up within the TCP/IP configuration accessible via the Network option within the Windows Control Panel.
11. Select the 'Open' anchor next to the desired multiple domain key. The entries table indicates whether any parameters have been defined for this domain.

12. To add a parameter, select the 'Add new entry' anchor and specify the parameter name and desired value. Parameters should only be defined to override the default parameter value.

13. To modify a parameter, select the 'Edit' anchor next to the parameter and specify the changed value.

14. The subkey table indicates whether any aliases or extensions have been defined for this domain. To create extensions or aliases, follow steps #8-11 from the preceding sections on Extensions or Aliases, respectively, to create the subkey within the registry and then define appropriate extensions or aliases.

15. Stop and restart **WebBase** so that the new/modified multiple domain information will take effect.

WebBase Windows

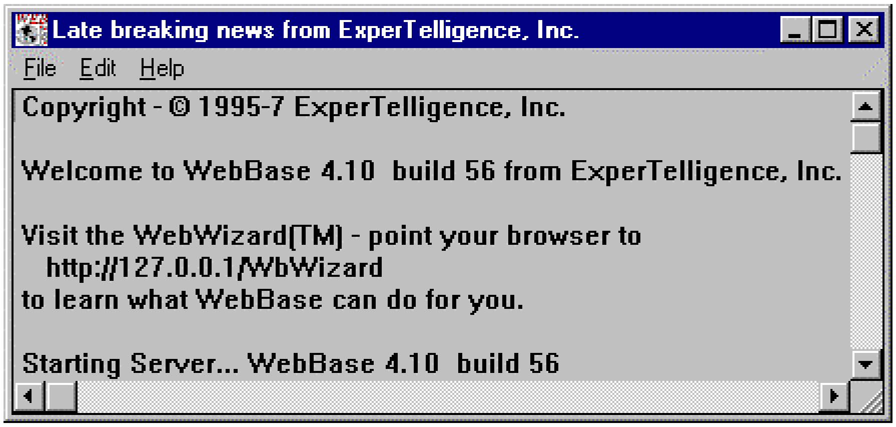
Chapter 5

There are a number of windows that are displayed on the host system while **WebBase** is running. This chapter describes these windows and the menu options available on them. Note that when **WebBase** is installed as a service under Windows NT, there may not be any windows displayed.

5.1 Late Breaking News Window

The first window displayed when **WebBase** is started is the 'Late Breaking News Window'. An example of this window is shown in Fig. 5.1 below.

Figure 5.1 Late Breaking News Window



Copyright - © 1995-7 ExperTelligence, Inc.

Welcome to WebBase 4.10 build 56 from ExperTelligence, Inc.

Visit the WebWizard(TM) - point your browser to
http://127.0.0.1/WbWizard
to learn what WebBase can do for you.

Starting Server... WebBase 4.10 build 56

The lines shown above are always displayed, and include the copyright statement, the welcome statement including the current **WebBase** version and build numbers, and an indication that the server is starting. The **WebBase WebWizard** information is displayed as long as the directory containing the **WebBase WebWizard** forms can be found on the server system. The **WebBase WebWizard** is installed as part of the **WebBase** installation. Information on the **WebBase WebWizard** is provided as readme.txt files with each **WebBase WebWizard** tool; additional documentation is available on the **WebBase** web page. Information on other **WebBase** add-on packages can also be found at the **WebBase** web site.

Below these lines is the latest news information that is posted frequently by ExperTelligence. This may include information on new releases, bug fixes, and documentation updates. If you do not see the news information when you start **WebBase**, it may be because:

- Your **WebBase** server is behind a firewall and cannot access the 'Late Breaking News' data. See Chapter 13 for information on firewalls.
- You are not on the Internet. You can still use **WebBase**; you will just not see any news in this window.
- The ExperTelligence server is unavailable. In this case, the Late Breaking News Window will display:

```
News server temporarily not available.
Please request "Current User News" later.
```

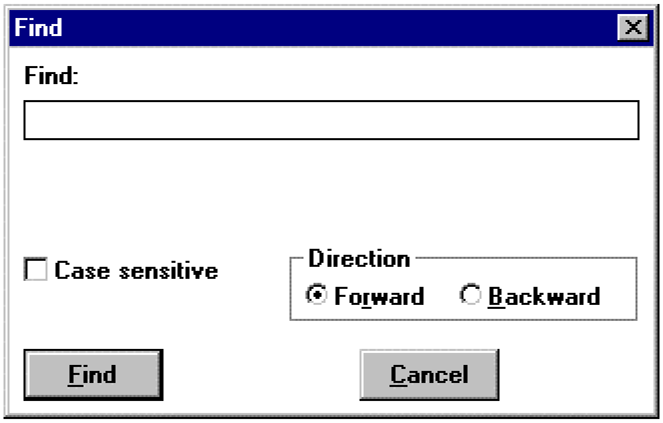
Errors that occur while **WebBase** is starting or running are also displayed in this window. During the installation and configuration of **WebBase**, it is suggested that this window be kept open to detect if any errors have occurred.

Menu Options

All **WebBase** windows include a menu bar at the top of the window. The 'Late Breaking News Window' includes several very simple menu options. Each of the menu options are described below.

- **File->Exit --** If this menu option is selected, the 'Late Breaking News Window' is closed. It is possible to run **WebBase** without this window open. This window is only necessary to read the latest news about the product.
- **Edit->Copy --** This menu option is only active if an area of text in the window has been highlighted. If this menu option is selected, the highlighted text is copied into the system's paste buffer. It can then be placed into another application (e.g., Word, PowerPoint). The keyboard shortcut <ctrl>-C (press the Ctrl key and the C key down at the same time) can also be used to perform a copy operation.
- **Edit->Clear All News --** If this menu option is selected, the news information displayed below the startup information is cleared. The user may subsequently select to view updated news by selecting the Help>Current User News option. Clearing the news area is also useful to easily see if any errors occur since error information is displayed in this window.
- **Edit->Find --** If this menu option is selected, the Find Dialog shown below in Fig. 5.2 is displayed. The user must specify the string to be found as well as whether the search will be forwards or backwards from the current location of the cursor. This dialog also allows the user to specify whether a case sensitive or insensitive search will be done. Once the information to be matched is entered, the user selects the 'Find' button. If a match is found, it is highlighted. If no match is found, a dialog indicating that the search string was not found is displayed. Note that a forwards search will only go to the end of the file; it does not loop around and start over at the beginning of the file. Likewise, a backwards search will only go to the beginning of the file; it does not loop around and start over at the end of the file. The keyboard shortcut <ctrl>-F (press the Ctrl key and the F key down at the same time) will also cause the Find Dialog to be displayed.

Figure 5.2 Find Dialog



Find:

□ Case sensitive

Direction
● Forward ○ Backward

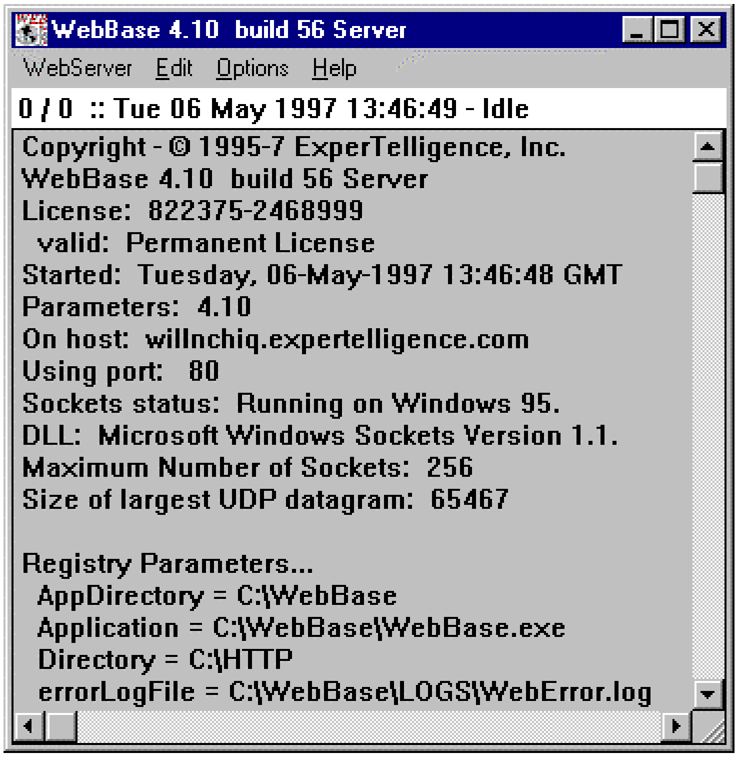
- **Edit->Find Again --** If no string has been specified on the Find Dialog, the user is prompted to enter the search string. Using either this string or the string previously specified on the Find Dialog, the next occurrence of the string is located and highlighted. Note that if no string was specified on the Find Dialog, the default search direction (forward) and type (case insensitive) will be used. If a search string was specified on the Find Dialog, the search parameters specified on the Find Dialog will be used. The keyboard shortcut <ctrl>-G (press the Ctrl key and the G key down at the same time) can also be used to invoke the Find Again function.

- **Help->Current User News --** If this option is selected, the latest news from ExperTelligence will be retrieved and displayed in the window. Any previous news or error messages displayed on the window are not cleared. It is recommended that the Edit>Clear All News option be selected before this option is selected.

5.2 WebBase Server Window

The second window displayed when **WebBase** is started is the 'WebBase Server Window'. The title of this window always indicates the version and build of the **WebBase** server. An example of this window is shown in Fig. 5.3 below.

Figure 5.3 WebBase Server Window



```
0 / 0  :: Tue 06 May 1997 13:46:49 - Idle
Copyright - © 1995-7 ExperTelligence, Inc.
WebBase 4.10  build 56 Server
License:  822375-2468999
  valid:  Permanent License
Started:  Tuesday, 06-May-1997 13:46:48 GMT
Parameters:  4.10
On host:  willnchiq.expertelligence.com
Using port:   80
Sockets status:  Running on Windows 95.
DLL:  Microsoft Windows Sockets Version 1.1.
Maximum Number of Sockets:  256
Size of largest UDP datagram:  65467

Registry Parameters...
  AppDirectory = C:\WebBase
  Application = C:\WebBase\WebBase.exe
  Directory = C:\HTTP
  errorLogFile = C:\WebBase\LOGS\WebError.log
```

There are three components to this window: the menu bar, the status line, and the text area. Each of these are described in the following sections.

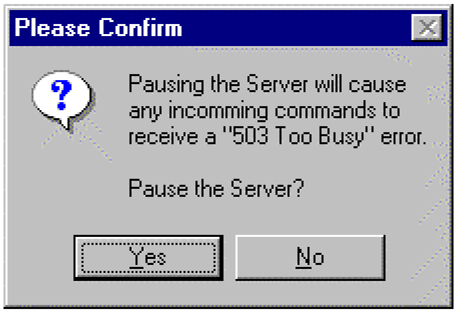
WebBase Server Window Menu Bar

The menu bar provides four sets of menu options. Each set is described below.

WebServer Menu Options

- **Pause Server** -- This is a toggle (on/off) option. If the server has been paused, a check mark is displayed next to the menu option. If the server is not paused, no check mark is displayed. If this option is selected and the server is active, the confirmation dialog shown in Fig. 5.4 is displayed. If the user confirms that the server should be paused, the status line in the window is redisplayed in red and the remainder of the window is displayed in blue-green. While the server is paused, it will return a “503 The Server is Too Busy” status code and message back to any requesting browsers. Although some server resources are required to handle the incoming requests and return the status, they are very minimal. If this option is selected and the server is paused, the server will be re-activated without any confirmation from the user. Pausing the server is useful to administer databases without having to shut down the server and without having to wrap errorProtect statements around forms that would otherwise generate errors. Alternative approaches to database administration are presented in Chapter 14.

Figure 5.4 Pause Server Confirmation Dialog



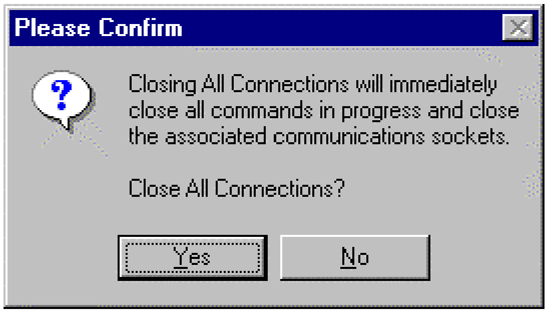
Please Confirm

Pausing the Server will cause any incomming commands to receive a "503 Too Busy" error.

Pause the Server?

- **Close All Connections --** If this option is selected, the confirmation dialog shown in Fig. 5.5 is displayed. If the user confirms that all connections should be closed, all commands in progress will be closed and the associated communications sockets will be closed. This option is also provided for trouble-shooting. If your server is not responding properly, you might try this option first to see if the problem is resolved.

Figure 5.5 Close All Connections Confirmation Dialog



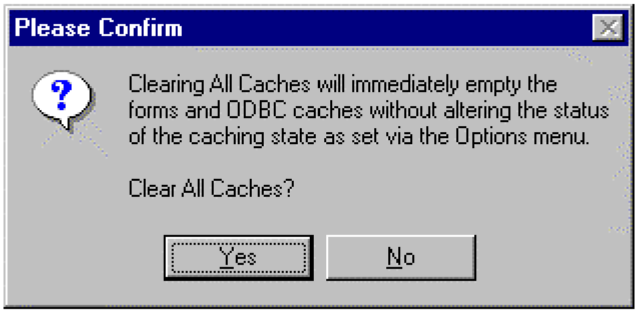
Please Confirm

Closing All Connections will immediately close all commands in progress and close the associated communications sockets.

Close All Connections?

- **Clear All Caches --** If this option is selected, the confirmation dialog shown in Fig. 5.6 is displayed. If the user confirms that the forms and ODBC connection caches should be closed, the caches are emptied without altering the status of the caching state as set via the Options Menu. This is equivalent to selecting both the 'Clear Forms Cache' and 'Clear ODBC Cache' menu options.

Figure 5.6 Clear All Caches Confirmation Dialog



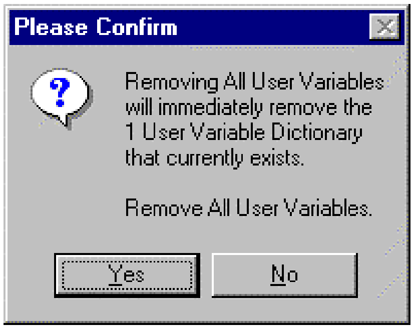
Please Confirm

Clearing All Caches will immediately empty the forms and ODBC caches without altering the status of the caching state as set via the Options menu.

Clear All Caches?

- **Remove All User Variables --** If there are no user variables currently defined, an information window is presented indicating that no action is necessary. If this option is selected and there is at least one user variable dictionary, the confirmation dialog shown in Fig. 5.7 is displayed. The total number of user variable dictionaries is specified as part of the dialog. If the user confirms that all user variable dictionaries and their contents should be deleted, the user variable dictionaries are emptied and removed. See Chapter 10 for additional information on user variables and user variable dictionaries. This option should be used only during form development and when no users are actively making requests of the **WebBase** server. If one or more form applications have been developed using user variables and the user variable dictionaries are emptied and deleted, any user currently interacting with the server may get unexpected results or errors.

Figure 5.7 Remove All User Variables Confirmation Dialog

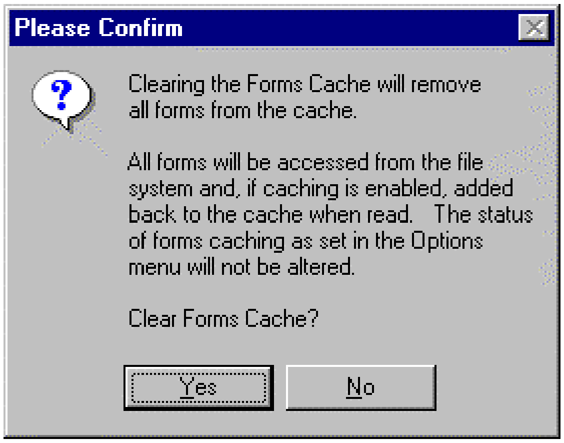


Removing All User Variables will immediately remove the 1 User Variable Dictionary that currently exists.

Remove All User Variables.

- **Clear Forms Cache** -- If this option is selected, the confirmation dialog shown in Fig. 5.8 is displayed. If the user confirms that all the forms in the cache should be cleared, the forms are removed. Forms caching is enabled via the Options menu (Enable Cache Read) or by setting the value of %cacheEnabled% to true (default value). Forms caching can be disabled via menu option or by setting the value of %cacheEnabled% to false. If forms caching is disabled, no forms will be in the cache so it is not necessary to clear them. It is strongly recommended that forms caching be used. When a file is specified as part of a URL, **WebBase** located the file on disk, opens and reads the file, parses the text into internal structures, and then processes the macros and variables within the file. The resulting output stream is returned to the browser. If forms caching is on, the internal structures built for the file are cached in memory. When the file is subsequently requested, the internal structures are retrieved from cache. **WebBase** does not have to find the file, read it and parse it. This can provide improved throughput and faster response. It is possible to clear both the forms cache and the ODBC connection cache using the Clear All Caches menu option.

Figure 5.8 Clear Forms Cache Confirmation Dialog



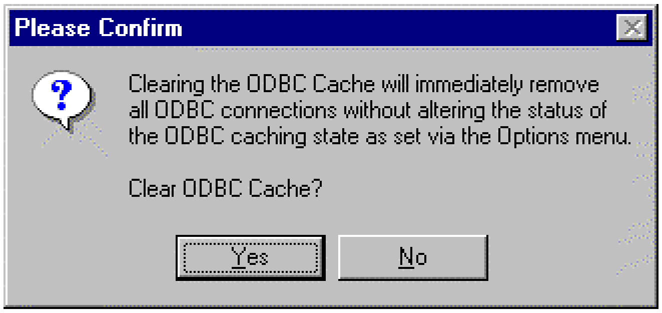
Clearing the Forms Cache will remove all forms from the cache.

All forms will be accessed from the file system and, if caching is enabled, added back to the cache when read. The status of forms caching as set in the Options menu will not be altered.

Clear Forms Cache?

- **Clear ODBC Cache --** If this option is selected, the confirmation dialog shown in Fig. 5.9 is displayed. If the user confirms that all the ODBC connections in the ODBC cache should be cleared, the connections are removed. ODBC connection caching is enabled via the Options menu (Cache ODBC Connections) or by setting the value of %cacheODBC% to true (default value). ODBC connection caching can be disabled via menu option or by setting the value of %cacheODBC% to false. If ODBC connection caching is disabled, no connections will be in the cache so it is not necessary to clear them. It is strongly recommended that ODBC connection caching be used. Each *sql* macro request specifies a source name, user name and password. An ODBC database connection is made using the source name and user name. If %cacheODBC% is true, the connection is cached. If a subsequent *sql* macro specifies the same source name and username, the connection in the cache is used and a new connection is not created. This can significantly reduce the amount of time it takes **WebBase** to process a request for the second and subsequent reference to the same source and username. See Chapter 12 for more information on ODBC caching. Clearing the ODBC cache will break any locks that **WebBase** has on ODBC databases. Releasing these locks is necessary to perform database maintenance. See Chapter 14 for more information on database maintenance.

Figure 5.9 Clear ODBC Cache Confirmation Dialog

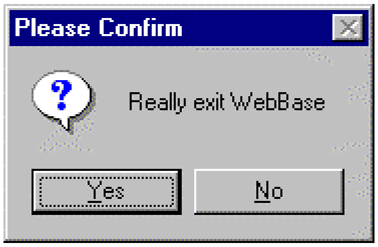


Clearing the ODBC Cache will immediately remove all ODBC connections without altering the status of the ODBC caching state as set via the Options menu.

Clear ODBC Cache?

- **Exit** -- If this option is selected, the confirmation dialog shown in Fig. 5.10 below is displayed. This dialog is also displayed if the user selects the close option from the window bar. If so confirmed, all **WebBase** windows are closed and **WebBase** processes stopped.

Figure 5.10 WebBase Exit Confirmation Dialog



Really exit WebBase

Edit Menu Options

- **Copy --** this menu option provides the same functionality as described for the Late Breaking News Window.

- **Find --** this menu option provides the same functionality as described for the Late Breaking News Window.

- **Find Again** -- this menu option provides the same functionality as described for the Late Breaking News Window.

- **Heartbeat** -- If this option is selected, a Heartbeat Window is opened. This window is described later in this chapter. The keyboard shortcut <ctrl>-H (press the Ctrl key and the H key down at the same time) can also be used to open a Heartbeat window.

- **Total View** -- If this option is selected, a Total View window is opened. This window is described later in this chapter. The keyboard shortcut <ctrl>-T (press the Ctrl key and the T key down at the same time) can also be used to open a Total View window.

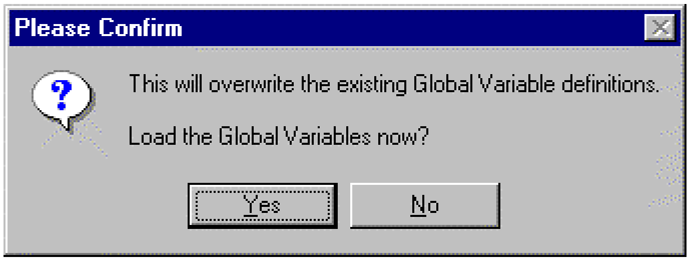
Options Menu Options

- **Enable Transactions Pane** -- This is a toggle (on/off) option. If the status line is enabled (default), a check mark is displayed next to the menu option. If the status line is disabled, no check mark is displayed. If the user turns the option off, the status line is displayed in gray and only a copyright statement is displayed within the status line. More information on the status line is presented later in this chapter.

- **Open Transactions Window --** If this option is selected, a **WebBase** Transactions Service Window is opened. This window is described later in this chapter. While the WebBase Transactions Service window is open, a checkmark appears next to this option. If the option is selected while there is a check mark next to it, the WebBase Transactions Service window is brought to the front.

- **Load Global Variables** -- If this option is selected, the confirmation dialog shown in Fig. 5.11 is displayed. If the user confirms that the global variable values should be updated, they are read in from the System Registry. The new values of all the global variables are displayed on the text area of the WebBase Server window. This option is only used when a change has been made to a global variable. See Chapter 9 for more information on global variables. Each time **WebBase** starts, it automatically reads in all the parameters, global variables and other information set up in the System Registry. It is important to remember that only global variables can be reloaded after **WebBase** has been started. **WebBase** parameters, aliases, extensions and multiple domain changes require that **WebBase** be stopped and restarted.

Figure 5.11 Load Global Variables Confirmation Dialog



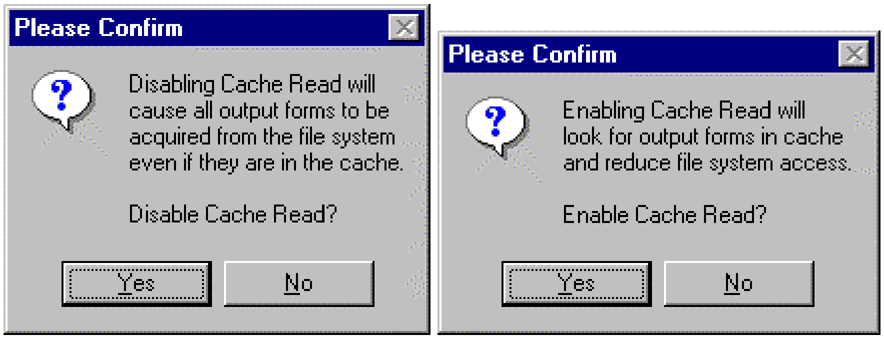
Please Confirm

This will overwrite the existing Global Variable definitions.

Load the Global Variables now?

- **Enable Cache Read** -- This is a toggle (on/off) option. If forms caching is enabled (default), a check mark is displayed next to the menu option. If forms caching is disabled, no check mark is displayed. If this option is selected, one of the confirmations shown in Fig. 5.12 is displayed. The dialog on the left is displayed if caching is currently enabled; the dialog on the right is displayed if caching is currently disabled. If caching is enabled, any form that is referenced is read from the file system, the text is parsed, and the resulting information is added to the cache. The advantage of using forms caching is that **WebBase** will not have to hit the disk to read the form each time it is accessed and will not have to parse the text in the file. If the form is subsequently referenced, it will be retrieved from the cache. This substantially reduces the amount of time it takes **WebBase** to process a request for the second and subsequent reference to the same Web page. If this option is turned off, all output forms will be acquired from the file system even if they are in the cache. If this option is disabled, the Enable Cache TimeCheck option is also disabled. If a change to caching is made using this menu option, it will stay in effect until **WebBase** is stopped. The variable %cacheEnabled% should be set to make any persistent change to whether forms caching will be used.

Figure 5.12 Enable Cache Read Confirmation Dialogs



Please Confirm

Disabling Cache Read will cause all output forms to be acquired from the file system even if they are in the cache.

Disable Cache Read?

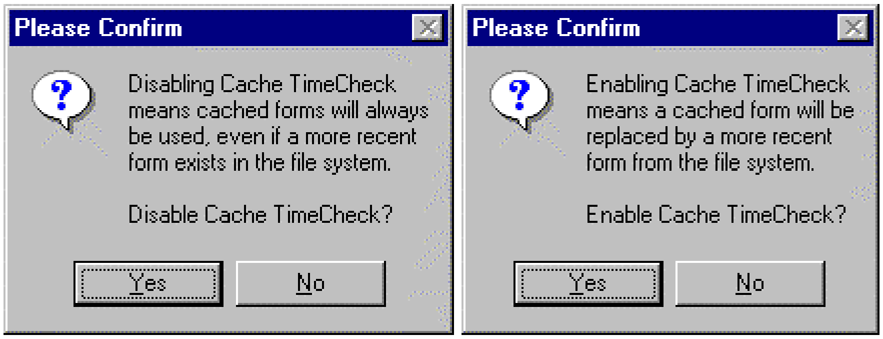
Please Confirm

Enabling Cache Read will look for output forms in cache and reduce file system access.

Enable Cache Read?

- **Enable Cache TimeCheck --** This option is only active if forms caching is enabled. This is a toggle (on/off) option. If time-check caching is enabled (default), a check mark is displayed next to the menu option. If time-check caching is disabled, no check mark is displayed. If this option is selected, one of the confirmations shown in Fig. 5.13 is displayed. The dialog on the left is displayed if time-checking is currently enabled; the dialog on the right is displayed if time-checking is currently disabled. If this option is enabled, **WebBase** will check the date of any file in the cache to determine if a more recent version exists in the file system. If a more recent version is found, the newer version is displayed and cached. Enabling this feature helps ensure developers are always seeing the most current form -- they need not be concerned whether the form they are editing has already been cached or not. If this option is disabled, the cached forms will always be used even if a more recent form exists in the file system. During production, it is recommended that this option be turned off, as this will enable throughput. If a change to time-check caching is made using this menu option, it will stay in effect until **WebBase** is stopped. The variable %cacheTimeCheck% should be set to make any persistent change to whether time-check caching will be used.

Figure 5.13 Enable Cache TimeCheck Confirmation Dialogs



Please Confirm

Disabling Cache TimeCheck means cached forms will always be used, even if a more recent form exists in the file system.

Disable Cache TimeCheck?

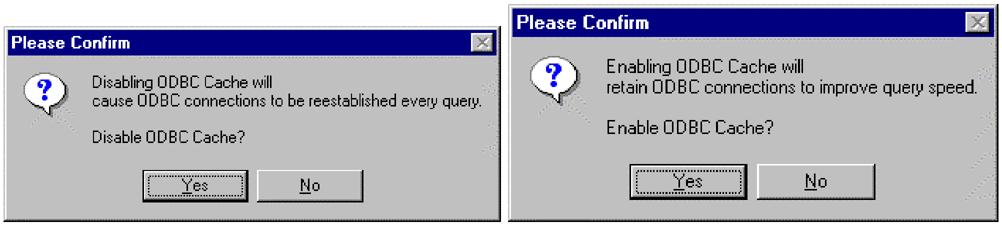
Please Confirm

Enabling Cache TimeCheck means a cached form will be replaced by a more recent form from the file system.

Enable Cache TimeCheck?

- **Cache ODBC Connections --** This is a toggle (on/off) option. If ODBC connection caching is enabled (default), a check mark is displayed next to the menu option. If ODBC connection caching is disabled, no check mark is displayed. If this option is selected, one of the confirmations shown in Fig. 5.14 is displayed. The dialog on the left is displayed if connection caching is currently enabled; the dialog on the right is displayed if connection caching is currently disabled. If this option is enabled, the connection to the ODBC database is added to the ODBC cache after the first database access. Statements to send or retrieve data from this source are addressed to the source via the ODBC connection. By caching the connection, significant startup and connection operations are avoided on subsequent queries. If this option is disabled, ODBC connections must be reestablished on each query. Having ODBC connections cached provides faster access if there are to be multiple accesses of the same database with the same user/password combination. If a change to ODBC connection caching is made using this menu option, it will stay in effect until **WebBase** is stopped. The variable %cacheODBC% should be set to make any persistent change to whether ODBC connection caching will be used.

Figure 5.14 Cache ODBC Connections Confirmation Dialogs



Please Confirm

Disabling ODBC Cache will
cause ODBC connections to be reestablished every query.

Disable ODBC Cache?

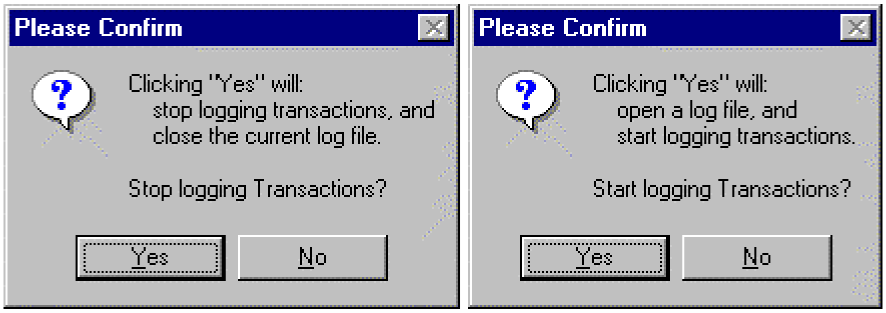
Please Confirm

Enabling ODBC Cache will
retain ODBC connections to improve query speed.

Enable ODBC Cache?

- **Enable Log File --** This is a toggle (on/off) option. If logging is enabled (default), a check mark is displayed next to the menu option. If logging is disabled, no check mark is displayed. If this option is selected, one of the confirmations shown in Fig. 5.15 is displayed. The dialog on the left is displayed if logging is currently enabled; the dialog on the right is displayed if logging is currently disabled. If this option is selected, log files will be generated for each **WebBase** transaction if a user has also defined a LogDirectory as a **WebBase** parameter. If logging is enabled, a log file is created each day to record each query made of **WebBase**. See Chapter 12 for details on logging and log file formats. If this option is disabled, log files will not be generated. If a change to logging is made using this menu option, it will stay in effect until **WebBase** is stopped. The variable %logEnabled% should be set to make any persistent change to whether logging will be done.

Figure 5.15 Enable Log File Confirmation Dialogs



Please Confirm

Clicking "Yes" will:
stop logging transactions, and
close the current log file.

Stop logging Transactions?

Please Confirm

Clicking "Yes" will:
open a log file, and
start logging transactions.

Start logging Transactions?

- **Flush Log File --** This option is only active if logging is enabled. Information to be written into the log file is buffered until sufficient data has been obtained, at which point it is written to the log file on disk. If this option is selected, any information in the buffer is written to disk. This ensures that the information the user views in the log file is all that has been generated.

Help Menu Options

- **Current User News** -- this menu option provides the same functionality as described for the Late Breaking News Window. If the Late Breaking News Windows is not open, it will automatically be opened and brought to the front.

WebBase Server Window Status Line

The status line displayed beneath the menu bar on the WebBase Server Window provides information about the current state of the system. The status line is normally displayed in white when it is active. If the user has turned off the status information by deselecting the 'Enable Transactions Pane' option in the Options menu, the **WebBase** copyright statement is displayed on a gray background. If the server has been paused, the status line has a red background.

In normal mode, the status line displays a number of important pieces of information. From left to right, the data displayed is the command counter, the concurrent commands in process, and the status. The command counter is separated from the concurrent commands in process by a '/'. The numbers are separated from the status by a '::'.

- **command counter** -- this value starts at zero when **WebBase** is launched and is incremented whenever **WebBase** processes a command (including the GIFs, JPGs, etc.)

- **concurrent commands in process** -- this value is the number of commands that are either being processed or are waiting to be processed. On most systems, this value will be either 1 or 0. However, if the server is loaded down with a mix of forms including heavy SQL access, this value may be higher.

- **status** -- The status information is either the last command processed or a date/time stamp with the server's status. When a request is made of the **WebBase** server, the status line will show the requesting browser's IP address followed by 'GET' or 'POST' and the command. For example, if a user is testing **WebBase** by sending the dateTime command, the status line would show

  ```
  1 / 0 :: 127.0.0.1 GET dateTime
  ```

  Once a minute, a status process runs within **WebBase** to check to see if any commands are in process. If there are no commands being processed, the status line is updated to indicate that the system is idle. The date and time are also displayed, and are updated each minute so the user can verify that **WebBase** is still responding. The idle status message looks like:

  ```
  2 / 0 :: Thr 13 Mar 1997 12:54:29 - Idle
  ```

WebBase Server Window Text Display

The following sets of information are displayed on the **WebBase** Server window below the status line.

- **System Parameters --** The system parameters section starts with the **WebBase** copyright statement and identifies the **WebBase** version and build, the user's license number, when **WebBase** was started, the type of system in use and other network-related information.

- **WebBase Parameters --** This section is a list of all the **WebBase** startup parameters defined in the System Registry. Many of these parameters are entered during installation. If any of these parameters needs to be changed, it is necessary to modify the value in the System Registry and then stop and restart **WebBase**. All the **WebBase** parameters are defined in Chapter 4.

- **Aliases** – This section is only included if the user has defined any aliases in the System Registry. If so, each alias and its translation are displayed in this section. Alias information and how to define aliases is found in Chapter 4. If an alias needs to be changed or added, it is necessary to modify the value in the System Registry and then stop and restart **WebBase**.

- **Domains** – This section is only included if the user has defined any domains in the System Registry. If so, each domain and its associated parameters are displayed in this section. Multiple domain support and how to define multiple domains are found in Chapter 4. If a parameter within a domain needs to be added or modified or if a domain needs to be added, it is necessary to modify the information in the System Registry and then stop and restart **WebBase**.

- **Commands --** This section lists all the built-in commands that are available in **WebBase**. These are described in Chapter 3.

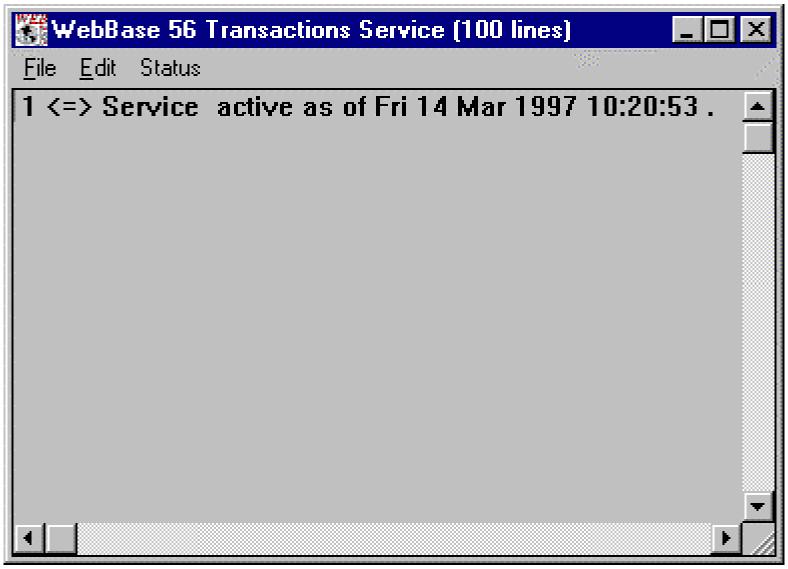
- **Dynamic variables --** This section lists all the **WebBase** dynamic variables. These are described in Chapter 9.

- **Global variables --** This section lists all the global variables. If the user selects the 'Load Global Variables' option from the Options menu, the updated global variables are displayed here.

5.3 WebBase Transactions Service Window

The WebBase Transactions Service Window maintains a queue of messages, the most recent is displayed at the top. The messages are those that are written out to the standard log file. If the global variable *%transactionsWindow%* is created and set to true, this window will automatically be opened when **WebBase** is started.

Figure 5.16 WebBase Transactions Service Window



1 <=> Service active as of Fri 14 Mar 1997 10:20:53 .

WebBase Transactions Menu Bar

The following menu options are available on the WebBase Transactions Service Window.

- **File>Exit** -- If this option is selected, the WebBase Transactions Service Window is closed. Closing this window has no effect on other **WebBase** functions.

- **Edit>Cut** -- this menu option is only active if an area of text in the window has been highlighted. If this menu option is selected, the highlighted text is copied into the system's paste buffer and removed from the text area. It can then be placed into another application (e.g., Word, PowerPoint). The keyboard shortcut <ctrl>-X (press the Ctrl key and the X key down at the same time) can also be used to perform a cut operation.

- **Edit>Copy** -- this menu option provides the same functionality as described for the Late Breaking News Window.

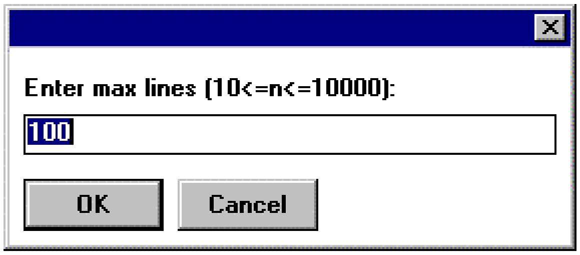
- **Edit>Clear All** -- If this option is selected, all of the information in the text area is removed.

- **Edit>Find** -- this menu option provides the same functionality as described for the Late Breaking News Window.

- **Edit>Find Again** -- this menu option provides the same functionality as described for the Late Breaking News Window.

- **Edit>Set Lines** -- If this option is selected, the Set Lines Dialog shown in Fig. 5.18 below is displayed. The number of lines of information to be displayed must be between 10 and 10000; the default is 100. The number of lines is displayed in the title bar of the window. The number of lines specified can affect system performance, as a large number of lines will require a large memory buffer. The global variable *%transactionsMaxLines%* can also be set to specify the number of lines on this window. The keyboard shortcut <ctrl>-S (press the Ctrl key and the S key down at the same time) can also be used to perform a cut operation.

Figure 5.18 Set Lines Dialog



Enter max lines (10<=n<=10000):

100

- **Status>Posting enabled --** If this option is selected, information will be written to the window. If the option is turned off (no check mark is displayed next to the option), the background of the window is displayed as dark gray and no data will be written to the window. For example, the user can select the Show TCP/IP Status option and nothing will be displayed in the window if posting is disable.

- **Status>Start transaction writing --** This option is only active if the ‘Stop transaction writing’ option was previously selected. It will cause transaction information to again be displayed in the WebBase Transaction Services window.

- **Status>Stop transaction writing --** This option is only active if transaction information is being written to the WebBase Transaction Services Window. When the WebBase Transactions Services Window is opened, transaction information will automatically start being written to the text area. When debugging a form, one might wish to view and/or capture some of the messages from the text area without having it scrolled off should other outside transactions come in. This option allows the user to stop the posting as soon as the desired trace is shown, and then resume later by selecting the ‘Start transaction writing’ option. When this option is selected, the background of the window is changed to blue-green.

- **Status>Trace incoming headers --** This is a toggle (on/off) option. If tracing of incoming headers is enabled, a check mark is displayed next to the menu option. If tracing of incoming headers is disabled (default), no check mark is displayed. If this option is selected, one of the confirmations shown in Fig. 5.15 is displayed. If this option is selected, the header records for the incoming messages are displayed in the text window. This is useful for checking out cookie messages. If a user requests the dateTime command, the following information will be displayed (some differences between systems will occur, the display is for informational purposes only):

```
19 <=>   in:  <CrLf>
18 <=>   in:  Cookie: WebBaseID=W14394896E161808318465B;
CookieCounter=1<CrLf>
17 <=>   in:  Accept: image/gif, image/x-xbitmap, image/jpeg,
image/pjpeg, */*<CrLf>
16 <=>   in:  Host: 127.0.0.1<CrLf>
15 <=>   in:  Pragma: no-cache<CrLf>
14 <=>   in:  User-Agent: Mozilla/3.0 (Win95; I)<CrLf>
13 <=>   in:  Connection: Keep-Alive<CrLf>
12 <=> 2 :: (8)  127.0.0.1 - - [14/Mar/1997:10:49:57 -0800] "GET
/dateTime HTTP/1.0" 200 496 "" "Mozilla/3.0 (Win95; I)"
```

- **Status>Trace outgoing headers** -- This is a toggle (on/off) option. If tracing of outgoing headers is enabled, a check mark is displayed next to the menu option. If tracing of outgoing headers is disabled (default), no check mark is displayed. If this option is selected, the header records for the outgoing messages are displayed in the text window. This is useful for checking out cookie messages and Last-Modified header records. If a user requests the dateTime command, the following information will be displayed (some differences between systems will occur, the display is for informational purposes only):

```
34 <=>   out:  <CrLf>
33 <=>   out:  Content-Length: 120<CrLf>
32 <=>   out:  Content-Type: text/html<CrLf>
31 <=>   out:  Last-Modified: Tuesday, 01-Jan-1901 01:01:01
GMT<CrLf>
30 <=>   out:  Expires: Tuesday, 01-Jan-1901 01:01:01 GMT<CrLf>
29 <=>   out:  Pragma: no-cache<CrLf>
28 <=>   out:  Date: Friday, 14-Mar-1997 18:52:05 GMT<CrLf>
27 <=>   out:  Set-Cookie: CookieCounter=3; path=/<CrLf>
26 <=>   out:  License: #######<CrLf>
25 <=>   out:  Server: WebBase 4.10  build 56<CrLf>
24 <=>   out:  MIME-Version: 1.0<CrLf>
23 <=>   out:  Message-ID:
<100127.3513600003@ExperTelligence.com><CrLf>
22 <=>   out:  HTTP/1.0 200 OK<CrLf>
21 <=> 3 :: (8)  127.0.0.1 - - [14/Mar/1997:10:52:05 -0800] "GET
/dateTime HTTP/1.0" 200 496 "" "Mozilla/3.0 (Win95; I)"
```

- **Status>Show Server Status** -- If this option is selected, the status of the server is displayed in the Transactions Service window in the following form:

```
36 <=> 3 :: Fri 14 Mar 1997 10:54:31Pause Server -> active
```

  The 3 indicates that the **WebBase** server has processed 3 commands. The 36 is the entry number within the WebBase Transactions Service window.

- **Status>Show TCP/IP Status** -- If this option is selected, the TCP/IP parameters are displayed in the WebBase Transactions Service window in the following form (the parameter values are dependent on the system configuration; they are presented here for illustration only):

```
53 <=>  0 :: TCP/IP: Fri 14 Mar 1997 11:39:22  valid: true  port:
80  descriptor: 7  last return code: 0  status: Running on Windows
95.
52 <=>  0 :: TCP/IP:  SoType  -->  1
51 <=>  0 :: TCP/IP:  SoError  -->  0
50 <=>  0 :: TCP/IP:  SoDebug  -->  false
49 <=>  0 :: TCP/IP:  SoRcvBuf  -->  8192
48 <=>  0 :: TCP/IP:  SoSndBuf  -->  8192
47 <=>  0 :: TCP/IP:  SoOobInline  -->  false
46 <=>  0 :: TCP/IP:  SoKeepAlive  -->  false
45 <=>  0 :: TCP/IP:  SoBroadcast  -->  false
44 <=>  0 :: TCP/IP:  SoLinger  -->  Onoff = 0,  Linger = 0
43 <=>  0 :: TCP/IP:  SoDontRoute  -->  false
42 <=>  0 :: TCP/IP:  SoReuseAddr  -->  false
41 <=>  0 :: TCP/IP:  SoDontLinger  -->  true
40 <=>  0 :: TCP/IP:  SoAcceptConn  -->  true
39 <=>  0 :: TCP/IP:  SoTcpNoDelay  -->  false
38 <=>  0 :: TCP/IP:  Microsoft Windows Sockets Version 1.1.
```

WebBase Transactions Text Window

The **WebBase** Transactions text area shows information about each transaction handled by **WebBase**. The information is presented in the format:

```
# <=> data
```

Each line starts with an entry number. When the window is first displayed, the first entry number is 1. As each additional entry is added to the window, the entry number is incremented. The number of entries maintained in the text area will not exceed the number of lines that the user has specified in the Set Lines menu option.

The information displayed after the entry number may be activation information, message-handling information, or error information. When the window is opened, the first entry is always of the form:

```
1 <=> Service active as of Fri 14 Mar 1997 11:42:29
```

When **WebBase** processes requests, the information displayed is the same as that written into the **WebBase** log files. The specific format of the log information is controlled by the LogFormat parameter. In the examples in this section, the default LogFormat of 2 (Extended Common Log Format) is used. This format displays the address of the requesting browser, the date and time of the request, the request line received from the browser, the status code returned to the browser, the number of bytes transferred back to the browser, the Referer variable and the User-Agent variable. If the user requests **WebBase** to print the date and time on a browser, the **WebBase** Transactions Service window will include an entry of the form:

```
2 <=> 4 :: (8)  127.0.0.1 - - [14/Mar/1997:11:43:38 -0800] "GET
/dateTime HTTP/1.0" 200 496 "" "Mozilla/3.0 (Win95; I)"
```

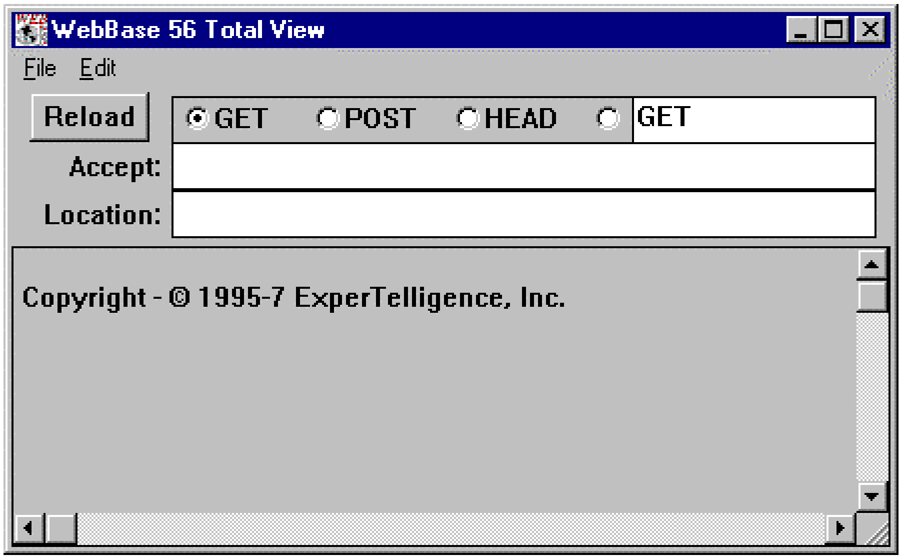
Other information displayed in the text area has been previously described in conjunction with the different menu options available on the window.

5.4 WebBase Total View Window

People have often asked “How can you tell what browser or server is handling my web information?”. The general reply is “it's in the header!”. But one does not get to SEE the header -- it is read and used by your browser and server but the information is kept hidden from you - the user. The Total View utility has been designed so that users can see the information contained within a header.

The WebBase Total View Window is displayed when the Total View option in the Edit menu in the WebBase Server window is selected. An example of the WebBase Total View Window is shown below.

Figure 5.19 WebBase Total View Window



GET

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From the WebBase Total View Window, the user can reference a web site via an Open Location command, just like most web browsers. But rather than processing the returned HTML, WebBase Total View merely displays the returned HTML -- header and all. It is an extension of the View Source functionality available with most browsers with the additional feature of not stripping off the header information.

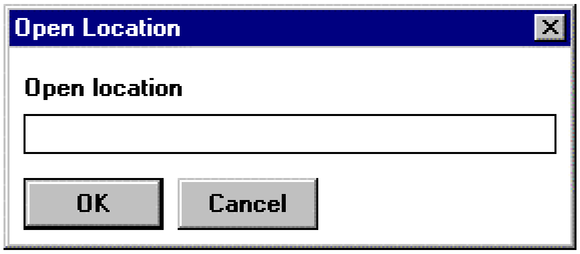
WebBase Total View Menu Bar

The following menu options are available on the WebBase Total View Window.

- **File>New Window** -- If this option is selected, a new WebBase Total View Window is opened. This is equivalent to selecting the Total View option from the Edit menu of the WebBase Server window.

- **File>Open Location --** If this option is selected, the Open Location Dialog shown in Fig. 5.20 below is displayed. The user is prompted to enter a location to which a request will be sent. The information entered by the user on the prompt is subsequently displayed in the 'Location' field, which is described below.

Figure 5.20 Open Location Dialog



- **File>Exit --** If this option is selected, the WebBase Total View Window is closed. Closing this window has no effect on other **WebBase** functions.

- **Edit>Cut** -- this menu option provides the same functionality as described for the WebBase Transactions Service Window.

- **Edit>Copy** -- this menu option provides the same functionality as described for the Late Breaking News Window.

- **Edit>Clear All** -- this menu option provides the same functionality as described for the WebBase Transactions Service Window.

- **Edit>Find** -- this menu option provides the same functionality as described for the Late Breaking News Window.

- **Edit>Find Again** -- this menu option provides the same functionality as described for the Late Breaking News Window.

- **Edit>Reload** -- If this option is selected, the request is sent to the specified location. This is equivalent to pressing the ‘Reload’ button in the WebBase Total View Window.

WebBase Total View Options

The WebBase Total View Window presents several input fields and buttons at the top that allow the user to enter the type of command to be generated and the location it is to be sent to.

- **Reload** -- If this button is pressed, the information entered by the user on the input fields (accept, location) and the type of command are formed into a message and sent to the specified location. The address, message sent, and the results of the command are displayed in the text window.

- **GET/POST/HEAD** -- These radio buttons identify the type of message that will be sent to the location. When a button is selected, the selection is displayed in the white area to the right of the buttons.

- **Accept** -- This field contains any information to be included as the ‘Accept’ parameter passed with the message. Details on this parameter can be found in Appendix C.

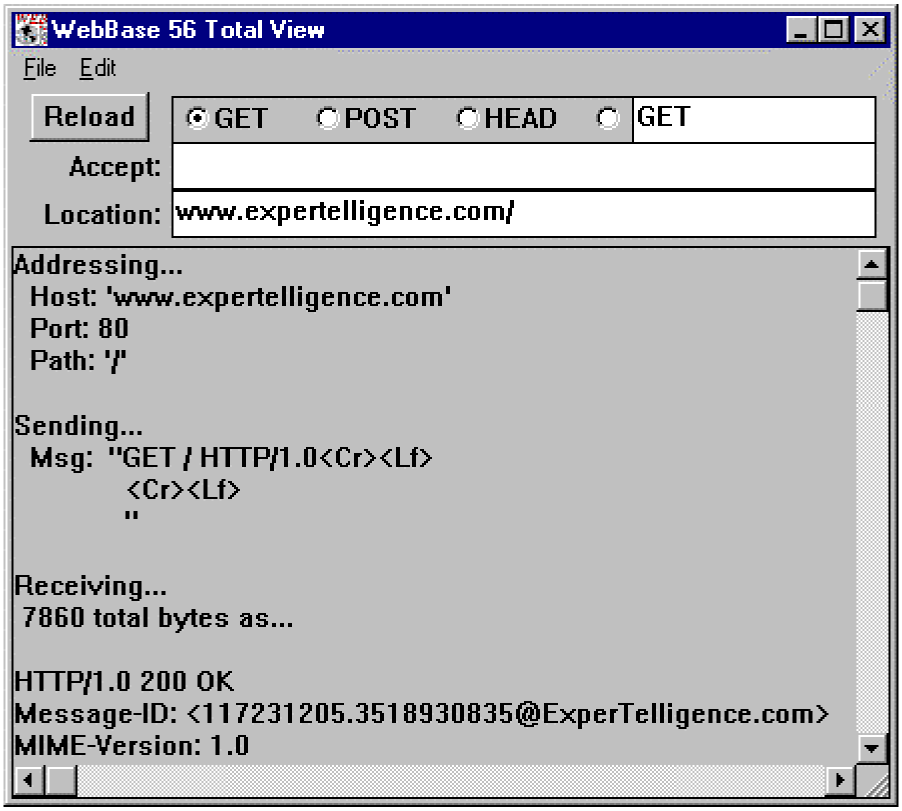
- **Location** -- This field contains the location of where the message will be sent. It can be in the form of ‘www.expertelligence.com’ or a numeric address (e.g., 127.0.0.1).

WebBase Total View Text Window

The text part of the WebBase Total View Window displays the results of creating and sending a message containing the selections made by the user to the specified location. The address where the message is sent is presented at the top of the window, broken down into host, port and path. Below this is the message that is sent. Finally, the WebBase Total View Window displays how many bytes were received and what the information was that was received back.

The results of selecting a ‘GET’ command and sending it to www.expertelligence.com are shown below.

Figure 5.21 WebBase Total View Window Showing Results



GET

Accept:

Location: www.expertelligence.com/

```
Addressing...
  Host: 'www.expertelligence.com'
  Port: 80
  Path: '/'

Sending...
  Msg:  "GET / HTTP/1.0<Cr><Lf>
         <Cr><Lf>
         "

Receiving...
 7860 total bytes as...

HTTP/1.0 200 OK
Message-ID: <117231205.3518930835@ExperTelligence.com>
MIME-Version: 1.0
```

5.5 WebBase Heartbeat Window

The **WebBase** Heartbeat function can be used to send commands to **WebBase** on a timed basis and receive reports on the reply status of the commands. When a command times out, the heartbeat function can reset the TCP/IP socket in an attempt to clear the problem and reissue the command to see if that socket reset has again enabled the communications port. The WebBase Heartbeat Window reports on the heartbeat commands and replies.

The heartbeat function is only activated if the WebBase Heartbeat Window is opened by selecting the menu option, or if the global variable *%heartbeatWindow%* is set to true. If a user wants to have the heartbeat function always active when **WebBase** is started, then %heartbeatWindow% should be created as a global variable.

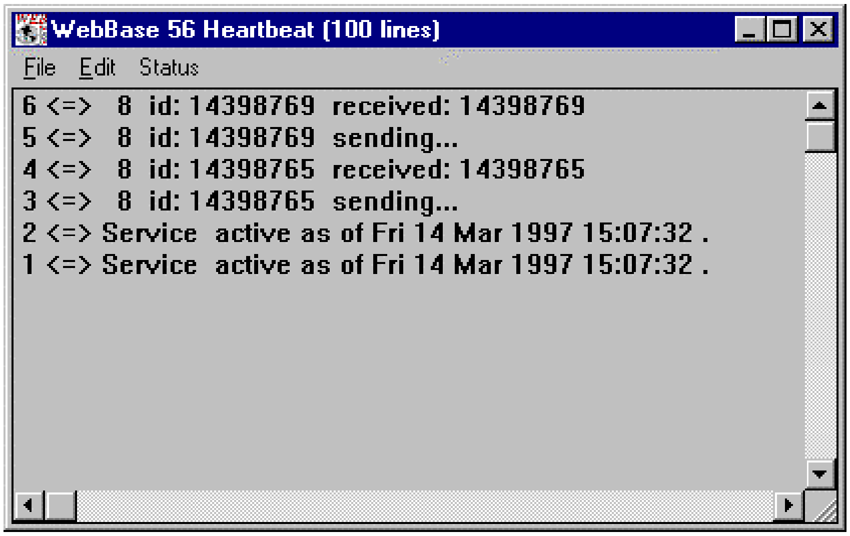
Note:

*On Windows NT systems in which **WebBase** is started as a service, creating the global variable %heartbeatWindow% with a value of true is the only mechanism by which the heartbeat function can be started.*

When the WebBase Heartbeat Window is closed, the heartbeat function is also terminated – the heartbeat function is only active when the WebBase Heartbeat Window is open or iconified.

Figure 5.22 shows an example of the WebBase Heartbeat Window. The first two lines are always displayed when the window is opened to indicate that the heartbeat service has been started. The remaining lines indicate the commands that are sent out and replies received. The menu bar indicates the number of lines of information that will be displayed within the window, as well as how often the commands will be sent out.

Figure 5.22 WebBase Heartbeat Window



```
6 <=>  8  id: 14398769  received: 14398769
5 <=>  8  id: 14398769  sending...
4 <=>  8  id: 14398765  received: 14398765
3 <=>  8  id: 14398765  sending...
2 <=> Service  active as of Fri 14 Mar 1997 15:07:32 .
1 <=> Service  active as of Fri 14 Mar 1997 15:07:32 .
```

The **WebBase** parameter **HostAddress** can be used to specify the IP address where the heartbeat command is to be sent. If the parameter is not defined, it defaults to ‘127.0.0.1’ that should work in most systems to identify the local host.

If the user sets a parameter that is a different and possibly remote **WebBase** server, the heartbeat commands will be sent to this server. However, if a reply time-out occurs, the TCP/IP restart command will be sent to the local server running the Heartbeat service.

WebBase Heartbeat Window Menu Bar

The following menu options are available on the **WebBase** Heartbeat Window.

- **File>Exit --** If this option is selected, the **WebBase** Heartbeat Window is closed. Closing this window has no effect on other **WebBase** functions. However, the heartbeat is only functional when this window is open. If the window is closed, the heartbeat will be stopped.
- **Edit>Cut --** this menu option provides the same functionality as described for the WebBase Transactions Service Window.
- **Edit>Copy --** this menu option provides the same functionality as described for the Late Breaking News Window.
- **Edit>Clear All --** This menu provides the same functionality as described for the Late Breaking News Window.
- **Edit>Find --** this menu option provides the same functionality as described for the Late Breaking News Window.
- **Edit>Find Again --** this menu option provides the same functionality as described for the Late Breaking News Window.

- **Edit>Set Lines** -- this menu option provides the same functionality as described for the WebBase Transactions Service Window. The global variable *%heartbeatMaxLines%* can also be set to specify the number of lines on this window.

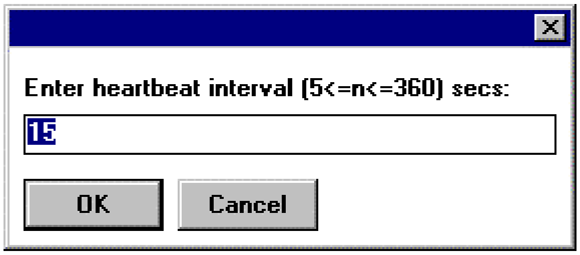
- **Status>Posting enabled** -- If this option is selected, information will be written to the window. If the option is turned off (no check mark is displayed next to the option), no data will be written to the window. For example, if posting is disabled there will be no messages displayed when a heartbeat command is sent out and a reply received. The background of the window is darkened when posting is disabled. The global variable *%heartbeatPostingEnable%* can also be set to 'true' or 'false' to enable or disable posting. If set to 'false', it will cause posting into the WebBase Heartbeat Window to be disabled when the window is opened (either automatically via the %heartbeatWindow% variable or manually via the Edit menu). Posting uses memory and processor resources, so it might be desirable in a production system to disable posting. Error messages will continue to be posted even though posting is marked as disabled. The TCP/IP reset will also be issued when appropriate regardless of the posting enabled status.

- **Status>Start heartbeat service** -- This option is only active if the 'Stop heartbeat service' option was previously selected. It will cause a heartbeat to be sent out periodically (the time interval is set by the Set heartbeat interval menu option or the variable *%heartbeatInterval%*) and the replies reported.

- **Status>Stop heartbeat service** -- This option is only active if the heartbeat function is currently active. Note that the heartbeat function is only active when the WebBase Heartbeat Window is opened, or if it has been stopped and then restarted using the Start Heartbeat Service available on this menu. If the heartbeat service is stopped, the background of the WebBase Heartbeat Window is changed to a blue gray color and no additional information is displayed until the heartbeat service is restarted. The heartbeat parameters described below can only be changed when the heartbeat service has been stopped.

- **Status>Set heartbeat interval** -- This option is only available when the heartbeat service has been stopped. If this option is selected, the Heartbeat Interval Dialog shown in Fig. 5.23 is displayed. The user is prompted to specify the interval between commands in seconds. The value entered must be between 5 and 360 seconds; the default is 15. The heartbeat interval is displayed in the title bar of the window. The global variable *%heartbeatInterval%* can also be used to specify the heartbeat interval.

Figure 5.23 Heartbeat Interval Dialog

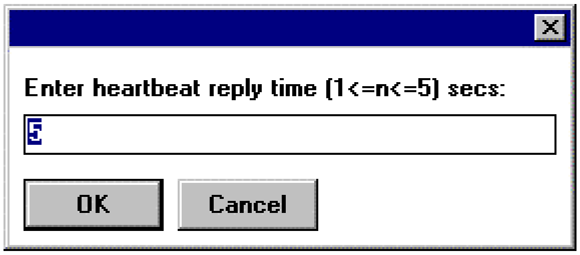

Enter heartbeat interval (5<=n<=360) secs:

15

- **Status>Set heartbeat reply time** -- This option is only available when the heartbeat service has been stopped. If this option is selected, the Heartbeat Reply Time Dialog shown in Fig. 5.24 is displayed. The user is prompted to specify the length of time to wait for a reply in seconds. The value entered must be between 1 and 5 seconds; the default is

5. The global variable *%heartbeatReplyTime%* can also be used to specify the heartbeat reply time.

Figure 5.24 Heartbeat Reply Time Dialog

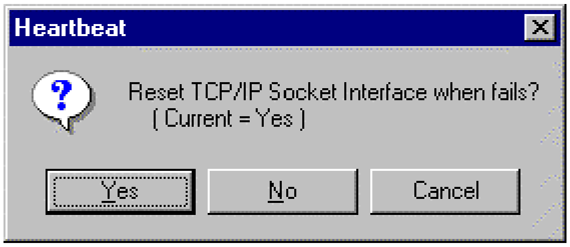


Enter heartbeat reply time (1<=n<=5) secs:

5

- **Status>Set heartbeat reset TCP** -- This option is only available when the heartbeat service has been stopped. If this option is selected, the Heartbeat Reset Dialog shown in Fig. 5.25 is displayed. The user is prompted whether the TCP/IP socket should be reset when a command times out. The default is that the socket will be reset. The global variable *%heartbeatResetTCP%* can also be used to indicate whether the TCP/IP socket should be reset.

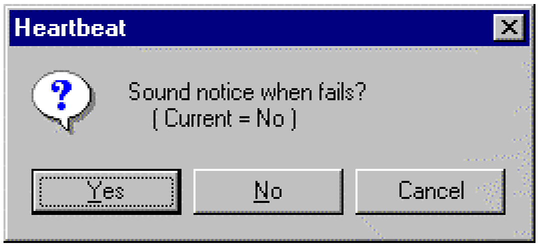
Figure 5.25 Heartbeat Reset Dialog



Reset TCP/IP Socket Interface when fails?
(Current = Yes)

- **Status>Set heartbeat sound** -- This option is only available when the heartbeat service has been stopped. If this option is selected, the Heartbeat Sound Dialog shown in Fig. 5.26 is displayed. The user is prompted whether a sound is played if a failure is identified. By default, no sound is played. If the user selects to have a sound played, the user cannot control which sound is played; the only available sound is a dirge. The global variable *%heartbeatSound%* can also be used to indicate whether a sound should be played if a failure is detected.

Figure 5.26 Heartbeat Sound Dialog



Sound notice when fails?
(Current = No)

- **Status>Issue single heartbeat** -- This option is only available when the heartbeat service has been stopped. If this option is selected, a single heartbeat command and reply sequence is issued and the results displayed in the text area of the window. This single heartbeat, if it fails, will cause a reset TCP and sound based on the settings of these parameters, not just a report on the status.

WebBase Heartbeat Text Window

The WebBase Heartbeat Window text area shows information about each heartbeat command sent out and the reply that is received. The information is presented in the format:

```
# <=> data
```

Each line starts with an entry number. When the window is first displayed, the first entry number is 1. As each additional entry is added to the window, the entry number is incremented. The number of entries maintained in the text area will not exceed the number of lines that the user has specified in the Set Lines menu option.

The information displayed after the entry number may be heartbeat command/reply details, status information, or error information. When the window is opened, the first entry is always of the form:

```
1 <=> Service  active as of Fri 14 Mar 1997 15:33:19
```

When heartbeat commands are sent out and replies received, the information displayed is the ID of the command, and whether it is being sent or received. Here is an example of a heartbeat command sent and received:

```
190 <=>   8  id: 7873913  received: 7873913
189 <=>   8  id: 7873913  sending...
```

If the heartbeat function detects no response to a command which has been sent out, the following messages are displayed:

```
119 <=> Heartbeat - Restarting the TCP/IP Socket Interface.
118 <=> Heartbeat - No response from server.
```

The bottom line would appear immediately above a “sending…” line. The top line will occur if the user has indicated that the TCP connection should be restarted if a “no response…” reply is received.

Other information displayed in the text area has been previously described in conjunction with the different menu options available on the window.

ODBC & SQL

Chapter 6

This chapter provides information about Open Database Connectivity (ODBC) which is the standard used by **WebBase** for communicating with databases. This chapter also covers some of the basics of Structured Query Language (SQL) that is used to create, retrieve and delete records from a relational database.

6.1 Open Database Connectivity

Open Database Connectivity (ODBC) is a standard devised by Microsoft to enable any application to communicate with any database manager. ODBC is based on Structured Query Language (SQL) as a standard for accessing data. This interface provides maximum interoperability: a single application can access different SQL Database Management Systems (DBMS) through a common set of code. This enables a developer to build and distribute a client/server application without targeting a specific DBMS. Database drivers are then added to link the application to the user's choice of DBMS.

Most key database vendors now provide an ODBC interface, via which the end-user has access to centrally stored data directly from the database. These interfaces are called ODBC drivers. Microsoft provides a set of ODBC drivers for their products on their web site; these drivers are also made available at the **WebBase** web site. Instructions on acquiring and installing these ODBC drivers are included in Chapter 3.

The *sql* macro within **WebBase** is used to generate a database query. **WebBase** packages the query into an ODBC function call that is then passed to the ODBC driver. The driver accepts the ODBC requests; translates them into internal format recognizable by the database system (e.g., ODBC to Microsoft Access); manages the communications with the database itself; and provides the results back to **WebBase**. **WebBase** completes processing of the results and they are then available in the form for subsequent use. The advantage of using ODBC in this approach is that it allows **WebBase** to support any ODBC compliant database with no need for internal knowledge about the specifies of a particular database system.

It is possible to design forms with multiple database queries, and queries of multiple database systems via different ODBC drivers. For example, it is possible to retrieve information from a Microsoft Access database and use it to generate a new record in an Oracle database. In the future if the Oracle database is replaced by a SQL Server database, no change to the **WebBase** forms are required!

6.2 Structured Query Language

Structured Query Language, or SQL, is a database access language. It is based upon the relational database model. A relational database is basically a collection of tables of data. Data is stored in rows in each table. Each row is broken into cells or fields of data; each row of data within a table has the same number of cells although the contents will usually differ.

It is not the purpose of this chapter to provide extensive information about SQL. However, database interactions via **WebBase** are done using SQL statements. The primary SQL statements are presented here, along with an example of how they would be implemented in **WebBase** code.

Users who are unfamiliar with SQL might want to consider finding a good reference book about SQL usage, or search the Internet for information or tutorials on using SQL. Each ODBC-compliant database implements many of the SQL statements. The reference materials provided with a user's particular database may also provide information about SQL statements.

SELECT

The SELECT statement is used to retrieve one or more rows of data from a table. This is the SQL statement most frequently used, both in general database interactions as well as with **WebBase**. The table below is a portion of the Cars table provided with **WebBase** and used in the **WebBase** database examples.

Example 6.1 Sample Database Table -- Cars

ID	Year	Maker	Model	Trans	Kind	Color	Miles	Price
1	1967	CITROEN	DDS1I	4 Speed	2 Door	Green	100000	3000.00
2	1985	MERCEDES	SE	Automatic	4 Door	White	69000	19500.00
3	1969	PORSCHE	911E	5 Speed	2 Door	Orange	75000	4900.00

SELECT -- General Usage

To retrieve all the records from the table, the following statement would be used:

```
SELECT * FROM Cars
```

The 'SELECT' indicates the type of database query that will be done, in this case some records will be selected and returned. The '*' is the wildcard character, and indicates that all the fields in each record are to be returned. The 'FROM' specifies which table the data will be retrieved from, and is followed by the name of the table.

It is possible to retrieve only some of the fields for each record. To retrieve only the ID, Year and Maker of the records, the following statement would be used:

```
SELECT ID, Year, Maker FROM Cars
```

It is strongly recommended that only the necessary fields of data be retrieved via a SELECT statement. This reduces the amount of data to be retrieved from the database and returned to **WebBase** via the ODBC driver, resulting in an improvement in performance.

Often, it is necessary to retrieve a set of records based on their contents. These qualifications are added to the SELECT status using a WHERE clause. In the example above, we might want to retrieve all the cars that were 2-door. The following example shows how this would be done:

```
SELECT * FROM Cars WHERE Kind = ‘2-door’
```

The WHERE clause contains three components: the field name from the table, a comparison operator, and a value. In this case, the field name was ‘Kind’, the operator was ‘=’, and the value was ‘2-door’. It is possible to specify several criteria in a single WHERE clause. Continuing with the above example, here’s the select statement for all cars that are 2-door and have less than 100000 miles:

```
SELECT * FROM Cars WHERE Kind = ‘2-door’ AND MILES < 100000
```

The OR statement can also be used to select records in which a field value matches one or the other criteria but not necessarily both. Here’s the SELECT statement for all cars that are 2-door or have less than 100000 miles:

```
SELECT * FROM Cars WHERE Kind = ‘2-door’ OR MILES < 100000
```

A number of different operators can be used, as shown above. Some of the more frequent operator are =, <, <=, >, >= and LIKE. The LIKE operator is used to do a case-insensitive comparison; the = operator does a case-sensitive comparison. When the LIKE operator is used, it is also possible to use wildcards as part of the value. The ‘%’ is the wildcard character. It can be added at the beginning of the value, the end of the value, or both. To select all cars whose transmission is ‘auto’, the following statement would be used:

```
SELECT * FROM Cars WHERE Trans LIKE ‘%auto%’
```

This would return matches for cars whose Trans entry was ‘Automatic’, ‘Auto’, and ‘Almost Automatic’.

The ORDER BY clause is useful to define the sort order of the resulting collection of records. All of the records in the Cars database can be retrieved and sorted using the following statement:

```
SELECT * FROM Cars ORDER BY Year ASC Price DESC
```

This will return a collection of records in which the years of the car are in ascending (increasing) order. For any cars with the same year value, their prices will be in descending order.

There are several other clauses that can be used with the SELECT statement, and are described in SQL reference materials. Again, it is not the purpose of this section to cover everything about the SELECT statement. There are many good references available in books and on the Internet that can provide additional details.

SELECT -- WebBase Usage

To use any of the above SELECT statements within a **WebBase** form, the statement is enclosed within the *sql* macro and any explicit values are replaced with appropriate **WebBase** variables. Let's assume that there is a form that asks the user what kind of car they want, and they can select from several options including '2-door', '4-door' and 'hatchback'. The user's selection is stored in the **WebBase** variable {kindOfCar}. The following **WebBase** expression will return all of the records from the Cars table that are of this particular kind:

```
{sql to allCars source 'myAccess' user 'fred' password 'test'}
  SELECT * FROM Cars WHERE Kind = '{kindOfCar sql=true}'
{/sql}
```

The only difference between the **WebBase** statement and an explicit SQL statement is that the explicit value – '2-door' – is replaced by the **WebBase** variable name. Instead of having to have separate explicit SQL statements for each kind of car, only a single statement using a **WebBase** variable is needed. **WebBase** will replace the variable with its value, and then perform the database query. The sql=true parameter is generally included with any **WebBase** variable that contains a string and is included in a SQL statement.

The value of a particular field must be clearly identified as part of any SQL statement, including a SELECT statement. Any text or memo field values must be enclosed in single quotes, as shown above. Date or date/time field values must be enclosed in '#' signs. An example using dates is presented with the INSERT statement below. Numeric values need no enclosing characters.

SELECT – Join Statements

Relational databases allow data to be related across tables; the data does not have to be stored in each table. Generally, there is one field that contains data that is common to both tables. In order to retrieve the information from both tables, a table join is done. The result of the table join is that selected fields from each table may be retrieved, or all the fields from both tables may be retrieved.

To show how a join statement works, another example table will be used. This table is called Owners, and contains the names and addresses of the car owners. The common field between the two tables is ID in the Owners table, and OwnerID in the Cars table. Note that the name of the field does not have to be the same between the two tables; only the contents are used to match up records.

The following SELECT statement would be used to retrieve records from both tables.

```
SELECT ct.Year, ct.Maker, ct.Model, ot.Name, ot.Address
  FROM Cars ct, Owners ot
  WHERE ct.OwnerID = ot.ID
```

Note that each table is assigned an abbreviated name and this abbreviated name is used to specify which fields are used or retrieved from which table. This is required if there are fields in both tables with the same name that may have different values. If there are no field names common to the two tables, then the abbreviated names do not have to be used and the above statement could be written as:

```
SELECT Year, Maker, Model, Name, Address
  FROM Cars, Owners
  WHERE OwnerID = ID
```

A join is also referred to as an INNER JOIN. An equivalent way of writing the above would be:

```
SELECT Year, Maker, Model, Name, Address
  FROM Cars INNER JOIN Owners ON Cars.OwnerID = Owners.ID
```

This latter format is used by database applications such as MS-Access. It is often useful to create the query within the database application and verify that the query is correct for a representative sample of data and selection criteria. Once the query is working, many applications can display the query in SQL format. Join queries will often use the above format. **WebBase** can accommodate either of the join formats displayed above.

INSERT

The INSERT statement is used to create a new row of data in a table.

INSERT -- General Usage

It is not necessary that all fields be specified at the time the row of data is created. For most databases, it is strongly recommended that one field contain a unique value (e.g., primary key). This field should be defined when the new row is created.

Note:

Some databases include an AutoNumber data type which can create a unique number for each new record added to the table. For those users just learning about SQL and databases and WebBase, if your database includes this data type, it is recommended that an id field using this data type be set up for each table.

If all the field values for the new row will be specified, the following statement can be used to create a new car record in the table:

```
INSERT INTO Cars VALUES (4, 1994, SATURN, SL2, 5 Speed, 4 Door, Red,
50000, 13000.00)
```

A new row is created, and then populated on a column-by-column basis using the information passed in as VALUES. Often, however, not all of the information to be stored in the fields will be known when the record is to be created. To create a record in which only some of the fields will be populated, the following statement is used:

```
INSERT INTO Cars (ID,
    Year,
    Make,
    Model,
    Miles,
    Price)
  VALUES (4,
    1994,
    SATURN,
    SL2,
    50000,
    13000.00)
```

All of the fields to be populated are specified immediately after the table name; all of the values to store into the fields are stored in the same order immediately after VALUES. There must be a 1:1 correlation between the field names and the values to be stored in them. The style used above to present the fields and values as columns is not required; all of the information can be placed in a single line.

INSERT -- WebBase Usage

As with the SELECT statement described earlier, it is very easy to take an explicit INSERT statement and use it within **WebBase**. Assume there is a form into which a user enters information about their car. The car information is stored in the **WebBase** variables {year}, {make}, {model}, {miles} and {price}. A new record will be created with these variables using the following:

```
{sql to allCars source 'myAccess' user 'fred' password 'test'}
  INSERT INTO Cars (ID,
      Year,
      Make,
      Model,
      Miles,
      Price,
      RecDate)
    VALUES (4,
      {year},
      ‘{make sql=true}’,
      ‘{model sql=true}’,
      {miles},
      {price},
      #{%dateTime%}#)
```

A new field is being added into this record called RecDate. This is the date on which the record was created. Such a field is not required in a table, although it is often found useful to know when a record was created and/or last updated. The value stored into that field is the current date and time. Because it is a date/time field, the variable must be enclosed with ‘#’ signs.

UPDATE

The UPDATE statement is used to change data in an existing row or rows, either by adding new data or modifying existing data.

UPDATE – General Usage

Each UPDATE statement identifies the table in which the row(s) of data to be updated is found, the field(s) to be updated, the new values for the fields, and possibly a WHERE clause to identify which particular records will be updated. To update the NumOwners field for all the Cars in the table to 1, the following statement would be used:

```
UPDATE Cars SET NumOwners = 1
```

More than one field can be updated at a time. To update both the NumOwners field to 1 and also specify that all audio systems are ‘AM/FM’, the following would be used:

```
UPDATE Cars SET NumOwners = 1, Audio = ‘AM/FM’
```

Often, only one or a few records in a table need to be updated. The WHERE clause is used to specify which particular records will be updated. The format of the WHERE clause is exactly as described above for the SELECT statement, and can include a single conditional or multiple conditionals using the AND and/or OR operators. To update the record created using the INSERT statement above,

```
UPDATE Cars SET NumOwners = 1, Audio = ‘AM/FM’ WHERE ID = 4
```

UPDATE – WebBase Usage

The UPDATE statement when used within the *sql* macro is very similar to an explicit UPDATE statement as described above. If the number of owners an audio type from the UPDATE statement in the preceding section were stored in the **WebBase** variables {numOwners} and {audioType}, the corresponding UPDATE statement in **WebBase** would look like:

```
{sql to allCars source 'myAccess' user 'fred' password 'test'}
  UPDATE Cars SET NumOwners = {numOwners},
    Audio = ‘{audioType sql=true}’ WHERE ID = 4
{/sql}
```

The {numOwners} value is being written into a numeric database field; thus it does not require any special enclosing characters. The {audioType} value is being written into a text field, so it is enclosed in single quotes.

DELETE

The DELETE statement is used to delete one or more records from a database[12].

DELETE – General Usage

The DELETE statement always specifies a table as well as a WHERE clause to identify the particular record or records to be deleted. To delete the car record inserted and updated in the previous sections, the following statement would be used:

```
DELETE FROM Cars WHERE ID = 4
```

The WHERE clause can include a single field/value pair, or it can specify several field and value pairs.

DELETE – WebBase Usage

Deleting a record in a **WebBase** form is as easy as adding or updating a record. The appropriate DELETE statement is placed within the *sql* macro, and any values are replaced by **WebBase** variables. The **WebBase** statement to delete the record added to the cars table in the database would be:

```
{sql to allCars source 'myAccess' user 'fred' password 'test'}
  DELETE FROM Cars WHERE ID = {carID}
{/sql}
```

[12] Some databases do not actually delete the record from the database. Instead they set a flag that the record is to be deleted; the record is not actually deleted until the database is compressed. See Chapter 14 for database-specific issues such as this.

The **WebBase** {carID} variable would have been previously determined either by an explicit entry by the user or as the result of a SELECT statement.

.htf Files

Chapter 7

WebBase is configured to process any file with an extension of .htf, .htm or .html. It is recommended that files containing **WebBase** macros and variables use the .htf file extension. Any files containing "pure" HTML syntax should use the .htm or .html file extensions.

Chapter 2 presented an example of a file in which **WebBase** was used to perform a database query, retrieve the results from the database, and determine how the data should be displayed at the browser. Because of the importance of forms to **WebBase**, this example will be reviewed again.

7.1 Editing .htf Files

WebBase .htf files are text files that can be created with a text editor or with an HTML editor. The **WebberActive** HTML editor provided with **WebBase**[13] is a full-featured HTML editor that is also customized for use with **WebBase**! You can insert any of the **WebBase** macros into your form being edited as easily as adding an HTML tag. You can even preview the page you're developing in **WebBase** within the browser preview capabilities of **WebberActive**!

There are many other commercial HTML editing packages available; each offers its own level of customization capabilities. Several of the HTML packages are based on the SGML specification, and can have problems handling **WebBase** .htf files due to the use of curly braces by **WebBase** macros and variables. Although it is possible to place **WebBase** expressions with the <SCRIPT> tag, this can seriously limit the extent of **WebBase** functionality that can be added into a form.

Although it is not required that **WebBase** forms be developed with **WebberActive**, we have found that the capabilities provided within **WebberActive** make it the optimum environment for developing and testing **WebBase** forms.

Note:

*When a new .htf file is created, the name of the file must contain only alphanumeric characters. Although operating systems such as Windows NT and Windows 95 support filenames containing spaces, **WebBase** and browsers do not support .htf*

[13] WebberActive is a 32-bit application, and is included with the purchase of WebBase effective with build 55. Users who purchased WebBase prior to build 55 may purchased WebberActive by contacting sales@expertelligence.com

filenames containing spaces. This also applies to directories. It is not possible to create a URL that includes a subdirectory whose name includes spaces.

7.2 Requesting Input on a Form

Many of the **WebBase** forms that are developed either request information from the user in preparation for querying the database, or present information back to the user after the query has been completed. This section covers forms that request information from the user.

Information from a user is generally requested using the HTML **<**FORM> construct. The form element can contain input, selection, and text area tags, along with document structuring elements. Form elements can be mixed in with document structuring elements. For example, a <PRE> element may contain a <FORM> element, or a <FORM> element may contain lists that contain input elements. This gives considerable flexibility in designing the layout of forms.

Each <FORM> statement has one required attribute: ACTION. This attribute identifies the file/URL to which the form contents will be submitted. A FORM may also have an optional attribute METHOD that defines whether a GET or a POST request will be made. GET requests include all the command line arguments as part of the URL; POST requests include the command line arguments as part of the request.

The INPUT tag represents a form field for user input. These can appear in a wide variety of types, including text, password, checkbox, radio, submit, reset, image and hidden. Most INPUT fields will also have a NAME attribute specified. This name and the value entered by the user into the field are passed as command line arguments and become a **WebBase** local variable[14]. It is also possible to set up a default value for an INPUT field; this is done using the VALUE attribute. The value of this attribute can be a constant or a **WebBase** variable.

The SELECT tag provides a list of values for the user to select from. The values are given in <OPTION> elements. As with INPUT fields, each SELECT tag has an associated NAME attribute that must be specified. The **WebBase** variable %varList% is used to create a **WebBase** variable containing the multiple selections; see Chapter 9 for more information on this variable.

The TEXTAREA tag is used to allow a user to type in multiple lines of text. It is usually used as a free-form message area. The content of the field is used as the default value. The rows and columns determine the size of the text area.

A FORM will generally include some type of button or other mechanism so that the user can indicate that their interactions with the form are complete and they are ready for their data to be processed. When such an indication is provided, the browser builds a URL starting with the file/URL specified as the ACTION attribute of the FORM statement. It appends name=value pairs to this URL, one pair for each named tag entity within the FORM. The browser then sends out the URL to the server for processing.

In the example presented earlier, the GET query generated was:

[14] Differences between browsers on the way that empty input fields are handled have been noted. For example, Netscape passes all variables as command line arguments whether a value is entered or not. MSIE only creates command line arguments for those variables for which the user entered a value. It is always recommended that form designers check the command line arguments that are received and take appropriate action depending on which variables are or are not received. It should be noted that the browser behavior described here may change with future versions of the browsers.

```
http://<hostURL>/getname.htf?name=Denny
```

The ACTION attribute of the FORM was “getname.htf”. There was a single INPUT tag within the FORM whose name was ‘name’. The value typed into the input field was ‘Denny’ (this was also the default value specified for the field). The browser combined all this information to generate the URL shown above.

7.3 Processing Input from a Form

After the user has entered information into a form and indicated that they wanted to proceed, another form is invoked. This form should address two issues: verifying that the user entered proper information, and processing the information entered by the user.

WebBase automatically creates local variables for each of the command line arguments sent by the browser. Any **WebBase** variable names specified in the .htf file within curly braces, e.g., *{name}*, are automatically replaced by the value of the variable. In the above example, any references in the file to {name} are replaced by the string ‘Denny’.

The form designer should include some code to verify that appropriate values were entered. For example, if a field is to contain only numbers, then an error should be returned back to the user if they entered a non-numeric value. Error checking such as this should be done before any data processing to ensure that only valid data is being used in computations and database interactions. It is much easier to correct data before it is stored in the database than to have to try to correct it once it is stored in the database.

The **WebBase WebWizard** basic example #7 shows how to do error checking and return error information to the user. Error checking can also be done using Java applets or JavaScript as part of the initial FORM statement. An example of using JavaScript for error checking is provided in the Java examples, also accessible from the **WebBase WebWizard** table.

Once the data has been validated, it can be processed. Continuing with the example from the previous section, the file ‘getname.htf’ that is accessed by the GET query is displayed in Fig. 2.1. This file does a database query, checks to see if there are any results returned from the query, and then displays appropriate information to the user. All **WebBase** expressions and variables are in bold.

The *sql* macro, starting with ‘{sql …}’ and ending with ‘{/sql}’, provides the details **WebBase** needs to interface with the database. This includes the data source and login information that is specified within the *sql* macro itself. Between the {sql} and {/sql} keywords is the database query. In this case, a SELECT statement is used to extract the desired records from the database. The **WebBase** variable *{name}* is used within the SELECT statement. When the form is processed, **WebBase** replaces {name} with ‘Denny’. The resulting SELECT statement received by the database will look like:

```
SELECT * FROM Examples WHERE Name LIKE '%Denny%'
```

The ‘%’ characters before and after ‘Denny’ are wildcard characters. Any database records containing the string ‘Denny’ will be returned. The LIKE operator specifies that the match should be a case insensitive match. Thus, names such as ‘Denny Bollay’, ‘Denny’s Restaurant’ and ‘photography by denny’ are valid. Only the first 25 records that have a match will be returned; this is controlled by the *max* keyword that is part of the *sql* macro. The returned records are stored in the **WebBase** variable *answers.*

NOTE:

Any valid ODBC SQL query statement can be constructed and processed by ***WebBase*** *including UPDATE, INSERT and DELETE statements* **--** *queries are not limited to SELECT statements.*

After the data has been retrieved from the database, the **WebBase** *if* macro is used to test conditions. In this example, the *if* macro starts with '{if …}' and ends with '{/if}'. It is used to determine the action to take based on the number of records returned by the query. The first line of this section

```
{if 0 answers size =}
```

tests the size of the **WebBase** variable *answers*. If there are 0 answers, the HTML immediately following the {if ...} statement is returned. If there is at least 1 record returned, the HTML immediately following the {else} statement is returned.

In this example, there are 2 records returned from the database. **WebBase** provides looping macros to iterate through multiple returns. The *forRow* macro, starting with '{forRow …}' and ending with '{/forRow}', loops on the records returned by the query and stored in the variable *answers*.

Field names defined in the database are referenced in the **.**htf file as **WebBase** field variables. The value of the field returned by the query will be substituted for the field name where it is used within curly braces. In this example, some of the field names in the database are: 'Name', 'Company', 'City', 'State', 'Zip' and 'Phone'. There may be additional field names in the database records whose contents are not used at this time (e.g., 'SocialSecurityNumber'). As each record is processed, the {Name}, {Company}, et al. field variables take on different values.

As **WebBase** has been processing the file, it has been building a stream of characters that will be returned to the browser. These characters are the HTML tags and data to be displayed. Much of the data to be displayed is the result of evaluating **WebBase** expressions. The returned stream does not include any **WebBase** expressions; it simply includes the results of evaluating the expressions.

Chapter 8

Macros

Invariably, one needs to add some intelligence to forms. The **WebBase** macro language allows tremendous flexibility in processing files.

Macros within **WebBase** are the means by which one specifies database SQL statements and performs logic on variables, including the results of SQL queries, such as IF THEN ELSE constructs, FOR loop iterations, and CASE statements. The **WebBase** macro language allows you to create ***Dynamic HTML*** -- web pages that respond to user input as well as database search results.

8.1 Overview of WebBase Macros

WebBase macros are expressed in one of two formats:

- Single expression format**:** The entire macro is expressed within a set of curly braces, e.g. {insert '../filename.HTF'} or {set counter 3}. This format is similar to the HTML <P> or <INPUT ...> construct.

- Start and end expression format**:** The macro is begun with one single expression statement, e.g. {if counter 3 =}, and is terminated with a second single expression statement, e.g. {/if}. This format is similar to the HTML <TITLE> ... </TITLE> construct. Some start and end expression format macros also have optional intermediate single expression macro forms that may exist between the beginning and ending macros such as the {else} clause within the {if...} {/if} range. This is much like the <LI> within a <UL> </UL> range.

With the exception of the *comment* and *output* macros, macros may be nested to any desired depth. Note, however, that forms or variables within curly braces cannot be nested. For example, the expression {if 0 {variable} =} will produce a syntax error; the correct format is simply {if 0 variable =}.

The **WebBase** macros are described below. Some macros have required and/or optional arguments. Required arguments are explicitly indicated in the macro definition line. Optional keyword-value pairs are described in a table for each macro; the keyword and value are always separated by a space. Except for specific cases noted below, any argument or value used in a **WebBase** macro can be a constant, a **WebBase** variable, or an expression. An integer constant is a collection of the decimal digits with an optional leading + or - sign, e.g., 12345.

A string constant is a collection of characters enclosed in single quotation marks, e.g., 'string constant'. Chapter 11 covers **WebBase** expressions. Unless the only argument to a macro is an expression (e.g., the `f=` macro), expressions within macros should be placed within parentheses, e.g., (1 start +).

8.2 The WebBase Macros

{~ text} {/~}

The ***brace*** macro generates a string enclosed in curly braces. This is useful when dynamically generating other .htf forms to be processed by **WebBase**. While the same functionality can be achieved using the *set* or *setString* macro and the %leftBrace% and %rightBrace% variables, the ***brace*** macro makes code much easier to read. The tilde (~) character is used to identify the macro so that 'brace' is not considered a reserved word. This reduces the potential for conflicts when adding this macro to existing forms. The example below generates a string '{set foo 'bar'}'.

Example 8.1 Brace macro example

```
{~}set foo 'bar'{/~}
```

{call <path> <args>} {/call}

The ***call*** macro essentially calls a subroutine! It starts up a new command as if the user addressed a different URL, but more than likely this 'subroutine' would not be referenced directly by a user via a URL as it would not be run independently. In principal, it is similar to the *insert* macro in that it allows code reuse but in implementation it is quite different. The *insert* macro actually inserts the source inline (the internal structures that are built to represent the macros, etc.). The ***call*** macro actually creates a new command, runs it, and if requested returns information from it to the calling form. The path is required, and specifies the name of the command or file to execute. See the *insert* macro below for the format of specifying the filename. As with most arguments, path can be a constant, variable or expression. The optional keyword-value pairs for the ***call*** macro are shown in the table below.

Keyword	Value	Description
return	String	The names of local variables that are to be SET with the return values from the CALLed command. The names are separated by spaces; e.g., return 'value1 val2 finalVal'. The CALLed command will use a {return val1 val2 val3} macro or {exit val1 val2 val3} macro to specify what is to be returned. The callee returns *n* items in positional order; the caller specifies *m* variables in positional order. **WebBase** places the returned values into the specified variables from left to right until whichever list runs out first (both should be the same length).
wait	Boolean	If true (default), a synchronous call will be done and **WebBase** will wait for the return. If false, the **return** and **output** arguments are meaningless and ignored.
output	Boolean	If the CALLed form generates output, it would

		normally be accumulated into the stream being created and returned to the requesting browser. If true (default), the calling form inserts any such output from the CALLed form at the point of the ***call*** macro. If false, the output is not inserted. This is desirable where the CALLed form is used to compute something and return results in variables and not in stream-to-browser output. This eliminates many blank lines generated by the newlines, tabs and spaces used to nicely indent and format the macros within the .htf files.

Arguments are passed into the CALLed routine by specifying them on the lines between the {call ...} {/call} using the format:

```
arg1 = value
arg2 = {WebBase variable value}
```

Note that only one argument can be specified on each line. The argument name is the line up to the = sign (less any starting or trailing spaces) and the value is the rest of the line (also less any starting or trailing spaces).

WebBase variables may be used in this argument area and will be replaced with their values before the argument = value pairing is performed. It is important to understand this ordering of variable substitution followed by argument processing to insure correct handling of the arguments to be passed to the CALLed routine.

Since variable substitution occurs first, any = (equal signs) and newlines (carriage return/line feed sequences) that might exist within a variable’s value become relevant to the argument processing that follows. Examine the following example:

Example 8.2 Variable Substitution 1

```
{set temp ‘arg1 = 1
 arg2 = 2’}
{call ‘form1.htf’ output false}
  {temp}
{/call}
```

Since variable substitution will occur before the arguments are processed and the variable `{temp}` was set to a string that contained both = signs and newlines, the above is identical to:

Example 8.3 Variable Substitution 2

```
{call ‘form1.htf’ output false}
  arg1 = 1
  arg2 = 2
{/call}
```

Embedded = signs and newlines might not always represent argument list formatting information, however, as in the following:

Example 8.4 Arbitrary Text String

```
{set temp ‘this is an arbitrary text string;
it may contain carriage returns and line feeds
and it might also contain expressions like
  variable = some value
that one wishes to pass to the CALLed routine
as a text block and NOT as a collection of
argument = value lines!’}
{call ‘form1.htf’ output false}
  testField = {temp}
{/call}
```

In the above example the ***call*** macro would attempt to interpret the text between the {call ...} {/call} statements as argument = value lines which would result in either errors or premature termination of the argument structure with undesired arguments and values being passed. Arbitrary text, including = signs and/or newlines, may be passed as the value of an argument by the ***call*** macro. In this case, the information must first be “encoded” so as to replace these characters before the lines are processed as argument lines. Within the CALLed form, the variable is “decoded” to return the data to its original state.

The easiest way of performing this encoding and decoding is to use the same technique that is used between a browser and server when passing information. Certain characters like the ? (question mark), & (ampersand), and newlines also have specific meaning within a browser-to-server command and thus must be encoded when used within text fields. **WebBase** provides operations on strings, ***encode*** and ***decode***, just for this purpose. In the last example above, writing:

```
{set temp1 temp encode}
{call ‘form1.htf’ output false}
  testField = {temp1}
{/call}
```

or:

```
{call ‘form1.htf’ output false}
  testField = {temp encode=true}
{/call}
```

would accomplish the desired result of having the text block within the variable `{temp}` encoded into a format that would essentially hide all the = signs and newlines so as to not cause problems when the arguments are processed. In the CALLed form, the local variable {testField} would now have to be decoded to return it to its original state. This can be accomplished by writing:

```
{set testField testField decode}
```

at the top of the CALLed form.

The example of the ***call*** macro presented below is contained in 3 files. These files also show examples of the *exit* macro when used with return variables, as well as the *return* macro.

Example 8.5 The calling form: call1.htf

```
<HTML>
<BODY>
{comment}
Assume variables UserId and Password were input and contain strings.
Check if the user id and password are valid in a specified
id/password database.

The valid routine returns three values,
  1st = true or false - okay on the database access
  2nd = true or false - if 1st was okay, this indicates that the
user's id and password were found as entered or not
  3rd = the error text if 1st is false.
{/comment}

{call './valid.htf' return 'okay yesorno message' output false}
  id = {UserId}
  pass = {Password}
  dbase = 'FileOne'
{/call}

{if okay not}
  {! we received an error - message in variable message do something
- then tell user file not found. !}
  {%err404%}
  {exit}
{/if}

{if yesorno}
  <P>Okay, you were found!

{! Now log the activity offline - i.e. don't make the user wait for
the sql call that does the logging to receive HTML output back at the
browser. !}
  {call './logger.htf' wait false}
    id = {UserId}
    trans = 'Some log transaction message here'
    dbase = 'LogOne'
  {/call}
{else}
  {%err404%}  {! not found in database !}
{/if}
</BODY>
</HTML>
```

Example 8.6 The first called file: valid.htf:

```
{comment}
We were called with three arguments as follows...
  id = the user's id
  pass = the password the user entered
  dbase = the ODBC source of the password database we are to use

We will return three values as follows...
  1st = true if the database lookup was okay, false if not
  2nd = true if the user id and password were found in the database
and
        were acceptable, false if not
  3rd = the error message if 1 above was false - i.e., the database
lookup
        was not successful.
{/comment}

{errorProtect}
  {sql to valid source dbase}
    SELECT PASSWORD FROM PASSTABLE WHERE [USER ID] = {id sql=true}
  {/sql}
{onError}
  {set msg %error% messageText}
  {exit false false msg}
{/errorProtect}

{set success pass PASSWORD =}
{return true success ''}
```

Example 8.7 The second called file: logger.htf:

```
{comment}
We were called with three variables,
  id = the user's id
  trans = some text to be logged to the log database
  dbase = the ODBC source name of the log database

We will not be returning anything and don't care if any errors occur
during the database transactions but we will wrap an errorProtect
around the entire process so that if any errors do occur we will
immediately skip out without bothering WebBase to return error data.
{/comment}

{errorProtect}
  {sql to ignore source dbase}
     INSERT INTO LOGTABLE (ID,WHEN,WHAT)
       VALUES ({id sql=true},{%dateTime%},{trans sql=true})
  {/sql}
{/errorProtect}
```

{case <exp>} {match <mArg>} {otherwise} {/case}

The ***case*** macro causes control to be transferred to one of several match clauses. Each ***case*** macro must have at least one match clause; the otherwise clause is optional. The **exp** expression argument is required with the case statement; the **mArg** argument is required with each **match** statement. The ***case*** macro evaluates **exp** and compares it to the values for each associated match clause. When the match clause value equals the *case* value, the text following that match clause until the next match, otherwise, or /case clause is processed. The otherwise clause contains a block of text that is processed if no match clause condition evaluates to true. If no match clause matches the *case* value and no otherwise clause is present, the macro returns no text for processing.

Example 8.8 **`case` Macro**

```
{case results size}
{match 0} {! no results returned !}
  <H2>Sorry but I couldn't find a match</H2>
{match 1}
  <H2>Wow! Exactly one match was found!</H2>
{otherwise}
  <h2>There were {f= results size} matches found...</H2>
{/case}
```

{comment} {/comment}

The ***comment*** macro allows the developer to insert commentary into the .htf files that will not be sent to the browsers as part of the HTML. The text contained between the {comment} and {/comment} is skipped as **WebBase** processes the file. Another valid comment macro format is {! comment statement !}. The latter is useful for short in-line comments within a .htf form.

Note:

*Since the purpose of the **comment** macro is to insert text that is to be skipped, **WebBase** does not parse the information within the {comment} ... {/comment} or {! … !} area. For this reason, after encountering the opening {comment} or {!, **WebBase** scans for the first occurrence of an ending {/comment} or !}. **WebBase** does not support nested comment blocks.*

Example 8.9 **`comment` Macro**

```
{comment}
  This is commentary on this file and is not to be sent to the
browser as
  is <!-- commentary --> so as never to be seen by the user!
{/comment}

{! This is a short comment !}
```

{ensure} {onExit} {/ensure}

The ***ensure*** macro is very similar to the *errorProtect* macro, in that it is used to ensure that some action is taken regardless of whether the ‘protected’ block terminates normally or not. With the *errorProtect* macro, one executes the onError clause only if an error occurs. The onExit clause of the ***ensure*** macro is executed regardless of whether the code preceding the onExit statement completed normally or with an error.

The example presented below ensures that the file opened for reading is closed even if an error occurs while reading. This can be particularly problematic on exclusive-access open for writing files. Without using this macro, if an error occurs the file will remain open until you terminate **WebBase,** as there is no handle to the file or stream by which it could be closed.

Example 8.10 `ensure` **Macro**

```
{ensure}
  {set filestream 'foo.txt' %File% pathNameReadOnly:}
      ... read from the stream ...
{onExit}
  {f== filestream close}
{/ensure}
```

{errorProtect} {onError} {/errorProtect}

The ***errorProtect*** macro is designed to trap errors that might occur during the processing of your **WebBase** .htf form and allow you to return a more meaningful message to the browser than the default error information ordinarily returned by **WebBase**. Any error that occurs in the statements following the **{errorProtect}** keyword will cause **WebBase** to branch to the onError clause. All statements within the onError clause will then be processed. If there is no onError clause, the default error message will be suppressed and no information will be returned to the browser.

Example 8.11 `errorProtect` **Macro**

```
{errorProtect}
  {sql ...}
    SELECT * WHERE ...
  {/sql}
{onError}
  <H2>Sorry, database not available. Please try later.</H2>
{/errorProtect}
```

A common usage for the ***errorProtect*** macro is around {sql ...} ... {/sql} blocks as shown above. If the *sql* macro and SELECT statement generate an error, the onError clause returns a message to the effect that “the database is temporarily down for maintenance ... please try again later”. This allows you to perform maintenance on the database without having to shut down your **WebBase** server, which might also be interacting with other databases that are still accessible. To insure you are not masking errors that should not be occurring, you can have the actual error message you masked logged to a database to be analyzed off-line. Within the onError clause, {f= %error% messageText} will provide the error message that would have been sent to the browser had the ***errorProtect*** macro not been used.

NOTE:

*The **errorProtect** macro will not catch programming errors such as leaving off the ending macro keyword (e.g., `{/if}`) or using a parenthesis instead of a curly brace. The macro is designed to capture user errors, not programming errors.*

{escape <label>}

The ***escape*** macro allows one to escape from within a forIndex or forRow loop. It can be used as an escape mechanism when, for example, your logic finds a condition within one of these loops under which you do not want to continue processing the loop but do not want to exit the entire .htf form. The ***escape*** macro can be called based on specific conditions within a loop and references the label associated with the loop from which the escape is to be made. Processing continues with the first statement following the closing {/forIndex} or {/forRow}.

If forIndex or forRow structures are nested, an enclosed escape can escape from any level of depth. It will escape to the first statement following the closing {/forIndex} or {/forRow} of the *forIndex* or *forRow* macro for which the label value matches the argument in the escape. The **label** required argument must be identical to the value of the label keyword in the forIndex or forRow macro out of which you wish to escape. A **WebBase** variable or expression cannot be used as the **label** value; only literal values can be used.

Unique labels should be used for each forIndex and forRow macro that may be nested together. The ***escape*** macro starts at the topmost forIndex or forRow and looks through the subsequent branches to find one with the matching label. As soon as the label is found, the escape is performed. If the same label is used on multiple branches with nested forIndex and forRow macros, the first branch with the specified label will be branched to, which may not necessarily be the correct branch. To prevent this type of problem, use unique labels.

Example 8.12 escape Macro

```
{forIndex anIxA from 1 to 20 label foo1}
   <BR>{anIxA}
   {forIndex anIxB from 1 to 20 label foo2}
         <BR>{anIxB}
         {if anIxB 5 =}
           {escape foo1}
         {/if}
   {/forIndex}
   <H3>Here is the next thing after foo2...</H3>
{/forIndex}
<H3>Here is the next thing after foo1...</H3>
```

The above example would generate the following results:

```
1
2
3
4
5
   Here is the next thing after foo1...
```

{exit <args>}

The ***exit*** macro exits the entire .htf form when encountered. It can be used as an escape mechanism when, for example, your logic finds an error in the input data the user supplied. It can be used within the onError clause of the *errorProtect* macro to exit the form after encountering an {sql} or other logic error. It is also very useful in verifying that a user is accessing a page only in a proper sequence or that they are authorized to access. It is very similar to the *escape* macro, but exits from the entire form. In essence, it closes the stream that has been accumulating the output and returns what has been collected to the browser.

The ***exit*** macro takes optional arguments that specify arguments to be returned. See the *call* and *return* macros for how return arguments may be used.

Example 8.13 `exit` Macro

```
{forIndex anIx from 1 to 20 label foo}
   <BR>{anIx}
   {if anIx 5 =}
     </BODY>
     </HTML>
     {exit}
   {/if}
{/forIndex}
<H3>Here is the next thing...</H3>
```

The above example would return the following results to the browser:

```
1
2
3
4
5
```

{f= <exp>}

The ***f*=** macro evaluates the given expression and prints the result in place of the {f= ...} statement. The only valid argument with the ***f*=** macro is a **WebBase** expression; constants or variables cannot be used. Note that there is no space between the ‘f’ and ‘=‘ but there IS a space between the f= and the subsequent expression terms. If the expression is written as {f = <exp>}, an error will result.

Example 8.14 `f=` Macro

```
{! add 3 to the number of results returned !}
{f= 3 results size +}
```

{f== <exp>}

This is very similar to the *f*= macro. The *f*= macro is designed to evaluate an expression and return the results to be printed at the browser. The ***f*==** macro is designed to evaluate the expression but return an empty string so as not to alter the browser output by its inclusion in a form. This is particularly for use in expressions like the example below, which returns a file object that is typically of no use to the user. The only valid argument with the ***f*==** macro is a **WebBase** expression; constants or variables cannot be used. Note that there is no space between the ‘f’ and ‘==‘ but there IS a space between the f== and the subsequent expression terms. If the expression is written as {f == <exp>}, an error will result.

Example 8.15 `f==` Macro

```
{f== ‘foo.EXE’ %File% execute:}
```

{forIndex <indexCtr> <args>} {/forIndex}

The ***forIndex*** macro iterates over the enclosed text a specified number of times, updating an index variable with the value of the current counter for each iteration. The first argument, **indexCtr**, is required and is a variable name for the index counter. The optional keyword-value pairs for the ***forIndex*** macro are described in the table below.

Keyword	Value	Description
from	Integer	The starting value of the index. The default value is 1.
to	Integer	The maximum or ending value of the index. The default value is 1. If not specified, the forIndex loop will execute only 1 time.
by	Integer	The value by which the index is incremented on each iteration through the macro. The default value is 1.
label	Literal value only	Used in conjunction with the *escape* macro to exit the macro.

Example 8.16 `forIndex` Macro

```
{forIndex anIndexVar from 3 to 17 by 2}
  The current forIndex loop counter is {anIndexVar}
{/forIndex}
```

{forRow <currentRow> <optionalArgs>} {/forRow}

The ***forRow*** macro iterates over the enclosed text once for each result in a collection, including one that contains results from an sql query. The first and a required argument is a variable name which will receive the current entry in the collection during each iteration of the loop. If the collection contains the results of a sql query, this variable will hold an OdbcRowObject. If the collection is a Dictionary, the variable will contain an Association. Finally, if the collection is any other type of Collection, the variable will be the entry in the collection. The optional keyword-value pairs for the ***forRow*** macro are shown in the table below.

Keyword	Value	Description
on	String	The name of the variable that contains the collection to be processed. If the **on** argument is missing, the variable **%results%** that contains the results from the last *sql* macro issued will be used.
from	Integer	The starting element within the list of results specified by the **on** argument; it defaults to 1.
max	Integer	The number of iterations of the loop to be processed; it defaults to infinite which means that all rows will be processed.
label	Literal value only	Used in conjunction with the *escape* macro to exit the macro.
order	‘asc’, ‘desc’, ‘reverse’	Specifies whether the collection is sorted in ascending or describing order or processed in reverse order. Only the specified strings (whether stored as constants, variables or expressions) are valid.
counter	String	The name of the variable that will hold the integer representing the number of the current row being processed. If not specified, the variable **%rowCounter%** holds the current row number. Note that this row number is merely the sequential number of rows that have been processed; it is not

		data that is actually stored as part of the database record.

Example 8.17 `forRow` Macro

```
{set counter 1}
{! return no more than 10 answers !}
{! print the Name and Address fields from the database !}
{forRow aRow on someAnswers max 10}
  Entry number {counter} is {Name} at {Address}.
  {set counter counter 1 +}
{/forRow}
```

{htf} {/htf}

The ***htf*** macro prevents values surrounded by curly braces in HTML from being processed by **WebBase**. This is useful if you want to include JavaScript within your form and not have **WebBase** try to process it.

Another use of this macro is to construct your own WHERE clause from information provided via FORM INPUT by creating the clause as the value of a hidden variable. The example below is extracted from Basic Example #9 that is accessed via the **WebBase WebWizard**.

Example 8.18 `htf` Macro – form 1

```
<PRE><FORM METHOD="GET" ACTION="Wbact9.htf">
<B>       Name: </B><INPUT NAME="name" SIZE="32">
<B>   Category: </B><SELECT NAME="category">
                    <OPTION>Manager
                    <OPTION>Programmer
                    <OPTION>Operator
                    </SELECT>
<B>Minimum Age: </B><INPUT NAME="age" VALUE="21" SIZE="3">
<B>       Work: </B><SELECT NAME="work">
                    <OPTION>Easy
                    <OPTION>Moderate
                    <OPTION>Hard
                    </SELECT>
<B>       Misc: </B><INPUT NAME="misc">
<INPUT TYPE="HIDDEN" NAME="myWhere"
                  VALUE="{htf} category = '{category}'
                               AND misc LIKE '%{misc sql=true}%'
                               AND work LIKE '%{work}%'
                               AND age {%GE%} {age}{/htf}">
<INPUT TYPE="SUBMIT" VALUE="SUBMIT">
</FORM>
</PRE>
```

The ***htf*** macro surrounding the information in the VALUE field above ‘quotes’ the contents so that **WebBase** does not PROCESS the fields contained within curly braces (e.g., ‘{category}’, ‘{misc sql=true}’) at this time. Instead, the ‘myWhere’ hidden variable is passed to Wbact9.htf, where WebBase will then process it.

The Wbact9.htf form called when you submit the above example uses the 'myWhere' variable as follows:

Example 8.19 `htf` Macro – form 2

```
{sql to answers source 'myData' user 'me' password 'secret'}
   SELECT * FROM myTable WHERE {f= myWhere %cmd% asHTF:}
{/sql}
```

The {f= myWhere %cmd% asHTF:} expression parses the contents of the {myWhere} variable, first removing any surrounding {htf} {/htf} macros and then evaluating the {variable} referenced contained within the string.

The ***htf*** macro would not be necessary if the input form was being handled by a non-**WebBase** server, since a non-WebBase server will not attempt to process anything within curly braces. If **WebBase** is used to handle the input form, the ***htf*** macro is simply a signal to **WebBase** to <u>not</u> process everything within the macro. The ***htf*** macro was designed so that, when used as shown above, a WebBase server or a non-WebBase server could use the exact same form.

The %GE% variable used in the example generates a '>=' when **WebBase** expands it. Some browsers end the <INPUT> tag if the VALUE contains a '>', even if the contents of the VALUE field are correctly enclosed in double quotation marks.

{if <exp>} {else} {/if}

The ***if*** macro evaluates its expression argument which returns a result of either true or false. If the result is true, the text following the {if} up to the {/if} keyword or the {else} keyword if present is processed. If the expression evaluates to false, the text following the optional {else} keyword is processed if present. If the expression evaluates to false and no {else} keyword is present, no text is returned by the ***if*** macro. The only valid argument with the ***if*** macro is a **WebBase** expression; constants or variables cannot be used.

Example 8.20 `if` Macro

```
{if 0 results size =}
  <H2>Sorry, no results.</H2>
{else}
  <H2>Hey, we got {f= results size} replies!</H2>
{/if}
```

{insert <filename>}

The ***insert*** macro allows one to insert other .htf files at the location of the **{insert}** keyword as if the text from the inserted file existed inline at that location. **WebBase** macros and variables within the inserted file are handled as in any .htf file. The ***insert*** macro allows one to write small .htf files that can be more easily understood and allows one to develop segments of .htf logic that could be used in many other .htf files.

The argument **filename** is required, and is the name of the file to be inserted. It can be a string, a variable containing a string, or an expression that generates a string. The valid formats for the filename are:

- **`'/file.htf'`** -or- **`'/subdir\file.htf'`**
  appends the filename string to the Directory parameter. This format specifies a filename that is relative to the Directory parameter. If multiple domains are specified, this is the Directory parameter for the current domain in use.

- **`':file.htf'`** -or- **`':subdir\file.htf'`**
  appends the filename string to the Directory parameter. This format specifies a filename that is relative to the Directory parameter. If multiple domains are specified, this is the default Directory parameter specified in the HttpSQL/Parameters key – not the Directory parameter for the current domain in use. If multiple domains are not in use, this format is equivalent to the previous format.

- **`'file.htf'`** -or- **`'subdir\file.htf'`**
  appends the filename to the directory of the current form. This format specifies a filename that is relative to the directory in which the current form (the one that contains the insert macro) exists. A variation on this format is '..\file.htf'. For each '..\' sequence, one moves up one level of directory from that in which the form doing the {insert…} was located.

- **`'c:\dir\subdir\file.htf'`**
  uses the filename string as the complete pathname for accessing the inserted file. This format specifies a filename that is absolute.

Note: forward slash / (URL syntax) and backslash \ (DOS) characters can be used interchangeably within .htf when referencing local files. **WebBase** will convert all / characters to \ as necessary to access files within the Windows host environment.

Example 8.21 `insert` Macro

```
{set fileone '../address.htf'}
{insert fileone}
```

{output <args>} {/output}

WebBase does not process the text contained within the ***output*** macro, but inserts it into the output HTML exactly as encountered. Variables and other macro keywords are not processed but are output with their enclosing { } characters as entered in the .htf file. The optional keyword-value pairs supported by this macro are described in the table below.

Keyword	Value	Description
convert	Boolean	If true, all < and > characters are converted to the character sequences &lt; and &gt; respectively, so that HTML forms can be printed as part of the text rather than being interpreted by the browser. If false (default), no character conversion is done.
insert	String	The name of another file to be output without processing. This allows one to output the contents of a file rather than including the file to be processed by **WebBase.** See the *insert* macro for the formats of the argument.

Note:

*Since the purpose of the **output** macro is to insert text that is to be printed and not processed by **WebBase**, **WebBase** does not parse the information within the {output} ... {/output} area. For this reason, after encountering the opening {output} keyword, **WebBase** scans for the first occurrence of an ending {/output} keyword. **WebBase** does not support nested output blocks.*

The example below would output <TITLE> {systemName} </TITLE> at the browser and NOT set the browser's title to the value of the variable systemName.

Example 8.22 `output` **Macro**

```
{output convert true}
<TITLE> {systemName} </TITLE>
{/output}
```

{parallel} {/parallel}

The ***parallel*** macro sets up a placeholder for a semaphore. Within the {parallel} {/parallel} statements, one can have multiple {fork} statements, each of which forks off a separate process within **WebBase** and ties their completion to the semaphore of the enclosing parallel structure. Logically picturing it, one starts off all these fork blocks, then sits and waits at the {/parallel} for them all to complete. This was primarily developed to allow multiple GET and POST operations to be running simultaneously, waiting until all complete. However, the ***parallel*** macro is not limited to that use.

Note:

*The **parallel** and **fork** statements form a static structure and the **fork** statements must be within the top-level scope of the **parallel** statement; i.e., they cannot be within another nested structure within the **parallel** like a forRow or forIndex.*

Example 8.23 `parallel` **Macro**

```
{parallel}
  {fork}
    {set var1 ...
    any general WebBase stuff here
    Could be SQL calls, maybe ones that reference
      databases on a remote machine
  {fork}
    another set of WebBase macros, etc.
    again, possibly {SQL - }
  {fork}
    and yet more...
{/parallel}
```

{reDirect <url>}

The ***reDirect*** macro causes a redirect instruction to be sent to the browser; the argument is sent as the new location. Most browsers will automatically access the new location. Some browsers may display a link to the new location. All .htf form processing stops when a ***reDirect*** macro is encountered and any reply data accumulated at that point is replaced with the redirect information.

The **url** argument is required, and can use any of the following formats:

- **`'/file.htf'`** **-**or**-** **`'/subdir\file.htf'`**
  The file string is relative to the Directory parameter. The resulting URL will be 'http://<server IP address>:<port #>/file string'.

- **`'file.htf'`** -or- **`'subdir\file.htf'`**
  The file string is relative to the directory of the current form. The resulting URL will be 'http://<server IP address>:<port #>/<current location>/file string'. A variation on this format is '..\file.htf'. For each '..\' sequence, one moves up one level of directory from that in which the form doing the {reDirect…} was located. However, it is NOT possible to move up in the directory structure past the Directory. For example, if the Directory parameter is set to 'c:\http', it is not possible to access a file in 'c:\' or 'c:\otherDir'. Aliasing can be used to access files in other directories or devices on the server system.

- **`'http://www.mySite.com/default.htm'`**
  The URL/file string is the complete URL.

Note:

*If any cookie variables are set using the {setCookie} macro in the form prior to the **redirect** macro being invoked, these cookies are returned to the browser, but the browser ignores them. The cookies will not subsequently be returned to the server by the browser.*

Example 8.24 reDirect Macro

```
{reDirect 'http://www.Mysite.com/'}
```

{reDirect2 <arg>} {/reDirect2}

The format of the ***reDirect2*** macro is identical to that of the *reDirect* macro, but allows arguments to be appended to the command line by specifying them as

```
arg1 = value
arg2 = value
```

The arguments are specified one per line between the {reDirect2 ...} and {/reDirect2} macros (just as in the *call* macro). While it is possible to do this using the *reDirect* macro, it is rather difficult. The following shows how the same result would be done using both the ***reDirect2*** and *reDirect* macros.

Example 8.25 reDirect2 Macro

```
{reDirect2 './abc.htf'}
  name=John Q Public
  id = 12.34
{/reDirect2}

{reDirect './abc.htf?name=John+Q+Public&id=12%3E34'}
```

{remove <varNames>}

The ***remove*** macro removes the variable with the specified **varName** from the topmost scope (see *scope* macro) or local variable if found. If no variable is found in either the scope or local variables, no error is returned. The argument is one or more variable names. If one variable is to be removed, the format is:

```
{remove aVar}
```

If multiple variables are to be removed, the format is:

```
{remove aVar bVar cVar}
```

Example 8.26 remove Macro

```
{set myVar ‘abcdef’}

{! Now set up scoping and create a variable !}
{scope}
  {set scopeVar 12345}
    ... more WebBase statements ...
  {remove myVar scopeVar}
{/scope}
```

{removeAll <varNames>}

The ***removeAll*** macro removes all scope and local variables of the given name. If no variables by this name exist within the current scope(s) or as a local variable, no error is returned. One or more variables can be specified as arguments; see the *remove* macro for more details.

Example 8.27 removeAll Macro

```
{set aVar ‘abcdef’}

{! Now set up scoping and create a variable of the same name !}
{scope}
  {set aVar 12345}
    ... more WebBase statements ...
  {removeAll aVar}
{/scope}
```

{removeCookie <varNames>}

For each name in the <varNames> list, the ***removeCookie*** macro creates a cookie by the specified name and sets its value to “deleted”. The expiration tag for the cookie is set to Tuesday, 01-Jan-1901 01:01:01 GMT. The cookie is added to the output cookies, and is returned to the browser when the form processing is completed. If a cookie by the specified name exists on the browser, it should be deleted. If the user has just created the cookie variable using the *setCookie* macro and then deletes it, the information is still returned to the browser which should do nothing since no cookie by that name exists on the browser.

Example 8.28 removeCookie Macro

```
{! create and remove a cookie variable !}
{setCookie cVar ‘abcdef’}
{removeCookie cVar}
{! remove a cookie variable that probably already exists !}
{removeCookie WebBaseID}
```

{removeGlobal <varNames>}

The ***removeGlobal*** macro removes the specified global variable(s) from memory; it does not delete them from the System Registry. The next time that **WebBase** is started, the global variable will once again exist unless it is explicitly removed from the System Registry. If no global variable with the specified name exists, no error is returned. One or more variables can be specified as arguments; see the *remove* macro for more details.

Example 8.29 removeGlobal Macro

```
{! create and remove a global variable !}
{setGlobal gVar ‘myCompanyName’}
  ... more WebBase statements ...
{removeGlobal gVar}
```

{removeHeader <varNames>}

The ***removeHeader*** macro removes the specified header variable that was created using the *setHeader* macro. If no header variable with the specified name exists, no error is returned. One or more variables can be specified as arguments; see the *remove* macro for more details

Example 8.30 removeHeader Macro

```
{! create and remove a header variable !}
{setHeader Expires %UniversalTime% now asString}
  ... more WebBase statements ...
{removeHeader Expires}
```

{removeLocal <varNames>}

The ***removeLocal*** macro removes the specified local variable(s). If scoping is not being used, this is equivalent to the *remove* macro. If scoping is being used, this will remove the variable(s) from the local context, but will not affect any scoping variables of the same name. If no local variable with the specified name exists, no error is returned. One or more variables can be specified as arguments; see the *remove* macro for more details.

Example 8.31 removeLocal Macro

```
{! create a local variable !}
{set lVar ‘test1’}
{scope}
  {set lVar ‘test2’}
  ... more WebBase statements ...
  {removeLocal lVar}
  {! the value of ‘lvar’ is still ‘test2’ within the scope !}
{/scope}
{! the local ‘lvar’ no longer exists !}
```

{removeUser <varNames>}

The ***removeUser*** macro removes the specified variable(s) from the current user dictionary, as specified with the variable **%userName%**. If no user variable with the specified name exists, no error is returned. One or more variables can be specified as arguments; see the *remove* macro for more details.

Example 8.32 removeUser Macro

```
{! create a user dictionary and user variable !}
{set %userName% ‘userVars’}
{setUser uVar ‘Employee Name’}
  ... more WebBase statements ...
{removeUser uVar}
```

{return <vals>}

The ***return*** macro, designed to be used within a CALLed form, posts the indicated values so that they can be read by the caller when the CALLed form completes (see the *call* macro for an example of how the ***return*** macro is used). The ***return*** macro writes its values to the call, it does not append them. If there is more than one ***return*** macro in a CALLed form, the last one executed is what gets returned.

The ***return*** macro can also be used within insert files that are designed to operate like subroutines; an example is presented below with the *scope* macro. The values posted by the return macro can be accessed via the **%returns%** dynamic variable. For example,

```
{return true varName 3}

{f= 1 %returns% at:}  -> true
{f= 2 %returns% at:}  -> value of varName variable
{f= 3 %returns% at:}  -> 3
```

The value fields in the macro line are evaluated before being written; thus variable names are allowed, their values will be returned. The ***return*** macro does not terminate processing of the form it occurs in, it merely writes the return values so any output being generated for the browser following the ***return*** macro will still be processed.

{scope} {/scope}

The ***scope*** macro is used to create a variable context that is in existence for a specified amount of processing, namely for all statements within the {scope}…{/scope} keywords. Scope variables override local variables for the duration of the scope. The ***scope*** macro creates a ‘topmost’ scope variables dictionary that is searched before any other already-existing scope dictionaries. Then the local variables, user variables, etc. are searched as necessary. As soon as the {/scope} keyword is encountered, the scope dictionary for that particular scope is removed so those scope variables are no longer accessible in subsequent processing of the form.

It is possible to nest scopes to create nested levels of scope dictionaries – all of which might be searched when looking for a particular variable. The innermost scope is the first to be searched, followed by the next scope, followed by any other scopes, and then finally the local variables, user variables, global variables and dynamic variables. Field variables within a scope will still take precedence over any other variables.

The ***scope*** macro example below shows how insert files work great as subroutines. This particular insert file creates a directory whose pathname is passed in as the variable "DIR_".

It will check to see if any intermediate levels of directory are required and if so make a directory at each level.

The ***scope*** macro is used because the variables DIR_1 and DIR_2 are created with the *set* macro, and the variable DIR_3 is created with the *forRow* macro. These variables have no value outside this insert file, and could possible override existing variables of the same name if this file were inserted into existing code without one realizing what was in it. Using the ***scope*** macro, these variables will not exist after the insert file is completed.

There are two other interesting features in this insert file. First, the *setString* macro is used at the top to act like a %output% off/on wrapper. This effectively turns off output without having to explicitly know whether the main form had the %output% status set to true or false. Nothing is added to the output being generated for the browser as the result of inserting this file, and the %output% variable status is not affected.

The second interesting feature is the use of the *return* macro that is returning values indicating success or failure of this routine. If it is successful, two values are returned; 1=the Boolean true and the second the pathname passed in of the directory that was created. If an error occurs during the create process, three return values are returned; 1=false, 2=pathname, 3=error message string. To query the returns from an “insert” subroutine such as this, the %returns% variable can be used as in the following:

```
{if %returns% first}
  successful
{else}
  error = {f= 3 %returns% at:}
{/if}
```

Example 8.33 scope Macro

```
{! create the necessary directories for the pathname in DIR_
   !}

{scope}
  {errorProtect}
    {if DIR_ %Directory% exists: not}
      {set DIR_1 $\ DIR_ pathnameDOS parseAt:}
      {set DIR_2 ''}
      {forRow DIR_3 on DIR_1}
        {if DIR_2 isNull}
          {set DIR_2 DIR_3}
        {else}
          {set DIR_2 DIR_3 '\' DIR_2 , ,}
        {/if}
        {if DIR_2 %Directory% exists: not}
          {f== DIR_2 %Directory% create:}
        {/if}
      {/forRow}
    {/if}
    {return true DIR_}
  {onError}
    {return false DIR_ (%error% messageTextBasic)}
 {/errorProtect}
{/scope}
```

{set <var> <val>}

The ***set*** macro creates a local variable whose name is specified by **var**, and whose value is specified by **val**. If **val** is an expression, the value of **var** is set to the result of evaluating the expression. The **val** argument may also be another variable name or a constant. The variable created will be a local scoping variable if within a {scope}…{/scope} statement. Local variables can be removed using the *remove*, *removeAll* or *removeLocal* macros.

In the example below, the first statement sets the variable *counter* to 3. The next statement sets the variable *xxx* to the value of the variable *name*. The last statement sets the variable *uName* to the result of applying the asUppercase method to the value of the variable *name*.

Example 8.34 set Macro

```
{set counter 3}
{set xxx name}
{set uName name asUppercase}
```

WebBase also allows for indirection when setting variables. If the second argument is specified as @myVar, the first argument is set to the value of the variable *myVar*. For example:

```
{set counter 3}
{set oldCounter ‘counter’}
{set newCounter @oldCounter}
```

The first expression sets *counter* to a value of 3. The next expression sets *oldCounter* to the string ‘counter’, which is also the name of a variable. The last expression @oldCounter says set the variable *newCounter* to the value of the variable whose name can be found in oldCounter.

If the indirection sign @ is placed in front of the variable that is being updated or created (i.e., the first argument), this means to treat this as an existing variable name whose contents is what we actually want here in the ***set*** macro. For example,

```
{set foo 'bar'}
{set @foo 3}
```

will set *bar* to 3. The value of the variable *foo* is ‘bar’, but the value of the variable *bar* is 3.

Multiple variable indirection is also possible as shown in the following two examples:

Example 8.35 set Macro and Multiple Variable Indirection

```
{set counter 3}
{set oldCounter ‘counter’}
{set olderCounter ‘oldCounter’}
{set newCounter @@olderCounter}

{set counter 3}
{set oldCounter ‘counter’}
{set olderCounter ‘@counter’}
{set newCounter @olderCounter}
```

{setCookie <var> <val>}

The ***setCookie*** macro operates exactly as does the *set* macro except that it will store its name-value pair in a cookie dictionary. A cookie dictionary is very similar to the user dictionaries described in Chapter 10. However, there is only a single cookies dictionary used by **WebBase**. The cookies dictionary gets written out as a header variable and sent back to the browser.

Unlike other variables, the value of the cookie specified by the user is combined with other data before being stored in its dictionary. The cookie value and the current values of %cookiePath%, %cookieDomain% and %cookieExpires% are all concatenated together, and then the value is stored into the dictionary. This allows the user to create some cookies that are transitory and others that are persistent – all within the same form. The example below shows how to set the value of %cookieExpires% to create a persistent cookie that will exist for approximately 2 years.

Chapter 9 includes additional information on cookie variables. Cookie variables can be removed using the *removeCookie* macro.

Example 8.36 setCookie Macro

```
{set %cookieExpires% 700 %UniversalTime% now addDays:}
{setCookie myCookieVar ‘test’}
```

Variable indirection is possible using cookie variables, but should be used with caution. The following example shows how indirection can be done. Note that the ***setCookie*** macro is only the last macro used. As noted above, when a name-value pair is entered into the cookies dictionary, additional information is appended to the variable name. Thus, it is not possible to retrieve a value from the cookie dictionary for use in indirection.

Example 8.37 setCookie Macro and Multiple Variable Indirection

```
{set counter 3}
{set oldCounter ‘counter’}
{setCookie newCounter @oldCounter}
```

{setGlobal <var> <val>}

The ***setGlobal*** macro will create a name-value pair as a global variable in memory only. Unless the System Registry is modified, the next time that **WebBase** is started this global variable will not exist. Global variables created either with the *setGlobal* macro or within the System Registry can be removed from memory using the *removeGlobal* macro. It is important to remember that both the ***setGlobal*** and *removeGlobal* macros only make in-memory changes. All permanent changes to global variables must be done in the System Registry.

Example 8.38 setGlobal Macro

```
{setGlobal myGlobalVar ‘test’}
```

{setHeader <var> <val>}

The ***setHeader*** macro allows users to specify header values that will be returned to the browser. For example, the user can specify the Expires: header information using this variable instead of using the %expires% dynamic variable. If a browser receiving the header variable and value does not recognize or support the header variable, it will normally just ignore it.

Example 8.39   setHeader Macro

```
{setHeader Expires %UniversalTime% now asString}
```

{setLocal <var> <val>}

The ***setLocal*** macro is designed for use only with the *scope* macro to create a local variable that will exist after the *scope* macro is completed. If scoping is not in effect, this is equivalent to the *set* macro.

Example 8.40   setLocal Macro

```
{scope}
  {setLocal localVar 'test'}
    ... more WebBase statements ...
{/scope}
{! the local variable 'localVar' still has a value of 'test' !}
```

{setString <var> <options>} {/setString}

The ***setString*** macro creates a variable containing a string; the string value is specified on one or more statements within the {setString}…{/setString} keywords. This macro provides an alternative to using the *set* or *f*= macros with multiple concatenation operations; it allows the user to see very clearly how text and variable values will be put together into the resulting variable. **var** is any valid variable name.

The ***setString*** macro supports a number of options that determine the type of variable to be created as well as how the resulting string value will be handled. Each of these options can be specified as a constant, variable or parenthesized expression; however, they must resolve to a string of the specified option name. The valid options are:

- **'collapse'** -- replaces all control characters and multiple spaces in the string within the {setString}…{/setString} with a single space character. This reduces the string to the barest minimum for sending to the browser. This is desirable as it eliminates extraneous whitespace when doing a view source at the client browser.

- **'trim'** – replaces leading and trailing spaces and newlines, but does not modify embedded formatting. This is less severe than the 'collapse' option above.

- **'local'** – the resulting variable is stored as a local variable.

- **'global'** – the resulting variable is stored as a global variable in memory only. When **WebBase** is restarted, the global variable will not exist unless the System Registry file is edited.

- **'user'** – the resulting variable is stored in the user variable dictionary specified by the %userName% variable.

- **‘cookie’** – the resulting variable is stored as a cookie variable that will be returned to the browser when form processing is completed.

If the type of the variable is not specified, the resulting variable will be a local variable within the current scope. If scoping is used, that means that the variable will not exist once the {/scope} keyword is encountered.

The ‘collapse’ option can be used in conjunction with any <u>one</u> of the other options. If two or more of ‘local’, ‘global’, ‘user’ and ‘cookie’ are specified, then resolution is done based on the order local, user, global and cookie.

Example 8.41 setString Macro

```
{setString imageFiles 'collapse'}
    Image1.gif;Image1.gif,
    Image2.gif;Image2.gif
{/setString}
```

{setUser <var> <val>}

The ***setUser*** macro operates exactly as does the *set* macro except that it will store its name-value pair in a user dictionary. See Chapter 10 for information on user variables and user dictionaries. The same variable indirection described above for the *set* macro can also be used for the ***setUser*** macro.

Example 8.42 setUser Macro

```
{set %userName% ‘myUserDict’}
{setUser xx ‘test’}
```

{signalError <error text string>}

The ***signalError*** macro signals an error that results in the argument being displayed as shown below. This macro can be helpful in simulating situations which could return errors under some circumstances. It allows you to develop appropriate {errorProtect} ... {/errorProtect} constructs and/or error logging procedures without having to force actual error conditions.

As with other errors, this error can be caught in the *errorProtect* macro to prevent the message from reaching the user but allowing one to ‘escape’ to the {onError} clause within the *errorProtect* macro.

The first example below shows the error message that will be displayed on the browser if the error is not trapped using the *errorProtect* macro. The second example shows the use of the *errorProtect* macro to redirect the user to a form instead of displaying the error message.

Example 8.43 signalError Macro – no error trapping

```
{signalError 'You should not be here!'}
```

```
The following is then displayed on the user’s browser:
```

```
An error occurred processing your request
Merging data into macro form

'You should not be here!
```

Example 8.44 signalError Macro – with error trapping

```
{errorProtect}
  {if answer isNull}
    {signalError 'x'}
  {/if}
{onError}
  {reDirect 'GetAnsr.htf'}
{/errorProtect}
```

{sql <args>} {/sql}

The ***sql*** macro identifies the database that is to be queried, allows for specifying a variable into which it can return its query results, and defines the text block that constitutes the actual ODBC query statement. The optional keyword-value pairs supported by the ***sql*** macro are listed in the following table:

Keyword	Value	Description
to	String	The variable name into which the results will be placed. If this argument is omitted, the variable *%results%* will be used. The value of this keyword must be a variable name, it cannot be an expression or constant.
source	String	The ODBC source name. If this argument is omitted, the variable *%source%* will be used.
user	String	The user id for logging into the ODBC source. If this argument is omitted, the variable *%user%* will be used. Note that some ODBC drivers do not require a username and password; this is a database-specific issue. It is recommended that even though a username and password may not be required by the current ODBC driver, that they be specified as part of the ***sql*** macro statement in case they are required by future ODBC drivers.
password	String	The required password for logging into the ODBC source. If this argument is omitted, the variable *%password%* will be used. Note that some ODBC drivers do not require a username and password; this is a database-specific issue. It is recommended that even though a username and password may not be required by the current ODBC driver, that they be specified as part of the ***sql*** macro statement in case

		they are required by future ODBC drivers.
buffer	Integer	The maximum buffer length for ODBC to use to return data from the database to **WebBase**. The default is 8192 bytes. If one requests a record from the database and the buffer is not long enough, some of the data will be truncated. This is typically some text from a long memo field but it can be entire fields as the data is returned in the order requested (SELECT field1, field2, field3, ...). If field1 is by itself longer than the buffer, the rest will be lost. See the operations available for ODBCRowObject in Chapter 11 that include detecting if a message about data truncation was received.
cache	Boolean	If set to false, the ODBC connection will not be added to the cache of ODBC connections after the operation and, if previously in the ODBC cache, will be removed as a side effect of the operation. This parameter in no way affects the setting of the ODBC connections cache. If caching is disabled, this parameter has no effect. Setting this parameter to true will not cause this connection to be cached if caching is disabled. The value of the 'Cache ODBC Connections' menu option set via the **WebBase** Service window always takes precedence. The default is true which means the connection will be cached if caching is enabled. This keyword/value pair is useful to selectively keep a database from being cached. It can also be used to remove a cached connection at the end of a form that possibly hit the database multiple times and cached the connection earlier so that non-**WebBase** access of the database can be made. Once **WebBase** caches a connection, the database has **WebBase** as a user with exclusive, read/write or read only access -- however the ODBC source was specified. This prevents the user from accessing the database with exclusive access for maintenance purposes. If this database is thus accessed on a routine basis, it is possible the user might wish to not leave the connection cached while wanting cached connections for other databases.
max	Integer	The maximum number of records the query is to return. By default, all records matching the query specifications are returned. The **WebBase WebWizard** Database Example #4 shows how to implement 'More' and 'Previous' buttons using this keyword.
start	Integer	The number of the first matching record to be returned (i.e., skip the first start - 1 matching records). The **WebBase WebWizard** Database Example #4 shows how to implement 'More' and 'Previous' buttons using this keyword.

rowCount	String	The name of the variable that will hold the number of INSERTED rows. If this variable name is not specified, %rowCount% is used.
error	String	The name of the variable that will hold any error messages reported by the ODBC driver. This can be used to determine exactly the nature of the error if specialized processing is needed. In general, users should not require this option. This does not prevent the macro from generating an error, the user should still wrap the ***sql*** macro with the *errorProtect* macro. Within the {onError} branch, the user can use the contents of this variable to determine the explicit error. Using the {f= %error% messageText} within the error branch returns the ODBC error message to the user, as well as all of the **WebBase** error information (macro dump, stack dump, etc.).
keepHandle	Boolean	The only purpose for this keyword is to address a problem with Microsoft Access 7.0 and greater databases and the associated ODBC driver. If false (default), the handle is not kept following the {sql} statement, unless of course the handle is cached in the ODBC connection cache. If true, the handle allocated for the ODBC connection to the data source will not be free following its use. In addition, even if one has the 'Cache ODBC Connections' menu option enabled, the connection handle associated with this {sql} statement will not be placed in the ODBC cache following use but will be disconnected but not freed. This will ensure that the handle does not cause any General Protection Fault (GPF) errors to occur either by executing the {sql} statement or by clearing the ODBC cache explicitly or on server shutdown. See Chapter 14 for details on implementing this keyword to address the Microsoft Access/ODBC driver problem.

Only a single SQL statement can be included within the sql macro. However, multiple sql macros can be placed within the same .htf form.

It is very important that **WebBase** variables used in SQL statements be set up to match the expected data type in the database table. Any **WebBase** variable that contains a string and will be written to a text or memo field must be enclosed in single quotes. It is also strongly recommended that the parameter {sql=true} be added to all text fields; this ensures that any apostrophes in the string stored in the **WebBase** variable will be properly inserted into the database. Any numeric value must be entered without single quotes. A date or date/time value must be entered by placing the '#' sign before and after the variable. In the example below, the Name field in the database is specified to be a text field; the Salary field is numeric, and the StartDate is a dateTime field.

Example 8.45 sql Macro

```
{sql source 'mySQL' user 'me' password 'test'}
  INSERT INTO Employees (Name,Salary,StartDate)
    VALUES ('{LastName sql=true}',{Salary},#{theDate}#)
{/sql}

{sql to aCltn source 'mySQL' user 'me' password 'test'}
  SELECT * FROM Employees WHERE StartDate <= #{%dateTime%}#
{/sql}
```

Note:

*The ODBC drivers do NOT return the number of records returned by a SELECT statement – the user must determine this information by asking the size of the **to** variable.*

{timer id <idVal> <args>} {/timer}

The timer macro is used to schedule entries on the **WebBase** timer queue. WebBase checks this queue once every minute and, when an entry's time has expired, the entry is processed. The <args> provide for scheduling the entry that can be for a "one time" execution or for a repeated, periodic execution.

The entry that is scheduled is all the text contained within the {timer ...} {/timer} construct as well as a copy of all variables defined at the time the entry is scheduled. This text will generally consist of **WebBase** macros and expressions that will be interpreted at the time the entry is executed. Since the timer queue entry will be executed at some point in the future it will not be associated with the browser that executed the form that originally scheduled the entry. If the entry references variables associated with such a browser (e.g. %browserAddress%, Accept, Content-length), unpredictable results can occur. Output generated by the timer queue entry does not get sent to a browser as does output generated by standard **WebBase** forms. However, output to files using any of the **WebBase** file access mechanisms and output to a database via the *sql* macro will be properly processed.

The id keyword is also required, as is its value which is either an integer or string which is used to identify this entry in a 'remove from timer queue' operation if necessary. The table below shows the optional keyword-value pairs that can be used with the ***timer*** macro.

Keyword	Value	Description
date	Date/String	The date on which the entry is to be executed. If a string, it is in a format that can be used to generate a Date instance.
time	Time/String	The time of day on which the entry is to be executed. If a string, it is in a format that can be used to generate a Time instance.
period	Integer	The number of minutes between execution of the entry. The first time the form will be run will be <Integer> minutes from the time the entry is placed onto the timer queue; it will not be run immediately.
title	String	The function of the entry added to the timer queue. This can be displayed using the timerQueueSQL operation available on %cmd% (see Chapter 11).

count	Integer	The number of times the entry should be run before it is removed from the queue. If **date** is specified, this value is automatically set to 1. It can be used to allow periodic entries to run every <Integer> minutes for a count number of times, then be removed.

The above **date**, **time** and **period** entries are interpreted as follows to control the scheduling of the timer entry.

If a **date** argument is supplied, the entry will be executed only once on the date indicated (or *today* if the date has already passed) based on the values of any additional arguments. If a **time** argument is indicated along with a **date**, the entry will be executed once at the specified time on the given date. If no **time** argument is specified, a time of 00:00:00 on the given date is assumed. The **period** argument has no effect on the scheduling when **date** is specified.

Note:

> *Both* ***date*** *and* ***time*** *arguments are processed as being* equal to or less than *the current date and time. When the entry is checked it will be executed if the date is the current date or a prior date and the time is the current time or has already expired.*

If no **date** argument is specified, the entry will be executed periodically until it is explicitly removed from the queue or the **WebBase** server is terminated. If a **time** argument is provided, the entry will be executed once per day at the specified time. The **period** argument has no effect when **time** is specified. If the **time** argument is specified and a **period** argument is also provided, the entry will be executed once every period minutes. If no **date**, **time** or **period** argument is provided, the entry will be queued but will never be executed.

The removeTimer: operation (see HttpCommand section in Chapter 11) can be used to remove a timer queue entry based on its id. There are no operations currently provided for manipulating or inquiring into the scheduling parameters (date, time or period) of a timer entry once it has been placed on the timer queue. The **WebBase WebWizard** More Examples includes an example of how to use the timer macro to schedule a form to be regularly processed.

Example 8.46 Timer macro

```
{timer id 3 time ...}
  {set var ...}
  {sql ...}
    ...
  {/sql}
  {comment}  any WebBase scripting here ... {/comment}
  ...
{/timer}
```

{while <exp>} {/while}

As long as **exp** returns true, the ***while*** macro will continue looping and executing all the statements contained within the macro. When **exp** returns false, control passes to the first statement following the {/while}. The variable *%whileLimit%* can be created and set to a positive integer to limit the number of times one will loop regardless of the state of the condition. This is useful as a safeguard during development to prevent infinite loops. The local variable %whileCounter% is automatically set to the loop count (e.g., 1, 2, 3).

The example below uses the ***while*** macro to wait for a given length of time before processing will continue. The variable pauseTime would be set before this macro is invoked and would contain an integer value identifying how many seconds to wait from the current time.

Example 8.47 while Macro

```
{set startTime %seconds%}
{set stopTime pauseTime startTime +}
{set now startTime}
{while now stopTime >}
  {set %priority% 0}
  {set now %seconds%}
  {if now startTime >}
    {set stopTime 86400 stopTime -}
  {/if}
{/while}
```

{with <val>} {/with}

The ***with*** macro allows one to specify an sql result set that is to be made available for accessing via field names. Unless one is within the *forRow* macro, by default the most recent *sql* macro data is made available for accessing by field names. If one were to use more than one *sql* macro in a form, the ***with*** macro allows one to indicate which of the result sets are to be used when a field name is specified outside a forRow construct.

The ***with*** macro can be nested as shown in the example below. The result set in effect will be the one in the innermost nesting at the time. See the section on Field Variables in Chapter 9 for details on how the ***with*** and *forRow* macros access field variables within a result set.

The argument to the ***with*** macro is either a variable name (as in the example below), or an expression that must evaluate to either a collection of records returned from a {sql} SELECT or a single OdbcRowObject instance. If the argument is a collection or records, only the first will be handled within the ***with*** macro. Generally, a single item from a collection will be the argument to the ***with*** macro. If one wished to address the last row of data returned by the first *sql* macro in the example below, one could write

```
{with set1 last}
```

or the third row of data returned in set2 would be

```
{with 3 set2 at:}
```

Example 8.48 with Macro

```
{sql to set1 ...}
  SELECT NAME, ADDRESS, ...
{/sql}
     ...
{sql to set2 ...}
  SELECT MODEL, ...
{/sql}
     ...
{with set1}
     ...
  {NAME}
  {with set2}
    {MODEL}
  {/with}
     ...
  {ADDRESS}
{/with}
```

{writeFile <file> <optionalArgs>} {/writeFile}

The ***writeFile*** macro surrounds text that is first processed by **WebBase** to substitute for variables and expressions. The resulting string is then written to the indicated file. The file can be specified in any of the formats as described for the *insert* macro. The optional keyword-value pairs for this macro are shown in the table below.

Keyword	Value	Description
append	Boolean	If true, the resulting string will be appended to the specified file. If false (default), the data in the file will be overwritten.

Example 8.49 writeFile Macro

```
{writeFile './myfile.txt' append true}
  I am going to add this text to the end of the file 'myfile.txt'.
It will include the current (%dateTime%} and the address of the
browser {%browserAddress%} that called me along with some other
interesting WebBase variables, etc.
{/writeFile}
```

Variables

Chapter 9

WebBase variables let you access, store, and display data within a **WebBase** .htf file. Browser GET or POST requests might include input variables, the author can define local variables and access global variables, and database queries will result in field variables. **WebBase** also has a number of dynamic variables that can be used in the .htf form.

Variables are expressed as alphanumeric names, e.g., *counter***.** They are distinguished from string constants by the fact that string constants are enclosed in single quote marks, e.g., ***'counter'***. All **WebBase** variable names must start with an alphabetic character or a '%'. The dynamic variables and global variables provided by **WebBase** all start with a '%'. It is recommended that users create their variable names starting with alphabetic characters so it is easy to differentiate between user-created and system-provided variables.

A **WebBase** variable name cannot be the same as a **WebBase** reserved word; the *%reservedWords%* dynamic variable is a collection of all the **WebBase** reserved words. It is also important to remember that variables are CASE SENSITIVE -- i.e., **counter** and **Counter** are two different variables.

The search order for **WebBase** variables is

1. Field variables
2. Local variables
3. User variables
4. Global variables
5. Dynamic variables

Notice that Local variables override User variables, and User variables take precedence over Global variables, and Global variables override Dynamic variables. Because of this precedence order, it is strongly recommended that you carefully select the names of any variables to ensure proper precedence. For example, preface all user variables with a U (e.g., {setUser Uname name}).

9.1 Field Variables

Field variables are variables whose names correspond to fields within a database record definition. Variables representing database record field names must be specified exactly as the field names are returned by the ODBC driver for that particular database. With many databases, the ODBC database driver returns the field names exactly as specified by the user when doing the record definition. For example, the user specifies 'Last Name' in the database development interface and the ODBC database driver returns 'Last Name'.

However, some ODBC database drivers return the field names in other forms (e.g., 'LAST NAME'). To determine how your specific ODBC driver returns the field names, it is recommended that you use the 'Data Sources' tool available from the **WebBase WebWizard** window. Select the 'Data Sources' anchor, and then select to view your available data sources. This will present a table of all the data sources you currently have defined on your system, as well as the driver associated with them. Select the desired source. A list of the tables within this database is displayed, along with information such as the path specification for the database file. Select the desired table, and a table showing all the fields in the table is displayed. The first column in this table lists all the fields within the database. The field names within this column can be used as field variables within **WebBase** forms. Again, be very sure on the spelling and case of each field variable name because all variable names are case sensitive.

When a database query is issued and data is returned, fields within the returned record are accessed using the field name as a variable. Multiple records will often be returned as the result of a query. The individual records can be accessed using the *with* or *forRow* macro. As each record is processed within the macro, the field variables within the macro take on the value of the field within the record being processed.

The *forRow* macro is useful for iterating through multiple records returned from a database and using field variables to access the data values within the record currently being processed. The *with* macro is useful for accessing field variables in a single record of data.

When a *forRow* or *with* macro is encountered in a form, any references to field variables will be resolved against the record set specified as the argument to the macro. In the *forRow* macro, this will be the current record within its record collection. In the *with* macro, this will be the argument if it is an OdbcRowObject, or it will be the first entry in the collection if the argument is a collection.

A potentially confusing situation can arise when a second set of records is acquired via an {sql} call within a *forRow* or *with* macro. It is not possible to access the field variables of this new data collection unless they are also accessed within a *forRow* or *with* macro. The result set used to resolve field variables is that for the current *forRow* or *with* macro.

Field variables can also be specified outside the *forRow* or *with* macros. In this case, the first record in the last collection of data records returned by an {sql} call is used. It is strongly recommended that field variables only be used within the *forRow* or *with* macros, and that the forms developer not rely on the result set received from the last {sql} macro.

The following two examples show how to improperly use field variables, as well as how to properly use field variables for multiple collections.

Example 9.1 Incorrect use of field variables

```
{sql to cltn1 source ‘aSrc’ user ‘aUser’ password ‘aPwd’}
  SELECT * FROM Table1
{/sql}
{forRow aRow on cltn1}
  {FieldVar1}
  {sql to cltn2 source ‘aSrc’ user ‘aUser’ password ‘aPwd’}
    SELECT * FROM Table2 WHERE ID = {FieldVar2}
  {/sql}
{! The following line will generate an error because only the field
variables from the records in cltn1 are accessible.  If not within
the ‘forRow’ macro, this would work. !}
  {VarFromCltn2}
{/forRow}
```

Example 9.2 Correct use of field variables

```
{sql to cltn1 source ‘aSrc’ user ‘aUser’ password ‘aPwd’}
  SELECT * FROM Table1
{/sql}
{forRow aRow on cltn1}
  {FieldVar1}
  {sql to cltn2 source ‘aSrc’ user ‘aUser’ password ‘aPwd’}
    SELECT * FROM Table2 WHERE ID = {FieldVar2}
  {/sql}
  {with cltn2 first}
{! The following line will correctly display the field value
VarFromCltn2 since the field variables for the recordSet of the
‘with’ macro are now being processed.  Note that if ‘FieldVar1’ were
used in the ‘with’ macro, an error would result since it is not part
of the current result set being used to determine field variables !}
    {VarFromCltn2}
  {/with}
{/forRow}
```

Database table and field names can often include spaces. In order to use a table name with a space as part of an SQL statement (e.g., INSERT, SELECT), the table name must be enclosed in double quotes as in:

```
{sql to cltn source ‘aSrc’ user ‘aUser’ password ‘aPwd’}
  SELECT * FROM “My Table”
{/sql}
```

Field names that contain a space must also be referenced as field variables using double quotes[15], as shown in the following:

```
{“File No”}
```

Only field variables can include embedded spaces. All other **WebBase** variables must consist of characters other than the space character.

[15] Some database applications such as Access allow the use of square brackets to specify table or field names that include spaces. Square brackets can be used with table and field names in WebBase, but the SQL standard is to use double quotes.

> *Note:*
>
> *Many databases also have reserved words such as Date, Time, Order, etc. These reserved words can be used in sql statements such as SELECT only if they are enclosed in double quotes. Double quotes can be used around any field name, with or without spaces and reserved word or not, without generating problems..*

WebBase provides two operations on strings for handling field names. The *asFieldName* operation adds double quotes around the specified string. The *asFieldNameName* operation removes double quotes from the specified string. Examples of these operations are found in Chapter 11.

As noted above, field variables are at the top of the precedence order. If you are using a local variable called {Name} and retrieve records from a database in which there is a field called Name, the field variable Name will take precedence over the local variable. This can cause unexpected errors in form processing.

9.2 Local Variables

Local variables are in existence for the duration of the form that is being processed. As soon as the **WebBase** server completes the processing of the form and returns the output stream to the browser, all local variables cease to exist. Maintaining state across multiple forms can be done using user variables, as described in Chapter 10.

Local variables can be created four ways:

- by passing arguments into a form via the command line
- by explicitly setting them using a **WebBase** macro
- from the header information on the request from the client
- from the cookies sent from a cookie-enabled browser to the server

Local Input Variables

Local input variables are created from command line arguments that are passed in from one form to another. A full URL GET request including command line arguments uses the format:

```
http://<IP address>:<port>/dirSpec/fileName.Type?arg1=val1
    &arg2=val2&arg3=val3
```

Each command line argument and value are separated by an ‘=’. The first argument/value pair following the filename is preceded by a ‘?’. All subsequent argument/value pairs are separated from the previous by an ‘&’.

There are several ways in which command line arguments can be created. The most common way to create command line arguments is to set up an HTML <FORM> that includes one or more <INPUT> statements. Some <INPUT> statements allow the user to make or enter selections, such as text field or check boxes. Other <INPUT> statements are buttons which signal that a user wants some type of action to be taken. And finally other <INPUT> statements allow hidden data to be passed to the next form to be invoked.

For example, a user might create a form to enter in a name, address, city, state and zip. There would be 2 buttons – one to create a new record and the other to cancel. Lastly, there might be a hidden variable passed along that was an ID previously entered by the user. A FORM construct for these input fields might look like:

```
<FORM METHOD="GET" ACTION="form2.htf">
Name: <INPUT TYPE="TEXT" NAME="name" SIZE=15 VALUE="">
Address: <INPUT TYPE="TEXT" NAME="address" SIZE=15 VALUE="">
City: <INPUT TYPE="TEXT" NAME="city" SIZE=15 VALUE="">
State: <INPUT TYPE="TEXT" NAME="state" SIZE=15 VALUE="">
Zip Code: <INPUT TYPE="TEXT" NAME="zip" SIZE=15 VALUE="">
<INPUT TYPE="SUBMIT" NAME="button" VALUE="Make Record">
<INPUT TYPE="SUBMIT" NAME="button" VALUE="Cancel">
<INPUT TYPE="HIDDEN" NAME="id" VALUE="12345">
</FORM>
```

The command line generated when the user presses the 'Make Record' button would look like:

```
form2.htf?name=my+name&address=123+Main+St.&city=Santa+Barbara&
state=CA&zip=93101&id=12345&button=Make+Record
```
[16]

The values typed in by the user would be passed along with each variable name on the command line. The '+' characters in the command line are automatically added to represent spaces; they are automatically removed by **WebBase** when the command line is received and parsed. The browser also encodes other special characters such as '%' in the formation of the URL sent to the server; **WebBase** automatically decodes these characters also.

When the **WebBase** server receives this command, it parses all the argument and value pairs into local variables and values. In this case, the local variables would be:

```
{name}='my name'
{address}='123 Main St.'
{city}='Santa Barbara'
{state}='CA'
{zip}='93101'
{id}='12345'
{button}='Make Record'
```

WebBase stores the names of all the local variables received via the command line in the variable %theArgs%. The form designer can use this variable to determine which local variables are a result of command line input. The values of the variables are not included in %theArgs%, just the names of the variables. The dynamic variables %inputVariables% and %inputVariablesHTML% can be used to determine/display the local variables created from command line arguments as well as their values.

Each local variable created from a command line is automatically stored as a string value, as indicated above. An important responsibility for the forms designer is to know which local variables should be passed into a form via a command line, and set up appropriate conversions of the data values if necessary. In the example above, the {id} should be a numeric value. This should be set up in the form as:

```
{set id id asNumber}
```

[16] A "POST" request passes the command line arguments to the receiving form in a similar fashion, but the arguments are not displayed as part of the URL. This is often desirable as it presents a cleaner interface to the user at the browser, and it may also hide information that the user should not see.

Another way to create command line arguments is to explicitly include them in the creation of anchors. An example of an anchor using command line arguments is:

```
<A HREF="file2.htf?id={id}&name={name encode=true}" Page 2 </A>
```

In this example, there are two **WebBase** variables that are going to be passed from the current form into ‘file2.htf’. The {name} variable is a text field and may include spaces or other punctuation characters that need to be specially encoded as part of the HTML command line. The ‘encode=true’ parameter indicates that the variable is a string that should be encoded. After **WebBase** processes this URL and sets up the anchor, it will look like:

```
<A HREF="file2.htf?id=12345&name=my+name" Page 2 </A>
```

The final way to create command line arguments is using the *redirect2* macro. Unlike the *redirect* macro that simply points to a new URL, the *redirect2* macro can be used to pass command line arguments to the specified file. The following shows how the {id} and {name} variables can be passed via a *redirect2* macro.

```
{redirect2 'file2.htf'}
  id={id}
  name={name}
{/redirect2}
```

Unlike with anchors, it is not necessary to indicate that the {name} variable is a text field and needs to be encoded. The *redirect2* macro will automatically handle this and generate a URL that looks like:

```
http://…/file2.htf?id=12345&name=my+name
```

Local variables created from command line arguments are indistinguishable from other local variables that may have been created by the *set* or *setLocal* macro, or may have been read in as header and cookie variables. Because of the variable precedence order and the several ways in which local variables can be created, it is very important that the form designer take care in the selection of variable names.

Set Local Variables

The author of an .htf form can define variables within the file using the *set* or *setLocal* macro. Writing *{set counter 3}* will create a local variable named *counter* and assign it the value *3*. If a local variable by this name already exists, its value will be updated to be *3*. It is important to remember that local variables can be created by both setting them as described here, by inputting them to the form, as described in the preceding section, or from header or cookie information sent from the client browser to the server as described in the following sections. All these variables are considered local variables. The creation of a variable with the *set* or *setLocal* macro can override any of these other local variables.

The *scope* macro has been designed for those situations in which some local variables need to be created for a specified amount of processing, but which should not interfere with other local variables. This situation is often encountered when using insert files to perform actions as would be done by subroutines. The local variables created and used within the *scope* macro are only in existence until the ending {/scope} keyword is encountered. The local variables created within the *scope* macro can override any other local variables, but only for the duration of the scope.

If scoping is not being used, then the *set* and *setLocal* macros are equivalent – both will cause a local variable of the specified name and value to be created that will be in duration until the form processing is completed. If scoping is being used, the *set* macro will create a local scoping variable with the specified name and value that is only in existence until the scope is completed. The *setLocal* macro, when used within a scoping context, will create or override a local non-scoping variable that will be in existence beyond the scope macro and until form processing is completed. The following example shows how the *set* and *setLocal* macros can be used with the *scope* macro.

Example 9.3 Scoping and local variables

```
{scope}
  {! The following variable will only exist within the scope !}
  {set sVar ‘abc’}
  {! The following variable will exist outside the scope !}
  {setLocal lVar true}
{/scope}
```

It is possible to nest scopes to create nested levels of scope dictionaries – all of which might be searched when looking for a particular variable. The innermost scope is the first to be searched, followed by the next scope, followed by any other scopes, and then finally the local variables, user variables, global variables and dynamic variables. Field variables within a scope will still take precedence over any other variables.

Additional information on scoping and local variables can be found in the description and example presented with the *scope* macro in Chapter 8.

Header Local Variables

When the WebBase server receives a request from a client, the browser has added some information to the start of the request. This information is called ‘header information’, and includes some or all of the entries that are described in Appendix C. This appendix includes the set of header variables defined by the HTTP/1.1 specification. There may be additional header variables created and sent by a particular client browser application.

Each header entry is extracted and created as a local variable. All of the header variables can be examined by looking at the *%headerVariables%* or *%headerVariablesHTML%* variables.

The header variables which **WebBase** forms developers may find useful are:

- **Host** – host portion of URL entered by user. This can be used to provide different responses based on different host designations. This is an alternative to multiple domain support.

- **Referer** – this variable is only included when a page is displayed via an anchor, redirect or <FORM> construct; it is not provided if the user explicitly types in a URL. It identifies the previous URL from which the current form was invoked.

- **User-Agent** – defines the browser in use

Cookie Local Variables

Cookies are a special type of header variable that are not supported by the current HTTP/1.1 specification, but are provided by many of the main browser applications such as Netscape and Microsoft Internet Explorer.

Cookies are a general mechanism which servers can use to both store and retrieve information from clients. A server, when returning an HTTP object to a client, may also send a piece of state information that the client will store. Included in that state object is a description of the range of URLs for which that state is valid. Any future HTTP requests made by the client which fall in that range will include a transmittal of the current value of the state object from the client back to the server. The state object is called a cookie, for no compelling reason.

Cookies are very useful for maintain state across multiple forms, as well as across time. However, not all browsers support cookies and some users may not have cookie support enabled at their browser. To maintain state through multiple forms, **WebBase** provides user variables that are described in the next chapter.

Creating Cookies

Cookies are created using the *setCookie* macro. Any "outbound" cookies created using this macro are sent to the browser when the form is returned to the browser for display. The browser may or may not do anything with the cookies, depending on the level of cookie support enabled at the browser.

A number of parameters can be specified with cookies that determine which domains they are valid for, and whether they will be persistent or memory-resident in the browser:

- **Name --** This string is a sequence of characters excluding semi-colon, comma and white space. It must also adhere to the **WebBase** variable standard, which requires the first character to be alphabetic or '%'.

- **expires** – The attribute specifies a date string that defines the valid life time of that cookie. Once the expiration date has been reached, the cookie will no longer be stored or given out. If not specified, the cookie will expire when the user's browser session ends (e.g., they shut down their browser application). To cause a cookie to be persistent on the client side, the form designer must specify an expiration time. This attribute is set using the *%cookieExpires%* variable, which by default is not specified.

- **domain** -- when searching the cookie list for valid cookies, a comparison of the domain attributes of the cookie is made with the Internet domain name of the host from which the URL will be fetched. If there is a tail match, then the cookie will go through path matching to see if it should be sent. "Tail matching" means that domain attribute is matched against the tail of the fully qualified domain name of the host. A domain attribute of "acme.com" would match host names "anvil.acme.com" as well as "shipping.crate.acme.com". This attribute is set using the *%cookieDomain%* variable, which by default is not specified.

- **path --** used to specify the subset of URLs in a domain for which the cookie is valid. If a cookie has already passed domain matching, then the pathname component of the URL is compared with the path attribute, and if there is a match, the cookie is considered valid and is sent along with the URL request. The path "/foo" would match "/foobar" and "/foo/bar.html". The path "/" is the most general path. If the path is not specified, it as assumed to be the same path as the document being described by the header that contains the cookie. This attribute is set using the *%cookiePath%* variable, which by default is set to '/'.

Receiving Cookies

When requesting a URL from an HTTP server, the browser will match the URL against all cookies and if any of them match, a line containing the name/value pairs of all matching cookies will be included in the HTTP request. Here is the format of that line:

```
Cookie: NAME1=OPAQUE_STRING1; NAME2=OPAQUE_STRING2 ...
```

WebBase extracts the cookies from this line and makes each cookie name a local variable.

A cookie variable can be deleted using the *removeCookie* macro.

NOTE:

Cookie variables are sensitive to the way in which the host machine is addressed. To ensure that the server properly receives cookie values, make sure your links are consistent in the way they reference your host machine. Referencing your host as 'http://www.yourSite.com/' in one instance and as 'http://1.2.3.4' in another instance might be pointing to the same host machine but will cause the Cookies connection to be re-established the first time you switch from one mode of reference to the other. If you consistently use the host name string, or the host IP address, or relative references (recommended), you should have no problems with cookie variables being received properly from cookie-enabled browsers..

WebBaseID Variable

When a browser that supports cookies sends a request to the **WebBase** server, it includes any cookies that have previously been received from the server. If the cookies sent to the browser by the server included an expiration date, the cookies may be persistent on the browser. If the cookies sent to the browser did not include an expiration date, they are memory resident on the browser until the browser application is stopped.

WebBase attempts to maintain a link between a browser and the server using the WebBaseID variable. WebBase automatically creates this variable for each request that is received from a browser that does not include the WebBaseID as an inbound cookie variable. For browsers that do not support cookies, **WebBase** will create this cookie each time it receives a request. This behavior can be modified using the %skipCookies% or %skipAutoCookies% variables.

It is preferable to use the WebBaseID cookie variable instead of the browser's IP address to maintain a link between the user's browser and the **WebBase** server. This is because a browser's address can change from one screen to the next when a user is sitting behind a firewall or network service provider talking to **WebBase**.

WebBase does not include any expiration information with the WebBaseID as a cookie when it is returned to the browser. If the browser is cookie-enabled, it will return WebBaseID as a cookie variable until the browser is stopped. When the browser is subsequent restarted and a connection established with **WebBase**, the browser will not send out the WebBaseID since it was only memory resident. **WebBase** will generate a new WebBaseID and return it to the browser on the first interaction.

The WebBaseID variable is often used in conjunction with user variables, as described in Chapter 10.

9.3 Global Variables

WebBase can access a number of global variables when the server is started. These variables differ from those defined within **WebBase** forms in that their values are set in the System Registry and not via an HTML GET or POST query. These global variables can be overridden by local variables of the same name for the processing of the .htf file in which the local variable is defined. It is also possible to create, change the value of, or delete global variables in memory using the *setGlobal* and *removeGlobal* macros. However, the values for global variables will only be persistent when the variables and their values are defined in the System Registry.

Consider using global variables to define the source, username and password required as part of the *sql* macro. If these values are set up using global variables and the values subsequently change, only the global variable's value has to be edited – not multiple forms. Any *sql* macros that reference these variables will now work successfully.

Global variables should be used to hold information that is used in multiple forms and that changes very infrequently. Some suggested uses of global variables are image directories (e.g. myPix -> 'http://www.myCompany.com/images/gifs/'), e-mail addresses (e.g., eMailAddr -> 'WebMaster@MyCompany.com'), and copyright statements (e.g., copyright -> '©1997 MyCompany, Inc.'). Should your system configuration(s) change and your **WebBase** server be moved to a different site or machine, you would need only to alter a few variables in one location and not edit numerous forms.

All global variables are extracted from the System Registry when **WebBase** is launched. Unlike parameters, it is possible to change the value of a global variable in the System Registry and have the change reflected in **WebBase**. The 'Load Global Variables' command in the WebServer window's 'Options' menu causes **WebBase** to re-read all the global variables from the System Registry. Any in-memory changes to global variables made using the *setGlobal* or *removeGlobal* macros will be lost unless they were explicitly added to the System Registry.

There are a number of global variables that are displayed in the **WebBase** Server window as global variables, but which do not appear in the System Registry. These global variables identify classes of objects. It is possible to perform operations on these classes (see Chapter 11 for class operations); it is also possible to create a new instance of a specific class, assign it to a variable, and perform operations on the instance. The global variables and the class they represent are:

- %Array% = Array
- %Association% = Association
- %DatabaseInfo% = DatabaseInfo
- %Date% = Date
- %Dictionary% = Dictionary
- %Directory% = Directory
- %File% = File
- %Float% = Float
- %Fraction% = Fraction
- %Integer% = Integer
- %Number% = Number
- %OrderedCollection% = OrderedCollection
- %OrderedList% = OrderedList
- %Point% = Point
- %ReadStream% = ReadStream

- %ReadWriteStream% = ReadWriteStream
- %RegistrationDatabase% = RegistrationDatabase
- %SortedCollection% = SortedCollection
- %SortedList% = SortedList
- %String% = String
- %Time% = Time
- %UniversalTime% = UniversalTime
- %WriteStream% = WriteStream

Editing Global Variables

Adding or changing global variables is done using the **WebBase WebWizard** Registration Database utility. Appendix B includes information on setting up the .INI files used on 16-bit systems. To edit **WebBase** global variables,

1. Start **WebBase** and open up the **WebBase WebWizard** by entering the URL:

   ```
   http://127.0.0.1/wbwizard/
   ```
2. Select the Registration Database anchor.
3. From the pull-down list, select 'HKEY_LOCAL_MACHINE' and then press the 'OPEN' button.
4. Select the 'Open' anchor next to the 'SOFTWARE' key.
5. Select the 'Open' anchor next to the 'ExperTelligence, Inc.' key.
6. Select the 'Open' anchor next to the 'WebBase' key.
7. Select the 'Open' anchor next to the '4.10' key.
8. If the key 'Variables' does not exist, create it by selecting the 'Add New Key' anchor and entering 'Variables' as the key name.
9. Select the 'Open' anchor next to the 'Variables' key. All of the **WebBase** global variables currently defined and their values are displayed in the table.
10. To add a new global variable, select the 'Add new entry' anchor and specify the global variable name and desired value.
11. To modify a parameter, select the 'Edit' anchor next to the parameter and specify the changed value.
12. From the WebBase Server Window, select the 'Load Global Variables' option to reload the global variables.

9.4 Dynamic Variables

Dynamic variables are similar to the global variables described above in that they are available for use in any .htf form. However, unlike global variables in which the user defines their value, WebBase sets the values of dynamic variables. A user can override the value of a dynamic value by creating a global variable of the same name following the procedures described in the previous section, or creating a local variable of the same name in a form.

A list of the **WebBase** dynamic variables is displayed in the **WebBase** Server window when **WebBase** is started. Some variables displayed on this list are for **WebBase** add-on products, which are documented separately. Other dynamic variables in the list are considered obsolete and are described in Appendix D. The **WebBase** dynamic variables, an example of their contents, and their descriptions are:

- **%allUserVariables%** *e.g., (Dictionary(('UW14259281E161808318469B' ==> Dictionary(('%%altered%%' ==> true) ('%%expires%%' ==> 60) ('Usite1name' ==> 'Personnel Directory Service') …)))))*
  a dictionary of the dictionaries of user variables. The keys to the top-level dictionary are the names of the different user variable dictionaries that have been created. The values in the top-level dictionary are the dictionaries containing user variables. The **%userVariables%** dynamic variable shows all the user variables defined for the user variable dictionary currently specified in **%userName%.** This variable shows the user variable dictionaries for all user variable dictionary names, including that specified in **%userName%.** Details on user variables can be found in Chapter 10.
- **%allUserVariablesHTML%** *e.g., (see below)*
  formats all the dictionaries containing user variables for a nice printout on the browser. The **%userVariablesHTML%** dynamic variable shows all the user variables defined for the user variable dictionary currently specified in *%userName%*. This variable shows the contents of the user variable dictionaries for all user variable dictionary names, including that specified in *%userName%*. Details on user variables can be found in Chapter 10. The example below shows the information generated by this dynamic variable as displayed on a browser. This particular display was generated by accessing the 'Sample Sites' option under the **WebBase** WebWizard™ window, as it uses user variables to set up the necessary sample sites.

Example 9.4 %allUserVariablesHTML% display

User Variables - UW14259281E161808318469B (17)

- **%%accessed%%** = (03/10/97 05:46:49 AM)
- **%%altered%%** = true
- **%%created%%** = (03/10/97 05:46:44 AM)
- **%%expires%%** = 60
- **Udirpath** = c:\http\WB-ShowMe
- **Ulogpath** = c:\http\WB-ShowMe\WBSM_Log
- **UMSAdriver** = Dictionary(('FileExtns' ==> '*.mdb') ('FileUsage' ==> '2') ('Driver' ==> 'C:\WINDOWS\SYSTEM\odbcjt32.dll') ('ConnectFunctions' ==> 'YYN') ('APILevel' ==> '1') ('ConectFunctions' ==> 'YYN') ('UsageCount' ==> 1) ('SQLLevel' ==> '0') ('Setup' ==> 'C:\WINDOWS\SYSTEM\odbcjt32.dll') ('DriverODBCVer' ==> '02.50'))
- **UmyDir** = c:\http\wbwizard\showme
- **UodbcDriver** = Microsoft Access Driver (*.mdb)
- **UodbcPaths** = Dictionary(('pds' ==> 'PDS.MDB') ('videos' ==> 'VIDEOS.MDB') ('cars' ==> 'CARS.MDB'))

- **UodbcSources** = Dictionary(('pds' ==> 'Web_Start_Pds') ('videos' ==> 'Web_Start_Videos') ('cars' ==> 'Web_Start_Cars'))
- **UserToken** = UW14259281E161808318469B
- **Usite1name** = Personnel Directory Service
- **Usite2name** = Used Cars Site
- **UsiteDict** = Dictionary(('pds' ==> 'Personnel Directory Service') ('videos' ==> 'On Line Videos') ('cars' ==> 'Used Cars Site'))
- **UsitesDir** = c:\http\wbwizard\showme\sit
- **UsubDirs** = SortedCollection(('\http\wbwizard\showme\sit\cars' 'cars') ('\http\wbwizard\showme\sit\pds' 'pds') ('\http\wbwizard\showme\sit\videos' 'videos'))

- **%allUserVarNamesHTML%** *e.g., (see below)*
  formats the names of all user variable dictionaries currently created for a nice printout on the browser. Only the names of the dictionaries are presented here; the contents of all the user variable dictionaries can be viewed using *%allUserVariablesHTML%* or *%userVariablesHTML%* for the specific user variable dictionary defined in *%userName%*. Details on user variables can be found in Chapter 10. The example below shows the information generated by this dynamic variable as displayed on a browser.

Example 9.5 %allUserVarNamesHTML% display

Current User Variable Dictionaries (1)

- UW14259281E161808318469B

- **%base%** *e.g. (http://127.0.0.1/)*
  returns the URL including the directory and subdirectories where the form requested by the browser is located. The server address specified in the URL is that which was used in the form request.
- **%browserAddress%** *e.g. (127.0.0.1)*
  the IP address of the browser issuing a query to the **WebBase** server.
- **%build%** *e.g. (56)*
  the build number of the **WebBase** server software.
- **%cmd%** *e.g. (an HttpGetN)*
  returns the instance of the internal 'command' object that is processing the current form. See Chapter 11 for the details on how to send messages to this variable.
- **%command%** *e.g., (GET /getname.htf?name=Denny)*
  the command line that was sent in from the browser, including the type of request (e.g., GET, POST), the path to the file to be processed, and any command line arguments.
- **%commandCounter%** *e.g. (123)*
  the count of the number of queries processed by **WebBase** since it was last started.
- **%commandsHTML%** *e.g. (see below)*
  formats the names of all the build-in commands for a nice printout on the browser. Each of the built-in commands in the display are set up as anchors, so that the corresponding built-in command can be executed immediately. These commands are described in Chapter 3.

Example 9.6 %commandsHTML% display

```
Internal Commands

•  build
•  buildString
•  dateTime
•  elapsedTime
•  gmt
•  milliseconds
•  seconds
•  title
•  titleString
```

- **%comment%** *e.g. '<!-- Processed by: WebBase 4.10 build 56 (TM) by ExperTelligence, Inc. 04/17/97 21:55:31 -->'*
  the header comment returned in the data back to the browser for any form which **WebBase** processes. Files which are returned but not processed by **WebBase** (e.g., gif files) do not include this header comment. This comment can be seen by doing a 'View Source' at the client browser. The *%skipHeaderComment%* variable can be set to true, which will cause this comment to not be included on any processed forms returned to the browser.

- **%concurrentUsers%** *e.g. (4)*
  returns the number of concurrent commands being serviced by **WebBase**.

- **%cookieDomain%** *e.g., ()*
  if this variable is set, it becomes part of the cookie that is sent to the browser. When one does a {setCookie ...}, this variable along with %cookieExpires% and %cookiePath% are appended to the value of the 'cookie'. The default value of this variable is an empty string so it is not included in any cookie sent to the browser. In this case, the domain address used at the browser is the host name of the server that generated the cookie response. The section on Cookie Local Variables earlier in this chapter provides additional details about cookies and domains. It is important to note that the value of this variable is used at the time the cookie is created by the *setCookie* macro; it is thus possible to change domains for cookies created within a single form by changing the value of this variable.

- **%cookieExpires%** *e.g., ()*
  if this variable is set, it becomes part of the cookie that is sent to the browser. When one does a {setCookie ...}, this variable along with %cookieDomain% and %cookiePath% are appended to the value of the 'cookie'. The expires attribute specifies a date string that defines the valid lifetime of that cookie. Once the expiration date has been reached, the cookie will no longer be stored or given out. The date string is formatted as Wdy, DD-Mon-YY HH:MM:SS GMT. If not specified, the cookie will expire when the user's browser session ends. The section on Cookie Local Variables earlier in this chapter provides additional details about cookies and their expiration. It is important to note that the value of this variable is used at the time the cookie is created by the *setCookie* macro; it is thus possible to change the expiration for cookies created within a single form by changing the value of this variable.

- **%cookieInVariables%** *e.g., (Dictionary(('CookieCounter' ==> '17') ('WebBaseID' ==> 'W14259214E161808318465B')))*
  a dictionary of the cookie variables that were received in the header of the request from the browser. The keys to the dictionary are the cookie variable names; the values are the contents of the cookies. These incoming cookie local variables are automatically created

when the header variables are created. They are not returned to the browser unless they are modified via a *setCookie* macro. The dictionary returned by this variable is a copy; thus modifying this dictionary will have no effect on the cookie variables active in **WebBase**. This dictionary should be used for information only. See also %cookieInVariablesHTML%, %cookieVariables% and %cookieVariablesHTML%.

- **%cookieInVariablesHTML%** *e.g., (see below)*
  formats the names of all the cookie local variables received in the header of the request from the browser for a nice printout on the browser as shown below. See also %cookieInVariables%, %cookieVariables% and %cookieVariablesHTML%.

Example 9.7 %cookieInVariablesHTML% display

```
Input Cookie Variables (2)

•  CookieCounter = 17
•  WebBaseID = W14259214E161808318465B
```

- **%cookieOutVariables%** *e.g., (Dictionary())*
  a dictionary of the cookie variables that have been created with the *setCookie* macro for return to the browser at the completion of form processing. The keys to the dictionary are the cookie variable names; the values are the contents of the cookies. These outgoing cookie local variables will be returned as input cookies in the next request from the same browser if the browser is cookie enabled. The dictionary returned by this variable is a copy; thus modifying this dictionary will have no effect on the cookie variables active in **WebBase**. This dictionary should be used for information only. See also %cookieOutVariablesHTML%, %cookieVariables% and %cookieVariablesHTML%.

- **%cookieOutVariablesHTML%** *e.g., (see below)*
  formats the names of all the cookie local variables created with the *setCookie* macro for return to the browser at the completion of form processing for a nice printout on the browser as shown below. See also %cookieOutVariables%, %cookieVariables% and %cookieVariablesHTML%.

Example 9.8 %cookieOutVariablesHTML% display

```
Output Cookie Variables (0)

NONE
```

- **%cookiePath%** *e.g., (/)*
  if this variable is set, it becomes part of the cookie that is sent to the browser. When one does a {setCookie ...}, this variable along with %cookieDomain% and %cookieExpires% are appended to the value of the ‘cookie’. The path attribute is used to specify the subset of URLs in a domain for which the cookie is valid. The section on Cookie Local Variables earlier in this chapter provides additional details about cookies, domains and path. It is important to note that the value of this variable is used at the time the cookie is created by the *setCookie* macro; it is thus possible to change paths for cookies created within a single form by changing the value of this variable.

- **%cookies%** *e.g. (true)*
  a flag indicating whether the browser sent a cookie to the **WebBase** server. If true, this indicates that the browser is cookie enabled and the server previously sent a cookie to this

browser. If false, this either indicates the browser is not cookie enabled or no cookies have been sent to the browser from the server, and thus none have been returned. On the first interaction with a browser, **WebBase** creates a cookie variable called WebBaseID that is returned to the browser. If the browser is cookie enabled, all subsequent requests from this browser will include this cookie. If the browser is not cookie enabled, the server will receive no cookies.

- **%cookieVariables%** *e.g. (Dictionary(('CookieCounter' ==> '17') ('WebBaseID' ==> 'W14259214E161808318465B')))*
  returns a dictionary of all the cookie variables, both incoming and outgoing. The keys to the dictionary are the names of the variables; the values are the values of the cookie variables. Note that there is no indication within the dictionary of which cookie variables were received from the browser and which have been created via the *setCookie* macro for return to the browser. Modifying this dictionary will have no effect on the cookie variables active in **WebBase**. See also %cookieVariablesHTML%, %cookieInVariables%, %cookieOutVariables%, %cookieInVariablesHTML% and %cookieOutVariablesHTML%.

- **%cookieVariablesHTML%** *e.g., (see below)*
  formats all the incoming and outgoing cookie variables and their values for a nice printout on the browser as shown in the example below. See also %cookieVariables%, %cookieInVariables%, %cookieOutVariables%, %cookieInVariablesHTML% and %cookieOutVariablesHTML%.

Example 9.9 %cookieVariablesHTML% display

```
Input Cookie Variables

•  CookieCounter = 17
•  WebBaseID = W14259214E161808318465B


Output Cookie Variables

NONE
```

- **%copyright%** *e.g. (‘Copyright - © 1995-7 ExperTelligence, Inc.’)*
  the system copyright string.

- **%date%** *e.g., (03/10/97)*
  the current date. It is accessed from the operating system and cached once per form the first time it is referenced. Although most forms are processed very quickly, there are some database queries that can take some time. This introduces the possibility that the form could start processing on ‘today’, and complete ‘tomorrow’. If the processing of a form will take some time and date information is critical, the forms designer should create a local variable using an expression like {set curDate %Date% today} each time the date is needed instead of using %date%. This will eliminate any problems with the caching of %date% and ensure the proper date is used.

- **%dateTime%** *e.g., (03/10/97 06:01:54)*
  the date and time. It is accessed from the operating system and cached once per form the first time it is referenced. The time is in the local time. Although most forms are processed very quickly, there are some database queries that can take some time. If the processing of a form will take some time and date/time information is critical, the forms designer should

create a local variable using an expression like {set curDate %UniversalTime% now} each time the date and time are needed instead of using %dateTime%. This will eliminate any problems with the caching of %dateTime% and ensure the proper date and time are used.

- **%defaultExtensionsHTML%** *e.g., (see below)*
  formats all the extensions specified for the **WebBase** server for a nice printout on the browser as shown below. Chapter 4 includes information on the system-supplied extensions, as well as how to override or set up additional extensions. Both system-supplied and user-defined extensions are included in this display.

Example 9.10 %defaultExtensionsHTML% display

```
Default Extensions (82)

•  = a MimeUnknown ( 'text/html' true)
•  * = a MimeError (* 404 true)
•  abs = a MimeReturn (abs 'audio/x-mpeg' true)
•  ai = a MimeReturn (ai 'application/postscript' true)
…
•  xwd = a MimeReturn (xwd 'image/x-xwindowdump' true)
•  z = a MimeReturn (z 'application/x-compress' true)
•  zip = a MimeReturn (zip 'application/x-zip-compressed' true)
```

- **%domainDirectory%** *e.g., (c:\http)*
  identifies the root directory for the IP address specified in the command. If multiple domains are in effect, each different domain can have a different root directory where files are located. It is not required that each domain has a different root directory. If the particular IP address maps to a domain but there is no root directory specified for the domain, then the default root domain is used. If multiple domains are not being used, this is the root directory as specified in the System Registry under Parameters. Chapter 4 includes information on multiple domains.

- **%domainExtensionsHTML%** *e.g., (see below)*
  formats all the extensions for the IP address specified in the command for a nice printout on the browser as shown below. If multiple domains are in effect, each different domain can have a different set of extensions it supports. It is not required that each domain have a set of extensions specified. If the particular IP address maps to a domain but there are no extensions specified for the domain, then the default set of extensions is used. If multiple domains are not being used, this is the set of extensions as specified in the System Registry under Extensions. Chapter 4 includes information on multiple domains and extensions.

Example 9.11 %domainExtensionsHTML% display

```
Extensions (0)

None
```

- **%domains%** *e.g., (Domain for: 1.2.3.4 Default = default.htf Directory = c:\http\et Error401 = error401.htf Error403 = error403.htf Error404 = error404.htf LogDirectory = c:\http\log1 Domain for: 1.2.3.5 Directory = c:\http\p Error403 = error403.htf Extensions = Dictionary(('xpm' ==> a MimeReturn (xpm 'image/x-xpixmap' true))...etc...))*
  returns a dictionary of all the domains that the user has defined. The key is the domain address, the values are a collection of the key/value pairs specified for this domain (e.g.,

extensions). Chapter 4 includes information on multiple domains. See also %domainsHTML%.

- **%domainsHTML%** *e.g. (see below)*
  returns the multiple domain information formatted for a nice printout on the browser as shown below. See also %domains%.

Example 9.12 %domainsHTML% display

```
Domains (2)

   1.2.3.4 (6)

      •  Default = default.htf
      •  Directory = c:\http\et
      •  Error401 = error401.htf
      •  Error403 = error403.htf
      •  Error404 = error404.htf
      •  LogDirectory = c:\http\log1

   1.2.3.5 (4)

      •  Directory = c:\http\p
      •  Error403 = error403.htf
      •  Extensions = Dictionary(('xpm' ==&;gt; a MimeReturn (xpm
      •  'image/x-xpixmap' true)) ('html' ==&;gt; a MimeProcess (html
         'text/html' true)) … )
```

- **%dynamicVariableNamesHTML%** *e.g. (see below)*
  returns the names of all the dynamic variables formatted for a nice printout on the browser as shown below. Note that some of the dynamic variables are for use by add-on products to **WebBase**, such as E-Merge.

Example 9.13 %dynamicVariableNamesHTML% display

```
Dynamic Variables - (138)

•  %adminTime%
•  %allUserVariables%
•  %allUserVariablesHTML%
•  %allUserVarNamesHTML%
•  %AOL%
…
•  %WHERE%
•  %whereAndOr%
•  %whereMultiAndOr%
•  %x%
•  %y%
```

- **%elapsed%** *e.g., (12080)*
  the elapsed time in milliseconds from the start of processing for this particular form. The value of the variable will continually change each time it is accessed as it makes an operating system call each time it is referenced for the current clock time.

- **%EQ%** *e.g. (=)*
  returns an equal sign (=) character.

- **%error%**
  used by the *errorProtect* macro, it is only set if an error condition occurs. If so, it contains the exception that caused the error. The particular error message can be displayed by sending the operation ‘messageText’ to the exception, as shown in the example below:

```
      {errorProtect}
           ... some WebBase scripting ...
     {onError}
       <H2>Sorry but we could not satisfy your request</H2>
       {if %local% =}
         {! browser is on the host, display the error that
occurred !}
         {f= %error% messageText}
       {/if}
{/errorProtect}
```

- **%err401%** *e.g. (see below)*
  generates the 401 Unauthorized error message text. This is displayed if Basic Authentication is being used and the user does not properly enter a username and password, or the user’s browser does not support Basic Authentication.

Example 9.14 %err401% display

```
401 Unauthorized

Proper authorization is required for this area. Either your
browser does not perform authorization, or your authorization has
failed.
```

- **%err403%** *e.g. (see below)*
  generates the 403 Browsing not permitted error message text. This is displayed if directory browsing is enabled but the directory or filename entered by the user is in a directory that has been marked for no browsing by inclusion of a file named ‘NOBROWSE’.

Example 9.15 %err403% display

```
403 Access to the requested file or directory is not permitted

Access to the requested file or directory is not permitted
```

- **%err404%** *e.g. (see below)*
  generates the 404 requested URL not found error message text. This is displayed if the user enters a filename that is not found. This is also displayed if a directory included in the URL does not exist.

Example 9.16 %err404% display

```
404 The requested URL was not found

The requested URL was not found
```

- **%err500%** *e.g. (see below)*
  generates the 500 internal server error message text. This is not used by **WebBase** but can be used by a forms developer to indicate that some type of error has occurred.

Example 9.17 %err500% display

```
500 Internal server error

Internal server error
```

- **%err501%** *e.g. (see below)*
  generates the 501 not implemented error message text. This is not used by **WebBase** but can be used by a forms developer to indicate that an option is not currently implemented.

Example 9.18 %err501% display

```
501 Not implemented

Not implemented
```

- **%err503%** *e.g. (see below)*
  generates the 503 server too busy error message text. This is displayed if a request is received from a browser but the server has currently been paused using the Pause Server option on the **WebBase** server window.

Example 9.19 %err503% display

```
503 The server is too busy

The server is too busy
```

- **%expire%** *e.g. (0)*
  the value of %expire% in seconds is added to the current time in GMT and returned to the browser in the header as the Expires parameter, e.g., Expires: Fri, 12 Jan 1996 05:39:40 GMT This is the time at which the form is to be considered expired so that the browser will no longer display the results from its own cache but reissue the query to the **WebBase** server for updating. This value defaults to 0 and should be overridden by the user with either a global variable of the same name or a local variable for the specific form. If the value is set to -1, the Expires parameter will not be set. If the value is set to -2, the Expires parameter is set to 12:00:01 on January 1, 1900. The time used to set the Expiration is that of the server system. The browser's clock may differ, slightly or substantially, from that of the server. In order to ensure that a form is expired, setting %expire% to a value of -2 is recommended. Experience with most current browsers shows this expiration is honored for pages that were accessed via POST requests and not those acquired via GET requests. See Chapter 12 for tips on how to handle browser-side caching of forms.

- **%filler%** *e.g. ( )*
  returns the space ( ) character and is used as the default pad character when specifying a size=<nn> parameter tag within a variable display - e.g. {varname size=7}.

- **%form%** *e.g. (test.htf)*
  returns the current form name. This is equivalent to {f= %cmd% path}.

- **%formDirectory%** *e.g., (/wbwizard/)*
  returns the name of the directory in which the form specified in the URL is located. Within this form, additional files may be inserted using the *insert* macro. These insert files

may be in other directories. The %formDirectory% is the directory of the main form, not the inserted form. A backslash character is always included at the end of the value.

- **%FORMScache%** *e.g., (Dictionary(('c:\http\ test.htf' ==> an OutputForm 'c:\http\test.htf')))*
  a dictionary containing all the forms which are currently cached. If *%cacheEnabled%* is disabled, this dictionary will be empty. See *%cacheEnabled%* for details on why caching should be used. See also %FORMScacheHTML%.
- **%FORMScacheHTML%** *e.g., (see below)*
  returns the list of forms which are currently cached. If %cacheEnabled% is disabled, there will be no forms in the cache. See %cacheEnabled% for details on why caching should be used. For each form in the cache, there are 5 items displayed: the full file specification, the date and local time it was cached by **WebBase**, the date and time it was last modified on disk, and the time in milliseconds for when the file was cached. See also %FORMScache%.

Example 9.20 %FORMScacheHTML% display

```
Forms cache

''form'' (size cached_date/time file_system_date/time <ms-clock>)

1)

•  "c:\http\test.htf" ( 472 bytes at: 03/10/97 10:04:46 AM
   03/10/97 05:39:24 <36286250> )
```

- **%fullHostAddress%** *e.g., (1.2.3.4:80)*
  the IP address and port number that the request from the browser was received on. If the address entered by the user was alphabetic (e.g., www.expertelligence.com), this will reflect the numeric IP address.
- **%fullHostName%** *e.g., (www.mydomain.com:80)*
  the HostName parameter if specified. One can provide a HostName parameter and that will be returned by this variable along with the port number. If HostName is not specified as a parameter, the IP address will be returned.
- **%GE%** *e.g. (>=)*
  returns the greater than or equal to (>=) sequence of characters.
- **%gfmt%** *e.g. (JPG)*
  a variable that returns the string JPG if the browser reports that it supports the Jpeg image display or GIF if it does not so indicate.
- **%globalVariables%** *e.g. (Dictionary(('%SortedList%' ==> SortedList) ('%OrderedCollection%' ==>OrderedCollection) ('%ReadStream%' ==> ReadStream) . . . ('%String%' ==> String)))*
  a dictionary of all the global variables. The keys to the dictionary are the names of the variables; the values are the values of the global variables. This is useful to determine if a particular global variable has been defined. The dictionary returned by this variable is a copy of the dictionary containing all the global variables. Thus, modifying this dictionary will have no effect on the global variables active in **WebBase**. This dictionary should be used for information only. See also %globalVariablesHTML%.

- **%globalVariablesHTML%** *e.g. (see below)*
  formats the global variables and their values for a nice printout on the browser. See also %globalVariables%.

Example 9.21 %globalVariablesHTML% display

```
Global Variables (23)

•  %Array% = Array
•  %Association% = Association
•  %DatabaseInfo% = DatabaseInfo
•  %Date% = Date
•  %Dictionary% = Dictionary
•  %Directory% = Directory
•  %File% = File
•  %Float% = Float
•  %Fraction% = Fraction
•  %Integer% = Integer
•  %Number% = Number
•  %OrderedCollection% = OrderedCollection
•  %OrderedList% = OrderedList
•  %Point% = Point
•  %ReadStream% = ReadStream
•  %ReadWriteStream% = ReadWriteStream
•  %RegistrationDatabase% = RegistrationDatabase
•  %SortedCollection% = SortedCollection
•  %SortedList% = SortedList
•  %String% = String
•  %Time% = Time
•  %UniversalTime% = UniversalTime
•  %WriteStream% = WriteStream
```

- **%gmt%** *e.g. (03/10/97 18:35:12)*
  the current time. It is accessed from the operating system once per form the first time it is referenced, and displayed in GMT format.

- **%GT%** *e.g. (>)*
  returns the greater than (>) character.

- **%headerVariables%** *e.g. (Dictionary(('User-Agent' ==> 'Mozilla/3.0 (Win95; I)') ('Connection' ==> 'Keep-Alive') ('Host' ==> ‘127.0.0.1’) ('Accept' ==> 'image/gif, image/x-xbitmap, image/jpeg, image/pjpeg, */*')))*
  a dictionary of all the header variables. The keys to the dictionary are the names of the variables; the values are the values of the header variables. This is useful to determine if a particular header variable has been defined. Header variables are also considered local variables. This variable allows the user to see specifically which local variables came from header information. The dictionary returned by this variable is a copy of the dictionary containing all the header variables. Thus, modifying this dictionary will have no effect on the header variables active in **WebBase**. This dictionary should be used for information only. See also %headerVariablesHTML%.

- **%headerVariablesHTML%** *e.g. (see below)*
  formats the header variables and their values for a nice printout on the browser, as shown below. Header variables are also considered local variables. This display allows the user

to see specifically which local variables came from header information. See also %headerVariables%.

Example 9.22 %headerVariablesHTML% display

```
Header Variables (4)

•  Accept = image/gif, image/x-xbitmap, image/jpeg, image/pjpeg,
   */*
•  Connection = Keep-Alive
•  Host = 127.0.0.1
•  User-Agent = Mozilla/3.0 (Win95; I)
```

- **%host%** *e.g. (myComputer.myCompany.com)*
  returns the host name of the server as set up in the TCP/IP network configuration.

- **%inputVariables%** *e.g., (Dictionary(('arg2' ==> 'abc') ('now' ==> '32254')))*
  a dictionary containing any arguments which were passed into the form on the command line. Command line arguments are another way to create local variables, as described at the start of this chapter. This display allows the user to see specifically which local variables came from command line arguments. See also %inputVariablesHTML%.

- **%inputVariablesHTML%** *e.g. (see below)*
  formats the command line arguments and their values for a nice printout on the browser, as shown below. Command line arguments are another way to create local variables, as described at the start of this chapter. This display allows the user to see specifically which local variables came from command line arguments. See also %inputVariables%.

Example 9.23 %inputVariablesHTML% display

```
Input Variables (2)

•  arg2 = abc
•  now = 32254
```

- **%LE%** *e.g. (<=)*
  returns the less than or equal to (<=) sequence of characters.

- **%leftBrace%** *e.g. ({)*
  returns the left brace ({) character. This is provided should you wish to display a { character in your .htf form and not have **WebBase** interpret it as the opening character of a macro or variable construct. It is similar to the HTML &lt; sequence. Setting this name with the *set* macro will change what is returned for the duration of the containing .htf form but will have no effect on the fact that **WebBase** will still interpret the { character as a special character used to start macro and variable fields within an .htf form. The *brace* macro can also be used to add braces around strings.

- **%local%** *e.g. (true)*
  a Boolean value identifying whether the browser that generated the request is on the same system as the **WebBase** server. This is equivalent to comparing *%serverAddress%* with *%browserAddress%.*

- **%localVariables%** *e.g. (Dictionary(('CookieCounter' ==> '2') ('%accepts%' ==> OrderedCollection('image/gif, image/x-xbitmap, image/jpeg, image/pjpeg, */*')) …))*
  a dictionary of all the local variables. The keys to the dictionary are the names of the

variables; the values are the values of the local variables. This is useful to determine if a particular local variable has been defined. Local variables include input variables (command line arguments), cookie variables, header variables, and variables set using the *set* or *setLocal* macros. Modifying this dictionary will have no effect on the local variables active in **WebBase**. See also %localVariablesHTML%.

- **%localVariablesHTML%** *e.g. (see below)*
  formats the local variables and their values for a nice printout on the browser. This information is appended to most error messages returned by **WebBase** to aid in debugging the form being developed. See also %localVariables%.

Example 9.24 %localVariablesHTML% display

```
Local Variables (15)

•  %accepts% = OrderedCollection('image/gif, image/x-xbitmap,
   image/jpeg, image/pjpeg, */*' )
•  %search% = now=32254 AND arg2=abc
•  %theArgs% = OrderedList('arg2' 'now' )
•  Accept = image/gif, image/x-xbitmap, image/jpeg, image/pjpeg,
   */*
•  Connection = Keep-Alive
•  Cookie = WebBaseID=W14263151E161808318465B; CookieCounter=2
•  CookieCounter = 2
•  Host = 127.0.0.1
•  User-Agent = Mozilla/3.0 (Win95; I)
•  WebBaseID = W14263151E161808318465B
```

- **%logRecord%** *e.g. (127.0.0.1 - - [10/Mar/1997:11:19:55 -0800] "GET /test HTTP/1.0" 200 0 "" "Mozilla/3.0 (Win95; I)")*
  a copy of the log record generated for the request that referenced this form. If logging is enabled, an identical record will be written to the log file. The actual format of the %logRecord% and the data written into the log file is determined by the LogFormat parameter.

- **%LT%** *e.g. (<)*
  returns the less than (<) character.

- **%milliseconds%** *e.g. (61480122)*
  the time in milliseconds from the previous midnight as returned by the operating system. This value is accessed from the operating system each time the variable is referenced and will therefore change during the processing of the form.

- **%name%** *e.g. (WebBase)*
  returns the product name string.

- **%NEQ%** *e.g. (!=)*
  returns the not equal to (!=) sequence of characters.

- **%newAscendingList%** *e.g. (SortedList())*
  returns a new sorted list object into which added elements will be sorted into ascending order.

- **%newDescendingList%** *e.g. (SortedList())*
  returns a new sorted list object into which added elements will be sorted into descending order.

- **%newList%** *e.g. (OrderedList())*
  returns a new list object into which added elements will be maintained in the sequence in which they are added to the list.

- **%nextCookieId%** *e.g., (W14264278E161808318467B)*
  returns a string similar to the WebBaseID that is used for initial interactions with the client browser. This variable is useful when the form developer wants a unique string that can be used as the name of the user variable dictionary. See Chapter 10 for more information on user variables.

- **%NGT%** *e.g. (!>)*
  returns the not greater than (!>) sequence of characters.

- **%NLT%** *e.g. (!<)*
  returns the not less than (!<) sequence of characters.

- **%ODBCcache%** *e.g., (OrderedCollection(an OdbcConnectionCache ('myAccess'/'fred'/' ' ('Microsoft Access Driver (*.mdb)' 1 03/10/97 12:22:58 PST 03/10/97 12:22:58 PST 0 +0:0:13))))*
  the collection of connection handles that are currently cached. See Chapter 12 for information on caching and ODBC connections. See also %ODBCcacheHTML%.

- **%ODBCcacheHTML%** e.g., (see below)
  formats the information on the connections stored in the ODBC cache for a nice printout on the browser. For each connection, the source, username and password are initially specified. The type of ODBC driver is then indicated, as well as how many times the handle has been used, when it was created, when it was last used, when it was cached, and how long it has been since it was used. See also %ODBCcache%.

Example 9.25 %ODBCcacheHTML% display

```
ODBC Cache

   'source'/'user'/'password' ('driver' 'count' created lastused
   time_cached time_idle)

(1)

   •  'myAccess'/'fred'/' ' ('Microsoft Access Driver (*.mdb)' 1
      03/10/97 12:22:58 PST 03/10/97 12:22:58 PST 0 +0:0:13)
```

- **%ODBCdrivers%** *e.g. (SortedCollection('Microsoft Access Driver (*.mdb)' ==> ('UsageCount=6809923' 'APILevel=1' 'ConnectFunctions=YYN' 'DriverODBCVer=02.50' 'FileUsage=2' 'FileExtns=*.mdb' 'SQLLevel=0' 'ConectFunctions=YYN') … etc …))*
  a collection of available ODBC drivers. The entries in the collection are each an association. The key to each association is the ODBC driver, the value is a string of interest attributes of the driver. See also %ODBCdriversHTML%.

- **%ODBCdriversHTML%** *e.g. (see below)*
  formats the information about the available ODBC drivers for a nice printout on the browser as shown below. The ODBC drivers in this list are those provided in the ODBC driver pack available from the **WebBase** web page or from Microsoft. See also %ODBCdrivers%

Example 9.26 %ODBCdriversHTML% display

```
ODBC Drivers (9)

•  Microsoft Access Driver (*.mdb) = ('UsageCount=6809923'
   'APILevel=1' 'ConnectFunctions=YYN' 'DriverODBCVer=02.50'
   'FileUsage=2' 'FileExtns=*.mdb' 'SQLLevel=0'
   'ConectFunctions=YYN')
•  Microsoft dBase Driver (*.dbf) = ('UsageCount=6809923'
   'APILevel=1' 'ConnectFunctions=YYN' 'DriverODBCVer=02.50'
   'FileUsage=1' 'FileExtns=*.dbf,*.ndx,*.mdx' 'SQLLevel=0'
   'ConectFunctions=YYN')
•  Microsoft Excel Driver (*.xls) = ('UsageCount=6809923'
   'APILevel=1' 'ConnectFunctions=YYN' 'DriverODBCVer=02.50'
   'FileUsage=1' 'FileExtns=*.xls' 'SQLLevel=0'
   'ConectFunctions=YYN')
•  Microsoft FoxPro Driver (*.dbf) = ('UsageCount=6809923'
   'APILevel=1' 'ConnectFunctions=YYN' 'DriverODBCVer=02.50'
   'FileUsage=1' 'FileExtns=*.dbf,*.cdx,*.idx,*.ftp' 'SQLLevel=0'
   'ConectFunctions=YYN')
•  Microsoft Paradox Driver (*.db ) = ('UsageCount=6809923'
   'APILevel=1' 'ConnectFunctions=YYN' 'DriverODBCVer=02.50'
   'FileUsage=1' 'FileExtns=*.db' 'SQLLevel=0'
   'ConectFunctions=YYN')
•  Microsoft Text Driver (*.txt, *.csv) = ('SQLLevel=0'
   'FileExtns=*.asc,*.csv,*.tab,*.txt' 'FileUsage=1'
   'DriverODBCVer=02.50' 'ConectFunctions=YYN' 'APILevel=1')
•  Microsoft Text Driver (*.txt; *.csv) = ('UsageCount=6809923'
   'APILevel=1' 'ConnectFunctions=YYN' 'DriverODBCVer=02.50'
   'FileUsage=1' 'FileExtns=*.,*.asc,*.csv,*.tab,*.txt,*.csv'
   'SQLLevel=0')
•  SQL Server = ('UsageCount=6809923' 'SQLLevel=1' 'FileUsage=0'
   'DriverODBCVer=02.50' 'ConnectFunctions=YYY' 'APILevel=2')
•  Visigenic 32-bit Oracle Driver = ('UsageCount=6809923'
   'SQLLevel=1' 'FileUsage=0' 'DriverODBCVer=02.50'
   'ConnectFunctions=YYY' 'APILevel=1')
```

- **%ODBCsources%** *e.g. (SortedCollection('dBASE Files' ==> 'Microsoft dBase Driver (*.dbf)' 'excel1' ==> 'Microsoft Excel Driver (*.xls)' 'FoxPro Files' ==> 'Microsoft FoxPro Driver (*.dbf)' 'myAccess' ==> 'Microsoft Access Driver (*.mdb)' 'Paradox Files' ==> 'Microsoft Paradox Driver (*.db)' 'Text Files' ==> 'Microsoft Text Driver (*.txt; *.csv)')*
  a collection of the ODBC sources which have been defined. Each entry in the collection is an association. The key to each association is the source name and the value is the driver used (e.g., MS Access, SQL Server). Note that some sources have database files associated with them (e.g., 'myAccess'), while other sources are generic and do not have database files associated with them. See also %ODBCsourcesHTML%.

- **%ODBCsourcesHTML%** *e.g. (see below)*
  formats the information about the available ODBC sources for a nice printout on the browser as shown below. See also %ODBCsources%.

Example 9.27 %ODBCsourcesHTML% display

```
ODBC Sources (6)

•  dBASE Files = Microsoft dBase Driver (*.dbf)
•  excel1 = Microsoft Excel Driver (*.xls)
•  FoxPro Files = Microsoft FoxPro Driver (*.dbf)
•  myAccess = Microsoft Access Driver (*.mdb)
•  Paradox Files = Microsoft Paradox Driver (*.db )
•  Text Files = Microsoft Text Driver (*.txt; *.csv)
```

- **%os%** *e.g. (Windows 4.0)*
  returns the operating system name and version as a string.

- **%output%** *e.g., (true)*
  a Boolean value that specifies whether output being generated by forms is added to the stream that is being constructed to go back to the browser. The default is true. Setting %output% to false stops all forms from outputting to the stream being constructed. The variable is changed using {set %output% <true-or-false>}. The <true-or-false> argument can be a constant, variable, or any expression that evaluates to true or false. If the expression does NOT evaluate to a true or false, the value of true is used without generating an error. This variable should be used to limit the whitespace (carriage returns, line feeds) returned to the browser. Each carriage return encountered within a form is added to the output stream, even if it is just at the end of a WebBase statement. If the expression {set %output% false} is placed around WebBase processing that does not generate anything to be displayed at the browser, less information will be returned to the browser.

- **%priority%** *e.g. (3)*
  a number (4=high 3=medium 2=low 0=yield) that is the priority of the current command. The statement {set %priority% 4} does not actually set the variable but changes the priority of the command. 0 does not change the priority number but forces the command to yield the CPU to give another process access to it.

- **%random%** *e.g. (a Random)*
  an instance of a random number generator object. Random numbers are in the range between 0.0 and 1.0. There are only two operations that can be used with %random%: ‘next’ and ‘integerBelow:’. The operation ‘next’ returns the next random number, as shown in the following example:

Example 9.28 %random% next usage

```
{! Generate a random number and save it in the variable ‘rand’ !}
{set rand %random% next}
```

If you want to choose among a set number of items randomly, you can use the integerBelow: operation. As shown in the example below, the returned value will be in the range 0 to the integer below the give argument inclusively.

Example 9.29 %random% integerBelow: usage

```
{! Pick a random entry from a list of returned answers !}
{set limit answers size}

{! Add 1 since indexing is 1 based but integerBelow: returns
   values from 0 through the limit - 1 !}
{set rand 1 limit %random% integerBelow: +}

{! Make random selection !}
{set selection rand answers at:}
```

- **%reservedWords%** *e.g., SortedList('!' 'ascending' 'call' 'case' 'changed' 'class' 'comment' 'commit' 'concat' 'copy' 'debug' 'dependents' 'descending' 'dll' 'edit' 'else' 'encode' 'ensure' 'errorprotect' 'escape' 'evaluate' 'exit' 'f=' 'f==' 'false' 'forindex' 'fork' 'forrow' 'free' 'get' 'grow' 'halt' 'hash' 'htf' 'if' 'include' 'insert' 'inspect' 'invoke' 'mail' 'match' 'match' 'munge' 'nil' 'no' 'onerror' 'onexit' 'otherwise' 'output' 'parallel' 'parse' 'patternmatch' 'post' 'print' 'quote' 'redirect' 'redirect2' 'release' 'remove' 'removeall' 'removecookie' 'removeglobal' 'removelocal' 'removeuser' 'repeat' 'return' 'rollback' 'scope' 'sender' 'set' 'setcookie' 'setglobal' 'setlocal' 'setstring' 'setuser' 'shoppingitem' 'signalerror' 'size' 'species' 'sql' 'timer' 'transact' 'true' 'value' 'verity' 'while' 'with' 'writefile' 'yes' 'yourself'))*
  the reserved words within **WebBase** that should not be used for variable names as errors will result. The reserved words include all **WebBase** macro names, as well as several operation names that can be applied to any **WebBase** data type. If the user attempts to create a local variable using any of the set* macros, an error will be displayed. However, it is also possible to create variables using command line arguments or field names. Database fields with the same name as a reserved work can be used by enclosing the field name in double quotes. A general rule-of-thumb is to take great care in selecting any variable name. See also %reservedWordsHTML%.
- **%reservedWordsHTML%** *e.g., (see below)*
  formats the list of **WebBase** reserved words for a nice printout on the browser as shown below. See also %reservedWords%.

Example 9.30 %reservedWordsHTML% display

```
Reserved Words (89)

•  !
•  ascending
•  call
•  case
. . .
•  with
•  writefile
•  yes
•  yourself
```

- **%results%** *e.g. ()*
  a default variable into which the ***sql*** macro places its results if a **to** keyword/value pair is not included.

- **%returns%** *e.g., (OrderedCollection())*
  the values returned by the last *return* macro. This is equivalent to {f= %cmd% returns}.

- **%rightBrace%** *e.g. (})*
  returns the right brace (}) character. This is provided should you wish to display a } character in your .htf form and not have **WebBase** interpret it as the closing character of a macro or variable construct. It is similar to the HTML &gt; sequence. Setting this name with the *set* macro will change what is returned for the duration of the containing .htf form but will have no effect on the fact that **WebBase** will still interpret the } character as a special character used to close macro and variable fields within an .htf form. The *brace* macro can also be used to add braces around strings.

- **%root%** *e.g., (c:\http)*
  the root directory for the particular domain specified in the IP address. If multiple domains are in use, each domain can have a different root directory. If multiple domains are not in use, this will be the same as %rootDirectory%.

- **%rootDirectory%** *e.g., (c:\http)*
  the root directory for **WebBase**. If multiple domains are in use, each domain can have a different root directory. If no root directory is specified for a domain, it will default to the root directory for **WebBase**.

- **%rowCount%** *e.g. (10)*
  contains the value of the ODBC statement's ‘row count’ field following the execution of the sql statement. The value returned for this variable is ODBC driver dependent and is typically NOT provided as a result of a SELECT statement. In general it does indicate the number of rows affected by NON-SELECT sql statements (INSERT, UPDATE, ...). Again, it is important to note that this field is very DRIVER DEPENDENT and users need to experiment with their particular ODBC driver to determine under what conditions this value is meaningful.

- **%rowCounter%** *e.g., (1)*
  used by the *forRow* macro. The *forRow* macro provides for a ‘counter’ keyword argument by which the user may specify a variable to keep a count of the iterations through the loop. If the user does not specify any counter variable, the default %rowCounter% variable will be created and used to keep track of the row element currently being processed on each iteration through the loop.

- **%rowHeader%** *e.g. (an OdbcRowHeader)*
  the OdbcRowHeader object for the most recent *sql* macro issued or nil if no sql has been used. See Chapter 11 for the messages which can be sent to this object.

- **%search%** *e.g., ('first=George AND Last=Jones')*
  this variable is the precursor to %WHERE%. It provides a very simplified form of the WHERE clause in which all testing is strictly by equality, and all argument/value pairs are put together with AND operators.

- **%seconds%** *e.g. (61480)*
  the time in seconds from the previous midnight as returned by the operating system. This value is accessed from the operating system each time the variable is referenced and will therefore change during the processing of the form.

- **%self%** *e.g. (c:\http\testfile.htf)*
  the full pathname of the file currently being processed. If %self% is used in an inserted file, it will contain the path of the file contained in the URL and not the path of the inserted file. This is equivalent to %root% and %form% concatenated together.

- **%selfDirectory%** *e.g. (c:\http\)*
  the full path to the directory containing the file currently being processed. If %selfDirectory% is used in an inserted file, it will contain the directory of the file contained in the URL and not the path of the inserted file. This is equivalent to %root% and %formDirectory% concatenated together.

- **%serverAddress%** *e.g. (127.0.0.1)*
  the IP address of the **WebBase** server in dotted 000.000.000.000 format. When one has multiple IP addresses assigned to the **WebBase** port, this allows one to detect which address was referenced by the incoming query and take a possibly different path based on IP address. See Chapter 4 for more information on multiple domain support.

- **%serverAverage%** *e.g., (7.07680945)*
  the average number of seconds that each command has taken to be processed by the **WebBase** server. This is simply the amount of time **WebBase** has been running since last launched divided by the number of commands it has processed. It does not take into account any idle time and therefore is not a measure of the performance of the server. See also %serverAverageHTML%.

- **%serverAverageHTML%** *e.g., (7.07680945 seconds per command)*
  formats the current statistic on the average number of seconds that each command has taken to be processed by the **WebBase** server for a nice printout on the browser as shown below. This is simply the amount of time **WebBase** has been running since last launched divided by the number of commands it has processed. It does not take into account any idle time and therefore is not a measure of the performance of the server. See also %serverAverage%.

Example 9.31 %serverAverageHTML% display

```
7.07680945 seconds per command.
```

- **%serverElapsedTime%** *e.g., (a TimeDifference (-1:19:51))*
  the amount of time that the server has been active. This value is used in the computation of %serverAverage% and %serverThroughput%.

- **%serverHostName%** *e.g., (http://www.expertelligence.com)*
  the name of the server system. If the local header variable Host is defined, the value is used. If not, the domain HostName parameter is used. If this parameter is not defined, then the server IP address is used. Any of these values are concatenated with ‘http://’ to generate the full server host name.

- **%serverStartTime%** *e.g., (Monday, 10-Mar-1997 14:12:40 GMT)*
  the date and time when the **WebBase** server was started.

- **%serverThroughput%** *e.g., (8.47839699)*
  the average number of commands that are being processed by the **WebBase** server. This is simply the number of commands **WebBase** has processed divided by the amount of time **WebBase** has been running since last launched. It does not take into account any idle time and therefore is not a measure of the performance of the server. See also %serverThroughputHTML%.

- **%serverThroughputHTML%** *e.g., (see below)*
  formats the current statistic on the average number of commands processed by the **WebBase** server for a nice printout on the browser as shown below. This is simply the

number of commands **WebBase** has processed divided by the amount of time **WebBase** has been running since last launched. It does not take into account any idle time and therefore is not a measure of the performance of the server. See also %serverThroughput%.

Example 9.32 %serverThroughputHTML% display

```
8.47839699 commands per minute
```

- **%statistics%** *e.g., (4/1)*
the current contents of the small statistics pane just under the menu bar in the **WebBase** Server window. It typically contains a string with the total command count / concurrent commands in process :: the most recent command string or a date/time - Idle message.

- **%time%** *e.g., (12:23:14 PM)*
the current local time. It is accessed from the operating system and cached once per form the first time it is referenced. Although most forms are processed very quickly, there are some database queries that can take some time. If the processing of a form will take some time and time information is critical, the forms designer should create a local variable using an expression like {set curTime %Time% now} each time the time is needed instead of using %time%. This will eliminate any problems with the caching of %time% and ensure the proper time is used.

- **%timeStamp%** *e.g., (Mon 10 Mar 1997 12:23:10)*
a string containing the current date and time. It is accessed from the operating system and cached once per form the first time it is referenced.

- **%title%** *e.g. ('WebBase 4.10 build 56')*
returns the product's title string consisting of its name, version number, and build number.

- **%userExpires%** *e.g., (60)*
default expiration time in minutes for User variables. This can be overridden by a global variable, or it can be set for each individual user variable dictionary. See Chapter 10 for information on user variables.

- **%userLimit%** *e.g., (0)*
the maximum number of User variable dictionaries allowed. See Chapter 10 for information on User Variables and User Variable Dictionaries. This variable returns 0 (zero) -- which indicates that there is NO limit to the number of user dictionaries.

- **%userName%** *e.g., (W14263151E161808318465B)*
the name of the current user variable dictionary. If not explicitly specified, it defaults to WebBaseID. It is possible to have multiple user variable dictionaries in use within one or more forms. See Chapter 10 for information on user variable dictionaries.

- **%userVariables%** *e.g. (Dictionary(('%%altered%%' ==> true) ('%%expires%%' ==> 60) ('%%created%%' ==> (03/10/97 04:42:25 PM)) ('%%accessed%%' ==> (03/10/97 04:42:26 PM)) ('UserToken' ==> 'UW14269116E161808318480B')))*
a dictionary of all the user variables. The keys to the dictionary are the names of the variables; the values are the values of the user variables. If no user variables have been defined for the user dictionary specified by %userName%, returns an empty dictionary. This is useful to determine if a particular user variable has been defined. One can also set %userName% to point to a specific dictionary and then use %userVariables% to dump the

contents. The dictionary returned by this variable is a copy of the dictionary containing all the user variables. Thus, modifying this dictionary will have no effect on the user variables active in **WebBase**. This dictionary should be used for information only. See also %userVariablesHTML%, %allUserVariables%, %allUserVariablesHTML% and %allUserVarNamesHTML%.

- **%userVariablesHTML%** *e.g. (see below)*
  formats the user variables and their values for a nice printout on the browser. See also %userVariables%, %allUserVariables%, %allUserVariablesHTML% and %allUserVarNamesHTML%.

Example 9.33 %userVariablesHTML% display

```
User Variables - W14263151E161808318465B (5)

•  %%accessed%% = (03/10/97 04:42:26 PM)
•  %%altered%% = true
•  %%created%% = (03/10/97 04:42:25 PM)
•  %%expires%% = 60
•  UserToken = UW14269116E161808318480B
```

- **%version%** *e.g., (4.10)*
  the program's version number as reported in the **WebBase** Server window title bar.

- **%WHERE%**
  a string of the form

```
WHERE xxx = yyy AND ...
```

The %WHERE% variable can be used in an SQL statement to identify a particular record or set of records based on command line arguments. For each command line argument/value pair, the 'xxx' specifies the name of the command line variable and the 'yyy' specifies the value of the variable. The advantage of the %WHERE% clause is that it is not generated until actually used within the sql statement. It is thus possible to modify the variables and values to be used in the %WHERE% variable before it is generated. For example, users may want to ensure that a given value is numeric and not a string of numbers, or that the string value of a variable is all in uppercase alpha characters. This can be done using statements like:

```
{set xxx xxx asNumber}
{set xxx xxx asUppercase}
```

The %WHERE% variable generates and returns a string each time it is called. This means that if one were to use the %WHERE% variable more than once in the same form, one could change the contents of a variable used within the %WHERE% after one access and receive a different string with the subsequent access. If you want to use the same %WHERE% string more than once in a single form, store the variable in a local variable with a statement like this:

```
{set where %WHERE%}
```

This not only ensures that the value does not change, but also reduces the overhead in not having to reconstruct the same %WHERE% string each time. More details on the use of the %WHERE% variable can be found in Chapter 12.

- **%whereAndOr%** *e.g., (AND)*
  specifies whether the command line argument/value pairs used in the %WHERE% variable will be put together with the AND or OR operator. By default, %whereAndOr% returns the string ‘AND’. If you want to replace the AND operators with OR operators, the following will create a local variable to override this dynamic variable to return the ‘OR’ string.

  ```
  {set %whereAndOr% 'OR'}
  ```

- **%whereMultiAndOr%** *e.g., (OR)*
  specifies whether multiple valued components used in the %WHERE% variable will be put together with AND or OR operators. The %WHERE% dynamic variable uses the value of %whereMultiAndOr% to indicate the logical operator to use when collecting multiple valued values (e.g. a collection of checkboxes all given the same variable name). By default, %whereMultiAndOr% returns the string ‘OR’. If you want to replace the OR operators with AND operators, the following will create a local variable to override this variable to return the ‘AND’ string.

  ```
  {set %whereMultiAndOr% 'AND'}
  ```

- **%whileCounter%** *e.g., (1)*
  used by the *while* macro, it is automatically set to the loop count.

- **%x%** *e.g. (123)*
  the x coordinate sent when the user clicks over an ISMAP image -- returns 0 if referenced outside the context of an ISMAP reference.

- **%y%** *e.g. (132)*
  the y coordinate sent when the user clicks over an ISMAP image -- returns 0 if referenced outside the context of an ISMAP reference.

Operational Variables

A global, user or local variable can override any of the above WebBase dynamic variables. The following dynamic variables can be modified by accessing the Options menu on the **WebBase** Server window. However, the changes made by selecting these menu options are only valid for the current session. When **WebBase** is stopped and restarted, the default values will be restored. If you want to permanently change the values of any of these variables, it is recommended that you add global variables with the desired values following the instructions earlier in this chapter. If a global variable is created to override the value of one or more of these dynamic variables, **WebBase** must be stopped and restarted for the change to take effect. The values of these operational variables are only <u>used</u> at system startup. The default value for each dynamic variable is shown in parentheses.

- **%cacheEnabled%** *e.g. (true)*
  a Boolean value which defaults to true, that indicates whether **WebBase** is to read forms from its internal cache. Each form that is handled by the **WebBase** server is first parsed to build internal structures identifying the macros in use. The form is then processed and the results returned to the browser. When a form is identified in a URL, **WebBase** checks to see if %cacheEnabled% is true. If so, it checks its internal cache to see if the form has already been processed. If so, the internal structures are re-used. This can significantly reduce the amount of time it takes **WebBase** to process a request for the second and subsequent reference to the same Web page since only the process step and not the parsing step has to be completed. For production systems, it is strongly recommended that this variable be left in its default mode, which is true.

- **%cacheTimeCheck%** *e.g. (true)*
  a Boolean value which defaults to true, that indicates whether **WebBase** is to check the file date of its forms against the file date stored in its internal cache to ensure it is using the latest version of the form. This variable is only used if **%cacheEnabled%** is true. During forms development, setting this variable to true helps ensure developers are always seeing the most current form -- they need not be concerned whether the form they are editing has already been cached or not. During production, however, disabling this feature improves throughput as **WebBase** will not have to do any file modification date determinations.

- **%cacheODBC%** *e.g. (true)*
  a Boolean value which defaults to true, that indicates that ODBC connections are to be cached within **WebBase**. Each *sql* macro request specifies a source name, user name and password. The username and password default to empty strings if not explicitly specified. An ODBC database connection is made using the source name and user name. If %cacheODBC% is true, the connection is cached. If a subsequent *sql* macro specifies the same source name and username, the connection in the cache is used and a new connection is not created. This can significantly reduce the amount of time it takes **WebBase** to process a request for the second and subsequent reference to the same source and username. See Chapter 12 for more information on ODBC caching.

- **%logEnabled%** *e.g. (true)*
  indicates that the log file functionality of **WebBase** is to be enabled. If a global or local variable sets this to false, logging will be disabled. Logging can be temporarily enabled or disabled using the **WebBase** server window menu options. It is strongly recommended that logging be enabled, and then only temporarily disabled if necessary. Many Web analysis tools can use the log information. See the section on Logging in Chapter 12 for more information.

Special Variables

The variables described in this section do not exist unless specified by the user. There is a default value associated with each of them, but it is not possible to query for or use this default value. Any of these special variables, unless otherwise specified, can be created as a global, user or local variable to override the default value.

- **%directoryBrowse%**
  This variable controls whether directory browsing is supported. By default, **WebBase** does not support directory browsing. To enable directory browsing, a global variable must be created with a value of ‘true’. It is not possible to enable directory browsing with a user or local variable.

- **%disableAllInternalCommands%**
  If set to true, all built-in (internal) commands are disabled. If this variable is created as a global variable, a user would not be able to send the dateTime command to the server. Instead, the 404 file not found error would be returned.

- **%dumpVariablesOnError%**
  By default, **WebBase** acts as if this variable were set to false. When set to true, the system will dump the local, header, cookie and user variables plus a list of available ODBC sources and drivers to the browser whenever an error message is generated. This can be helpful in debugging .htf forms. It is recommended that this variable be created and its value set to true during forms development. Once the forms have been debugged, the forms

designer should remove any statements setting this variable to true to prevent displaying this information on browsers visiting their site.

- **%enablePrivateInternalCommands%**
  If set to true and %disableAllInternalCommands% is not set to true, any dynamic variable can be called as if it were a built-in (internal) command. When a dynamic variable is invoked as a built-in command, the surrounding '%' signs are removed from the variable name. Thus, localVariablesHTML, allUserVariablesHTML, reservedWordsHTML, etc. can be invoked directly from a browser without having to write a form to return them. This can be useful during forms development on a development machine. It is not recommended that this variable be enabled on a production system.

- **%errorMacroLines%**
  this variable is used when an error message is generated due to a form's designer programming error. It defines the number of lines beginning with the start tag of the macro and number of lines ending with the end tag of the macro that will be displayed. The center portion will be replaced by '…' if the total lines exceed 2*%errorMacroLines*+1. It defaults to 5. If a value less than 2 is specified, the entire macro is displayed.

- **%errorUseColor%**
  this variable is used when an error message is generated due to a form's designer programming error. It is either true or false, and determines whether color is used in the error display. It defaults to false, so no color is displayed. If set to true, the error line is displayed in red and the macro containing the error is displayed in blue. All other code is displayed in black.

- **%errorWrapperLines%**
  this variable is used when an error message is generated due to a form's designer programming error. It defines the number of lines to be displayed before and after the macro that contains the error to give more help in locating the offending code. It defaults to 3. If a value less than 2 is specified, the entire form is displayed within the error message.

- **%heartbeatInterval%**
  this variable defines the length of time in seconds between heartbeat commands. The value entered must be between 5 and 360 seconds; the default is 15. More information on the WebBase Heartbeat Window can be found in Chapter 5.

- **%heartbeatMaxLines%**
  this variable defines the number of lines of information to be displayed in the WebBase Heartbeat Window. By default, 100 lines are displayed. If %heartbeatMaxLines% is created as a global variable with a value between 10 and 10000, this defines how many lines will be displayed in the window. More information on the WebBase Heartbeat Window can be found in Chapter 5.

- **%heartbeatPostingEnable%**
  this variable enables or disables posting of information into the WebBase Heartbeat Window. If set to 'false', it will cause posting into the WebBase Heartbeat Window to be disabled when the window is opened (either automatically via the *%heartbeatWindow%* variable or manually via the Edit menu). Posting uses memory and processor resources, so it might be desirable in a production system to disable posting. Error messages will continue to be posted even though posting is marked as disabled. The TCP/IP reset will also be issued when appropriate regardless of the posting enabled status.

- **%heartbeatReplyTime%**
  this variable defines the length of time the heartbeat function will wait for a reply in seconds. The value must be between 1 and 5 seconds; the default is 5. More information on the WebBase Heartbeat window can be found in Chapter 5.

- **%heartbeatResetTCP%**
  this variable is either true or false, and defines whether the TCP/IP socket will be reset when a heartbeat command times out. If not specified, the default value is true. More information on the WebBase Heartbeat window can be found in Chapter 5.

- **%heartbeatSound%**
  this variable is either true or false, and defines whether a sound is played if a heartbeat failure is identified. If not specified, the default value is false. More information on the WebBase Heartbeat window can be found in Chapter 5.

- **%heartbeatWindow%**
  this variable determines whether a WebBase Heartbeat Window is opened when **WebBase** is started. By default, the window is not opened. If %heartbeatWindow% is created as a global variable with a value of true, the window will be opened each time **WebBase** is started. Note that if **WebBase** is started as a service under Windows NT, no windows may be displayed. More information on the WebBase Heartbeat window can be found in Chapter 5.

- **%lastModified%**
  When the processed information is returned back to the browser, additional header information is attached to the message. One of the fields returned by the server is Last-Modified. This field indicates the date and time at which the server believes the file was last modified. This is not always meaningful because many forms are dynamic: they contain data taken from a database, etc. Thus, what the user sees is not really the .htf form itself but what the form caused to be generated and returned to the browser. The user can set %lastModified% to any of 3 values: a UniversalTime, true or false. If the user sets %lastModified% to %dateTime% or any other UniversalTime, that is the date and time that will be returned in the header. If %lastModified% is set to true, then the current %dateTime% value is returned in the header. If %lastModified% is set to false, the Last-Modified: header entry is not returned by the server. If the user does not set the value of %lastModified%, the date the file was last modified is returned to the browser.

- **%max%**
  the maximum number of records to be returned in a query by the {sql} macro. This can be created as a global, user or local variable, or overridden explicitly in the *sql* macro using the *max* keyword argument. This defaults to 0, which means that all records will be returned by the query.

- **%mimeType%**
  this variable identifies what will be stored in the Content-type: header entity that is returned to the browser. For standard .htf files, this defaults to ‘text/html’. Each file extension has an associated mime type, as described in Chapter 4. Since a .htf file is already being processed and will ship something back to the browser for display, the only other type of %mimeType% that one might want to set is ‘text/plain’. This means the browser ignores all the HTML tags and just displays the text - including all the <H2> controls, etc.

- **%password%**
  the name of the password to be used by the *sql* macro. This can be created as a global,

user or local variable, or overridden explicitly in the *sql* macro using the *password* keyword argument. This defaults to an empty string.

- **%skipAutoCookies%**
  This is less drastic than turning off cookie support completely by setting %skipCookies% to true. If set to true, WebBase will not send any of the default WebBase cookies to the browser. Any cookies created by the user using the setCookie macro will be sent to the browser. If %skipCookies% is set to true, the value of this variable is ignored.

- **%skipCookies%**
  By default, **WebBase** will always try and establish a 'cookie connection' with the browser. If it receives a cookie from the browser, it will return that cookie on the next write. If it does not receive a cookie, it will generate a new one and send it to the browser. If this variable is set to true, **WebBase** will not send a cookie to the browser regardless of whether one was received or not.

- **%skipHeaderComment%**
  When **WebBase** processes a file, it accumulates all the information to be returned to the browser in a stream. Once the processing is completed, the header information is created and added to the start of the stream. By default, **WebBase** also includes a comment line at the start of the stream indicating that the stream was generated by **WebBase** as well as the current date and time. The comment information is stored in the %comment% variable. This starting comment in the HTML returned to the browser is only seen if the user does a 'View Source' at their browser. If this variable is set to true, the %comment% value is not included in data returned to the browser.

- **%source%**
  the name of the data source to be used by the *sql* macro. This can be created as a global, user or local variable, or overridden explicitly in the *sql* macro using the *source* keyword argument. It defaults to an empty string.

- **%sqlBufferSize%**
  the maximum buffer length for ODBC to use to return data from the database to **WebBase**. This can be created as a global, user or local variable, or overridden explicitly in the *sql* macro using the *buffer* keyword argument. This defaults to 8192 bytes.

- **%start%**
  the number identifying the first matching record to be returned by the *sql* macro. This can be created as a global, user or local variable, or overridden explicitly in the *sql* macro using the *start* keyword argument. This defaults to 1.

- **%statusCode%**
  this variable is used to change the default status code that is returned as part of the header message. All servers use the same status numbers. For example, 200 means 'OK' and 404 means 'file not found'. The variable should be set to an integer or begin with a 3-digit status value.   If the variable is set to a string, the first 3 characters must be one of the valid status codes listed below. Any additional text provided with the variable is not used. The valid status codes are:

Example 9.34 %statusCode% values

```
100   Continue
101   Switching Protocols
200   OK
201   Created
202   Accepted
```

203	Non-Authoritative Information
204	No Content
205	Reset Content
206	Partial Content
300	Multiple Choices
301	Moved Permanently
302	Moved Temporarily
303	See Other
304	Not Modified
305	Use Proxy
400	Bad Request
401	Unauthorized
402	Payment Required
403	Forbidden
404	Not Found
405	Method Not Allowed
406	Not Acceptable
407	Proxy Authentication Required
408	Request Time-out
409	Conflict
410	Gone
411	Length Required
412	Precondition Failed
413	Request Entity Too Large
414	Request-URI Too Large
415	Unsupported Media Type
500	Internal Server Error
501	Not Implemented
502	Bad Gateway
503	Service Unavailable
504	Gateway Time-out
505	HTTP Version not supported

The actual message displayed may vary by browser. Browsers are not required to understand the meaning of all these status codes. However, browsers must understand the class of any status code, as indicated by the first digit, and treat any unrecognized response as being equivalent to the x00 status code of that class.

- **%theArgs%**
  this variable contains the names of all command line arguments that were specified as part of the URL. This variable is in fact a local variable but, as it is created dynamically for each form that is processed by **WebBase**, its description is included here. The variable is used in the construction of the %WHERE% variable if used within the form. A form designer can also use this variable to determine input arguments and their values.

  It is possible to modify the list of variable names found in %theArgs% and thus impact the resulting %WHERE% variable. For example, one could use the following:

  ```
  {set newArg.GE 13}
  {set %theArgs% 'newArg.GE' %theArgs% add:}
  ```

  to add the variable named *newArg.GE* to the list of arguments stored in %theArgs%. The resultant %WHERE% variable would now include the following test along with the arguments provided via the command line.

  ```
  ... newArg >= 13 ...
  ```

- **%transactionsMaxLines%**
  this variable defines the number of lines of information to be displayed in the WebBase Transactions Service window. By default, 100 lines are displayed. If %transactionsMaxLines% is created as a global variable with a value between 10 and 10000, this defines how many lines will be displayed in the window. More information on the WebBase Transactions Service window can be found in Chapter 5.

- **%transactionsWindow%**
  this variable determines whether a WebBase Transactions Service window is opened when **WebBase** is started. By default, the window is not opened. If %transactionsWindow% is created as a global variable with a value of true, the window will be opened each time **WebBase** is started. Note that if **WebBase** is started as a service under Windows NT, no windows may be displayed. More information on the WebBase Transactions Service window can be found in Chapter 5.

- **%updateStats%**
  If set to false, disables the 'Transactions Pane' - the one line band just below the menu bar in the server window. If the %updateStats% variable is not defined or is set to true, this pane will display the command counter and most recent command line. The user can enable/disable this pane via the Transactions Pane menu item in the server's Options menu. Providing a global variable %updateStats% set to false will cause this pane to initially come up as disabled.

- **%user%**
  the name of the user to be used by the *sql* macro. This can be created as a global, user or local variable, or overridden explicitly in the *sql* macro using the *user* keyword argument. It defaults to an empty string.

- **%varList%**
  The **%varList%** variable is specified by the user in conjunction with having a form return more than one variable using the same name. This is common when a form may contain a series of checkboxes using the <SELECT MULTIPLE ...> ... </SELECT> construct, where the user is requested to select none, one, or many items as desired to satisfy a request. An example form with multiple checkboxes is presented below in Fig. 9.36.

Example 9.35 Example form with multiple checkboxes

```
<B>Select a body style</B><P>
You can select as many different body styles as you like.  <P>
<PRE>
<FORM METHOD="GET" ACTION="test.htf">
<INPUT TYPE="checkbox" NAME="modtype" value="convertible">
Convertible
<INPUT TYPE="checkbox" NAME="modtype" value="minivan"> Minivan
<INPUT TYPE="checkbox" NAME="modtype" value="truck"> Truck
....
<INPUT TYPE="submit" VALUE="Submit Query">
</PRE>
```

The resultant GET command for such a list, should the user select multiple checkboxes, might appear as

```
GET test.htf?modtype=convertible&modtype=minivan& modtype=truck
```

The normal way in which **WebBase** would parse the command string would be to assign the value 'convertible' to the variable named 'modtype', then assign the value 'minivan' to the variable named 'modtype' (overwriting the first value), then on with 'truck' and so forth. The result would be a variable named 'modtype' with a value of the last "modtype=xxx" entry found in the command string.

The %varList% variable is used to inform **WebBase** that there are multiple entries in the command string with the same name and that all values associated with these entries are desired. This variable is created using a hidden variable, as in the following expression:

```
<INPUT TYPE=HIDDEN NAME="%varList%" VALUE="modtype">
```

Placing this input field before the fields named **modtype** causes **WebBase** to set up a list for collecting the **modtype** values as they are encountered in the command string. With this entry in the command string, the 'modtype' variable would return a list of the accumulated values as

```
{modtype} → OrderedList('convertible' 'minivan' 'truck')
```

The **size** method can be sent to **modtype** (e.g. {case modtype size} ...) to determine the number of entries and the {forRow oneValue on modtype} ... {oneValue} ... {/forRow} construct could be used to iterate over the collected entries.

If the input form were to contain more than one variable that is to be repeated in the command string, one must specify all the variables that can appear multiple times in the **%varList%** variable. This is done by listing all the variable names as the value of **%varList%**, separated by commas. For example, if the above form had a list of manufacturers, styles and colors as well as model types to select from, the following expression would be used:

```
<INPUT TYPE=HIDDEN NAME="%varList%" VALUE="manufacturer,
modtype,style,color">
```

- **%whileLimit%**
  used by the *while* macro, it limits the number of times the macro will loop regardless of the state of the condition. This is useful as a safeguard during development to prevent infinite loops.

9.5 Displaying Variables

The value of a **WebBase** variable can be displayed in HTML by enclosing the variable name in curly braces, e.g. *{counter}*. Parameters can be used to control the format in which variables will be displayed within the HTML resulting from **WebBase** processing the .htf file.

Variable parameters are specified following the variable name and within the braces using the format **parameterName=value**. One or more parameters can be specified with each variable name. However, parameters can only be used when the variable name only is within the braces. Parameters cannot be used with variables in an expression. The following is a valid **WebBase** variable expression:

```
{counter size=5 align=right prefix=$}.
```

The following is an invalid expression using variables and parameters:

```
{set myCntr counter size=5 align=right prefix=$}
```

Parameter names are not case sensitive. Supported parameters and their allowable values are described below.

Note:

> *Some of the parameters allow the user to insert spaces into a field (align, padchr, etc.). Recall that browsers replace multiple spaces with a single space character except within the <PRE> ... </PRE> construct.*

- **align**
  specifies the alignment of the field within the specified **size** area. Valid values are left, center, right, and currency. If currency is specified, the alignment is right justified and the numeric value is displayed with two decimal places and a comma character inserted for every group of three digits to the left of the decimal point. Default value is left for strings and right for numbers.

- **comma**
  allows for redefinition of the comma character. The default value is the comma character (‘,’).

- **currency**
  allows for redefinition of the currency character. The default value is $.

- **decimal**
  allows for redefinition of the decimal point character. This is useful to change monetary values in which a comma should separate values instead of a decimal point. The default value is the period character (‘.’).

- **encode**
  specifies that the value of the variable is to be explicitly encoded in the same fashion as the browser automatically encodes its command string when sending it to the server. Browsers encode the command string by:

  1) replacing all spaces with plus (+) signs

  2) encoding most non-alphanumeric characters as a sequence of three characters: a percent (%) sign followed by two hexadecimal digits representing the original ASCII character's numerical equivalent.

The browser provides any necessary encoding for the command line arguments generated by the <FORM> </FORM> construct. **WebBase** will handle any necessary encoding on arguments passed via the *redirect2* macro. However, it is the responsibility of the form designer to properly set up any arguments and values used on anchors and their associated HREFs. The general rule-of-thumb is that any **WebBase** variable containing text and used as an argument on an anchor must include the *encode=true* parameter. For example,

```
<A HREF=”file2.htf?numArg={nArg}&strArg={sArg encode=true}”> </A>
```

HTTP command line processing stops at the first space character. If the *encode=true* parameter is not used on a variable containing a string, some of the string value may be lost. Any variables and values following the space will also not be set up as variables.

- **nonempty**
When *nonempty=true* is specified, a ‘&nbsp’ Non Breaking Space sequence will be returned in place of a nil or empty string value. This is helpful when formatting table fields as most browsers do not display a border for a field that has no value to display. The &nbsp sequence constitutes a displayable value and thus the border is properly displayed.

- **padchr**
a single character to be used as a padding character when aligning values in a field where the specified size is greater than the size of the value. The default value is a space.

- **prefix**
a series of characters that will be prepended to the value of the variable, preceded by one or more pad characters if the field requires padding.

- **size**
specifies the field width as an integer. Results larger than the specified size will be truncated on the right while results shorter than the size will be aligned as specified by the **align** parameter, and padded with the indicated **padchr** as necessary to fill out the field.

- **sql**
indicates that the variable will be used in a statement within an *sql* macro and must be checked for the inclusion of an apostrophe character. SQL statements must have strings enclosed within apostrophes -- thus any strings that contain apostrophes must have these enclosed apostrophes represented by two consecutive apostrophe characters. To accomplish this within a variable's value without requiring the user to enter two apostrophes for each one desired, one must specify the parameter as in:

```
{VarName sql=true}
```

As a general rule-of-thumb, forms designers should always include the *sql=true* parameter on any **WebBase** variable containing a text string that is used in a statement within the *sql* macro. Although one might not expect a variable to contain an apostrophe, users will sometimes do the unexpected and enter an apostrophe. A little extra effort during form design will generate forms that are much more robust and less likely to have runtime errors.

- **suffix**
a series of characters that will be appended to the variable's value, followed by one or more pad characters if the field requires padding.

User Variables

Chapter 10

The previous chapter described the general principles behind variables and how field variables, local variables, global variables, and dynamic variables are used within **WebBase** forms. This chapter describes an additional type of variable, called a user variable, and its intended use within **WebBase**.

Local variables provide the .htf form author with the ability to obtain information from the user, change information, and return information to the user. Local variables can be read and written by the form designer, but their lifetime is the duration of processing of one form.

Global and dynamic variables have a much longer life span: they exist as long as **WebBase** is up and running. They can be overridden by a local variable, but again this change is only for the duration of a single form.

The type of variable that is missing is one that can be both read and written by the forms designer and whose lifetime can span the processing of a series of .htf forms:

- variables that could be set by one form and read by a subsequent form,
- variables that could maintain ‘state’ information for a user who is browsing a number of related and/or disjoint forms,
- variables whose ‘state’ information could influence the content of the ‘next’ form a user would visit.

10.1 User Variables

User variables are simply variables that can be both read and written by an .htf form. They are created using the *setUser* macro. When a local variable is created using the *set* or *setLocal* macro, the local variable and its value are stored into a dictionary that is maintained as part of the form being processed. As soon as the command is completed, the local dictionary ceases to exist. When a user variable is created, the user variable and its value are stored in a user variable dictionary that is maintained as part of the **WebBase** server – not part of the form being processed. The data in the user variable dictionary is available to other forms being processed, thus allowing state information to be maintained through multiple pages within a session.

10.2 User Variable Dictionaries

The **WebBase** server maintains a list of all the user variable dictionaries that have been created. This list and the dictionaries reside in memory and are accessible by any number of requests sent to **WebBase**. The implementation and use of user variables and user variable dictionaries is up to each form designer.

WebBase supports multiple user dictionaries. For example, the user variable {UserVar} might have the value 'Denny' in one user dictionary while it has the value 'Denny Smith' in another user dictionary. The variable *%userName%* identifies which user variable dictionary is currently in use. It is possible to use several user variable dictionaries – all within a single form!

The default value for this variable is the value of the local variable WebBaseID. As described previously, the WebBaseID variable is created for each request received from a browser that does not include WebBaseID as a cookie variable. On the first interaction between a browser and the **WebBase** server, **WebBase** will generate this variable and return it as a cookie. If the browser supports cookies, the variable will be returned on any subsequent requests from the browser until the browser is shut down.

It is important to note that user variable dictionary names should be unique for each user accessing the dictionary. The information stored in user variables is generally information that has been entered by a specific user, and should be considered sensitive. Under no circumstance should it be made available to other users accessing the same form. If a user dictionary name is created which is not unique to each user, information may be improperly displayed to other users.

For example, let's create a user variable dictionary whose name is set to 'theUserDict'. The first form requests a user to enter their name, address and social security number. If there are user variables for the name, address and social security number, they are displayed. If there are no user variables yet defined, the fields are blank. The first user accesses the form, sees all blank fields, and enters their name, address, and social security number. This information is stored as user variables in the user variable dictionary whose name is 'theUserDict'. The second user accesses the form. However, this second user sees a form on which is displayed the first user's name, address and social security number. This is definitely not desirable!

The WebBaseID and %nextCookieId% variables have been set up specifically for use with user variables – to ensure that a unique value can be used as the name of the user variable dictionary.

Special User Variables

The user variable dictionary is not actually created when the name of the dictionary is specified in %userName%. The user dictionary is created when the *setUser* macro is processed and the appropriate user dictionary is not found in **WebBase** memory.

When a new user variable dictionary is created, a number of special user variables are automatically written into the dictionary as follows:

- **%%created%%**
  contains a timestamp of when the dictionary was created

- **%%accessed%%**
  contains a timestamp of the most recent read or write access to the dictionary

- **%%expires%%**
  the number of minutes that the dictionary should be maintained in memory since last accessed (%%accessed%% value). This variable is initialized with the contents of the dynamic variable *%userExpires%*, the default value of which is 60 minutes. Setting this value to 0 will cause the dictionary and its contents to immediately be removed. A form or set of forms can specify how long a user dictionary should be allowed to exist following the last access by setting this variable to an appropriate value. For example,

  ```
  {setUser %%expires%% 15}
  ```

  will cause the dictionary to be removed if it has not been accessed in 15 minutes. Each time %%expires%% is set, it updates the %%accessed%% variable also.

All of the above special variables can be read from the user variable dictionary, but only the *%%expires%%* variable can be written using the *setUser* macro. There is one other special user variable that is not written into the user dictionary as a result of its appearance in a *setUser* macro but that will have side effects on the maintenance of the dictionary.

- **{setUser %%remove%% dictionaryName}**
  tells **WebBase** to remove the dictionary named dictionaryName (specified by a string constant such as ‘myDictionary’ or as the value of a variable such as %userName%). This is equivalent to setting this dictionary’s %%expires%% variable to 0 except that it operates on a specifically named dictionary rather than on the current dictionary referenced by %userName%. If the dictionary name is specified as the string constant ‘%%all%%’, **WebBase** will remove all user dictionaries from memory.

User Variable Dictionary Maintenance

WebBase periodically performs maintenance on user variable dictionaries to ensure memory is managed in a reasonable fashion. It will check the *%%accessed%%* and *%%expires%%* values of all dictionaries once per minute and remove those that have expired.

In addition, a **WebBase** administrator can limit the number of user dictionaries that can exist at a single time. The variable *%userLimit%* can be overridden to indicate the total number of dictionaries that can be created. **WebBase** will remove the least recently accessed dictionaries that exceed this limit regardless of their expiration status. By default, there is no limit on the number of user dictionaries.

From the host server, the administrator has one Options menu items to interact with the user dictionaries within **WebBase**. The **Remove All User Variables** menu item causes **WebBase** to remove all user dictionaries regardless of their expiration status. This last option should be used with great care. If there are users interacting with forms in which user variables are used, the users may get unexpected results or errors if all the user variable dictionaries are removed.

10.3 Using User Variables in WebBase

The initial concept of cookie support on browsers was to allow state to be maintained in a session between a browser and a server. Not all browsers support cookies, and some users disable cookie support on their browsers due to security considerations. Another alternative needed to be found to allow state between forms. **WebBase** provides user variables to maintain state information without the necessity of cookies!

User Variable Design

If the form designer is setting up user variables, the default value of WebBaseID for %userName% can certainly be used. However, this requires all accessing browsers to be cookie enabled. In some Intranet configurations, this may be acceptable. However, as noted above, not all browsers support cookies and some may not have cookie support enabled. If the forms designer relies on the default value of WebBaseID for the value of %userName% and the browser does not return cookies to the server, a new WebBaseID will be created for each request received from the browser. All user variables created on the first form will be stored in a user variable dictionary associated with the first WebBaseID. Any user variables needed or created on the second form will be stored in a user variable dictionary associated with the second WebBaseID. Form #2 will not have access to any of the user variables from form #1, because it does not have the same WebBaseID as used on form #1.

There is an easy solution to this problem. The form designer can create a token as a local variable using the value of WebBaseID or %nextCookieId%. For example,

```
{set myToken WebBaseID ‘App-‘ ,}
```

will generate a local variable called *myToken* whose value will be something like App-W14263151E161808318465B. The forms designer can then set this local variable to be the name of the user variable dictionary using:

```
{set %userName% myToken}.
```

Any user variables created via the *setUser* macro within this form will automatically go into this user variable dictionary. This local variable is also passed to any other forms that will be displayed, either via a FORM statement, anchor or *redirect2*macro (the redirect2 macro supports passing arguments; the redirect does not). Those subsequent forms would set this local input variable to be the name of the user variable dictionary. These forms would then have access to the user variables created in the first form. They would also be able to modify or create new user variables. Because there is only one dictionary of user variables, any form that receives the local variable *myToken* and sets it to be the user variable dictionary name can access any of the user variables in the dictionary.

User Variable Example

The **WebBase WebWizard** Basic Example #7 shows how user variables can be used to pass information between two forms. The first form requests the user to enter several pieces of information, some of which are required or have specific requirements as to the contents. The second form verifies that all input requirements have been met. If any requirements are lacking, the information entered by the user is passed back to the first form and redisplayed with a request to correct it.

One of the big advantages of using user variables is that the amount of information to be passed between forms can be substantially reduced. In Example #7, a number of command line arguments are passed from the first form to the second to indicate the values the user entered into the input fields. After the error checking has been completed, it may be necessary for the user to correct some of the entered information.

If user variables were not used, the FORM, redirect or anchors used on the second page to return back to the first page would have to include all of the input arguments and their values. This is a lot of information to be set up properly by the form designer. In addition, all the information must be sent as part of the browser request that can generate a large request.

Instead, user variables are used. The first forms create a {token} local variable using WebBaseID. It passes this as a hidden variable to the second form, along with all the other variables generated from the input statements. On the second form, the {token} local variable is received and set up as the name of the user variable dictionary. All the other input local variables, such as name and address, are stored as user variables. The error checking is performed, and the error information is stored as a user variable. Finally, the anchors and FORM statements are set up to return {token} to the first form. No other local variables need to be passed back to the first form!

The first form is redisplayed with the error information at the top, and the values – as entered by the user the first time – redisplayed in the input fields. All of this is possible using a local variable {token} and storing information in the user variable dictionary. Plus, there is no dependence on whether a browser supports cookies or not. The form designer uses the initial value of WebBaseID – or any other unique value – to create a token. The form designer then passes that token to any other forms to be accessed.

Creating User Variables

User variables are created via the *setUser* macro. The *setUser* macro operates exactly as does the *set* macro except that it will store its name-value pair in the appropriate user variable dictionary as described above.

The following expression will create a user variable called *xx* whose value will be the string ‘test’:

```
{setUser xx ‘test’}
```

Using the variable {xx} in a subsequent form using the same user variable dictionary will return the value ‘test’.

User variables are accessed as are any other **WebBase** variables by merely specifying their name within curly braces, e.g. {UserVar}, and the value of the variable will be substituted in the form at that point. Since user variables are stored in a user dictionary, the containing .htf form must specify the name of the user dictionary currently in effect before the variable is referenced.

The search order for **WebBase** variables is

1. Field variables
2. Local variables
3. **User variables**
4. Global variables
5. Dynamic variables

Notice that local variables can be used to mask user variables, user variables can be used to mask global variables, and global variables in turn can be used to mask dynamic variables.

Persistent User Variables

User variable dictionaries provide state across multiple forms. In general, however, they will eventually expire and be removed from memory in typical **WebBase** installations. If the form designer wishes to make the contents of a user dictionary persistent, the variables in the dictionary can be written to a database using the *sql* macro. In like fashion, a user dictionary can be created and populated with the results of reading a database via .htf SQL.

For example, imagine an application that requests information from the user such as their name, address and e-mail address. Once this information is entered, it is stored in user variables. A unique token is created as the name of the user variable dictionary; this token is sent to the browser as a cookie. An expiration date is also specified for the cookie so that it will not expire and be removed from the browser for 1 year. If the browser does not support cookies, this information is just discarded. If the browser does support cookies, this information will be stored on disk and loaded into memory each time the browser starts up.

In addition to storing the information as user variables, it is also written into a database table that contains fields for name, address, e-mail, tokenID and browserAddress. The tokenID is the unique token returned to the browser as a cookie and used as the user variable dictionary name. The browserAddress is set to %browserAddress%, the IP address of the client browser.

Several days later, the user again visits the same site. Instead of again having to fill in his name, address and e-mail address, he is greeted by name! There are two reasons this is possible.

First, if the user's browser supports cookies, the initial cookie which was sent from **WebBase** to his browser was stored by the browser and was returned to the **WebBase** server as part of the request. A simple SQL SELECT statement was used to query the database to see if there were any records for this unique ID. If a match is found, then the information in the database is loaded into a user variable dictionary with the specified unique name.

If no matches are found, it may be because the user has never visited the site or because his browser does not support cookies. In this case, another SQL SELECT query is made to see if a match can be found based on the incoming %browserAddress%. If a match is found, then again the user variable dictionary is set up and populated with the information from the database. If no match is found, then the blank form is displayed and the user has to re-enter his information. This situation may occur if the user is on another system, is behind a firewall, or is going through a provider that generates different IP addresses for each session.

Once the user enters the information again, yet another SQL SELECT query can be done. This time, the query checks to see if a match exists between the e-mail address entered by the user and entries in the database. E-mail addresses are also quite unique and can be used to help identify a user. If a match is found in this fashion, then once again the user variable dictionary is created, populated, and the user can resume his interactions with the forms.

A judicial use of user variable dictionaries and SQL maintenance of these dictionaries in a database provides a very wide range of capabilities with respect to developing Web pages that are highly interactive and carefully tailored to a given user's needs.

Expressions

Chapter 11

Expressions are used in macros for math tests, string manipulation and more. **WebBase** expressions are in a **'FORTH-Like'** or **Reverse Polish Notation (RPN)** format. This chapter provides a description of RPN and how it is used in expressions. The remaining sections cover all the different types of **WebBase** data types, the operations that can be performed on them within **WebBase** expressions and examples of their use.

11.1 WebBase Expression Components

Each **WebBase** operation is performed on a **receiver**. For example, to determine how many characters are in a string, the **operation** would be *size* and the **receiver** would be *'myString'*. Some operations require arguments. For each ':' (colon) in the operation, an argument must be provided[17]. For example, to determine if a date is between two other dates, the **operation** would be *between:and:*, the **receiver** would be *date1*, and the **arguments** would be *date2* and *date3*. In RPN notation, the receiver always immediately precedes the operation. Any arguments will precede the receiver; the arguments are in order left to right within the RPN statement.

Each operation returns some type of result. In some cases, a new instance is returned. For example, the result of adding 3 and 5 is 8. The receiver is 3, the operation is '+', the argument is 5 and the result is 8. As another example, when 'abc' and 'xyz' are concatenated together, a new string -- 'abcxyz' -- is returned.

In other operations, the receiver is returned. The receiver may or may not have been modified, depending on the purpose of the operation. For example, {f= 2 3 'BC' 'abcdef' replaceFrom:to:with:} returns the original string but it has now been modified to be 'aBCdef'.

In some other operations, a copy of the receiver is returned and the original receiver is left unmodified. For example, {f= 2 3 'BC' 'abcdef' copyReplaceFrom:to:with:} returns a new string -- 'aBCdef'; the receiver is unmodified -- it is still 'abcdef'.

[17] There are a number of operations that do not include a ':' (colon) but do require an operator including +, -, =, <, >. The information included with each operation description identifies argument requirements.

The descriptions and examples provided below for the operations supported for each **WebBase** data type clearly identify the type of data returned. It is important to understand what is returned because unexpected errors can result.

Sound confusing? It can be. The following section presents several examples of how to develop expressions using RPN.

11.2 RPN Notation

A **WebBase** expression is written using the RPN format which is easy for the computer to understand but is difficult to read and frequently difficult to write. For example, to see if the contents of the variable **counter** is equal to the constant **3,** one would write

```
{f= counter 3 =}
```

To determine if the number of results returned in the variable **results** from a database query is greater than zero, one would write

```
{f= 0 results size >}
```

There are three types of components within an expression: constants (e.g., integers, characters, strings), variables and operators. **WebBase** works from left to right in evaluating the information in the expression. If a constant is encountered, it is put directly onto the stack. If a variable is found, the value of the variable is put onto the stack. If an operator is found, the receiver of the operator is retrieved from the stack -- it will be the last item placed on the stack. If the operation has arguments, the necessary arguments will be retrieved from the stack. The result of the operation will be computed and placed onto the stack.

We will go through two examples of expressions in RPN notation to see how each of these types of components is handled.

The first example we will examine is:

```
{f= Shipping Total TaxRate * +}
```

When the expression is parsed from left to right and evaluated, the following actions occur. The information on the stack at each step is displayed in the right column.

Example 11.1 Simple RPN Example

Action	Computations	Stack
The first component encountered is **Shipping** which is a variable, so its value is placed onto the stack.		{Shipping}
Next is **Total** which is another variable; its value is also placed onto the stack.		{Total} {Shipping}
Next is **TaxRate**, another variable whose value is placed onto the stack. The stack now contains three values.		{TaxRate} {Total} {Shipping}
The next component is the '*' operator. The top value on the stack is removed; this is the receiver for the '*' operation.	{TaxRate}	{Total} {Shipping}
This operation requires one argument, so the next value from the stack is removed.	{TaxRate} * {Total}	{Shipping}

The operation is performed on the receiver and argument, the result is placed back onto the stack. There are now two values on the stack -- the original value of **Shipping** and the product of **Total** and **TaxRate**.		{TR*T}
		{Shipping}

The last component in the expression is the '+' operator. The top value on the stack is popped off; this is the receiver of the '+' operator.	{TR*T}	{Shipping}

The next value on the stack (and the only remaining value) is popped off.	{TR*T}
	+
	{Shipping}	

The operation is performed; the result of summing the receiver and the argument is returned as the value of the expression.		

The next example includes a operation with multiple arguments. It will determine whether 15 is between 10 and 20. Although this example does not include as many stack operations as the previous example, it shows how multiple arguments are placed within the **WebBase** expression and onto the stack.

```
{f= 10 20 15 between:and:}
```

Example 11.2 Detailed RPN Example

Action	Computations	Stack
The first component encountered is **10** which is a constant, so it is placed directly onto the stack.		10
Next is **20** which is another constant; its is also placed directly onto the stack.		20 10
Next is **15**, another constant that is placed onto the stack. The stack now contains three values.		15 20 10
The next component is the '**between:and:**' operator. The top value on the stack is removed; this is the receiver for the operation.	15	20 10
This operation requires two arguments, so the two previous values on the stack areremoved. Note that the arguments are on the stack in the reverse of how they are used in the operation: the second argument is highest in the stack and removed first; the first argument is lower in the stack and removed second.	15 between: 10 and: 20	
The operation is performed; and the result (in this case, true) is returned as the value of the expression.		

Building Compound Statements in RPN

After reviewing the examples of RPN usage shown above, RPN can still be difficult to use especially when attempting to build compound statements. When attempting to build a compound 'if' statement in RPN, we recommend:

1. Set the values of each of the individual components of the compound ‘if’ as a unique **WebBase** variable using the set statement.

2. Combine the results using the required and/or logical. Again do it one at a time setting the result to another local **WebBase** variable.

3. Test the resultant variable within the compound if.

4. Once you get the above working, cut the expression from one set statement and paste it into the following statement where that variable name was used. Continue back up the sequence of set statements, etc. until you've eliminated the need for the local variables.

For example, how would a user go about building a statement to do something IF var1 is greater than 5 and the string str1 contains the substring 'abc' or variable var2 is greater than 10 but less than 20. Here’s how the RPN would be developed.

Example 11.3 Developing RPN Statements

```
{! cond1 is set true if var1 > 5, otherwise it is set false !}
{set cond1 5 var1 >}
{set cond2 'abc' str1 containsString:}
{set cond3 10 var2 >}
{set cond4 20 var2 <}

{! the and-ing of  var2 > 10 AND var2 < 20 !}
{set cond5 cond3 cond4 &}
{set cond6 cond1 cond2 &}
{! the solid vertical bar is the OR operator !}
{set cond7 cond5 cond6  ¦}
```

Now you can write...

```
{if cond7}
    ......
{/if}
```

Then,

Example 11.4 Developing RPN Statements -- Continued

```
{if cond5 cond6 ¦}  ...  replacing cond7 by its expression,
{if cond3 cond4 & cond6 ¦}  ...  replacing cond5 by its expression,
{if cond3 cond4 & cond1 cond2 & ¦}  ... and so forth...
{if 10 var2 > cond4 & cond1 cond2 & ¦}  ...
{if 10 var2 > 20 var2 < & cond1 cond2 & ¦}  ...
{if 10 var2 > 20 var2 < & cond1 'abc' str1 containsString: & ¦}  ...
{if 10 var2 > 20 var2 < & 5 var1 > 'abc' str1 containsString: & ¦}
...
```

Just go through the process one step at a time! The sequence of set’s and the {if cond7} will work just fine. They do add a little bit of overhead in the creation of the temp variables but they make it that much easier to understand.

11.2 General Operations

The remainder of this chapter covers the different types of operations that can be performed on **WebBase** data types. The user is encouraged to read through the different operations available to become familiar with the various data types as well as the types of operations that can be performed upon and with them. For each data type, there are operations that can be performed upon an instance of the data type. There may also be operations that can be performed upon the class itself.

There are several **WebBase** expression operators that are represented by special characters:

```
,  =     concatenation
&  =     logical AND
|  =     logical OR
```

General Instance Operations

The operations described in this section may be used with an instance of any type of **WebBase** data (e.g., numbers, strings, collections).

- **asString**
  returns a string representing the information stored in the receiver. Each **WebBase** data can represent itself differently as a string.

- **copy**
  returns a copy of the receiver which can subsequently be modified without affecting the receiver.

- **hasMessage**
  returns false unless the receiver is an ODBCRowObject which has an associated message or if the receiver is a collection and one of the members of the collection is an ODBCRowObject which has an associated message.

- **isArray**
  returns true if the argument is an array, otherwise false

- **isAssociation**
  returns true if the argument is an association, otherwise false

- **isBoolean**
  returns true if the argument is a Boolean (e.g., true or false), otherwise false

- **isCharacter**
  returns true if the argument is a character, otherwise false

- **isCollection**
  returns true if the receiver is a collection; otherwise false. Note that strings, dictionaries and lists are types of collections.

- **isDictionary**
  returns true if the receiver is a dictionary; otherwise false.

- **isDirectory**
  returns true if the receiver is a directory; otherwise false.

- **isFloat**
  returns true if the receiver is a floating point number; otherwise false

- **isFraction**
  returns true if the receiver is a fractional number (represented as n/m); otherwise false

- **isInteger**
  returns true if the receiver is an integer; otherwise false

- **isList**
  returns true if the receiver is a list; otherwise false

- **isNil**
  returns true if the receiver is non-existent; use this to test for a non-existent variable or field

- **isNull**
  returns true if the receiver is non-existent or if it is a collection (e.g., string, list or dictionary) and does not have any contents

- **isNumber**
  returns true if the receiver is a number (e.g., integer, fraction, float); otherwise false

- **isPoint**
  returns true if the receiver is a point; otherwise false.

- **isSortedList**
  returns true if the receiver is a sorted list; otherwise false

- **isStream**
  returns true if the receiver is a stream; otherwise false

- **isString**
  returns true if the receiver is a string; otherwise false

- **isSymbol**
  returns true if the receiver is a symbol; otherwise false

- **notNil**
  returns true is the receiver exists; equivalent to isNil not

- **notNull**
  returns true is the receiver exists; equivalent to isNull not

- **printOn:**
  return the receiver, which is not modified. Adds the appropriate representation of the receiver to the argument, which must be a stream.

11.3 Numbers

There are three different kinds of numbers supported within **WebBase**: integers (e.g., 12345), floats (e.g., 123.45) and fractions (1/2).

Number Instance Operations

This section covers all the operations that can be performed on any type of number. Operations specific to integers or floats or fractions are described in subsequent sections. In general, numbers are always instances. There are no class operations that can be performed on numbers.

- **-**e.g., _{f= 3 6 -}_ fi _3_
  returns the difference of the receiver and an argument

- ***** e.g.,_{f= 3 3 *}_ fi _9_
  returns the product of the receiver and an argument

- / e.g., _{f= 3 10.0 /}_ fi _3.33333333_
  returns a number generated by dividing the receiver by the argument. If both numbers are integers, returns either an integer or a fraction. If either number is a float, returns a float.

- // e.g., _{f= 3 10.0 //}_ fi _3_
  returns an integer generated by dividing the two arguments; the result is truncated

- \\ e.g., _{f= 3 10.0 \\}_ fi _1_
  returns the integer remainder after dividing the receiver by the argument; the result is truncated

- + e.g., _{f= 3 3 +}_ fi _6_
  returns the sum of the receiver and an argument

- < e.g., _{set Price 29.95} {f= 100 Price <}_ fi _true_
  returns true if the receiver is less than the argument, otherwise false

- <= e.g., _{set Price 29.95} {f= 100 Price <=}_ fi _true_
  returns true if the receiver is less than or equal to the argument, otherwise false

- = e.g., _{set Price 29.95} {f= 100 Price =}_ fi _false)_
  returns true if the receiver is equal to the argument, otherwise false

- > e.g., _{set Price 29.95} {f= 100 Price >}_ fi _false_
  returns true if the receiver is greater than the argument, otherwise false

- >= e.g., _{set Price 29.95} {f= 100 Price <}_ fi _false_
  returns true if the receiver is greater than or equal to the argument, otherwise false

- **abs** e.g., _{f= -10 abs}_ fi _10_
  returns the absolute value of the receiver

- **alignDollar:** e.g., _{f= 7 123.45 alignDollar: }_ fi _'$123.45'_
  returns a string representing the receiver as a dollar amount. The argument defines the number of characters to be contained in the resulting string; spaces are added on the left for padding if necessary. If the total number of digits plus the $ sign are more than the

specified field width argument, the returned string will be longer than the specified value; truncation is not performed.

- **arcCos** e.g., *{f= 0 arcCos}* fi *1.57079633*
  returns the arc-cosine, an angle in radians, of the receiver

- **arcSin** e.g., *{f= 0.5 arcSin}* fi *0.52359878*
  returns the arc-sin, an angle in radians, of the receiver

- **arcTan** e.g., *{f= 1/4 arcTan}* fi *0.24497866*
  returns the arc-tangent, an angle in radians, of the receiver

- **asBoolean:** e.g., *{f= 0 0.0 asBoolean: }* fi *false*
  {f= 0 1/2 asBoolean: } fi *true*
  returns true if the receiver is zero, otherwise false. The argument is required but ignored internally so any value can be used.

- **asInteger** e.g., *{f= 13.6 asInteger}* fi *14*
  returns an integer representing the receiver as an integer; equivalent to rounded

- **asNumber** e.g., *{f= -13.6 asNumber}* fi *-13.6*
  returns the receiver

- **between:and:** e.g., *{f= 5 25 20 between:and: }* fi *true*
  returns true if the value of the receiver is between the first and second arguments, otherwise false

- **ceiling** e.g., *{f= 12.7 ceiling}* fi *13*
  {f= 12.3 ceiling} fi *13*
  returns an integer that is rounded up to the next highest integer from the receiver

- **containsInteger** e.g., *{f= -13 containsInteger}* fi *true*
  {f= 13.7 containsInteger} fi *false*
  returns true if the receiver is an integer or a string representation of an integer, otherwise false

- **containsNumber** e.g., *{f= -13.7 containsNumber}* fi *true*
  returns true if the receiver is a number or a string representation of a number, otherwise false

- **cos** e.g., *{f= 1 cos}* fi *0.54030231*
  returns the cosine, an angle in radians, of the receiver

- **degreesToRadians** e.g., *{f= 360 degreesToRadians}* fi *6.28318531*
  returns a number representing the receiver converted from degrees to radians

- **denominator** e.g., *{f= 17.3 denominator}* fi *1*
  {f= 3/10 denominator} fi *10*
  returns the denominator of the receiver. For most numbers, this is 1. For fractions, it will be the denominator within the fraction

- **even** e.g., *{f= 11 even}* fi *false*
  returns true if the receiver is an even number, otherwise false

- **exp** e.g., *{f= 5 exp}* fi *148.413159*
  returns a float that is the exponential of the receiver

- **floor** e.g., *{f= 12.7 floor}* fi *12*
  {f= 12.3 floor} fi *12*
  returns an integer that is rounded down to the preceding integer from the input

- **format:** e.g., *{set phoneNumber 1234567890} {f= '(000) 000-0000' phoneNumber format:}* fi *(123) 456-7890*
  returns a string in which any digits in the control string argument have been replaced with the next corresponding character from the receiver - all other characters in the control string print as entered. Processing stops when the end of the receiver or control string is reached. There must be a good match between the receiver and control stream. In the example shown above, if the variable phoneNumber did not have an area code, the string returned would be (456) 789-0, which is probably not what was intended.

- **integerCos** e.g., *{f= 0.3 integerCos}* fi *100*
  returns the integer cosine of the receiver angle, measured in degrees, scaled by 100

- **integerSin** e.g., *{f= 3.6 integerSin}* fi *7*
  returns the integer sine of the receiver angle, measured in degrees, scaled by 100

- **ln** e.g., *{f= 17 ln}* fi *2.83321334*
  returns the natural log of the receiver

- **log:** e.g., *{f= 2 17 log:}* fi *4.08746284*
  returns the log of the argument in the base specified by the receiver

- **max:** e.g., *{f= 22 25 max:}* fi *25*
  returns the maximum of the receiver or the argument

- **min:** e.g., *{f= 22 25 min:}* fi *22*
  returns the minimum of the receiver or the argument

- **negated** e.g., *{f= 12.7 negated}* fi *-12.7*
  returns the negative value of the receiver

- **negative** e.g., *{f= 11 negative}* fi *false*
  returns true if the receiver is a negative number, otherwise false

- **numerator** e.g., *{f= 17.3 numerator}* fi *17.3*
  {f= 3/10 numerator} fi *3*
  returns the numerator of the receiver. For most numbers, this is the value of the receiver. For fractions, it will be the numerator within the fraction.

- **odd** e.g., *{f= 11 odd}* fi *true*
  returns true if the receiver is an odd number, otherwise false

- **positive** e.g., *{f= 11 positive}* fi *true*
  returns true if the receiver is a positive number, otherwise false

- **printDollars** e.g., *{f= 29.95 printDollars}* fi *'$29.95'*
  returns a string representing the receiver as a dollar value. If the receiver contains more than 2 decimal places, it is rounded.

- **printFraction:** e.g., *{f= 3 0.52399327 printFraction:}* fi *'0.524'*
  returns a string representing the receiver in which it has been truncated and rounded to the number of decimal places specified by the argument

- **printFraction:decimalSeparator:** e.g.,*{f= 3 ‘,’ 0.52399327 printFraction:decimalSeparator:}* fi *'0,524'*
  returns a string representing the receiver in which it has been truncated and rounded to the number of decimal places specified by the first argument and the second argument (a string) is used as the decimal separator.

- **printRounded:** e.g., *{f= 3 0.52399327 printRounded:}* fi *'0.524'*
  returns a string representing the receiver in which it has been rounded to the number of decimal places specified by the first argument.

- **printWholeDollars** e.g., *{f= 29.95 printWholeDollars}* fi *‘$30’*
  returns a string representing the receiver as a dollar value. If necessary, the receiver is rounded.

- **quo:** e.g., *{f= 3.2 17.6 quo:}* fi *5*
  returns the integer quotient generated by dividing the receiver by the argument; the result is truncated toward zero.

- **radiansToDegrees** e.g., *{f= 3.14159265 radiansToDegrees}* fi *180.0*
  return a number representing the receiver converted from radians to degrees

- **raisedTo:** e.g., *{f= 3 5 raisedTo:}* fi *125.0*
  returns a float representing the receiver raised to the power specified by the argument

- **raisedToInteger:** e.g., *{f= 3 5 raisedToInteger:}* fi *125*
  returns a number representing the receiver raised to the power specified by the argument. This differs from raisedTo: in that the argument must be an integer.

- **reciprocal** e.g., *{f= 4.0 reciprocal}* fi *0.25*
  returns a number representing 1 divided by the receiver

- **rem:** e.g., *{f= 6 17 rem:}* fi *5*
  returns the integer remainder generated by dividing the receiver by the argument

- **rounded** e.g., *{f= 12.7 rounded}* fi *13*
  {f= 12.3 rounded} fi *12*
  returns the nearest integer to the receiver

- **roundTo:** e.g., *{f= 5 17 roundTo:}* fi *15*
  returns a number representing the receiver rounded to the nearest multiple of the argument

- **sign** e.g., *{f= 12 sign}* fi *1*
  {f= -12 sign} fi *-1*
  returns 1, -1 or 0 identifying whether the receiver is positive, negative or zero, respectively

- **sin** e.g., *{f= 1 sin}* fi *0.84147098*
  returns the sine, an angle in radians, of the receiver

- **sqrt** e.g., *{f= 25 sqrt}* fi *5.0*
  returns a number representing the square root of the receiver

- **squared** e.g., *{f= 5 squared}* fi *25*
  returns a number representing the square of the receiver

- **strictlyPositive** *e.g.,{f= 3 strictlyPositive}* fi *true*
  {f= 0 strictlyPositive} fi *false*
  returns true if the receiver is greater than zero, otherwise false

- **tan** e.g., *{f= 30 tan}* fi *-6.4053312*
  returns the tangent, an angle in radians, of the receiver

- **timesTwoPower:** e.g., *{f= 3 5 timesTwoPower:}* fi *40.0*
  returns the result of multiplying the receiver by 2 to the exponent identified by the argument

- **truncated** e.g., *{f= 12.7 truncated}* fi *12*
  {f= 12.3 truncated} fi *12*
  returns the integer portion of the receiver; any fraction is dropped.

- **truncateTo:** e.g., *{f= 6 17 truncateTo:}* fi *12*
  returns an integer that is the receiver truncated to the nearest multiple of the argument

11.4 Integers

This section describes all the operations that can be performed on integers. Integers can also perform any of the operations described in the General Number Operations section above.

Integer Instance Operations

Integers are always instances of the class Integer, which is accessed via the variable %Integer%. The Integer class operations that can be done are described in the following section.

- **and:** e.g., *{f= 12 23 and:}* fi *4*
  returns an integer representing the receiver bits ANDed with the argument.

- **asBoolean** e.g., *{f= 0 asBoolean}* fi *false*
  {f= 3 asBoolean} fi *true*
  returns true if the receiver is non-zero.

- **asCharacter** e.g., *{f= 123 asCharacter}* fi *${*
  returns the character whose ASCII value matches the value of the receiver.

- **asFloat** e.g., *{f= 13 asFloat}* fi *13.0*
  returns a float representing the receiver as a floating point value.

- **asUnsigned** e.g., *{f= -12345 asUnsigned}* fi *4294954951*
  {f= 12345 asUnsigned} fi *12345*
  returns a number representing the receiver as a 32-bit unsigned number.

- **authEncode** e.g., *{f= 123 authEncode}* fi *$w*
  returns a character representing the receiver that has been encoded for use in the Basic Authorization capabilities within **WebBase**.

- **bitInvert** e.g., *{f= 123 bitInvert}* fi *-124*
  returns an integer whose bit values are the inverse of the bit values of the receiver.

- **bitShift:** e.g., *{f= 2 12345 bitShift:}* fi *49380*
  {f= -2 12345 bitShift:} fi *3086*
  returns an integer which is the receiver shifted left the number of bit positions specified by the argument if the argument is positive, or shifted right the number of bit positions specified by the argument negated if the argument is negative.

- **factorial** e.g., *{f= 8 factorial}* fi *40320*
  returns the factorial of the receiver.

- **gcd:** e.g., *{f= 180 255 gcd:}* fi *15*
  returns the greatest common divisor between the receiver and the argument.

- **intSqrt** e.g., *{f= 144 intSqrt}* fi *12*
  returns the integer square root of the receiver.

- **lcm:** e.g., *{f= 180 255 lcm:}* fi *3060*
  returns the least common multiple between the receiver and the argument.

- **printOn:base:** e.g., *{set strm %String% new %WriteStream% on:} {f== strm 3 25 printOn:base:} {f= strm contents}* fi *3r221*
  appends the ASCII representation of the receiver with radix specified by the second argument to the stream specified in the first argument.

- **printOn:base:showRadix:** e.g., *{set strm %String% new %WriteStream% on:} {f== strm 3 false 25 printOn:base:showRadix:} {f= strm contents}* fi *221*
  appends the ASCII representation of the receiver with radix specified by the second argument to the stream specified in the first argument.

- **printPaddedTo:** e.g., *{f= 5 123 printPaddedTo:}* fi *' 123'*
  returns a string representing the receiver padded on the left with blanks to be at least the number of characters as specified in the argument.

- **printPaddedWith:to:base:** e.g., *{f= $% 6 9 123 printPaddedWith:to:base:}* fi *'%%%146'*
  returns a string representing the receiver padded on the left with the character specified by the first argument to be at least the number of characters as specified in the second argument. The third argument specifies the base of the result.

- **printStringRadix:** e.g., *{f= 3 529 printStringRadix:}* fi *'3r201121'*
  returns a string containing a text description of the receiver with the radix specified by the argument.

- **radix:** e.g., *{f= 3 529 radix:}* fi *'3r201121'*
  returns a string representing the receiver with radix specified by the argument.

- **radix:showRadix:** e.g., *{f= 3 true 529 radix:showRadix:}* fi *'3r201121'*
  {f= 3 false 529 radix:showRadix:} fi *'201121'*
  returns a string representing the receiver with radix specified by the argument. If the second argument is true, include the radix prefix.

Integer Class Operations

The Integer class is accessed using the variable %Integer%. The following operations can be performed on this class.

- **readFrom:** e.g., *{f= '123' asStream %Integer% readFrom:}* fi *123*
  reads an integer from the stream (argument) and returns the integer. Note that the argument must be a stream, and not a string.

11.5 Floats

This section describes all the operations that can be performed on floating point numbers. Floats can also perform any of the operations described in the General Number Operations section above.

Float Instance Operations

Floating point numbers are always instances of the class Float, which is accessed via the variable %Float%.   The Float class operations that can be done are described in the following section.

- **asFloat** e.g., *{f= 13.5 asFloat}* fi *13.5*
  returns the receiver.

- **exponent** e.g., *{f= 423.543 exponent}* fi *8.0*
  returns a float whose value is the exponent part of the floating point representation of the receiver.

- **printOn:decimalSeparator:** e.g., *{set strm %String% new %WriteStream% on:} {f== strm ',' 123.45 printOn:decimalSeparator:} {f= strm contents}* fi *'123,45'*
  appends the ASCII representation (maximum of 8 digits) of the receiver to the stream identified in the first argument using the second argument as the decimal separator.   Note that the second argument must be a string.

- **significand** e.g., *{f= 423.543 significand}* fi *1.65446484*
  return a float whose value is the significand part of the floating point representation of the receiver.

Float Class Operations

The Float class is accessed using the variable %Float%. The following operations can be performed on this class.

- **fromInteger:** e.g., *{f= 123 %Float% fromInteger:}* fi *123.0*
  returns a floating point representation of the integer argument.

- **fromString:** e.g., *{f= '-0.593' %Float% fromString:}* fi *0.593*
  returns a floating point conversion of the string argument. The argument is expected to be a sequence of the form [(+|-)][digits][decSep [digits]] [(E|e)[(+|-) digits]].

- **fromString:decimalSeparator:** e.g., *{f= '-0.593' $, %Float% fromString:decimalSeparator:}* fi *-0,593* returns a floating point conversion of the first argument, using the second argument as the decimal separator. See fromString: for the format of the first argument.

- **pi** e.g., *{f= %Float% pi}* fi *3.14159265*
  return the floating point representation of pi.

11.6 Fractions

This section describes all the operations that can be performed on fractions. A fraction is represented by two integers and a '/' (e.g., 1/2). Fractions can also perform any of the operations described in the General Number Operations section above.

Fraction Instance Operations

Fractions are always instances of the class Fraction, which is accessed via the variable %Fraction%. The Fraction class operations that can be done are described in the following section.

- **asFloat** e.g., *{f= 13/5 asFloat}* fi *2.6*
  returns the receiver.

Fraction Class Operations

The Fraction class is accessed using the variable %Fraction%. The following operations can be performed on this class.

- **numerator:denominator:** e.g., *{f= 15 28 %Fraction% numerator:denominator:}* fi *15/28*
  returns a new instance of fraction with the numerator specified in the first argument and the denominator specified in the second argument.

11.7 Points

A Point represents a position in two dimensions (e.g., the cursor's position on a screen). It consists of a pair of numbers, x and y, representing the horizontal and vertical coordinates respectively.

Point Instance Operations

This section covers all the operations that can be performed on a point. Two example points are used in the following and are generated using {set point1 3 5 %Point% x:y:} and {set point2 4 6 %Point% x:y:}.

- **-** e.g., *{f= point1 point2 -}* fi *1@1*
  returns a new point which is the difference between the receiver and the argument. The argument can be a number or another point. If it is a point, the x-coordinates are subtracted and the y-coordinates are subtracted. If it is a number, the value is subtracted from both the x-coordinate and the y-coordinate.

- ***** e.g., *{f= point1 point2 *}* fi *12@30*
  returns a new point which is the product of the receiver and the argument. The argument

can be a number or another point. If it is a point, the x-coordinates are multiplied and the y-coordinates are multiplied. If it is a number, the value is multiplied by both the x-coordinate and the y-coordinate.

- / e.g., *{f= point1 point2 /}* fi *(4/3) @ (6/5)*
  returns a new point which is the receiver divided by the argument. The argument can be a number or another point. If it is a point, the x-coordinates are divided and the y-coordinates are divided. If it is a number, the x-coordinate and y-coordinate of the receiver are both divided by the value.

- // e.g., *{f= point1 point2 //}* fi *1@1*
  returns a new point which is the receiver divided by the argument. The argument can be a number or another point. If it is a point, the x-coordinates are divided and the y-coordinates are divided. If it is a number, the x-coordinate and y-coordinate of the receiver are both divided by the value.

- \\ e.g., *{f= point1 point2 \\}* fi *1@1*
  returns a new point which is the integer remainder of the receiver divided by the argument. The argument can be a number or another point. If it is a point, the x-coordinates are divided and the y-coordinates are divided. If it is a number, the x-coordinate and y-coordinate of the receiver are both divided by the value.

- + e.g., *{f= point1 point2 +}* fi *7@11*
  returns a new point which is the sum or the receiver and the argument. The argument can be a number or another point. If it is a point, the x-coordinates are added and the y-coordinates are added. If it is a number, the value is added to both the x-coordinate and y-coordinate of the receiver.

- < e.g., *{f= point1 point2 <}* fi *false*
  returns true if the x and y coordinates of the receiver are less than the x and y coordinates of the argument, respectively, otherwise answer false.

- <= e.g., *{f= point1 point2 <=}* fi *false*
  returns true if the x and y coordinates of the receiver are less than or equal to the x and y coordinates of the argument, respectively, otherwise answer false.

- = e.g., *{f= point1 point2 =}* fi *false*
  returns true if the x and y coordinates of the receiver are equal to the x and y coordinates of the argument, respectively, otherwise answer false.

- > e.g., *{f= point1 point2 >}* fi *true*
  returns true if the x and y coordinates of the receiver are greater than the x and y coordinates of the argument, respectively, otherwise answer false.

- >= e.g., *{f= point1 point2 >=}* fi *true*
  returns true if the x and y coordinates of the receiver are greater than or equal to the x and y coordinates of the argument, respectively, otherwise answer false.

- **abs** e.g., *{f= point1 point2 - abs}* fi *1@1*
  returns a new point whose coordinates are the absolute values of the x and y coordinates of the receiver.

- **between:and:** e.g., *{set point3 5 7 %Point% x:y:}*
  {f= point1 point3 point2 between:and:} fi *true*

returns true if the receiver is greater than or equal to the first argument (another point) and less than or equal to the second argument (yet another point); otherwise false.

- **dotProduct:** *e.g.,{f= point1 point2 dotProduct:}* fi *42*
  returns a number which is the sum of the product of the x-coordinates and the product of the y-coordinates of the receiver and the argument.

- **max:** *e.g.,{f= point1 point2 max:}* fi *4@6*
  returns a new point whose coordinates are the maximum of the x-coordinates and the maximum of the y-coordinates of the receiver and the argument.

- **min:** *e.g.,{f= point1 point2 min:}* fi *3@5*
  returns a new point whose coordinates are the minimum of the x-coordinates and the minimum of the y-coordinates of the receiver and the argument.

- **negated** *e.g.,{f= point1 negated}* fi *-3@-5*
  returns a new point with the x and y coordinates of the receiver negated.

- **rounded** *e.g.,{f= point1 rounded}* fi *3@5*
  returns a new point which has the receiver coordinates rounded to integers.

- **transpose** *e.g.,{f= point1 transpose}* fi *5@3*
  returns a new point with x-coordinate equal to the receiver's y-coordinate and y-coordinate equal to the receiver's x-coordinate.

- **truncated** *e.g.,{f= point1 truncated}* fi *3@5*
  returns a new point which has the receiver coordinates truncated to integers.

- **x** *e.g.,{f= point1 x}* fi *3*
  returns the receiver's x-coordinate

- **x:** *e.g.,{f== 4 point1 x:} {point1}* fi *4@5*
  returns the receiver after changing its x-coordinate to the argument.

- **y** *e.g.,{f= point1 y}* fi *5*
  returns the receiver's y-coordinate

- **y:** *e.g.,{f== 6 point1 y:}{point1}* fi *3@6*
  returns the receiver after changing its y-coordinate to the argument.

Point Class Operations

This section covers all the operations that can be performed on the Point class, which is accessed using the global variable %Point%.

- **x:y:** *e.g.,{f= 3 5 %Point% x:y:}* fi *3@5*
  returns a new point whose x-coordinate is the first argument and whose y-coordinate is the second argument.

11.8 General Collection Operations

Many of the objects used within **WebBase** are a type of collection, including Arrays, OrderedCollections, OrderedLists, SortedCollections, SortedLists, Strings and Symbols. A Dictionary is also a collection, but its structure is enough different that it is covered separately.

General Collection Instance Operations

This section describes all the operations that can be performed on an instance of any type of collection. Subsequent sections will cover the operations that are specific to a given type of collection. Several of the operations described apply only to numeric values within a collection. If the collection contains no numeric values, a result of 0 is returned. If there are a mix of numbers and non-numbers in the collection, only the numeric values are used for computations. The examples shown for these operations are a list that contains the integers (1 2 3) generated using the expression *{set numCltn #asInteger ',' '1,2,3' parseAt: map:}*. Note that any type of numbers can be included in collections.

Although ordered collections and strings are both types of collections, examples of each will be presented for each of the operations below for clarification. The example collection used is cltn1, generated using: *{set cltn1 ‘,’ ‘one,two,three’ parseAt:}*. The example string used is *‘abc’*.

- **,** (comma) *e.g., {set cltn2 ‘,’ ‘four,five,size’ parseAt:}*
  {f= cltn2 cltn1 ,} fi *OrderedList(‘one’ ‘two’ three’ ‘four’ ‘five’ ‘six’}*
  {f= ‘xyz’ str1 ,} fi *‘abcxyz’*
  returns a new collection with the contents of the two collections concatenated together.

- = *e.g., {set cltn2 ‘,’ ‘four,five,size’ parseAt:}*
  {f= cltn2 cltn1 =} fi *false*
  {f= ‘xyz’ str1 =} fi *false*
  returns true if the receiver and argument are equal, otherwise false. Each element within the receiver must exactly match the corresponding element within the argument. For example, if the arguments are strings, the receiver and argument are compared using a case sensitive string comparison.

- **asArray** *e.g., {f= cltn1 asArray}* fi *(‘one’ ‘two’ ‘three’)*
  {f= str1 asArray} fi *($a $b $c)*
  returns an array containing all the elements of the receiver.

- **asOrderedCollection** *e.g., {f= cltn1 asOrderedCollection}* fi *OrderedCollection(‘one’ ‘two’ ‘three’)*
  {f= str1 asOrderedCollection} fi *OrderedCollection($a $b $c)*
  returns an ordered collection containing all the elements of the receiver.

- **asSortedCollection** *e.g., {f= cltn1 asSortedCollection}* fi *SortedCollection(‘one’ ‘three’ ‘two’)*
  {f= str1 asSortedCollection} fi *SortedCollection($a $b $c)*
  returns a sorted collection containing all the elements of the receiver sorted in ascending order.

- **atAllPut:** *e.g., {f= ‘new’ cltn1 atAllPut:}* fi *(‘new’ ‘new’ ‘new’)*
  {f= $p str1 atAllPut:} fi *‘ppp’*
  returns the receiver after each element has been replaced with the value in the argument.

- **average** *e.g., {f= numCltn average}* fi *2*
  returns the average of all the numbers in the collection. Only numeric values in the collection will be processed; non-numeric values will be skipped and not counted in determining the number of items over which the average is taken.

- **concat** *e.g., {f= cltn1 concat}* fi *'onetwothree'*
  {f= str1 concat} fi *'abc'*
  returns a string consisting of all the elements in the collection concatenated together. The items in the collection must all be strings.

- **concatWith:** *e.g., {f= $, cltn1 concatWith:}* fi *'one,two,three'*
  {f= $, str1 concatWith:} fi *'a,b,c'*
  returns a string consisting of all the elements in the collection concatenated together and separated with the specified separator character. The elements in the collection must all be strings.

- **concatFrom:to:** *e.g., {f= 1 2 cltn1 concatFrom:to:}* fi *'onetwo'*
  {f= 1 2 str1 concatFrom:to:} fi *'ab'*
  returns a new string made of the elements in the receiver from the start index (first argument) to end index (second argument) concatenated together. The elements in the collection must all be strings.

- **concatFrom:to:with:** *e.g., {f= 1 2 $, cltn1 concatFrom:to:with:}* fi *'one,two'*
  {f= 1 2 $, str1 concatFrom:to:with:} fi *'a,b'*
  returns a new string made of the elements in the receiver from the start index (first argument) to end index (second argument) concatenated together with the given separator string (third argument). The elements in the collection must all be strings.

- **copyFrom:to:** *e.g., {f= 1 2 cltn1 copyFrom:to:}* fi *('one’ ‘two')*
  {f= 1 2 str1 copyFrom:to:} fi *'ab'*
  returns a new collection containing the elements between the starting index (first argument) and ending index (second argument)

- **copyReplaceFrom:to:with:** *e.g., {set newCltn ‘,’ ‘eight,nine’ parseAt:}*
  {f= 1 2 newCltn cltn1 copyReplaceFrom:to:with:} fi *(‘eight’ ‘nine’ ‘three’)*
  {f= 1 2 ‘st’ str1 copyReplaceFrom:to:with:} fi *'stc'*
  returns a new collection containing all the elements in the receiver with entries indexed from start (first argument) through stop (second argument) being replaced by the elements in the collection (third argument). Note that the replacement collection may be less than or greater than the number of elements to be replaced.

- **copyWith:** *e.g., {f= ‘four’ cltn1 copyWith:}* fi *(‘one’ ‘two’ ‘three’ ‘four’)*
  {f= $d str1 copyWith:} fi *'abcd'*
  returns a new collection containing a copy of the receiver with the element in the argument added to the collection.

- **copyWithout:** *e.g., {f= ‘one’ cltn1 copyWithout:}* fi *(‘ two’ ‘three’)*
  {f= $c str1 copyWithout:} fi *'ab'*
  returns a new collection containing a copy of the receiver with the first element that <u>exactly</u>

matches the argument omitted. If there is no element in the receiver that matches the argument, a copy of the receiver is returned.

- **first** *e.g., {f= cltn1 first}* fi *‘ one’*
{f= str1 first} fi *$a*
returns the first element of the collection. For strings, the value returned is a character. In order to return the first character of a string as a string, you must use:

  ```
  {f= 'Hello' first asString} → 'H'
  ```

- **hasMessage** *e.g., {f= cltn1 hasMessage}* fi *false*
returns true if one or more of the members of the receiver is an ODBCRowObject which has an associated message.

- **includes:** *e.g., {f= ‘two’ cltn1 includes:}* fi *true*
{f= $d str1 includes:} fi *false*
returns true if the collection includes the specified element, otherwise false.

- **indexOf:** *e.g., {f= ‘two’ cltn1 indexOf:}* fi *2*
{f= $d str1 indexOf:} fi *0*
returns an integer defining the index position of the specified element (argument) within the receiver. If no such element is found, return 0.

- **indexOfCollection:** *e.g., {f= cltn2 cltn1 indexOfCollection:}* fi *0*
{f= ‘bc’ str1 indexOfCollection:} fi *2*
returns an integer defining the index position of the first occurrence of the collection (argument) within the receiver. If no such collection is found, return 0.

- **isEmpty** *e.g., {f= cltn1 isEmpty}* fi *false*
{f= '' isEmpty} fi *true*
returns true if the receiver does not contain any elements, otherwise false

- **last** *e.g., {f= cltn1 last}* fi *‘ three’*
{f= str1 last} fi *$c*
returns the last element of the collection. For strings, the value returned is a character. In order to return the last character of a string as a string, you must use:

  ```
  {f= 'Hello' last asString} → 'o'
  ```

- **map:** *e.g., {f= #asInteger ',' '1,2,3' parseAt: map:}* fi *(1 2 3)*
{f= #asUppercase str1 map:} fi *‘ABC’*
returns a new collection in which each element in the receiver has had the operation in the argument performed on it. This is useful for converting a collection of strings identifying numbers into a collection of numbers. The argument must be a symbol (i.e., preceded by the ‘#’ sign).

- **map:for:** *e.g., {f= #< 2 numCltn map:for:}* fi *false false true)*
returns a new collection generated by applying the given method (first argument) to the target (second argument) and taking each member of the receiver in turn as an argument. The example is for illustration only; the receiver does not have to be a collection containing only numbers.

- **map:with:** *e.g., {f= #+ 5 numCltn map:with:}* fi *6 7 8)*
returns a new collection in which each element in the receiver has had the operation in the first argument performed on it. The operation in the first argument requires an additional

argument, which is specified in the second argument. The example is for illustration only; the receiver does not have to be a collection containing only numbers.

- **max** *e.g., {f= numCltn max}* fi *3*
returns the largest number in the collection. Only numeric values in the collection will be processed; non-numeric values will be skipped.

- **min** *e.g., {f= numCltn min}* fi *1*
returns the smallest number in the collection. Only numeric values in the collection will be processed; non-numeric values will be skipped.

- **notEmpty** *e.g., {f= cltn1 notEmpty}* fi *true*
{f= '' notEmpty} fi *false*
returns true if the receiver does contains any elements, otherwise false. Equivalent to isEmpty not

- **nums** *e.g., {f= numCltn nums}* fi *3*
returns the number of list items that are numbers.

- **occurrencesOf:** *e.g., {f= ‘two’ cltn1 occurrencesOf:}* fi *1*
{f= $A str1 occurrencesOf:} fi *0*
returns the number of elements contained in the receiver that are equal to the element specified in the argument.

- **replaceFrom:to:with:** *e.g., {set newCltn ‘,’ ‘eight,nine’ parseAt:} {f= 1 2 newCltn cltn1 replaceFrom:to:with:}* fi *(‘eight’ ‘nine’ ‘three’)*
{f= 1 2 ‘st’ str1 replaceFrom:to:with:} fi *'stc'*
returns the receiver with the elements from the start index (first argument) to the end index (second argument) replaced with the elements in the specified collection (third argument). The number of elements being replaced must be the same as the number of elements in the third argument. This is very similar to copyReplaceFrom:to:with, except that this operation returns the modified receiver and the copyReplaceFrom:to:with: operation returns a new collection and leaves the receiver unmodified.

- **replaceFrom:to:with:startingAt:** *e.g., {set newCltn ‘,’ ‘eight,nine,ten’ parseAt:} {f= 1 2 newCltn 2 cltn1 replaceFrom:to:with:startingAt:}* fi *(‘nine’ ‘ten’ ‘three’)*
{f= 2 3 ‘jkl’ 2 str1 replaceFrom:to:with:startingAt:} fi *'akl'*
returns the receiver with the elements from the start index (first argument) to the end index (second argument) replaced with the elements in the specified collection (third argument). The replacement elements are selected starting at the index specified in the fourth argument.

- **replaceFrom:to:with:startingWith:** *e.g., {set newCltn ‘,’ ‘eight,nine,ten’ parseAt:} {f= 1 2 newCltn 2 cltn1 replaceFrom:to:with:startingWith:}* fi *(‘nine’ ‘ten’ ‘three’) {f= 2 3 ‘jkl’ 2 str1 replaceFrom:to:with:startingWith:}* fi *'akl'*
returns the receiver with the elements from the start index (first argument) to the end index (second argument) replaced with the elements in the specified collection (third argument). The replacement elements are selected starting at the index specified in the fourth argument. This is almost the same as replaceFrom:to:with:startingAt: except that it has improved error handling.

- **replaceFrom:to:withObject:** *e.g., {f== 1 2 ‘four’ cltn1 replaceFrom:to:withObject:} {cltn1}* fi *(‘four’ ‘four’ ‘three’)*
{f== 2 3 $L str1 replaceFrom:to:withObject:} {str1} fi *'aLL'*

returns the replacement element (third argument). The receiver is modified by replacing the elements from the start index (first argument) to the end index (second argument) with the element specified in the third argument).

- **reverse** *e.g., {f= cltn1 reverse}* fi *('three' 'two' 'one')*
  {f= str1 reverse} fi *'cba'*
  returns a new collection in which the elements in the receiver have been reversed (i.e., the first element in the receiver is the last element in the returned collection). This can also be written as reversed.

- **size** *e.g., {f= cltn1 size}* fi *3*
  {f= '' size} fi *0*
  returns an integer defining the number of elements in the collection

- **sum** *e.g., {f= numCltn sum}* fi *6*
  returns the sum of all the numbers in the collection. Only numeric values in the collection will be processed; non-numeric values will be skipped.

General Collection Class Operations

This section describes all the operations that can be performed on an of the collection classes accessed using the variables %Array%, %OrderedCollection%, %OrderedList%, %SortedCollection%, %SortedList% and %String%.

- **with:** *e.g., {f= 'one' %Array% with:}* fi *('one')*
  returns a new collection with only one element, the argument

- **with:with:** *e.g., {f= 'one' 'two' %OrderedCollection% with:with:}* fi *OrderedCollection('one' 'two')*
  returns a new collection with two elements, the first and second arguments

- **with:with:with:** *e.g., {f= 'one' 2 3.0 %Array% with:with:with:}* fi *('one' 2 3.0)*
  returns a new collection with three elements, the first, second and third arguments

- **with:with:with:with:** *e.g., {f= 'one' 'two' 'three' 'four' %SortedList% with:with:with:with:}* fi *SortedList('one' 'two' 'three' 'four')*
  returns a new collection with four elements, the first, second, third and fourth arguments

11.9 Arrays

An array is a collection of any objects accessed through a fixed range of integer indices (representing the positions of the elements within the array). Note that the size of an array cannot grow. There are no operations that are specific to arrays. All of the general collection instance operations above are applicable to an array. Likewise, the general collection class operations described above are valid when sent to the variable %Array%.

11.10 Strings

Strings are a collection of characters that are enclosed in single quotes. To include a single quote mark within a string, put two quote marks together. A string and a character within **WebBase** are different types of data. See the section on Characters for the representation and use of characters within **WebBase**. The following operations can be performed on any string.

String Instance Operations

This section describes all the operations that can be performed on a string.

NOTE:

> *The inclusion of a ‘}’ or ‘{‘ in a string may cause unexpected results because* ***WebBase*** *may interpret it as an opening or closing to a macro instead of part of a string. Instead of using these characters in strings in a form, the user should use the* ***WebBase*** *dynamic variables %leftBrace% and %rightBrace% and concatenate them with the string at the appropriate place(s). For example, {set strBuf 'my output' %leftBrace% asString , } will set the variable strBuf to ‘{my output’.*

NOTE:

> *The operations asFloat, asInteger and asNumber return a numerical value -- if the argument is a string that is not a representation of a number, the value returned will be 0.0, 0, or 0 respectively. Note that preceding or trailing blanks will cause what otherwise might appear as a number to be treated as non-numeric and a 0 or 0.0 will be returned. trimBlanks can be used to remove any leading or trailing blanks. Use containsNumber or containsInteger to test a string before conversion if it might NOT be a representation of a number and the resultant value of 0 would cause problems with your logic.*

- < *e.g., {f= 'Goodbye' 'Hello' <}* fi *false*
  returns true if the receiver is less than the argument using a case insensitive string comparison, otherwise false

- <= *e.g., {f= 'Goodbye' 'Hello' <=}* fi *false*
  returns true if the receiver is less than or equal to the argument using a case insensitive string comparison, otherwise false

- > *e.g., {f= 'Goodbye' 'Hello' >}* fi *true*
  returns true if the receiver is greater than the argument using a case insensitive string comparison, otherwise false

- >= *e.g., {f= 'Goodbye' 'Hello' >=}* fi *true*
  returns true if the receiver is greater than or equal to the argument using a case insensitive string comparison, otherwise false

- **align:** *e.g., {f= 5 ‘abc’}* fi *'abc '*
  returns a new string containing the receiver and enough blanks necessary on the right to pad it out to the number of characters specified in the argument. If the total number of digits is more than the specified field width argument, the returned string will be truncated**.**

- **alignDollar:** *e.g., {f= 5 '123' alignDollar:}* fi *' $123'*
  {f= 8 '123.45' alignDollar:} fi *' $123.45'*
  returns a new string representing the receiver as a dollar amount. If the total number of digits plus the $ sign are more than the specified field width argument, the returned string will be truncated.

- **alignLeft:** *e.g., {f= 5 'abc' alignLeft:}* fi *'abc '*
  returns a new string containing the receiver and enough blanks necessary on the right to pad it out to the number of characters specified in the argument. If the total number of digits is more than the specified field width argument, the returned string will be truncated.

- **alignLeft:fill:** *e.g., {f= 5 $# 'abc' alignLeft:fill:}* fi *'abc##'*
returns a new string containing the receiver and enough fill characters specified in the second argument necessary on the right to pad it out to the number of characters specified in the first argument. If the total number of digits is more than the specified field width argument, the returned string will be truncated.

- **alignRight:** *e.g., {f= 5 'abc' alignRight:}* fi *' abc'*
returns a new string containing the receiver and enough blanks necessary on the left to pad it out to the number of characters specified in the argument. If the total number of digits is than the specified field width argument, the returned string will be truncated.

- **alignRight:fill:** *e.g., {f= 5 $# 'abc' alignRight:fill:}* fi *'##abc'*
returns a new string containing the receiver and enough fill characters specified in the second argument necessary on the left to pad it out to the number of characters specified in the first argument. If the total number of digits is more than the specified field width argument, the returned string will be truncated.

- **appendFilename:** *e.g., {set a 'c:\dir'} {set b 'file.htf'} {f= b a appendFilename:}* fi *'c:\dir\file.htf'*
returns a new string in which the receiver is combined with the argument to generate a pathname including the correct number of '\' characters between each directory and filename (i.e., always one and not two '\' or no '\' characters).

- **appendFilenameDOS:** *e.g., {set a 'c:\dir'} {set b 'file.htf'} {f= b a appendFilenameDOS:}* fi *'c:\dir\file.htf'*
returns a new string in which the receiver is combined with the argument to generate a pathname including the correct number of '\' characters between each directory and filename (i.e., always one and not two '\' or no '\' characters). This is equivalent to appendFilename:, and ensures that the DOS directory separation character ('\') is used.

- **appendFilenameUNIX:** *e.g., {set a '\dir'} {set b 'file.htf'} {f= b a appendFilenameUNIX:}* fi *'/dir/file.htf'*
returns a new string in which the receiver is combined with the argument to generate a pathname including the correct number of '/' characters between each directory and filename (i.e., always one and not two '/' or no '/' characters). This ensures that the UNIX directory separation character ('/') is used.

- **asArrayOfSubstrings** *e.g., {f= 'roses and daisies' asArrayOfSubstrings}* fi *('roses' 'and' 'daisies')*
returns an array of substrings from the receiver. The receiver is divided into substrings at the occurrences of one or more space characters.

- **asArrayOfSubstringsSeparatedBy:** *e.g., {f= $- '555-11-5555' asArrayOfSubstringsSeparatedBy:}* fi *('555' '11' '5555'')*
returns an array of substrings from the receiver. The receiver is divided into substrings at the occurrences of one or more of the input argument, which is a character.

- **asBoolean:** *e.g., {f= 0 'yes' asBoolean:}* fi *true*
{f= 0 'maybe' asBoolean:} fi *0*
{f= 0 '0' asBoolean:} fi *false*
returns true if the first character of the receiver is a 't' or 'T' or 'y' or 'Y' or if the receiver converted to a number is not zero. Returns false if the first character of the receiver if a 'f' or 'F' or 'n' or 'N' or if the receiver converted to a number is zero. If none of these are satisfied, returns the argument.

- **asCapitalized** *e.g., {f= ‘aBc123xYz’ asCapitalized}* fi *‘Abc123xyz’*
  returns a new string in which the first character is capitalized and any subsequent alphabetic characters are lowercase.

- **asCharacter** *e.g., {f= ‘a’ asCharacter}* fi *$a*
  returns the first character of string. This functionality is now obsolete since a character can be defined using the format $a; it is maintained for compatibility with previous versions of **WebBase**.

- **asCodedHtml** *e.g., {f= '#$%' asCodedHtml}* fi *'&#35;&#36;&#37;'*
  returns a copy of the receiver with all non-alphanumeric characters encoded as per the HTML Coded Character set definitions, &#n where n is the integer number of the ASCII character e.g. '&' -> $#38;.

- **asDate** *e.g., {f= '29 March 1997' asDate}* fi *03/29/97*
  returns a date representing the date described by the receiver. The receiver can be in any of these formats: ‘Jan 2, 1990’, ‘2 Jan, 1990’ or ‘02-01-90’ with any sequence of non-alphanumeric characters between the month, day and year.

- **asDoubleQuoteString** *e.g., {f= 'string with "quotes"' asDoubleQuoteString}* fi *'string with ""quotes""'*
  returns a new string in which each occurrence of a double quote character has been doubled. In SQL one often uses formats like xx = '{something}' so the asSqlString routine is used to double the single quotes within {something sql=true} to prevent syntax problems. A similar situation exists when creating HTML forms. One writes <INPUT NAME="name" VALUE="{value}"> - if {value} contains any double quotes the same type of syntax problem occurs - embedded "-s need to be doubled.

- **asFieldName** *e.g., {f= 'Goodbye Hello' asFieldName}* fi *‘”Goodbye Hello”’*
  if the receiver contains any space character, returns a new string containing the receiver enclosed in double quotes. If the receiver does not contain any space characters, returns the receiver

- **asFieldNameName** *e.g., {f= '”Field One”' asFieldNameName}* fi *‘Field One’*
  if the receiver is enclosed in double quotes, returns a new string with the starting and ending double quotes removed. If the receiver is not enclosed in double quotes, returns the receiver

- **asFloat** *e.g., {f= '-13.6' asFloat}* fi *-13.6*
  {f= 'not a number' asFloat} fi *0.0*
  returns a float value if the string is the representation of a number, otherwise returns 0.0

- **asInteger** *e.g., {f= '-13' asInteger}* fi *-13*
  {f= 'not a number' asInteger} fi *0.0*
  returns an integer value if the string is the representation of a number, otherwise returns 0.0

- **asLowercase** *e.g., {f= 'Hi There' asLowercase}* fi *'hi there'*
  returns a new string in which all the characters of the receiver have been converted to lowercase. This can also be written using asLowerCase.

- **asNonEmptyString** *e.g., {f= 'Hi’ asNonEmptyString}* fi *‘Hi’*
  {f= ‘’ asNonEmptyString} fi *‘&nbsp;’*

returns the receiver if the receiver is not an empty string; otherwise returns a non-breaking HTML space.

- **asNumber** *e.g., {f= '-13.6' asNumber}* fi *-13.6*
  {f= 'not a number' asNumber} fi *0.0*
  returns a number if the string is the representation of a number, otherwise returns 0.0

- **asOptions:** *e.g., {f= ‘banana’ ‘apple;banana;cherry’ asOptions:}* fi
  '<OPTION>apple<OPTION SELECTED>banana<OPTION>cherry</SELECT>'
  the receiver is a string of options as would be found on an HTML list box. Each option is separated from the other by a semi-colon. The input argument is the option which is currently selected. A string is returned that is properly formatted for HTML to identify all the options and which particular option is currently selected.

- **asPrintableHTML** *e.g., {f= '&and' asPrintableHTML}* fi *'&amp;and'*
  returns the receiver with any occurrences of ‘&’, ‘>‘ or ‘<‘ replaced with ‘&amp;’, ‘&gt;’ and ‘&lt;’, respectively.

- **asSqlString** *e.g., {f= 'O''Brien' asSqlString}* fi *'O''''Brien'*
  returns a new string in which all single quote marks within the string have been doubled. This is required syntax for sql statements where the value is enclosed within single quotes and the value might contain a single quote character

- **asStream** *e.g., {f= 'my data for a stream' asStream}* fi *a ReadWriteStream*
  returns a stream (read-write) containing the receiver. The contents of the stream are the receiver, and the stream is positioned at the beginning for any subsequent operations.

- **asSymbol** *e.g., {f= 'myString' asSymbol}* fi *#myString*
  returns a symbol whose characters are the same as the receiver

- **asTime** *e.g., {f= '10:30:00 AM' asTime}* fi *10:30:00 AM*
  returns a time as specified in the receiver. Note that the receiver must be in the time format in use by the operating system (e.g., 12-hour or 24-hour).

- **asUppercase** *e.g., {f= 'Hi There' asUppercase}* fi *'HI THERE'*
  returns a new string in which all the characters of the argument have been converted to uppercase. This can also be written using asUpperCase.

- **asUseableHTML** *e.g., {f= '&amp &lt; &gt’ asUseableHTML}* fi *'& < >’'*
  returns the receiver after replacing any occurrences of ‘&amp’ with ‘&’, ‘&lt;’ with ‘<’, and ‘&gt;’ with ‘>’.

- **at:** *e.g., {f= 2 'Hello' at:}* fi *$e*
  returns the character at the position specified within the string. An error occurs if the index is out of range for the string size.

- **at:put:** *e.g., {f= 1 $H 'hello' at:put:}* fi *$H*
  returns the second argument after placing it within the receiver at the index specified in the first argument. Note that the modified string is NOT returned, but that if the string had been saved in a variable, the value of the variable would reflect the change.

- **authDecode** *e.g., {f= 'Basic bXlOYW1lOm15UGFzc3dvcmQ=' authDecode}* fi
  'myName:myPassword'
  returns a new string representing the receiver that has been decoded per RFC 1421.

- **authEncode** *e.g., {f= 'myName:myPassword' authEncode}* fi *'Basic bXlOYW1lOm15UGFzc3dvcmQ='*
  returns a new string representing the receiver that has been encoded per RFC 1421 for use in the Basic Authorization capabilities within **WebBase**.

- **authPassword** *e.g., {f= 'Basic bXlOYW1lOm15UGFzc3dvcmQ=' authPassword}* fi *'myPassword'*
  returns a new string containing the password portion of the RFC 1421 encoded string (see authEncode)

- **authUserName** *e.g., {f= 'Basic bXlOYW1lOm15UGFzc3dvcmQ=' authUserName}* fi *'myName'*
  returns a new string containing the user name portion of the RFC 1421 encoded string (see authEncode)

- **authValid** *e.g., {f= 'Basic bXlOYW1lOm15UGFzc3dvcmQ=' authValid}* fi *true*
  returns true if the receiver begins with 'Basic ' and contains at least one ':' character - as required by RFC 1421 (see authEncode); otherwise false

- **base64decodeFileTo:** *e.g., {f= ‘c:\temp\encoded.htf’ ‘c:\temp\decoded.htf’ base64decodeFileTo:}* fi *‘c:\temp\encoded.htf’*
  returns the argument after decoding the contents of the file whose pathname is the receiver to a file whose pathname is the argument. See also base64EncodeFile:to:. These operations are used by the *mail* macro and setting up mail attachments to be sent.

- **base64EncodeFile:to:** *e.g., {f= ‘c:\temp\encoded.htf’ ??tagArg ‘c:\http\wbwizard\Wizard’ base64EncodeFile:to:}* fi *‘c:\temp\encoded.htf’*
  returns the path to the file created by encoding the file whose pathname is the receiver using base-64 encoding. The first argument is either an integer or a Boolean. If an integer, it defines the number of base64 encoded characters to output before inserting a newline sequence (carriage return/line feed). If it is a boolean, true means to automatically insert the newline sequence after 64 characters. If false, no newline sequences are inserted. See also base64DecodeFileTo:. These operations are used by the *mail* macro and setting up mail attachments to be sent.

- **characterConstant** *e.g., {f= '$w' characterConstant}* fi *$w*
  {f= 'w' characterConstant} fi *nil*
  returns the character constant if and only if the first character of the string was a $, otherwise returns nil.

- **classBaddr** *e.g., {f= '123.45.6.78' classBaddr}* fi *'123.45'*
  returns the class B address portion of the receiver if it is formatted as an IP address, otherwise returns an empty string

- **classCaddr** *e.g., {f= '123.45.6.78' classCaddr}* fi *'123.45.6'*
  returns the class C address portion of the receiver if it is formatted as an IP address, otherwise returns an empty string

- **collapse** *e.g., {f= ‘   a space   and tab’ collapse}* fi *‘a space and tab’*
  returns a copy of the receiver with all control characters replaced by a single blank and all multiple blanks replaced by a single blank. This is useful for removing multiple spaces or other characters (e.g., tabs) that the browser will consolidate into a single space character unless within the <PRE> construct.

- **containsAnyString:** *e.g., {set cltn1 ‘,’ ‘one,two,three’ parseAt: asOrderedCollection} {f= cltn1 ‘threes’ containsAnyString:}* fi *true*
  returns true if any item in the receiver collection contains the string specified in the argument; otherwise false. Matches are case sensitive. Note that the receiver collection should contain strings.

- **containsAnyStringIgnoreCase:** *e.g., {set cltn1 ‘,’ ‘one,two,three’ parseAt: asOrderedCollection} {f= cltn1 ‘THREES’ containsAnyStringIgnoreCase:}* fi *true*
  returns true if any item in the receiver collection contains the string specified in the argument; otherwise false. Matches are case insensitive. Note that the receiver collection should contain strings.

- **containsInteger** *e.g., {f= '-13' containsInteger}* fi *true*
  {f= '13.7' containsInteger} fi *false*
  returns true if the receiver is a string representation of an integer, otherwise false

- **containsNumber** *e.g. {f= -13.7 containsNumber}* fi *true*
  returns true if the receiver is a string representation of a number, otherwise false

- **containsString:** *e.g., {f= 'ello' 'Hello' containsString:}* fi *true*
  returns true if the receiver contains the argument; this method does a case sensitive comparison

- **containsStringChecked:** *e.g., {f= ‘apple’ ‘fruit’ containsStringChecked:}* fi *‘’*
  {f= ‘apple’ ‘apple’ containsStringChecked:} fi *‘CHECKED’*
  returns an empty string if the receiver does not contain the argument; otherwise returns the string ‘CHECKED’. This is useful for determining which check boxes on a form have been selected by a user.

- **containsStringIgnoreCase:** *e.g., {f= 'ELLO' 'Hello' containsStringIgnoreCase:}* fi *true*
  returns true if the receiver contains the argument; this method does a case insensitive comparison

- **decode** *e.g., {f= 'String+%28Sample%29' decode}* fi *'String (Sample)'*
  returns a new string decoded from the receiver that was encoded as a browser would when returned as part of a <Form>...</FORM> block

- **encode** *e.g., {f= 'String (Sample)' encode}* fi *'String+%28Sample%29'*
  returns a new string encoded as a browser would when returned as part of a <FORM>...</FORM> block

- **equals:** *e.g., {f= 'hello' 'Hello' equals:}* fi *false*
  returns true if the receiver and argument are equal when doing a case sensitive string comparison, otherwise false. This is the same as using ‘=‘.

- **equalsIgnoreCase:** *e.g. {f= 'hello' 'Hello' equalsIgnoreCase:}* fi *true*
  returns true if the receiver and argument are equal when doing a case insensitive string comparison, otherwise false

- **fileExtension** *e.g. {f= 'c:\mydir\aSubDir\myFile.txt' fileExtension}* fi *'txt'*
  returns a new string containing the three characters that follows the receiver’s last period (‘.’) character.

- **fileFullExtension** *e.g. {f= 'c:\mydir\aSubDir\myFile.text' fileFullExtension}* fi *'text'*
  returns a new string containing the characters that follows the receiver's last period ('.') character. This supports file extensions longer than 3 characters.

- **fileName** *e.g. {f= 'C:\mydir\aSubDir\myFile.txt' fileName}* fi *'c:\mydir\aSubDir\myFile'*
  returns a new string containing the characters of the receiver up to the last period ('.') character.

- **fileNameLessPath** *e.g. {f= 'C:\mydir\aSubDir\myFile.txt' fileNameLessPath}* fi *'myFile.txt'*
  returns a new string containing the unqualified file name of the receiver (file name and extension without drive or directory path).

- **fileNamePath** *e.g. {f= 'c:\mydir\aSubDir\myFile.txt' fileNamePath}* fi *'c:\mydir\aSubDir'*
  returns a new string containing the directory path of the receiver path name (without the file name and extension).

- **format:** *e.g., {set phoneNumber '1234567890'} {f= '(000) 000-0000' phoneNumber format:}* fi *(123) 456-7890*
  returns a new string in which any digits in the control string argument have been replaced with the next corresponding character from the receiver - all other characters in the control string print as entered. Processing stops when the end of the receiver or control string is reached. There must be a good match between the receiver and control stream. In the example shown above, if the variable phoneNumber did not have an area code, the string returned would be (456) 789-0, which is probably not what was intended.

- **indexOfString:** *e.g., {f= 'ello' 'Hello' indexOfString:}* fi *2*
  returns an integer defining the starting position of the argument within the receiver. If the receiver does not contain the argument, returns 0

- **indexOfString:startingAt:** *e.g., {f= 'ello' 4 'Mello Yellow' indexOfString:startingAt:}* fi *8*
  returns an integer representing the starting position of the substring (first argument) found after the starting index (second argument) within the receiver. If the substring is not found, returns 0.

- **isValidDirectory** *e.g., {f= 'c:\HTTP\Wbwizard\' isValidDirectory}* fi *true*
  returns true if the string represents the pathname of a directory that exists on the host system, otherwise false

- **isValidFile** *e.g., {f= 'c:\HTTP\Wbwizard\default.htf' isValidFile}* fi *true*
  returns true if the string represents the pathname of a file that exists on the host system, otherwise false

- **isValidIPaddr** *e.g., {f= '1.2.3.4' isValidIPaddr}* fi *true*
  returns true if the string represents an IP address of the form #.#.#.# where each component is a numeric value that is less than 256.

- **nonempty** *e.g., {f= 'Hello' nonempty}* fi *'Hello'*
  {f= '' nonempty} fi *'&nbsp;'*
  if the receiver is empty, returns the non-breaking space sequence. If the receiver is not empty, returns the receiver.

- **onlyDigits** *e.g., {f= '1 and 2 and 3’ onlyDigits}* fi *‘123’*
  returns a new string containing only the numeric values contained within the receiver.

- **parseAt:** *e.g., {f= ',' 'one,two,three' parseAt:}* fi *OrderedList('one' 'two' 'three')*
  returns an ordered list of items generated by parsing the receiver using the parse character argument. If the receiver does not contain the parse character, returns an empty list. This process is reversible using the concat* operations described above. Note that the argument can be either a string or a character.

- **parseAt:into:** *e.g., {set cltn ',' 'one,two,three' parseAt:} {f= ',' cltn 'four,five,six' parseAt:into:}* fi *OrderedList('one' 'two' 'three' ‘four’ ‘five’ six’)*
  returns the second argument which is an ordered list. The receiver is parsed using the first argument and the result(s) are appended to the collection in the second argument. If the receiver does not contain the parse character, returns the second argument. Note that the first argument can be either a string or a character.

- **parseAtAny:** *e.g., {f= ',:' 'one,two:three' parseAtAny:}* fi *OrderedList('one' 'two’ 'three')*
  returns an ordered list of items generated by parsing the receiver using any of the characters found in the input argument. If the receiver does not contain any of the parse characters, returns an empty list.

- **parseAtAny:into:** *e.g., {set cltn ',' 'one,two,three' parseAt:} {f= ',:' cltn 'four:five:six' parseAtAny:into:}* fi *OrderedList('one' 'two' 'three' ‘four’ ‘five’ six’)*
  returns the second argument which is an ordered list. The receiver is parsed using the parse characters found in the first argument which is a string. The result(s) are appended to the collection in the second argument. If the receiver does not contain any of the parse characters, returns the second argument.

- **passEncode:** *e.g., {f= ‘myUsername’ 'myPassword' passEncode:}* fi *'mR)UR:Q,H`":c$m'*
  returns a new string containing an encoded password based on the receiver (initial password) and argument (user name).

- **pathnameDOS** *e.g., {f= '/dir1/subdir1/myfile.txt' pathnameDOS}* fi *'\dir1\subdir1\myfile.txt'*
  returns a new string in which all the ‘/’ characters in the receiver have been converted to '\'

- **pathnameUNIX** *e.g., {f= '\dir1\subdir1\myfile.txt' pathnameUNIX}* fi *'/dir1/subdir1/myfile.txt'*
  returns a new string in which all the ‘\’ characters in the receiver have been converted to '/

- **quote** *e.g., {f= 'String' quote}* fi *'''String'''*
  returns a new string in which a single quote mark has been added to the beginning and end of the receiver. For example, suppose you want to use a string value in an SQL statement:

  ```
  SELECT * FROM Table WHERE name = '{varname sql=true}'
  ```

  If one were to construct the SELECT statement dynamically, one would need to surround the {varname} value with single quotes as well as process any enclosed single quote marks. The following statement accomplishes both of these requirements.

```
{set var varname asSqlString quote}
```

- **readFromFile** *e.g. {f= 'c:\temp\message.txt' readFromFile}*
  The **readFromFile** allows one to read text from a file in the file system and either display that text as part of the returned HTML or store that text into a **WebBase** variable and manipulate it as with any other text string. The **readFromFile** message is sent to a string that contains a pathname for the file to be read. The pathname string is NOT relative to the Directory parameter as is used for .htf forms but must be a full pathname for the host machine's file system. The read is protected such that if an error occurs in locating and/or reading the file an empty string ('') will be returned rather than an error. The **isValidFile** message can first be sent to the same pathname string to determine if the file does exists.

  Note that this **readFromFile** message reads and returns the entire contents of the file as a string so users should be aware of the possible memory constraints of reading a very large file. Also note that if the string being read is to be displayed by a browser, any HTML in the file WILL be processed by the browser but any **WebBase** macros or variables WILL NOT be recursively processed by **WebBase** -- they will be simply returned as text. This is not another way of accomplishing what the *insert* macro does.

- **rejectComments** *e.g., {f= 'Here is a "comment" within a string' rejectComments}* fi *'Here is a within a string'*
  returns a new string in which all of the embedded comments in the receiver have been deleted. A comment is indicated by double quotes.

- **rejectControls** *e.g., {f= '   a tab and cr*

  and another tab' rejectControls} fi *' a tab and cr and another tab'*
  returns a new string representing the receiver with all of the embedded control characters replaced by space characters - multiple contiguous controls being replaced by a single space.

- **rejectHTML** *e.g., {f= 'Here is an HTML <INPUT> statement' rejectHTML}* fi *'Here is an HTML statement'*
  returns a new string in which all of the embedded <HTML> tags in the receiver have been deleted.

- **removeString:** *e.g., {f= 'Hi' 'Hi there' removeString:}* fi *' there'*
  returns a copy of the receiver with the argument removed

- **removeStringIgnoreCase:** *e.g., {f= 'hi' 'Hi there' removeStringIgnoreCase:}* fi *' there'*
  returns a copy of the receiver with the argument removed. Note that the case of the receiver and argument do not have to match.

- **replace:with:** *e.g., {f= 2 'hE' 'Hello' replace:with:}* fi *'hEllo'*
  returns the receiver after replacing the number of characters specified in the first argument with the characters in the collection in the second argument.

- **replaceCharacter:from:to:withString:** *e.g. {f= $l 1 5 'Xx' 'Hello' replaceCharacter:from:to:withString:}* fi *'HeXxXxo'*
  extracts the substring between the starting and ending positions. Replaces any occurrences of the specified character with the specified string. Returns the modified substring.

NOTE:

> *The resulting string may be longer than the original string if the replacement string is longer than a single character. The resulting string may be shorter than the original string if the starting and ending positions do not include the entire original string.*

- **replaceCharacter:with:** *e.g. {f= $l 75 'Hello' replaceCharacter:with:}* fi *'HeKKo'*
  Replaces any occurrences of the specified character within the receiver and returns the modified receiver. The second argument may be a string, character, integer or any other non-nil object. If it is an integer, the character value associated with that integer is used, not the string representation of the integer.

  NOTE:

  > *The resulting string may be longer than the original string if the replacement string is longer than a single character.*

- **replaceCharacter:withString:** *e.g. {f= $l 'Xx' 'Hello' replaceCharacter:withString:}* fi *'HeXxXxo'*
  Replaces any occurrences of the specified character within the receiver and returns the modified receiver.

  NOTE:

  > *The resulting string may be longer than the original string if the replacement string is longer than a single character.*

- **replaceNewlinesWithString:** *e.g., {set longText 'Here is*
  some text with
  carriage returns
  and line feeds
  in it'}
  *{f= '*CR*' longText replaceNewlinesWithString:}* fi *Here is*CR*some text with*CR*carriage returns*CR*and line feeds*CR*in it*
  returns a new string containing the receiver after all carriage returns have been removed and all linefeeds have been replaced with the string identified in the argument.

- **replaceString:with:** *e.g., {f= 'll' 'LL' 'hello' replaceString:with:}* fi *'heLLo'*
  returns a copy of the receiver with the string specified in the first argument replaced by the string specified in the second argument.

- **sortAscendingAt:** *e.g., {f= $, 'George,Bev,Robert' sortAscendingAt:}* fi *'Bev,George,Robert'*
  returns a new string of items that have been sorted. The receiver is a set of substrings that are separated by the parsing character specified as the input argument. The receiver is converted into a sorted list using ascending order, and then converted back into a string. See also parseAt: and concatWith:

- **sortDescendingAt:** *e.g., {f= $, 'George,Bev,Robert' sortDescendingAt:}* fi *'Robert,George,Bev'*
  returns a new string of items that have been sorted. The receiver is a set of substrings that are separated by the parsing character specified as the input argument. The receiver is converted into a sorted list using descending order, and then converted back into a string. See also parseAt: and concatWith:

- **stripQuotes** *e.g., {f= '" string in dbl quotes"' stripQuotes}* fi *'string in dbl quotes'*
  if the receiver is enclosed in double quotes, returns a copy of the receiver with the enclosing double quotes removed. If the receiver is not enclosed in double quotes, returns the receiver.

- **symbolConstant** *e.g., {f= '#foo' symbolConstant}* fi *#foo*
  returns a symbol from the string if and only if the first character was a '#' -, otherwise returns nil.

- **trimBlanks** *e.g., {f= ' Hi There ' trimBlanks}* fi *'Hi There'*
  returns a new string with the leading and trailing blanks (spaces) of the receiver removed. Note that any embedded blanks are not removed.

- **upTo:** *e.g., {f= $l 'Hello' upTo:}* fi *'He'*
  returns a copy of the receiver up to the specified character.

- **withCrs**
  returns the receiver after all occurrences of the backslash character ($\) have been replaced with a carriage return. This is effective when displayed within a <PRE> construct where the browser honors carriage returns. For example, the statement <PRE>{f= 'One\Per\Line' withCrs} </PRE> will generate:

  ```
  One
  Per
  Line
  ```

- **zapCrs**
  returns a copy of the receiver with all carriage return characters removed

String Class Operations

The string class is accessed using the **WebBase** variable %String%. The operations in this section can be performed on this variable, as can any of the operations described above for general collection classes.

- **fromArrayOfSubstrings:separatedBy:** *e.g., {set cltn ',' 'one,two,three' parseAt:}*
  {f= cltn $: %String% fromArrayOfSubstrings:separatedBy:} fi *'one:two:three'*
  returns a new string by appending all of the strings in the first argument with the second argument used as a separator character between each substring.

- **readFrom:** *e.g., {f= 'abc''defg''hi' asStream %String% readFrom:}* fi *'defg'*
  read and return a string from the argument, which is a stream. A string comprises all of the characters between quotes. Two quote marks together put a quote into the string.

11.11 Symbols

A symbol is a sequence of characters that is guaranteed to be unique throughout **WebBase**. Symbols are represented using the #symbol notation. All of the operations for Strings can also be used for symbols, with the exception of at:put: and the replace* operations. There are no operations specifically for symbols. While a number of operations described in this chapter return a symbol, there is no variable used to access the Symbol class.

11.12 Ordered Collections

An ordered collection is similar to an array, except that it can grow to accommodate more elements if the original collection is not big enough. An ordered collection is often used as a dynamic array, stack or queue.

Ordered Collection Instance Operations

This section describes all the operations that can be performed on an ordered collection.

An ordered collection is created and used by some **WebBase** macros. For example, in an **{sql to xxx ...} SELECT{/sql}** construct, the variable **xxx** will contain an ordered collection following the execution of the SELECT via ODBC. The collection may be empty (if no matching data records were found) or may contain a number of ODBC row objects -- the results of the SELECT. Several of the operations described below can only be applied to ordered collections containing OdbcRowObjects. The collection used in these examples is cltn1, generated using *{set cltn1 ',' 'one,two,three' parseAt: asOrderedCollection}.* The asOrderedCollection operation is used to convert the ordered list generated by parsing into an ordered collection. All of the displayed behavior would work for ordered lists also.

- **add:** *e.g., {f= 'end' cltn1 add:}* fi *'end'*
  {cltn1} fi *OrderedCollection('one' 'two' 'three' 'end')*
  returns the argument after adding it to the end of the receiver.

- **add:after:** *e.g., {f== 'end' ‘two’ cltn1 add:after:} {cltn1}* fi *OrderedCollection('one' 'two' 'end' 'three')*
  returns the first argument after adding it to the receiver immediately after the element in the second argument.

- **add:afterIndex:** *e.g., {f== 'end' 2 cltn1 add:afterIndex:} {cltn1}* fi *OrderedCollection('one' 'two' 'end' 'three')*
  returns the first argument after adding it to the receiver at the index position immediately after the second argument.

- **add:before:** *e.g., {f== 'end' ‘two’ cltn1 add:before:} {cltn1}* fi *OrderedCollection('one' ‘end’ 'two' 'three')*
  returns the first argument after adding it to the receiver immediately before the element in the second argument.

- **add:beforeIndex:** *e.g., {f== 'end' 2 cltn1 add:beforeIndex:} {cltn1}* fi *OrderedCollection('one' ‘end’ 'two' 'three')*
  returns the first argument after adding it to the receiver at the index position immediately before the second argument.

- **addAll:** *e.g., {set cltn2 ',' ‘four,five,six’ parseAt: asOrderedCollection} {f== cltn2 cltn1 addAll:} {cltn1}* fi *OrderedCollection('one' 'two' 'three' ‘four’ ‘five’ ‘six’)*
  returns the argument after all of the elements in it have been added to the receiver.

- **addAllFirst:** *e.g., {set cltn2 ',' ‘four,five,six’ parseAt: asOrderedCollection} {f== cltn2 cltn1 addAllFirst:}{cltn1}* fi *OrderedCollection(‘four’ ‘five’ ‘six’ 'one' 'two' 'three')*
  returns the argument after all of the elements in it have been added to the receiver prior to the first element in the receiver.

- **addAllLast:** *e.g., {set cltn2 ',' ‘four,five,six’ parseAt: asOrderedCollection} {f== cltn2 cltn1 addAllLast:} {cltn1}* fi *OrderedCollection('one' 'two' 'three' ‘four’ ‘five’ ‘six’)*
  returns the argument after all of the elements in it have been added to the receiver after the last element in the receiver. This is equivalent to addAll:

- **addFirst:** *e.g., {f== 'end' cltn1 addFirst:} {cltn1}* fi *OrderedCollection(‘end’ 'one' 'two' 'three')*
  returns the argument after adding it to the start of the receiver.

- **addLast:** *e.g., {f== 'end' cltn1 addLast:} {cltn1}* fi *OrderedCollection('one' 'two' 'three' ‘end’)*
  returns the argument after adding it to the end of the receiver.

- **after:** *e.g., {f= 'two' cltn1 after:}* fi *'three'*
  returns the element that immediately follows the argument in the receiver. If the argument is not found in the receiver, an error is reported.

- **ascending** *e.g., {f= cltn1 ascending}* fi *SortedCollection('one' 'three' 'two')*
  returns a SortedCollection containing all the elements of the receiver in ascending order

- **asOptions:** *e.g., {set cltn2 ‘,’ ‘apple,banana,cherry’ parseAt: asOrderedCollection} {f= ‘banana’ cltn2 asOptions:}* fi *'<OPTION>apple<OPTION SELECTED>banana <OPTION>cherry</SELECT>'*
  the receiver is a collection of strings of options as would be found on an HTML list box. The input argument is the option which is currently selected. A string is returned that is properly formatted for HTML to identify all the options and which particular option is currently selected.

- **asOptions:field:** *e.g., {sql to answers …} SELECT … {/sql} {f= ‘banana’ ‘FruitType’ answers asOptions:field:}* fi *'<OPTION>apple<OPTION SELECTED>banana<OPTION>cherry </SELECT>'*
  the receiver is a collection of ODBCRowObjects as returned from a SELECT query. The first argument is the option which is selected; the second argument is the name of the field within the database record. Returns a new string that is properly formatted for HTML identifying all the options as read from the specified field within the database, and which particular option is currently selected.

- **at:** *e.g., {f= 2 cltn1 at:}* fi *'two'*
  returns the item at the specified index

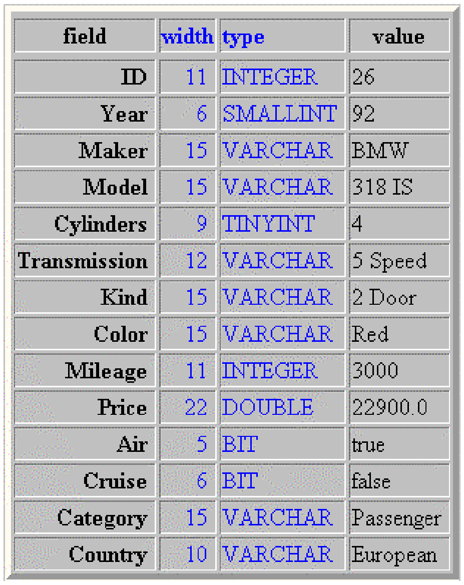
- **at:put:** *e.g., {f== 2 'middle' cltn1 at:put:} {cltn1}* fi *OrderedCollection('one' 'middle' 'three')*
  returns the second argument after replacing the element in the receiver at the specified index (first argument) with the new value (second argument).

- **before:** *e.g., {f= 'two' cltn1 before:}* fi *'one'*
  returns the element that immediately precedes the argument in the receiver. If the argument is not found in the receiver, an error is reported.

- **descending** *e.g., {f= cltn1 descending}* fi *SortedCollection(‘two’ ‘three’ 'one')*
  returns a SortedCollection containing all the elements of the receiver in descending order

- **describeVHTMLTable** *e.g., {sql to answers …} SELECT … {/sql} {f= answers describeVHTMLTable}* fi *<see below>*
returns a string that displays a <TABLE> for each entry in the collection. The table shows the field name, field size, field type and value within the field. The example below shows a single record from the cars database provided with the **WebBase WebWizard** examples.

Example 11.5 describeVHTMLTable example



field	width	type	value
ID	11	INTEGER	26
Year	6	SMALLINT	92
Maker	15	VARCHAR	BMW
Model	15	VARCHAR	318 IS
Cylinders	9	TINYINT	4
Transmission	12	VARCHAR	5 Speed
Kind	15	VARCHAR	2 Door
Color	15	VARCHAR	Red
Mileage	11	INTEGER	3000
Price	22	DOUBLE	22900.0
Air	5	BIT	true
Cruise	6	BIT	false
Category	15	VARCHAR	Passenger
Country	10	VARCHAR	European

- **describeVHTMLTable:** *e.g., {sql to answers …} SELECT … {/sql} {f= 'Cars Database' answers describeVHTMLTable}*
returns a string that displays a <TABLE> for each entry in the collection. The table shows the field name, field size, field type and value within the field. This is the same as the describeVHTMLTable operation described above, except that the title of the table can also be specified.

- **printHTMLTable** *e.g., {sql to answers ...} SELECT ... {/sql} {f= answers printHTMLTable}*
returns a string representing the receiver in tabular form using a <TABLE> </TABLE> block. This only works on collections that contain OdbcRowObjects returned from an sql select. Column headers are taken from the database table's column names as returned by the ODBC call. Limited formatting is done to allow for the indicated field widths as specified in the database. This operation does not include any way to specify sizes in any of the <TH> or <TD> generated. If you need to perform more details formatting (like size=), you will need to write a {forRow ...} loop and do the <TABLE> ... </TABLE> manually. As a starting point, you can use printHTMLTable in your form, view the source from your browser, and copy and paste the <TR><TH> header row and one of the <TR><TD> data rows to your .htf form, and then add the appropriate size, border, alignment, etc. formatting tags to achieve the desired results. The **WebBase WebWizard** database example #2 uses printHTMLTable.

- **printPRETable** *e.g., {sql to answers ...} SELECT ... {/sql} {f= answers printPRETable}*
returns a string representing the receiver in tabular form using a <PRE> </PRE> block. This only works on collections that contain OdbcRowObjects returned from an sql select.

Column headers are taken from the database table's column names as returned by the ODBC call. Limited formatting is done to allow for the indicated field widths as specified in the database. The **WebBase WebWizard** database example #2 uses printPRETable.

- **printTable** *e.g., {sql to answers …} SELECT … {/sql} {f= printTable}*
  returns a string representing the receiver in tabular form using a <TABLE> construct block if the browser supports it, or in a <PRE> construct if the browser does not support tables. This only works on collections that contain OdbcRowObjects returned from an sql select. See printHTMLTable and printPRETable for details on how the tables may be displayed.

- **printVHTMLTable** *e.g., {sql to answers ...} SELECT ... {/sql} {f= answers printVHTMLTable}*
  This is very similar to the printHTMLTable operation, but prints the table vertically with labels on the left (right justified), a colon, then values on the right (left justified).

```
     Name: John Q. Public
  Address: 123 State St.
Telephone: (123) 456-7890
```

  This operation should be used when there are a lot of fields (horizontal table would require a lot of horizontal scrolling) and especially when there is only a single row to be displayed. The operation does iterate over all the rows in the collection it is sent to. This only works on collections that contain OdbcRowObjects returned from an sql select.

- **printVHTMLTable:** *e.g., {sql to answers ...} SELECT ... {/sql} {f= 'Employees in Company X' answers printVHTMLTable:}*
  This is the same as printVHTMLTable except that it allows a title to be specified. When the table is displayed, the title is displayed centered over the table. This only works on collections that contain OdbcRowObjects returned from an sql select.

- **remove:** *e.g., {f== 'two' cltn1 remove:} {cltn1}* fi *OrderedCollection('one' 'three')*
  returns the argument after it has been removed from the receiver.

- **removeAll** *e.g., {f= cltn1 removeAll}* fi *OrderedCollection( )*
  returns the receiver after all of the elements in it have been removed.

- **removeAll:** *e.g., {set cltn2 ',' 'one,two' parseAt: asOrderedCollection}*
  {f== cltn2 cltn1 removeAll:} {cltn1} fi *OrderedCollection('three')*
  returns the argument after all of the elements in it have been removed from the receiver.

- **removeFirst** *e.g., {f= cltn1 removeFirst}* fi *'one'*
  returns the first element in the receiver after it is removed from the receiver.

- **removeIndex:** *e.g., {f= 2 cltn1 removeIndex:}* fi *OrderedCollection('one' 'three')*
  returns the receiver after the element at the index position specified in the argument is removed.

- **removeLast** *e.g., {f= cltn1 removeLast}* fi *'three'*
  returns the last element in the receiver after it is removed from the receiver.

Ordered Collection Class Operations

The OrderedCollection class can be accessed using the variable %OrderedCollection% (note there is no space between Ordered and Collection in either the variable or class name). This section covers those operations that are sent to the %OrderedCollection% variable. The operations described above for general collection classes are also applicable for this variable.

- **new** *e.g., {f= %OrderedCollection% new}* fi *OrderedCollection ( )*
  returns a new empty ordered collection capable of holding 12 elements. When the number of elements in the collection exceeds the collection size, the collection is "grown" by creating a new larger empty ordered collection and copying all the elements from the small collection into the larger collection. Depending on the sizes of the collections, this can be a performance issue. If the size of the collection to be created is known when the collection is created, the new: operation should be used to optimize performance.

- **new:** *e.g., {f= 25 %OrderedCollection% new:}* fi *OrderedCollection ( )*
  returns an empty ordered collection capable of holding the number of elements specified in the argument. See the description of the new operation above for usage tips.

11.13 Ordered Lists

An ordered list is almost the same as an ordered collection. All of the operations described for ordered collections apply to ordered lists. There are no operations specific to ordered lists. However, an ordered list and a sorted list are the only **WebBase** data types that will return true to the isList operation. The %OrderedList% **WebBase** variable can be used with the general collection and ordered collection class operations described above. There are no class operations specific to the OrderedList class.

An ordered list can be created in **WebBase** by parsing a string (see **parseAt:** above), or via the dynamic variable **%newList%.** Typically, one would assign a list to a variable, then send messages to that variable to manipulate the contents of the list as appropriate for the application.

11.14 Sorted Collections

A sorted collection contains elements sorted according to the elements sort order (which is how they respond to the < method. All of the operations that can be performed on ordered collections can also be performed on sorted collections. However, ordered collection operations which add a new element to a specific location within the collection (e.g., addFirst:, removeLast:) cannot be used on sorted collections. The %SortedCollection% **WebBase** variable can be used with the general collection and ordered collection class operations described above. There are no class operations specific to the SortedCollection class.

11.15 Sorted Lists

A sorted list is almost the same as a sorted collection. All of the operations described for sorted collections apply to sorted lists. There are no operations specific to sorted lists. However, an ordered list and a sorted list are the only **WebBase** data types that will return true to the isList operation. In addition, a sorted list is the only **WebBase** data type that returns true to the isSortedList operation.

Sorted lists can be created in **WebBase** via the dynamic variables **%newAscendingList%** or **%newDescendingList%**. Typically, one would assign a list to a variable, then send messages to that variable to manipulate the contents of the list as appropriate for the application.

Sorted List Class Operations

The %SortedList% variable is used to create a new sorted list using the class operations described below. The operations described above for general collection and ordered collection classes are also applicable for this variable.

- **newAscending** *e.g., {f= %SortedList% newAscending}* fi *SortedList ()*
  returns an empty sorted list whose sort order for elements is ascending.

- **newDescending** *e.g., {f= %SortedList% newDescending}* fi *SortedList ()*
  returns an empty sorted list whose sort order for elements is descending.

11.16 Associations

An association associates two objects known as the key/value pair. Association objects are used to store information into dictionaries.

Association Instance Operations

This section describes all the operations that can be performed on an association. There are two examples associations used in the following examples: assoc1 and assoc2. They are generated using: *{set assoc1 'Version' %version% %Association% key:value:}* and *{set assoc2 'Build' %build% %Association% key:value:}*. Although both of these examples include strings as the keys and values, it is possible to have any data type as a key or a value. However, it is recommended that keys be strings or symbols whenever possible.

- < *e.g., {f= assoc2 assoc1 <}* fi *false*
  returns true if the receiver key is less than the argument key; otherwise false. Note that the argument must also be an association.

- <= *e.g., {f= assoc2 assoc1 <=}* fi *false*
  returns true if the receiver key is less than or equal to the argument key; otherwise false. Note that the argument must also be an association.

- = *e.g., {f= assoc2 assoc1 =}* fi *false*
  returns true if the receiver key and the argument key are the same, otherwise false

- > *e.g., {f= assoc2 assoc1 >}* fi *true*
  returns true if the receiver key is greater than the argument key; otherwise false. Note that the argument must also be an association.

- >= *e.g., {f= assoc2 assoc1 >=}* fi *true*
  returns true if the receiver key is greater than or equal to the argument key; otherwise false. Note that the argument must also be an association.

- **between:and:** *e.g., {set assoc3 'Title' %comment% %Association% key:value:} {f= assoc2 assoc1 assoc3 between:and:}* fi *true*
  returns true if the receiver is between the first and second arguments, otherwise false.

Note that the arguments must be associations, and the comparison is done based on the keys.

- **key** *e.g., {f= assoc1 key}* fi *‘Version’*
  returns the key of the receiver

- **max:** *e.g., {f= assoc2 assoc1 max:}* fi *'Version' ==> '4.10'*
  returns the maximum of the receiver or the argument

- **min:** *e.g., {f= assoc2 assoc1 min:}* fi *'Build' ==> '56'*
  returns the minimum of the receiver or the argument

- **value** *e.g., {f= assoc1 value}* fi *'4.10'*
  returns the value of the receiver

Association Class Operations

The Association class is accessed using the %Association% **WebBase** variable. This section describes all the operations that can be performed on the Association class.

- **key:** *e.g., {f= ‘Version’ %Association% key:}* fi *'Version' ==> nil*
  returns a new association whose key is set to the first argument (the value is left as nil).

- **key:value:** *e.g., {f= ‘Version’ %version% %Association% key:value:}* fi *'Version' ==> '4.10'*
  returns a new association whose key is set to the first argument and whose value is set to the second argument.

11.17 Dictionaries

A dictionary is a collection of key/value pairs of objects. The keys in a dictionary are unique, whereas values may be duplicated. A dictionary may be searched either by key or by value. Key searches use hashing for efficiency.

Dictionary Instance Operations

This section describes all the operations that can be performed on a dictionary. For the examples in the following, we will use an example dictionary dict1 containing the two example associations used in the preceding section. This dictionary is created using *{set dict1 %Dictionary% new} {f== assoc1 dict1 add:} {f== assoc2 dict1 add:} {dict1}* fi *Dictionary('56' '4.10')*

- **add:** *e.g., {set assoc3 ‘Title’ %title% %Association% key:value:} {f== assoc3 dict1 add:} {dict1}* fi *Dictionary('WebBase 4.10 Build 56' '56' '4.10')*
  returns the argument after adding it to the receiver. Note that the argument is an association.

- **addAll:** *e.g., {set assoc3 ‘Title’ %title% %Association% key:value:} {set assoc4 ‘Company’ ‘ExperTelligence, Inc.’ %Association% key:value:} {set cltn1 assoc3 assoc4 %OrderedCollection% with:with:}*
  {f== cltn1 dict1 addAll:} {dict1} fi *Dictionary(('Title' ==> 'WebBase 4.10 build 56') ('Build' ==> '56') ('Company' ==> 'ExperTelligence,Inc.') ('Version' ==> '4.10'))*

returns the argument after adding all the elements in it to the receiver. Note that the elements in the argument collection are associations.

- **addDictionary:** *e.g., {set assoc3 'Title' %title% %Association% key:value:} {set assoc4 'Company' 'ExperTelligence, Inc.' %Association% key:value:} {set dict2 %Dictionary% new} {f== assoc3 dict2 add:} {f== assoc4 dict2 add:} {f== dict2 dict1 addDictionary:} {dict1}* fi *Dictionary(('Title' ==> 'WebBase 4.10 build 56') ('Build' ==> '56') ('Company' ==> 'ExperTelligence,Inc.') ('Version' ==> '4.10'))*
  returns the receiver after adding all the associations in the argument to the receiver.

- **asArray** *e.g., {f= dict1 asArray}* fi *('56' '4.10')*
  returns an array containing all the associations in the receiver.

- **asKeys** *e.g., {f= dict1 asKeys}* fi *OrderedList('Build' 'Version')*
  returns an ordered list containing all of the keys in the receiver.

- **asOrderedCollection** *e.g., {f= dict1 asOrderedCollection}* fi *OrderedCollection('56' '4.10')*
  returns an ordered collection containing all the associations in the receiver.

- **asPairs** *e.g., {f= dict1 asPairs}* fi *OrderedList('Build' ==> '56' 'Version' ==> '4.10')*
  returns an ordered list containing all the associations in the receiver.

- **associationAt:** *e.g., {f= 'Version' dict1 associationAt:}* fi *'Version' ==> '4.10'*
  returns the association whose key is the same as the argument. If not found, an error is reported.

- **asSortedCollection** *e.g., {f= dict1 asSortedCollection}* fi *SortedCollection('56' '4.10')*
  returns a sorted collection containing all the associations in the receiver sorted in ascending order.

- **asValues** *e.g., {f= dict1 asValues}* fi *OrderedList('56' '4.10')*
  returns an ordered list containing all the values in the receiver. Note that if there are multiple associations with the same value, there will be multiple entries in the ordered list that are the same value.

- **at:** *e.g., {f= 'Version' dict1 at:}* fi *'4.10'*
  returns the value of the association whose key equals the argument. If not found, an error is reported.

- **at:put:** *e.g., {f== 'Build' '57' dict1 at:put:} {dict1}* fi *Dictionary(('Build' ==> '57') ('Version' ==> '4.10'))*
  returns the second argument. If the receiver contains the association whose key is the same as the first argument, replaces the value of the association with the second argument. If the receiver does not contain an association whose key is the same as the first argument, creates a new association whose key is the first argument and whose value is the second argument and adds it to the receiver.

- **elementsEqual:** *e.g., {set assoc3 'Title' %title% %Association% key:value:} {set assoc4 'Company' 'ExperTelligence, Inc.' %Association% key:value:} {set dict2 %Dictionary% new} {f== assoc3 dict2 add:} {f== assoc4 dict2 add:} {f= dict2 dict1 elementsEqual:}* fi *false*
  returns true if the receiver has exactly those elements in the argument; otherwise false.

- **includes:** *e.g., {f= %version% dict1 includes:}* fi *true*
  returns true if the receiver contains an association whose value is the same as the argument; otherwise false.

- **includesKey:** *e.g., {f= 'Version' dict1 includesKey:}* fi *true*
  {f= 'version' dict1 includesKey:} fi *false*
  returns true if the receiver contains an association whose key is the same as the argument; otherwise false. Note that the key must match exactly.

- **isEmpty** *e.g., {f= dict1 isEmpty}* fi *false*
  {f= %Dictionary% new isEmpty} fi *true*
  returns true if the receiver does not contain any associations, otherwise false

- **keyAtValue:** *e.g., {f= '4.10' dict1 keyAtValue:}* fi *'Version'*
  returns the key for the association whose value equals the argument. If not found, returns nil.

- **notEmpty** *e.g., {f= dict1 notEmpty}* fi *true*
  {f= %Dictionary% new notEmpty} fi *false*
  returns true if the receiver does contains any associations, otherwise false. Equivalent to isEmpty not

- **occurrencesOf:** *e.g., {f='4.10' dict1 occurrencesOf:}* fi *1*
  returns the number of associations in the receiver whose value is the same as the argument.

- **removeAll** *e.g., {f= dict1 removeAll}* fi *Dictionary( )*
  returns the receiver after all of the associations within it have been removed.

- **removeAssociation:** *e.g., {f= assoc1 dict1 removeAssociation:}* fi *Dictionary(('Build' ==> '56'))*
  returns the receiver after the specified association has been removed from it. If the association is not in the receiver, reports an error.

- **removeKey:** *e.g., {f== 'Version' dict1 removeKey:} {dict1}* fi *Dictionary(('Build' ==> '56'))*
  returns the receiver after the association whose key is the same as the argument is removed from it. If an association is not found, an error is reported.

- **size** *e.g., {f= dict1 size}* fi *2*
  returns the number of elements contained in the receiver.

- **urlArgString** *e.g., {f= dict1 urlArgString}* fi *Build=56&Version=4.10*
  returns a string of key=value&key=value entries that can be used on a URL command line.

Dictionary Class Operations

The Dictionary class can be accessed using the variable %Dictionary%. This section covers those operations that are sent to the %Dictionary% variable. The operations described above for general collection classes are also applicable for this variable.

- **new** *e.g., {f= %Dictionary% new}* fi *Dictionary( )*
  returns a new empty dictionary.

11.18 Characters

Characters in **WebBase** are specified using the format $a where the actual character desired follows the '$'. Note that characters and strings are represented and handled differently within **WebBase**. Several special characters, their description, and their ASCII value are available as follows:

$cr	carriage return	13
$lf	line feed	10
$ff	form feed	12
$bs	backspace	8
$esc	escape	27
$tab	tab	9
$space	space	32
$null	null	0
$bell	bell	7

This section describes all the character related operations that can be applied to the character(s) extracted from string variables and/or character constants. There are no class operations available for characters.

- - *e.g., {f= $A $Z -}* fi *25*
  {f= 25 $Z -} fi *65*
  If the argument is a character, returns the difference between the receiver's asciiValue and the argument's asciiValue; if it is an integer, returns the difference between the receiver's asciiValue and the argument.

- , (comma) *e.g., {f= $B $A ,}* fi *'AB'*
  {f= 'bc' $A ,} fi *'Abc'*
  returns a string generated by concatenating the receiver with the argument, which is either a character or a string.

- + *e.g., {f= 25 $A +}* fi *$Z*
  returns a character whose asciiValue is the sum of the receiver's asciiValue and the argument (or its asciiValue)

- < *e.g., {f= $e $f =}* fi *false*
  returns true if the receiver is less than the argument using a sort-order character comparison, otherwise false

- <= *e.g., {f= $e $f =}* fi *false*
  returns true if the receiver is less than or equal to the argument using a sort-order character comparison, otherwise false

- = *e.g., {f= $e 2 'Hello' at: =}* fi *true*
  returns true if the receiver and the argument are the same character, otherwise false

- > *e.g., {f= $e $f =}* fi *true*
  returns true if the receiver is greater than the argument using a sort-order character comparison, otherwise false

- >= *e.g., {f= $e $f =}* fi *true*
  returns true if the receiver is greater than or equal to the argument using a sort-order character comparison, otherwise false

- **asCharacter** *e.g., {f= $X asCharacter}* fi *$X*
  returns the receiver since it is already a character

- **asciiValue** *e.g., {f= $X asciiValue}* fi *88*
  returns an integer representing the ASCII value for the receiver

- **asInteger** *e.g., {f= $X asInteger}* fi *88*
  returns the integer ASCII value for the receiver; this is the same as the asciiValue message

- **asLowercase** *e.g., {f= $X asLowercase}* fi *$x*
  returns the lowercase character for the receiver if it is an alphabetic character, otherwise returns the receiver as is. This may also be written using asLowerCase.

- **asUppercase** *e.g., {f= $x asUppercase}* fi *$X*
  returns the uppercase character for an the receiver if it is an alphabetic character, otherwise returns the receiver as is. This may also be written using asUpperCase.

- **authDecode** *e.g., {f= $w authDecode}* fi *48*
  return an integer representing the character as per RFC 1421. See the number method authEncode also.

- **between:and:** *e.g., {f= $A $Z $X between:and:}* fi *true*
  returns true if the receiver is between the first and second arguments when doing a sort-order character comparison

- **digitValue** *e.g., {f= $W digitValue}* fi *32*
  returns a number corresponding to the digit value of the receiver. Only the characters $0-$9 and $A-$Z are valid as a receiver (note that the lowercase alphabetic characters are not valid).

- **isAlphaNumeric** *e.g., {f= $X isAlphaNumeric}* fi *true*
  {f= $$ isAlphaNumeric} fi *false*
  returns true for the characters for letters a through z, A through Z and digits 0 through 9, otherwise false

- **isDigit** *e.g., {f= $X isDigit}* fi *false*
  {f= $2 isDigit} fi *true*
  returns true for the characters for digits 0 through 9, otherwise false

- **isLetter** *e.g., {f= $X isLetter}* fi *true*
  {f= $2 isLetter} fi *false*
  returns true for the characters for letters a through z and A through Z, otherwise false

- **isLowercase** *e.g., {f= $x isLowercase}* fi *true*
  {f= $X isLowercase} fi *false*
  returns true for the characters for letters a through z, otherwise false. This may also be written as isLowerCase.

- **isSeparator** *e.g., {f= $space isSeparator}* fi *true*
  {f= $X isSeparator} fi *false*

returns true for the characters for Space, Tab, Carriage Return, Line Feed, and Form Feed characters; otherwise false

- **isUppercase** *e.g., {f= $X isUppercase}* fi *true*
  {f= $x isUppercase} fi *false*
  returns true for the characters for letters A through Z, otherwise false. This may also be written as isUpperCase.

- **isVowel** *e.g., {f= $X isVowel}* fi *false*
  {f= $A isVowel} fi *true*
  returns true for the characters a, A, e, E, i, I, o, O, u and U; otherwise false

- **isWhitespace** *e.g., {f= $space isWhitespace}* fi *true*
  {f= $X isWhitespace} fi *false*
  returns true for Space or control characters, otherwise false

- **max:** *e.g., {f= $A $X max:}* fi *$X*
  returns the larger character when doing a sort-order character comparison

- **min:** *e.g., {f= $A $X min:}* fi *$A*
  returns the smaller character when doing a sort-order character comparison

- **validHtmlChar** *e.g., {f= $A validHtmlChar}* fi *true*
  {f= $% validHtmlChar} fi *false*
  returns true or false depending on if the receiver needs to be converted for HTML use. All alphanumeric characters and some punctuation characters return true. Any character that must be encoded for use in a command line argument will return false.

11.19 Booleans

There are only two instances of Boolean - true and false. There are many Boolean operations in the other sections that return a true or false value depending on the result of the computation. These operations require the receiver to be a Boolean. There are no class operations available for Booleans.

- **&** *e.g., {f= 'yes' 'yes' = 'no' 'no' = &}* fi *true*
  returns the logical AND of the receiver and argument

- **|** *e.g., {f= 'yes' 'no' = 'no' 'yes' = | }* fi *false*
  returns the logical OR of the receiver and argument

- **asBoolean:** *e.g., {f= false 1 1 = asBoolean:}* fi *true*
  returns the receiver and ignores the argument. This is provided for compatibility with the asBoolean: operation available on strings.

- **asSqlString** *e.g., {f= 1 1 = asSqlString}* fi *'True'*
  returns the string 'True' if the receiver is true, or the string 'False' if the receiver is false.

- **eqv:** *e.g., {f= 'yes' 'no' = 'no' 'yes' = eqv:}* fi *true*
  returns true if the receiver is equivalent to the argument, otherwise false.

- **not** *e.g., {f= 'yes' 'no' = not}* fi *true*
  returns the inverse of the receiver.

- **xor:** *e.g., {f= 'yes' 'no' = 'no' 'yes' = xor:}* fi *false*
  returns true if the receiver is not equivalent to the argument, otherwise false.

11.20 Dates

A date represents a particular day since the start of the Julian calendar. The dynamic variable **%date%** returns the current date.

Date Instance Operations

The following messages can be sent to any **WebBase** variable containing a date. For the following examples, assume %date% → 3/18/97.

- < *e.g., {set date1 '2/10/97' asDate } {f= %date% date1 <}* fi *true*
  returns true if the receiver is less than the argument, otherwise false

- <= *e.g., {set date1 '2/10/97' asDate } {f= %date% date1 <=}* fi *true*
  returns true if the receiver is less than or equal to the argument, otherwise false

- = *e.g., {set date1 '2/10/97' asDate } {f= %date% date1 =}* fi *false*
  returns true if the receiver and argument are the same date, otherwise false

- > *e.g., {set date1 '2/10/97' asDate } {f= %date% date1 >}* fi *false*
  returns true if the receiver is greater than the argument, otherwise false

- >= *e.g., {set date1 '2/10/97' asDate} {f= %date% date1 >=}* fi *false*
  returns true if the receiver is greater than or equal to the argument, otherwise false
- **addDays:** *e.g., {f= 20 %date% addDays:}* fi *04/07/97*
  returns a new date that is ‘n’ number of days after the specified date, where ‘n’ is the input argument.

- **asSeconds** *e.g., {f= %date% asSeconds}* fi *3036096000*
  returns the number of seconds elapsed from January 1, 1901 until the specified date

- **between:and:** *e.g., {set date1 '12/10/97' asDate } {set date2 '2/10/97' asDate} {f= date2 date1 %date% between:and:}* fi *true*
  returns true if the receiver is between the two dates specified as arguments

- **day** *e.g., {f= %date% day}* fi *35140*
  returns the number of days elapsed from January 1, 1901 until the specified date

- **dayIndex** *e.g., {f= %date% dayIndex}* fi *2*
  returns the index for the day of the week, 1=Mon, 7=Sun

- **dayName** *e.g., {f= %date% dayName}* fi *#Tuesday*
  returns the symbol identifying the day of the week

- **dayOfMonth** *e.g., {f= %date% dayOfMonth}* fi *18*
  returns an integer from 1 to 31 specifying the day number within the month

- **dayOfYear** *e.g., {f= %date% dayOfYear}* fi *77*
  returns an integer from 1 to 365 identifying the day number within the year

- **daysInMonth** *e.g., {f= %date% daysInMonth}* fi *31*
  returns an integer identifying the number of days in the month

- **daysInYear** *e.g., {f= %date% daysInYear}* fi *365*
  returns an integer identifying the number of days in the year

- **daysLeftInMonth** *e.g., {f= %date% daysLeftInMonth}* fi *12*
  returns an integer specifying how many days remain in the month

- **daysLeftInYear** *e.g., {f= %date% daysLeftInYear}* fi *288*
  returns an integer specifying how many days remain in the year

- **elapsedDaysSince:** *e.g., {set date1 '2/10/97' asDate} {f= date1 %date% elapsedDaysSince:}* fi *36*
  returns an integer specifying the number of days between the receiver and the argument.

- **elapsedMonthsSince:** *e.g., {set date1 '2/10/97' asDate} {f= date1 %date% elapsedMonthsSince:}* fi *1*
  returns an integer specifying the number of months between the receiver and the argument.

- **elapsedSecondsSince:** *e.g., {set date1 '2/10/97' asDate} {f= date1 %date% elapsedSecondsSince:}* fi *3110400*
  returns an integer specifying the number of seconds between the receiver and the argument.

- **firstDayInMonth** *e.g., {f= %date% firstDayInMonth}* fi *60*
  returns an integer specifying the number of the first day in the month from the beginning of the year

- **firstDayOfMonth** *e.g., {f= %date% firstDayOfMonth}* fi *03/01/97*
  returns a new date representing the first of the month

- **firstSundayIn:** *e.g., {f= 3 %date% firstSundayIn:}* fi *61*
  returns the number of days after the start of the year for the first Sunday within the month for the specified index.

- **firstSundayInMonth** *e.g., {f= %date% firstSundayInMonth}* fi *61*
  returns the number of days after the start of the year for the first Sunday in the current month

- **lastSundayIn:** *e.g., {f= 3 %date% lastSundayIn:}* fi *89*
  returns the number of days after the start of the year for the last Sunday within the month for the specified index.

- **lastSundayInMonth** *e.g., {f= %date% lastSundayInMonth}* fi *89*
  returns the number of days after the start of the year for the last Sunday in the current month

- **max:** *e.g., {set date1 ‘2/10/97’ asDate} {f= date1 %date% max:}* fi *03/18/97*
  returns the maximum (more recent) of the receiver or the argument.

- **min:** *e.g., {set date1 ‘2/10/97’ asDate} {f= date1 %date% min:}* fi *03/18/97*
  returns the minimum (less recent) of the receiver or the argument.

- **monthIndex** *e.g., {f= %date% monthIndex}* fi *3*
  returns the number of the month

- **monthName** *e.g., {f= %date% monthName}* fi *#March*
  returns the symbol identifying the name of the month

- **previousWeekday:** *e.g., {f= #Tuesday %date% previousWeekday:}* fi *03/11/95*
  returns a Date reflecting the most recent day name represented by the argument preceding the receiver. The argument must be a symbol; valid entries are Sunday, Monday, Tuesday, Wednesday, Thursday, Friday and Saturday. The '#' denotes that the argument is a symbol.

- **printInFormat:twoDigitYear:** *e.g., {f= 2 false %date% printInFormat:twoDigitYear:}* fi *1997/03/18*
  returns a string representing the receiver in the form specified by the first argument. The first argument is an integer as noted below:

  ```
  0 = Month-Day-Year
  1 = Day-Month-Year
  2 = Year-Month-Day
  ```

  The second argument is a Boolean that specifies whether the year should be printed in 2 digits or 4. See also printOn:inFormat:twoDigitYear:.

- **printOn:inFormat:twoDigitYear:** *e.g., {set strm %String% new %WriteStream% on:} {f== strm 2 false %date% printOn:inFormat:twoDigitYear:} {f= strm contents}* fi *1997/03/18*
  appends a string representing the receiver in the form specified by the second argument to the stream identified in the first argument. The third argument is a Boolean that specifies whether the year should be printed in 2 digits or 4. See also printInFormat:twoDigitYear:.

- **printOn:inFormat:twoDigitYear:dateSeparator:** *e.g., {set strm %String% new %WriteStream% on:} {f== strm 2 false '*' %date% printOn:inFormat:twoDigitYear:dateSeparator:} {f= strm contents}* fi *1997*03*18*
  appends a string representing the receiver in the form specified by the second argument to the stream identified in the first argument. The third argument is a Boolean that specifies whether the year should be printed in 2 digits or 4; the fourth argument is a string used to separate the month, day and year portions of the date.

- **printOn:withPicture:** *e.g., {set strm %String% new %WriteStream% on:} {f== strm 'MMM dd yyyy' %date% printOn:withPicture:} {f= strm contents}* fi *'Mar 18 1997'*
  appends a string representing the receiver in the form specified by the second argument to the stream identified in the first argument. See printWithPicture: for format information.

- **printWithPicture:** *e.g., {f= 'MMM dd yyyy' %date% printWithPicture:}* fi *Mar 18 1997'*
  returns a formatted string displayed according to the argument. The receiver will be printed with the substitutions listed below taking place. Note that there must be a separation character between the 'M', 'd' and 'y' characters; the separation character will be displayed in the output. (e.g., MM/dd/yy → 01/24/96)

  - ♦ Every single M (uppercase M) will be replaced by the number of the month as a single or two-digit value.

- ♦ Every two consecutive MM's (uppercase MM's) will be replaced by the number of the month as a two-digit (zero left filled if necessary) value.
- ♦ Every three consecutive MMM's (uppercase MMM's) will be replaced by a three-letter ABBREVIATION for the month -- e.g., 03 → Mar.
- ♦ Every four consecutive MMMM's (uppercase MMMM's) will be replaced by the full NAME of the month -- e.g., 03 → March.
- ♦ Every single d (lowercase d) will be replaced by the number of the day as a single or two-digit value
- ♦ Every two consecutive dd's (lowercase dd's) will be replaced by the number of the day as a two-digit (zero left filled if necessary) value
- ♦ Every three consecutive ddd's (lowercase ddd's) will be replaced by a three-letter ABBREVIATION for the day of the week -- e.g., Sun.
- ♦ Every four consecutive dddd's (lowercase dddd's) will be replaced by the full NAME of the day of the week -- e.g., Sunday.
- ♦ Every two consecutive yy's (lowercase yy's) will be replaced by the last two digits of the year -- e.g., 97
- ♦ Every occurrence of a single y - or multiple (but not 2) yyyy's (lowercase y) will be replaced by the four-digit value of the year -- e.g., 1997

- **subtractDate:** *e.g., {set date1 '2/10/97' asDate} {f= date1 %date% subtractDate:}* fi *36*
  returns the number of days between the receiver and the date specified in the argument.

- **subtractDays:** *e.g., {f= 20 %date% subtractDays:}* fi *02/26/97*
  returns a new date that is 'n' number of days before the specified date

- **year** *e.g., {f= %date% year}* fi *1997*
  returns an integer specifying the year

Date Class Operations

The %Date% variable allows the Date class to be accessed. This class has many useful operations to create, compare and compute dates.

- **calendarForMonth:year:** *e.g., {f= #April 1997 %Date% calendarForMonth:year:}* fi *<see below>*
  returns a string containing the formatted calendar for the month whose name is the symbol specified in the first argument, and the year is specified in the second argument. The results of the above example are:

```
Su Mo Tu We Th Fr Sa
       1  2  3  4  5
 6  7  8  9 10 11 12
13 14 15 16 17 18 19
20 21 22 23 24 25 26
27 28 29 30
```

- **dateAndTimeNow** *e.g., {f= %Date% dateAndTimeNow}* fi *(03/18/97 02:03:27 PM)*
returns an array containing two elements: a date representing the current date and a time representing the current time.

- **day:month:year:** *e.g., {f= 25 5 97 %Date% day:month:year:}* fi *05/25/97*
returns a new date defined by the day (first argument), month (second argument) and year (third argument).

- **dayNames** *e.g., {f= %Date% dayNames}* fi *Dictionary((Fri ==> 5) (Sunday ==> 7) (Wednesday ==> 3) (Friday ==> 5) (Sat ==> 6) (Tue ==> 2) (Saturday ==> 6) (Monday ==> 1) (Thr ==> 4) (Tuesday ==> 2) (Thursday ==> 4) (Wed ==> 3) (Mon ==> 1) (Sun ==> 7))*
returns a dictionary. The key of each association is the day name as a symbol and the value is the index of the day (1=Monday). Note: there is an association for the full name and the short name of each day of the week (e.g., Mon, Monday).

- **dayOfWeek:** *e.g., {f= #Mon %Date% dayOfWeek:}* fi *1*
returns an integer from 1 to 7 indicating the weekday number for the symbol argument (1=Monday, 7=Sunday). Note: the argument may be the symbol for either the short or full name of the day.

- **daysInMonth:forYear:** *e.g., {f= #April 1997 %Date% daysInMonth:forYear:}* fi *30*
returns the total number of days for the month specified with the symbol in the first argument in the year specified in the second argument.

- **daysInYear:** *e.g., {f= 1997 %Date% daysInYear:}* fi *365*
returns the total number of days for the year specified in the argument.

- **fromDays:** *e.g., {f= 1000 %Date% fromDays:}* fi *09/28/03 (note this is 1903, not 2003!)*
{f= -1000 %Date% fromDays:} fi *04/06/98 (note this is 1898, not 1998!)*
returns a date that is the number of days specified in the argument before or after January 1, 1901. If the argument is negative, the date will be computed <u>before</u> January 1. If the argument is positive, the date will be computed for after January 1, 1901.

- **fromString:** *e.g., {f= 'May 6, 1997' %Date% fromString:}* fi *05/06/97*
returns the date specified by the argument, which must represent a date in one of three formats:

  ♦ `‘Jan 2, 1990’`
  ♦ `‘2 Jan, 1990’`
  ♦ `‘02-01-90’`

  The delimiters between the month, day and year can be any sequence of non-alphanumeric characters.

- **indexOfMonth:** *e.g., {f= #April %Date% indexOfMonth:}* fi *4*
returns an integer from 1 to 12 indicating the month index for the symbol argument

- **leapYear:** *e.g., {f= 1996 %Date% leapYear:}* fi *1*
  {f= 1997 %Date% leapYear:} fi *0*
  returns 1 if the year specified in the argument is a leap year; otherwise 0

- **leapYearsTo:** *e.g., {f= 1996 %Date% leapYearsTo:}* fi *23*
  returns the number of leap years from 1901 to the year before the year specified in the argument

- **monthNameFromString:** *e.g., {f= 'May' %Date% monthNameFromString:}* fi *#May*
  returns the symbol for the month name corresponding to the argument

- **monthNames** *e.g., {f= %Date% monthNames}* fi *Dictionary((Jul ==> 7) (July ==> 7) (Oct ==> 10) (Feb ==> 2) (March ==> 3)(December ==> 12) (November ==> 11) (Mar ==> 3) (February ==> 2) (Jan ==> 1) (January ==> 1) (August==> 8) (Dec ==> 12) (October ==> 10) (Nov ==> 11) (April ==> 4) (September ==> 9) (Sep ==> 9) (Aug ==>8) (Apr ==> 4) (May ==> 5) (Jun ==> 6) (June ==> 6))*
  returns a dictionary. The key of each association is the month name as a symbol, the value is the month index. Note: there is an association for the full name and the short name of each month (e.g., Jan, January).

- **nameOfDay:** *e.g., {f= 3 %Date% nameOfDay:}* fi *#Wednesday*
  returns the weekday name as a symbol corresponding to the integer argument (Monday for 1, Sunday for 7).

- **nameOfMonth:** *e.g., {f= 3 %Date% nameOfMonth:}* fi *#March*
  returns the month name as a symbol corresponding to the integer argument (January for 1, December for 12).

- **newDay:month:year:** *e.g., {f= 15 #June 1997 %Date% newDay:month:year:}* fi *06/15/97*
  returns a date with the day specified in the first argument, the month in the second argument, and the year specified in the third argument. The day and year are specified as integers; the month is a symbol.

- **newDay:year:** *e.g., {f= 89 1997 %Date% newDay:year:}* fi *03/30/97*
  returns a date with the day specified in the first argument and the year specified in the second argument. The date is an integer representing the number of days since the first of the year.

- **pathToday:** *e.g., {f= %Date% today %Date% pathToday:}* fi *970318*
  returns a six-digit string in the format yymmdd using the date specified in the argument.

- **shortNameOfDay:** *e.g., {f= 2 %Date% shortNameOfDay:}* fi *#Tue*
  returns the short weekday name as a symbol corresponding to the weekday index integer argument (Mon for 1, Sun for 7).

- **shortNameOfMonth:** *e.g., {f= 2 %Date% shortNameOfMonth:}* fi *#Feb*
  returns the short month name as a symbol corresponding to the month index integer argument (Jan for 1, Dec for 12).

- **today** *e.g., {f= %Date% today}* fi *03/18/97*
  returns a date representing the current date

11.21 Times

A time represents a particular time of day to the nearest second. The dynamic variable **%time%** returns the current time.

Time Instance Operations

The following messages can be sent to any **WebBase** variable containing a time. For the following examples, assume %time% → 01:30:00 PM.

- < *e.g., {set time1 '8:00:00 PM' asTime} {f= %time% time1 <}* fi *false*
  returns true if the receiver is less than the argument, otherwise false

- <= *e.g., {set time1 '8:00:00 PM' asTime} {f= %time% time1 <=}* fi *false*
  returns true if the receiver is less than or equal to the argument, otherwise false

- = *e.g., {set time1 '8:00:00 PM' asTime} {f= %time% time1 =}* fi *false*
  returns true if the receiver and argument are the same time, otherwise false

- > *e.g., {set time1 '8:00:00 PM' asTime} {f= %time% time1 >}* fi *true*
  returns true if the receiver is greater than the argument, otherwise false

- >= *e.g., {set time1 '8:00:00 PM' asTime} {f= %time% time1 >=}* fi *true*
  returns true if the receiver is greater than or equal to the argument, otherwise false

- **addTime:** *e.g., {set twoHoursInSeconds 60 60 2 * *} {set time1 twoHoursInSeconds %Time% fromSeconds:} {f= time1 %time% addTime:}* fi *03:30:00 AM*
  returns a new time in which the amount of time specified in the argument (a time) has been added to the receiver time.

- **asSeconds** *e.g., {f= %time% asSeconds}* fi *48600*
  returns the number of seconds from midnight until the specified time

- **between:and:** *e.g., {set time1 '8:00:00 AM' asTime} {set time2 '8:00:00 PM' asTime} {f= time1 time2 %time% between:and:}* fi *true*
  returns true if the input time is between the receiver and the argument

- **hours** *e.g., {f= %time% hours}* fi *13*
  returns the number of hours from midnight until the specified time

- **max:** *e.g., {set time1 '3:30:00 AM' asTime} {f= time1 %time% max:}* fi *01:30:00 PM*
  returns the greater of the receiver or the argument.

- **min:** *e.g., {set time1 '3:30:00 AM' asTime} {f= time1 %time% min:}* fi *03:30:00 AM*
  returns the lesser of the receiver or the argument.

- **minutes** *e.g., {f= %time% minutes}* fi *30*
  returns the number of minutes past the hour

- **printOn12Hr:** *e.g., {set strm %String% new %WriteStream% on:} {f== strm %time% printOn12Hr:} {f= strm contents}* fi *01:30:00 PM* appends a string representing the receiver time to the stream specified in the argument. The time is in 12-hour plus AM/PM format.

- **printOn24Hr:** *e.g., {set strm %String% new %WriteStream% on:} {f== strm %time% printOn24Hr:} {f= strm contents}* fi *13:30:00*
  appends a string representing the receiver time to the stream specified in the argument. The time is in 24-hour clock format.

- **seconds** *e.g., {f= %time% seconds}* fi *0*
  returns the number of seconds past the minute

- **subtractTime:** *e.g., {set oneHourInSeconds 60 60 *} {set time1 oneHourInSeconds %Time% fromSeconds:} {f= time1 %time% subtractTime:}* fi *12:30:00 PM*
  returns a new time in which the amount of time specified in the argument (a time) has been subtracted from the receiver time.

Time Class Operations

The %Time% variable allows the Time class to be accessed. This section covers the operations that the Time class can do.

- **dateAndTimeNow** *e.g., {f= %Time% dateAndTimeNow}* fi *(03/19/97 09:38:17 AM)*
  returns an array of two elements containing the current date and the current time. Note that the array returned by the Date class is the same as the array returned by this operation.

- **fromSeconds:** *e.g., {f= 4500 %Time% fromSeconds:}* fi *01:15:00 AM*
  returns a time which represents the number of seconds in the argument after midnight.

- **fromString:** *e.g., {f= '11:29:00 PM' %Time% fromString:}* fi *11:29:00 PM*
  returns a time for the value given by the argument. The argument must be in the form specified by the current system time format (e.g., 12-hour or 24-hour format).

- **fromString12:** *e.g., {f= '3:30:00 PM' %Time% fromString12:}* fi *03:30:00 PM*
  returns a time for the value given by the argument. The argument must be in 12 hr AM/PM format.

- **fromString24:** *e.g., {f= '15:30:00' %Time% fromString24:}* fi *03:30:00 PM*
  returns a time for the value given by the argument. The argument must be in 24 hr clock format.

- **hours:minutes:seconds:** *e.g., {f= 11 29 00 %Time% hours:minutes:seconds:}* fi *11:29:00 AM*
  returns a time which represents the given number of hours (first argument), minutes (second argument) and seconds (third argument) after midnight of the current day.

- **millisecondClockValue** *e.g., {f= %Time% millisecondClockValue}* fi *34697800*
  returns the number of milliseconds from midnight of the current day to the current time.

- **now** *e.g., {f= %Time% now}* fi *09:38:17 AM*
  returns a time representing the current time in seconds

- **totalSeconds** *e.g., {f= %Time% totalSeconds}* fi *34697*
  returns the number of seconds from midnight of the current day to the current time.

11.22 Universal Times

The dynamic variable **%dateTime%** returns the current date and time as a UniversalTime object.

Universal Time Instance Operations

The following messages can be sent to any **WebBase** variable containing a UniversalTime. Note that these messages also include those which can be sent to dates or times.

- < *e.g., {set dateTime1 '2/10/97' %dateTime% dateFromString: } {set dateTime2 '2/11/97' %dateTime% dateFromString: } {f= dateTime1 dateTime2 <}* fi *false*
  returns true if the receiver is less than the argument, otherwise false

- <= *e.g., {set dateTime1 '2/10/97' %dateTime% dateFromString: } {set dateTime2 '2/11/97' %dateTime% dateFromString: } {f= dateTime1 dateTime2 <=}* fi *false*
  returns true if the receiver is less than or equal to the argument, otherwise false

- = *e.g., {set dateTime1 '2/10/97' %dateTime% dateFromString: } {set dateTime2 '2/11/97' %dateTime% dateFromString: } {f= dateTime1 dateTime2 =}* fi *false*
  returns true if the receiver and argument are the same date and time, otherwise false

- > *e.g., {set dateTime1 '2/10/97' %dateTime% dateFromString: } {set dateTime2 '2/11/97' %dateTime% dateFromString: } {f= dateTime1 dateTime2 >}* fi *true*
  returns true if the receiver is greater than the argument, otherwise false

- >= *e.g., {set dateTime1 '2/10/97' %dateTime% dateFromString: } {set dateTime2 '2/11/97' %dateTime% dateFromString: } {f= dateTime1 dateTime2 >=}* fi *true*
  returns true if the receiver is greater than or equal to the argument, otherwise false

- **addDays:** *e.g., {f= 4 %dateTime% addDays:}* fi *03/23/97 11:23:16*
  returns a new UniversalTime with the indicated number of days added to the receiver. Note that the number of days can be negative.

- **addSeconds:** *e.g., {f= 360 %dateTime% addSeconds:}* fi *03/19/97 11:29:16*
  returns a new UniversalTime with the indicated number of seconds added to the date and time of the receiver. Note that the number of seconds can be negative.

- **asCookieDateTime** *e.g., {f= %dateTime% asCookieDateTime}* fi *Wednesday, 19-Mar-1997 11:23:16 GMT*
  returns a string containing the current date and time in a format acceptable as the cookie expiration time used when doing a setCookie.

- **asDate** *e.g., {f= %dateTime% asDate}* fi *'03/19/97'*
  returns a string representing the date portion of the receiver.

- **asDateTime** *e.g., {f= %dateTime% asDateTime}* fi *'03/19/97 11:23:16 AM'*
  returns a string representing the date and time of the receiver. Uses the OS to determine 12-hour or 24-hour format

- **asDateTimewithPicture:** *e.g., {f= 'MMM dd yyyy' %dateTime% asDateTimewithPicture:}* fi *'Mar 19 1997 11:23:16 AM'*
returns a formatted string of the receiver's date and time with the 'date' portion displayed according to the argument. The 'time' portion will be formatted as in the asDateTime method. See Date--printWithPicture: for the formatting details. See also asDateTime12withPicture: and asDateTime24withPicture:.

- **asDateTime12** *e.g., {f= %dateTime% asDateTime12}* fi *'03/19/97 11:23:16 AM'*
returns a string representing the date and time of the receiver 12-hour format

- **asDateTime12withPicture:** *e.g., {f= 'MMM dd yyyy' %dateTime% asDateTime12withPicture:}* fi *'Mar 19 1997 11:23:16 AM'*
returns a formatted string of the receiver's date and time with the 'date' portion displayed according to the argument. The 'time' portion will be formatted as in the asDateTime12 method. See Date--printWithPicture: for the formatting details. See also asDateTimewithPicture:, asDatewithPicture:.

- **asDateTime24** *e.g., {f= %dateTime% asDateTime24}* fi *'03/19/97 11:23:16'*
returns a string representing the date and time of the receiver in 24-hour format

- **asDateTime24withPicture:** *e.g., {f= 'MMM dd yyyy' %dateTime% asDateTime24withPicture:}* fi *'Mar 19 1997 11:23:16'*
returns a formatted string of the receiver's date and time with the 'date' portion displayed according to the argument. The 'time' portion will be formatted as in the asDateTime24 method. See Date--printWithPicture: for the formatting details. See also asDateTimewithPicture:, asDatewithPicture:.

- **asDatewithPicture:** *e.g., {f= 'MMM dd yyyy' %dateTime% asDatewithPicture:}* fi *'Mar 19 1997'*
returns a formatted string of the receiver's date displayed according to the argument. See Date—printWithPicture: for the formatting details.

- **asHeaderDateTime** *e.g., {f= %dateTime% asHeaderDateTime}* fi *Wednesday, 19-Mar-1997 11:23:16 GMT*
returns a string containing the receiver's date and time in a format acceptable for use in a header

- **asLogFileTimeStamp** *e.g., {f= %dateTime% asLogFileTimeStamp}* fi *[19/Mar/1997:11:23:16 -0800]*
returns a string displaying the date and time in the format used in the log file records.

- **asMailDateTime** *e.g., {f= %dateTime% asMailDateTime}* fi *Fri, 19 Mar 1997 13:20:30*
returns a string containing the receiver's date and time in a format acceptable for use in the mail utility. This operation can only be used if the user has purchased the E-Merge add-on option, which is described in Chapter 16.

- **asSeconds** *e.g., {f= %dateTime% asSeconds}* fi *3036647206*
returns the number of seconds elapsed from January 1, 1901 until the specified date plus the number of seconds in the time.

- **asTime** *e.g., {f= %dateTime% asTime}* fi *'11:23:16 AM'*
returns a string representing the time of the receiver. Uses the OS to determine 12-hour or 24-hour format

- **asTime12** *e.g., {f= %dateTime% asTime12}* fi *'11:23:16 AM'*
  returns a string representing the time of the receiver in 12-hour format

- **asTime24** *e.g., {f= %dateTime% asTime24}* fi *'11:23:16'*
  returns a string representing the time of the receiver in 24-hour format

- **between:and:** *e.g., {set dateTime1 '8:00:00 AM' %dateTime% timeFromString:} {set dateTime2 '8:00:00 PM' %dateTime% timeFromString: }*
  {f= dateTime1 dateTime2 %dateTime% between:and:} fi *true*
  returns true if the receiver is between the two arguments

- **date** *e.g., {f= %dateTime% date}* fi *03/19/97*
  returns the date portion of the receiver

- **dateAndTime** *e.g., {f= %dateTime% dateAndTime}* fi *(03/19/97 11:23:16 AM 'PST')*
  returns an array containing 3 elements: the date, the time, and the name of the timezone.

- **dateFromString:** *e.g., {f= '2/10/97' %dateTime% dateFromString:}* fi *02/10/97 11:23:16*
  returns a new Universal time in which the date is as specified in the input string. The time is the same as the time in the receiver. Acceptable date string formats are:

  ```
  'mm/dd/yy'   (mm=month, dd=day, yy=year)
  'FEB 10 96'
  '10 FEB 96')
  ```

- **day** *e.g., {f= %dateTime% day}* fi *35140*
  returns the number of days elapsed from January 1, 1901 until the specified date. This is equivalent to {f= %dateTime% date day}.

- **dayIndex** *e.g., {f= %dateTime% dayIndex}* fi *2*
  returns the index for the day of the week, 1=Mon, 7=Sun. This is equivalent to {f= %dateTime% date dayIndex}.

- **dayName** *e.g., {f= %dateTime% dayName}* fi *#Tuesday*
  returns the symbol identifying the day of the week. This is equivalent to {f= %dateTime% date dayName}.

- **dayOfMonth** *e.g., {f= %dateTime% dayOfMonth}* fi *18*
  returns an integer from 1 to 31 specifying the day number within the month. This is equivalent to {f= %dateTime% date dayOfMonth}.

- **dayOfYear** *e.g., {f= %dateTime% dayOfYear}* fi *77*
  returns an integer from 1 to 365 identifying the day number within the year. This is equivalent to {f= %dateTime% date dayOfYear}.

- **daysInMonth** *e.g., {f= %dateTime% daysInMonth}* fi *31*
  returns an integer identifying the number of days in the month. This is equivalent to {f= %dateTime% date daysInMonth}.

- **daysInYear** *e.g., {f= %dateTime% daysInYear}* fi *365*
  returns an integer identifying the number of days in the year. This is equivalent to {f= %dateTime% date daysInYear}.

- **daysLeftInMonth** *e.g., {f= %dateTime% daysLeftInMonth}* fi *12*
  returns an integer specifying how many days remain in the month. This is equivalent to {f= %dateTime% date daysLeftInMonth}.

- **daysLeftInYear** *e.g., {f= %dateTime% daysLeftInYear}* fi *288*
  returns an integer specifying how many days remain in the year. This is equivalent to {f= %dateTime% date daysLeftInYear}.

- **elapsedDaysSince:** *e.g., {set date1 25 %date% subtractDays:} {set dt1 date1 asString %dateTime% dateFromString:} {f= dt1 %dateTime% elapsedDaysSince:}* fi *25*
  returns an integer specifying the number of days between the receiver and the argument. Only the date portion of the receiver and argument are used; both receiver and argument must be UniversalTimes.

- **elapsedMonthsSince:** *e.g., {set date1 25 %date% subtractDays:} {set dt1 date1 asString %dateTime% dateFromString:} {f= dt1 %dateTime% elapsedMonthsSince:}* fi *1*
  returns an integer specifying the number of months between the receiver and the argument. Only the date portion of the receiver and argument are used; both receiver and argument must be UniversalTimes.

- **firstDayInMonth** *e.g., {f= %dateTime% firstDayInMonth}* fi *60*
  returns an integer specifying the number of the first day in the month from the beginning of the year. This is equivalent to {f= %dateTime% date firstDayInMonth}.

- **firstDayOfMonth** *e.g., {f= %dateTime% firstDayOfMonth}* fi *03/01/97*
  returns a new date representing the first of the month. This is equivalent to {f= %dateTime% date firstDayOfMonth}.

- **firstSundayIn:** *e.g., {f= 3 %dateTime% firstSundayIn:}* fi *61*
  returns the number of days after the start of the year for the first Sunday within the month for the specified index. This is equivalent to {f= 3 %dateTime% date firstSundayIn:}.

- **firstSundayInMonth** *e.g., {f= %dateTime% firstSundayInMonth}* fi *61*
  returns the number of days after the start of the year for the first Sunday in the current month. This is equivalent to {f= %dateTime% date firstSundayInMonth}.

- **gmt** *e.g., {f= %dateTime% gmt}* fi *03/19/97 19:23:16*
  returns a new UniversalTime with the date and time in the GMT time zone

- **hours** *e.g., {f= %dateTime% hours}* fi *13*
  returns the number of hours from midnight until the specified time. Only the time portion of the receiver is used; this is equivalent to {f= %dateTime% time hours}.

- **lastSundayIn:** *e.g., {f= 3 %dateTime% lastSundayIn:}* fi *89*
  returns the number of days after the start of the year for the last Sunday within the month for the specified index. This is equivalent to {f= 3 %dateTime% date lastSundayIn:}.

- **lastSundayInMonth** *e.g., {f= %dateTime% lastSundayInMonth}* fi *89*
  returns the number of days after the start of the year for the last Sunday in the current month. This is equivalent to {f= %dateTime% date lastSundayInMonth}.

- **max:** *e.g., {set dt1 3 %dateTime% addDays:} {f= dt1 %dateTime% max:}* fi *04/14/97 09:35:21*
  returns the greater of the receiver or the argument.

- **min:** *e.g., {set dt1 3 %dateTime% addDays:} {f= dt1 %dateTime% min:}* fi *04/11/97 09:35:21*
  returns the lesser of the receiver or the argument.

- **minutes** *e.g., {f= %dateTime% minutes}* fi *30*
  returns the number of minutes past the hour. Only the time portion of the receiver is used; this is equivalent to {f= %dateTime% time minutes}.

- **monthIndex** *e.g., {f= %dateTime% monthIndex}* fi *3*
  returns the number of the month. This is equivalent to {f= %dateTime% date monthIndex}.

- **monthName** *e.g., {f= %dateTime% monthName}* fi *#March*
  returns the symbol identifying the name of the month. This is equivalent to {f= %dateTime% date monthName}.

- **seconds** *e.g., {f= %dateTime% seconds}* fi *0*
  returns the number of seconds past the minute. Only the time portion of the receiver is used; this is equivalent to {f= %dateTime% time seconds}.

- **time** *e.g., {f= %dateTime% time}* fi *11:23:16 AM*
  returns the time portion of the receiver

- **timeFromString:** *e.g., {f= '8:00:00 PM' %dateTime% timeFromString:}* fi *03/19/97 20:00:00*
  returns a new Universal time in which the time is as specified in the input string. The date is the same as the date in the receiver. The time string MUST be in the format of the system clock. If the system is set to a 12-hour format, the time string must be in a 12 hour format with an uppercase AM or PM. If the system is set to a 24-hour format, the time string must be in a 24 hour format. Because of these restrictions, it is recommended you use one either **timeFromString12:** or **timeFromString24:**.

- **timeFromString12:** *e.g., {f= '8:00:00 PM' %dateTime% timeFromString12:}* fi *03/19/97 20:00:00*
  returns a new Universal time in which the time is as specified in the input string. The date is the same as the date in the receiver. The time string MUST be in 12-hour format with AM or PM regardless of the format of the system clock.

- **timeFromString24:** *e.g., {f= '20:00:00 PM' %dateTime% timeFromString24:}* fi *03/19/97 20:00:00*
  returns a new Universal time in which the time is as specified in the input string. The date is the same as the date in the receiver. The time string MUST be in 24-hour format regardless of the format of the system clock.

- **year** *e.g., {f= %dateTime% year}* fi *1997*
  returns an integer specifying the year. This is equivalent to {f= %dateTime% date year:}.

- **zoneName** *e.g., {f= %dateTime% zoneName}* fi *PST*
  returns the time zone name of the receiver

Universal Time Class Operations

The value of the %UniversalTime% **WebBase** variable is the UniversalTime class, which can perform any of the following operations.

- **gmt** *e.g., {f= %UniversalTime% gmt}* fi *03/19/97 19:23:17*
  returns a new universal time representing the current date and current time as GMT.

- **now** *e.g., {f= %UniversalTime% now}* fi *03/19/97 11:23:17*
  returns a new universal time representing the current date and time.

11.23 OdbcTimeStamp

The value contained within a DateTime field in an ODBC database is returned to **WebBase** as an OdbcTimeStamp. It is made up of 3 components: the date, the time, and a fraction. The date time value is displayed as: 07/11/96 02:37:38 PM.0. The date is displayed first, followed by the time. The '.0' at the end is the fraction, and is either a 0 or a 1.

The following operations can be sent to any instance of an OdbcTimeStamp returned as the value in a DateTime field in a database. For the examples below, the variable otsVar1 will contain the OdbcTimeStamp representing the date and time: 03/11/97 02:37:38 PM.0. The variable otsVar2 will contain the OdbcTimeStamp representing the date and time: 03/12/97 11:23:35 AM.0.

- < *e.g., {f= otsVar1 otsVar2 <}* fi *false*
  returns true if the receiver is less than the argument, otherwise false

- <= *e.g., {f= otsVar1 otsVar1 <=}* fi *false*
  returns true if the receiver is less than or equal to the argument, otherwise false

- = *e.g., {f= otsVar1 otsVar2 =}* fi *false*
  returns true if the receiver and argument are the same date and time, otherwise false

- > *e.g., {f= otsVar1 otsVar2 >}* fi *true*
  returns true if the receiver is greater than the argument, otherwise false

- >= *e.g., {f= otsVar2 otsVar2 >=}* fi *true*
  returns true if the receiver is greater than or equal to the argument, otherwise false

- **asDateTime** *e.g., {f= otsVar1 asDateTime}* fi *'03/11/97 02:37:38 PM'*
  returns a string representing the date and time of the receiver. Uses the OS to determine 12-hour or 24-hour format

- **asDateTimeWithPicture:** *e.g., {f= 'MMM dd yyyy' otsVar1 asDateTimeWithPicture:}* fi *'Mar 11 1997 02:37:38 PM'*
  returns a formatted string of the receiver's date and time with the 'date' portion displayed according to the 'picture string'. The 'time' portion will be formatted as in the asDateTime method. See Date--printWithPicture: for the formatting details. See also asDateTime12withPicture: and asDateTime24withPicture:.

- **asDateTime12** *e.g., {f= otsVar1 asDateTime12}* fi *'03/11/97 02:37:38 PM'*
  returns a string representing the date and time of the receiver 12-hour format

- **asDateTime12WithPicture:** *e.g., {f= 'MMM dd yyyy' otsVar1 asDateTime12WithPicture:}* fi *'Mar 11 1997 02:37:38 PM'*
  returns a formatted string of the receiver's date and time with the 'date' portion displayed according to the 'picture string'. The 'time' portion will be formatted as in the asDateTime12 method. See Date--printWithPicture: for the formatting details.

- **asDateTime24** *e.g., {f= otsVar1 asDateTime24}* fi *'03/11/97 14:37:38'*
  returns a string representing the date and time of the receiver in 24-hour format

- **asDateTime24WithPicture:** *e.g., {f= 'MMM dd yyyy' otsVar1 asDateTime24WithPicture:}* fi *'Mar 11 1997 14:37:38'*
  returns a formatted string of the receiver's date and time with the 'date' portion displayed according to the 'picture string'. The 'time' portion will be formatted as in the asDateTime24 method. See Date--printWithPicture: for the formatting details.

- **asDateWithPicture:** *e.g., {f= 'MMM dd yyyy' otsVar1 asDateWithPicture:}* fi *'Mar 11 1997'*
  returns a formatted string of the receiver's date displayed according to the 'picture string'. See also asDateTimeWithPicture:, asDateTime12WithPicture: and asDateTime24WithPicture:. See Date--printWithPicture: for the formatting details.

- **asNonEmptyString** *e.g., {f= otsVar1 asNonEmptyString}* fi *'03/11/97 02:37:38 PM'*
  returns the receiver as a date time string. This is equivalent to the asDateTime operation. It is provided for compatibility with the asNonEmptyString operation on Strings.

- **asSeconds** *e.g., {f= otsVar1 asSeconds}* fi *3035543858*
  returns the number of seconds elapsed from January 1, 1901 until the specified date plus the number of seconds in the time.

- **asUniversalTime** *e.g., {f= otsVar1 asUniversalTime}* fi *03/11/97 14:37:38*
  returns a new UniversalTime instance in which the date and time are set to those of the receiver.

- **date** *e.g., {f= otsVar1 date}* fi *03/11/97*
  returns the date portion of the receiver.

- **dateAndTime** *e.g., {f= otsVar1 dateAndTime}* fi *(03/11/97 02:37:38 PM)*
  returns an array containing the date and the time represented by the receiver.

- **fraction** *e.g., {f= otsVar1 fraction}* fi *0*
  returns the fractional portion of the receiver (either 0 or 1).

- **max:** *e.g., {f= otsVar1 otsVar2 max:}* fi *03/12/97 11:23:35 AM.0*
  returns the greater of the receiver or the argument.

- **min:** *e.g., {f= otsVar1 otsVar2 min:}* fi *03/11/97 02:37:38 PM.0*
  returns the lesser of the receiver or the argument.

- **time** *e.g., {f= otsVar1 time}* fi *02:37:38 PM*
  returns the time portion of the receiver.

11.24 Files

A file provides sequential or random access to the host file system. Each read operation answers one page (maximum 2k bytes) of the file with the exception of the last page which may have fewer bytes. The number of bytes to write may be from 1 to 2k bytes. In general, reading and writing of file information should be done using a file stream. The specific file associated with a file stream can be obtained from the file stream.

File Instance Operations

The following operations can be sent to any instance of a file. For the examples below, two file instances are used. The first is called myFile1 and is opened on the file default.htf that is provided with the **WebBase WebWizard**. This instance is created using *{set fileDir 'c:\http\wbwizard\’ %Directory% pathName:} {set myFile 'default.htf' fileDir %File% open:in:}*. The second instance is called myFile2 and is opened on a non-existent file called fileExam.htf. This instance is created using *{set fileDir 'c:\http\wbwizard\’ %Directory% pathName:} {set myFile 'fileExam.htf' fileDir %File% open:in:}*. The myFile1 instance is used for read access; the myFile2 instance is used for write access.

- **close** *e.g., {f= myFile1 close}* fi *a File on: 'default.htf'*
  returns the receiver after closing the file

- **directory** *e.g., {f= myFile1 directory}* fi *a Directory on: 'c:\http\wbwizard\'*
  returns the directory which contains the receiver

- **flush** *e.g., {f= myFile1 flush}* fi *a File on: 'default.htf'*
  returns the receiver after forcing all data written to the receiver to be recorded on disk

- **getFileTime** *e.g., {f= myFile1 getFileTime}* fi *02/26/97 15:22:40*
  returns a universal time representing the system time of the file

- **name** *e.g., {f= myFile1 name}* fi *‘default.htf’*
  returns a string containing the receiver’s file name

- **pathName** *e.g., {f= myFile1 pathName}* fi *‘c:\http\wbwizard\default.htf’*
  return a string that contains the entire path name (drive:/path/filename.ext).

- **readBuffer:atPosition:** *e.g., {set strBuf 100 %String% new:} {f== strBuf 1 myFile1 readBuffer:atPosition:} {strBuf}* fi *<see below>*
  returns the number of bytes read starting at the position specified in the second argument into the first argument. The result of the above example is:

  ```
  {set %output% false}
  {!- © 1997 ExperTelligence, Inc.  All Rights Reserved. -!}

  {reDirect2 ('Wi
  ```

- **size** *e.g., {f= myFile1 size}* fi *184*
  returns the number of bytes in the file.

- **writeBuffer:ofSize:atPosition:** *e.g., {set strBuf ‘Data to be written into a file that is already open’} {f= strBuf strBuf size 1 myFile2 writeBuffer:ofSize:atPosition:}* fi *a File on: 'fileExam.htf'* returns the receiver after writing the number bytes specified in the second argument of the first argument into the receiver file at the position specified in the third argument.

File Class Operations

The %File% variable provides access to the File class, which includes a number of useful operations, as described below.

- **changeModeOf:to:** *e.g., {f= 'c:\http\wbwizard\default.htf' #r %File% changeModeOf:to:}* fi *File*
  {f= 'c:\http\wbwizard\default.htf' #n %File% changeModeOf:to:} fi *File*
  change the attributes of the file named in the first argument to those of the attribute in the second argument. Valid types of attributes are #r - read only, #h - hidden, #s - system, #a - archive. All attributes can be unset by specifying an attribute other than r, h, s or a; this is shown in the second example above.

- **copy:to:** *e.g., {f= 'c:\http\wbwizard\default.htf' 'c:\http\wbwizard\default.htm' %File% copy:to:}* fi *true*
  copy the file named in the first argument to the new file named in the second argument. Return true if the copy is successful, otherwise false.

- **drive:path:file:** *e.g., {f= $c '\http\wbwizard\' 'default.htf' %File% drive:path:file:}* fi *'c:\http\wbwizard\default.htf'*
  returns the file path name of the file name. Note that the drive must be a character; the path and file are strings.

- **execute:** *e.g., {f= 'c:\msoffice\access\msaccess.exe' %File% execute:}* fi *File*
  execute the file named in the argument (a .exe or .pif file). To run a batch file, specify 'command.com /c xxx.bat'.

- **exists:** *e.g., {f= 'c:\http\wbwizard\default.htf' %File% exists:}* fi *true*
  returns true if the file or subdirectory specified by the string argument exists; otherwise false.

- **exists:in:** *e.g., {set fileDir 'c:\http' %Directory% pathName:} {f= 'example.htf' fileDir %File% exists:in:}* fi *false*
  returns true if the file or subdirectory specified by the string argument exists in the specified directory (second argument); otherwise false. Note that the second argument must be a directory, not a string identifying a directory.

- **fileName:extension:** *e.g., {f= 'aLongFilename' 'aLongFileType' %File% fileName:extension:}* fi *aLngFlnm.aLo*
  returns a string which is a file name abbreviated from the first and second arguments. Lowercase vowels are dropped from the right of the first argument until it is less than or equal to 8 characters.

- **fullPathName:** *e.g., {f= 'webbase.exe' %File% fullPathName:}* fi *C:\WEBBASE\WebBase.exe*
  returns the full path name of the file name specified in the argument

- **newFile:** *e.g., {f= 'testFile.dat' %File% newFile:}* fi *a FileStream on: 'testFile.dat'*
  returns a file stream with path name specified by the argument

- **newFile:in:** *e.g., {set fileDir 'c:\http' %Directory% pathName:}*
  {f= 'example.dat' fileDir %File% newFile:in:} fi *a FileStream on: 'example.dat'*
  returns a file stream with path name specified by the first argument in the directory specified in the second argument.

- **open:in:** *e.g., {set fileDir 'c:\http\wbwizard\' %Directory% pathName:}*
  {f= 'default.htf' fileDir %File% open:in:} fi *a File on: 'default.htf'*
  returns a file opened on the file named in the first argument in the directory specified in the second argument. Note that this operation returns a file; most of the other operations return a file stream.

- **pathName:** *e.g., {f= 'c:\http\wbwizard\default.htf' %File% pathName:}* fi *a FileStream on: 'default.htf'*
  returns a file stream on the path named by the first argument

- **pathName:in:** *e.g., {set fileDir ‘c:\http\wbwizard\’ %Directory% pathName:} {f= ’default.htf’ fileDir %File% pathName:in:}* fi *a FileStream on: 'default.htf’*
  returns a file stream on the path named by the first argument with the default directory specified in the second argument..

- **pathNameReadOnly:** *e.g., {f= 'c:\http\wbwizard\default.htf' %File% pathNameReadOnly:}* fi *a FileStream on: 'default.htf'*
  returns a file stream on the path named by the argument; the file stream allows only read access.

- **pathNameReadOnly:in:** *e.g., {set fileDir 'c:\http\wbwizard\' %Directory% pathName:} {f= 'c:\http\wbwizard\default.htf' fileDir %File% pathNameReadOnly:in:}* fi *a FileStream on: 'default.htf'*
  returns a file stream on the path named by the first argument in the directory specified in the second argument; the file stream allows only read access.

- **remove:** *e.g., {f= 'c:\http\wbwizard\default.xxx’ %File% remove:}* fi *File*
  erase the file named in the argument

- **rename:to:** *e.g., {f= 'c:\http\wbwizard\default.htm' 'c:\http\wbwizard\default.xxx' %File% rename:to:}* fi *File*
  rename the file named in the first argument to have the name in the second argument.

11.25 Directories

A directory represents a disk directory with a volume string and a path name string. Files are generally described in terms of a directory and a file name.

Directory Instance Operations

The following operations can be sent to any instance of a directory. An example directory dir1 is used in the following descriptions. It is generated using *{set dir1 ‘c:\http\wbwizard\' %Directory% pathName:}.*

- = *e.g., {set dir2 'c:\webbase\ ' %Directory% pathName:} {f= dir2 dir1 =}* fi *false*
  returns true if the argument and receiver are the same directory; otherwise false

- **create** *e.g., {set dir2 'c:\myNewDir\ ' %Directory% pathName:} {f= dir2 create}* fi *a Directory on: 'C:\myNewDir\'*
  returns the receiver after creating a directory on the disk for it

- **drive** *e.g., {f= dir1 drive}* fi *$C*
  returns the disk drive letter of the receiver

- **drivePathName** *e.g., {f= dir1 drivePathName}* fi *'C:\http\wbwizard\'*
  returns a string representing the drive and path name of the receiver.

- **drivePrefix** *e.g., {f= dir1 drivePrefix}* fi *'C:'*
  returns a string that contains the logical drive (e.g., <drive>: for real drives, or '\\SERVER\ALIAS' for network drive names).

- **file:** *e.g., {f= 'default.htf' dir1 file:}* fi *a FileStream on: 'default.htf'*
  returns a file stream for the file named by the argument in the current directory. If the file does not exist, it will be created.

- **fileReadOnly:** *e.g., {f= 'default.htf' dir1 fileReadOnly:}* fi *a FileStream on: 'default.htf'*
  returns a file stream for the file named by the argument in the receiver directory. If the file does not exist, it will be created and opened for read only access.

- **filesNamed:** *e.g., {f= '*.txt' dir1 filesNamed:}* fi *('testfile.txt')*
  returns a collection of file names from the receiver, filtered using the argument (e.g., '*.TXT').

- **formatted** *e.g., {f= dir1 formatted}* fi *OrderedCollection(('wizard.gif' 432 '06/28/95 12:24:58' 'a' 517759773) ('wizard.htf' 332 '02/19/97 08:40:44' 'a' 575907094) ('testfile.txt' 0 '03/21/97 03:25:46' 'a' 578124599) ('default.htf' 184 '02/26/97 03:22:40' '' 576355028) ('expere2.gif' 170 '06/02/95 06:36:26' 'a' 516043917) ('experli.gif' 875 '02/24/97 08:34:12' 'a' 576209990) ('ii_secur.hti' 314 '02/19/97 09:25:34' 'a' 575884081) ('ii_anchr.hti' 260 '02/20/97 07:29:54' 'a' 575945659) … etc.)*
  returns a collection of arrays of file information for the receiver. Each array has five entries: file name, size, date/time, attributes and internal date/time representation.

- **formatted:** *e.g., {f= '*.txt' dir1 formatted:}* fi *OrderedCollection(('testfile.txt' 0 '03/21/97 03:25:46' 'a' 578124599))*
  returns a collection of arrays of file information for the receiver, filtered using the argument, e.g., '*.TXT'. Each array has five entries: file name, size, date/time, attributes and internal date/time representation.

- **freeDiskSpace** *e.g., {f= dir1 freeDiskSpace}* fi *394625024*
  returns the number of bytes of free space on the disk containing the current directory (not necessarily the receiver).

- **fullDirName** *e.g., {f= dir1 fullDirName}* fi *'C:\http\wbwizard\'*
  returns a string representing the path name of the receiver, including drive letter. There is always a \ at the end.

- **hasNetworkName** *e.g., {f= dir1 hasNetworkName}* fi *false*
  returns true if the drive specifier is a string representing a network drive (e.g., '\\SRV\ALIAS'), otherwise false.

- **hasSubdirectory** *e.g., {f= dir1 hasSubdirectory}* fi *true*
  returns true if the receiver has a subdirectory

- **makeCurrent** *e.g., {f= dir1 makeCurrent}* fi *a Directory on: 'C:\http\wbwizard\'*
  returns the receiver after making it the current directory

- **newFile:** *e.g., {f= 'testFile.txt' dir1 newFile:}* fi *a FileStream on: 'testFile.txt'*
  returns a file stream for the file named by the argument in the receiver directory. If the file exists, it will be removed and a new file will be created.

- **pathName** *e.g., {f= dir1 pathName}* fi *‘\http\wbwizard\’*
  returns a string representing the path name of the receiver (drive letter not included).

- **remove** *e.g., {set dir2 'c:\myNewDir\ ' %Directory% pathName:} {f= dir2 remove}* fi *a Directory on: 'C:\myNewDir\'*
  returns the receiver after removing the directory represented by it from the disk

- **subdirectories** *e.g., {set dir2 'c:\webbase' %Directory% pathName:} {f= dir2 subdirectories}* fi *SortedCollection(('\webbase\docs' 'docs') ('\webbase\logs' 'logs') ('\webbase\odbtalk' 'odbtalk') ('\webbase\support' 'support'))*
  returns an ordered collection of arrays, where each array contains the complete pathname and the file name of a subdirectory of the receiver

- **valid** *e.g., {f= dir1 valid}* fi *true*
  returns true if the receiver is valid; otherwise false

- **validDrive** *e.g., {f= dir1 validDrive}* fi *true*
  returns true if the receiver’s drive is valid; otherwise false

- **validFile:** *e.g., {f= 'xxx.dat’ dir1 validFile:}* fi *false*
  returns true if the file name in the argument is a file or subdirectory in the receiver.

- **volumeLabel** *e.g., {f= dir1 volumeLabel}* fi *WILLIE*
  returns the volume label of the disk containing the receiver

Directory Class Operations

The value of the %Directory% variable is the Directory class. The operations that can be performed on this class are described below.

- **create:** *e.g., {f= ‘c:\myNewDir’ %Directory% create:}* fi *Directory*
  creates a directory on the disk with the complete path name specified in the argument

- **current** *e.g., {f= %Directory% current}* fi *a Directory on: 'C:\http\wbwizard\'*
  returns a directory representing the current directory

- **currentDisk** *e.g., {f= %Directory% currentDisk}* fi *2*
  returns the current default drive (0=A, 1=B, etc.).

- **drives** *e.g., {f= %Directory% drives}* fi *('a:' 'c:' 'd:' 'e:')*
  returns the pathname strings of all the known drives.

- **exists:** *e.g., {f= 'c:\webbase’ %Directory% exists:}* fi *true*
  returns true if the directory specified by the argument exists; otherwise false.

- **pathName:** *e.g., {f= 'c:\webbase' %Directory% pathName:}* fi *a Directory on: 'C:\webbase\'*
  returns a directory described by the complete path name in the input argument.

- **remove:** *e.g., {f= 'c:\myNewDir' %Directory% remove:}* fi *Directory*
  removes the directory with the path name specified in the input argument. The directory must be empty before it can be removed.

- **removeAll:** *e.g., {f= 'c:\myNewDir' %Directory% removeAll:}* fi *true*
  removes the directory with the path name specified in the input argument by first removing any files or subdirectories within the directory, and then removing the directory. Returns true if the directory removal was successful; false otherwise.

11.26 Streams

A stream is used for accessing files, devices and internal objects as a sequence of characters or other objects. A stream has an internal record of its current position. It has access messages to get or put the object(s) at the current position and cause the position to be advanced. Messages are defined for changing the stream position, so that random access is possible.

Stream Instance Operations

The following methods can be sent to an instance of any type of stream. Be sure to review the use of the *ensure* macro when using these methods. It is important that any files opened also be properly closed. In the examples below, the stream in use will be a file stream on the file ‘c:\http\wbwizard\default.htf’ generated using *{set strm ‘c:\http\wbwizard\default.htf’ %File% pathNameReadOnly:}.*

- **atEnd** *e.g., {f= strm atEnd}* fi *false*
  returns true if the receiver is positioned at the end (beyond the last object); otherwise false.

- **close** *e.g., {f= strm close}* fi *a FileStream on: 'default.htf'*
  returns the receiver after closing it.

- **contents** *e.g., {f= strm contents}* fi *<see below>*
  returns the collection over which the receiver is streaming. The contents of the example file are:

```
{set %output% false}
{!- © 1997 ExperTelligence, Inc.  All Rights Reserved. -!}

{reDirect2 ('Wizard.htf' %base% appendFilename: pathnameUNIX)}
  now = {%seconds%}
{/reDirect2}
```

- **copyFrom:to:** *e.g., {f= 15 42 strm copyFrom:to:}* fi *false}*
  {!- © 1997 ExperTel
  returns the subcollection of the collection over which the receiver is streaming, from the starting position (first argument) to the ending position (second argument).

- **countBlanks** *e.g., {f= ' 3spaces' asStream countBlanks}* fi *3*
  returns the number of character position skipped when reading the stream starting with where it is currently positioned. A space is 1, a tab is 4. If the next character read by the stream is not a space or tab, returns 0.

- **indexOf:** *e.g., {f= 'htf' strm indexOf:}* fi *106*
  returns the position of the first occurrence of the collection in the argument in the receiver. If no such collection is found, return 0.

- **indexOfLowercase:** *e.g., {f= ‘unix’ strm indexOfLowercase:}* fi *142*
  returns the position of the first occurrence of the collection in the argument in the receiver. If no such collection is found, return 0. All tests are done after converting the contents of the receiver to lowercase.

- **isEmpty** *e.g., {f= strm isEmpty}* fi *false*
  returns true if the receiver contains no elements, otherwise false.

- **lineDelimiter** *e.g., {f= strm lineDelimiter}* fi *$cr*
  returns the current line delimiter, the default is a carriage return character.

- **lineDelimiter:** *e.g., {f= $cr strm lineDelimiter:}* fi *a FileStream on: 'default.htf'*
  returns the receiver after changing the line delimiter character to the argument. This is only valid for file streams.

- **next:** *e.g., {f= 10 strm next:}* fi *{set %outp*
  returns the number of items from the receiver as specified in the argument. The items are returned in a collection of the same type as the stream is streaming over.

- **nextInteger** *e.g., {f= strm nextInteger}* fi *0*
  returns the next integer from the receiver; the value may include a radix. In the example, 0 is returned because there were no integers to read from the file.

- **nextLine** *e.g., {f= strm nextLine}* fi *‘{set %output% false}’*
  returns a string containing the characters of the receiver up to the next line delimiter.

- **nextMatchFor:** *e.g., {f= ${ strm nextMatchFor:}* fi *true*
  returns true if the next object is the same as the argument; otherwise false

- **nextWord** *e.g., {f= strm nextWord}* fi *‘set’*
  returns a string containing the next work in the receiver. A word starts with a letter, followed by a sequence of letters and digits.

- **peek** *e.g., {f= strm peek}* fi *${*
  returns the next object in the receiver without advancing the stream position. If the stream is positioned at the end, returns nil

- **peekFor:** *e.g., {f= $> strm peekFor:}* fi *false*
  returns true if the next object to be accessed in the receiver is the same as the argument; otherwise false. The stream position of the receiver is advanced only if the answer is true.

- **position** *e.g., {f= strm position}* fi *0*
  returns the receiver’s current stream position. 0 is at the start of the stream.

- **position:** *e.g., {f= 25 strm position:}* fi *a FileStream on: 'default.htf'*
  returns the receiver after setting its position to the argument. If the argument is outside the bounds of the receiver collection, reports an error.

- **reset** *e.g., {f= strm reset}* fi *a FileStream on: 'default.htf'*
  returns the receiver after positioning it to the beginning

- **reverseContents** *e.g., {f= strm reverseContents}* fi *<see below>*
  returns a collection of the same type of the receiver's collection, with the contents in reverse order. The contents of the example file, in reverse order, are:

  ```
  }2tceriDer/{
  }%sdnoces%{ = won
  })XINUemanhtap :emaneliFdneppa %esab% 'fth.draziW'( 2tceriDer{
  }!- .devreseR sthgiR llA  .cnI ,ecnegilleTrepxE 7991 © -!{
  }eslaf %tuptuo% tes{
  ```

- **setToEnd** *e.g., {f= strm setToEnd}* fi *a FileStream on: 'default.htf'*
  returns the receiver after setting its position to the end

- **size** *e.g., {f= strm size}* fi *184*
  returns the number of objects in the receiver stream

- **skip:** *e.g., {f= 10 strm skip:}* fi *a FileStream on: 'default.htf'*
  returns the receiver after incrementing its position by the argument

- **skipSeparators** *e.g., {f= strm skipSeparators}* fi *a FileStream on: 'default.htf'*
  skip over any separators

- **skipTo:** *e.g., {f= $r strm skipTo:}* fi *true*
  returns true if the argument is found, otherwise false. If the argument is found, the position of the receiver is advanced to it. If the argument is not found, the position is put at the end of the stream.

- **skipToWhitespace** *e.g., {f= strm skipToWhitespace}* fi *true*
  advance the receiver's position beyond the next occurrence of whitespace, or if none, to the end of the stream. Return true if a whitespace occurred; otherwise false.

- **skipWhitespace** *e.g., {f= strm skipWhitespace}* fi *aFileStream on: 'default.htf'*
  skip over any whitespace characters.

- **upTo:** *e.g., {f= $t strm upTo:}* fi *{se*
  returns the collection of objects from the receiver starting with the next accessible object and up to but not including the argument. Set the position beyond the argument. If the argument is not present, returns the remaining elements of the stream.

- **upToWhitespace** *e.g., {f= strm upToWhitespace}* fi *{set*
  returns the collection of objects from the receiver starting with the next accessible object and up to but not including the next whitespace character. Set the position beyond the whitespace character. If no whitespace character is present, returns the remaining elements of the stream.

Stream Class Operations

The following methods can be sent to any type of stream class. The stream classes that are available are %ReadStream%, %WriteStream% and %ReadWriteStream%.

- **crString** *e.g., {f= %WriteStream% crString}* fi *<CR><LF> characters*
  returns a string containing a carriage return and line feed characters. This is equivalent to the cr operation available on WriteStreams. It does not add the string to a stream; it merely returns it.

- **on:** *e.g., {f= ‘a string to read’ %ReadStream% on:}* fi *a ReadStream*
  {f= %String% new %WriteStream% on:} fi *a WriteStream*
  return a new instance of the receiver stream class whose contents are the argument (a collection).

11.27 Read Streams

A read stream allows streaming over an indexed collection of objects for read access, but not write access.

Read Stream Instance Operations

All of the operations described above for streams can also be performed on read streams. The following operations are specifically for read streams.

- **next** *e.g., { f= ‘c:\http\wbwizards\default.htf’ %File% pathNameReadOnly: next}* fi *${*
  returns the next object accessible by the receiver and advances the stream position. If the receiver is at the end, returns an error.

Read Stream Class Operations

The %ReadStream% variable represents the ReadStream class, which can use the stream class operations described above. There are no class operations specifically for this class.

11.28 Write Streams

A write stream allows streaming over an indexed collection of objects for write access, but not read access.

Write Stream Instance Operations

All of the operations described above for streams can also be performed on write streams. The following operations are specifically for write streams. Write streams are particularly useful for concatenating a large number of strings together. Although the same result can be achieved with the ‘,’ operator, it is more efficient to create a write stream on an empty string, add in all of the desired strings, and then use the contents of the stream. The stream used in the following examples is generated using *{set wstrm %String% new %WriteStream% on:}*.

- **cr** *e.g., {f= wstrm cr}* fi *a WriteStream*
  returns the receiver after writing the line terminating character (carriage return and line-feed) to it.

- **nextPut:** *e.g., {f= $a wstrm nextPut:}* ﬁ *$a*
  returns the argument after writing it to the receiver stream. For write streams on strings, the argument must be a character.

- **nextPutAll:** *e.g., {f= 'abc' wstrm nextPutAll:}* ﬁ *'abc'*
  returns the argument (a collection) after writing each of the objects in it to the receiver. For write stream son strings, the argument can be a substring.

- **space** *e.g., {f= wstrm space}* ﬁ *a WriteStream*
  returns the receiver after writing the space character to it. This is equivalent to {f= wstrm nextPut: $space}.

- **tab** *e.g., {f= wstrm tab}* ﬁ *a WriteStream*
  returns the receiver after writing the tab character to it. This is equivalent to {f= wstrm nextPut: $tab}.

- **tab:** *e.g., {f= 5 wstrm tab:}* ﬁ *a WriteStream*
  returns the receiver after writing the number of tab characters specified in the argument to it.

Write Stream Class Operations

The %WriteStream% variable represents the WriteStream class, which can use the stream class operations described above. There are no class operations specifically for this class.

11.29 Read-Write Streams

A read-write stream allows streaming over an indexed collection of objects for read and write access.

Read-Write Stream Instance Operations

All of the operations described above for streams and write streams can also be performed on read-write streams. The following operations are specifically for read-write streams.

- **next** *e.g., {set strm 'This is an example string' %ReadWriteStream% on:} {f= strm next}* ﬁ *$T*
  returns the next object accessible by the receiver and advances the stream position. If the receiver is at the end, returns an error.

- **truncate** *e.g., {set strm 'This is an example string' %ReadWriteStream% on:} {f== 15 strm position:} {f== strm truncate} {f= strm contents}* ﬁ *'This is an exam'*
  returns the receiver after setting the size of its stream to its current position

Read-Write Stream Class Operations

The %ReadWriteStream% variable represents the ReadWriteStream class, which can use the stream class operations described above. There are no class operations specifically for this class.

11.30 File Streams

A file stream allows streaming over the characters of files for read and write access. A file stream accesses its file in pages, and streams across the string containing the current file page. Because writes are buffered, a flush or close message must be sent to the file stream to ensure that the written data is physically recorded. All of the operations on read write streams can also be performed on file streams. The example file stream used in below is generated using *{set fstrm ‘c:\http\wbwizard\default.htf’ %File% pathName:}.*

- **file** *e.g., {f= fstrm file}* fi *a File on: 'default.htf'*
  returns the file over which the receiver is streaming.

- **flush** *e.g., {f= fstrm flush}* fi *a File on: 'default.htf'*
  guarantee that any writes to the receiver are physically recorded on disk

- **pathName** *e.g., {f= fstrm pathName}* fi *‘C:\http\wbwizard\default.htf’*
  returns the complete pathname of the file over which the receiver is streaming

11.31 OdbcRowObjects

An OdbcRowObject represents a row of data returned via an *sql* macro SELECT request. The OdbcRowObjects generated by the SELECT request are placed into an ordered collection that is stored in the **WebBase** variable specified in the *sql* macro. An OdbcRowObject is very similar to an ordered collection since it contains the fields for the row that is represents. An OdbcRowObject also can identify its associated OdbcRowHeader (see below). The example OdbcRowObject used in the following operations is retrieved from the database examples provided with the **WebBase WebWizard**. The data is retrieved using this *sql* macro:

```
{sql to answers source 'myAccess' user 'fred' password 'test'}
  SELECT * FROM Cars ORDER BY Year DESC, Price
{/sql}
```

After the SELECT is complete, the matching rows have been stored in the **WebBase** variable {answers} as OdbcRowObjects. The first of these will be used: *{set examORO answers first}.*

- **alignDollar:** *e.g., {f= ‘123’ examORO alignDollar:}* fi *'$123'*
  returns a string in which the argument has been properly formatted to represent a dollar value (e.g., a ‘$’ at the start). The alignDollar: operation provided by String is more useful since it allows a width of the resulting string to be specified.

- **at:** *e.g., {f= 1 examORO at:}* fi *26*
  returns the value of the field at the specified key (argument). The argument may be a string or symbol or number.

- **colTypeOf:** *e.g., {f= 1 examORO colTypeOf:}* fi *4*
  returns the column Sql type of the field at the specified key (argument).

- **columnNames** *e.g., {f= examORO columnNames}* fi *('ID' 'Year' 'Maker' 'Model' 'Cylinders' 'Transmission' 'Kind' 'Color' 'Mileage' 'Price' 'Air' 'Cruise' 'Category' 'Country')*
  returns a collection of the column names.

- **columnSqlTypes** *e.g., {f= examORO columnSqlTypes}* fi *(4 5 12 12 -6 12 12 12 4 8 -7 -7 12 12)*
  returns a collection of the column names. The different sql types are:

Example 11.6 SQL Types

```
BIT ==> -7
TINYINT ==> -6
BIGINT ==> -5
LONGVARBINARY ==> -4
VARBINARY ==> -3
BINARY ==> -2
LONGVARCHAR ==> -1
CHAR ==> 1
NUMERIC ==> 2
DECIMAL ==> 3
INTEGER ==> 4
SMALLINT ==> 5
FLOAT ==> 6
REAL ==> 7
DOUBLE ==> 8
DATE ==> 9
TIME ==> 10
TIMESTAMP ==> 11
VARCHAR ==> 12
DEFAULT ==> 99
```

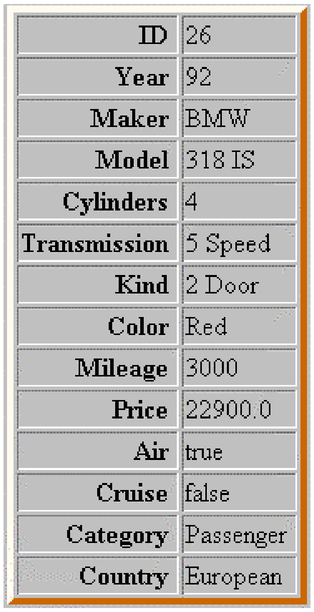
- **colWidthOf:** *e.g., {f= 1 examORO colWidthOf:}* fi *11*
  returns the column width of the field at the specified key (argument).

- **describeHTMLRecord** *e.g., {f= examORO describeHTMLRecord}*
  returns a string that displays a <TABLE> about the receiver. The table shows the field name, field size, field type and value within the field. The example presented with the OrderedCollection describeVHTMLTable operation uses this operation to display multiple tables; one for each OdbcRowObject in the collection.

- **describeHTMLRecord:** *e.g., {f= 'Record 1' examORO describeHTMLRecord:}*
  returns a string that displays a <TABLE> about the receiver. The table shows the field name, field size, field type and value within the field. This is the same as describeHTMLRecord, but includes a title at the top of each table.

- **fullHTMLRecord** *e.g., {f= examORO fullHTMLRecord}* fi *<see below>*
  returns the receiver in a <TABLE></TABLE> format. No title is added to the table. The results of the example are:

Example 11.7 fullHTMLRecord example



ID	26
Year	92
Maker	BMW
Model	318 IS
Cylinders	4
Transmission	5 Speed
Kind	2 Door
Color	Red
Mileage	3000
Price	22900.0
Air	true
Cruise	false
Category	Passenger
Country	European

- **fullHTMLRecord:** *e.g., {f= 'Data Table' examORO fullHTMLRecord:}* fi *<see above>*
returns a string representing the receiver in a <TABLE></TABLE> format. The argument specified is the title that is included in the table. The results are identical to those presented above, with the exception that the title is displayed at the top of the table.

- **fullRecord** *e.g., {f= examORO fullRecord}* fi *<see below>*
returns a string containing the column names and values for all the fields in the receiver. The names and values are separated by a ':'. Each name/value pair is separated by a carriage return. The results from the above example are shown below:

Example 11.8 fullRecord example

```
          ID: 26
        Year: 92
       Maker: BMW
       Model: 318 IS
   Cylinders: 4
Transmission: 5 Speed
        Kind: 2 Door
       Color: Red
     Mileage: 3000
       Price: 22900.0
         Air: true
      Cruise: false
    Category: Passenger
     Country: European
```

- **getMessage** *e.g., {f= examORO getMessage}* fi ''
returns any message associated with this receiver. This may occur if the buffer was insufficient to hold all the data which was subsequently truncated. The hasMessage

returns true if there is a message to retrieve. If there is no message to retrieve, an empty string is returned.

- **hasMessage** *e.g., {f= examORO hasMessage}* fi *false*
  returns true if there is a message associated with the receiver. This may occur if the buffer was insufficient to hold all the data which was subsequently truncated. The getMessage operation is used to retrieve the actual message.

- **header** *e.g., {f= examORO header}* fi *an OdbcRowHeader*
  returns the row header of the receiver.

- **indexFor:** *e.g., {f= 'Price' examORO indexFor:}* fi *10*
  returns the integer index of the field with the name specified in the argument. The name may be either a string or a symbol.

- **isCurrencyCol:** *e.g., {f= 'Price' examORO isCurrencyCol:}* fi *false*
  returns true if the column with the name specified in the argument has a type of Currency; otherwise false.

- **isNumeric:** *e.g., {f= 'Price' examORO isNumeric:}* fi *true*
  returns true if the column with the name specified in the argument has a type of Number; otherwise false.

- **isYesNo:** *e.g., {f= 'Price' examORO isYesNo:}* fi *false*
  returns true if the column with the name specified in the argument has a type of Yes/No; otherwise false.

- **printField:on:** *e.g., {set stream %String% new %WriteStream% on:} {f== 1 stream examORO printField:on:} {stream contents}* fi *26*
  returns the receiver after adding the properly formatted description of the field specified in the first argument to the stream specified in the second argument.

- **printHRecord** *e.g., {f= examORO printHRecord}* fi *'<tr><td>26</td> <td>92</td><td>BMW</td><td>318 IS</td><td>4</td><td>5 Speed</td> <td>2 Door</td><td>Red</td><td>3000</td><td>22900.0</td> <td>true</td><td>false</td><td>Passenger</td><td>European</td></tr>'*
  returns a string containing all the field values properly formatted (see printField:on:).

- **printRecord** *e.g., {f= examORO printRecord}* fi *26 92 BMW 318 IS 4 5 Speed 2 Door Red 3000 22900.0 true false Passenger European*
  returns a string containing all the field values properly formatted.

- **printTHColumnNamesOn:** *e.g., {set stream %String% new %WriteStream% on:} {f= stream examORO printTHColumnNamesOn}* fi *<tr><th>ID</th> <th>Year</th><th>Maker</th><th>Model</th><th>Cylinders</th> <th>Transmission</th><th>Kind</th><th>Color</th><th>Mileage</th> <th>Price</th><th>Air</th><th>Cruise</th><th>Category</th> <th>Country</th></tr>'*
  returns a string containing the column names as HTML <TH> headings.

- **tableWidth** *e.g., {f= examORO tableWidth}* fi *167*
  returns an integer representing the width of all the columns in the receiver.

- **valueAt:** *e.g., {f= 1 examORO valueAt:}* fi *'26'*
  returns a string representing the value of the field specified in the argument. The argument can be an integer, string or symbol identifying the field.

11.32 OdbcRowHeaders

The OdbcRowHeader contains a number of OrderedCollection slots - each collection the size of the number of fields returned for that sql statement. The header contains things like column (field) names, column widths, column types, etc. The example OdbcRowHeader is accessed via the OdbcRowObject used above: *{set examORH examORO header}*.

- **at:** *e.g., {f= #ID examORH at:}* fi *1*
  returns the number of the column specified by the argument which must be a symbol.

- **colTypeOf:** *e.g., {f= 1 examORH colTypeOf}* fi *4*
  returns an integer representing the sql type of the column specified in the argument. The argument must be an integer. The different sql types are described as part of the OdbcRowObject columnSqlTypes operation.

- **columncbColDefs** *e.g., {f= examORH columncbColDefs}* fi *(10 5 15 15 3 10 15 15 10 15 1 1 15 10)*
  returns an array of column definitions.

- **columnDisplaySizes** *e.g., {f= examORH columnDisplaySizes}* fi *(11 6 15 15 3 10 15 15 11 22 1 1 15 10)*
  returns an ordered collection of the display sizes of each field in the row

- **columnLengths** *e.g., {f= examORH columnLengths}* fi *(4 2 15 15 1 10 15 15 4 8 1 1 15 10)*
  returns an ordered collection of the length of each field in the row

- **columnNames** *e.g., {f= examORH columnNames}* fi *('ID' 'Year' 'Maker' 'Model' 'Cylinders' 'Transmission' 'Kind' 'Color' 'Mileage' 'Price' 'Air' 'Cruise' 'Category' 'Country')*
  returns an ordered collection of the names of each field in the row

- **columnSqlTypes** *e.g., {f= examORH columnSqlTypes}* fi *(4 5 12 12 -6 12 12 12 4 8 -7 -7 12 12)*
  returns an ordered collection of the SQL types of each field in the row. The different sql types are described as part of the OdbcRowObject columnSqlTypes operation.

- **isNumeric:** *e.g., {f= 1 examORH isNumeric:}* fi *true*
  returns true if the column specified in the argument has a type of Number; otherwise false. The argument must be an integer.

- **isYesNo:** *e.g., {f= 1 examORO isYesNo:}* fi *false*
  returns true if the column specified in the argument has a type of Yes/No; otherwise false. The argument must be an integer.

- **printColumnDashes** *e.g., {f= examORH printColumnDashes}* fi **'---------- ------ --------------- -------------- --------- ----------- -------------- -------------- ---------- --------------------- ----- ------ -------------- ----------'**
  returns a string that prints enough dashes for columnLengths with one space between each

group of dashes. This is used when formatting tabular output but not using features like the <TABLE> construct.

- **printColumnNames** *e.g., {f= examORH printColumnNames}* fi *‘ ID Year Maker Model Cylinders Transmission Kind Color Mileage Price Air Cruise Category Country ‘*
  returns a string containing the names of the columns in a format similar to printColumnDashes.

11.33 Registration Database

The Registration Database can be used on 32-bit systems to access the System Registry. The System Registry is organized like a Dictionary, and the RegistrationDatabase is very similar to a dictionary. There are several top-level keys in the System Registry, including HKEY_CLASSES_ROOT, HKEY_CURRENT_USER, HKEY_LOCAL_MACHINE and HKEY_USERS. The value associated with each of these keys is another dictionary (or RegistrationDatabase) containing keys and values. Each key/value pair in the System Registry also can have name/value pairs associated with it. Each key/value pair has a default name/value pair automatically created for it; the name is ‘(Default)’ and the value is ‘(value not set)’.

In the following, the terms ‘keys’, ‘values’ and ‘name/value pair’ will be used to specifically identify the type of data being accessed in a registration database.

Registration Database Instance Operations

The examples in the following will use a RegistrationDatabase instance set up using the following:

{set regDB 'SOFTWARE\ExperTelligence, Inc.\WebBase\4.10\Parameters' %RegistrationDatabase% localMachine at:}.

- **add:** *e.g., {set assoc ‘exampleKey’ ‘exampleValue’ %Association% key:value:} {f== assoc regDB add:} {set strm %String% new %WriteStream% on:} {f== strm regDB printHierarchyOn:} {f= strm contents}* fi *exampleKey - exampleValue*
  returns the argument after adding it to the receiver. The argument must be an association. Note that this creates a key in the specified registration database; the default value within this key is specified as the association value (e.g., ‘exampleValue’). This does NOT add a new name/value pair into the specified registration database. To add a new name/value pair into a registration database:

  ```
  {f=’SOFTWARE\ExperTelligence, Inc.\WebBase\4.10\Parameters’ assoc
  %RegistrationDatabase% localMachine at:put:}
  ```

- **at:** *e.g., {f= ’SOFTWARE\ExperTelligence, Inc.\WebBase\4.10\Parameters’ %RegistrationDatabase% localMachine at:}* fi *aRegistrationDatabase*
  returns a new RegistrationDatabase which spans out from the node named by the argument. If the node does not exist, an error is generated. The following code will display all of the **WebBase** parameters, as shown below the code:

  ```
  {set strm %String% new %WriteStream% on:} {set aCltn regDB
  entryValues}
  {forRow aRow on aCltn}
    {f== aRow asString strm nextPutAll:}
    {f== strm cr}
  ```

```
{/forRow}
{f= strm contents}
```

The results of the above are:

```
'PortNo' ==> 80
'LogDirectory' ==> 'C:\WebBase\LOGS'
'Directory' ==> 'C:\HTTP'
'errorLogFile' ==> 'C:\WebBase\LOGS\WebError.log'
'LogFormat' ==> 2
```

- **at:put:** *e.g., {set assoc ‘exampleKey’ ‘exampleValue’ %Association% key:value:} {f= ’SOFTWARE\ExperTelligence, Inc.\WebBase\4.10\Parameters’ assoc %RegistrationDatabase% localMachine at:put:}* fi *'exampleKey' ==> 'exampleValue'*
returns the second argument after setting the value of the node named in the first argument to the value in the second argument. This is used to set (create/update) a name/value pair within the specific registration database identified in the first argument.

- **entryValues** *e.g., {f= regDB entryValues}* fi *Dictionary(('PortNo' ==> 80) ('LogDirectory' ==> 'C:\WebBase\LOGS') ('Directory' ==> 'C:\HTTP') ('errorLogFile' ==> 'C:\WebBase\LOGS\WebError.log') ('LogFormat' ==> 2))*
returns a dictionary containing the name/value pairs of the receiver.

- **includesKey:** *e.g., {f= ‘Parameters’ ‘SOFTWARE\ExperTelligence, Inc.\WebBase\4.10’ %RegistrationDatabase% localMachine at: includesKey:}* fi *true*
returns true if the receiver contains a subkey named by the argument; otherwise false. Note that this finds keys within a registration database. To determine if a name in a name/value pair is in a registration database, use:

  ```
  {f= ‘Directory’ regDB entryValues includesKey:}
  ```

- **keyName** *e.g., {f= regDB keyName}* fi *’SOFTWARE\ExperTelligence, Inc.\WebBase\4.10\Parameters’*
returns the name of the receiver up to but not including the top-level registry key. The keyName for any top-level registry key is a numeric value. It is not possible to rename any of the keys in the System Registry.

- **keys** *e.g., {f= ’SOFTWARE\ExperTelligence, Inc.\WebBase\4.10’ %RegistrationDatabase% localMachine at: keys}* fi *OrderedCollection('Parameters' 'Variables' 'Extensions' 'Aliases')*
returns a collection of the keys of the receiver, including any Windows reserved keys.

- **printHierarchyOn:** *e.g., {set strm %String% new %WriteStream% on:} {f== strm 'SOFTWARE\ExperTelligence, Inc.\WebBase\4.10' %RegistrationDatabase% localMachine at: printHierarchyOn:}*
{f= strm contents} fi *<see below>*
returns the receiver after adding its hierarchical representation to the stream specified in the argument. The default value, if one is specified, follows each key name. The results of the above are:

```
Parameters -
  exampleKey - exampleValue
Variables -
Extensions -
Aliases -
```

- **printHierarchyOn:indent:** *e.g., {set strm %String% new %WriteStream% on:} {f== strm ‘*******’ 'SOFTWARE\ExperTelligence, Inc.\WebBase\4.10' %RegistrationDatabase% localMachine at: printHierarchyOn:indent:} {f= strm contents}* fi *<see below>*
returns the receiver after adding its hierarchical representation to the stream specified in the first argument. The second argument defines the initial indentation; each subsequent level will indent 3 more spaces.

```
*******Parameters -
******* exampleKey - exampleValue
*******Variables -
*******Extensions -
*******Aliases -
```

- **publicKeys** *e.g., {f= 'SOFTWARE\ExperTelligence, Inc.\WebBase\4.10' %RegistrationDatabase% localMachine at: publicKeys}* fi *OrderedCollection('Parameters' 'Variables' 'Extensions' 'Aliases')*
returns a collection of the keys of the receiver; Windows reserved keys are not included.

- **removeKey:** *e.g., {f= ’exampleKey’ regDB removeKey:}* fi *aRegistrationDatabase*
returns the receiver after removing the subkey named in the argument.

- **value** *e.g., {set assoc ‘exampleKey’ ‘exampleValue’ %Association% key:value:} {f== assoc regDB add:} {f= ‘SOFTWARE\ExperTelligence, Inc.\WebBase\4.10\Parameters\exampleKey’ %RegistrationDatabase% localMachine at: value}* fi *‘exampleValue’*
returns the value of the receiver if a default value has been set; otherwise returns an empty string.

- **value:** *e.g., {set assoc ‘exampleKey’ ‘exampleValue’ %Association% key:value:} {f== assoc regDB add:} {f= ‘newExampleValue’ ‘SOFTWARE\ExperTelligence, Inc.\WebBase\4.10\Parameters\exampleKey’ %RegistrationDatabase% localMachine at: value:}* fi *aRegistrationDatabase*
returns the receiver after settings its value to the argument.

- **values** *e.g., {f= ‘SOFTWARE\ExperTelligence, Inc.\WebBase\4.10’ %RegistrationDatabase% localMachine at: values}* fi *OrderedCollection('' '' '' '')*
returns a collection of the values corresponding to all the keys of the receiver. If no default value is specified for a key, returns an empty string in the appropriate location within the collection.

Registration Database Class Operations

The %RegistrationDatabase% variable represents the RegistrationDatabase class. The following operations can be sent to this class.

- **classesRoot** *e.g., {f= %RegistrationDatabase% classesRoot}* fi *aRegistrationDatabase*
returns a new instance of the receiver corresponding to the HKEY_CLASSES_ROOT

predefined key. The keyName for top-level registration databases is a number (e.g., 2147483652) that uniquely identifies this top-level RegistrationDatabase.

- **copyFrom:in:to:in:** *e.g., {f= 'SOFTWARE\Company' #currentUser 'SOFTWARE\Company' #localMachine %RegistrationDatabase% copyFrom:in:to:in:}* fi *aRegistrationDatabase*
  copy the key and all subkeys from one location in the registry to another. An error is generated if the input key is absent, the output key will be created or overwritten.

- **currentUser** *e.g., {f= %RegistrationDatabase% currentUser}* fi *aRegistrationDatabase*
  returns a new instance of the receiver corresponding to the HKEY_CURRENT_USER predefined key. The keyName for top-level registration databases is a number (e.g., 2147483652) that uniquely identifies this top-level RegistrationDatabase.

- **localMachine** *e.g., {f= %RegistrationDatabase% localMachine}* fi *aRegistrationDatabase*
  returns a new instance of the receiver corresponding to the HKEY_LOCAL_MACHINE predefined key. The keyName for top-level registration databases is a number (e.g., 2147483652) that uniquely identifies this top-level RegistrationDatabase.

- **new** *e.g., {f= %RegistrationDatabase% new}* fi *aRegistrationDatabase*
  returns a new instance corresponding to the HKEY_CLASSES_ROOT predefined key.

- **new:** *e.g., {f= 'Access.Database\CurVer' %RegistrationDatabase% new:}* fi *aRegistrationDatabase*
  returns a new instance which spans out from the hierarchy node specified in the argument. The argument must be a subtree within HKEY_CLASSES_ROOT; it can specify one subtree or a full specification.

- **printHierarchy** *e.g., {f= %RegistrationDatabase% printHierarchy}* fi *' … '*
  returns a String containing a hierarchical representation of the complete System Registry hierarchy. Because the System Registry contains many entries in its hierarchy, the results are not presented here.

- **printHierarchyOn:** *e.g., {set strm %String% new %WriteStream% on:} {f= strm %RegistrationDatabase% printHierarchyOn:}* fi *RegistrationDatabase*
  returns the receiver after appending a hierarchical representation of the complete System Registry hierarchy to the stream specified in the argument. Because the System Registry contains many entries in its hierarchy, the results are not presented here.

- **users** *e.g., {f= %RegistrationDatabase% users}* fi *aRegistrationDatabase*
  returns a new instance of the receiver corresponding to the HKEY_ USERS predefined key. The keyName for top-level registration databases is a number (e.g., 2147483652) that uniquely identifies this top-level RegistrationDatabase.

11.34 HttpCommand

The **%cmd%** variable is an instance of HttpCommand that is created within **WebBase** to process the specific GET or POST request being handled. Some of the **WebBase** macros and variables already described are directly associated with this command instance -- e.g., the **%browserAddress%** variable contains the IP address of the browser from which the GET or

POST was issued -- therefore each command instance will have its own **%browserAddress%** variable.

In addition to standard macros and variables that are tied to a given command instance, there are a number of operations that can be sent directly to the command instance. In general this is not encouraged as one can alter the contents of the command instance to the point where **WebBase** can no longer process it without generating an error. There are, however, a few methods that can be useful in the development of .htf forms that will be described here.

- **argList** *e.g., {f= %cmd% argList}* fi *'httpcmd?arg1=abc&arg2=1'*
  The full argument string including the command (file) name.

- **argString** *e.g., {f= %cmd% argString}* fi *arg1=abc&arg2=1*
  Returns just the arguments part of the argList (see above).

- **asHTF:** e*.g., {f= myWhere %cmd% asHTF:}* fi *WHERE clause*
  The asHTF: 'parses' the contents of the variable, first removing any surrounding {htf} {/htf} macros and then evaluating the {variable} references contained within the string. NOTE: the asHTF: message only processes variables -- it does not evaluate **WebBase** macros like the {if ...}, {case ...} etc. The characters immediately following the opening curly brace ({) are taken to be a field or variable name and any parameters (such as sql=true) will be handled as described in the documentation of **WebBase** variables. The basic example #9 included with the **WebBase WebWizard** shows how the asHTF: operation can be used.

- **beep** *e.g., {f= %cmd% beep}* fi *a HttpGetN (causes a beep to sound)*
  Beeps the server.

- **beep:for:** *e.g., {f= 3 50 %cmd% beep:for:}* fi *a HttpGetN (causes 3 beeps every 50 ms at the server)*
  Beeps the server at the frequency specified in the first argument for the duration specified in the second argument. The duration is in milliseconds.

- **cacheFreeForm:** *e.g., {f= 'c:\http\wbwizard/default.htf' %cmd% cacheFreeForm:}* fi *false*
  Removes the indicated form from the forms cache. The argument must be the fully qualified form pathname - not just the 'default.htf' portion as referenced via a URL. This operation returns true if the form was found in the cache and removed; false if not found in the cache.

- **cacheFreeSource:user:** *e.g., {f= 'myAccess' 'fref' %cmd% cacheFreeSource:user:}* fi *false*
  Removes the specified ODBC connection from the cache. This is similar to the **cache** keyword used on the *sql* macro described earlier. A user can create a .htf form for maintenance purposes that merely clears out specific cache entries whenever the form is run. The first argument is the name of the ODBC source, the second is the username. If no username was assigned by the ODBC administrator, an empty string (' ') must be specified for the second argument.

- **cacheMenuItemCheck** *e.g., {f= %cmd% cacheMenuItemCheck}* fi *a HttpGetN*
  Force the menu items under the WebBase WebServer Option's menu to agree with the current state of caching. This should be used if the user is modifying the value of %cacheOdbc% within a form to ensure that subsequent interactions with the WebBase WebServer window accurate reflect the status of ODBC connection caching.

- **canAccept** _e.g., {f= %cmd% canAccept}_ fi _OrderedCollection('Connection' ==> 'Keep-Alive' 'User-Agent' ==> 'Mozilla/3.0 (Win95; I)' 'Host' ==> '127.0.0.1' 'Accept' ==> 'image/gif, image/x-xbitmap, image/jpeg, image/pjpeg, */*' 'Cookie' ==> 'WebBaseID=W14696994E161808318465B; CookieCounter=5')_
  Returns an ordered collection of associations of the header keys and their values. The operation is a bit misnamed since ‘Accept’ is only one of the keys that is returned.

- **clearFormsCache** _e.g., {f= %cmd% clearFormsCache}_ fi _a HttpGetN_
  Clears all the forms from the forms cache.

- **clearOdbcCache** _e.g., {f= %cmd% clearOdbcCache}_ fi _a HttpGetN_
  Clears all the connections from the ODBC connection cache. This should be used when trying to release a database file for external modifications.

- **cmdStr** _e.g., {f= %cmd% cmdStr}_ fi _‘GET’_
  Returns the type of command issued - GET, POST, or HEAD

- **command** _e.g., {f= %cmd% command}_ fi _‘GET /httpcmd?arg1=abc&arg2=1 HTTP/1.0’_
  Returns the full command up to and including the HTTP 1.0 command line terminator.

- **commandString** _e.g., {f= %cmd% commandString}_ fi _GET /httpcmd?arg1=abc&arg2=1 HTTP/1.0 Connection: Keep-Alive User-Agent: Mozilla/3.0 (Win95; I) Host: 127.0.0.1 Accept: image/gif, image/x-xbitmap, image/jpeg, image/pjpeg, */* Cookie: WebBaseID=W14696994E161808318465B; CookieCounter=5_
  Returns the full command plus header variables sent by the browser.

- **cookieTags** _e.g., {f= %cmd% cookieTags}_ fi _‘; path=/’_
  Returns the accumulation of the %cookiePath%, %cookieDomain% and %cookieExpires% variables as a string that gets appended to all outgoing cookies. Because the user can set any of these variables, the results displayed will vary depending on the current values of the above three %cookie*% variables. Only %cookiePath% has a default which is shown in the example above.

- **cookieWebBaseId** _e.g., {f= %cmd% cookieWebBaseId}_ fi _’WebBaseID=W14697403E161808318469B; path=/’_
  This is a default cookie that **WebBase** always generates and sends out to the browser to see if it can establish a cookie connection. This value is used as the default %userName% for user variables if the browser responds with the WebBaseID cookie. The example above defines the cookie WebBaseID and has the cookieTag (with the %cookiePath% default) appended.

- **enumerateHTML:titled:** _e.g., {f= %localVariables% ‘Local WebBase Variables’ enumerateHTML:titled:}_ fi _<See output of %localVariablesHTML%>_
  Creates an HTML <UL> <LI> ... </UL> bulleted list of the dictionary or collection which is the first argument with the title being the second argument. It is used by dynamic variables like %localVariablesHTML%, and is a useful formatting tool for displaying any type of collection or dictionary.

- **flash:** _e.g., {f= 'this is a test' %cmd% flash:}_ fi _’:: Flash: this is a test’_
  Writes the string argument to the little ‘flash’ or current command pane in the server window below the menu bar. Returns the contents of that pane (which will have a ':: Flash: ' prefixing the string passed in).

- **fromVars:default:** *e.g., {f= {set var1 'var' 'default' %cmd% fromVars:default:}* fi *’default’*
  Looks for a variable whose name is specified in the first argument (a string containing one or more space-separated variable names). If the variable is found, returns it value. It is does not exist, then returns the second argument. This is useful to help determine if a variable exists and if not, create it and set its initial value. See also fromNonNullVars:default: and variableExists:.

- **fromNonNullVars:default:** *e.g., {f= {set var1 'var' 'default' %cmd% fromNonNullVars:default:}* fi *’default’*
  This is the same as fromVars:default:, except that if the variable is found but its value is null (either nil or an empty string), then treat it as if it does not exist and go on to the next variable or return the default if at the end of the list of variable names. See also fromVars:default: and variableExists:.

- **getAnyLocalVariable:** *e.g., {f= ‘myLocalVar’ %cmd% getAnyLocalVariable:}* fi *’’*
  returns the value of the first scope/local variable whose name matches the argument. The local scoping variables are checked first, and then the local variables. If no match is found, returns nil and does not continue looking for another match in the user, global or dynamic variables. If a match is found whose value is nil, returns an empty string.

- **getGlobalVariable:** *e.g., {f= ‘aGlobalVar’ %cmd% getGlobalVariable:}* fi *’’*
  returns the value of the global variable whose name matches the argument. If no match is found, returns nil and does not continue looking for another match in the dynamic variables. If a match is found whose value is nil, returns an empty string.

- **getLetVariable:** *e.g., {f= ‘myLocalVar’ %cmd% getLetVariable:}* fi *’’*
  returns the value of the first scope variable whose name matches the argument. If no match is found, returns nil and does not continue looking for another match in the local, user, global or dynamic variables. If a match is found whose value is nil, returns an empty string.

- **getLocalVariable:** *e.g., {f= ‘myLocalVar’ %cmd% getLocalVariable:}* fi *’’*
  returns the value of the first local variable whose name matches the argument. No local scoping variables are checked. If no match is found, returns nil and does not continue looking for another match in the user, global or dynamic variables. If a match is found whose value is nil, returns an empty string.

- **getUserVariable:** *e.g. {f= 'myVar' %cmd% getUserVariable:}* fi *’’*
  returns the value of the first user variable whose name matches the argument. If no match is found, returns nil and does not continue looking for another match in the global or dynamic variables. If a match is found whose value is nil, returns an empty string.

- **getVariable:** *e.g. {f= 'myVar' %cmd% getVariable:}* fi *’’*
  Returns the contents of the variable requested or nil if the variable is not found. This differs from simply using the variable which would result in an error being generated if the variable were not defined. One can wrap the variable usage in the errorProtect macro but often it is more convenient to use the above form to test for the existence of a variable in situations where it may often be non-existent. In addition, the argument may itself be a variable name (not enclosed in single quotes) in which case the contents of that variable (which must be a string) will be used as the name of the variable to be fetched. This allows for a level of dynamic indirection in accessing variables. If one uses a variable to provide the variable name and the variable does not exist, **WebBase** will generate an error. If the variable exists but does not contain a string, **WebBase** will return a value of nil.

- **isTrue32bit** *e.g., {f= %cmd% isTrue32bit}* fi *true*

  Returns true or false identifying whether the server is a 32-bit or 16-bit operating system.

- **logRecord** *e.g., {f= %cmd% logRecord}* fi *‘127.0.0.1 - - [23/Mar/1997:19:15:56 -0800] "GET /httpcmd?arg1=abc&arg2=1 HTTP/1.0" 200 0 "" "Mozilla/3.0 (Win95; I)" ‘*

  Returns the default record that will be written to the default log file if logging is enabled. Note: this record is always available by reading logRecord on %cmd% even if writing it to a file is disabled or was never enabled in the first place.

- **mime** *e.g., {f= %cmd% mime}* fi *‘text/html’*

  Returns the current mime type string. If the user has set up a extension to process a command and return something other than the default "text/html" mime type, this would return whatever was set up.

- **name** *e.g., {f= %cmd% name}* fi *a HttpGetN for: httpcmd*

  Returns the type of command created (either HttpGetN, HttpPost, HttpHead, or HttpError) and the command name.

- **nextCookieId** *e.g., {f= %cmd% nextCookieId}* fi *W14697403E161808318469B*

  Returns the unique value as used in the default cookie that **WebBase** always generates and sends out to the browser to see if it can establish a cookie connection.

- **removeTimer**: *e.g., {f= anId %cmd% removeTimer:}* fi *anHttpGet*

  Removes the timer queue entry whose id is equal to the value of anId (may be a constant integer or string or a variable name of a variable whose value is an integer or a string). If no such timer queue entry is found, no error is indicated. If multiple timer queue entries have the same id value, only the first such entry will be removed. Entries are created and added to the timer queue using the *timer* macro.

- **search** *e.g., {f= %cmd% search}* fi *‘arg1=abc AND arg2=1’*

  This operation is now obsolete and is maintained for compatibility with forms developed under previous versions. It is a precursor to the current %WHERE% variable. It returned the arguments as a string of arg=value with the intervening & replaced with ' AND '.

- **startTime** *e.g., {f= %cmd% startTime}* fi *28739920*

  The number of milliseconds between the previous midnight and when current command was started. It is used by %elapsed% to determine elapsed time to the point where %elapsed% is executed.

- **text** *e.g., {f= %cmd% text}*

  Returns the text for the command. This is the entire file being processed. Any insert files are not included in this string.

- **timerQueueSQL** *e.g., {f= %cmd% timerQueueSQL}* fi *‘OrderedCollection(anODBCRowObject anODBCRowObject)*

  Returns a collection of SQL-like OdbcRowObjects that contain the following fields: ‘id’, ‘title’, ‘created’, ‘period’, ‘date’, ‘time’, ‘count’, ‘minutes’, ‘ranDate’ and ‘ranTime’. The ‘id’, ‘title’, ‘period’, ‘date’ and ‘time’ fields are those specified as keyword/value arguments to the *timer* macro. The ‘created’ is the date/time when the entry was created and initially put onto the timer queue. The ‘count’ is the number of times the form will yet be run before it is removed from the queue. The ‘minutes’ is the number of minutes remaining before a periodic entry will be executed again. The ‘ranDate’ and ‘ranTime’ are the last date/time the entry was executed.

- **userAgent** *e.g. {f= %cmd% userAgent}* fi *Mozilla/3.0 (Win95; I)*
  Returns the string that identifies the browser.

- **variableExists:** *e.g., {f= ‘myVar’ %cmd% variableExists:}* fi *true*
  Returns true or false if a variable by the specified name exists. The variable precedence order is used to determine if the variable exists (e.g., field -> local -> user -> global -> dynamic).

- **vars** *e.g., {f= %cmd% vars}* fi *Dictionary(('arg1' ==> 'abc') ('CookieCounter' ==> '5') ('%cookieDomain%' ==> '') ('%cmd%' ==> a HttpGetN) ('%resultLimit%' ==> 0) ('%accepts%' ==> OrderedCollection('image/gif, image/x-xbitmap, image/jpeg, image/pjpeg, */*')) ('%resultOffset%' ==> 1) ('User-Agent' ==> 'Mozilla/3.0 (Win95; I)') ('%resultCount%' ==> 0) ('%cookiePath%' ==> '/') ('%repeatCount%' ==> 1) ('Cookie' ==> 'WebBaseID=W14696994E161808318465B; CookieCounter=5') ('%resultStart%' ==> 1) ('Connection' ==> 'Keep-Alive') ('Host' ==> '127.0.0.1') ('WebBaseID' ==> 'W14696994E161808318465B') ('%theArgs%' ==> OrderedList('arg1' 'arg2')) ('%browserAddress%' ==> '127.0.0.1') ('arg2' ==> '1') ('%cookieExpires%' ==> '') ('Accept' ==> 'image/gif, image/x-xbitmap, image/jpeg, image/pjpeg, */*'))*
  Returns the local variables dictionary.

11.35 DatabaseInfo

%DatabaseInfo% is a global variable that allows access to the DatabaseInfo class that provides information about ODBC sources. No instance operations are provided as it is not possible to create an instance of this class. The following class operations are supported:

- **canConnect:user:password:** *e.g., {f= ‘myAccess’ ‘fred’ ‘test’ %DatabaseInfo% canConnect:user:password:}* fi *true*
  Returns true or false depending on whether it is possible to connect to the given ODBC data source.

- **isValidSource:** *e.g., {f= ‘myAccess’ %DatabaseInfo% isValidSource:}* fi *true*
  Returns true or false depending on whether the specified source name is set up as an ODBC source.

- **odbcDataSources** *e.g., {f= %DatabaseInfo% odbcDataSources}* fi *SortedCollection('dBASE Files' ==> 'Microsoft dBase Driver (*.dbf)' 'excel1' ==> 'Microsoft Excel Driver (*.xls)' 'FoxPro Files' ==> 'Microsoft FoxPro Driver (*.dbf)' 'myAccess' ==> 'Microsoft Access Driver (*.mdb)' 'Paradox Files' ==> 'Microsoft Paradox Driver (*.db)' 'Text Files' ==> 'Microsoft Text Driver (*.txt; *.csv)' 'textExample' ==> 'Microsoft Text Driver (*.txt, *.csv)’)*
  returns a collection of all the ODBC data sources defined on the system. The contents of the collection are associations. The key of each association is the name of the data source; the value is the name of the ODBC driver associated with the source. The ODBC data sources that are returned are those that are <u>probably</u> associated with an actual database file. Some ODBC drivers create “virtual” sources that do not have database files associated with them. The full list of sources, including virtual sources is available using the odbcDataSourcesRaw operation.

- **odbcDataSourcesRaw** *e.g., {f= %DatabaseInfo% odbcDataSourcesRaw}* fi *SortedCollection('dBASE Files' ==> 'Microsoft dBase Driver (*.dbf)' 'Excel Files' ==> 'Microsoft Excel Driver (*.xls)' 'excel1' ==> 'Microsoft Excel Driver (*.xls)' 'FoxPro*

Files' ==> 'Microsoft FoxPro Driver (.dbf)' 'MS Access 7.0 Database' ==> 'Microsoft Access Driver (*.mdb)' 'myAccess' ==> 'Microsoft Access Driver (*.mdb)' 'Paradox Files' ==> 'Microsoft Paradox Driver (*.db)' 'Text Files' ==> 'Microsoft Text Driver (*.txt; *.csv)' 'textExample' ==> 'Microsoft Text Driver (*.txt, *.csv)')*
returns a collection of all the ODBC data sources defined on the system. This list includes all sources set up by the user, as well as any "virtual" sources which are set up as part of the driver installation but are not actually associated with a database file. The list of sources associated with actual files is available using the odbcDataSources operation.

- **odbcDataSourcesSQL** *e.g., {f= %DatabaseInfo% odbcDataSourcesSQL}* fi *OrderedCollection(an OdbcRowObject …)*
returns an ordered collection containing OdbcRowObjects representing each ODBC data source. This collection can be iterated through the using *forRow* macro to look at the information contained within each data source, which includes the fields 'Data_Source_Name' and 'Data_Source_Driver'. This operation is useful to obtain information that is to be displayed within a <TABLE> construct, as in the **WebBase WebWizard** ODBC Viewer utility.

- **odbcDrivers** *e.g., {f= %DatabaseInfo% odbcDrivers}* fi *SortedCollection('Microsoft Access Driver (*.mdb)' ==> ('UsageCount=6811003' 'APILevel=1' 'ConnectFunctions=YYN' 'DriverODBCVer=02.50' 'FileUsage=2' 'FileExtns=*.mdb' 'SQLLevel=0' 'ConectFunctions=YYN') …)*
returns a sorted collection of associations. The key to each association is the name of the ODBC driver; the value is a collection of strings defining the different attributes of the driver (e.g., UsageCount, APILevel, ConnectFunctions).

- **odbcDriversSQL** *e.g., {f= %DatabaseInfo% odbcDriversSQL}* fi *OrderedCollection(an OdbcRowObject …)*
returns an ordered collection containing OdbcRowObjects representing each ODBC driver. This collection can be iterated through the using *forRow* macro to look at the information contained within each driver. The attributes of each driver are set up as fields (e.g., UsageCount, APILevel, ConnectFunctions). This operation is useful to obtain information that is to be displayed within a <TABLE> construct, as in the **WebBase WebWizard** ODBC Viewer utility.

- **odbcDriversSQL2** *e.g., {f= %DatabaseInfo% odbcDriversSQL2}* fi *OrderedCollection(an OdbcRowObject …)*
returns an ordered collection containing OdbcRowObjects representing each ODBC driver. This collection can be iterated through the using *forRow* macro to look at the information contained within each driver, which includes the fields 'Data_Source_Driver' and 'Data_Source_Driver_Attributes'. This operation is useful to obtain information that is to be displayed within a <TABLE> construct, as in the **WebBase WebWizard** ODBC Viewer utility.

- **table:source:user:password:** *e.g., {f= 'Cars' 'myAccess' 'fred' 'test' %DatabaseInfo% table:source:user:password:}* fi *OrderedCollection(an OdbcRowObject …)*
returns an ordered collection containing OdbcRowObjects representing each field in the specified table and source. This collection can be iterated through the using *forRow* macro to look at the information contained within each field. This operation is useful to obtain information that is to be displayed within a <TABLE> construct, as in the **WebBase WebWizard** ODBC Viewer utility.

- **tablesIn:user:password:** *e.g., {f= 'myAccess' 'fred' 'test' %DatabaseInfo% tablesIn:user:password:}* fi

OrderedCollection(OrderedCollection('C:\HTTP\WbWizard\DBEx\autos' nil 'Cars' 'TABLE' nil) OrderedCollection('C:\HTTP\WbWizard\DBEx\autos' nil 'LogData' 'TABLE' nil))
return an ordered collection of database tables for the given ODBC source. Each entry in the collection is another ordered collection containing the path of the database file, owner qualifier, the name of the table, table type, name qualifier.

- **tableSource:user:password:** *e.g., {f= ‘myAccess’ ‘fred’ ‘test’ %DatabaseInfo% tableSource:user:password:}* fi *OrderedCollection(an OdbcRowObject …)*
  returns an ordered collection containing OdbcRowObjects representing each table in the specified source. This collection can be iterated through the using *forRow* macro to look at the information contained within each table, including the fields ‘table_name’, ‘table_owner’ and ‘table_qualifier’. This operation is useful to obtain information that is to be displayed within a <TABLE> construct, as in the **WebBase WebWizard** ODBC Viewer utility

Features

Chapter 12

This chapter contains descriptions of the features of **WebBase**. It is suggested that you occasionally check the **WebBase** Web site for new tips and techniques. Valuable information can also be obtained on the **WebBase** Support Forum, also accessible at the **WebBase** Web site.

12.1 Logging

WebBase stores information about every command that it processes or returns, unless logging has been disabled in general or for a particular file extension. Logging can be enabled or disabled on the WebBase Server window; by default it is enabled.

The log information is stored within files in the directory specified as the LogDirectory parameter. If this parameter is not specified, then logging cannot be enabled. It is strongly recommended that this parameter be created, and then logging be enabled or disabled via the WebBase Server window.

A new log file is created each day named Wbyymmdd.log where yy=year, mm=month, and dd=day. For example, WB970504.log is the log file for May 5, 1997. These log files will contain one entry for each query made of **WebBase**, and will contain information based on the LogFormat selected. Details on each log format are included later in this section.

There are five LogFormat types supported by **WebBase**. The LogFormat parameter (0-4) and the corresponding format type are shown below:

```
4 -- Extended Combined Log File Format
3 -- Common Log File Format
2 -- Extended Common Log File Format (Default)
1 -- Extended Original WebBase (EMWACS) Log File Format
0 -- Original WebBase (EMWACS) Log File Format
```

The five logging formats and examples of each are presented below. The example text file for each was generated by running the first two basic examples provided with **WebBase**.

Common Log File Format (LogFormat=3)

The Common Log File Format is used by many of the commonly available Web analysis tools[18]. The text file containing the output in Common Log File Format is shown below:

Example 12.1 Common Log File Format

```
0.0.0.0  - - [26/Mar/1997:08:02:32 -0800] "none Start_Log HTTP/1.0" - -
0.0.0.0  - - [26/Mar/1997:08:02:33 -0800] "none Pause_Server_->_paused HTTP/1.0" - -
0.0.0.0  - - [26/Mar/1997:08:02:34 -0800] "none Pause_Server_->_active HTTP/1.0" - -
127.0.0.1 - - [26/Mar/1997:08:03:41 -0800] "GET /wbwizard/Wizard.htf?now=28700
HTTP/1.0" 200 6136
127.0.0.1 - - [26/Mar/1997:08:03:44 -0800] "GET /wbwizard/BasicEx?now=29021 HTTP/1.0"
200 491
127.0.0.1 - - [26/Mar/1997:08:03:45 -0800] "GET
/wbwizard/basicex/Wbexams.htf?now=29024 HTTP/1.0" 200 7783
127.0.0.1 - - [26/Mar/1997:08:03:47 -0800] "GET
/wbwizard/basicex/WBexam1.HTF?now=29025040&useBACKbutton.XX=doUSEit HTTP/1.0" 200 1033
127.0.0.1 - - [26/Mar/1997:08:03:48 -0800] "GET
/wbwizard/basicex/WBexams.htf?now=29027020 HTTP/1.0" 200 7783
127.0.0.1 - - [26/Mar/1997:08:03:50 -0800] "GET
/wbwizard/basicex/WBexam2.HTF?now=29028830&useBACKbutton.XX=doUSEit HTTP/1.0" 200 1395
127.0.0.1 - - [26/Mar/1997:08:03:52 -0800] "GET
/wbwizard/basicex/WBexams.htf?now=29030430 HTTP/1.0" 200 7783
0.0.0.0  - - [26/Mar/1997:08:03:59 -0800] "none Pause_Server_->_paused HTTP/1.0" - -
0.0.0.0  - - [26/Mar/1997:08:04:00 -0800] "none Quitting HTTP/1.0" - -
0.0.0.0  - - [26/Mar/1997:08:04:00 -0800] "none Stop_Log HTTP/1.0" - -
```

There are seven pieces of information displayed on each line:

- **remotehost** – the remote host IP number. For general server entries (e.g., Start_Log, Quitting, Stop_Log), this value is entered as ‘0.0.0.0’.

- **rfc931** – the remote logname of the user. This information is not currently retrieved by **WebBase**, so a dash (‘**-**‘) is output.

- **authuser** – the username as which the user has authenticated himself via Basic Authentication or ‘-‘ if authentication has not been performed

- **[date]** – the date and time of the request with timezone offset from GMT at the end. The format is: [DD/Mon/YYYY:hh:mm:ss [+/-]HHMM]

- **“request”** – the request line exactly as it came from the client in the format “method file httpversion”. The method could be GET, HEAD, POST, or none. The file contains the full file path and arguments of the requested file. The file path is relative to the directory containing the **WebBase** forms. The httpversion specifies the version number of the HTTP specification. This will generally be ‘HTTP/1.0’.

- **status** – the HTTP status code returned to the client (three digits) or ‘**-**‘ if not available. This is generally 200, indicating OK.

- **bytes** – the content-length of the document transferred in bytes or ‘**-**‘ if not available.

[18] No web analysis tools are provided by ExperTelligence or as part of the WebBase application. There are a number of web analysis tools from other vendors available via the web that support one or more of the log file formats provided by WebBase.

Extended Common Log File Format (LogFormat=2)

The Extended Common Log File Format is also acceptable to many of the commonly available Web analysis tools. If no LogFormat parameter is specified, this is the default log format style. The text file containing the output in Extended Common Log File Format is shown below:

Example 12.2 Extended Common Log File Format

```
0.0.0.0  - - [26/Mar/1997:07:58:09 -0800] "none Start_Log HTTP/1.0" - - "" ""
0.0.0.0  - - [26/Mar/1997:07:58:10 -0800] "none Pause_Server_->_paused HTTP/1.0" - -
"" ""
0.0.0.0  - - [26/Mar/1997:07:58:10 -0800] "none Pause_Server_->_active HTTP/1.0" - -
"" ""
127.0.0.1 - - [26/Mar/1997:07:58:20 -0800] "GET /wbwizard/ HTTP/1.0" 200 527 ""
"Mozilla/3.0 (Win95; I)"
127.0.0.1 - - [26/Mar/1997:07:58:21 -0800] "GET /wbwizard/Wizard.htf?now=28700
HTTP/1.0" 200 6135 "" "Mozilla/3.0 (Win95; I)"
127.0.0.1 - - [26/Mar/1997:07:58:24 -0800] "GET /wbwizard/BasicEx?now=28700 HTTP/1.0"
200 490 "http://127.0.0.1/wbwizard/Wizard.htf?now=28700" "Mozilla/3.0 (Win95; I)"
127.0.0.1 - - [26/Mar/1997:07:58:25 -0800] "GET
/wbwizard/basicex/Wbexams.htf?now=28704 HTTP/1.0" 200 7782
"http://127.0.0.1/wbwizard/Wizard.htf?now=28700" "Mozilla/3.0 (Win95; I)"
127.0.0.1 - - [26/Mar/1997:07:58:27 -0800] "GET
/wbwizard/basicex/WBexam1.HTF?now=28705050&useBACKbutton.XX=doUSEit HTTP/1.0" 200 1032
"http://127.0.0.1/wbwizard/basicex/Wbexams.htf?now=28704" "Mozilla/3.0 (Win95; I)"
127.0.0.1 - - [26/Mar/1997:07:58:29 -0800] "GET
/wbwizard/basicex/WBexams.htf?now=28707790 HTTP/1.0" 200 7782
"http://127.0.0.1/wbwizard/basicex/WBexam1.HTF?now=28705050&useBACKbutton.XX=doUSEit"
"Mozilla/3.0 (Win95; I)"
127.0.0.1 - - [26/Mar/1997:07:58:31 -0800] "GET
/wbwizard/basicex/WBexam2.HTF?now=28709720&useBACKbutton.XX=doUSEit HTTP/1.0" 200 1394
"http://127.0.0.1/wbwizard/basicex/WBexams.htf?now=28707790" "Mozilla/3.0 (Win95; I)"
127.0.0.1 - - [26/Mar/1997:07:58:41 -0800] "GET
/wbwizard/basicex/WBexams.htf?now=28711690 HTTP/1.0" 200 7783
"http://127.0.0.1/wbwizard/basicex/WBexam2.HTF?now=28709720&useBACKbutton.XX=doUSEit"
"Mozilla/3.0 (Win95; I)"
0.0.0.0  - - [26/Mar/1997:07:58:52 -0800] "none Pause_Server_->_paused HTTP/1.0" - -
"" ""
0.0.0.0  - - [26/Mar/1997:07:58:54 -0800] "none Quitting HTTP/1.0" - - "" ""
0.0.0.0  - - [26/Mar/1997:07:58:54 -0800] "none Stop_Log HTTP/1.0" - - "" ""
```

Extended Common Log File Format is the same as Common Log File Format with the addition of two items at the end of each line:

- **refer** – the referer to this page (Referer) or “**-**“ if none.
- **user-agent** – the browser requesting this page (User-Agent) or “**-**“ if not available

Extended Combined Log File Format (LogFormat=4)

The Extended Combined Log File Format is also acceptable to many of the commonly available Web analysis tools. The text file containing the output in Extended Combined Log File Format is shown below:

Example 12.3   Extended Combined Log File Format

```
0.0.0.0  - - [26/Mar/1997:08:14:14 -0800] "none Start_Log HTTP/1.0" - - "" ""
0.0.0.0  - - [26/Mar/1997:08:14:15 -0800] "none Pause_Server_->_paused HTTP/1.0" - -
"" ""
0.0.0.0  - - [26/Mar/1997:08:14:16 -0800] "none Pause_Server_->_active HTTP/1.0" - -
"" ""
127.0.0.1 127.0.0.1 - [26/Mar/1997:08:14:48 -0800] "GET /wbwizard/ HTTP/1.0" 200 473
"" "Mozilla/3.0 (Win95; I)"
127.0.0.1 127.0.0.1 - [26/Mar/1997:08:14:49 -0800] "GET /wbwizard/Wizard.htf?now=29688
HTTP/1.0" 200 6136 "" "Mozilla/3.0 (Win95; I)"
127.0.0.1 127.0.0.1 - [26/Mar/1997:08:14:51 -0800] "GET /wbwizard/BasicEx?now=29689
HTTP/1.0" 200 491 "http://127.0.0.1/wbwizard/Wizard.htf?now=29688" "Mozilla/3.0
(Win95; I)"
127.0.0.1 127.0.0.1 - [26/Mar/1997:08:14:52 -0800] "GET
/wbwizard/basicex/Wbexams.htf?now=29691 HTTP/1.0" 200 7783
"http://127.0.0.1/wbwizard/Wizard.htf?now=29688" "Mozilla/3.0 (Win95; I)"
127.0.0.1 127.0.0.1 - [26/Mar/1997:08:14:54 -0800] "GET
/wbwizard/basicex/WBexam1.HTF?now=29692500&useBACKbutton.XX=doUSEit HTTP/1.0" 200 1033
"http://127.0.0.1/wbwizard/basicex/Wbexams.htf?now=29691" "Mozilla/3.0 (Win95; I)"
127.0.0.1 127.0.0.1 - [26/Mar/1997:08:14:56 -0800] "GET
/wbwizard/basicex/WBexams.htf?now=29694800 HTTP/1.0" 200 7783
"http://127.0.0.1/wbwizard/basicex/WBexam1.HTF?now=29692500&useBACKbutton.XX=doUSEit"
"Mozilla/3.0 (Win95; I)"
127.0.0.1 127.0.0.1 - [26/Mar/1997:08:14:58 -0800] "GET
/wbwizard/basicex/WBexam2.HTF?now=29696340&useBACKbutton.XX=doUSEit HTTP/1.0" 200 1395
"http://127.0.0.1/wbwizard/basicex/WBexams.htf?now=29694800" "Mozilla/3.0 (Win95; I)"
127.0.0.1 127.0.0.1 - [26/Mar/1997:08:14:59 -0800] "GET
/wbwizard/basicex/WBexams.htf?now=29698100 HTTP/1.0" 200 7783
"http://127.0.0.1/wbwizard/basicex/WBexam2.HTF?now=29696340&useBACKbutton.XX=doUSEit"
"Mozilla/3.0 (Win95; I)"
0.0.0.0  - - [26/Mar/1997:08:15:05 -0800] "none Pause_Server_->_paused HTTP/1.0" - -
"" ""
0.0.0.0  - - [26/Mar/1997:08:15:06 -0800] "none Quitting HTTP/1.0" - - "" ""
0.0.0.0  - - [26/Mar/1997:08:15:06 -0800] "none Stop_Log HTTP/1.0" - - "" ""
```

Extended Combined Log File Format is the same as Extended Common Log File Format except that the ‘rfc931’ entry has been replaced with the server address.

- **serverAddress** – the server's IP address. This can be useful if multiple domains are being used as the log records applicable to a particular domain can be identified.

Original WebBase (EMWACS) Log File Format (LogFormat=0)

The Original WebBase (EMWACS) Log File Format was derived from the EMWACS HTTP Server. This format is **not** compatible with many of the Web analysis tools. This format is provided for compatibility with previous releases of **WebBase**; it may not be supported in future releases. It is strongly recommended that the Common Log File Format, Extended Common Log File Format or Extended Combined Log File Format be used. The text file containing the output in Original WebBase (EMWACS) Log File Format is shown below:

Example 12.4 Original WebBase (EMWACS) Log File Format

```
Wed 26 Mar 1997 08:24:07 0.0.0.0 0.0.0.0 ***** Start Log *****
Wed 26 Mar 1997 08:24:08 0.0.0.0 0.0.0.0 ***** Pause Server -> paused *****
Wed 26 Mar 1997 08:24:08 0.0.0.0 0.0.0.0 ***** Pause Server -> active *****
Wed 26 Mar 1997 08:24:36 127.0.0.1 127.0.0.1 GET /wbwizard/ HTTP/1.0
Wed 26 Mar 1997 08:24:36 127.0.0.1 127.0.0.1 GET /wbwizard/Wizard.htf?now=30276
HTTP/1.0
Wed 26 Mar 1997 08:24:39 127.0.0.1 127.0.0.1 GET /wbwizard/BasicEx?now=30277 HTTP/1.0
Wed 26 Mar 1997 08:24:40 127.0.0.1 127.0.0.1 GET
/wbwizard/basicex/Wbexams.htf?now=30279 HTTP/1.0
Wed 26 Mar 1997 08:24:42 127.0.0.1 127.0.0.1 GET
/wbwizard/basicex/WBexam1.HTF?now=30280250&useBACKbutton.XX=doUSEit HTTP/1.0
Wed 26 Mar 1997 08:24:43 127.0.0.1 127.0.0.1 GET
/wbwizard/basicex/WBexams.htf?now=30282450 HTTP/1.0
Wed 26 Mar 1997 08:24:45 127.0.0.1 127.0.0.1 GET
/wbwizard/basicex/WBexam2.HTF?now=30283820&useBACKbutton.XX=doUSEit HTTP/1.0
Wed 26 Mar 1997 08:24:47 127.0.0.1 127.0.0.1 GET
/wbwizard/basicex/WBexams.htf?now=30285420 HTTP/1.0
Wed 26 Mar 1997 08:24:57 0.0.0.0 0.0.0.0 ***** Pause Server -> paused *****
Wed 26 Mar 1997 08:24:58 0.0.0.0 0.0.0.0 ***** Quitting *****
Wed 26 Mar 1997 08:24:58 0.0.0.0 0.0.0.0 ***** Stop Log *****
```

There are four pieces of information displayed on each line:

- **date** – the date and time of the request.
  The format is: XXX MMM DD YYYY HH:MM:SS

- **server** – the server's IP number. For general server entries (e.g., Start_Log, Quitting, Stop_Log), this value is entered as 0.0.0.0.

- **remoteHost** – the remote host IP number. For general server entries (e.g., Start_Log, Quitting, Stop_Log), this value is entered as 0.0.0.0.

- **request** – the request line exactly as it came from the client in the format *method file httpversion*. The method could be GET, HEAD, POST, or none. The file contains the full file path and arguments of the requested file. The file path is relative to the directory containing the **WebBase** forms. The httpversion specifies the version number of the HTTP specification. This will generally be HTTP/1.0.

Extended Original WebBase (EMWACS) Log File Format (LogFormat=1)

The Extended Original WebBase (EMWACS) Log File Format is the same as the Original WebBase (EMWACS) Log File Format with the addition of a single extra value in each line. This format is **not** compatible with many of the Web analysis tools. This format is provided for compatibility with previous releases of **WebBase**; it may not be supported in future releases. It is strongly recommended that the Common Log File Format, Extended Common Log File Format or Extended Combined Log File Format be used. The text file containing the output in Extended Original WebBase (EMWACS) Log File Format is shown below:

Example 12.5 Extended Original WebBase (EMWACS) Log File Format

```
Wed 26 Mar 1997 08:26:56 0.0.0.0 0.0.0.0 ***** Start Log *****
Wed 26 Mar 1997 08:26:56 0.0.0.0 0.0.0.0 ***** Pause Server -> paused *****
Wed 26 Mar 1997 08:26:57 0.0.0.0 0.0.0.0 ***** Pause Server -> active *****
Wed 26 Mar 1997 08:27:02 0.0.0.0 0.0.0.0 ***** Pause Server -> paused *****
Wed 26 Mar 1997 08:27:03 0.0.0.0 0.0.0.0 ***** Quitting *****
Wed 26 Mar 1997 08:27:03 0.0.0.0 0.0.0.0 ***** Stop Log *****
Wed 26 Mar 1997 08:27:12 0.0.0.0 0.0.0.0 ***** Start Log *****
Wed 26 Mar 1997 08:27:13 0.0.0.0 0.0.0.0 ***** Pause Server -> paused *****
Wed 26 Mar 1997 08:27:13 0.0.0.0 0.0.0.0 ***** Pause Server -> active *****
Wed 26 Mar 1997 08:27:32 127.0.0.1 127.0.0.1 GET /wbwizard/ HTTP/1.0 <473>
Wed 26 Mar 1997 08:27:33 127.0.0.1 127.0.0.1 GET /wbwizard/Wizard.htf?now=30453
HTTP/1.0 <6136>
Wed 26 Mar 1997 08:27:36 127.0.0.1 127.0.0.1 GET /wbwizard/BasicEx?now=30453 HTTP/1.0
<491>
Wed 26 Mar 1997 08:27:36 127.0.0.1 127.0.0.1 GET
/wbwizard/basicex/Wbexams.htf?now=30456 HTTP/1.0 <7783>
Wed 26 Mar 1997 08:27:38 127.0.0.1 127.0.0.1 GET
/wbwizard/basicex/WBexam1.HTF?now=30456620&useBACKbutton.XX=doUSEit HTTP/1.0 <1033>
Wed 26 Mar 1997 08:27:39 127.0.0.1 127.0.0.1 GET
/wbwizard/basicex/WBexams.htf?now=30458430 HTTP/1.0 <7783>
Wed 26 Mar 1997 08:27:40 127.0.0.1 127.0.0.1 GET
/wbwizard/basicex/WBexam2.HTF?now=30459810&useBACKbutton.XX=doUSEit HTTP/1.0 <1395>
Wed 26 Mar 1997 08:27:42 127.0.0.1 127.0.0.1 GET
/wbwizard/basicex/WBexams.htf?now=30460850 HTTP/1.0 <7783>
Wed 26 Mar 1997 08:27:46 0.0.0.0 0.0.0.0 ***** Pause Server -> paused *****
Wed 26 Mar 1997 08:27:47 0.0.0.0 0.0.0.0 ***** Quitting *****
Wed 26 Mar 1997 08:27:47 0.0.0.0 0.0.0.0 ***** Stop Log *****
```

Extended Original WebBase (EMWACS) Log File Format is the same as Original WebBase (EMWACS) Log File Format with the addition of one item at the end of each line:

- **<bytes>** – the content-length of the document transferred in bytes or 0 if not available.

12.2 Caching

Caching is storing information into local memory so that if the information needs to be used in the future it will be readily accessible. There are several variables of caching used by or affecting **WebBase**: browser-side caching of forms, **WebBase** forms caching, and **WebBase** ODBC Connection caching.

Browser-Side Caching

When a browser sends a URL to a server, it caches the full URL and the results returned from the URL. If the URL is requested again, the browser simply displays the contents from the cache instead of making the request of the server again. This works fine for static pages. But the true power of **WebBase** is in being able to provide dynamic pages. This section addresses how to circumvent browser-side caching to always provide the latest information on a page to a user.

The first approach is to provide information to the browser about when the information in its cache is no longer valid. This can be done by setting the *%expire%* variable, which causes the Expires header parameter to be set. The value of *%expire%* in seconds is added to the current time in GMT and returned to the browser. This value defaults to 0. If *%expire%* is set to -1, the Expires header parameter is not generated; the form will never expire. If the value is set to -2, the Expires header parameter is set to 12:00:01 on January 1, 1900. It is recommended that %expire% be set to -2 to cause forms to be marked as expired.

However, experience has shown that most browsers do not honor this Expire header parameter unless the page was accessed using the POST command. Pages accessed via a GET seem to ignore this feature. **WebBase** sends the expiration information in the header regardless of the command used to request the page.

The second approach is to generate unique command lines. Browsers typically cache pages based on the command line sent to the server. For a page referenced as http://<x>/foo.htf, it can also be referenced via http://<x>/foo.htf?x=1 where the x=1 is an argument that the page should ignore but it is part of what the browser uses to identify the pages in its cache. For example,

```
http://<addr>/foo.htf
http://<addr>/foo.htf?x=1
http://<addr>/foo.htf?x=2
```

would all be considered different pages as far as the browser's cache is concerned. If the page is not dependent upon the argument x, they should all return the same result as

```
http://<addr>/foo.htf
```

Here are some examples of how to create a unique URL using command line arguments. Each of these includes a variable called “now” whose value is set to %seconds%. Since the number of seconds is going to be always changing, this will keep the form from being cached at the browser so the latest information will always be retrieved and displayed for your users.

For an anchor:

```
<A HREF="form2.htf?arg1=val1&now={%seconds%}" Next page </A>
```

For a <FORM> construct:

```
<FORM METHOD="GET" ACTION="form2.htf">
  ...some input statements...
  <INPUT TYPE="HIDDEN" NAME="now" VALUE="{%seconds%}">
</FORM>
```

For a redirect:

```
{redirect2 form2.htf}
  now={%seconds%}
{/redirect2}
```

There is no requirement that form2.htf actually has to do anything with the “now” argument passed in. It is simply being used to override browser caching. If you run the **WebBase** examples, you'll notice this "now=###" construct showing up on lots of the examples.

This "trick" is only required when you are working with dynamic pages whose contents are expected to change. But since that's what **WebBase** is designed for -- allowing a user to create dynamic pages from database information -- it's a very useful trick to master.

Forms Caching

Forms are the files read and processed by **WebBase**. By default, they are .htf files although other files can also be specified to be processed by **WebBase**. When a file to be processed is specified in a URL, **WebBase** locates the file on disk, reads the information into it, and generates an internal tree structure representing the **WebBase** macros and variables. Once the tree structure is built, WebBase then processes it. The appropriate value of each variable is substituted, any operations are performed, and the results are added into the stream that is finally returned to the browser. This stream contains only text and HTML tags; all **WebBase** constructs have been removed.

WebBase is set up by default to perform forms caching. The internal tree structure that is built is placed into the form cache. If the file is subsequently referenced, the internal structure is removed from the cache and re-used. The forms are re-entrant – only the associated variables and fields differ. This provides a performance advantage is that **WebBase** does not have to hit the disk to read the form each time it is accessed, nor does it have to parse the text each time.

There are two variables affecting caching: %cacheEnabled% and %cacheTimeCheck%. Both of these can be modified via the WebBase WebServer menus. By default, both variables are set to true. The %cacheEnabled% variable indicates that forms caching is to be used. It is strongly recommended that this variable always be set to true, as it provides a performance improvement with no associated limitations.

The %cacheTimeCheck% variable is only active when forms caching is enabled. If set to true, which is the default, **WebBase** will check to see if the form on disk has been modified subsequent to the version that was added to the cache. If so, the form on disk is opened, read and the new contents are placed into the cache. This should be set to true in a highly interactive development environment. In a pure production environment this should be turned off as checking the time stamp involves open file overhead, although less than allocating buffers and actually reading and reparsing the file as when caching is off all together.

Creating a form containing the following line can clear all of the forms in the cache:

```
{f= %cmd% clearFormsCache}
```

ODBC Connection Caching

The first time a user makes a request of a database, a new ODBC connection is made for that source name and username. When the request is finished, the connection is put into the cache and marked that it is idle. If multiple users are accessing the same database at the same time, then multiple connections will be made and cached since each connection can only handle a single request at a time. If you were to look at the %ODBCcacheHTML% variable, you might find several entries in the cache for the same source and username. These are there because multiple users have been making requests at the same time.

It is recommended that ODBC connection caching be enabled to improve performance. If ODBC caching is disabled, each database query will take longer to be made since a new connection has to be created. After the query is complete, the connection goes away. You can turn caching off by creating a global variable %cacheODBC% and setting its value to false. If you have multiple databases, this will turn caching off for all of them.

It is possible to control when an ODBC connection is generated using the cache keyword on the *sql* macro. A value of ‘false’ will cause the connection for that particular sql query to not be cached. If the keyword is not specified, the connection is cached.

All of the current ODBC connections can be cleared either using the Clear ODBC Cache option on the WebBase WebServer window, or by creating a form containing the following line:

```
{f= %cmd% clearOdbcCache}
```

Additional information about the ODBC connection cache in included in the section on Database Administration in Chapter 14.

12.3 WHERE Clause & Variable Name Suffixes

The *%WHERE%* variable was designed to automatically create an SQL WHERE clause from the variables found in the GET or POST command string.

A simple example:

```
GET test.htf?ID=1234&name=George
```

yields

```
{%WHERE%} → WHERE ID = 1234 AND name = 'George'
```

The ID= and name= fields in the command line would typically come from <INPUT NAME="ID" VALUE...> elements in a form. One could also specify this information in an anchor as <A HREF="test.htf?ID={val1}&name={val2}"> ...

It may not always be desirable to have all of the fields in a command line be used in the creation of the WHERE clause nor will all the tests be the **=** (equal) operator. **WebBase** has taken this into account by providing a scheme for encoding a suffix on the variable name field to alter the way in which the *%WHERE%* variable is constructed.

Here is another example. The <INPUT> statements within the <FORM> construct requesting variable values are:

```
<INPUT TYPE=”TEXT” NAME=”ID.GT” VALUE=”1234”>
<INPUT TYPE=”TEXT” NAME=”NAME.%LIKE%” VALUE=”George”>
```

The command line generated using these two input variables and their values is shown below. Note that the browser has performed the necessary encoding on the non-alphanumeric characters (e.g., the ‘%’ and ‘.’):

```
GET test.htf?ID%3EGT=1234&name%3E%25LIKE%25=George& code%3EXX=wxyz
```

The resulting %WHERE% variable is:

```
WHERE ID > 1234 AND name LIKE '%George%'
```

In this example, a > (greater than) test was done on the ID field and a LIKE (case-insensitive comparison) test on the name field using wild carding. The variable name suffixes that can be used to modify a %WHERE% clause, their functions and an example of their usage are:

- **.EQ** e.g. *ID.EQ=123* fi *ID = 123*
  adds the field to the WHERE clause using an equal operator (the default if no suffix is specified).

- **.EQN** e.g. *ID.EQN=123* fi *ID = 123*
  same as .**EQ** but coerces the value to a number using asNumber.

- **.EQS** e.g. *ID.EQS=123* fi *ID = '123'*
  same as .**EQ** but coerces the value to a string using asString and encloses the field in single quotes.

- **.GE** e.g. *ID.GE=123* fi *ID >= 123*
  adds the field to the WHERE clause using a greater than or equal operator.

- **.GEN** e.g. *ID.GEN=123* fi *ID >= 123*
  same as .**GE** but coerces the value to a number using asNumber.

- **.GES** e.g. *ID.GES=123* fi *ID >= '123'*
  same as .**GE** but coerces the value to a string using asString and encloses the field in single quotes.

- **.GT** e.g. *ID.GT=123* fi *ID > 123*
  adds the field to the WHERE clause using a greater than operator.

- **.GTN** e.g. *ID.GTN=123* fi *ID > 123*
  same as .**GT** but coerces the value to a number using asNumber.

- **.GTS** e.g. *ID.GTS=123* fi *ID > '123'*
  same as .**GT** but coerces the value to a string using asString and encloses the field in single quotes.

- **.LE** e.g. *ID.LE=123* fi *ID <= 123*
  adds the field to the WHERE clause using a less than or equal operator.

- **.LEN** e.g. *ID.LEN=123* fi *ID <= 123*
  same as .**LE** but coerces the value to a number using asNumber.

- **.LES** e.g. *ID.LES=123* fi *ID <= '123'*
  same as .**LE** but coerces the value to a string using asString and encloses the field in single quotes.

- **.LIKE** e.g. *name.LIKE=George* fi *name LIKE 'George'*
  adds the field to the WHERE clause with a LIKE operator. This is very similar to using ‘=‘. However, the value of LIKE is when the user is allowed to type in the % character as part of the input: thus positioning the ‘wildcard’ somewhere in the input text rather than just at the beginning and/or the end of the string. Even if the wildcard character is to be at the beginning or the end, the user who is entering the text has control over where the % character is located and not the developer of the Web page.

- **.%LIKE%** e.g. *name.%LIKE%=George* fi *name LIKE '%George%'*
  adds the field to the WHERE clause with a LIKE operator and includes wild carding at both ends of the string.

- **.%LIKE** e.g. *name.%LIKE=George* fi *name LIKE '%George'*
  adds the field to the WHERE clause with a LIKE operator and includes wild carding at the beginning of the string.

- **.LIKE%** e.g. *name.LIKE%=George* fi *name LIKE 'George%'*
  adds the field to the WHERE clause with a LIKE operator and includes wild carding at the end of the string.

- **.LT** e.g. *ID.LT=123* fi *ID < 123*
  adds the field to the WHERE clause using a less than operator.

- **.LTN** e.g. *ID.LTN=123* fi *ID < 123*
  same as .**LT** but coerces the value to a number using asNumber.

- **.LTS** e.g. *ID.LTS=123* fi *ID < '123'*
  same as .**LT** but coerces the value to a string using asString and encloses the field in single quotes.

- **.NEQ** e.g. *ID.NEQ=123* fi *ID != 123*
  adds the field to the WHERE clause using a not equal operator.

- **.NEQN** e.g. *ID.NEQN=123* fi *ID != 123*
  same as .**NEQ** but coerces the value to a number using asNumber.

- **.NEQS** e.g. *ID.NEQS=123* fi *ID != '123'*
  same as .**NEQ** but coerces the value to a string using asString and encloses the field in single quotes.

- **.NLT** e.g. *ID.NLT=123* fi *ID !< 123*
  adds the field to the WHERE clause using a not less than operator.

- **.NLTN** e.g. *ID.NLTN=123* fi *ID !< 123*
  same as .**NLT** but coerces the value to a number using asNumber.

- **.NLTS** e.g. *ID.NLTS=123* fi *ID !< '123'*
  same as .**NLT** but coerces the value to a string using asString and encloses the field in single quotes.

- **.NGT** e.g. *ID.NGT=123* fi *ID !> 123*
  adds the field to the WHERE clause using a not greater than operator.

- **.NGTN** e.g. *ID.NGTN=123* fi *ID !> 123*
  same as .**NGT** but coerces the value to a number using asNumber.

- **.NGTS** e.g. *ID.NGTS=123* fi *ID !> '123'*
  same as .**NGT** but coerces the value to a string using asString and encloses the field in single quotes.

- **.XX** e.g. *code.XX=sample* fi
  skips this field name when constructing the WHERE clause.

12.4 ISMAP Features

WebBase can handle **ISMAP** images but does not make use of a .MAP file. The HREF specified in the anchor surrounding the ISMAP image is not a .MAP file but simply another .htf file. This file can access the variables *%x%* and *%y%* to determine the x and y coordinates returned when the user clicked over the ISMAP image. Using the {if ...}{else}{/if} or {case ...}{match...}{/case} features of **WebBase**, one can determine how to respond to a click at a given x,y coordinate and either present information directly from the current pseudo-.MAP form or use the *reDirect* macro to point the user to another location to handle that coordinate mouse click.

The example presented below in Fig. 12.6 tests for the **x** coordinate being between 100 and 150 and the **y** coordinate being between 200 and 300. If this condition is true the user is redirected to another web page. Inline HTML can also be returned as part of the appropriate if/else/end-if structure.

Fig. 12.6 Example ISMAP image code

```
{if 100 150 %x% between:and: 200 300 %y% between:and: &}
   {reDirect 'url...'}
{/if}
```

A more detailed example using an ISMAP image is presented with the WebBase WebWizard More Examples table.

Security

Chapter 13

This chapter discusses how **WebBase** forms can be made secure using Basic Authentication and directory browsing. Information on configuring firewalls to allow **WebBase** access is also presented.

13.1 Basic Authentication

Basic Authentication is used by browsers for authenticating access to files and/or directories. Upon receipt of an unauthorized request for a URL, the server responds with a challenge requesting authorization. To receive authorization, the client sends a user name and password. If an improper or invalid user name/password pair is sent to the server, an error code of ‘401, Unauthorized’ is returned by the server.

Before addressing how authorization should be set up using **WebBase**, the user must first decide which page(s) require authorization before the user can view them. Any page requiring authorization should include something similar to the code presented in Fig. 13.1 at the top of each page:

Fig. 13.1   Example code checking for authorization

```
{set %output% false}
{if 'Authorization' %cmd% getVariable: isNil}
  {reDirect 'login.htf'}
  {exit}
{/if}
```

The user must specify the file referenced by the redirect macro; there is no requirement that it be called ‘login.htf’ as in the example code above. This authorization check can be included in a separate insert file (e.g., checkAuth.htf), so that only the following would have to be added on each page requiring authorization:

```
{insert ‘checkAuth.htf’}
```

Figure 13.2 is an example of a form that requests authentication via the browser:

Fig. 13.2 Form requesting authentication

```
{comment}
  Check if authentication has been performed yet.  The variable
‘Authorization’ will be nil if authentication has not yet been
performed.  When the variable ‘Authenticate’ is set to hold a non-
empty string, WebBase will inform the browser that authentication
should be performed.  The string associated with the Authenticate
variable, along with the entered IP address, is used in the
authentication window.
{/comment}
{if 'Authorization' %cmd% getVariable: isNil}
  {set Authenticate 'User Verify'}
{else}
  {set Authenticate ''}

  {comment}
    The authUserName and authPassword operations extract the username
and password from the Authorization variable; these are the entries
made by the user in the authentication process.
  {/comment}
  {set thename Authorization authUserName}
  {set thepass Authorization authPassword}

  {comment} Check the database to see if a match was found.  The
specific source, user and password must be set up by each user site.
Note that the {sql} macro is wrapped within the {errorProtect} macro
in case a problem occurs accessing the table of usernames and
passwords.  The specific action to be taken is site-specific; in this
case the user is redirected to the form ‘error.htf’ which may simply
indicate that the site is currently unavailable.
  {/comment}
  {errorProtect}
    {sql to results source 'users' user 'db_username' password
'db_password'}
      SELECT * FROM USER_TABLE WHERE USER_NAME = '{thename sql=true}'
AND USER_PWD = '{thepass sql=true}'
    {/sql}
  {onError}
    {reDirect 'error.htf'}
  {/errorProtect}

{comment}
    Use the {case} macro to determine the next form based on whether
the user entered a valid username and password.
  {/comment}
  {case results size}
    {match 0}
    {comment}
      User does not exist.  This will cause the browser to inform the
user that authentication failed and see if they want to try again.
If they cancel at this point, the text within this portion of the
case block is displayed.  The specific HTML to be displayed to the
user on cancel is user-specific; the following is just an example.
    {/comment}
    <HTML><HEAD><TITLE>LOGIN FAILED!</TITLE></HEAD>
    <BODY>
    <CENTER><H1>LOGIN HAS FAILED!</H1><P></P>
    <A HREF="login.htf">TRY AGAIN</A><P></P>
    </BODY>
    </HTML>
    {set Authenticate 'User Verify'}
    {exit}
  {otherwise}
    {comment}
      A match was found in the database, so allow the user to go to a
“protected” page
    {/comment}
    {reDirect 'protectedPage.htf'}
    {exit}
  {/case}
{/if}

{comment}
  The user pressed the Cancel button on the initial Authentication
window.  Display some appropriate HTML to the user.
{/comment}
<HTML><HEAD><TITLE>LOGIN FAILED!</TITLE></HEAD>
<BODY>
<CENTER><H1>LOGIN HAS FAILED!</H1><P></P>
<A HREF="login.htf">TRY AGAIN</A><P></P>
</BODY>
</HTML>
```

Setting the variable 'Authenticate' tells **WebBase** to send the browser:

```
HTTP/1.0 401 Unauthorized
WWW-Authenticate: Basic realm="User Verify"
```

The value returned by authentication in the variable 'Authorization' looks like

```
'Basic VG9ktDptDWplx3Q='
```

To more easily test for valid username and password matches, the following operations are available. These would all be sent to the variable Authorization created as outlined above.

- **authValid**
  returns true if the string is in fact a ‘Basic’ authentication encoded string, otherwise false. It checks for the existence of the required ‘Basic ‘ prefix and the colon ‘:’ separator required between the user name and password portions of the returned data.

- **authUserName**
  returns a string containing the User Name portion of the authorization. The statement {set uname Authorization authUserName} will decode the returned **Authorization** variable and extract the User Name portion, storing it in the variable **uname**.

- **authPassword**
  returns a string containing the Password portion of the authorization. The statement {set upass Authorization authPassword} will decode the returned **Authorization** variable and extract the Password portion, storing it in the variable **upass**.

The above operations utilize the **authDecode** operation that simply decodes the encoded authorization information in the **Authorization** variable into a string containing the username, a colon (:), and the password. Thus, an Authorization string of the form 'Basic

GdkLkkdn34e9dkLkdj6' might yield an authDecode string of the form 'Joe User:password'; authUserName would return 'Joe User' and authPassword would return 'password'.

A complimentary **authEncode** method exists that, when sent to a string such as 'Joe User:password' would return the string 'Basic GdkLkkdn34e9dkLkdj6'.

The storage and maintenance of the user ids and passwords used for Basic Authentication is entirely at the discretion of each user. It is recommended that a database be created with at least two fields; one for the username and one for the password. Using an appropriate SELECT statement, the database is queried using the username and password entered by the user. If a match is found, access is granted. If no match is found, access is denied.

There is a caveat that needs to be stressed when using Basic Authentication. Once a browser has performed Basic Authentication, the browser will continue to send authentication information to the server with each request until the browser is stopped. It is not possible to clear out the authentication information so that a user can be authenticated differently within another portion of a database.

Although it is possible for a user to create their own user authentication form, an advantage of using Basic Authentication is that the username and password entered by the user are sent in an encrypted format to the server. **WebBase** does not currently support any other mechanism for having information generated at the browser sent to the server in an encrypted fashion.

13.2 Directory Browsing

WebBase can allow directory browsing of files and subdirectories in the path defined by the Directory parameter of the machine hosting **WebBase**. By default, directory browsing is disabled. To enable this feature, a global variable *%directoryBrowse%* must be created with the value ‘true’. See Chapter 9 for information on adding and editing global variables.

Setting this variable to true enables the directory browsing capability within **WebBase**. When the user references a directory pathname via a browser, **WebBase** will return a listing of the files and subdirectories in that directory if it does not find a default file present to return and if browsing has been enabled.

To enable directory browsing but restrict access to specific directories, a file named ‘NOBROWSE’ (note: no extension) is created in the directory to be restricted. The contents of this file are immaterial -- the *existence* of a file with the name NOBROWSE is what restricts **WebBase** from displaying the directory contents of the containing directory. The parent directory entry and any subdirectory entries that contain NOBROWSE files within them will cause these entries to not be shown in the listing of the directory being browsed.

If a user should explicitly reference a directory containing a NOBROWSE file and general directory browsing is enabled via the %directoryBrowse% variable being set ‘true’, the following message is displayed at the browser:

```
403 Browsing is not permitted in that directory
```

13.3 Firewalls

The purpose of a firewall is to limit access to a network. This is often done by limiting access to ports. If multiple HTTP servers will be used and access to users outside the firewall is desired, it is necessary for the site network administrator to modify the firewall to allow access to each port that is used by an HTTP server. For example, if **WebBase** is using port 8000 and Microsoft Internet Information System is using port 80, the firewall must be modified to allow access to port 80 and 8000.

The Late Breaking News window shows information about new releases, bug fixes, and documentation updates available from ExperTelligence. The information comes from a server at ExperTelligence. If your **WebBase** server is behind a firewall, you can allow **WebBase** to get through the firewall by adding the following parameters:

- **HTTP_Proxy**: firewall proxy host name

- **HTTP_ProxyPort**: firewall proxy port number

If these parameters are defined when you launch **WebBase**, the query to get Late Breaking News passes through the indicated firewall.

Database Issues

Chapter 14

This chapter presents information about database and ODBC issues. It also includes sections on specific databases that have unique characteristics.

14.1 ODBC Driver/Database Engine Errors

It is possible to send requests to an ODBC driver and/or database engine that will result in an error occurring within that driver or engine - not actually within the **WebBase** application code itself. This error will be reported back as an “ODBC/driver/database” error with the corresponding *sql* macro provided as part of the error text. This is done to help indicate specifically which macro call was involved should there be more than one in the pertinent form.

Some situations are handled gracefully within the ODBC driver and/or database engine and result in an error message being returned to **WebBase** that **WebBase** then presents to the user. Other error conditions result in an Operating System error which, although returned to **WebBase**, does not necessarily leave the ODBC driver and/or the database engine in a state to allow the server to continue. Some such errors are ‘Protection Violation’ and ‘GPF’ (general protection fault) errors. If one were to examine the error.log file created in the directory containing the WebBase.exe application, one would see a traceback indicating an ODBCDLL API call was made just prior to the error.

It is impossible for **WebBase** itself to prevent errors such as the ‘Protection Violation’ or ‘GPF’ errors noted above. However, **WebBase** will not terminate with such errors. Rather, it will ‘trap’ these errors and report them to the user in a graceful manner that allows for continued operation of the server.

We have been able to reproduce some ‘Protection Violation’ and ‘GPF’ errors in house. One particular way to generate the error was to request a very large amount of data be processed by the database - in one case approximately 40 million records. Although the specific sql macro specified a max of 10 records be returned, the SELECT statement specified a WHERE clause that all the records in the database satisfied - and an ORDER BY clause that requested the ODBC driver sort all these records before returning the first 10 results. Detailed debugging of this situation determined that the ‘Protection Violation’ that occurred was during the execution of the SELECT statement - the ODBC driver was called with the indicated query and ultimately returned the ‘Protection Violation’. In this case the database was simply overloaded in trying to sort all the records in the database to be able to respond to the SELECT request and return only the desired 10 records.

WebBase itself has no concept of what is being requested by an *sql* macro - the enclosed text is merely processed for **WebBase** variables and then passed to the ODBC driver. Nor does it have any concept of the structure and size of the database being addressed. Because of this, **WebBase** cannot prevent such conditions that result in these ODBC driver and/or database engine errors. In some cases, properly screening input from the user before substituting such values into the *sql* macro can minimize the possibility of these types of errors occurring. The above in-house situation had a WHERE FIELD LIKE '%%' clause in its SELECT statement meaning any value in the FIELD column would satisfy the request. If the form had required all input fields to contain values, this error could have been prevented.

WebBase specifically identifies errors of this type as being "ODBC/driver/database" errors and provides the full query that was passed into the ODBC driver as part of the error message text. If such errors are encountered, the user should be able to better analyze such situations and redesign the queries, where possible, to avoid such error situations.

14.2 Database Administration

In many implementations of **WebBase**, the database files will be accessed and updated primarily via forms developed for and processed by **WebBase**. However, there are occasions when it is necessary to edit the database directory or even completely replace the database file. If ODBC caching is enabled, this can cause error messages to be displayed to the user when they attempt to edit or replace the database.

Database administration is a very delicate operation, and becomes even more so if it is to be done remotely. If it is desired to replace the existing database file with a new one, between the time that the database file is copied to your location, any necessary editing changes made, and the file returned back to the server system, people may have added new records to the database. These will then be lost when the new version is copied onto the server.

Clearing Caches

If ODBC connection caching is disabled, then access to the database file should not present any problems. However, it is recommended that ODBC connection caching be used if at all possible with **WebBase** to improve performance. If ODBC connection caching is enabled, all connections to the database must be released before the database is accessible.

Chapter 12 provides details about ODBC connection caching, including how to clear the cache. In order to update a file, it is necessary to turn caching off as well as clear the cache. If you clear the cache without turning caching off, then any connections currently in use are restored to the cache when the request is completed. Because these connections are in use (either active or back in the cache), you will not be able to access the database. In addition, any users making new requests of pages that access the particular source/username will have new connections generated and cached. This again prevents database modifications from being made.

During form development, changes to a database will often need to be made. With ODBC connection caching enabled, these connections can be cleared out by simply doing selecting to 'Clear ODBC Cache' via the WebBase WebServer window. The database can be edited and then form development and testing can continue.

There are also occasions when a production database needs to be modified. This is more difficult to handle since it is not possible to control who is attempting to access a web site. The code in Figure 14.1 can be used to provide forms-based control of caching. This form would be executed to turn off caching and clear the cache. Any necessary database modifications would be done. Then the form would be re-executed to turn caching back on.

Figure 14.1 Example forms-based database updating code

```
{! Display the state of the ODBC cache upon entry !}
ODBC Cache state before: {%cacheODBC%}

{! Display the contents of the ODBC cache !}
{%ODBCcacheHTML%}

{! Toggle the state of the ODBC cache !}
{setGlobal %cacheODBC% %cacheODBC% not}

{! Clear the cache.  Toggling the state only sets a flag; it does not
remove any existing connections !}
{f== %cmd% clearOdbcCache}

{! Force the menu items under the WebBase WebServer Option’s menu to
agree with the current state of caching.  The cache flag was changed
above but this does not cause the menu item to be updated !}
{f== %cmd% cacheMenuItemCheck}

{! Display the new state of the caching flag !}
ODBC Cache state after: {%cacheODBC%}

{! Should display that the cache is now empty !}
{%ODBCcacheHTML%}
```

It is strongly recommended that forms such as these be protected with some form of authorization (e.g., Basic Authentication), so that access to them is restricted to appropriate personnel.

Note:

Turning the cache off does not prevent someone else from hitting your site and accessing that database after you have turned the cache off - they will simply create a connection to the database and release that connection as soon as they are done with it. Timing is the issue here - it is possible for someone to hit your site after you've turned the cache off but before the database file modifications have been completed. Protecting the database from access while caching is off can be done as described in the following section.

SQL Protect using Global Variables

In order to do database administration, it is necessary for the forms designer to give some thought to how best to protect the database yet still allow it to be modified. One suggestion is to use a global variable that indicates whether the database is OK to use in a sql call. If so, then execute the sql statement. If not, output a message that the database is unavailable.

For example, create a global variable called myDBAvailable and set it to true. Then on each {sql} call, implement it like:

Fig. 14.2 Example code to test database availability

```
{if myDBAvailable}
  {errorProtect}
    {sql source ...}
      INSERT/SELECT statement
    {/sql}
  {onError}
    Oops!  A database error occurred.
  {/errorProtect}
{else}
  Sorry, database is currently unavailable.  Please try again later.
{/if}
```

When it is time to perform maintenance on the file, either locally or remotely, set the global variable to false, reload the global variables, and then users will get the message that the database is unavailable. After the maintenance is completed, which can be in 1 minute or 1 hour, the value of the global variable is changed to true and users can again access the database successfully.

Think of it as sort of an "sql protect" macro -- you're not checking for errors as much as you're checking for the availability of the database.

14.3 SQL Selects & Timing

If ODBC connection caching is used, as is the default, it has been discovered that a problem can occur when an INSERT, UPDATE or DELETE of the database is done immediately followed by a SELECT in which the changed information is to be reflected. Users who force the connection to be closed following the INSERT, UPDATE or DELETE consistently find their new or updated data in the subsequent SELECT. Closing the connection flushes any pending INSERT or UPDATE operations that are apparently performed in an asynchronous fashion.

It is possible to close the connection following an INSERT, UPDATE or DELETE (or a SELECT for that matter) by including the ‘cache false’ keyword value pair in the *sql* macro. This tells **WebBase** that regardless of whether a cached or a new connection was used for the SQL statement, the connection that was used is to be closed and released following its use.

14.4 Microsoft Access Database Issues

ODBC Driver Bug/Workaround

The ODBC driver for MS Access included in ODBC Driver Pack #3 for Windows-NT and Windows-95 systems has a bug that Microsoft is working on correcting. The symptom of this bug is that **WebBase** will crash or simply quit with no error indication whatsoever. If you experience these problems, are running on Windows NT 4.0, and are using Microsoft Access, it is recommended that you implement this workaround.

Accessing an MS Access database via ODBC while running under Windows NT 4.0 presents a problem when one attempts to free the memory associated with the first allocated ODBC connection handle. In most cases attempting to free this area of memory results in a GPF or

Protection Violation error. This may not occur the first time, but it will usually occur within the first three or four times that same memory area is allocated and freed.

WebBase uses ODBC to access its databases and must allocate a connection handle when first connecting to a database. Under default conditions, this handle is retained in the **WebBase** ODBC cache after its allocation and remains in cache until the **WebBase** server is shut down or the user explicitly clears the ODBC cache. Under either of these conditions it is probable that the above-described GPF error will then occur. If a user has disabled the ODBC cache, it is highly likely that the GPF will occur as soon as a **WebBase** .htf form that accesses an Access database is processed.

The solution to the above problem is in allocating the first connection handle, then closing the connection and not freeing the handle. This is deliberately creating a small memory leak by leaving the handle's memory allocated. This not only prevents the GPF from occurring on this first handle allocation but makes this area of memory unavailable for reuse in subsequent ODBC calls and thus prevents the GPF from occurring on any of these calls. The problem seems to be very specifically related to the first and only the first allocated ODBC connection handle.

For users of the **WebBase** server this means that one must

1. have a way of specifying that the connection handle associated with an *sql* macro call NOT be freed after use

2. have a way of ensuring such an *sql* macro call will be made before any other *sql* macro call to an Access database can occur. In other words, there must be a way to ensure this is the first allocated connection handle that is being marked for NOT being released.

Item #1 is accomplished through the use of the new *keepHandle* keyword on the *sql* macro. The <u>only</u> purpose of this keyword is to support this workaround. It is anticipated that once Microsoft corrects this problem and a new ODBC driver pack is available that this keyword and workaround will be eliminated. By default the value of the keepHandle keyword is false; the handle is NOT kept following the SQL statement (unless, of course, the handle is being cached in the ODBC connection cache).

Setting the keyword *keepHandle* to true indicates that the handle allocated for the ODBC connection to the Data Source is <u>not</u> to be freed following use. In addition, even if the ODBC cache is enabled, the connection handle associated with this SQL statement will NOT be placed in the ODBC cache following use but will be disconnected but NOT freed. This will ensure that this handle will not cause a GPF as a result of this SQL statement. It will also ensure that a GPF will not be caused as a result of clearing the ODBC cache in the future either explicitly or as a result of the cleanup action taken when the server is shut down.

For this *keepHandle* keyword to be effective against the GPF problem it must be associated with the first ODBC connection made to the database. For this reason the SQL statement containing this option must be executed before any other SQL statement can be executed.

Item #2 is accomplished through the specification of a startup form. To ensure that the above SQL statement is executed before any other **WebBase** .htf form is run that might contain an SQL statement, a Startup Form is used. The Startup Form is a .htf form that **WebBase** will automatically run each time that the server is started and before it begins processing any browser commands.

WebBase runs the Startup Form as if it had been CALLed by the *call* macro. The only difference is that the Startup Form is CALLed by the **WebBase** Server itself and NOT by another .HTF form. This CALLed Startup Form is CALLed as if wait true were indicated; the server waits for the form to complete before going on to process other forms. It accepts any number of returned parameters passed back from either a return or exit macro in the CALLed Startup Form.

Since there is no browser involved in the running of this Startup Form, the output returned from this form is displayed in the WebBase WebServer window. An example of such output is:

```
Running StartupForm: 'Startup.htf'.
01: 'OK'
StartupForm: 'Startup.htf' complete.
```

The Startup Form is identified and the 01: 'OK' was the first (and only) parameter returned by this form. Additional returns would be displayed as 02: ..., 03: ... etc.) If the CALLed Startup Form would have returned text to a browser (if CALLed from another .HTF form initiated by a browser command) that text will be displayed following the above in the same WebBase WebServer window. This output can be used to visually verify that the Startup Form executed as expected. An example is shown below using an errorProtect macro sending both normal and error return codes back to the server as appropriate.

WebBase will run a Startup Form each time it is launched if one is specified as a **WebBase** parameter and the specified file exists at the indicated location within the server's Directory structure.

If the StartupForm parameter is not specified when **WebBase** is launched or if no file is found at the indicated location, then the Startup Form will not be executed. If StartupForm parameter is specified but the file cannot be found, a message to that effect will be posted to the WebBase WebServer window. The absence of the file will not cause processing to stop or any other error to be indicated.

Since each user will have their own ODBC Data Sources, it is necessary for each user to provide an SQL statement that will connect to one of these sources using the new *keepHandle* keyword. This allocates the connection handle in a way that will ensure it is not released following the ODBC call. To insure this specific call is made each time **WebBase** is launched before any .htf form containing an SQL statement addressing an Access database is processed the {sql ... keepHandle true ...} macro should be placed in a Startup Form as described above. It is not necessary to make a specific type of SQL statement (SELECT, INSERT, UPDATE, or DELETE) nor is it necessary to submit/retrieve any data to/from the database. The most efficient way of utilizing this workaround is to specify a SELECT that will return no matches. It is merely the act of connecting to and not releasing the connection handle after disconnecting from the database that circumvents the problem.

Below is a sample Startup Form used to solve this problem. The referenced database is the **WebBase** Autos.mdb Used Cars example database that we distribute with **WebBase**. The Autos.mdb file itself is an MS Access 2.0 file but if one was to access it using the MS Access 7.0 ODBC driver under Windows NT 4.0, it becomes a candidate for generating the GPF error described above.

Fig. 14.3 Example Startup Form to handle Access Workaround

```
{set %output% false}
{comment}
  This is a startup form. This form is being used explicitly as a
workaround for the problem associated with accessing an MS Access
database via ODBC while running under Windows NT 4.0. The preceding
{set %output% false} will prevent any text generated within this form
(newlines, etc.) from being sent back to the WebBase server - all
such output would normally be displayed in the WebBase WebServer
window in lieu of a browser as is done for normal .htf forms.
{/comment}

{errorProtect}
  {sql to temp source 'myAccess' user 'fred' password 'test'
    keepHandle true}
    SELECT * FROM Cars WHERE ID = 0
  {/sql}

  {comment}
    The above SELECT will always return zero records since we know
that no entry in the database has an ID of 0. The following exit
macro will report to the WebBase WebServer window the fact that the
above SQL statement completed without an error.
  {/comment}

  {exit 'OK'}
{onError}

  {comment}
    If an error occurs while attempting to process the above SQL
statement we will come to this onError clause of the errorProtect
macro. Below we will extract the messageText from the error instance,
turn the %output% back on, and display that message text in the
"browser output" which in this case will result in it being displayed
in the WebBase WebServer window.  We will also explicitly return the
word 'Error' in place of the 'OK' as done above.
  {/comment}

  {set text %error% messageText}
  {set %output% true}
    Error: {text}
  {return 'Error'}
 {/errorProtect}
```

We believe the above workaround is a reasonable solution for a problem that we hope will be fixed by a future ODBC and/or Windows NT 4.0 Service Pack.

The added SQL macro keepHandle keyword will more than likely be removed in a future release of **WebBase** when it is confirmed that such a fix has been implemented and sufficient time has elapsed to allow our users to obtain and install the fix.

Too Many Client Tasks Error

WebBase was designed so that database connections would be cached to improve performance. When a *sql* macro is processed, the ODBC connection cache is checked to see if there is a connection handle for the specified source and username. If so, the handle is reused. If not, a connection handle is created and then stored in the cache after the sql call is completed.

The following error may occur when caching is enabled:

```
"ODBC API call: 'connect:' returned the following error message: '
 [Microsoft][ODBC Microsoft Access 7.0 Driver] Too many client
tasks."
```

The above error has been noted by a number of WebBase users and is based upon the fact that Microsoft's Jet database engine versions 1.1, 2.0, and 2.5 can only be used by 10 client applications simultaneously on any one machine. WebBase, to boost database performance, caches ODBC connections by default and can quickly cause more than 10 simultaneous connections to be established with MS databases using this Jet database engine.

Note again, this limitation is with the total number of simultaneous connections via the Jet database engine, not to any one data source. This Jet database engine is used for MS Access, MS dBase, MS Excel, MS FoxPro, MS Paradox, and MS Text ODBC Driver interfaces so any combination of the above data sources are included in this limitation.

We have confirmed that this is not an issue with the Microsoft ODBC Desktop Driver Pack 3.0 (Jet 3.0). During testing, we were able to access many more than 10 data sources via this driver with simultaneous (cached) connections in WebBase!

Microsoft ODBC Desktop Driver Pack 3.0 (and later releases), however, are targeted for Windows 95 and Windows NT 4.0 Operating Systems only. User's running earlier versions (Windows 3.1, Windows for Workgroups or Windows NT 3.5x) cannot take advantage of this fix.

To assist WebBase users on these earlier operating systems, WebBase has been modified to alleviate (although not totally eliminate) this "Too many client tasks" limitation without requiring users to disable the ODBC Connections Cache.

Users facing this "Too many client tasks" limitation can set a variable called %clearCacheAndRetryOnConnectionError% to true (the default condition is to assume this variable is set to false including when the variable itself does not exist). This may be a local variable defined within a given .htf form or a global variable set in the System Registry or WebVars.ini file. If set as a local variable, the condition will apply for that one form only; if as a global variable, for all forms (unless overridden locally).

When WebBase attempts to make a new ODBC connection because it did not find an available, appropriate connection in its ODBC Connections Cache, the above "Too many client tasks" error is returned when this limit is reached. At this time, if %clearCacheAndRetryOnConnectionError% is found to be set to true, WebBase will clear the ODBC Connections Cache of all cached connections and try making the requested new connection a second time. Assuming the ODBC Connections Cache contained at least one idle connection to an ODBC source serviced by the Jet database engine, clearing the cache will make available the needed connection and the second attempt should succeed. If either the variable %clearCacheAndRetryOnConnectionError% was not found to be set to true or the second attempt at connecting to the data source fails, the error will be returned to the user as are all other ODBC API errors.

This process does introduce some inefficiency in that **WebBase** is unaware of the fact that the requested data source requires the Jet database engine since all it has is the ODBC data source name, user name, and password values. It does not attempt to interrogate the cached connections to see if they are Jet-engine-based ODBC driver connections. Although it is possible for WebBase to be a bit more selective when clearing the cache, it was felt that the above-described implementation is a reasonable attempt to address a problem that in essence is associated with operating systems that Microsoft itself has obsoleted. The net effect is to introduce additional disconnect and connect overhead only when triggered by the "Too many client tasks" error and not for every data source access as required when ODBC Connections Cache is totally disabled.

14.5 Microsoft Excel Database Issues

Microsoft Excel spreadsheets can also be accessed via **WebBase** and ODBC drivers. However, it’s a bit more involved than with other databases. Here's how to go about setting up ODBC access of Excel spreadsheets:

1. You can only have 1 sheet in a workbook.

2. The sheet must be set up so that row 1 contains all the field names, rows 2-n contain the data records.

3. Once you have your data set up, select all the cells you want to consider as a “table”. This must include the field names in row 1. You can include empty rows which will give you room to insert new records. Within Excel, from the Insert pull-down menu, select Name and then select Define. Enter an appropriate name for your “table” (e.g., Employees).

4. Close the workbook.

5. Set up your Excel ODBC source following the general instructions in Chapter 3, and point it to the workbook file.

6. Write your htf file to access the source name entered in step #5 and the “table” name entered in step #3.

7. Invoke the htf file and you should be able to access the records!

You cannot have any empty columns in the selected table (columns without a field name for them). You can have empty cells within a column, but the column must have a name in row #1.

It is also recommended to include empty rows at the bottom of the table. This is equivalent to having null records in the database that can be filled in at a later date WITHOUT having to go back into Excel and redefine the “table” to contain new records that may have been added via an INSERT.

14.6 FoxPro Database Issues

The FoxPro database does not support the DELETE command in the same fashion as other databases. Instead of actually deleting the record from the database, it simply flags the record as being deleted. This flag is implemented as just another field in the record. When performing a SELECT, the ODBC driver does not check this particular ‘delete-flag-field’ when returning records that match the select criteria. Thus, records which have been marked for delete may be returned as part of a collection retrieved via a SELECT statement. The database needs to be compressed before “deleted” records are actually removed.

WebBase Q&A

Chapter 15

This chapter includes some frequently asked questions and their answers. Installation problems are addressed in Chapter 3. Additional information may be found on the **WebBase** Web site and in the **WebBase** Support Forum on the **WebBase** Web site.

- **How do I upgrade?**
  Check the **WebBase** Web site for instructions on how the latest version of **WebBase** can be acquired.

- **I launch WebBase and try the dateTime command to test the program but get a 404 The requested URL was not found error.**
  For any file name or internal command sent to **WebBase**, **WebBase** will first try and locate the directory specified in the Directory parameter. If **WebBase** cannot locate the directory, it reports the '404 - file not found' error. Check your startup parameters to verify that the Directory parameter specified actually exists.

- **Why can't I get the database examples to run? I see the source of Dbexam1.htf form when I open this file.**
  This happens when you do an **open file** on Dbexam1.htf. Many browsers allow you to view local file system files - and this is what you are doing. To process the file you must do an Open Location using a URL and not merely an Open File using the file pathname. Also, the Database Examples require that you have set up the Autos.mdb database file to be accessible via ODBC; see Chapter 3 for instructions on how to set up the data source, username and password for this example.

- **How can I display images or pictures from a database?**
  WebBase does not currently support retrieving binary data from database fields. As there are many people interested in being able to save and retrieve images, the solution that we provide is to store the binary image information in external files in a defined location and then identify the location within the database field. For example, a local, user or global variable could be defined such as:

```
{set imagesDir 'images\'}
```

This directory would be relative to the directory containing forms, which is normally c:\http. Within the database, there would be a field to contain the location of the image file. An entry in this field would look something like:

```
{imagesDir}JBOX3A.GIF
```

The curly braces are used to indicate that the 'imagesDir' is a variable name. When the record containing this field is retrieved, the image can be displayed using:

```
<IMG SRC="{f= PictureField %cmd% asHTF:}">
```

The 'asHTF:' operation causes the {imagesDir} variable to be resolved into 'images\'. Thus, the source of the image to be displayed is 'images\jbox3a.gif'. Absolute path references can also be used, including accessing the image files via another server! For example, you might want to have both IIS and **WebBase** running on your site. WebBase could handle any forms needing database processing. Any image files could be returned via IIS. To handle this, you would simply create your variable using something like:

```
{set imagesDir 'http://www.yourSite.com:8000/images/'}
```

- **How do I replace a database when users are actively posting requests?**
  There is not a way to put **WebBase** into a ‘non-service’ state but you might consider simply protecting all your database accesses. Chapter 14 presents details on how to do Database Administration.

- **How can I find out the type of browser accessing WebBase?**
  The header variable User-Agent is passed in from the browser and identifies the type and version of the browser in use. For example, a Netscape 3.0 browser on a Windows-95 system will return:

```
Mozilla/3.0 (Win95; I)
```

A MSIE 3.0 browser on the same system will return:

```
Mozilla/2.0 (compatible; MSIE 3.01; Windows 95)
```

- **Can you use stored procedures in WebBase?**
  WebBase provides you a means of issuing an SQL statement via ODBC to your database. If the query language supports stored procedures and the ODBC driver supports stored procedures, then **WebBase** will support stored procedures. The ‘text’ between the {sql ...} and {/sql} macros is defined by the ODBC SQL - you should be able to access your stored procedures as defined by the SQL query language for your database. For example, if there is a stored query called *qryQuery1*, it would be used in **WebBase** as:

```
{sql to lstquery1 source 'ODBC Connect' user "" password ""}
  SELECT * FROM qryQuery1
{/sql}
```

However, **WebBase** does not currently support passing parameters into stored procedures.

- **Can I use a formatted text file with WebBase and ODBC?**
  The ODBC Driver packs provided with **WebBase** include a Microsoft Text Driver. Via ODBC you select MS Text File Driver, and specify a directory in which your text file resides. Specify the file type if necessary. Select the 'Define Format' option within the ODBC Text Driver Setup window, and select the text file to be used. Identify the type of delimiters, and set up the column information. The result is a Schema.ini file. You can then write an .htf file that accesses this source and perform database interactions as with other relational databases.

- **Any suggestions on improving performance when using WebBase?**
  The most expensive part of the ODBC interface process is the 'binding' of the returned results to the **WebBase** data structures. You should only retrieve the fields to be used in computations/display within a SELECT statement. If all fields are retrieved, more complex data structures have to be built within **WebBase** that require both time and memory. If you avoid bringing back some fields by specifying exactly what fields you want instead of using the "*" you should see a performance improvement. The bigger the gap between what you are asking for versus what you would get with "*", the bigger the improvement.

- **How can I make database search results clickable references?**
  Simply wrap a <A HREF=...> </A> around the field you are displaying. You can include information in the HREF string to specifically identify the field being clicked on. For example, assume the field name is in {fName}

  ```
  <A HREF="someForm.htf?item={fName encode=true}">{fName}</A>
  ```

  Now when one clicks on the value displayed by {fName}, the form someForm.htf will be called and it will have a local variable named item with the value of {fName}. The encode=true is necessary only if fName might contain non-alphanumeric characters since browsers do not encode the HREF strings like they do the values of <INPUT ...> items within a <FORM ...> which is how one usually calls other forms passing in arguments. The encode=true will NOT hurt anything if the fName field does NOT contain any special characters or spaces so in general it is a good idea to use it when including {...} fields within an HREF string.

  In a similar fashion, it is possible to create graphical or text-based buttons to perform the submit and reset functions just like a post or get. Just place an anchor - <A HREF=...> ... </A> - around your button and include the same information that would be in the command line were a submit button used. For example,

  ```
  HREF="form.htf?value1=this&value2=that&..."
  ```

- **How can I use the logging feature?**
  If the user has enabled the **WebBase** logging feature, information on each command processed or returned by **WebBase** is written to a log file. The greatest power of **WebBase** is its database access facilities. Given this, one of the best way of performing 'log analysis' at a **WebBase** supported site is to use **WebBase** to log your "hits" to a database rather than using the default flat log files.

  You can set up any number of log databases, each specifically designed to collect that data that might be relevant to a particular web page or collection of web pages a user visits.

You can then use **WebBase** .htf forms to read these databases and provide you with meaningful statistics relative to that database. These can be run from any browser so you can perform your analysis from a remote site (with appropriate logon authorization to keep users out of these forms).

You can create a single file for one log database that performs the database write and insert or call this file from each page that you wish to have logged. Thus you do not add a lot of code to each of your pages. In addition, if you have a very busy site, you can create a User Variables dictionary into which you accumulate log information, then write this information out to disk every <nn> times the dictionary is accessed to reduce the required disk accesses. Again, all this can be done in a single file so very little needs be done to each of your web pages besides an insert of or call to this file.

The **WebBase WebWizard** Database Example #3 provided with **WebBase** performs automatic logging of each database query to another database.

The Web analysis tools that are now available as shareware or commercial systems can be used with the log files generated by **WebBase**. These tools are useful for determining the number of hits to a site, as well as much more information.

E-Merge

Chapter 16

WebBase E-Merge is an add-on product to **WebBase** that allows a webmaster to search a database and send mail-merge letters that are individualized and customized by criteria. Fields from the database can be merged into e-mails, and paragraphs can be conditioned on calculations. E-mails may also be sent to arbitrary selections of the database as the result of an event, and even queued for delayed delivery. **WebBase E-Merge** supports normal and timed e-mail, as well as attachments. An additional licensed features key is required before a user can use E-Merge. Contains sales@expertelligence.com for information on obtaining this LicensedFeatures key.

16.1 Configuration

WebBase E-Merge does not require a separate installation; the necessary software is included when **WebBase** is installed. Before **WebBase E-Merge** can be used, the user must specify several initialization parameters as described below.

E-Merge Parameters

As with the **WebBase** initialization parameters, the **WebBase E-Merge** initialization parameters are stored in the System Registry. Adding in or changing the E-Merge parameters will have no effect on a running **WebBase** application. To effect a change for any entry, you must stop and restart **WebBase** after editing the parameter.

The name of each parameter is case sensitive and must be entered exactly as shown below. If a parameter name is entered incorrectly, **WebBase** will not be able to access it or use its value. The values for string input fields are not case sensitive.

The following are the required **WebBase E-Merge** parameters. They should be added to the System Registry following the instructions provided in Chapter 4 for adding or editing parameters.

LicensedFeatures -- a LicensedFeatures key is similar to the License parameter. The License parameter enables **WebBase**; the LicensedFeatures key enables different add-on options within **WebBase**. If you purchase a new add-on option, you will receive a new LicensedFeatures key that has to be installed. **WebBase E-Merge** or any other add-on product will not work until the appropriate LicensedFeatures parameter is entered.

SMTP_Server -- identifies the host machine that is to process the mail you wish to send via **WebBase E-Merge**. This entry is either a fully qualified name accessible via a Domain Name Server (e.g. mail.myhost.com), or the IP address of the mail server host (e.g. 11.22.33.44)

The Mail Log

The Mailer maintains a log of all mail processed and any error messages encountered while trying to process that mail. This log is similar to the standard **WebBase** log in that daily log files are created in the location specified in the **LogDirectory** parameter just as is done for **WebBase**. The mail log files are preceded with the prefix WM (for **WebBase** Mail) rather than the WB used for the default **WebBase** logs.

Menu items in the **WebBase** Server window's Option menu allow the user to enable/disable the mail log and flush the mail log.

Note:

*One must specify a **LogDirectory** parameter to have mail logging available. One can provide such a parameter, then disable normal logging if only mail logging is desired.*

Shutting Down WebBase

If **WebBase** is shut down, either normally or abnormally, any messages in the mail queue that have not yet been delivered will be lost. The mail queue is strictly a memory-only queue with no backup to disk support. If you are going to frequently generate mail messages within **WebBase** that <u>must</u> be delivered, it is recommended that your messages be queued in the mail queue as well as saved within a database. After a message has been sent, it can be removed from the database. If **WebBase** terminates, your messages are saved in the database. You can then write appropriate **WebBase** forms to determine if any messages need to be requeued after **WebBase** is restarted. This is a good example of the type of functionality that can be included in a **WebBase** startup form.

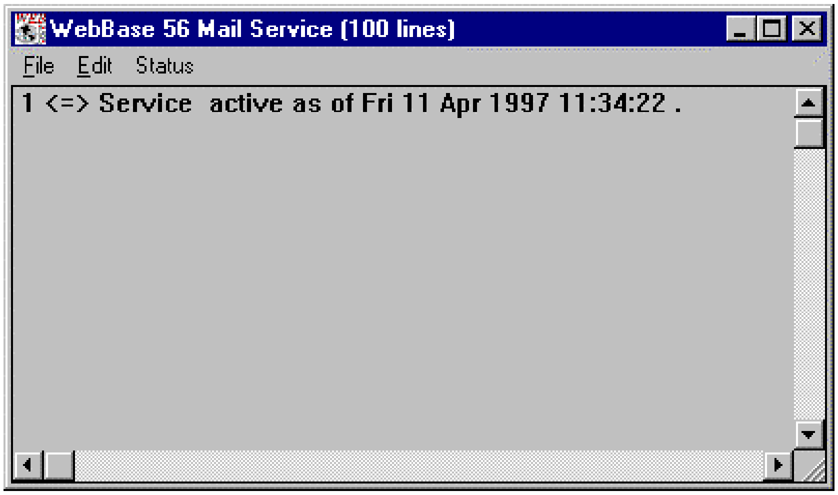
16.2 E-Merge Windows

WebBase Mail Service Window

The Mailer is the process within **WebBase** that manages the accumulation and sending of mail at the appropriate time. The Mailer is represented by the **WebBase** Mail Service Window that displays some mail status information and has menu items to exit the mail process, start and stop (suspend) the mailing of queued mail messages, and flush the mail queue.

The WebBase Mail Service Window is displayed by selecting the Mailer option from the Edit menu on the WebBase WebServer Window. The WebBase Mail Service Window is also automatically opened each time the Mailer detects that there is a mail message in the queue that needs to be sent. An example of the WebBase Mail Server Window is shown below.

Figure 16.1 **WebBase Mail Service Window**



1 <=> Service active as of Fri 11 Apr 1997 11:34:22 .

If the WebBase Mail Service Window is explicitly closed, it will be reopened the next time a message is to be sent. The sockets interface used by mail to send messages is internally connected to the WebBase Mail Service Window. If the window is closed, processing overhead is required to re-establish the sockets interface. It is recommended that the window be left open and iconified.

When a mail message is submitted to the queue for immediate delivery or if the delivery date of an envelope in the queue has arrived, an entry is made on the WebBase Mail Service Window:

```
Starting Mail Service #
```

The # specified is the unique process number assigned to handle the piece of mail; it may be displayed with other information in the window (e.g., if messages are being traced). This identification number is automatically assigned to the process. Once the process is completed, subsequent processes may reuse the number.

Menu Options

The following are the options available from the pull-down menu bar at the top of the WebBase Mail Service Window.

- **File->Exit** -- if this menu option is selected, the WebBase Mail Service Window is closed. The WebBase Mail Service Window will automatically be opened whenever a message from the Mail Queue is removed and sent. If the window is explicitly closed, it will be reopened the next time a message is to be sent.   It is recommended that the window be kept open and iconified to reduce the processing overhead required to set up the sockets interface associated with the window and the sending of mail messages.

- **Edit>Cut** -- this menu option provides the same functionality as described for the WebBase Transaction Service Window.

- **Edit->Copy** -- this menu option provides the same functionality as described for the Late Breaking News Window.

- **Edit>Clear All --** this menu option provides the same functionality as described for the WebBase Transaction Service Window. Note that this only clears the display and does not have any effect on entries in the MailQueue.

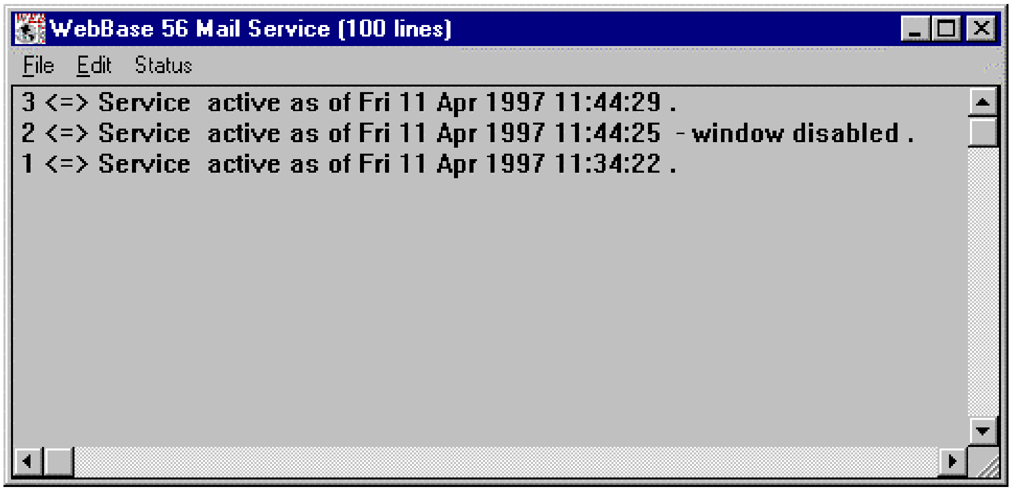
- **Edit->Find** -- this menu option provides the same functionality as described for the Late Breaking News Window.

- **Edit->Find Again** -- this menu option provides the same functionality as described for the Late Breaking News Window.

- **Edit>Set Lines --** this menu option provides the same functionality as described for the WebBase Transactions Service Window. The global variable *%mailMaxLines%* can also be set to specify the number of lines on this window.

- **Status>Posting enabled** -- If this option is selected, information will be written to the window. If the option is turned off (no check mark is displayed next to the option), no data will be written to the window. For example, the user can select the Show Stats option and nothing will be displayed in the window if posting is disabled.   However, mail will still be sent and, if mail logging is enabled, log records will be written to disk. The display below shows the information displayed on the WebBase Mail Service Window when the Posting Enabled option is turned off and then back on. The variable %mailPostingEnable% can be used to control whether Posting is enabled or disabled; by default it is enabled. If the user is logging to disk and not actually sitting at the server, there is probably no need to post mail transactions and the variable can be set to false to disable posting. Posting does add overhead because of the I/O required to display information on the window.

Figure 16.2 Enabling/Disabling Posting Display



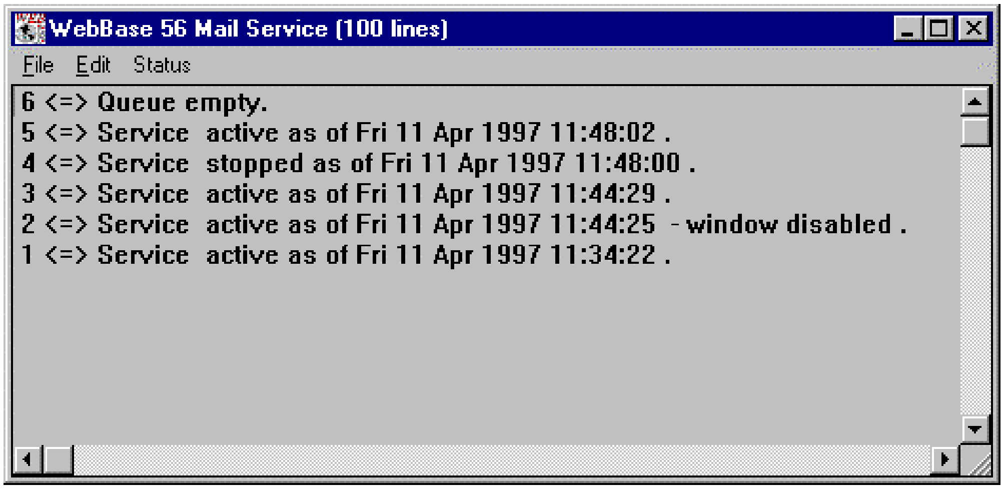
```
3 <=> Service  active as of Fri 11 Apr 1997 11:44:29 .
2 <=> Service  active as of Fri 11 Apr 1997 11:44:25  - window disabled .
1 <=> Service  active as of Fri 11 Apr 1997 11:34:22 .
```

- **Status>Start Mailer** -- This option is only available if the Stop Mailer option was previously selected. If selected, the checking of mail in the queue is resumed.

- **Status>Stop Mailer** -- this option is only available if the mail service is currently active. If selected, the checking of mail in the queue is stopped. Any in-process mail is completed. This option does not affect the status of writing to the WebBase Mail Service Window. If one stops the service, any mail in process will continue being sent and any messages being posted as a result of this in-process mail will continue to be written to the window if Posting is enabled. The mail service can be resumed by using the Start Mailer option.

However, if the Mailer is stopped and the WebBase Mail Service Window is closed, the Mailer is automatically started the next time the WebBase Mail Service Window is manually opened. The display below shows the information displayed on the WebBase Mail Service Window when the Stop Mailer option is selected followed by the Start Mailer option. Notice that two lines of information are displayed when the mail service is restarted – one to indicate the status of the service and the other to provide information about what is in the queue. In this case, there were no messages in the queue to be processed.

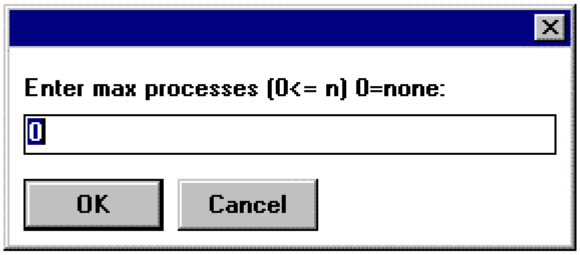
Figure 16.3 Starting and Stopping Mail Service Display



```
6 <=> Queue empty.
5 <=> Service  active as of Fri 11 Apr 1997 11:48:02 .
4 <=> Service  stopped as of Fri 11 Apr 1997 11:48:00 .
3 <=> Service  active as of Fri 11 Apr 1997 11:44:29 .
2 <=> Service  active as of Fri 11 Apr 1997 11:44:25  - window disabled .
1 <=> Service  active as of Fri 11 Apr 1997 11:34:22 .
```

- **Status>Set Mail Limit --** If this option is selected, the dialog shown in Fig. 16.4 is displayed. The user is prompted to enter a number that how many mail processes will be created and used. If 0 (zero) is entered, there are unlimited mail processes. Each time a new mail message is generated, a mail process is created to handle the sending.   It is possible to saturate a mail server by sending it hundreds of simultaneous mail messages. **WebBase E-Merge** handles mail in an asynchronous fashion, so each mail message is sent without waiting for a previous message to finish. The number of mail processes must be set to accommodate the specific mail server in use. If the parameters of your mail server are set up to restrict its input handling but **WebBase E-Merge** does not have a limit on the number of mail processes (or the number is too large), the WebBase Mail Service Window will show numerous error replies that the server is too busy. When this happens, **WebBase E-Merge** requeues each mail that has not been delivered, resends it, gets another 'too busy' error, requeues the message, and so on. Setting a limit of concurrent mail in process eliminates these problems. If you are not familiar with your mail server's capabilities, experiment with the server and the mail process limit. Too big a number of processes when sending a large volume of mail will result in the WebBase Mail Service Window reporting many error returns from the server. The variable %concurrentMailLimit% defines the number of mail processes; it defaults to 0 which means unlimited.

Figure 16.4 Number of Mail Processes Dialog

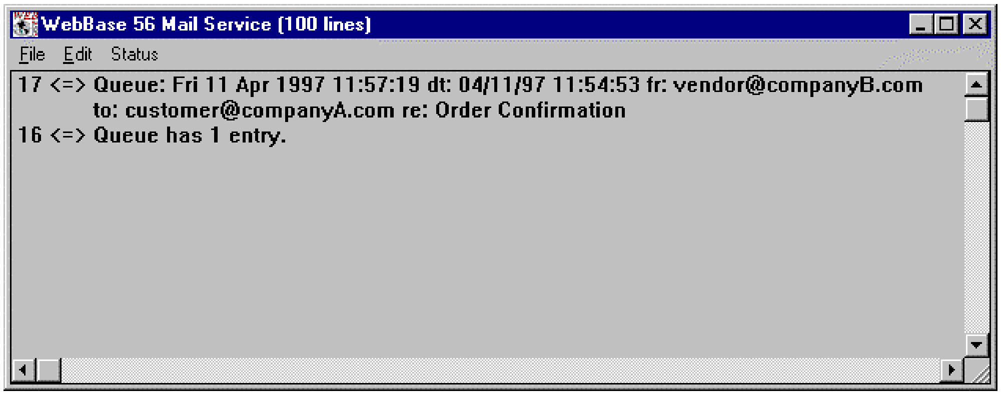


Enter max processes (0<= n) 0=none:

0

- **Status>Show Mail Queue --** This option is only active if there are entries in the mail queue. If selected, the first line added to the window indicates the number of entries currently in the queue. Subsequent lines display for each message in the queue the current date, the date the message is to be sent, who the message is from, who the message is to and the subject of the message. Figure 16.5 shows the results of the Show Mail Queue option when there is a single envelope in the queue. To present this display, a mail message was queued for delivery at a later date to keep it in the queue. If the mail service is not busy, mail messages may not be in the queue long enough to see them as they are immediately sent from **WebBase E-Merge** to the mail service for processing.

Figure 16.5 Show Mail Queue Display



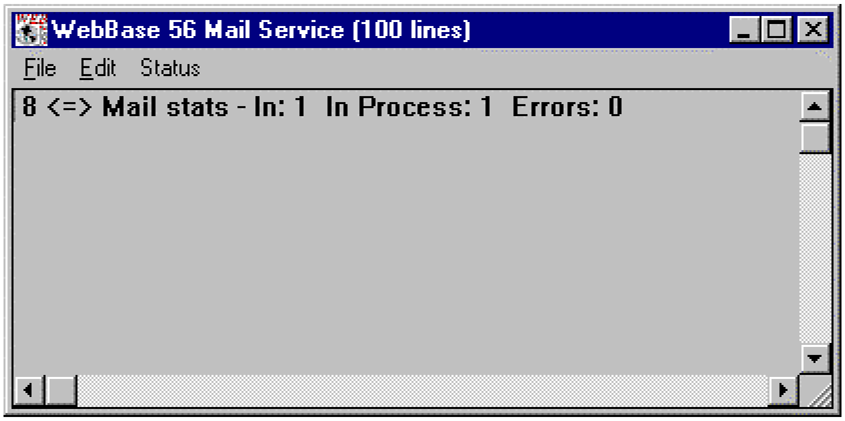
```
17 <=> Queue: Fri 11 Apr 1997 11:57:19 dt: 04/11/97 11:54:53 fr: vendor@companyB.com
        to: customer@companyA.com re: Order Confirmation
16 <=> Queue has 1 entry.
```

- **Status>Flush Mail Queue --** This option is only active if there are entries in the mail queue. A confirmation dialog is presented indicating the number of mail messages that will be deleted. If so confirmed, all entries are removed from the mail queue.

- **Status>Show In Process Mail --** If selected, the first line added to the window indicates the number of entries currently being processed (mail processes have been created but the process has not yet completed sending the mail). Subsequent lines display for each message being processed in the queue the current date, the date the message is to be sent, who the message is from, who the message is to and the subject of the message. The display at the end of this section shows the information displayed if there is in-process mail.

- **Status>Show Stats** -- if selected, the number of messages that have been received in the mail queue, the number that are currently being processed, and the number of errors that have occurred while sending messages are displayed in the WebBase Mail Service Window, as shown in Fig. 16.6 below.

Figure 16.6 Mail Statistics Display

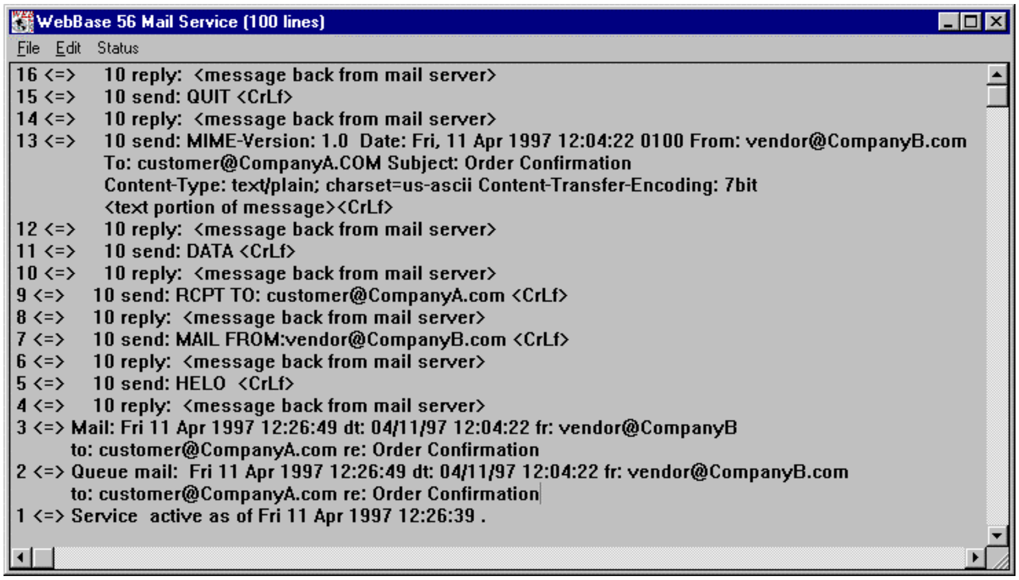


```
8 <=> Mail stats - In: 1  In Process: 1  Errors: 0
```

- **Status>Trace Mail Commands** -- this is a toggle option that turns on trace information in the mail window. By default, this option is disabled. If selected, a check mark is displayed next to this option on the pull-down menu. If selected, it shows each write that is done and the reply code received from the server. The writes include things like HELO, RECP TO, DATA, and QUIT; replies are merely numbers like 200 (OK). The variable %mailTrace% can be used to automatically enable or disable this feature; by default it is disabled.

- **Status>Full Trace --** this option is only active if the Trace mail commands option has been enabled. If selected, extensive trace information on each mail transaction is displayed in the WebBase Mail Service Window. This includes the entire stream of information that is sent out (all the send to addresses, the full text of the mail, etc.) and the entire reply from the server which usually is quite lengthy and includes server name, status, id numbers, etc. The display below shows the results of a full trace for a message. The information returned by the mail server has been removed from the display; it is normally displayed on the window. The variable %mailFullTrace% can be used to automatically enable or disable this feature; by default it is disabled.

Figure 16.7 Full Mail Trace of Single Message



```
16 <=>    10 reply:  <message back from mail server>
15 <=>    10 send: QUIT <CrLf>
14 <=>    10 reply:  <message back from mail server>
13 <=>    10 send: MIME-Version: 1.0  Date: Fri, 11 Apr 1997 12:04:22 0100 From: vendor@CompanyB.com
          To: customer@CompanyA.COM Subject: Order Confirmation
          Content-Type: text/plain; charset=us-ascii Content-Transfer-Encoding: 7bit
          <text portion of message><CrLf>
12 <=>    10 reply:  <message back from mail server>
11 <=>    10 send: DATA <CrLf>
10 <=>    10 reply:  <message back from mail server>
9 <=>    10 send: RCPT TO: customer@CompanyA.com <CrLf>
8 <=>    10 reply:  <message back from mail server>
7 <=>    10 send: MAIL FROM:vendor@CompanyB.com <CrLf>
6 <=>    10 reply:  <message back from mail server>
5 <=>    10 send: HELO  <CrLf>
4 <=>    10 reply:  <message back from mail server>
3 <=> Mail: Fri 11 Apr 1997 12:26:49 dt: 04/11/97 12:04:22 fr: vendor@CompanyB
      to: customer@CompanyA.com re: Order Confirmation
2 <=> Queue mail:  Fri 11 Apr 1997 12:26:49 dt: 04/11/97 12:04:22 fr: vendor@CompanyB.com
      to: customer@CompanyA.com re: Order Confirmation
1 <=> Service  active as of Fri 11 Apr 1997 12:26:39 .
```

WebBase Server Window

When the **WebBase E-Merge** utility in **WebBase** is enabled, the WebBase Server Window includes some additional menu options.

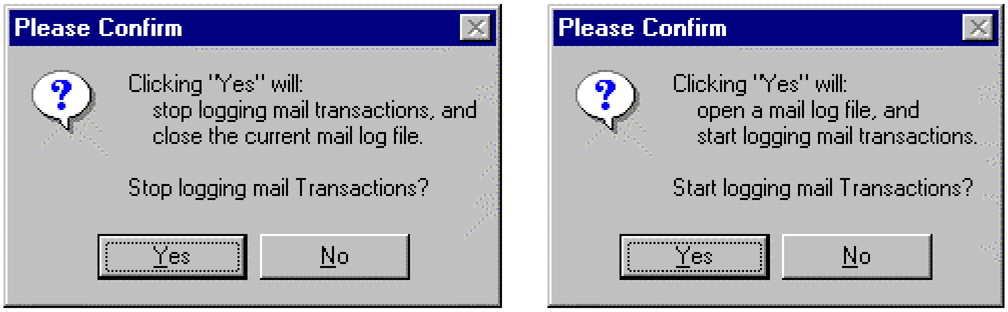
Menu Options

The following are the **WebBase E-Merge** options available from the pull-down menu bar at the top of the WebBase Server window.

- **Edit->Mailer** -- If this menu option is selected, the WebBase Mail Service Window is opened. Note that this window will also be opened if mail has been sent out since **WebBase** was started.

- **Enable Mail Log File --** If this option is selected, one of the dialogs shown in Fig. 16.8 will be displayed. The dialog on the left is displayed if mail logging is currently on; the dialog on the left is displayed if there logging has been disabled. Mail log files will be generated for each **WebBase E-Merge** transaction if a user has also defined the LogDirectory parameter. If logging is enabled, a mail log file is created each day to record all mail activity with **WebBase**. Each log entry contains a timestamp, the date the message was to be sent, who the message is from, who the message is to, and the subject of the message. The actual text of the message is not included. If this option is turned off, mail log files will not be generated. Note that it is possible to have mail log files but not **WebBase** log files, or vice versa. It is suggested that you specify the LogDirectory parameter, and then turn logging on or off either dynamically via this menu item or by setting the %mailLogEnabled% variable. If mail logging is on, a check mark is displayed next to this item.

Figure 16.8 Mail Log Enable/Disable Dialogs



Clicking "Yes" will:
stop logging mail transactions, and
close the current mail log file.

Stop logging mail Transactions?

Clicking "Yes" will:
open a mail log file, and
start logging mail transactions.

Start logging mail Transactions?

- **Flush Mail Log File** -- Information to be written into the mail log file is buffered until sufficient data has been obtained, at which point it is written to the mail log file on disk. If this option is selected, any information in the buffer is written to disk. This ensures that the information the user views in the mail log file is all that has been generated.

16.3 WebBase Macros

A special macro has been provided with **WebBase E-Merge** to allow one to conveniently send mail directly from a **WebBase** .htf form.

{mail <args>} {/mail}

The ***mail*** macro allows the user to send mail from a **WebBase** .htf form. Keywords in the ***mail*** macro specify information about when and where the mail is to be sent while the text between the {mail ...} and the {/mail} statements becomes the text or body of the mail message. Note that the text provided may contain **WebBase** variables, macros, and database field references so one can dynamically construct the body of the mail message just as one can dynamically construct Web pages with **WebBase**.

The ***mail*** macro contains a number of required and optional keywords used to direct the sending of the mail message. Each keyword is followed by a single value, either a string constant (with the exception of the send keyword as described below), a **WebBase** variable or a **WebBase** expression.

- **to** -- This keyword is required and is the address or addresses of where the mail message is to be sent. It will appear in the header of the message as

  `“To: ‘ ... ‘ “`

  The format for this value (and the **from**, **cc**, and **bcc** fields below with exceptions as noted) is a string such as ‘you@yourCompany.com’. As noted above, this value may be specified explicitly as a string, or as the value of a variable or the result of evaluating an expression. Multiple addresses can be specified by separating each with a comma.

- **from --** This keyword is also required. It is the address of the sender of the message; the location to which a reply would be sent if appropriate. Unlike the to, cc, and bcc values, this field will accept only a single address value. This value will appear in the header of the message as:

  `“From: ‘ ... ‘ “`

- **subject --** an optional keyword, this identifies the subject of the message. It is a string that will be placed in the header of the message as:

  `“Subject: ‘ ... ‘ “`

- **attach** – this keyword is optional and specifies attachments to be included with the mail message. The value must be a constant, variable, or expression that evaluates to a string that can be parsed at space, comma or semicolon into a collection of strings, or a collection of strings. Each string must be a fully qualified DOS pathname of a locally accessible file to be sent as an attachment.

- **cc --** this keyword is optional and is the address or addresses of where copies of the mail message are to be sent. The format of the **cc** value is the same as that of the **to** value. It will appear in the header of the message as:

  `“Cc: ‘ ... ‘ “`

- **bcc** -- an optional keyword that is the address(es) of where copies of the mail message are to be sent that will not appear in the header of the message. The format of the **bcc** value is the same as that of the **to** value.

- **reply** – an optional keyword that is the address to be included in the Reply-To: header field. The format of the **reply** value is the same as that of the **from** value.

- **organization** – an optional keyword that is the name of the company or organization to be included in the Organization: header field.

- **id** -- this is an arbitrary string you may provide to help identify the mail message and/or provide a search mechanism for locating the message on the MailQueue using the findByID: operation described later in this chapter. If present, this id value is shown in the header of the message as

  ```
  “ID: ‘ ... ‘ “
  ```

- **send** -- This is an optional keyword. If used, its value is a UniversalTime object indicating when the mail is to be sent. The default value is the value that would be returned by the %dateTime% variable at the time the mail macro is processed. To queue the mail for future sending, set a variable to the current time plus some number of seconds, e.g. {set time 600 %dateTime% addSeconds:} for 10 minutes from now, then use this variable name as the value for the send keyword.

  The **send** keyword also recognizes two string values, **‘now’** which means send the mail immediately (same as the default), and **‘queue’** (or just **‘q’**) which means queue the mail but do not send it. In fact, the mail is marked for sending approximately 1 year from the date of queuing, for all practical purposes, never.

  As noted above, the **attach** keyword can be used to specify attachments to be sent along with e-mail message. If the pathname has an extension of txt, htf, or hti, it will be sent as a text attachment; all others will be sent as a base64 encoded (binary) attachment.

  Fully qualified pathnames may be preceded by a flag to specify some error and encoding information, using the format i@ where i is a single digit integer between 0 and 7. For example,

  ```
  '3@c:\http\... .txt'
  ```

  The prefix flags are:

  - no prefix - an error is generated if the specified attachment is not found at mail macro merge time or at mail send time and the mail is not sent.

  - 0@ -or- 4@ prefix - same as no prefix above.

  - 1@ -or- 5@ prefix - the existence of the attachment is checked at mail send time and if missing an error is generated and the mail is not sent.

  - 2@ -or- 6@ prefix - the existence of the attachment is checked at mail send time and if missing a text attachment to that effect is sent instead.

  - 3@ -or- 7@ prefix - the existence of the attachment is checked at mail send time and if missing the attachment is ignored (as if never specified).

  No prefix and values 0 through 3 use the pathname extension to determine if the file is a text attachment (.txt, .htf, .hti). If not, the contents of the file are encoded in base64 encoding and sent.

  Prefix values 4 through 7 can be used to indicate that for files sent as base64 encoded files, the file contents have already been so encoded and thus can be sent ‘as is’. This can be a very efficient way of attaching a non-text (binary) file that is to be attached to many emails. It can be encoded once and the overhead of encoding it for each and every email can be eliminated. The base64encodeFile:to: operation on String allows one to perform such encoding of a source file to a destination file specifying the two files as pathname strings. Example 16.2 shows how attachments can be done within a mail macro.

Example 16.1 Mail Macro

```
{sql to addressees source 'business' ...}
    SELECT Email,Name,Title,Product FROM clients
      WHERE OrderStatus = 'IN_HOUSE'
{/sql}
{if 0 addressees size >}
  {forRow aRow on addressees}
    {set subj ' is in!' Product ,}
    {mail to Email subject subj
      from 'OrderEntry@BestCompany.com'
      bcc 'Sales@BestCompany.com'}
        Dear {Title} {Name},
          We're glad to inform you that the {Product}
   you ordered is now in stock and ...

    {/mail}
  {/forRow}
{/if}
```

Example 16.2 Mail Macro with Attachments

```
{! Encode a gif file for sending to multiple people.  This makes the
sending more efficient since it does not have to be encoded for each
person it is sent to !}
{f== false ‘c:\http\wbwizard\Wizard.gif’ ‘c:\temp\encoded.gif’
base64encodeFile:to:}

{! Generate the e-mail messages !}
{mail to 'you@CompanyA.com, them@CompanyA.com'
   from 'me@CompanyB.com'
   organization 'Company B, Inc.'
   subject 'sending attachments'
   attach 'c:\http\wbwizard\default.htf
         c:\http\wbwizard\dbex\autos.mdb
         c:\http\wbwizard\Wizard.gif
         4@c:\temp\encoded.gif'}
I am sending you 4 attachments - 1 text file, 1 Access database file,
and 2 gif images.  The second image is a "previously base64 encoded"
file.  It is the same as the first image.  During the processing and
sending of the mail, the first image would be encoded EACH time it
was sent out.  The second image was encoded prior to the mail macro
and does not have to be encoded with each sending.
{/mail}
```

16.4 E-Merge Variables

There are a number of dynamic variables specifically for **WebBase E-Merge** that are described below

Dynamic Variables

The **WebBase E-Merge** dynamics variables are included on the list of the **WebBase** dynamic variables displayed in the WebBase Server window when **WebBase** is started. The **WebBase E-Merge** dynamic variables include:

- **%MailerStatus%** e.g. (idle)
  returns one of the following values as a string:
  - ♦ **unavailable -** the **WebBase E-Merge** feature is not available because it has not been enabled via a valid LicensedFeatures parameter
  - ♦ **inactive -** mailer has not been started or was exited by the user
  - ♦ **idle** - mailer was started but is currently idle (no envelopes on the queue)
  - ♦ **stopped** - mailer was stopped by the user
  - ♦ **active -** mailer is currently active (sending mail from the queue)
- **%MailQueue%** e.g. (MailList())
  the actual mail queue. A MailList is a special type of SortedList that responds to specific messages related to mail. The queue contains envelopes relating to mail that is waiting to be sent. %MailQueue% responds to the **size** message, returning the number of envelopes currently on the queue. It can also be placed in a {forRow ... } loop to process the individual envelope entries.

Operational Variables

The following **WebBase E-Merge** dynamic variable can be modified by accessing the Options menu on the WebServer window. However, the change made by selecting this menu option is only valid for the current session. When **WebBase** is stopped and restarted, the default value will be restored. If you want to permanently change the value of this variable, it is recommended that you add a global variable with the desired value following the instructions in Chapter 9. The default value is shown in parentheses.

- **%mailLogEnabled%** e.g. (true)
  indicates that the mail log file functionality of **WebBase** is to be enabled. This variable is very similar to the %logEnabled% **WebBase** parameter. It is suggested that you specify the **WebBase** LogDirectory parameter, and then turn mail logging on or off by setting this variable or using the menu option on the WebBase Server window.

Special Variables

- **%mailMaxLines%** e.g., (100)
  this variable defines the number of lines of information to be displayed in the WebBase Mail Service Window. By default, 100 lines are displayed. If %mailMaxLines% is created as a global variable with a value between 10 and 10000, this defines how many lines will be displayed in the window.

- **%mailPostingEnable%** e.g., (true)
  this variable enables or disables posting of information into the WebBase Mail Service Window. If set to 'false', it will cause posting into the WebBase Mail Service Window to be disabled when the window is opened (either automatically when a mail message is processed manually via the Edit menu).

- **%concurrentMailLimit%** e.g., (0)
  this variable determines the number of concurrent mail processes that will be created. The

default value of 0 indicates that there is no limit on the number of processes. Some mail servers have a limit on the number of mail requests they can handle. See the previous section for more information on mail processes.

- **%mailTrace%** e.g., (false)
  this variable determines whether each mail command processed will have trace information displayed in the WebBase Mail Service window. By default, tracing is disabled.

- **%mailFullTrace%** e.g., (false)
  this variable works in conjunction with %mailTrace%. If %mailTrace% is disabled, then this value is not used. If %mailTrace% is true, then the value of this variable determines how much trace information will be displayed.

16.5 E-Merge Operations

There are two classes provided with WebBase E-Merge: Mail Lists and Envelopes. The operations that users can make use of within forms development are described below.

Mail Lists

A mail list is a special type of sorted collection that contains only envelopes, each holding a mail message.

Mail List Instance Operations

In addition to the operations that can be performed by sorted lists, the following messages can be sent to the %MailQueue% or any other variable holding a Mail List. Each message below will return a MailList object with 0, 1 or many entries depending on how many envelopes match the specified criteria.

- **findByDate:** e.g., *{f= %dateTime% %MailQueue% findByDate:}*
  returns a Mail List containing entries whose ‘send’ field matches the date in the argument. Note: the send field expects a Universal Time such as is returned by the %dateTime% global variable.

- **findByFrom:** e.g., *{f= ‘WebMaster@ExperTelligence.com’ %MailQueue% findByFrom:}*
  returns a Mail List containing entries whose ‘from’ field matches the argument.

- **findByID:** e.g., *{f= ‘anID’ %MailQueue% findByFrom:}*
  returns a Mail List containing entries whose ‘id’ field matches the argument.

- **findByTo:** e.g., *{f= ‘Fred@companyA.com’ %MailQueue% findByTo:}*
  returns a Mail List containing entries whose ‘to’ field matches the argument.

- **findBySubject:** e.g., *{f= ‘New Product Announcement’ %MailQueue% findBySubject:}*
  returns a Mail List containing entries whose ‘subject’ field matches the argument.

Envelopes

An envelope contains a mail message that has been queued in a mail list. It contains the mail message along with all the necessary addressing and time-to-be-sent information accumulated from both the *mail* macro and the body of the mail message.

Envelope Instance Operations

The following operations can be sent to any entry in a Mail List.

- **mailID** e.g., *{f= %MailQueue% first mailID}*
  returns the value of the 'id' field of the mail message.

- **mailTo** e.g., *{f= %MailQueue% first mailTo}*
  returns the value of the 'to' field of the mail message.

- **mailCC** e.g., *{f= %MailQueue% first mailCC}*
  returns the value of the 'cc' field of the mail message.

- **mailBCC** e.g., *{f= %MailQueue% first mailBCC}*
  returns the value of the 'bcc' field of the mail message.

- **mailFrom** e.g., *{f= %MailQueue% first mailFrom}*
  returns the value of the 'from' field of the mail message.

- **mailSubject** e.g., *{f= %MailQueue% first mailSubject}*
  returns the value of the 'subject' field of the mail message.

- **mailDate** e.g., *{f= %MailQueue% first mailDate}*
  returns the value of the 'send' field of the mail message.

16.6 E-Merge Examples

The **WebBase WebWizard** includes several examples showing how to queue a message using E-Merge, as well as how to query the mail queue and delete messages from the mail queue.

Appendix A

Software License Agreement

WebBase™ Software License Agreement

This agreement is a legal contract. Please read it carefully before installing your copy of the WebBase software. Completion of the installation process indicates acceptance of the terms of this agreement.

Upon acceptance of the terms of this agreement, you are hereby authorized to receive and use a single copy of the computer software package known as WebBase ("the Program"), which includes (1) object code computer software and (2) related end-user documentation. All right, title, and interest in and to the Program is retained by ExperTelligence, Inc. ("Company"), and is disclosed to you only for use in accordance with the terms of this agreement.

1. You are granted a personal, nonassignable, nonexclusive, fully revocable license to install the Program in a single server.

2. The Program is a commercially valuable, proprietary product of Company, the design and development of which reflect the efforts of development experts and the investment of considerable time and money. The Program is based on substantial trade secrets of Company, and Company claims and reserves all rights and benefits afforded under federal copyright law and international copyright treaties in the Program as published work.

3. You are required to devote your best efforts to prevent any use or disclosure of the Program or of any trade secret embodied or reflected in the Program. You agree that no copies shall be made of the Program or any portion thereof and that you shall not reverse engineer or decompile the object code of the Program into source code. It is understood that the foregoing shall not apply to information that (1) is in the public domain through no fault of your own at the time of its disclosure to you, (2) is independently developed by you or others without reliance on the information, media, and materials provided to you hereunder, or (3) subsequent to disclosure hereunder, is disclosed to you without restriction by a person having the right to make such a disclosure without breach of an obligation of confidentiality.

4. The terms of this agreement regarding the protection and security of the Program shall remain in full force and effect for so long as you continue to use, process, or have access to the Program, including any trade secrets embodied or reflected therein.

5. The Program is provided and COMPANY SHALL HAVE NO LIABILITY FOR ANY WARRANTY, TRAINING, OR INSTALLATION SERVICES, OR USE OF THE PROGRAM OR ITS OUTPUT.

Appendix B

Special Configuration Issues

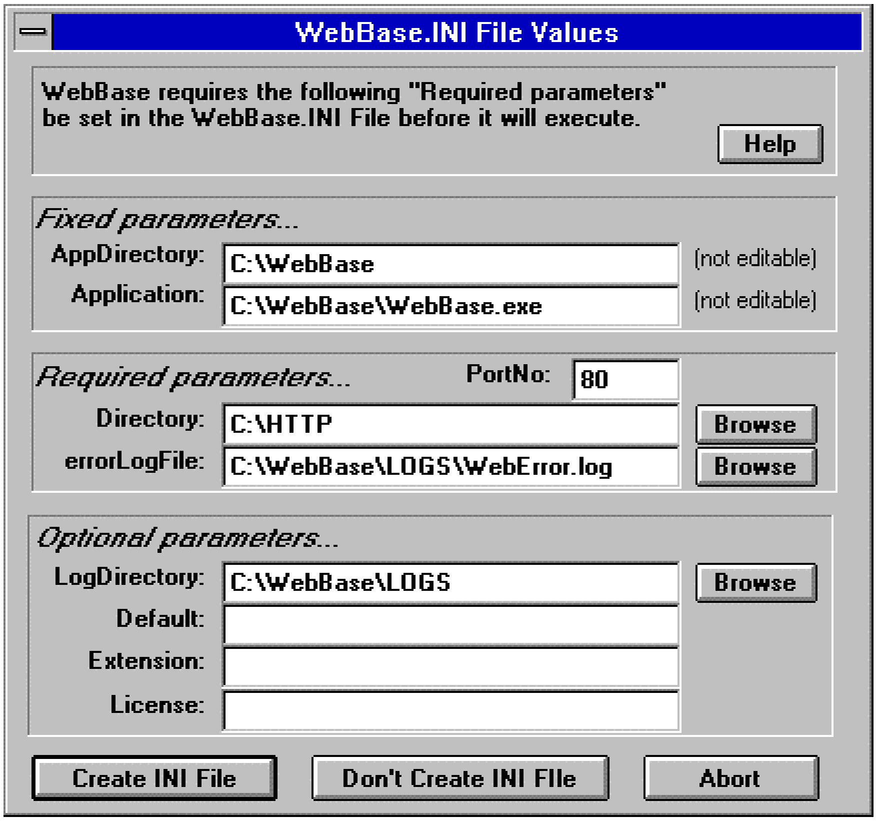
B.1 16-bit Systems

This section provides details on how to set up **WebBase** parameters, extensions, aliases and global variables in their respective initialization files. This information is only applicable to 16-bit systems running Windows 3.1 and Windows for Workgroups 3.11. This information for 32-bit systems (Windows NT, Windows-95) is provided in Chapter 4 and Chapter 9.

Installation

For 16-bit systems, **WebBase** accesses its parameters from a WebBase.ini file. **WebBase** uses this file to access information about the environment in which it will be executing. Chapter 4 describes these parameters in detail; the remainder of this appendix covers how the WebBase.ini file can be edited. During installation, Figure B.1 prompts for these parameters and creates the WebBase.ini file in the ‘Destination Directory’.

Figure B.1 WebBase Parameters Dialog



WebBase.INI File Values

WebBase requires the following "Required parameters" be set in the WebBase.INI File before it will execute.

Fixed parameters...

AppDirectory: C:\WebBase (not editable)

Application: C:\WebBase\WebBase.exe (not editable)

Required parameters...

PortNo: 80

Directory: C:\HTTP

errorLogFile: C:\WebBase\LOGS\WebError.log

Optional parameters...

LogDirectory: C:\WebBase\LOGS

Default:

Extension:

License:

The **PortNo** parameter specifies which port **WebBase** will use to communicate with a browser. This port must be unique within your Windows environment (i.e., not assigned to another application). The default value is set to 80.

The **Directory** parameter specifies where in your local directory structure browsers can access forms via **WebBase**. This directory location corresponds to a browser referencing 'http://host-address/'. Placing a 'default.HTF' or 'default.HTM' file in this directory will cause **WebBase** to return that form if a browser references 'http://host-address/'.

The **errorLogFile** parameter specifies the name of a file that **WebBase** can create and write error messages into. These messages can be helpful in diagnosing problems you might encounter while **WebBase** executes. The file need not exist at this time, but the directory specified must exist before executing **WebBase** so the file can be created as specified.

The **LogDirectory** parameter specifies where in your local directory structure **WebBase** can write log files. **WebBase** creates a log file each day and records the requests it processes. These files are written into the directory you specify here. Log files are named using the following scheme: WByymmdd.LOG where yy=year, mm=month, and dd=day. For example, the log file for November 23, 1995 would be named WB951123.LOG. Leaving this entry blank will cause **WebBase** to skip the logging process. You can specify this Log Directory and still disable logging via the **WebBase** Options menu if so desired. You cannot enable logging, however, if you have not specified a Log Directory here.

The **Default** parameter is the name of the default file to be used when a directory is referenced. The automatic defaults are 'default.HTF' and 'default.HTM' in that order. You can enter a single file name, or a series of files to be searched for in the order presented (index.HTM,index.HTML) separated by commas. If you enter an empty string then no default file will be searched for.

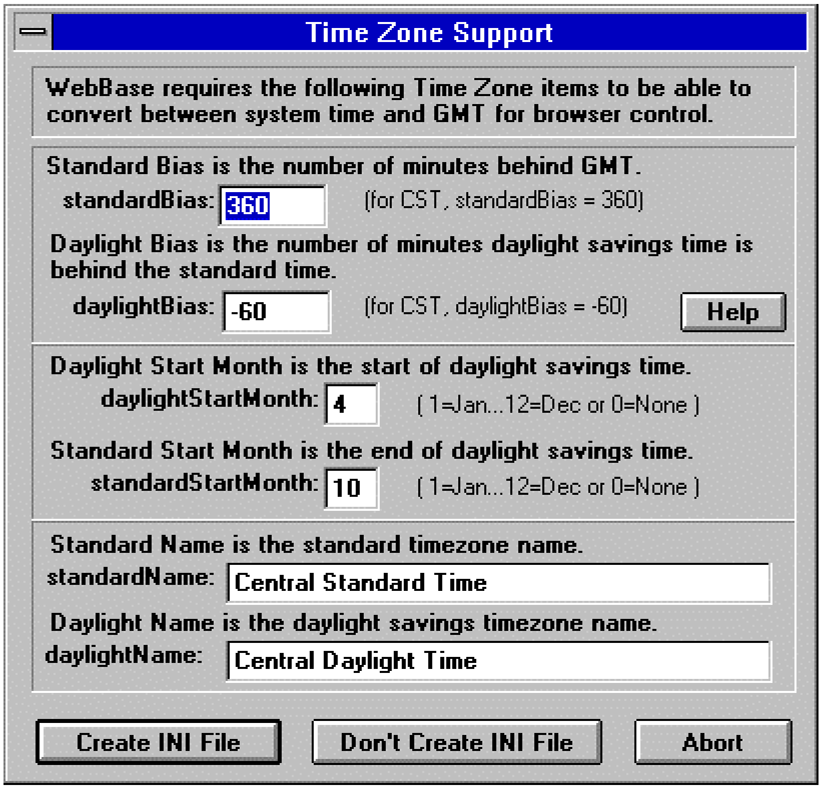
The **Extension** parameter specifies the default extension (or extensions) to append to a file name should the user enter what appears to be a file reference without an extension. Default value is ‘htf’,’htm’ in that order.

The **License** parameter specifies the value of your license number. This parameter will be prompted for the first time the application starts unless it is provided here.

At the bottom of the window is a button labeled ‘Don’t Create .INI File’. This button should be selected only during an upgrade so that your WebBase.INI file will not be modified or if you want to manually edit this file to set up all the necessary parameters at a later date. It is strongly recommended that the user allow the WebBase.INI file to be created or updated during the installation process.

Since Windows 3.1 and Windows for Workgroups do not provide for time zone support, you must provide **WebBase** some information about your time zone for it to effectively communicate with browsers which may be executing in a time zone different from yours. The information entered in the dialog shown in Fig. B.2 is being requested in a format compatible with that of Windows NT and Windows 95 Registry support for time zones.

Figure B.2 TimeZone Parameters



Time Zone Support

WebBase requires the following Time Zone items to be able to convert between system time and GMT for browser control.

Standard Bias is the number of minutes behind GMT.

standardBias: 360 (for CST, standardBias = 360)

Daylight Bias is the number of minutes daylight savings time is behind the standard time.

daylightBias: -60 (for CST, daylightBias = -60)

Daylight Start Month is the start of daylight savings time.

daylightStartMonth: 4 (1=Jan...12=Dec or 0=None)

Standard Start Month is the end of daylight savings time.

standardStartMonth: 10 (1=Jan...12=Dec or 0=None)

Standard Name is the standard timezone name.

standardName: Central Standard Time

Daylight Name is the daylight savings timezone name.

daylightName: Central Daylight Time

The **standardBias** parameter is the number of minutes your time zone is behind GMT. The default for this parameter is 360.

The **daylightBias** is the number of minutes Daylight Savings Time in your local area is behind Standard Time. In most areas, Daylight Savings Time differs from Standard Time by 1 hour, so the default value of -60 is acceptable. If your locale does not adjust for Daylight Savings Time, enter 0.

The **daylightStartMonth** parameter is the month in which Daylight Savings Time begins in your locale. Months are represented by an integer: 1 for January through 12 for December. If you locale does not observe Daylight Savings Time, enter a 0 (zero) here.

The **standardStartMonth** is the month in which Daylight Savings Time ends and Standard Time begins again in your locale. Months are represented by an integer: 1 for January through 12 for December. If your locale does not observe Daylight Savings Time, enter a 0 (zero) here.

The **standardName** parameter is the name typically used to identify the time zone in your locale during either that time of the year when Daylight Savings Time is not in effect or the entire year if your locale does not adjust to Daylight Savings Time. Examples of Standard Time Zone names from the USA are Eastern Standard Time, Central Standard Time and Pacific Standard Time. The first letters of these names are accessed to produce an abbreviation attached to the result of sending the **dateTime** built-in command to **WebBase**, as in: ‘Date: Mon, 04 Dec 1995 02:48:11 PM CST’. If you wish, you may enter just the abbreviation for your locale here with no embedded spaces.

The **daylightName** parameter is the name typically used to identify the time zone in your locale during either that time of the year when Daylight Savings Time is in effect. If your locale does not adjust to Daylight Savings Time, this field should contain the same value as the **standardName** field. Examples of Daylight Savings Time names from the USA are Eastern Daylight Time, Central Daylight Time, and Pacific Daylight Time. The first letters of these names are accessed to produce an abbreviation attached to the result of sending the **dateTime** command to **WebBase**, as in: ‘Date: Mon, 08 Apr 1996 02:48:11 PM EDT’. If you wish, you may enter just the abbreviation for your locale here with no embedded spaces.

NOTE:

*If the above time zone information is not supplied, **WebBase** will operate as if the local time is GMT and no time conversion will take place when sending the current time and forms expiration time to browsers.*

Editing Parameters

WebBase parameters are provided for Windows 3.1 and Windows for Workgroups in the file WebBase.ini. This file must reside in the same directory as the **WebBase** application (e.g., c:\webbase). The WebBase.ini file must contain the **WebBase** parameters described in Chapter 4, as well as the parameters listed above. The following is an example of a WebBase.ini file.

Figure B.3 Example WebBase.ini file

```
[WebBase 4.10 INI file]

[Required Parameters]
PortNo       = 80
Directory    = c:\WebBase
License      = 12345-67890

[Optional Parameters]
LogDirectory  = c:\WebBase
errorLogFile  = c:\WebBase\WebError.log
Default       = default.htf,default.htm
Extension     = htf,htm
HostAddress   = 1.2.3.4

[Time Zone Support]
standardBias       = 360
daylightBias       = -60
standardName       = Central Standard Time
daylightName       = Central Daylight Time
daylightStartMonth = 3
standardStartMonth = 10
```

Items in square brackets, [ ], are comments. The parameter name to the left of the = sign is CASE SENSITIVE while the value to the right is not.

Extensions

For Windows 3.1 and Windows for Workgroups, the optional WebExtns.ini file defines the extensions within the **WebBase** environment. If no extensions are to be defined by the user, then this file does not have to exist. When extensions are defined, the WebExtns.ini file must be located in the directory containing the **WebBase** application (e.g., c:\webbase). The same format is used in the WebExtns.ini file as in the WebBase.ini file shown above. The following is an example of a WebExtns.ini file.

Figure B.4 Example WebExtns.ini file

```
[WebBase 4.10 WebExtns.INI file]

htf = ;{text/html}
```

Aliases

For 16-bit systems, the optional WebAlias.ini file defines the aliases within the **WebBase** environment. If aliases are not to be used, then this file does not have to exist. When aliases are defined, the WebAlias.ini file must be located in the same directory as the **WebBase** application (e.g., c:\webbase). The same format is used in the WebAlias.ini file as in the WebBase.ini file shown above. The following is an example of a WebAlias.ini file.

Figure B.5 Example WebAlias.ini File

```
[WebBase 4.10 Alias file]

foobar = f:\foo\bar
```

Global Variables

Global variables on Windows 3.1 and Windows for Workgroups are defined in the file WebVars.ini. This file is optional; the user should create it only if global variables are to be defined. The WebVars.ini file must be located in the same directory as the **WebBase** application (e.g., c:\webbase). The same format is used in the WebVars.ini file as in the WebBase.ini file shown above. The following is an example of a WebVars.ini file.

Figure B.6 Example WebVars.ini File

```
[WebBase 4.10 WebVars.INI file]

%directoryBrowse%=true
%whereAndOr%=‘AND’
```

B.2 Editing the System Registry

The 32-bit systems store **WebBase** parameters, extensions, aliases, multiple domains and global variables in the System Registry. This is a Windows utility that is used by many different applications. In general, it is recommended that the **WebBase WebWizard** Registration Database option be used to add or modify **WebBase** entries in the System Registry. However, if it is not possible to start **WebBase** or if an entry needs to be deleted, that can only be done by directly editing the System Registry. This section includes details on how to access and edit the registry.

Accessing the System Registry

All of the **WebBase** parameters, aliases, etc. are maintained in the same location within the System Registry. The following steps should be taken regardless of what type of **WebBase** information is to be added, edited or deleted in the registry.

1. Run the Registry Editor. On Windows NT this is **REGEDT32.EXE**; on Windows 95 this is **REGEDIT.EXE.**

2. Open **HKEY_LOCAL_MACHINE\SOFTWARE\ExperTelligence, Inc.\WebBase\4.10\**

3. All **WebBase** parameters are stored within this key. If this full path does not exist, create each key using the exact information presented above.

Parameters

1. Select the **Parameters** entry[19]. Enter any new **WebBase** parameters as a string or DWORD (integer) value. Each parameter name is spelling and case sensitive, so be sure to enter them exactly as described in Chapter 4. The value of any parameter can also be modified. Parameters can also be deleted, but care should be taken before deleting a parameter as it may affect the ability of **WebBase** to be restarted.

Extensions

1. If no extensions have been defined, create 'Extensions' as a New Key. Note that the key must be entered exactly as indicated.

2. Select the Extensions entry. Create any new extensions as String Values, with the appropriate key (extension type) and value (mime type). Existing extensions may be edited or deleted. Any changes to extensions will not take effect until **WebBase** is stopped and restarted.

Aliases

1. If no aliases have been defined, create 'Aliases' as a New Key. Note that the key must be entered exactly as indicated.

2. Select the Aliases entry. Create any new extensions as String Values, with the appropriate key (alias name) and value (pathname). Existing aliases may be edited or deleted. Any changes to aliases will not take effect until **WebBase** is stopped and restarted.

Multiple Domains

1. If no domains have been defined, create 'Domains' as a New Key. Note that the key must be entered exactly as indicated.

2. Select the Domains entry. Create a New Key for each desired domain address. This key must be the IP address of the domain (e.g., 1.2.3.4).

3. Select the new IP address subkey. Any parameters specific to this domain are entered within this key. Any extensions or aliases for this domain are entered in subkeys called 'Extensions' and 'Aliases', respectively. Chapter 4 provides details on the parameters that can be specified for each domain, as well as how to define extensions and aliases for multiple parameters. Existing multiple domain parameters, extensions or aliases may be edited or deleted. Any changes to multiple domains will not take effect until **WebBase** is stopped and restarted.

Global Variables

1. If no aliases have been defined, create 'Variables' as a New Key. Note that the key must be entered exactly as indicated.

[19] The 'Parameters' entry will exist if the user selected to store the WebBase parameters entered during installation into the System Registry (default). If thi skey does not exist, create it as a New Key. Note that the spelling and case must be exact.

2. Select the Variables entry. Create any new global variables as String or Dword Values, with the appropriate key (global variable name) and value. Existing global variables may be edited or deleted. Unlike with **WebBase** parameters, extensions, aliases and multiple domains, it is possible to update a running **WebBase** application with global variable modifications. From the WebBase WebServer window, select the ‘Load Global Variables’ option.

Header Variables

Appendix C

This appendix describes the header variables that may be included with a request from a client browser. These header variables are defined in the HTTP 1.1 specification. If new specifications are approved, additional header information may be defined. The actual header variables received from a client browser are dependent on the implementation of HTTP supported by the browser. It is always best to determine if a header variable is received from a browser before expecting it to be there.

WebBase does not currently support all the HTTP 1.1 functionality. However, incoming header parameters that are part of the HTTP 1.1 specification will still be received by **WebBase** and created as local header variables.

HTTP 1.1 Input Header Variables

- **Accept** –can be used to specify certain media types that are acceptable for the response. Accept headers can be used to indicate that the request is specifically limited to a small set of desired types, as in the case of a request for an in-line image. If no Accept header field is present, then it is assumed that the client accepts all media types. If an Accept header field is present, and if the server cannot send a response that is acceptable according to the combined Accept field value, then the server SHOULD send a 406 (not acceptable) response.

- **Accept-Charset** –can be used to indicate what character sets are acceptable for the response. This field allows clients capable of understanding more comprehensive or special-purpose character sets to signal that capability to a server that is capable of representing documents in those character sets. The ISO-8859-1 character set can be assumed to be acceptable to all user agents. If no Accept-Charset header is present, the default is that any character set is acceptable. If an Accept-Charset header is present, and if the server cannot send a response which is acceptable according to the Accept-Charset header, then the server SHOULD send an error response with the 406 (not acceptable) status code, though the sending of an unacceptable response is also allowed.

- **Accept-Encoding** –similar to Accept, but restricts the content-coding values which are acceptable in the response. If no Accept-Encoding header is present in a request, the server MAY assume that the client will accept any content coding. If an Accept-Encoding header is present, and if the server cannot send a response that is acceptable according to the Accept-Encoding header, then the server SHOULD send an error response with the 406 (Not Acceptable) status code.

- **Accept-Language** – similar to Accept, but restricts the set of natural languages that are preferred as a response to the request.

- **Authorization --** A user agent that wishes to authenticate itself with a server--usually, but not necessarily, after receiving a 401 response--MAY do so by including an Authorization request-header field with the request. The Authorization field value consists of credentials containing the authentication information of the user agent for the realm of the resource being requested. See the section on Basic Authentication for more information on authentication and authorization.

- **Cache-Control --** used to specify directives that MUST be obeyed by all caching mechanisms along the request/response chain. The directives specify behavior intended to prevent caches from adversely interfering with the request or response. These directives typically override the default caching algorithms. Note – this variable does not impact **WebBase** caching.

- **Connection --** allows the sender to specify options that are desired for that particular connection and MUST NOT be communicated by proxies over further connections.

- **Date --** the date and time at which the message was originated. An example is

  ```
  Date: Tue, 15 Nov 1994 08:12:31 GMT
  ```

- **From --** if given, this field SHOULD contain an Internet e-mail address for the human user who controls the requesting user agent. This header field MAY be used for logging purposes and as a means for identifying the source of invalid or unwanted requests. It SHOULD NOT be used as an insecure form of access protection. An example is:

  ```
  From: webmaster@w3.org
  ```

- **Host --** specifies the Internet host and port number of the resource being requested, as obtained from the original URL given by the user or referring resource (generally an HTTP URL). The Host field value MUST represent the network location of the origin server or gateway given by the original URL. This allows the origin server or gateway to differentiate between internally-ambiguous URLs, such as the root "/" URL of a server for multiple host names on a single IP address.

- **If-Match --** used with a method to make it conditional. A client that has one or more entities previously obtained from the resource can verify that one of those entities is current by including a list of their associated entity tags in the If-Match header field. The purpose of this feature is to allow efficient updates of cached information with a minimum amount of transaction overhead. It is also used, on updating requests, to prevent inadvertent modification of the wrong version of a resource.

- **If-Modified-Since --** used with the GET method to make it conditional: if the requested variant has not been modified since the time specified in this field, an entity will not be returned from the server; instead, a 304 (not modified) response will be returned without any message-body.

- **If-None-Match --** used with a method to make it conditional. A client that has one or more entities previously obtained from the resource can verify that none of those entities is current by including a list of their associated entity tags in the If-None-Match header field. The purpose of this feature is to allow efficient updates of cached information with a minimum amount of transaction overhead. It is also used, on updating requests, to prevent inadvertent modification of a resource that was not known to exist.

- **If-Range** -- if a client has a partial copy of an entity in its cache, and wishes to have an up-to-date copy of the entire entity in its cache, it could use the Range request-header with a conditional GET (using either or both of If-Unmodified-Since and If-Match.) However, if the condition fails because the entity has been modified, the client would then have to make a second request to obtain the entire current entity-body.

- **If-Unmodified-Since** -- used with a method to make it conditional. If the requested resource has not been modified since the time specified in this field, the server should perform the requested operation as if the If-Unmodified-Since header were not present.

- **Max-Forwards** -- may be used with the TRACE method to limit the number of proxies or gateways that can forward the request to the next inbound server. This can be useful when the client is attempting to trace a request chain that appears to be failing or looping in mid-chain.

- **Pragma** -- used to include implementation-specific directives that may apply to any recipient along the request/response chain. All pragma directives specify optional behavior from the viewpoint of the protocol; however, some systems MAY require that behavior be consistent with the directives.

- **Proxy-Authorization** -- allows the client to identify itself (or its user) to a proxy that requires authentication. The Proxy-Authorization field value consists of credentials containing the authentication information of the user agent for the proxy and/or realm of the resource being requested.

- **Range** -- HTTP retrieval requests using conditional or unconditional GET methods may request one or more sub-ranges of the entity, instead of the entire entity, using the Range request header, which applies to the entity returned as the result of the request.

- **Referer** -- allows the client to specify, for the server's benefit, the address (URI) of the resource from which the Request-URI was obtained (the "referrer", although the header field is misspelled.) The Referer request-header allows a server to generate lists of back-links to resources for interest, logging, optimized caching, etc. It also allows obsolete or mistyped links to be traced for maintenance. Example:

  ```
  Referer: http://www.webbase.org/default.htf
  ```

- **Transfer-Encoding** -- indicates what (if any) type of transformation has been applied to the message body in order to safely transfer it between the sender and the recipient. This differs from the Content-Encoding in that the transfer coding is a property of the message, not of the entity.

- **Upgrade** -- allows the client to specify what additional communication protocols it supports and would like to use if the server finds it appropriate to switch protocols.

- **User-Agent** -- contains information about the user agent originating the request. This is for statistical purposes, the tracing of protocol violations, and automated recognition of user agents for the sake of tailoring responses to avoid particular user agent limitations. User agents SHOULD include this field with requests. The field can contain multiple product tokens and comments identifying the agent and any subproducts that form a significant part of the user agent.

- **Via --** used by gateways and proxies to indicate the intermediate protocols and recipients between the user agent and the server on requests, and between the origin server and the client on responses. It is intended to be used for tracking message forwards, avoiding request loops, and identifying the protocol capabilities of all senders along the request/response chain.

Appendix D Obsolete Components

This appendix describes macros, variables and parameters which are still supported by **WebBase** but are considered obsolete. These macros, variables and parameters may be dropped from future versions of **WebBase**. It is recommended that forms designers review any existing forms to ensure that these macros, variables and parameters are not used.

D.1 Obsolete macros

- **{include file}**
  The ***include*** macro serves the same purpose as the *insert* macro. Its syntax is slightly different in that when the filename is not presented as a string (enclosed in single quotes), it is treated as a filename as, for example, **file.HTF -or- subdir/file.HTF.**

  ```
  {include '../address.htf'}
  ```

- **{print <args>} {/print}**
  The text contained within the ***print*** macro is not processed by **WebBase** but is inserted into the output HTML exactly as encountered. Variables and other macro keywords are not processed but are printed with their enclosing { } characters as entered in the .htf file. This macro has been superseded by the *output* macro.

  If the optional argument **convert** is specified, all < and > characters are converted to the character sequences &lt; and &gt; respectively, so that HTML forms can be printed as part of the text rather than being interpreted by the browser.

  An optional keyword/value argument **include filename** indicates that the ***print*** macro is to take its text from another file (see the ***include*** macro for a description of the filename specification options). This facility allows one to print the contents of an included file rather than including the file to be processed by **WebBase**.

  Note: since the purpose of the ***print*** macro is to insert text that is to be printed and not processed by **WebBase**, **WebBase** does not parse the information within the **{print} ... {/print}** area. For this reason, after encountering the opening **{print}** keyword, **WebBase** scans for the first occurrence of an ending **{/print}** keyword. **WebBase** does not support nested print blocks.

The example below would print <TITLE> {systemName} </TITLE> at the browser and NOT set the browser's title to the value of the variable systemName.

```
{print convert}
<TITLE> {systemName} </TITLE>
{/print}
```

D.2 Obsolete dynamic variables

- **%AOL%**
  a Boolean indicator of whether the calling browser is accessing the server through AOL. If a user needs to present information for a specific type of browser, it is recommended that the User-Agent header variable be examined to determine the browser type.

- **%debugAddresses%**
  returns the same value as %serverAddress%

- **%errorVariableNotFound%**
  By default, if the user accesses a variable that has not been defined, an error is generated and an error message is returned to the browser. In most cases, this is the desired action while the user is developing .htf files. There are some circumstances, however, when .htf files must determine if a variable does exist and take appropriate action if it does not rather than returning an error message. Setting this variable to false as shown above will suppress the error message and allow the user to query variables with an **isNull** or **notNull** message.

  Several operations are available for the user to test to see if a variable is in existence. Instead of using %errorVariableNotFound%, the user should explicitly check for a value of a variable if there is the possibility that it will not exist. To check for the value of a variable, use:

  ```
  {if ‘varName’ %cmd% variableExists:}
  ```

  This returns either true or false, which can cause the appropriate branch within the {if} macro to be invoked. Other operations on HttpCommand that can be used are fromVars:default and fromNonNullVars:default.

- **%Microsoft%**
  a Boolean indicator of whether the calling browser is Microsoft Internet Explorer. If a user needs to present information for a specific type of browser, it is recommended that the User-Agent header variable be examined to determine the browser type. While this dynamic variable can be used, the information returned in the User-Agent variable may change as new versions of browsers become available. This dynamic variable also does not indicate version information (e.g., MSIE 2.0 or 3.0).

- **%Netscape%**
  a Boolean indicator of whether the calling browser is a Netscape browser. If a user needs to present information for a specific type of browser, it is recommended that the User-Agent header variable be examined to determine the browser type. While this dynamic variable can be used, the information returned in the User-Agent variable may change as new versions of browsers become available. This dynamic variable also does not indicate version information (e.g., Netscape 2.0 or 3.0).

D.3 Obsolete variable parameters

- **at**
  specifies an index into a table of rows returned by a database query. This is used in conjunction with the **in** parameter. For example, using the collection of records returned by a SELECT statement and stored in the variable *myCltn*, a specific field could be retrieved using:

  ```
  NameField in=myCltn at=1
  ```

  This could also be used within a *forRow* macro and the value of the **at** parameter would be a variable with an integer value indexing into the collection.

  The recommended alternative to this parameter is to use the *forRow* or *with* macros to identify particular records or fields, and then use field variables to display the desired information.

- **in**
  specifies the name of a row variable from a *forRow* macro that contains the data from a row of a database query result. This notation allows for nesting of *forRow* macro statements where the rows returned from 2 or more simultaneous database queries may contain the same field name. Using the notation NameField in=RowOne ... and NameField in=RowTwo ... allows for explicit accessing of the correct field and row.

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