Constellation™

A Real-Time Software Framework

Getting Started Guide

Constellation Version 1.0

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Available Documentation

Constellation documentation includes:

- ❏ The Overview, Capabilities and Benefits, ConstellationOverview.pdf. This document provides an overview of Constellation's main features and discusses the benefits of using Constellation.
- ❏ The Getting Started Guide, GettingStarted.pdf. This document includes installation instructions, system requirements, supported architectures, and compatibility with other products.
- ❏ The Tutorial, ConstellationTutorial.pdf. This tutorial provides basic exercises to give you hands-on experience working in the Constellation environment to build, test, and run new components and applications.
- ❏ The User's Manual, Manual.pdf. The manual contains step-by-step instructions on how to use the tools, build components, run and debug applications.
- ❏ The Distributed Applications Guide, DistributedApplications.pdf. This document describes two approaches (NDDS® and CORBA®) for developing Constellation applications that need to communicate with other (Constellation and non-Constellation) applications.
- ❏ The UML Guide, ConstellationUMLGuide.pdf. This document provides an introduction to the Unified Modeling Language (UML) and describes how to create UML diagrams with Constellation and use them in your development process.

You can access these documents through the main online documentation file, **Constellation.html**, which also includes extensive online HTML documentation. This file is copied onto your system when you install *Constellation*. It is located in **<your installation path>/cs.8.0*x***, where ***x*** is a version-specific letter. You can open the file directly with any standard web browser such as Netscape® or Microsoft® Internet Explorer, or by starting *Constellation* and using the **Help** menu.

Contents

Welcome to Constellation

Welcome to the *Constellation* design system from Real-Time Innovations, Inc. *Constellation* is a development tool set for designing *and* implementing real-time applications. *Constellation*'s graphical component-based design tools, component repository management tools, code generators, run-time execution engines, and run-time debugging tools allow you to build and maintain your real-time applications quickly and easily.

Hands-On Reading

If you want hands-on experience with *Constellation*:

- ❏ Use the *Constellation Getting Started Guide* to install *Constellation*.
- ❏ Work through the exercises in the *Constellation Tutorial*.
- ❏ Use the *Constellation User's Manual* as a reference tool, it provides details on each *Constellation* feature.
- ❏ If you are developing a distributed application, see the *Constellation Distributed Applications Guide*.
- ❏ If you want to create UML diagrams and use them to implement your application, see the *Constellation UML Guide*.

Concepts-Only Reading

If you only want to learn the concepts and do not want to do any exercises or programming, read the *Constellation User's Manual*. You do not need to read this guide if you are not installing *Constellation*.

Conventions

Pathnames

This guide will often refer to directories and files. The *Constellation* tools and this guide follow the Internet standard of using forward slashes as path separators, such as **/local/rti/cs/repositories**. You may need to translate to backward slashes when interacting directly with the Microsoft Windows® operating system.

Variable Pathnames

This manual often refers to directory pathnames and other values that have been customized for you and your site. For instance:

- **<PRODUCT_DIR>** refers to the path where *Constellation* is installed on your system. In the examples in this document, it is **/apps/rti/constellation.1.0x/cs.8.0x** on UNIX systems, and **C:\RTI\Constellation.1.0x\cs.8.0x** on Windows systems (where **x** is a version-specific letter).
- **<RTICONFIGHOME>** refers to the directory where you have installed all of RTI's products. It is typically *two levels up* from **<PRODUCT_DIR>**. In the examples in this document, it is **/apps/rti** or **C:\RTI**.

Platform Support

Constellation runs on, and can generate, applications that run on many different platforms. To support the vast array of architectures, we separate the executable, library, and object files into individual directories.

Each platform name has four parts: hardware architecture (such as SPARC® or Pentium®), operating system (such as Solaris™ or VxWorks®), operating system version,

and compiler. For example, **sparcSol2.8gcc2.95** is the directory that contains files specific to Solaris version 2.8 for the SPARC processor, using the gcc version 2.95 compiler.

The full list of supported architectures can be found in Section 1.3.

Typographical Conventions

This guide uses fonts to clarify the text by distinguishing between what you type, what you should see as display output, variables, and literal strings. Subroutine names are always followed by parentheses, such as **OnExecute()**. Table 1 lists the conventions used.

Table 1 **Font Conventions**

Usage	Examples
pathnames, files	**/local/rti/cs**, **pdControl.dfc**
property names, variables	***verbosity, arch***
constants, keywords	**CSFSM_ANY_RETCODE**, **new**
keyboard input	**`java -version`**
named keys on keyboard	<**`Enter`**>, <**`Ctrl`**>
display output, source code	`Starting Java...`

Chapter 1

System Requirements and Compatibility

Before installing *Constellation*, you should be aware of the requirements and compatibility issues presented in this chapter:

1.1 Disk and Memory Usage

Disk usage for a typical installation that supports one host architecture and one target architecture is approximately 65 MB. Installation for more than one target architecture will increase disk usage.

We recommend that you have *at least* 128 MB of RAM installed on your host development system—256 MB is preferable. *Constellation* design tools are Java applications, and as of this writing, Java can use quite a bit of resources.

1.2 Networking Support

The *Constellation* design tools are licensed products. *StethoScope* and the license manager require that you have TCP/IP services available on your host machines. Additionally, the *LiveLook* mode of *Constellation* requires TCP/IP.

1.3 Supported Host and Target Architectures

The run-time applications built with *Constellation* require multi-threading support from the operating system.

The *Constellation* development tools support the host platforms in Table 1.1. You can build applications that run on the platforms in Table 1.2.

Table 1.1 **Supported Host Architectures**

Host OS	Architecture
Linux™ 2.4.x	Intel x86
Solaris 2.7	UltraSPARC
Solaris 2.8	UltraSPARC
Windows 2000	Intel x86
Windows NT® 4.0	Intel x86
Windows XP	Intel x86

Note: Support for additional platforms not listed in Table 1.1 and Table 1.2 may be available through special development and maintenance agreements. Contact your RTI sales representative for details.

Table 1.2 **Supported Target Architectures**

Operating System	CPU	Compiler	RTI Architecture
VxWorks 5.4 / Tornado 2.0.x Host: Solaris or Windows	Intel 486 with hardware floating point	gcc 2.7.2	i486Vx5.4gcc
	Pentium	gcc 2.7.2	pentiumVx5.4gcc
	PowerPC™ 603, 824x, 825x, and 826x (w/ hardware floating point)	gcc 2.7.2	ppc603Vx5.4gcc
	PowerPC 604, 7xx and 74xx	gcc 2.7.2	ppc604Vx5.4gcc
	PowerPC 860, PPCEC603 (PPC8260 w/out hardware floating point), PPC8xx	gcc 2.7.2	ppc860Vx5.4gcc
	Motorola®68020, 68040, 68060, hardware floating point required	gcc 2.7.2	m68020Vx5.4gcc
VxWorks 5.5 / Tornado 2.2 Host: Solaris or Windows	Pentium	gcc 2.9	pentiumVx5.5gcc
	Pentium 2	gcc 2.9	pentium2Vx5.5gcc
	Pentium 3	gcc 2.9	pentium3Vx5.5gcc
	Pentium 4	gcc 2.9	pentium4Vx5.5gcc
	PPC603, PPC8255, PPC824x, PPC826x	gcc 2.96	ppc603Vx5.5gcc
	PPC604, PPC750, PPC765, PPC 7xx, PPC74xx	gcc 2.96	ppc604Vx5.5gcc
	PPC860, PPC8xx	gcc 2.96	ppc860Vx5.5gcc
Solaris 2.7	UltraSPARC	Sun CC 5.0	sparcSol2.7cc5.0
		gcc 2.95	sparcSol2.7gcc2.95
Solaris 2.8	UltraSPARC	Sun CC 5.2	sparcSol2.8cc5.2
		gcc 2.95	sparcSol2.8gcc2.95
Windows NT, Windows 2000, Window XP	Pentium	Visual C++® 6.0 (service pack 3 or higher)	i86Win32VC60
	Pentium	Visual C++ 7.0	i86Win32VC70[a]
Linux with 2.4 kernel (Red Hat® 7.3)	Pentium	gcc 2.96	i86Linux2.4gcc2.96
Linux with 2.4 kernel (Red Hat 8.0 & 9.0)	Pentium	gcc 3.2	i86Linux2.4gcc3.2
TimeSys™ Linux 4.0	Pentium	gcc 3.2	i86TimeSys4.0gcc3.2

a. VC7.0 native compiler and libraries are supported but debugging integration with Visual Studio® .Net is not enabled

1.4 Compatibility with Other Products

Constellation 1.0 is compatible with RTI's *NDDS*® 3.0m, *StethoScope*® 7.0f, and *RTILib* 4.2c. *StethoScope* and *RTILib* are included with the *Constellation* 1.0 distribution. *NDDS* is an optional product which may be purchased separately.

Constellation 1.0 is also compatible with The MathWorks' MATLAB® Release 13 (version 6.5), Release 12.1 (version 6.1) and Release 12 (version 6.0).

Constellation 1.0 is compatible with Telelogic DOORS® version 6.0. *Constellation*'s DOORS integration is supported on Microsoft Windows NT 4.0, Windows 2000, and Window XP platforms. You must have a special license from RTI that enables the DOORS integration.

Constellation 1.0 requires GLOBEtrotter Software's FLEX*lm*® version 8.1 for license management. This software is included with the *Constellation* 1.0 distribution.

For instructions on upgrading existing applications to use *Constellation* 1.0, see the *Release Notes* (accessed from **Constellation.html**).

Chapter 2

Installing Constellation

This chapter provides instructions on how to install and set up *Constellation*. The basic steps are:

1. Download the distribution (Section 2.1).
2. Install *Constellation* (Section 2.2 for UNIX® systems, or Section 2.3 for Windows systems).
3. Run the Site Profile Manager to configure *Constellation* settings that apply to all users. On Windows systems, this step happens automatically at the end of the installation process. On UNIX systems, you will need to run **cs_site_setup**. Section 2.4 describes the site setup process.

   Site setup is typically performed by the system administrator. It should be performed on a project-by-project basis to define configurations that will be used by all members of a development team.
4. Start the license manager (Section 2.5, with details in Chapter 3). This step is not required if you are using a temporary license while evaluating *Constellation*.
5. If your application will be using a CORBA® ORB to make remote method invocations, install and configure your CORBA ORB. See Chapter 5 for instructions.
6. Run *Constellation* (Section 2.6). The first time you run *Constellation*, a User Profile Manager tool will help you make user-specific customizations. Section 2.7 describes the user setup process.
7. *If you are upgrading from a previous version,* follow the upgrade process described in the *Constellation Release Notes*.

This document refers to version **1.0x**, where you should replace the ***x*** with the version letter for your distribution. See the *Constellation Release Notes* for the latest version.

2.1 Downloading the Distribution

To download Constellation from RTI's website:

1. Send e-mail to **license@rti.com** for a web shipping user name and password.
2. Select **downloads**, located at the top of our home page, http://www.rti.com.
   a. Select Constellation, located at the left of the page.
   b. Enter the user name and password for web shipping.
3. Select the version of *Constellation* you want to download, such as *Constellation* **1.0x**, then click **Submit**.
4. Click the link to download the file to your computer.

   If you need help with the download, contact RTI at **support@rti.com**.

2.2 Installing on UNIX Systems

Before installation:

1. Make sure you are *not* logged on as the system administrator (root).
2. Make sure you have GNU's version of the **tar** utility; it handles long filenames correctly. You can download **gtar** from RTI's home page, http://www.rti.com. From there, select **Free Downloads**. You will see a list of items you can download, including GNU tar.
3. Create a directory to hold *Constellation*. For example:

   ```
   mkdir /apps/rti/constellation.1.0x
   ```

   We will assume you are using the above path throughout this document. Substitute your actual directory pathname.

4. Use **gtar** to extract the distribution. For example, if you downloaded the distribution as **constellation10x-sol28.tar.Z**, use a UNIX shell to run the following:

```
cd /apps/rti/constellation.1.0x
zcat constellation10x-sol28.tar.Z | gtar xvf -
```

   The extraction process will result in a directory tree that contains the products you have purchased. A directory listing of **/apps/rti/constellation.1.0x** might look like the following:

```
cs.8.0x/      flexlm.8.1b/      rtilib.4.2b/      scope.7.0c/
```

5. Use an HTML browser to open the online documentation at **/apps/rti/constellation.1.0x/cs.8.0x/Constellation.html**. This is the top page of *Constellation*'s online documentation.

   Select the **Installation and Getting Started** link in the "navigation bar" at the left of the page to get the latest information on the initial setup for your site.

6. Run Constellation's Site Profile Manager to make site-level customizations. To start the tool, run the **cs_site_setup** program from the **scripts** directory. For example:

```
/apps/rti/constellation.1.0x/cs.8.0x/scripts/cs_site_setup
```

   For details on the Site Profile Manager, see Section 2.4.

7. After installation and the Site Profile Manager complete, see Section 2.5 for instructions on installing the license manager. Then see Section 2.6 for instructions on running *Constellation* and creating user profiles.

IMPORTANT — throughout this document:

- **${PRODUCT_DIR}** refers to the path to the **cs.8.0x** directory. In the examples in this document, it is **/apps/rti/constellation.1.0x/cs.8.0x**.
- **${RTICONFIGHOME}** refers to the directory that is *two levels up* from **${PRODUCT_DIR}**. In the examples in this document, it is **/apps/rti**.

2.3 Installing on Windows Systems

Note: You do *not* need to be logged on as an administrator to install *Constellation.*

1. The installation process for Windows systems is fully automated. Run the file which you downloaded from RTI's website, such as **Constellation10x.exe**. It will guide you through the installation process, run the Site Profile Manager tool, and create shortcuts under the **Start** menu.
2. The first prompt you will see is for a destination location—where *Constellation* should be installed. The default path is **C:\RTI,** we will assume you are using this path throughout this document and refer to it as **%RTICONFIGHOME%**. Substitute your actual directory pathname. After the installation process you will see a directory called **C:\RTI\Constellation.1.0x**, which might look like the following:

   ```
   cs.8.0x/      flexlm.8.1b/      rtilib.4.2b/      scope.7.0c/
   ```

3. The next prompt is for the location of your license file. Choose (and write down) the default path selected by the too1. If you want to enter a custom location, read Section 3.2.1 first.
4. At the end of the installation process, the Site Profile Manager (described in Section 2.4) will run *automatically.* If you need to change the profile later, you can run it again by using the command under *Constellation*'s **Tools** menu or the shortcut installed under the Windows **Start** menu.
5. Use an HTML browser to open the online documentation by selecting **Start, Programs, RTI,** Constellation **1.0x,** Constellation **Online Documentation**. This is the top page of *Constellation*'s online documentation.

   Select the **Installation and Getting Started** link in the "navigation bar" at the left of the page to get the latest information on the initial setup for your site.
6. After installation and the Site Profile Manager complete, see Section 2.5 for instructions on installing the license manager. Then see Section 2.6 for instructions on running *Constellation* and creating user profiles.

IMPORTANT — throughout this document:

- **%RTICONFIGHOME%** refers to the directory entered at the start of the installation process (see Step 2 above), such as **C:\RTI**.
- **%PRODUCT_DIR%** refers to the directory which contains *Constellation*, such as **%RTICONFIGHOME%\Constellation.1.0x\cs.8.0x**.

2.4 Setting Up Constellation for a Site or Project

Use the Site Profile Manager to configure *Constellation* settings that apply to all users on a development team. This group of settings, called a *site profile*, contains the list of repositories to be used, target architectures, compiler information, and the locations of optional tools such as *StethoScope*.

Your site administrator must create at least one site profile before anyone can run *Constellation*. It is common to have multiple site profiles, one for each development team or project. The list of site profiles is called a *portfolio*. Each *Constellation* user will select one of these site profiles when they start *Constellation* for the first time (user profiles are described in Section 2.7).

Each time you upgrade to a new release of *Constellation*, you must run the Site Profile Manager to update your configuration. This will allow you to maintain and support multiple versions of *Constellation* simultaneously as you wait for users to migrate to newer versions.

2.4.1 Using the Site Profile Manager

The Site Profile Manager can be started from:

- On UNIX systems: **${PRODUCT_DIR}\scripts\cs_site_setup**
  or
  ${PRODUCT_DIR}\scripts\cs -sitesetup
- On Windows systems: **Start, Programs, RTI,** Constellation **1.0x, Tools,** Constellation **Site Setup**
- *Constellation*'s **Tools** menu

Before running the Site Profile Manager, the *Constellation* site administrator must know the location of the compiler tools that will be used to compile *Constellation* components and applications. Table 1.1 lists the supported compilers.

The Site Profile Manager is a wizard that helps the administrator configure the site to run a particular version of *Constellation*. The administrator will be prompted by the wizard to enter the locations of various tool directories and other customizable parameters.

The wizard provides "best guesses" by using information from default settings or from the last version of *Constellation* installed at the site. In most cases, you can use these defaults and click **Next** to move to the next page. (Default and invalid guesses are shown as strings enclosed by '#' characters, for example: "**#/default/path/#**.")

To add a site profile: Click **Add...** on the window seen in Figure 2.1, then specify a name and a location on disk where that profile will be stored. Choose names that are easy to relate to. For example, site profile names can be named after project names.

When adding profiles, be aware of the following rules:

- ❏ Each profile must have a unique name (regardless of its location on disk).
- ❏ No more than a single profile may exist on disk in a given location.
- ❏ Profiles may be renamed in the same location, but may not be moved to a different location.

If you want to choose a non-default location, make sure that the location already exists. If the location contains a valid profile for the current version of *Constellation*, the tool will prompt you to add it to the list of known profiles. You may then either choose to simply add it to your portfolio for later use or edit it (in which case, it will still add it to your portfolio).

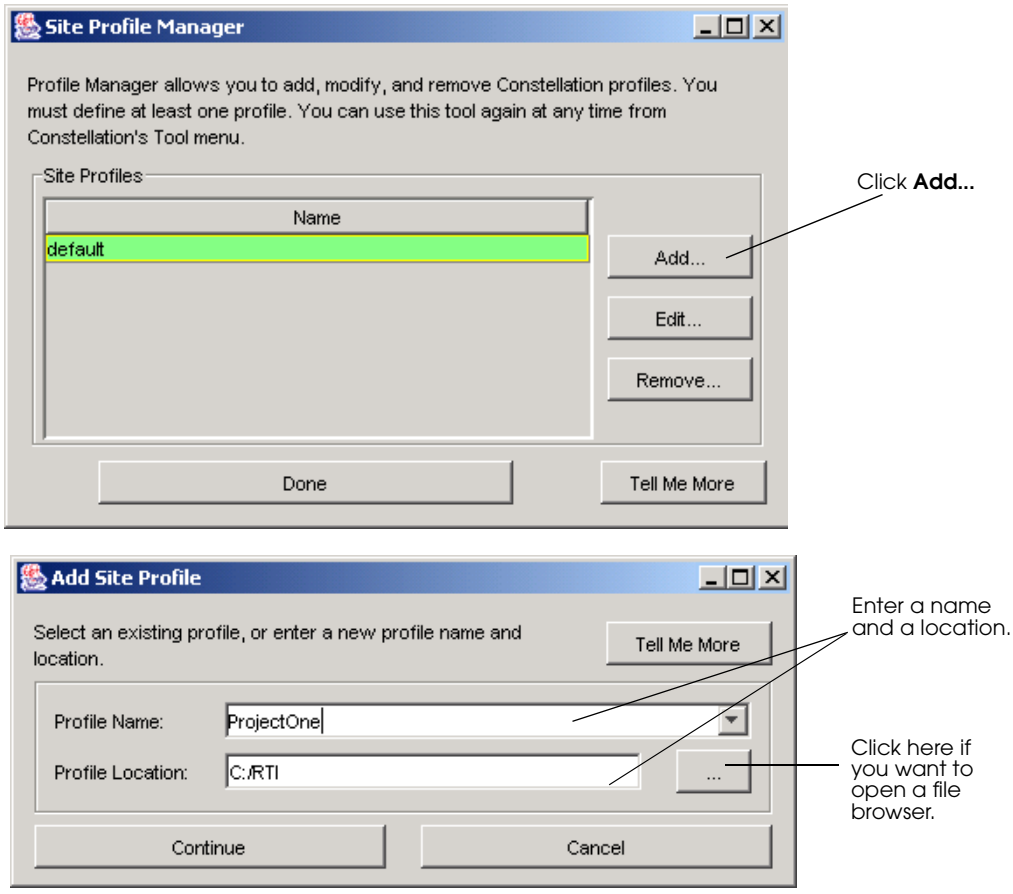
To edit a site profile: To make changes to the defaults or "best guesses" provided for each parameter, you can type directly in the edit boxes, choose from a drop-down list box, or click **Browse...**. Click **Next** to move from one page to the next. On the last page, click **Finish**. You can use the Site Profile Manager again later to add, delete, or edit profiles (see the three methods above for starting the wizard).

Note: The wizard validates entries to minimize typing mistakes. There may be times when you do not want it to check the validity of your entries—the directory or program you are specifying may not exist yet, for instance. In that case, just clear the Validate check box next to the particular entry.

In general, if the wizard was unable to choose a valid value for an entry—such as an existing directory—it will leave it blank. For instance, choices that map to the location of a directory or file will only appear if the directory or file exists. For any entry—even a blank one—the wizard may have more than one choice. You can view and select from the alternatives if you click the drop-down list box button (see Figure 2.2).

The following sections describe the parameters you can configure with the Site Profile Manager.

Figure 2.1 **Site Setup with the Site Profile Manager**

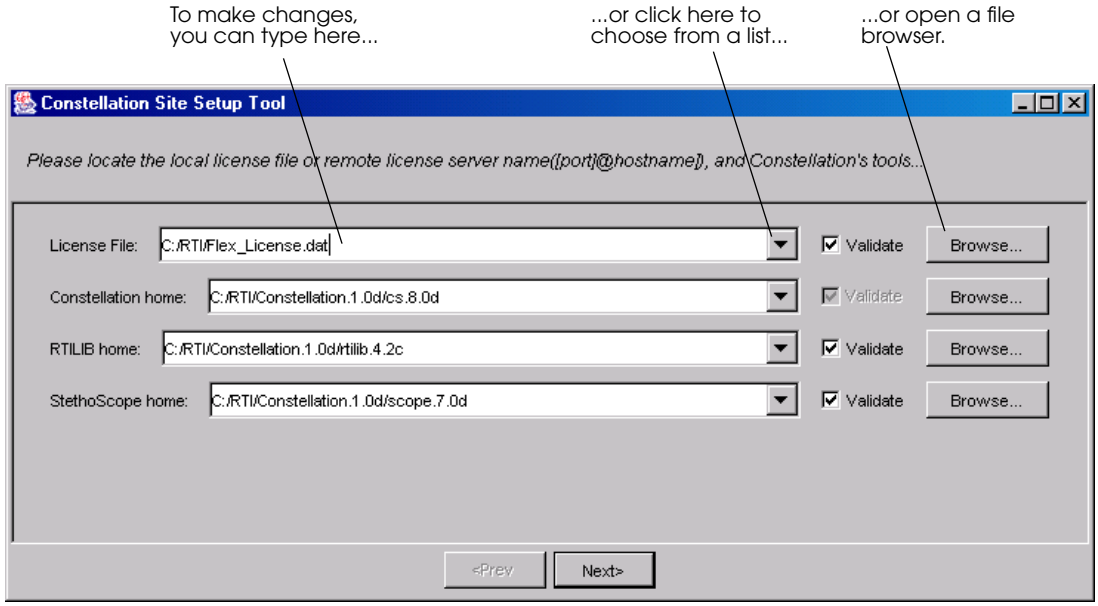


2.4.2 Constellation's License File and Tools

RTI products are licensed. You will need to obtain a license from your distributor and place it in a license file. As seen in Figure 2.2, the first entry on this page specifies the location of the license file. For more information on licenses, see Section 3.2.1.

The remaining entries on this page list the associated tools included in your distribution. Provide the full pathnames to the directories that contain each of these tools, such as **/apps/rti/constellation.1.0x/rtilib.4.2b**, or **C:\RTI\Constellation.1.0x\rtilib.4.2b**. In most cases, the wizard will have already initialized these, so you may not need to make any changes.

Figure 2.2 **Locations for License File and Included Tools**



2.4.3 Optional Add-in Tools

The wizard's next two pages allow you to configure external "optional" packages that you may have purchased separately. As seen in Figure 2.3, you can include support for:

- ❑ CVS Integration — a version control system for archiving and managing files
- ❑ CORBA
- ❑ Telelogic's DOORS®
- ❑ The MathWorks' Simulink®
- ❑ Microsoft Visual Studio® IDE (Integrated Development Environment)
- ❑ Real-Time Innovations' NDDS (Network Data Delivery Service)
  — If you choose this tool, see Section 2.4.3.1 for important information.

Select the tools that you want to use, then click **Next** to specify information for each selected tool. For most tools you will need to enter the path to the application. Some tools such as CORBA require additional parameters, as seen in Figure 2.4.

Figure 2.3 **Optional Tools**

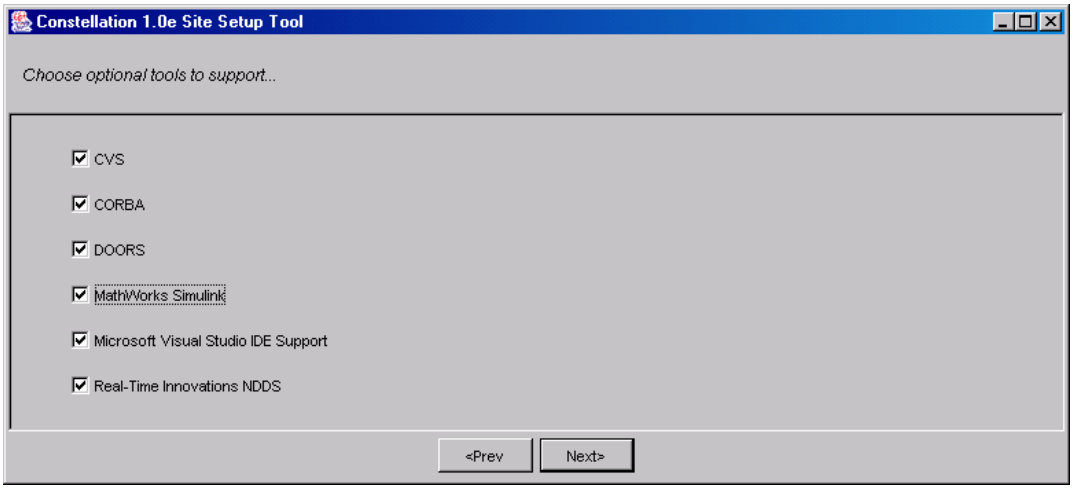
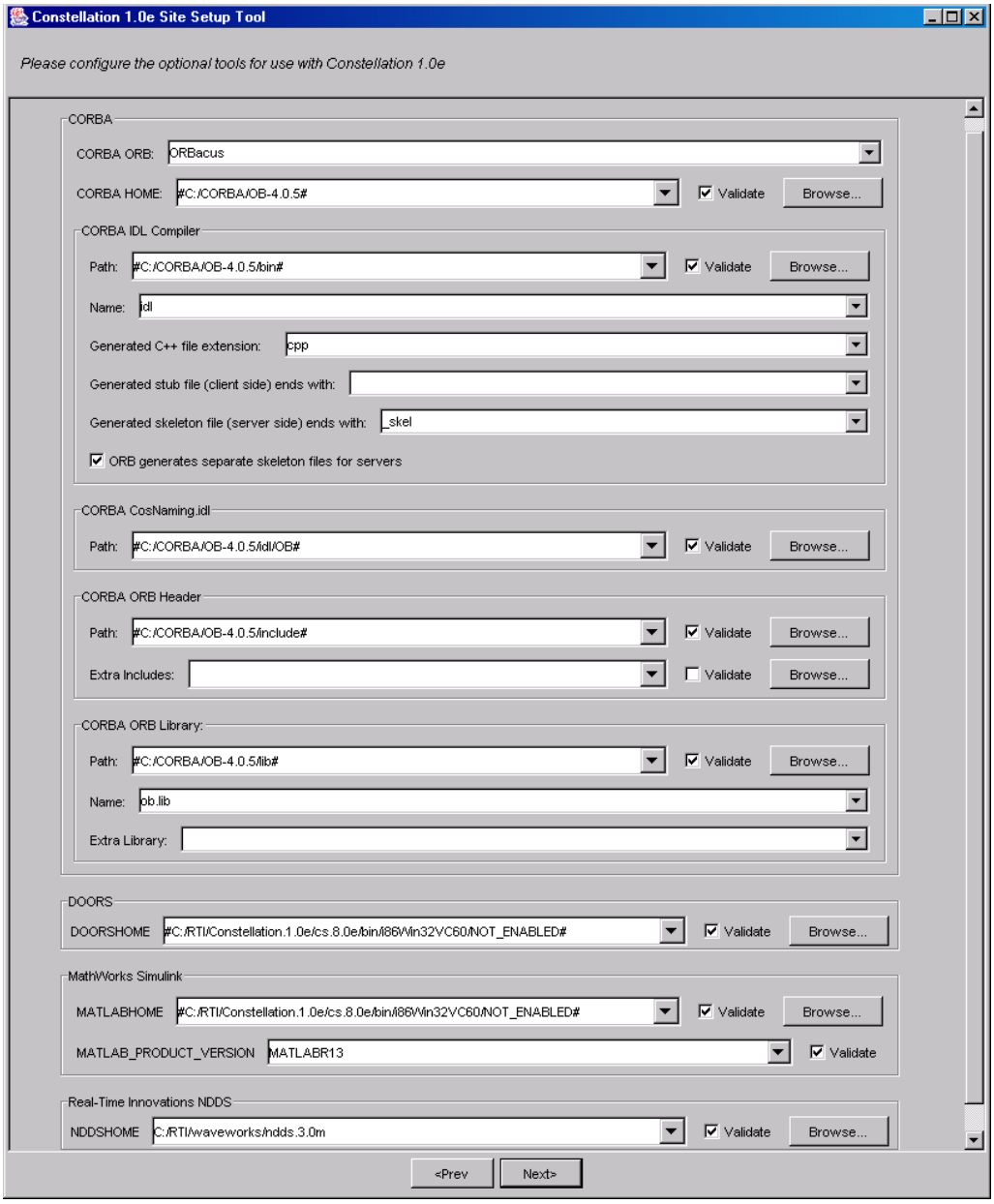


Figure 2.4 **Parameters for Optional Tools**



2.4.3.1 Setting a Required Environment Variable for NDDS

To use *NDDS*, you must set the environment variable, **NDDS_PEER_HOSTS**.

NDDS_PEER_HOSTS is a colon-separated list of the nodes (computers) that will be communicating with each other in your distributed application. Each node can be represented by its host name or by its IP address in the standard dot notation. Both unicast and multicast addresses are allowed. For example:

```
mars:pluto:jupiter
206.197.57.101:206.197.57.195:207.110.10.12
```

- On UNIX systems, use the *setenv* command. For example:

  ```
  setenv NDDS_PEER_HOSTS mars:pluto:jupiter
  ```

- On Windows systems, use the *set* command. For example:

  ```
  set NDDS_PEER_HOSTS=mars:pluto:jupiter
  ```

  Warning: Do not put a space character on either side of the = character.

- On VxWorks systems, use the *putenv* command. For example:

  ```
  putenv "NDDS_PEER_HOSTS=mars:pluto:jupiter:myTarget"
  ```

For more information on **NDDS_PEER_HOSTS**, see the *NDDS Getting Started Guide*.

2.4.4 Site Repositories

This page allows you to create a list of repositories that all *Constellation* users will be able to access. This list can include repositories supplied with *Constellation* and custom repositories created at your site that are common to all users.

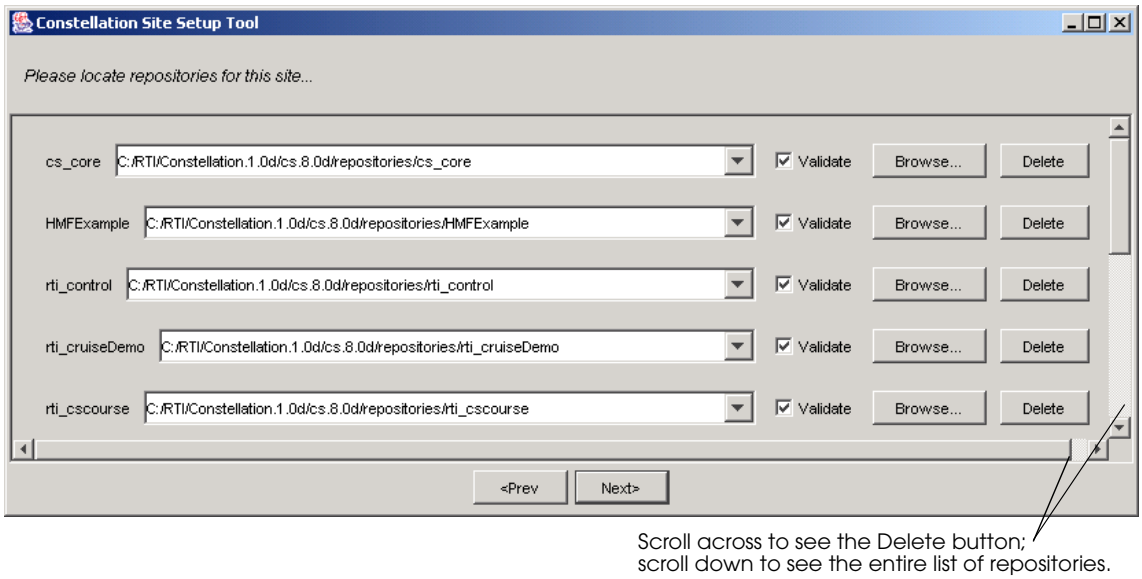
You may not want all of the repositories supplied with *Constellation* to be accessible by users. For example, the **rti_cscourse** repository is useful mainly to beginning *Constellation* users. This repository, as well as any others supplied by RTI, can be added to the users' repositories portfolio on an individual basis.

The **cs_core** repository *must* be in the site repository list. Other useful repositories supplied by RTI are **rti_util**, **rti_control**, and **rti_drivers**. The **rti_network** repository allows you to publish and subscribe using *NDDS* (see the *Constellation Distributed Applications Guide* for more information). You will find online documentation for each of the repositories in the **HTML** directory of each repository.

Note: You should remove **rti_tutorial** from the list, because it is meant to be copied by users working through the exercises in the *Constellation Tutorial*.

The other repositories supplied by RTI—**rti_network_examples**, **rti_cruiseDemo**, **rti_cscourse**, and **HMFExample**—are example repositories that users can add to their own portfolios.

Figure 2.5 **Choosing Site-Level Repositories**



Scroll across to see the Delete button;
scroll down to see the entire list of repositories.

2.4.5 Choosing Target Platforms

You can build and run *Constellation* applications on many different types of machine architectures. All you need is the compiler tool set. The wizard will detect the architecture of your host machine and offer that as a choice. If you are have a version of *Constellation* that includes support for VxWorks targets, the wizard will also offer VxWorks architectures as choices to allow you to perform cross-compilation.

2.4.6 Configuring Each Target Platform

For each platform that you select, the wizard will present a series of pages that allow you to configure its compiler tool set. Exactly which directories you will be prompted to locate or what compiler flags and directives you will be asked to supply will depend on the specific architecture.

- ❑ For native tools (e.g., **/usr/bin/CC**), the choices supplied by the wizard are usually valid and do not require modification.
- ❑ For VxWorks cross-compilation, you will need to supply information on the location of the cross-compilers supplied by the VxWorks development environment. You can use the GNU GCC or Diab™ compilers.
- ❑ For host architectures that use GNU compilers, you will need to locate where the GNU tools have been installed (see Section 2.4.6.1).
- ❑ For Microsoft Windows NT, Windows XP, or Windows 2000, you will need to locate where the Visual C++ 6.0 or 7.0 compiler has been installed.

2.4.6.1 Notes for Using the GNU GCC Compiler

The GNU compilers need two additional parameters to help locate support files:

- ❑ **GCC_EXEC_PREFIX** This is a directory with a name ending in **lib/gcc-lib**. It is usually located parallel to the **bin** directory that contains the compiler executable. For instance:

```
Gnu binaries: /apps/gnu/bin
gcc's exec prefix:/apps/gnu/lib/gcc-lib

Gnu binaries: /apps/Tornado/host/sun4-solaris2/bin
gcc's exec prefix:/apps/Tornado/host/sun4-solaris2/lib/gcc-lib
```

- ❑ **COMPILER_PATH** This is a directory—typically underneath **lib/gcc-lib**—that contains support tools, such as the preprocessor, loader, etc. The directory name usually contains a full description of the host and target architecture and ends in the specific GCC version. Examples are:

```
/apps/gnu/lib/gcc-lib/sparcSol2.7/2.7.2

/apps/Tornado/host/sun4-solaris2/lib/gcc-lib/powerpc-wrs-vxworks
/cygnus-2.7.2-960126
```

Determine these directory pathnames for each architecture you have and enter them in the wizard. The wizard will verify that the directories exist.

2.4.7 Finishing Up

After configuring the last platform for your site, click **Finish** to complete the site profile. You can run the tool again to change the profile or create a new one.

What did the Site Profile Manager do? It used your responses to create the following files in **<RTICONFIGHOME>/.rti_site/cs.8.0x**:

- **environment** (see Section 2.4.7.1)
- **repositories** (see Section 2.4.7.2)
- **architectures** (see Section 2.4.7.3)
- **environment.vxworks** (see Section 2.4.7.4)
- **setup.vxworks** (see Section 2.4.7.5)

Note: A new directory and set of files will be created for each version of *Constellation*.

The contents of these files are listed below, in case you want to manually update them without using the Site Profile Manager.

Look for examples of these configuration files in **<PRODUCT_DIR>/resource/config**.

The Site Profile Manager also updates the makefiles in **<RTICONFIGHOME>/.rti_site/cs.8.0x/makehome** and the links in the HTML documentation for the standard *Constellation* repositories.

2.4.7.1 The Environment File

When *Constellation* starts, it reads the **environment** file to set its environment variables. You do not have to manually set these environment variables or have custom scripts. The entries in this file include:

```
RTICONFIGHOME
NDDSHOME
RTILIBHOME
LM_LICENSE_FILE
STETHOSCOPEHOME
DOORSHOME
RTIMAKEHOME
MATLABHOME
RTI_SUPPORT_CVS
RTI_SUPPORT_MSDEV_IDE
CONTROLSHELLHOME
```

2.4.7.2 The Repositories File

This file contains a list of site repositories that is shared by all users. The entries are of the form:

```
repositoryName=/directory/repositoryName
```

where each line maps a symbolic name to a file-system location. No spaces are allowed around the '=' character.

Note: The final part of the directory name must match the symbolic name of the repository and this directory must contain a **REPOSITORY_INDEX** file.

All site repositories are always visible to a user, but a user can remap a site repository to a different directory during user customization.

2.4.7.3 The Architectures File

This file lists the target-host architecture combinations enabled for the site. These pairings determine what compilers to invoke when you build *Constellation* components and applications.

The entries are of the form:

```
targetArch=hostArch
```

where the ***targetArch*** and ***hostArch*** match one of those architecture names defined by the *Constellation* build system. No spaces are allowed around the '=' character. Each entry specifies that from a ***hostArch*** machine, there exists a compiler that will build for ***targetArch***.

2.4.7.4 The environment.vxworks File

This file is a mirror of the environment file, but contains VxWorks-specific commands to set up the environment on a VxWorks target. This file is included by the autogenerated command scripts for each application.

2.4.7.5 The setup.vxworks File

This file contains VxWorks-specific commands that you can customize to enable NFS or FTP access to host systems from a VxWorks target. If you do not edit this file, the target will use **tftp**. We recommend that you enable NFS, if possible, to speed up application loading. See the *Constellation User's Manual* for more details.

2.5 Setting Up the License Manager

Constellation is a licensed product, enforced with a license manager, FLEX*lm*® version 8.1b. You must run FLEX*lm* before you can run *Constellation*, unless you have a demo version with a temporary license.

If you are given a temporary license file for evaluating *Constellation*, simply enter the path to the license file when prompted by the Site Profile Manager wizard (see Figure 2.2).

The license manager is a process (daemon) that runs in the background of your machine (or any other machine on your network) and grants permission to applications before they can run. The administrator for *Constellation* and other RTI products must start the license manager with a valid license file containing specific keys to "unlock" your products.

The steps for running FLEX*lm* are described in Chapter 3.

After you have FLEX*lm* running, proceed to the instructions in Section 2.6.

2.6 Running Constellation

Before starting *Constellation*, make sure the FLEX*lm* license manager is running by using the instructions in Chapter 3 (unless you have a temporary license, which does not require FLEX*lm*).

When you run *Constellation* for the first time, the *Constellation* User Profile Manager will run and allow you to customize settings for a particular user. For details, see Section 2.7.

2.6.1 Running Constellation on UNIX Systems

Assuming that *Constellation* is installed in the **/apps/rti/constellation.1.0x/cs.8.0x** directory, to run *Constellation* from the command line, enter:

```
% /apps/rti/constellation.1.0x/cs.8.0x/scripts/cs &
```

where ***x*** is replaced with the actual version of your distribution.

The ampersand (**&**) places the program in the background so you can continue using the Command Window for other tasks.

Or, if you have **/apps/rti/constellation.1.0x/cs.8.0x/scripts** in your **PATH**, then you can use:

```
% cs &
```

2.6.2 Running Constellation on Windows Systems

The installation process creates a Desktop shortcut as well as a shortcut in the **Start** menu for launching *Constellation*. Double-click the Desktop shortcut or select the shortcut from the **Start** menu to launch *Constellation*.

2.7 Setting Up Constellation for a User

Use the User Profile Manager to configure *Constellation* settings that apply to a specific user. This group of settings, called a *user profile*, contains the site profile to be used, a list of repositories, and your preferred text editor. (Site profiles are described in Section 2.4.) A user profile is a way to fine-tune a site profile for a specific user.

Each user must create at least one user profile before running *Constellation*. It is common for each user to have multiple user profiles, one for each project. A user's list of defined user profiles is called a *portfolio*.

2.7.1 Using the User Profile Manager

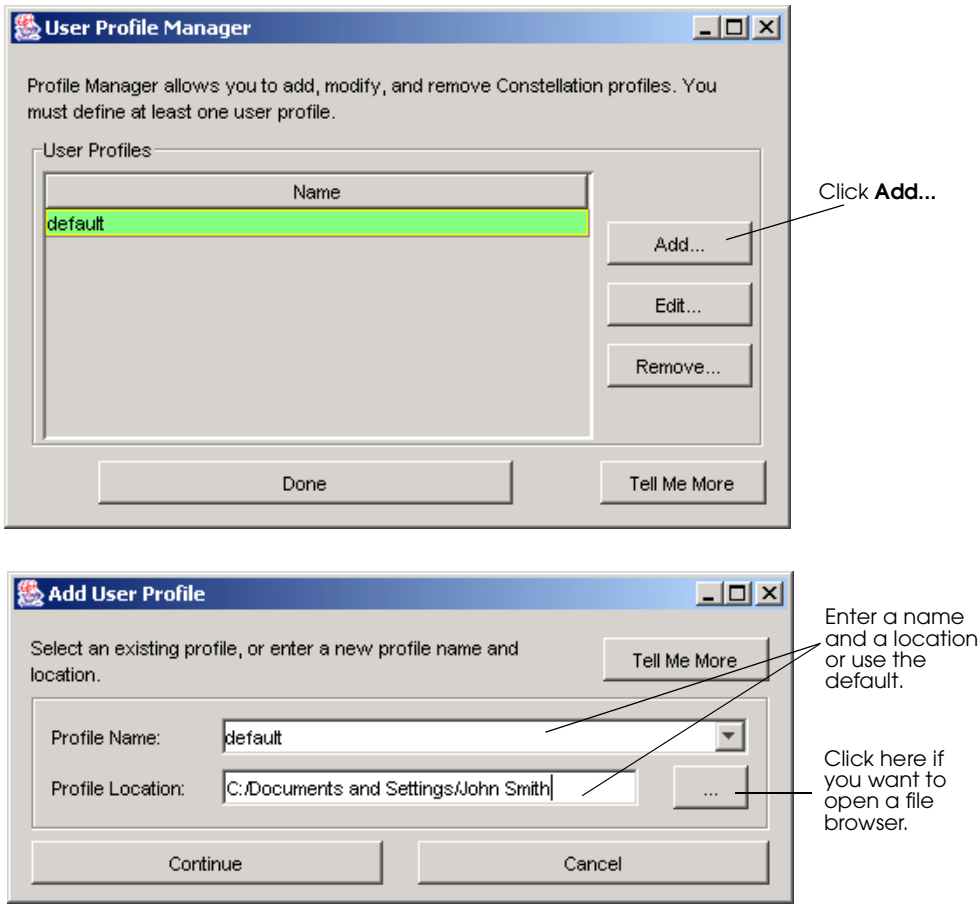
The User Profile Manager can be started from:

- On UNIX systems: **<PRODUCT_DIR>\scripts\cssetup**
  or
  <PRODUCT_DIR>\scripts\cs -usersetup
- On Windows systems: **Start, Programs, RTI,** <Constellation **Program Group>, Tools,** Constellation **User Setup**
- *Constellation*'s **Tools** menu

The User Profile Manager is a wizard that allows you to control what site profile to use, what repositories you want to use, and your default editor.

The wizard provides "best guesses" by using information from default settings or from the last version of *Constellation* installed at the site. In most cases, you can use these

Figure 2.6 **User Setup with the User Profile Manager**



defaults and click **Next** to move to the next page. (Default and invalid guesses are shown as strings enclosed by '#' characters, for example: "**#/default/path/#**.")

To add a user profile: Click **Add...** on the window seen in Figure 2.1, then specify a name and a location on disk where that profile will be stored. If you want to choose a non-default location, note that the location (directory) must already exist on the file system. Choose names that are easy to relate to. For example, user profile names can be named after each team member; if you need more than one user profile, you can use a combination of your name and the project's name, such as "John ProjectOne".

A *portfolio* is a list of user and site profiles, stored on per user basis. The User Profile Manager uses the profiles in the portfolio to offer choices when starting *Constellation* (to list user profile choices) and when starting the User Profile Manager (to list site profile choices).

The following rules apply to User Profiles:

- ❏ Each profile must have a unique name (regardless of its location on disk).
- ❏ No more than a single profile may exist on disk in a given location.
- ❏ Profiles may be renamed in the same location, but may not be moved to a different location.

Besides defining completely new profiles, you may reuse an existing profile from another user or site profile. To do so, add a profile with a new name, but use the location of an existing profile. This is an easy way to set up initial user profiles for each user. For example, first create a common user profile such as "CommonUserProfile" in location **C:\RTI\Constellation.1.0x**. Then users can add user profiles matching their names, with the location set to **C:\RTI\Constellation.1.0x\CommonUserProfile**.

To edit a user profile: To make changes to the defaults or “best guesses” provided for each parameter, you can type directly in the edit boxes, choose from a drop-down list box, or click **Browse...**. Click **Next** to move from one page to the next. On the last page, click **Finish**. You can use the User Profile Manager again later to add, delete, or edit profiles (see the three methods above for starting the wizard).

Note: The wizard validates entries to minimize typing mistakes. There may be times when you do not want it to check the validity of your entries—the directory or program you are specifying may not exist yet, for instance. In that case, just clear the Validate check box next to the particular entry.

In general, if the wizard was unable to choose a valid value for an entry—such as an existing directory—it will leave it blank. For instance, choices that map to the location of a directory or file will only appear if the directory or file exists. For any entry—even a blank one—the wizard may have more than one choice. You can view and select from the alternatives if you click the drop-down list box button (see Figure 2.2).

Although you may have multiple site and user profiles in your portfolio, only one user profile (with an underlying site profile) is active during a single *Constellation* session. If you only have one user profile, *Constellation* will use it automatically.

If you have more than one user profile, you must tell *Constellation* which one to use. You can specify your choice by using the **-profile** command-line option, or you can choose one from your portfolio when *Constellation* starts up. For example, if you have a user profile named "MyDefault," invoking "**cs -profile MyDefault**" from a command prompt will start *Constellation* with that user profile. If you start *Constellation* without specifying

a profile, you will be asked to choose one from your portfolio. Selecting "MyDefault" from your portfolio in this manner has the same effect as using the "**-profile MyDefault**" command-line option. If you are working on a Windows system, you may want to copy and modify the default shortcut to add "**-profile <user-profile-name>**".

The following sections describe the parameters you can configure with the User Profile Manager.

2.7.1.1 Site Profile

The wizard starts by prompting you to select a site profile, as seen in Figure 2.7. This site profile will be used as a base for the user profile.

2.7.1.2 Text Editor

The wizard's next page allows you to specify the path to your preferred text editor, as seen in Figure 2.8. This text editor will be used to edit source code and data files. You do not have to list a full path if the tool is already in your **PATH**. The default for UNIX systems is **xemacs**. The default for Windows systems is **write.exe** (WordPad).

Figure 2.8 **Selecting an Editor**

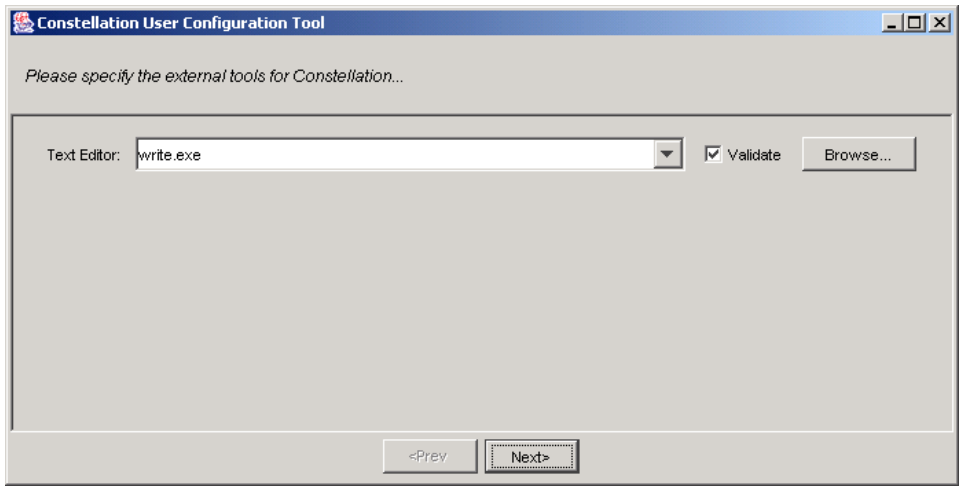
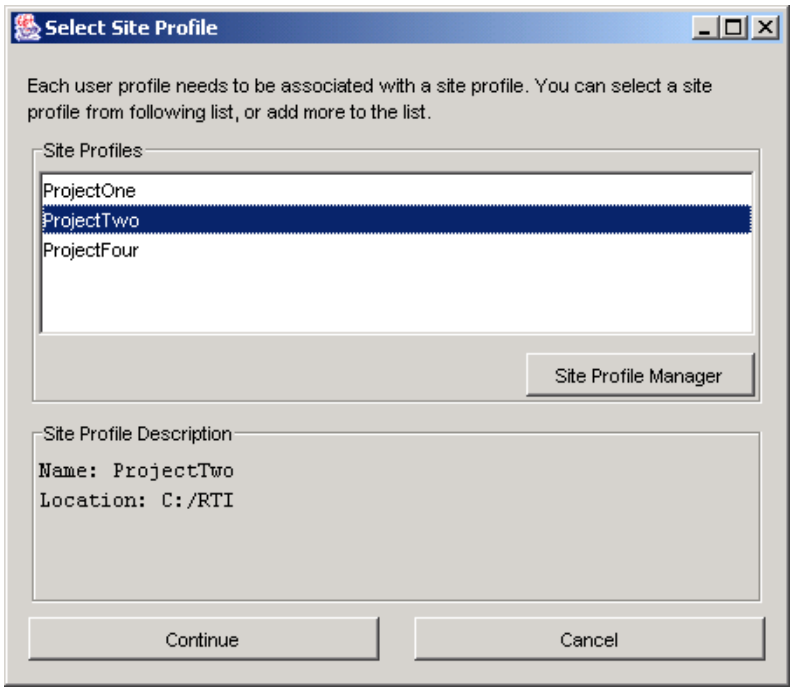


Figure 2.7 **Selecting a Site Profile**



2.7.1.3 Browser (UNIX Systems Only)

The next page prompts you to select an HTML browser to use for viewing online documentation. You only need to set this for UNIX systems; the default is Netscape®.

2.7.1.4 Site Repositories

The last page is used to override the locations of the site repositories (see Section 2.4.4). You can add personal repositories to the ones available on a site-wide basis or remove some site-wide repositories from your portfolio.

Chapter 3

License Installation

3.1 About the License Manager

Constellation is a licensed product which uses FLEX*lm*® version 8.1 for licensing. You need to obtain a license file and run the *FLEX License Manager*'s server application (**lmgrd**) before you can run *Constellation*.

1. Obtain a license file from **license@rti.com**. You will need to provide your customer ID, as well as the *hostname* and *hostid* of the machine that is to run the license manager. See Section 3.2 for details.
2. Run the license manager as described in Section 3.3 (for UNIX systems) or Section 3.4 (for Windows systems).

Note: If you have a temporary license for the purpose of evaluating *Constellation*, you do not need to run the license manager. Simply specify the path to your license file when prompted during Site Setup.

*FLEX License Manager (*FLEX*lm)* is a network floating-license manager. Its purpose is to allow you to run a limited number of copies of an application on one or more computers within a network of computers.

FLEX*lm* runs as an independent *license-server* process on a workstation or PC known as the *license-server host*. The license-server host is usually also a file server, but can be any machine on the network. When an application starts, it requests a *license* from the server. The server "checks out" a copy of the license to the *client* application. When all the avail-

able licenses are in use, the server denies new requests, preventing additional copies of the application from starting.

Licenses are returned by a licensed application when it exits. Each application keeps its license as long as it is active. Most applications will exit immediately if their license is stripped away forcefully, or if the license manager is terminated.

For more details on the license manager, refer to the FLEX*lm 8.1 End User's Guide*. An HTML version of this manual is located in your *Constellation* installation in **<PRODUCT_DIR>/../flexlm.8.1/html/allTOC.htm.**[1] (**<PRODUCT_DIR>** is defined in Section 2.2 for UNIX systems and Section 2.3 for Windows systems.)

3.2 Licenses and the License File

To obtain a *Constellation* license, contact your distributor with your customer ID, and the host name and host ID of the machine that will be running the license manager.

To find your host name and host ID on a UNIX system:

1. Run the **hostname** command to get the host name.

```
% hostname
zeus
```

2. Run the **lmutil** command to get the 48-bit hexadecimal FLEX*lm* hostid. The **lmutil** command is in **${PRODUCT_DIR}/host/*HOST_TYPE*[2]/bin**. Refer to Section 3.2.2 for how to find license server applications and tools.

```
% lmutil lmhostid
lmutil - Copyright (C) 1989-2001 Globetrotter Software, Inc.
The FLEXlm host ID of this machine is "000102f3f873"
```

   In this example, **zeus** is the host name and **000102f3f873** is the host ID.

To find your hostname and host ID on a Windows system:

1. Locate FLEX*lm* Tools in the **Start** Menu under **Programs, RTI, <Constellation Program Group>, Tools**.
2. Run FLEX*lm* Tools and select the **System Settings** tab.

1. For Windows systems, replace forward slashes (/) with backward slashes (\).
2. *HOST_TYPE* refers to the host architecture (e.g. sparcSol2.7cc5.0, pentiumVx5.4gcc)

3. The *Computer/Hostname* entry gives the **hostname**.
4. The *Ethernet Address* or *Disk Volume Serial Number* can be used as the host ID for requesting a *Constellation* license. If you have multiple Ethernet interfaces or use a docking station, make sure you use the disk ID.

Note: Hostnames are case-sensitive.

3.2.1 License File Location

The license manager looks for license information in a license file. The location of the license file is typically set in your Site Profile, with a default location of **<PRODUCT_HOME>/flex_license.dat**.

Be sure to set the permissions on the file so that all users can read it. On UNIX systems, use the command:

```
% chmod a+r flex_license.dat
```

When the license manager reads a license file, it looks for licenses (also called license keys) for various features, such as support for DOORS, CVS, various platforms, etc. When you receive license keys for *Constellation* from your distributor, you must put them in a license file and then specify the license file's location. The simplest method is to put all of your license keys in a single file and then enter the location of that file in a Site Profile. However, it is also possible to specify additional license files that supplement or override the site-level license file—see Section 3.2.1.1 for details.

Note You should keep a separate copy of your license file in a safe place and be careful not to overwrite it when you install updates.

3.2.1.1 Using Multiple License Files

Licenses can be in a single file or strategically placed in multiple files. For instance, perhaps you are the only one on your team that requires a specific feature, such as the DOORS integration. In that case, you can place the DOORS-integration license key in a separate file such as myLicense.dat and omit it from the site-level file. Then start *Constellation* with the **-c** command-line option to specify the user-level file:

```
cs -c myLicense.dat
```

Constellation looks for licenses in all of the following places:

- ❏ The license file provided with the **-c** command-line option when starting *Constellation*.
- ❏ The site profile. (Site profiles are discussed in Section 2.4 and Section 2.7.1.1.)

- ❏ The **LM_LICENSE_FILE** environment variable.
- ❏ The **RTID_LICENSE_FILE** variable in the Windows registry (under **HKEY_LOCAL_MACHINE\SOFTWARE\FLEXlmLicenseManager\ RTID_LICENSE_FILE**).

Constellation uses the first occurrence of any license that it finds. If the same license key is found in more than one location, only the first one is used.

3.2.2 License Manager Application and Tools

Your *Constellation* installation comes with the FLEX*lm* license manager daemon (**lmgrd**), an RTI vendor daemon (**RTID**), and the FLEX*lm* Tools (**lmutil** on UNIX systems, or **lmtools** on Windows systems) for license administration and monitoring.

On UNIX systems, these executables are located in **${PRODUCT_HOME}/../flexlm.8.1/bin/HOST_TYPE.** Access them through the command line.

On Windows systems, these executables are located in **%PRODUCT_HOME%\..\flexlm.8.1\bin\i86Win32VC60** or **i86Win32VC70**. Shortcuts for FLEX*lm* server and FLEX*lm* Tools are in the **Start** Menu, under **Programs, RTI, <Constellation Program Group>, Tools.**

3.3 Using FLEX*lm* on UNIX Systems

Constellation can obtain its license from a FLEX*lm* license manager running on your local machine or from a remote license manager on the network.

Note: If you have a node-locked, uncounted license file, you do not have to run a license manager. In this case you only need to make sure that the license file's path is specified in the site profile as described in Section 3.2.1.

You can run the License Manager from a command prompt (see Section 3.3.1), or automatically at system startup with a boot script (see Section 3.3.2).

3.3.1 Starting the License Manager from a Command Prompt

To start the license manager from a command prompt, simply type:

```
% lmgrd -c licensefile [ -l logfile ]
```

where:

- **lmgrd** is the license manager daemon as described in Section 3.2.2.
- ***licensefile*** is the full path name of the license file on your system (such as **${PRODUCT_HOME}/flex_license.dat**).
- ***logfile*** is optional and can be specified with the **-l** option. It is the file where all license server messages are logged. If this option is not specified then all messages are displayed on the console where **lmgrd** executes.

Super-user (root) permissions are not required to run **lmgrd**. You should run the license manager as a normal user to avoid security risks associated with a server running under root permissions.

3.3.2 Starting the License Manager at System Startup

To start the license server automatically at system startup, add the command:

```
% lmgrd -c licensefile -l logfile
```

to the appropriate boot script. See the *FLEXlm End User's Guide* for more information.

3.3.3 License Administration on UNIX Systems - lmutil

The **lmutil** command is a license administration tool. It allows you to stop a license server, reread licenses without stopping the license server, view server status and license activities, manage license log files and diagnose license file for errors along with a host of other features. Refer to the *FLEXlm End User's Guide* for more details on using **lmutil**.

3.4 Using FLEX*lm* on Windows Systems

Constellation can obtain its license from a FLEX*lm* license manager running on your local machine or from a remote license manager on the network.

Note: If you have a node-locked, uncounted license file, you do not have to run a license manager. In this case you only need to make sure that the license file's path is specified in the site profile as described in Section 3.2.1.

You can run the License Manager as a Windows service (see Section 3.4.1), or as an application (see Section 3.4.2).

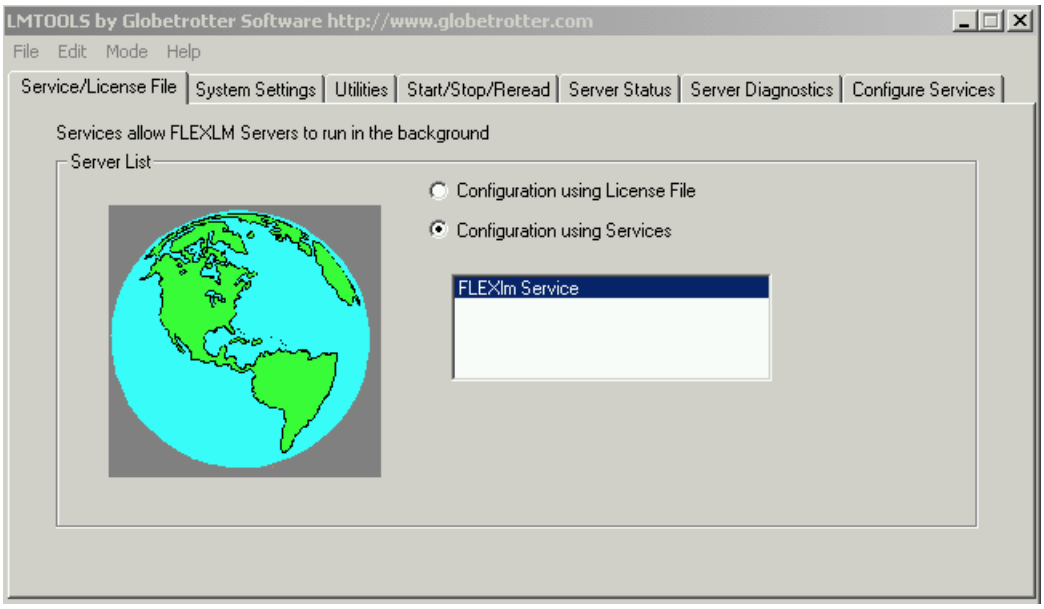
3.4.1 Running the License Manager as a Windows Service

The FLEX*lm* license manager does not automatically start as a service after installing *Constellation.* You need a valid license file before you can start the license manager. Once you obtain the license file as described in Section 3.2, start the license manager service as follows:

1. Start FLEX*lm* Tools. To locate the tool, see Section 3.2.2. Figure 3.1 shows the main window on startup.
2. Under the **Service/License file** tab (seen in Figure 3.1), select the radio button for **Configuration using Services**.
3. Select the **Configure Services** tab.
4. Enter a name, for example, *FLEXlm Service* in the **Service Name** box.
5. Enter the full path to **lmgrd.exe**. (Locate **lmgrd.exe** as described in Section 3.2.2).
6. Enter the full path to the license file. You may have to use the ***.*** filter to locate the file using the **Browse** button.
7. Enter the location of the log file in the **Path to debug log file** box.
8. Select the **Use Services** check box.

   This will activate the **Start Server at Power Up** check box. Selecting this will cause the service to be automatic, otherwise the service will be manual.
9. Click **Save Service** to save the service configuration.
10. Select the **Service/License file** tab to see the service you just added.

Figure 3.1 **Configuring FLEX*lm* as a Windows Service**



11. Open the **Services** utility in **Start, Settings, Control Panel** to verify that the service was installed. (On Windows 2000 systems, this is under the **Administrative Tools** icon.)

12. Start the license manager service by using one of the following methods:

    - Choose the **Start/Stop/Reread** tab in the FLEX*lm* Tools window. Select the license manager service you created in Step 4. Then click **Start Server** to start the service.
    - Or, open the **Services** utility as in Step 11 and choose the start action for the service. If you did not install the service as automatic in Step 8, you will have to manually start the service every time you restart the license manager. Making the service automatic avoids this.

3.4.2 Running the License Manager as an Application

You can start the license manager from the Windows **Start** menu or from a command prompt.

3.4.2.1 From the Start Menu

To start the license manager using the Windows **Start** menu:

1. Make sure that **%PRODUCT_HOME%\flex_license.dat** exists, where **flex_license.dat** is a file containing a valid license.
2. Select the **FLEX*lm* License Manager** shortcut under **Start, Programs, RTI, <Constellation Program Group>, Tools** to start the license manager. (The exact location may vary.)
3. Minimize the window and leave the license manager running.

Note: If you move the license file from the location given above, you must edit the properties of the shortcut to point to the new location.

3.4.2.2 From a Command Prompt

You can also start the license manager by typing the following at a command prompt:

`lmgrd -c` *licensefile* `[ -l` *logfile*`]`

where:

- **lmgrd.exe** is located as described in Section 3.2.2.
- *licensefile* is the full path name of the license file on your system (for example, **%PRODUCT_HOME%\flex_license.dat**).
- *logfile* is optional and can be specified with the **-l** option. It is the file where all license manager messages are logged. If this option is not specified then all messages are displayed on the command prompt window where **lmgrd** executes.

Note: If you want to automatically start the license manager every time you log in, move or copy the shortcut into the **Startup** folder of the **Start** menu**.**

3.4.3 License Administration on Windows Systems - lmtools

FLEX*lm* Tool (**LMTOOLS**) is a license administration tool. It lets you set up and configure licensing, start and stop license managers, reread new license files without stopping the license manager, view server status and license activities, manage license log files and perform server diagnostics, along with many other features.

You can start FLEX*lm* Tool either from the shortcut in **Programs, RTI, <Constellation Program Group>, Tools** under the Windows **Start** menu, or by executing **lmtools.exe** from the command line. Refer to Section 3.2.2 for details on locating **LMTOOLS**. Refer to the *FLEXlm End User's Guide* for details on using **LMTOOLS.**

3.5 Using a License Manager

If you are running a license manager, *Constellation* needs to know its location in order to check out a license. This license manager could be your local computer or a central license server.

You can run *Constellation* with a command-line option to specify a license manager:

```
cs -c <licensefile or @server>
```

You can also set the **LM_LICENSE_FILE** or **RTID_LICENSE_FILE** environment variables to point to a license manager. See Section 3.2.1.1, as well as the *FLEXlm End User's Guide*, for more details on specifying a license manager.

Note for Windows users: When you start *Constellation* from the shortcut (in **Start, Programs,** <Constellation **Program Group>**), it will use the license file or license manager specified in the site profile. If a license cannot be checked out, the FLEX*lm* License Finder (Figure 3.2) dialog box will appear. The dialog box allows you to specify a license server or file. Select the option that allows you to specify a license server. On the next prompt asking for the license server, enter the hostname of the license manager and click through to finish.

Figure 3.2 **FLEX*lm* License Finder (for Windows systems)**

3.5.1 Remote License Manager

If you have several machines on a network using *Constellation*, you can run a central floating license manager, serving licenses over the network. Such a setup relieves individual users from the overhead of managing license managers. The process of setting

up a remote license manager is same as that of setting up a license manager as described in Section 3.3 and Section 3.4. You will, however, have to use a license file that permits you to serve multiple licenses.

Note: If you want to run the license manager on a machine that is not running *Constellation*, contact RTI to obtain license manager binaries for your platform.

3.6 Troubleshooting

The most common reasons for a license manager to fail to start up are:

- ❏ A license manager using the same vendor daemon (**rtid.exe** on Windows systems or **RTID** on **UNIX systems**) is already running.
- ❏ A valid license file does not exist at the specified location.

The basic troubleshooting steps are:

1. View the log file or log console for the FLEX*lm* license manager to look for any error messages, such as an already running license manager or a wrong license file.
2. Stop and restart the license manager.

   On UNIX systems:

   ```
   % lmutil lmdown -c @licensehostname
   ```

   (Beware that shutting down the license manager will take away licenses from all users who have currently checked out a license from this server).

   On Windows systems:

   a. Run FLEX*lm* Tools.

   b. Choose the **Start/Stop/Reread** tab.

   c. Select the appropriate license manager and choose **Shutdown**.

   Note: You could also do this by terminating the **rtid.exe** process through the Windows Task Manager.

   Now start a license manager as described earlier.
3. Check that both **lmgrd** and **rtid** exist at the same location specified in Section 3.2.2.

For more troubleshooting details refer to the troubleshooting section in the *FLEXlm End User's Guide.*

3.6.1 How Constellation Checks Out a License

This section describes how *Constellation* locates a license when it is started. The information in this section is intended to help you with troubleshooting in the event of a license checkout failure. It will also help you understand how to use multiple license files.

There are several ways by which *Constellation* can locate a valid license and will start successfully *if any one of them* points to a valid license file, license manager or node locked, uncounted license file:

1. If *Constellation* is started with a **-c** command-line option specifying a license file or server.
2. If the **LM_LICENSE_FILE** or **RTID_LICENSE_FILE** environment variable points to a valid license manager or a valid node-locked, uncounted license file.
3. If a successful license checkout is performed, the location of the license (server or file) is saved in **${HOME}/.flexlmrc** on UNIX systems or in the registry under **HKEY_LOCAL_MACHINE\SOFTWARE\FLEXlm License Manager\ RTID_LICENSE_FILE** on Windows systems. Subsequent attempts to checkout a license will first lookup the location specified here.
4. (Windows systems only) If none of the above steps are able to locate a valid license, the FLEX*lm* License Finder comes up as described in Section 3.5.

For related information, see Section 3.2.1.1.

Chapter 4

Platform-Specific Information

4.1 Thread-Creation Parameters

When you create *Constellation* applications, the parameters you supply to the LOCAL habitats let you fine-tune how the application runs in a real-time environment. These parameters specify the properties of the operating-system threads that will be created to process data-flow and finite-state-machine activity. These parameters include the priority, stack size and any miscellaneous thread-creation options.

The values you specify within an application-definition file (APP) are not platform specific, but you do need to know how they map to the underlying operating-system parameters. This section describes the mapping of *Constellation*'s platform-independent values to platform-specific values.

4.1.1 Priorities

The platform-independent values for the thread priorities you specify within a *Constellation* application-definition file range from 0 to 255, with 255 being the highest priority. You can also specify **–1** to indicate that you want to use of a default priority that is specific to each platform. This section defines what the default priorities are, and how to map the platform-independent priorities to operating-system-specific priorities. Table 4.1 lists the default thread priorities for each platform.

Table 4.1 **Default Thread Priority**

Target Platform	Thread Priority
Linux 2.4	Default priority.
Solaris 2.x, Solaris and POSIX threads	Default priority for Solaris. This is a degrading priority.
Tornado 2.0.x/VxWorks 5.4x, Tornado 2.2/VxWorks 5.5	100
Windows 2000, Windows NT, Windows XP	**THREAD_PRIORITY_NORMAL** (0). Uses the **NORMAL_PRIORITY_ CLASS** class.

The formula used to derive native thread priorities from *Constellation*'s platform-independent priorities is based on the minimum and maximum native-priority values:

$$nativePriority = nativeMin + \frac{csPriority}{255}(nativeMax - nativeMin)$$

where ***csPriority*** is *Constellation*'s priority, ***nativePriority*** is the equivalent native priority, ***nativeMax*** is the maximum value of the native priorities, and ***nativeMin*** is the minimum value of the native priorities. The minimum and maximum native priorities for each target platform are found in Table 4.2.

Table 4.2 **Minimum and Maximum Thread Priorities**

Target Platform	Minimum Priority	Maximum Priority
Linux 2.4	0	99
Solaris 2.x, Solaris and POSIX threads. Root permissions for real-time priorities[a]	0	59
Solaris 2.x, Solaris and POSIX threads. User permissions for normal (degrading) prioritiesa	-60	0
Tornado 2.0.x/VxWorks 5.4, Tornado 2.2/VxWorks 5.5	255	0
Windows 2000, Windows NT, Windows XP	-3	3

a. Run "**priocntl -l**" to see what values your system is configured for.

Note: VxWorks priority numbers are inverted: lower numbers indicate higher priorities.

4.1.2 Stack Sizes

When you specify **–1** for the stack size in the application-definition file for LOCAL habitats, you will get the default stack sizes as defined in Table 4.3.

Table 4.3 **Default Stack Sizes**

Target Platform	Default Stack Size	Explicit Stack Size
Linux 2.4	System default. Grows as needed.	System minimum size + specified size. Grows as needed.
Solaris 2.x	System default. Grows as needed.	System minimum size + specified size. Grows as needed.
Tornado 2.0.x/VxWorks 5.4, Tornado 2.2/VxWorks 5.5	16 KB. Fixed.	Specified size. Fixed.
Windows 2000, Windows NT, Windows XP	32 KB. Fixed.	Specified size. Fixed.

4.1.3 Thread Options

The thread options may not be meaningful for all platforms. Table 4.4 lists the currently available options.

Table 4.4 **Thread Options**

Option Name	Numeric Value
THREAD_STDIO[a]	**2**

a. This option applies to VxWorks.

Chapter 5

Settings for a CORBA ORB

To use CORBA® components and CORBA network ports for remote method invocations over the network, you need to have a CORBA ORB and set it up as described in this chapter.

For more information on using CORBA components and CORBA network ports for remote method invocations over the network, see the *Constellation Distributed Applications Guide*.

5.1 Setting up Constellation to Use a CORBA ORB

5.1.1 Configuring the Name Server

Constellation uses the OMG Naming Service. Therefore, you need to configure the name server according to the instructions for your CORBA ORB.

For example, ORBacus™ requires a configuration file that specifies the machine name and port number from which you are going to run the name server. It must contain:

```
ooc.orb.service.NameService =
    Corbaloc::<machine_name>:<port_no>/NameService
```

5.1.2 Setting Environment Variables

The environment variables that *Constellation* requires for CORBA are listed in Table 5.1. To set these environment variables, modify **<RTICONFIGHOME>/environment**.

Table 5.1 **Constellation Environment Variables for CORBA**

Environment Variable	Description
RTI_CS_SUPPORT_CORBA	Set to ENABLE when you use CORBA in *Constellation*.
CORBA_ORB_VENDOR	Name of your CORBA ORB vendor.
IDL_COMPILER_PATH	Path of the IDL compiler provided by your CORBA ORB vendor.
IDL_COMPILER_NAME	Name of the IDL compiler provided by your CORBA ORB vendor.
IDL_COMPILER_GEN_SKEL_FILE	Whether or not the compiler generates separate skeleton files for servers (TRUE or FALSE)
IDL_COMPILER_GEN_FILE_EXT	*Optional.* Extension of the C++ stub/skeleton code files generated by the IDL compiler after compiling an IDL file.
IDL_GEN_CLIENT_FILE_ENDING	String to use at the end of compiler-generated client files.
IDL_GEN_SERVER_FILE_ENDING	*Optional.* String to use at the end of compiler-generated server files.
COSNAMING_IDL_FILE_DIR	Location of *CosNaming.idl* file provided by your CORBA ORB vendor.
CORBA_ORB_INCLUDE_PATH	Location of the "/include" directory containing header files provided by your CORBA ORB vendor.
CORBA_ORB_EXTRA_INCLUDES	*Optional.* Location of any additional "includes" directory.
CORBA_ORB_LIB_PATH	Location of the CORBA library provided by your CORBA ORB vendor.
CORBA_ORB_LIB_NAME	Name of the CORBA library provided by your CORBA ORB vendor. This library contains the ORB binaries and is linked into the *Constellation* CORBA application.
CORBA_ORB_EXTRALIBS	*Optional.* Name of any additional library to link into the *Constellation* CORBA application.

Example **environment** file for using ORBacus on a Windows system:

```
RTICONFIGHOME=Z:\\home\\john\\rti\\cs\\configs\\develop\\win
NDDSHOME=Z:/local/ship/ndds/ndds.3.0i
RTILIBHOME=Z:/local/preship/rtilib/rtilib.4.1h
LM_LICENSE_FILE=C:/Rti/license_80a.dat
STETHOSCOPEHOME=Z:/local/ship/scope/scope.6.1c
RTIMAKEHOME=Z:\\home\\john\\rti\\cs\\configs\\develop\\win/
.rti_site/cs.8.0b/makehome
MATLABHOME=\#NOT_ENABLED\#
MATLAB_VERSION=MATLABR12
RTI_SUPPORT_MSDEV_IDE=\#NOT_ENABLED\#
CONTROLSHELLHOME=Z:/home/john/rti/cs/cs.8.0b
RTI_CS_SUPPORT_CORBA=ENABLED
CORBA_ORB_VENDOR=ORBacus
IDL_COMPILER_PATH=Z:/local/apps/CORBA/Orbacus/OB-4.0.5/windows/bin
IDL_COMPILER_NAME=idl
IDL_COMPILER_GEN_SKEL_FILE=TRUE
IDL_COMPILER_GEN_FILE_EXT=cpp
IDL_GEN_SERVER_FILE_ENDING=_skel
COSNAMING_IDL_FILE_DIR=Z:/local/apps/CORBA/Orbacus/OB-4.0.5/idl/OB
CORBA_ORB_INCLUDE_PATH=Z:/local/apps/CORBA/Orbacus/OB-4.0.5/windows/
include
CORBA_ORB_LIB_PATH=Z:/local/apps/CORBA/Orbacus/OB-4.0.5/windows/lib
CORBA_ORB_LIB_NAME=ob.lib
```

Example **environment** file for using ACE+TAO on a UNIX system:

```
#RTI Variables
#Mon Jul 01 10:49:14 GMT-08:00 2002
RTICONFIGHOME=/raid1/home/john/rti/cs/configs/develop/unix
NDDSHOME=/local/ship/ndds/ndds.3.0i
RTILIBHOME=/local/preship/rtilib/rtilib.4.1h
LM_LICENSE_FILE=@mammoth
STETHOSCOPEHOME=/local/ship/scope/scope.6.1c
RTIMAKEHOME=/raid1/home/john/rti/cs/configs/develop/unix/.rti_site/
cs.8.0b/makehome
MATLABHOME=/local/applications/matlab.6.0
RTI_SUPPORT_MSDEV_IDE=\#NOT_ENABLED\#
MATLAB_VERSION=MATLABR12
CONTROLSHELLHOME=/home/john/rti/cs/cs.8.0b
RTI_CS_SUPPORT_CORBA=ENABLED
CORBA_ORB_VENDOR=ACE+TAO
IDL_COMPILER_PATH=/local/apps/CORBA/ACE-TAO/ACE5.2_TAO1.2/TAO/
TAO_IDL
```

```
IDL_COMPILER_NAME=tao_idl
IDL_COMPILER_GEN_SKEL_FILE=TRUE
IDL_COMPILER_GEN_FILE_EXT=cpp
IDL_GEN_CLIENT_FILE_ENDING=C
IDL_GEN_SERVER_FILE_ENDING=S
COSNAMING_IDL_FILE_DIR=/local/apps/CORBA/ACE-TAO/ACE5.2_TAO1.2/TAO/
orbsvcs/orbsvcs
CORBA_ORB_INCLUDE_PATH=/local/apps/CORBA/ACE-TAO/ACE5.2_TAO1.2/TAO
CORBA_ORB_EXTRAINCLUDES=/local/apps/CORBA/ACE-TAO/ACE5.2_TAO1.2
CORBA_ORB_LIB_PATH=/local/apps/CORBA/ACE-TAO/ACE5.2_TAO1.2/ace
CORBA_ORB_LIB_NAME=TAO
CORBA_ORB_EXTRALIBS=TAO_PortableServer
```

Your CORBA ORB vendor may require additional environment variables (not used by *Constellation*). For instance, ORBacus requires an environment variable, **ORBACUS_CONFIG**, that points to the location of the name server configuration file mentioned in Section 5.1.1.

5.2 Rebuilding Types and Methods

Before using a *Constellation*-provided type or method for CORBA components, you need to rebuild that type or method for your specific type of ORB. For example, if you want to use **CSTypeInt** from the **cs_core** repository, you need to rebuild it so that the **CSTypeInt** IDL and CORBA files are generated and compiled using your ORB.

5.3 Running an Application that Uses CORBA

The OMG Naming Service must be started *before* running a CORBA application in *Constellation*. It must be started on the machine ***<machine_name>*** specified in the configuration file.

For example, in ORBacus, type:

```
nameserv -OAport <port_no>
```

where:

<port_no> must be the same port number specified in the configuration file.

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