The Standby Wizard For Oracle

User Manual

For Windows 2000 / XP Servers

Version 8

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Introduction to Standby Databases

Today's environment dictates that our information be stored in highly available systems. As we move into the 21st Century, we are faced with increased incidents of online attacks, power shortages, and real terrorism. Yet, at the same time, our information systems must meet the 24/7 demands of a global networked economy.

The Oracle Corporation offers the *standby database* as its high availability paradigm. In the Oracle model, a production *primary database* archives changes (redo logs) to a dormant standby database. This standby database constantly *recovers* those same logs to stay synchronized with the primary database. In the event of a failure, this standby database can be *activated* - made ready to perform the crucial tasks of the primary database and thus become *available* for use.

Unfortunately, up to this point, setting up an Oracle standby database is a very complex and costly *project*. Only skilled DBA's can accomplish the many steps required to both build and maintain standby database configurations.

In response to these high human resource costs, Relational Database Consultants, Inc. (RDC) has automated the labor involved in creating and maintaining standby databases in the form of the new software offering: *The Standby Wizard for Oracle.*

The Standby Wizard for Oracle is designed to lower your costs, automate your labor, and increase the fitness of your high-availability solution. With the Standby Wizard, any Oracle DBA can set up a standby database configuration in only a few hours.

After a user becomes proficient with the Standby Wizard, one can define and begin building a standby database in only a few minutes. The Standby Wizard is also not dependent on the Oracle Enterprise Edition or Complex Net8 settings. This feature will help smaller companies reduce their Oracle licensing costs, or at least, allow them to purchase other Oracle offerings they find necessary.

The Standby Wizard not only automates the *creation* of your standby database(s) – diagnostic and maintenance functions are also automated. Managing a standby database configuration used to involve the querying of complex data dictionary views or mulling over raw output. Now all this information is at your fingertips with a simple Windows interface and an easy-to-understand auditing log for each standby database that you create.

Some maintenance tasks that used to be crucial to keeping a standby database viable are no longer necessary with the Standby Wizard. The Standby Wizard can actually detect if a tablespace (data file) or redo log specification has changed and will perform intelligently an *incremental rebuild* of your standby database, making only the minimal changes necessary.

The Standby Wizard will also detect database changes that are not logged (*no logging)* and will perform an intelligent rebuild on only those data files that need repair. This not only saves human resource hours but it will save you disk and CPU usage in maintaining your standby database configuration.

If disaster ever hits, the Standby Wizard can be *activated* along with your standby database without the need for an Oracle DBA to issue SQL commands to start, mount, activate, and open your standby database.

Simply click on an automated command file from your mouse or run a shell script - The Standby Wizard automates these tasks, and with our powerful monitoring and validation tools, the chances of your standby database performing incorrectly during a crisis greatly diminish.

In your high-availability planning to migrate back to your primary database after a crisis, the graceful switchback features of the Standby Wizard are second to none. Simply click on a single button with your mouse and the Standby Wizard rebuilds your original primary database from memory.

Because of this graceful switchback feature, the Standby Wizard can be used as an automated backup tool for your production databases or as a tool to clone databases with.

The number of person-hours you will save using the Standby Wizard is amazing. We at Relational Database Consultants, Inc. (RDC) have experienced a 95% reduction in labor costs when using the Standby Wizard to build and maintain standby databases.

Once you use the Standby Wizard, the complex *project* of implementing Oracle's standby database technology will become nothing more than a simple *task* – no more difficult than creating or dropping a table while drinking your morning cup of java.

However, as you drink your java for the first time with the Standby Wizard User Manual, we strongly recommend that you carefully read each chapter of this user manual before you perform the associated tasks or function of the Standby Wizard.

Don't be fooled by the ease-of-use of this product, behind the scenes the complex tasks of standby database creation are still taking place. When you first install the Standby Wizard, there is a checklist you need to go through. Therefore, we urge you to learn as much as you can about the Standby Wizard and Oracle's standby database paradigm – yet leave the actual work to the Standby Wizard.

Chapter One

Installation of the Standby Wizard

Requirements

The Standby Wizard for Oracle on Windows requires the following to be implemented successfully on your Oracle platform(s):

1. An Oracle database of version 9.201 to 10.X with the Java option installed.

> Note:
>
> If you would like the Standby Wizard for a previous version of Oracle contact us at: swdemo@relationalwizards.com.

2. An Oracle database that is archiving its redo logs (alter database archivelog). 10g users need to define an archive destination, the parameter db_recovery_file_dest is not used by the Standby Wizard.

3. To run the Java user-interface of the Standby Wizard - you will need the Java JRE 1.4 or higher installed and running on either your Windows/Unix/Linux Server or a network accessible client. The Java JRE 1.4 is supplied by Oracle. You can download the Java JRE 1.4 from SUN at this link:

http://java.sun.com/products/archive/j2se/1.4.1_02/index.html

4. Technical ability to perform basic Windows Administration tasks.

5. Technical ability to perform Oracle DBA tasks.

6. A valid Oracle support license.

7. A SQL*net connection between listeners on the primary and standby servers; therefore the listener should be installed (default) on your standby configuration.

8. An Oracle database installed and running on Windows 2000 or above.

Once you have determined that these above conditions are met, Installation of the Standby Wizard is performed in three easy steps:

Installation Step One - Client Installation

The first step of installing the Standby Wizard is to choose any windows client that is Network accessible to your primary database and then download the Standby Wizard. The executable will create a program group called "Standby Wizard Version 8" and will guide you through a generic windows installation.

The Standby Wizard Windows Installation places all of the Standby Wizard programs in the c:\Program Files\Standby Wizard Version 8 installation directory.

Be sure to read your license agreement that resides in this directory. The demo version
of this release only works for a limited time and must not be used on production systems.

Installation Step Two - Database Installation

The Standby Wizard for Oracle is only installed on the *primary database* that we are going to create standby databases *from* and never on a standby database. The database installation script (rdc_standby_install.sql) is run from SQL*Plus.

The database installation script *rdc_standby_install.sql*, first connects as SYSTEM to create an Oracle user account by the name *rdc_standby_user*. You will be prompted for the system password.

Here is a list of roles the Standby Wizard is granted:

1. Connect
2. Resource
3. Execute_Catalog_Role
4. Select_Catalog_Role
5. Select Any Dictionary
6. Select Any Table
7. Manage Tablespace
8. Alter Database
9. Alter System
10. Administer Database Trigger
11. Execute Any Procedure
12. JavaSysPriv

Re-installation

If you are re-installing the Standby Wizard, make sure no one is connected as the Standby Wizard user, *rdc_standby_user* and that the primary agent is offline. The Database Installation script first drops the Standby Wizard user account and all of its objects, to insure a clean install.

Starting the Database Installation Script from Windows:

Once you have installed the Standby Wizard product on your client Windows machine, you will need to start the Database Installation icon from the Program Menu - simply navigate to Start | Programs | Standby Wizard Version 8. | Database Installation.

The database installation script creates the Standby Wizard user and installs the Standby Wizard tables and intelligent PL/SQL packages within the Oracle RDBMS via SQL*Plus.   To run this script, click on the icon within the Standby Wizard program group labeled: "Database Installation". If you wish, you may chose to run the script directly from SQL*Plus as shown below.

SQL>start "c:\Program Files\Standby Wizard Version 8\rdc_standby_install.sql"

Database Installation Script Walk-Through

Here is a list of the five prompts you will receive when running the Database Installation script:

1. Enter the password for the Oracle user account SYSTEM:

This is the sting of the *system* account password. This password is only used to create the Standby Wizard user account *rdc_standby_user* and is immediately *undefined* in the installation script.

2. Enter the SQL*Net service_name used to connect to this database:

This is the service name that you currently use in your connection strings to login into the database for which you are installing the Standby Wizard, your primary database.

For instance, if you log in as: scott/tiger@mydb, then your service name is: *mydb*.

3. Enter the password you would like for the new Standby Wizard account *rdc_standby_user*:

This will be the Oracle user account password that you use would like to use when connecting to the Standby Wizard User Interface. This password is for the Oracle user account *rdc_standby_user*.

4. Enter the default tablespace for the Standby Wizard user (optional):

Enter a tablespace name where the Standby Wizard is to create its small schema. In most environments, the Standby Wizard schema will never grow over a few megabytes. This parameter is optional.

5. Enter the default temporary tablespace for the Standby Wizard user (optional):

Enter the default temporary tablespace for the Standby Wizard. This parameter is optional.

When the Database Installation script finishes, you will be notified of a successful installation. Check the output of the Database Installation by editing the file: "rdc_standby_install.log" in your installation directory or your current directory. Once the install script has notified you of its successful completion, you are ready to run the Standby Wizard User Interface to register your Standby Wizard license.

Installation Step Three – Java User Interface

To successfully run the Standby Wizard's Java User Interface, a Java JRE (1.4 or higher) must be installed on the client. To test that you have the proper java version in your command path, issue this command from either your Windows command prompt:

>java –version

Tip: Defining your Java path in windows (Optional)

1.   Navigate to: Control Panel | Administrative Tools | Computer management.

2.   Choose: Actions | properties | Advanced | Environment Variables

3.   Click on the system variable in the lower list called "path" and click on EDIT to modify the path to include the proper java path.

Example: (In this example *mypath* is already defined)

Path = c:\mypath;C:\Program Files\s1studio_jdk\j2sdk1.4.1_02\bin

For Oracle users who don't want to install the SUN JRE, the following example uses the Oracle JRE 1.3. In this example, ORACLE_HOME is defined as c:\oracle\ora92. In Oracle 9 the JRE path is: ORACLE_HOME/jdk/jre/bin.

Path = c:\mypath;c:\oracle\ora92\jdk\jre\bin;

Once you have edited the path information and clicked on OK - open a new command prompt window and run the command "java –version" again.

Starting the Standby Wizard User Interface

To invoke the Standby Wizard User Interface from a Windows client simply click on the icon labeled *Java User Interface*, located in your Windows start menu in the *Standby Wizard* program group.

Tip: You may also run the bat file named *StandbyWizard.bat* directly from the installation directory.

After you start the User Interface, you will be prompted for the database password to the Standby Wizard account *rdc_standby_user:*
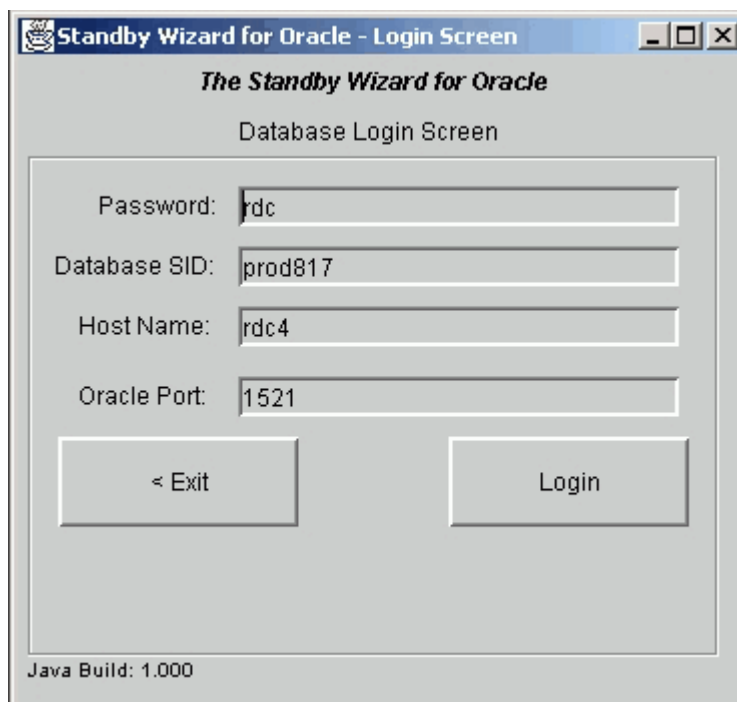
In the above screen, the *password* we specified during the Standby Wizard install is rdc (usually hidden) and the *Database SID* is *prod817*. The host machine where the Oracle server resides is *rdc4*

*I*if you do not have a host name you can instead use the IP address of the database server. In most cases the default Oracle port number is 1521 or 1522. Feel free to change this value dependent on the settings of the listener.ora file located on your database server.

The Standby Wizard Main Menu

Once Java connects you to your RDBMS, you will see the Standby Wizard Main Menu:
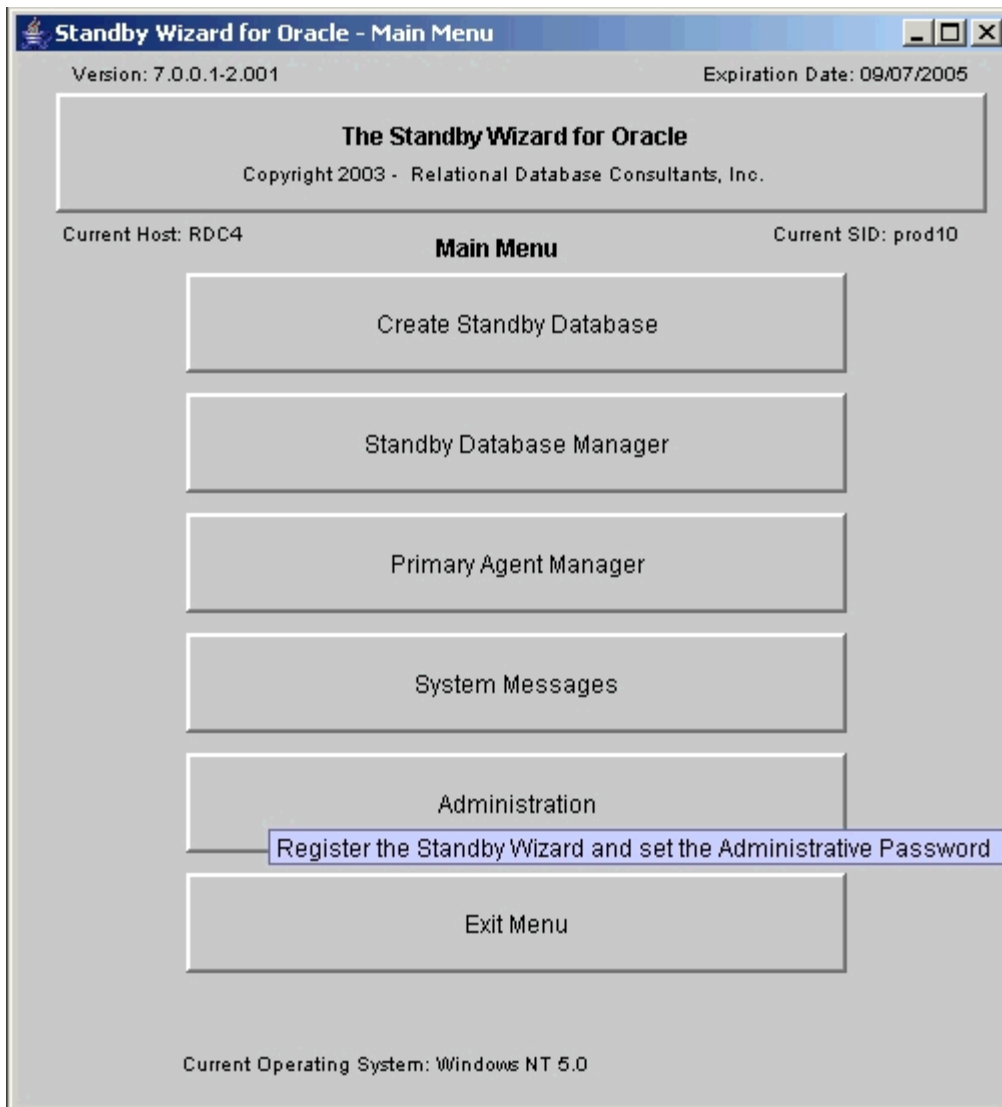
From the Standby Wizard main menu, you can always see the following useful items:

1. The Version No. of the Standby Wizard.
2. The Expiration Date.
3. The Host Name of the physical machine the Standby Wizard has been installed on.
4. The primary database Oracle SID.
5. The current Operating System of the primary database.

When you first enter the Main Menu - you will be instructed to enter a demo license code which can be obtained at swdemo@relationalwizards.com.

To complete your installation, click on the last menu item labeled: "Administration". This action will open the Administration Screen:

When you enter this screen for the first time, you will need to enter your demo license code in the license number field. To do this simply type in your email address, a space, and then your 3 digit demo code obtained from swdemo@relationalwizards.com or your appropriate vendor.

In the above example Sue Jones has typed in her email address and her 3 digit code. Once you have entered this code simply click on the button at the bottom of the screen labeled "Register Wizard" to complete the registration process.

Now you are ready to create standby databases…hot off your primary database. Yet, before we attempt standby database creation for the first time with the Standby Wizard, we must go through the Preliminary Checklist.

Chapter Two

The Preliminary Checklist

Using the Standby Wizard to create standby databases is very simple. The Standby Wizard interface takes you through four easy steps to create a standby database. In each step, you define or clarify basic information that the Standby Wizard will need to create your new standby database.   Yet, don't be fooled by the simplicity of this process - creating a Standby Database is always a complex task and very CPU/Disk intensive. This is why we must go through a preliminary checklist before we create our first standby database with the Standby Wizard.

1. Free Disk Space

Essentially, what must occur in standby database creation is the duplication of all database data from the primary host on the standby host. If your database is large, this step could take hours or even days!

For instance, if your current database size is 300 gigabytes, then 300 gigabytes of data will need to be copied from your primary host to your standby host. And although the Standby Wizard efficiently deletes old redo logs after they are successfully applied, you will need more than 300 gigabytes of disk space free on your standby host to accommodate both the Oracle Installation itself and any bulk transfer of redo logs that might need to be applied to the standby database after a network shortage.

If you are creating a standby database on the same host as your primary database, then the new standby database will still require enough free disk space to copy all of the Oracle data files to a new location and the ability to accommodate any unexpected bulk transfer of redo logs.

To find out your total database size, enter the Standby Wizard main menu. At the bottom of the window - your total database size is listed next to the label "Current Database Size". To create a standby database for an OLTP production system, we recommend that you have free disk space of not less than 150% of the current database size – after you have installed the Oracle software on the standby host

2. The Standby Host

If you plan to create your standby database on the same physical host as your primary database, then you do not need to perform an installation check because your primary instance is assumed to already exist and be running.

If the new standby host is to be on a separate machine, you are required to install the same Oracle RDBMS version as installed on the primary host (or as close as possible). Furthermore, the standby host must be running the same operating system version and using the same file system (NTFS, FAT32) as the primary host.

The Standby Wizard does not require that your Java installation connect to the standby host unless you wish to use the GUI Activation Screen and/or the graceful switchback features of the Standby Wizard. If you would like to implement these features on your

standby host, you will need to install the Standby Wizard forms on the standby host and/or create a Net8 connection for them on the standby host.

If you are going to use the Standby Wizard front-end on your standby host for activation and switchback, verify that your standby host can be connected to by the java interface.

Caution:

Never perform a [Database Installation](#) *on a standby database created by the Standby Wizard. By definition, the standby database is a copy of the primary database, and thus already contains the Standby Wizard schema – necessary for a graceful switchback.*

When you install the Oracle RDBMS on your standby host, feel free to create the default Oracle installation database or any other instances you require. As long as the standby database's *Oracle Sid* and *database name* is unique for each physical standby host - there will be no conflicts. If you are installing Oracle for the first time on the standby host, you may allow the installer to create the default instance so you can test the fitness of your new database server.

Many times critical applications require that certain executable files, directory structures, and cron jobs be present and running on the standby host server. If this is the case at your site, a valid application environment will also have to be installed on the standby host in case of a fail-over. You should test this environment first, by *activating* your first standby database and using it as a duplicate test site. If this step is avoided or not completed properly, then during a crisis your Oracle database will be working perfectly when activated by the Standby Wizard - yet your ability to use it will not exist!

3. Disk Sharing on Windows

To use the Standby Wizard for Windows you will need to define *sharing* on the remote network drives of the standby host for use by the primary host. If you are creating your standby database on the same host, you do not need to perform this task.

To define sharing for the standby host, we must consider at least three directories that the Standby Wizard is going to create and/or populate with data. The drive(s) that will house these directories must be accessible to the Win32 command XCOPY from the primary host. Here are the functional descriptions of the three directory types utilized by the Standby Wizard:

> **1. The default datafile directory** - This will be where the Standby Wizard stores the data files of the primary host as well as the current redo logs. By default, the Standby Wizard will create a series of sub-directories in the default data file directory with the original primary machine path names. Of course, if you have a mission-critical OLTP database that must be optimized, *then* you may want to separate your new standby data files on multiple drives. In this scenario, the Standby Wizard will map any configuration of drives you need, yet you must define a *share name* for all of these drives so they are accessible to XCOPY on the primary host for the user account that will be operating the Standby Wizard.

> **2. The archived log directory** – This will be the directory path on the standby host that will receive archived redo logs from the primary host via the Standby Wizard. This directory path will be the *log_archive_dest* parameter of the automatically generated standby database init.ora file.

3. The standby working directory - This will be the new standby database initialization directory path that will contain the generated control file and init.ora file for the standby database. Along with these crucial files, this directory contains programs (command files) to start, recover, validate, and activate your standby database. The size of all these files combined is usually only a few megabytes.

In many cases, we can simply use one new logical drive number for all the above directories. For instance, we might define a shared drive C$STANDBY on the standby host, so drive C can be accessed from the primary host. On this drive, the Standby Wizard would create the three above sub-directories that it requires. For Instance,

C:\standby\scripts
C:\standby\archive
C:\standby\data

To successfully define a *share* drive for the Standby Wizard to use on the standby host, three conditions must be met:

For instance, If you plan to use drives E, F, and G on your standby host, the new *share name* for each of these drives must be E$STANDBY, F$STANDBY, G$STANDBY respectively. This allows the Standby Wizard to parse Oracle data dictionary path names and convert them to network path names. If you already have another share name for a particular drive, simply create a second one for the Standby Wizard.

Once you have created the *new share* for the necessary drives on the standby host, you must grant the *permissions*: *change* and *read* to the Standby Wizard user on the primary host. This is because the Standby Wizard will need to push over database files and scripts to the appropriate directories on the standby host using the XCOPY command.

It is beyond the scope of this document to explain how to define drive sharing in the Microsoft world. Normally one would enter "My computer" from the standby host and right click on the drive we wish to share. From here, we would chose the option labeled "Sharing" to get started. If you have never defined sharing for a network drive before, you should read the documentation provided by Microsoft before you attempt the operation. Ideally, an Oracle DBA should hand this task off to a Microsoft-certified system administrator.

4. Modifying Windows Services Permissions

If you only plan on using the Standby Wizard to create Oracle standby databases on your local host, you can skip this step.

Because the Standby Wizard utilizes java stored procedures within the SGA to execute OS copy commands, the Standby Wizard is dependent on the Windows service running your Oracle instance. Microsoft runs all services as *Local System,* which is an unauthenticated user. Thus, we must either instruct the Oracle Service to login to an Administrator-level windows account or we must use *null session shares* on the standby.

Therefore, Windows Administrators are recommended to pursue one of these three choices:

1. Instruct the Oracle Service of the Primary Database to Login as a User

This method requires you to shutdown your primary database before you first use the Standby Wizard for Windows. The reason being, is that you will need to stop

your Oracle Service and instruct it to logon as an administrative level account and not as the unauthenticated user, local system.

To change the service parameters, complete the following tasks:

1. Shutdown the database and the Oracle Service of your primary database

2. Enter the Windows Service Mangement Screen by clicking on Start | Settings | Conrol Panel | Administrative Tools | Services.

3. Modify the Oracle Service to login as an administrative account that has the ability to issue XCOPY commands to your standby host *without* password prompting:
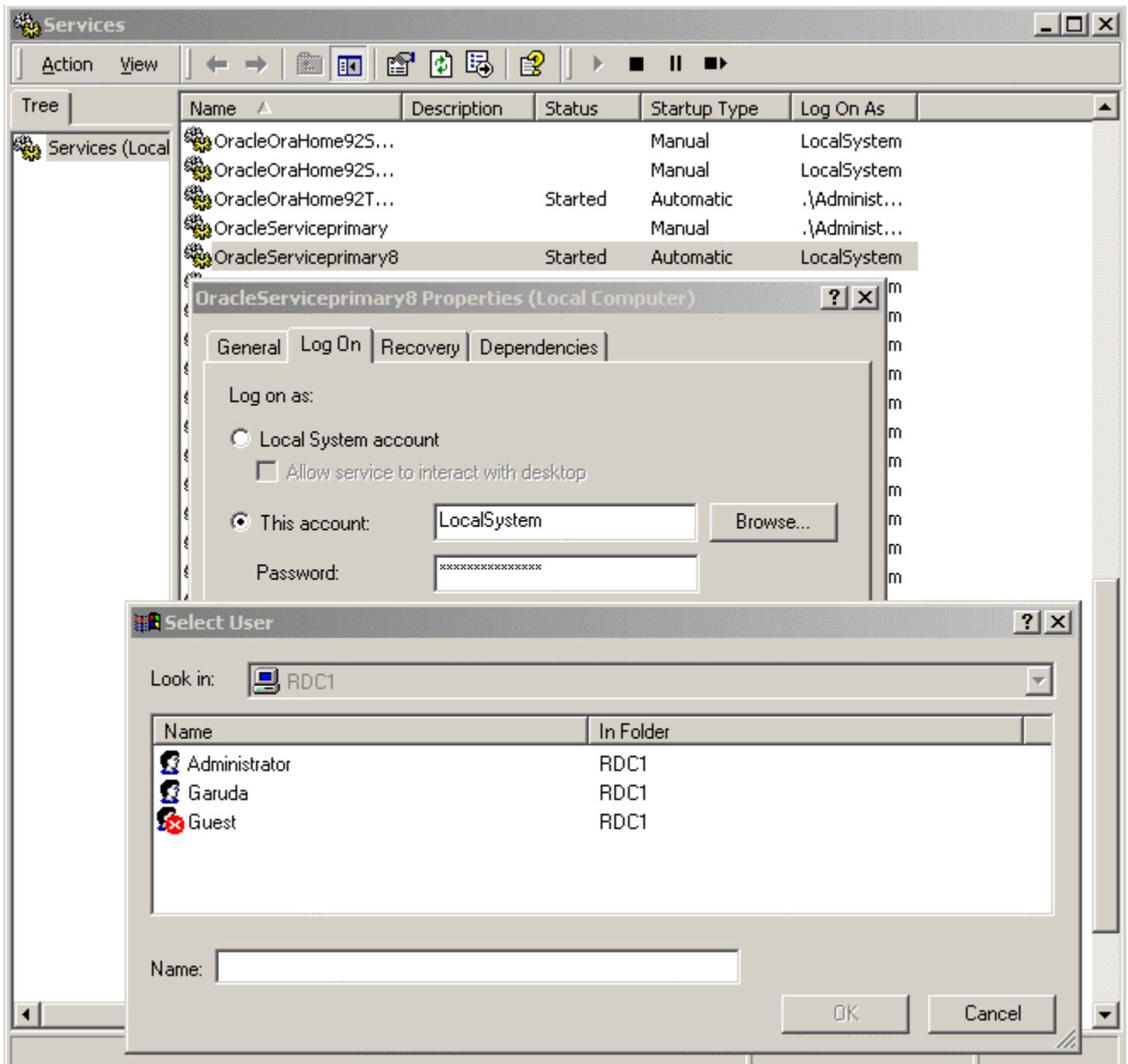
In the above case we would choose Administrator, since that is the only administrative level account available on this primary host. Feel free to create a new user to run the Oracle Services.

After changing the service parameters:

1. Repeat the above steps for the Oracle listener Service.

2. Now start the listener service and then the Oracle service for the primary database.

After you have set up your permissions, you should attempt two tests. Login again to the user account that will be operating the Standby Wizard and the Oracle Service of the primary host. The first test will be issuing a DIR command from the command prompt on the primary host as such:

>dir *standbyhost\drive*

If your standby host machine is named *Apollo* and you have set up sharing of the C drive, you would type in from the command prompt:

>dir \\apollo\c$standby

If you receive the directory listing from the standby host C drive, then you have confirmed read permissions and sharing for the Standby Wizard. To confirm write ability, find a file you would like to copy to the standby host and issue this command:

>xcopy *filename* \\standbyhost\drive*

In our above example, we might attempt to copy the file named test.txt as such:

>xcopy test.txt \\apollo\c$standby*

5. The Standby Database SID/Instance/Service Name

Before you create your standby database you need to decide what the service name/*Oracle SID* will be for the standby database. For example, if you are running a production database with service name/Oracle SID of "prod" and connecting as such:

sqlplus scott/tiger@prod,

You might choose a standby Oracle SID of *standby1*; therefore allowing users to re-connect to their accounts using the service name of *standby1* in the event of a disaster. For example, the user scott would be able to connect to the above standby database during a fail-over in the following way:

sqlplus scott/tiger@standby1

In some cases, this SID difference can be hidden from the users by using Net8 service names; yet, the Standby SID will still determine the name of the init.ora file generated by the Standby Wizard, along with all of the command script names; Therefore it is important to choose a short and easy to understand identifier for your standby database. If you are running your standby database on a separate physical host, feel free to use the same SID as used for your primary database.

If your standby database is on the same physical host as your primary database, you must use a unique SID for your standby database, different from the SID of the primary database you are attempting to duplicate. This is because both database are residing on the same physical host and require unique names.

6. Check Log_Archive_Format Parameter (init.ora)

In some default Oracle installations the *log_archive_format* parameter for a given database is set something similar to:

```
Log_archive_format=%%ORACLE_SID%%T%TS%S.ARC
```

The problem for standby database configuration with this format mask is that the Primary Oracle SID is hard-coded into the archived log file name through the use of %ORACLE SID%.

If your *log_archive_forma*t parameter is set to this value, then the following limitations exist regarding your standby database strategy:

> 1. All standby databases created off your primary database must have the *same* Oracle SID as your primary database.
>
> 2. You may not create two databases with the same Oracle SID on any physical host.
>
> 3. You may not create a standby database locally, because this would violate the 2nd rule above.
>
> 4. If you are planning multiple standby databases in support of your primary database, each standby database must be on a separate physical host. This also follows from the 2nd rule above.

If this restriction is too limiting, shutdown your Oracle instance and change the
log_archive_format parameter to something like:

arc%T%S.arc

In this case, the prefix 'arc' will replace the Oracle SID. This will allow your archived logs
to be recovered by a standby database that has an Oracle SID name other than that of
your primary database.

Note to 10-11g Users:

*The init.ora parameter db_recovery_file_dest is not used by the Standby Wizard;
therefore a **log_archve_dest_N** parameter needs to be defined.*

7. SQL*Net settings for the Standby Database

You will need to list each standby databases in both the listener.ora and tnsnames.ora
files on your primary database. This is because the Standby Wizard uses database links
to communicate with your standby database. Alternatively, you my use a tool like
Enterprise Manager to configure your listener.

See Appendix C for sample listener.ora and tnsnames.ora files.

If you are using the Oracle Names Server Configuration as a part of your Net8 strategy,
you can configure your network to automatically fail over to the standby database when
the primary database is unreachable. For more information on this strategy, refer to
Oracle Manual titled: Standby Database Concepts and Administration, Chapter 5 under
the section "Configuring Client Application Fail over."

8. Redo Log Compression (Optional)

If you plan on running the Standby Wizard for Windows using redo log file compression,
you will need to follow these steps:

1. Download GNU Zip at: http://www.gzip.org/gzip124xN.zip. The product is free open-
source software.
(Be sure to read the file COPYING provided with gzip for specific license information)

2. Install the executable gzip.exe in a default path, we recommend c:\winnt\system32.
GNU Zip runs exclusively from the command line.

The Standby Wizard uses the command gzip –f [logfile] to compress redo logs, and it
uses the command gzip –fd *.gz to unzip log files on the Standby Host. We have enjoyed
a 5:1 compression ratio using gzip. The Standby Wizard will always name Compressed
log files with the extension 'gz'. The Standby Wizard always unzips archived log files on
the primary host immediately after transfer so as not to interfere with any recovery effort
that may be necessary later.   As of release 6.1.X, compression only is implemented
after the initial Standby Database build and is performed by the *primary agent.*

Note:

For licensed users - you may modify the Standby Wizard compile parameters to provide modified flags or your own compression/encryption algorithm for redo log transfer. Contact our support staff for such assistance at standby@relationalwizards.com*.*

9. System Administration Considerations

The Windows user account that will be performing the Standby Wizard tasks must have the system privileges to:

1. Define Sharing as mentioned above, unless performed by a system administrator.
2. Start, Stop, and Create Services using Oracle's ORADIM utility.
3. Perform the basic tasks required for Oracle database administration.

.

10. Oracle DBA Considerations

The Standby Wizard for Oracle is normally only used by one client at a time. The *primary* and *standby* agents that the Standby Wizard employs on the primary database usually have no more than 25 cursors open. The Standby Wizard does query certain v$ dictionary tables on a regular basis.

The front-end tool will sometimes create up to 8 users duing a standby database build or rebuild, this is due to autonomous transactions within the Standby Wizard Packages and JDBC interface.

1. Allow for database startup triggers (default)

For the Standby Wizard to synchronize your databases automatically during startup, make sure that the init.ora file for your primary and standby databases does NOT have the following parameter set to false:

_system_trig_enabled = FALSE (blocks the Standby Wizard at startup)

You do not need to add this parameter. If you do not have the parameter set, the Standby Wizard will run correctly since the default value is TRUE. If you have it set to FALSE you can reset the parameter manually and restart your primary database as such:

_system_trig_enabled = TRUE (correct setting for the Standby Wizard)

2.   Changing RDC_Standby_User Password

If you ever change the Standby Wizard password, make sure to login to the front-end so this information can be transferred to the standby databases.

Chapter Three

Creating a Standby Database

Enter the main menu of the Standby Wizard. From here, click on the first button labeled: "Create Standby Database".

Step 1 of 4 - Basic Information

1. What will be the name of your new standby database?

Enter a unique name to identify your standby database. This name is not used outside the Standby Wizard dialogues and maintenance screens, so it can be anything you would like. An entry like *my first standby* is perfectly valid.

2. *What is the name of the host machine where the new standby database will reside?*

If the Standby Wizard detects that your primary database's archived logs have a naming format that includes the Oracle SID name, you are restricted to using the same Oracle SID for your standby database as your production database. You can edit the init.ora parameter *log_archive_format* if this restriction is unacceptable. Simply take out any references to %SID% or %ORACLE_SID%. This is also discussed in the preliminary checklist of the previous chapter.

3. What will be the Oracle SID of the new standby database?

Enter a unique identifier that will define the Oracle SID for your standby database. The standby Oracle SID should already have been decided upon, since it is one of the steps in the preliminary checklist discussed in the previous chapter. If you are creating a standby database on the same physical host as your primary database, the Oracle SID name must be different from that of your primary instance.

4. *Service Name (Optional)*

This allows you to enter an optional service name different from your new Standby's Oracle SID. This service name must be listed in the tnsnames.ora file on your primary database. Usually this option is only used if you want to create a standby with the same Oracle SID as your primary.

5. *What is the Oracle Home of your standby database? (Optional)*

If you are running multiple Oracle Home's on your standby host, you may enter the Oracle Home of your standby database. This value will be set in every script generated by the Standby Wizard.   If you are not running multiple Oracle Home's on your standby host, ignore this field.

Caution:

You still must use the Oracle Home Selector or edit your Environment if you are using multiple Oracle Home's before you manually run the mount or activation scripts. This is because these scripts use oracle's ORADIM utility to create new Oracle services for Windows.

Step 2 of 4 - Directory Path Information

In the second step of standby database creation, the Standby Wizard asks you to define both the *primary* and *standby working directories* that will house the Standby Wizard scripts, control file, and init.ora file. You will also define in this step the archived redo log destination you would like used on the standby host.

To complete the above screen, step 2 in standby database creation, provide full directory path names, as shown above, for the three following questions:

1. What directory on the primary host would you like the Standby Wizard scripts to reside?

Assign the *primary working directory* for the Standby Wizard to use on the primary host. This directory is where the Standby Wizard will write out all necessary scripts, the standby control file, and the init.ora file that will later be copied to the standby host. If the specified directory doesn't yet exist…the Standby Wizard will create it for you. By definition, this directory must reside on the primary host.

2. What directory on the standby host would you like the Standby Wizard scripts to reside?

Assign the *standby working directory* for the Standby Wizard to use on the standby host. This directory will receive a copy of the above-mentioned files from the primary host working directory. It is here, in the standby working directory, that you can mount, recover and activate your standby database from. If the specified directory doesn't exist, the Standby Wizard will create it for you.

3. What directory on the standby host would you like to receive Archived Redo Logs?

This directory will become the archive destination log_archive_dest of the standby host. Here redo logs from the primary machine will be received and read into the Oracle RDBMS to keep the standby instance synchronized with the primary instance. If the specified archive directory doesn't exist, the Standby Wizard will create it for you.

Step 3 of 4 - Storage Options

The third step towards standby database creation is to choose a *general* storage strategy to map the primary database's data files and redo logs to the standby database:

The step three window contains only two radio buttons and one field. From here you will chose one of two strategies to map your primary database files to the standby database. In the next step you can make modifications to either of these strategies:

1. Map all data files from the primary host to this directory on the standby host:

If you chose the default option you will need to define the *default datafile directory* on the standby host where the primary database data files and redo logs will be stored. When you chose option one, be sure to enter a mount point that has the free space necessary to duplicate the primary database file system. If your primary database contains data stored on many different logical and/or physical disks, the standby wizard will create a sub-directory tree containing the original *logical* structure of your data files beneath the *default datafile directory* you specify.

If you have a very large database and need to separate the data on many disks, simply enter one of the directory locations you are going to use for data files in this step. In the next step, you can edit your Oracle data file locations and assign them any valid windows path on your standby host that the Standby Wizard account can write to using the *share name* of the given disk.

2. Do not automatically map the standby data files.

In most cases, there is no need to use this option unless you wish an exact mirror of the data and redo logs on both the standby host and the primary host. Your standby host must exist on a separate machine for the Standby Wizard to create an exact mirror of your data files.

If you want an exact mirror of your data files but on a new disk drive letter, simply chose option one instead and enter the new drive letter as your *default data file directory*

After you have chosen the strategy to map your primary database's data files to your standby host, choose from the list below the transfer method that you would like the Standby Wizard to use when copying files. This topic is covered extensively in section 4 of the previous chapter: Standby Database Creation - Preliminary Checklist.

3. Re-Create Temp Files

This will instruct the Standby Wizard to re-define your Tempfiles on the new standby database, these file names can be edited or blanked-out during the next step.

4. Use this transfer method to copy data files

After you have chosen the strategy to map your primary database's data files to your standby host, choose from the list below the transfer method that you would like the Standby Wizard to use when copying files. This topic is covered extensively in section 3 of the previous chapter: Standby Database Creation - Preliminary Checklist.

5. Compress Archived Redo Logs before transfer

By Checking this box you instruct the primary agent to transfer archived logs by compressing them first. This will reduce network I/O for large archive redo log sizes. The default Unix compression commands used by the Standby Wizard are *compress* and *uncompress* - these commands are required as discussed in section 8 of the previous chapter: Standby Database Creation - Preliminary Checklist.

To remove compression after you have built a standby database, simply perform an *incremental rebuild* to reset the scripts.

6. Manually Copy Data Files

A few of our clients use this option to transfer large physical backups of data warehouses when telnet transfer is not practical. Simply follow instructions during the build and manually transfer the datafiles during the build.

Step 4 of 4 - Data Mapping

Data Mapping is the fourth and final step in standby database creation. This screen contains an editable multi-record listing of all your data files and how they are initially mapped on the standby host:

Standby Wizard for Oracle - Standby Database Creation Step 4

The Standby Wizard for Oracle
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Standby Database Creation
Step 4 of 4

Data File Mapping

Primary Database Filename	Standby Database File Path
REDOLOG1A.ORA	c:\st\datafiles\ORACLE\ORA817\DATABASE\REDOLOG1A.ORA
REDOLOG1B.ORA	c:\st\datafiles\ORACLE\ORA817\DATABASE\REDOLOG1B.ORA
REDOLOG2A.ORA	c:\st\datafiles\ORACLE\ORA817\DATABASE\REDOLOG2A.ORA
REDOLOG2B.ORA	c:\st\datafiles\ORACLE\ORA817\DATABASE\REDOLOG2B.ORA
REDOLOG3A.ORA	c:\st\datafiles\ORACLE\ORA817\DATABASE\REDOLOG3A.ORA
REDOLOG3B.ORA	c:\st\datafiles\ORACLE\ORA817\DATABASE\REDOLOG3B.ORA
TEMP.ORA	c:\st\datafiles\ORACLE\ORA817\DATABASE\TEMP.ORA
USERS.ORA	c:\st\datafiles\ORACLE\ORA817\DATABASE\USERS.ORA
ROLLBACK.ORA	c:\st\datafiles\ORACLE\ORA817\DATABASE\ROLLBACK.ORA
SYSTEM.ORA	c:\st\datafiles\ORACLE\ORA817\DATABASE\SYSTEM.ORA

Edit data file mapping...

< Back	Exit	Edit Data File	Next Step >

From the data-mapping screen, you can view and modify the full directory path planned for each new data file and redo log on the standby host. Feel free to create any new file paths or change the names of the automatically mapped file paths. If the new file paths don't yet exist - the Standby Wizard will create the specified file path automatically when you build your standby database.

To edit a data file, click on the appropriate file path and then click on the button labeled "Edit Data File". From here you. Can change the destination directory of any datafile on the standby host. You can also view the size of the given data file in bytes:
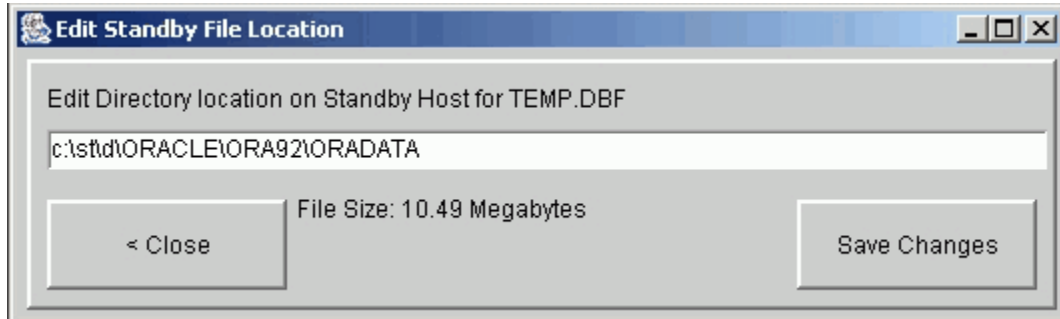
Even If you do not need to edit any of these file path names, scroll through the listing of files and verify that each underlying storage device on the standby host will have adequate free disk-space to house the file sizes necessary.

Once you have finished this last step, simply click on the button labeled "next"…and you will be ready to build your first standby database.

Chapter Four

Building a Standby Database

Up until this point, the Standby Wizard has not done anything CPU intensive. At most, the Standby Wizard has queried a number of small data dictionary tables and entered a few rows of data into its schema. Now we are ready to build our standby database and unlike the previous steps, this is one of the most intensive database tasks there is. When the Standby Wizard is ready to build a standby database, you will always see this screen:
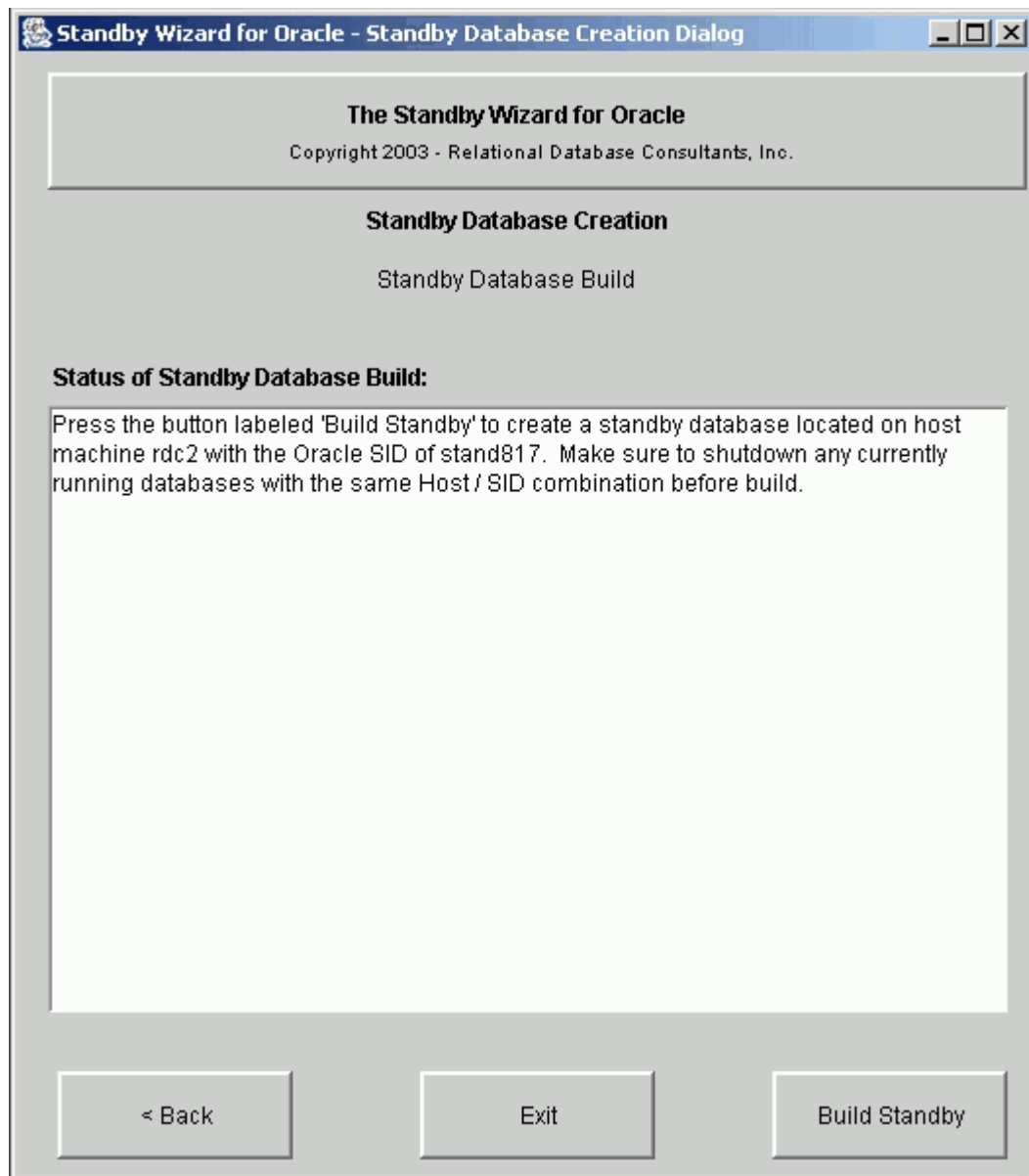
Once you click on the "Build Standby" button - control to the screen will be frozen - aside from informational messages - and the Standby Wizard will begin the task of copying your live production database to a remote host. This task entails going into hot backup mode and copying each data file across a network. Therefore, activity on your primary database's redo logs are going to increase and disk IO, along with network IO, will skyrocket.

If your database is used heavily, then it would be a good idea to build your standby database during off-peak hours. Furthermore, if you have a huge data-warehouse, the task of copying all the data files could take days. If you are concerned about estimating the time to copy your primary database to the standby host, simply use your copy command of choice to copy one data file of a given size to its destination on the standby host. For Example, if 1 gigabyte takes 4 minutes to copy then 300 gigabytes will take approximately (4X300) 1200 minutes or 20 hours.

As the standby Wizard performs standby database creation, you will be informed as to all the steps the Standby Wizard goes through in the process, including the copying of each primary data file to the standby host. Once this process is finished, the Standby Wizard will notify you. At this point, you can simply return to the main menu. Your Standby Database creation is now complete.

Tip:

If you want to stop the Standby Wizard in the middle of a long standby database build, you will need to kill the Java front-end and you may also need to use the process table to kill any currently running copy commands. After you have stopped this build, unless
The standby database creation was successful, the definition you created will be deleted during the next login attempt to the Standby Wizard interface.

Chapter Five

Mounting the Standby Database

A standby database must enter recovery mode in order to keep-up with the primary database's changes. After the initial data files and log files are copied, recovery is the only way to refresh a standby database without performing an incremental or complete rebuild.

Therefore, once we have created our standby database, we need to *mount* our standby database on the standby host and thus enable recovery via the *standby agent* and *primary agent.* This is a simple two-step process.

1. Confirm the Existence of the Standby Scripts

Before mounting your new standby database, enter the *standby working directory* that you defined in step 2 of 4 in your standby database build and confirm the existence of the Standby Wizard scripts. These five shell scripts and the respective SQL scripts they call, are all prefixed with your standby host name and standby Oracle SID respectively:

rdc1_standby_activate.bat   rdc1_standby_recover.sql
rdc1standby_activate.sql   rdc1_standby_shutdown.bat
rdc1_standby_mount.bat   rdc1_standby_shutdown.sql
rdc1_standby_mount.sql   rdc1_standby_startup.bat
rdc1_standby_recover.bat   rdc1_standby_startup.sql
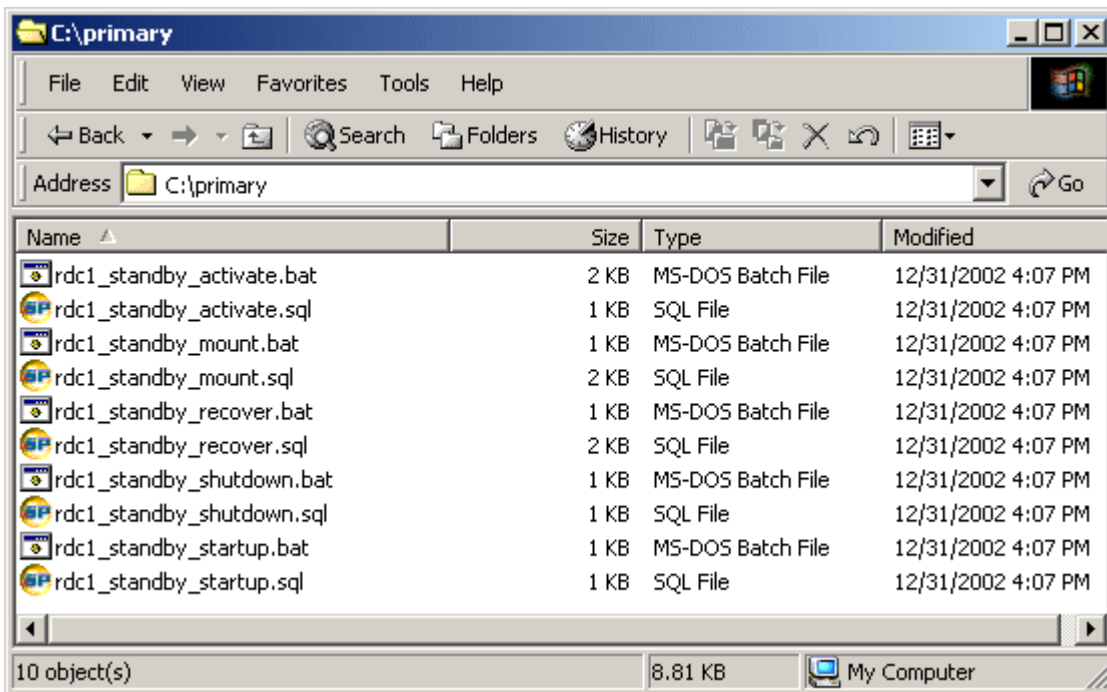
You may run all of the batch file scripts by either double-clicking on them in Windows Explorer or by running them directly from the command prompt. Only one script needs to be run by you directly. These five automatically generated scripts that exist on the standby host represent the full life cycle of tasks that are performed on a standby database:

1. Mount

The Mount Script is the only script that you need to run manually…and only after the initial build of your standby database or after a *rebuild*. The mount script also accepts one parameter, the password for the new standby *orapwd* password file.

Make sure to delete any old Oracle PWD files of the same instance name in oracle_home\database if you are performing a complete rebuild.

2. Recover

This script is used by the *standby agent* to recover archived logs from the primary instance. It can also be run manually.

3. Startup

This script will start your standby database and open it in read-only mode.

4. Shutdown

This script should be run if you need to shutdown the standby database. You can still shutdown your new standby database using SQL*Plus or your favorite DBA tool, yet this script is tailored by the Standby Wizard to perform any final recovery before the shutdown is complete.

.

5. Activate

This script is used to activate your standby database and transform it into a regular read-write database. Remember, activation can never be undone, once you activate your standby database it becomes a working duplicate of your primary database and is no longer a standby database. You must perform a complete rebuild to transform it again into a standby database.

 For more on information on activation strategies, refer to Chapter 11 - Emergency Fail-Over to a Standby Database (Activation)

2. Run the Mount Script

The mount script needs to be run only once unless you are performing a rebuild on your standby database. When you execute the mount script, the Standby Wizard will create for you the appropriate windows service and orapwd file during the mount process using Oracle's ORADIM utility for windows.

To run the mount script we simply pass in a new password for ORADIM to use in creating the password file for your standby database. For example, if you want to assign the password "tiger" to the password file we would mount our standby database by clicking on the mount script from Windows explorer or by running the mount script from the command line as such:

>rdc2_standby_mount tiger

If you do not supply a ORAPWD file password, the mount script will prompt you for one.

As the mount script runs, you will see a message similar to this one during recovery:

```
Alter Database Recover Automatic Standby Database Until Cancel
*
ERROR at line 1:
ORA-00279: change 4624336 generated at 02/24/2002 10:56:04 needed for thread 1
ORA-00289: suggestion : \c:\archive\arch_1_1244.arc
ORA-00280: change 4624336 for thread 1 is in sequence #1244
ORA-00278: log file '\c:\archive\arch_1_1244.arc' no longer needed for this
recovery
ORA-00308: cannot open archived log 'c:\archive\arch_1_1244.arc'
ORA-27037: unable to obtain file status
```

Ignore the fact that Oracle prints out this error; this is normal output for a recovery operation. After this message, you will receive some useful informational messages, which should conclude with the following string:

```
OPEN_MODE
----------
READ ONLY

SQL> Spool Off
SQL> Exit;
```

This final message insures that your standby database is valid and currently open in *read only* mode. If you simply want to clone your primary database - you could activate your new standby database now by running the activation script in the same way we ran the mount script.

In most cases though, we want our standby database(s) to mirror our primary instance and take over *only* in times of peril, thus we still need to confirm that the new standby database is synchronized with the primary database that it supports.

The Standby Wizard accomplishes the task of synchronization behind the scenes by launching the *primary agent* and the *standby agent*. In the next chapter, we will learn how to use the *Standby Database Manager* to confirm the fitness of our new standby database configuration and its ability to remain current with the primary instance.

Chapter Six

Managing Your Standby Database

To enter Standby Database Management, Enter the Main Menu of the Standby Wizard, click on the second button on the main menu labeled: "Standby Database Management".
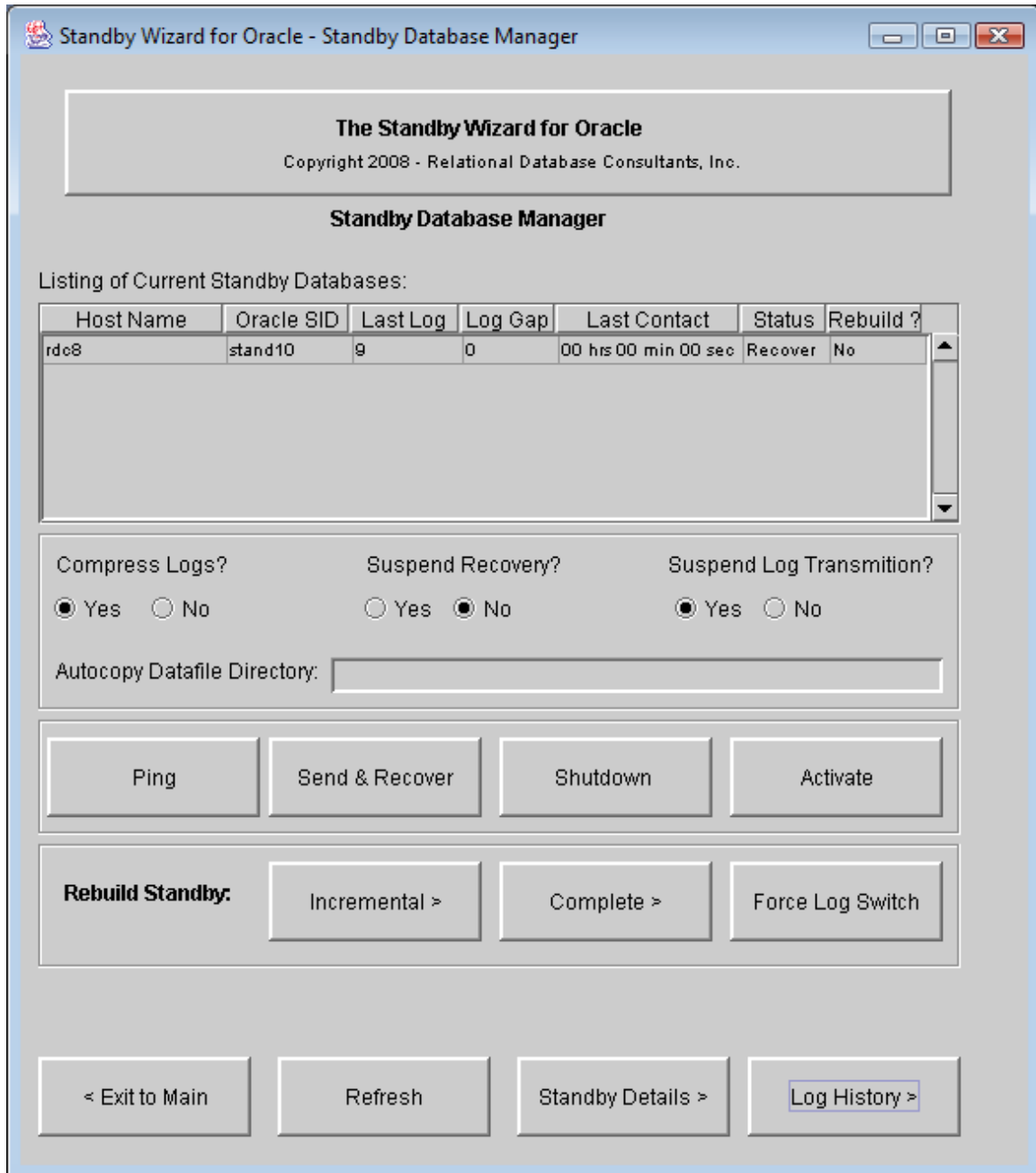
From the summary screen, we can confirm the fitness of our standby database. The first two fields of the summary screen, Standby Host and Standby SID, allow us to identify any given standby database that we have created, the fields that follow them are the current attributes for that standby database. Here is a description of each of the columns in the summary screen:

Host Name

This is the physical host that you defined for your standby database in Step 1 of 4 in the standby database build.

Oracle SID

You specified this Oracle SID for your standby database in Step 1 of 4 in the standby database build.

Last Log

The log sequence# of the last log recovered on the standby database.

Log Gap

This numeric field is the difference between the last redo log archived by the primary instance and the last archived log that was successfully recovered by the standby agent. The current log gap represents how synchronized your standby database would be if a failure interrupted service on the primary host at any given moment.

The current log gap should always tend towards 0, and should only equal a high value if there is very intense database activity with redo logs being archived at a rate faster than your network and the Standby Wizard can handle. After a network failure, or a shutdown on the standby host, this number will be high, but the Standby Wizard will work hard to *close the gap* once you have re-established a connection between servers and started the two instances.

Last Contact

This represents the time elapsed since the primary agent has had contact with the standby database via the *standby agent.* Its value equals the time since the primary agent last read an updated status file from the standby agent. In most cases, *time since last contact* should be under two minutes.

Status

This field defaults to "Recover" after you build your standby database. This means that the standby agent is instructed to keep the standby database open for read-only operations if and only if recovery is complete.

By suspending recovery as explained below the mode changes to "Opened."

Rebuild?

This field is either labeled *Yes* or *No*. Hopefully, after your first standby database build this value should be *No*. If the value changes to "Yes" - it indicates that the Standby Wizard has detected a change in the data file structure or has detected that a *nologging* operation was performed on your primary database. We will learn more about rebuilds in Chapter 9 - Rebuilding Your Standby Database**.**

Confirming Synchronization Using the Summary Screen

After confirming that the primary agent is communicating with your newly created standby database by checking the summary screen's initial read-out, you now need to test synchronization between the primary and standby database(s) to verify that your initial standby database configuration is valid. To do this, click on the button labeled: *Force Log Switch*.

After you issue the log switch, the *primary agent* will become aware of your action, and send over the new log you created to the standby database and then issue a recovery command.

If synchronization does not occur, first check the Standby Wizard's database link as discussed in Chapter 8, Section 6 on troubleshooting.

To view the history of log transfers between the primary and standby databases, click on the Log History button:

Archive Log RecID	Time Sent
849	09/22/03 18:05:24
848	09/22/03 17:49:23
847	09/22/03 17:41:55
846	09/22/03 17:34:22
845	09/22/03 17:26:53
844	09/22/03 17:19:24
843	09/22/03 17:12:05
842	09/22/03 17:04:36
841	09/22/03 16:57:14
840	09/22/03 16:49:42
839	09/22/03 16:42:12
838	09/22/03 16:34:39
837	09/22/03 16:27:04
836	09/22/03 16:19:27
835	09/22/03 16:11:55
834	09/22/03 16:04:20
833	09/22/03 16:04:12
832	09/22/03 16:04:10

Standby Wizard for Oracle - Stan...

Standby Wizard for Oracle - Standby Lo
Log Transfer History

* Denotes Resend

< Close   Clear Log

Log transfer history for this standby database...

The Log History screen contains a the Log Sequence # that maps directly to the table V$Log_History. This number will grow in time.

To clear the Standby Wizard's Log History for any given standby database, simply click on the button at the bottom labeled "Clear History".

The Standby Details Screen

You can view detailed information regarding any standby databases clicking on the button below labeled "Standby Details".   You will then be transported to the Standby Database Manager – Standby Details Screen:

Standby Wizard for Oracle - Standby Database Manager - Details

The Standby Wizard for Oracle
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Standby Database Details

Standby Name: My First standby   Create Date: 21-SEP-2003

Archived Log source on primary:

C:\Oracle\Ora92\Database\Archive

Archived Log destination on standby:

c:\st\a

Primary Database Script Directory

c:\st\p

Standby Database Script & ControlFile Directory

c:\st

Standby Host: rdc4   Standby SID: stand92

Standby Database Data Files	Bytes
c:\st\d\ORACLE\ORADATA\PROD92\SYSTEM.DBF	230,686,720
c:\st\d\ORACLE\ORADATA\PROD92\ROLLBACK.DBF	20,971,520
c:\st\d\ORACLE\ORA92\ORADATA\TEMP.DBF	10,485,760
c:\st\d\ORACLE\ORADATA\PROD92\USERS.DBF	10,485,760
C:\st\d\ORACLE\ORA92\ORADATA\BABS.DBF	5,242,880
c:\st\d\ORACLE\ORADATA\PROD92\LOG1PRIMARY.ORA	512,000
c:\st\d\ORACLE\ORADATA\PROD92\LOG2PRIMARY.ORA	512,000

Standby Database details...

< Close	Refresh Screen	Delete Standby	System Log >

Deleting a Standby Database

Deleting a standby database from the details screen deletes the database *definition* stored in the Standby Wizard's schema and thus stops the primary agent from sending redo logs to the *standby archive directory*. Standby deletion does not shutdown or delete the actual physical standby database instance or remove any log files.

Standby Database Management Flags and Buttons

Management Flags:

1. **Compress Logs**

   You can instruct the Standby Wizard to compress archived logs before copying them to save network bandwidth. Make sure GNU Zip is installed on your servers.

2. **Suspend Recovery**

   Instruct the Standby Database selected to stay open for reporting or other tasks, even if new logs are archived.

3. **Suspend Log Transmission**

   Instruct the primary agent to not send redo logs to the selected standby database.

Command Buttons to Perform Management Operations:

1. **Ping**

   When you hit the ping button it is similar to "refresh." The standby database is checked and an audit record is written if this ping is successful.

2. **Send & Recover**

   If, for some reason, the Primary Agent isn't sending logs or recovering them, you can do this manually with this dialog to keep your standby database synchronized while you debug the problem.

3. **Shutdown**

   This button will shutdown your standby database by executing the shutdown script.

4. **Activate**

   This button will activate you standby database. Remember, this task cannot be undone.

Warning:

Oracle 9i users should close the java user-interace, if it freezes during activation.

Chapter Seven

Understanding the Primary Agent

Synchronization between any Oracle database and its standby database is defined as the successful transfer and recovery of archived redo logs to the standby database. Therefore, in any standby database configuration, two things must occur for synchronization to be successful:

1. Archived Redo logs from the primary database must be sent to the standby database.

2. The standby database must recover these logs,

If both of these above events occur, synchronization is accomplished and your *log gap* will always tend towards zero. The first task, the sending of archived redo logs to the standby host, is accomplished by the Standby Wizard through the use of a *primary agent.* The second task, the recovery of these logs, is accomplished by remote calls via a database link from the primary database to the standby

The Primary Agent and Its Functions

The Primary Agent, by default, is usually launched by a database startup trigger existing on the primary host. The Primary Agent is first launched when you create your first standby database.

After the Primary agent is launched on your primary database, it remains in an infinite loop, performing a series of simple tasks all in support of the transfer of newly archived redo logs to the Standby Wizard's standby database(s). The following list is the lifecycle of tasks that the Primary Agent goes through between its sleep periods

1. Check the primary instance to see if any new redo logs have been archived.
3. Send required redo log(s) to the standby.
4. Call a PL/SQL package on the standby via a database link to enact recovery.
5. Delete old archived logs from the standby
6. Sleep

The Standby Wizard allows you to manage and monitor the primary agent through the Primary Agent Manager interface. To enter the Primary Agent Manager, click on the button labeled "Primary Agent" from the Standby Database Manager.

Here is a typical view that you will see from the Primary Agent Manager:
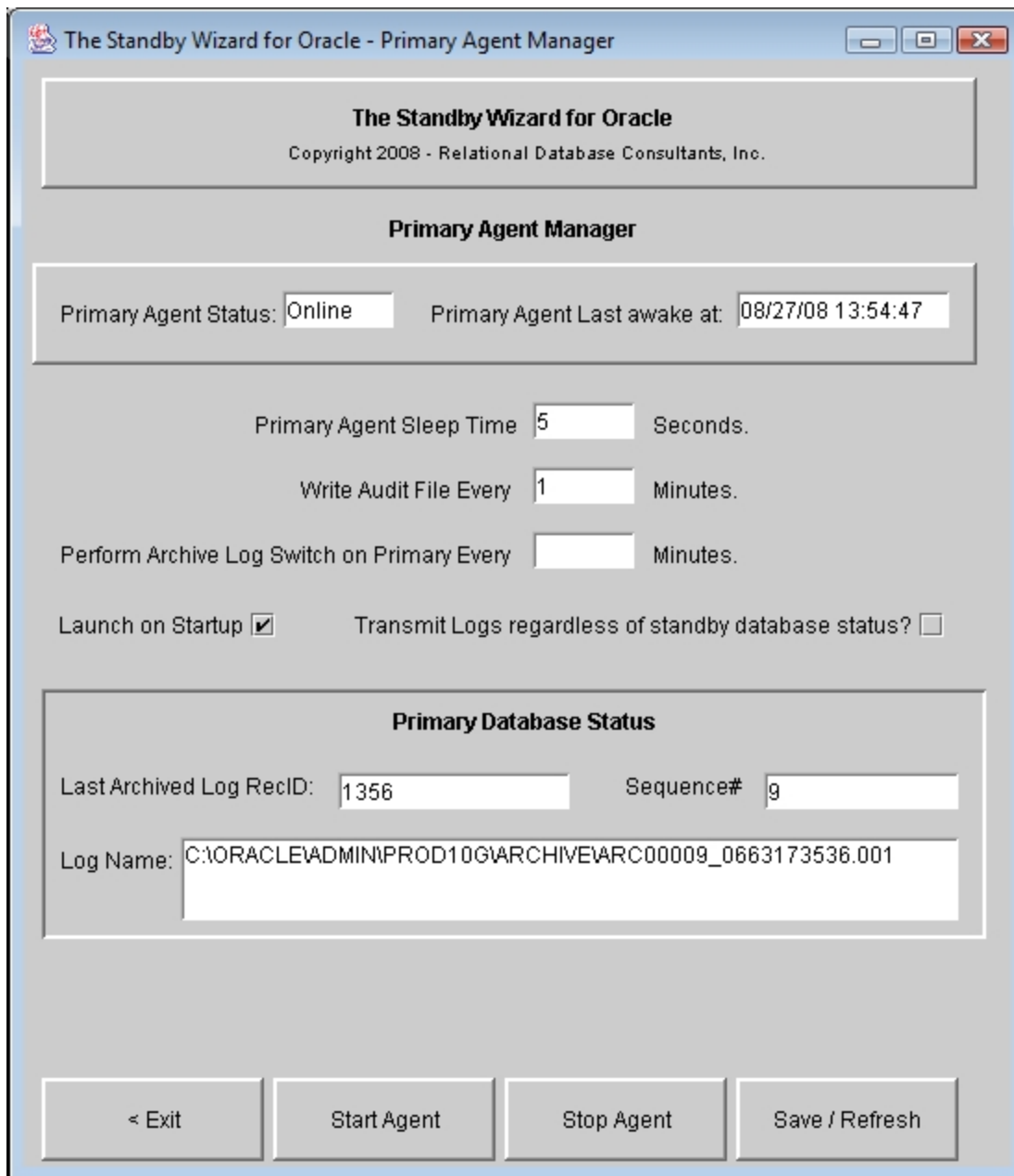
As you can see, the primary agent manager will indicate the *status* of the primary agent. We can also see information on the last log archived on the primary database.

These are the following functions you can perform with the Primary Agent Manager

1. Change Sleep Time

This value should not be changed until you have operated the Standby Wizard successfully for a time with the default values of 3 seconds. If your primary database does not write to its redo logs often, a number like 30 seconds is not unreasonable.

2. Change Audit File Write Time

The audit file is written every N minutes on both the standby and primary agents. To decrease the size of this file increase this number – in minutes.

3. Perform Archive Log Switch on Primary (Automatically)

You can instruct the primary agent to switch your primary database every N minutes. This is similar to using Oracle's init.ora log_checkpoint_interval parameter to force log switches

4. Launch On Startup

Normally a database startup trigger launches the primary agent. To disable this, uncheck this box.

5. Transmit Logs Regardless of Standby Agent Status

If you would like the transmission of redo logs to occur, regardless of the state of your standby database, then simply mark the checkbox labeled: "Transmit Logs Regardless of Standby Agent Status". A drawback of this strategy is that during a network failure, the primary agent will continue to attempt to send redo logs even though it has lost contact with the standby agent.

6. Start Agent / Stop Agent

The Primary Agent Manager GUI allows you to start and stop the primary agent. Yet because of the importance of this agent, you can also start and stop the primary agent from the SQL*Plus command line as such:

SQL>exec rdc_standby_user.rdc_standby_util.startagent;

SQL>exec rdc_standby_user.rdc_standby_util.stopagent;

SQL>exec rdc_standby_user.rdc_standby_util.killagent;

Obviously, the third method should not be used outside of an emergency, because the status of the Primary Agent will not be updated when it is killed.

Hint:

Information about the Primary Agent is stored in a one-row table within the Standby Wizard schema called *Primary_Agent*.   The history of the primary agent archived log transfers are kept in the table *Standby_Log_History*.

Chapter Eight

Troubleshooting a Standby Database

Although the Standby Database Manager can detect and report many errors, for advanced troubleshooting, we need to consider the following files used to track both Oracle issues and the Standby Wizard's own online System Log that can be accessed from the main menu:
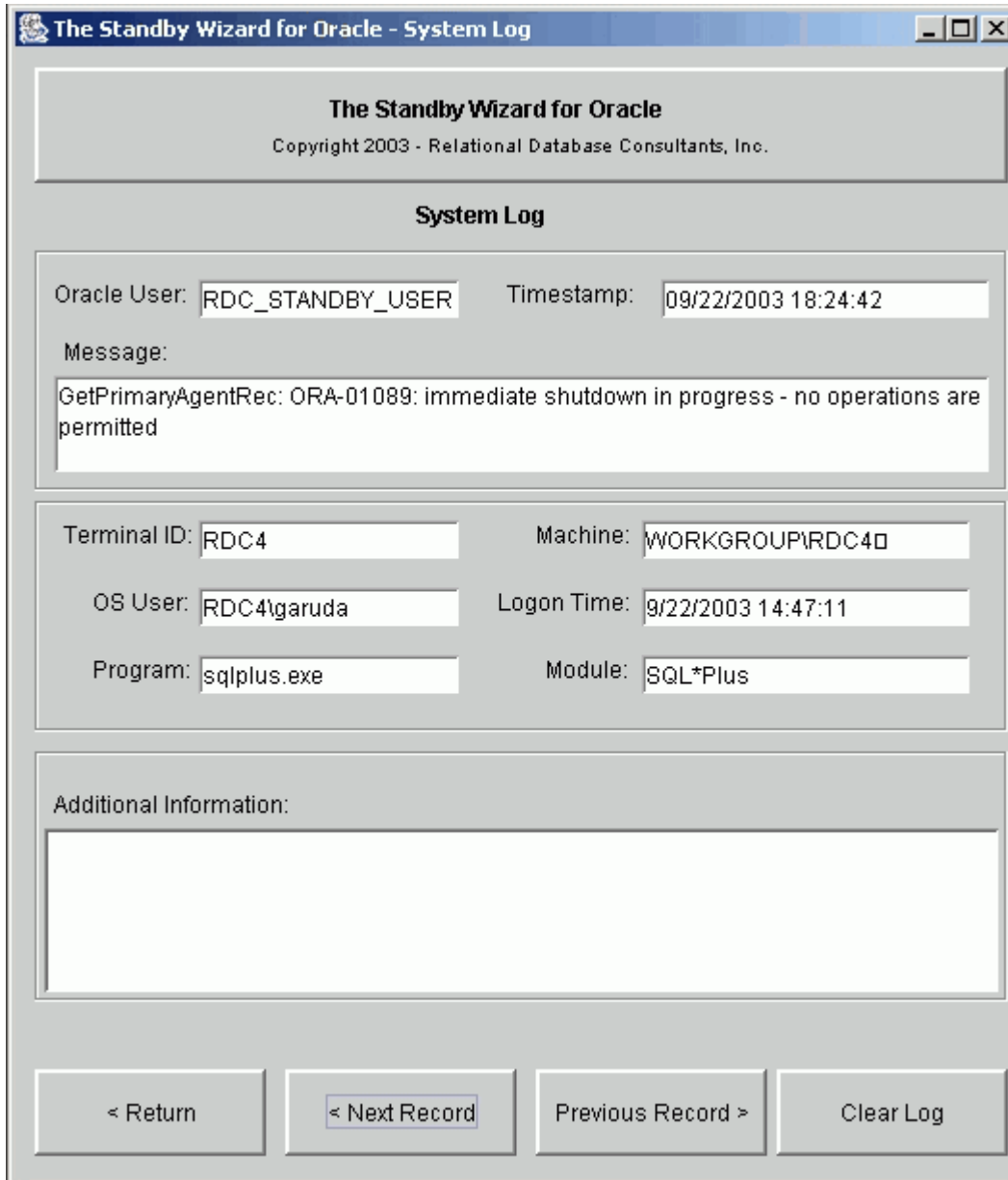
Aside from information in the System Log, the Standby Wizard creates the following files to trace even harder to find errors:

1. The Audit Log

The audit log is written to both the standby and primary working directories every few minutes to trace the status of your standby database(s). The audit log has the naming convention of *host_sid_*audit.txt.

Example of the Audit Log:

```
********************* Standby Database Status **********************

Event Message:                    Ping from primary.
Standby Host:                     rdc8
Standby SID:                      stand10
Last Contact: (Standby Time):     08/19/2008 12:51:53
Standby Archive Directory:        c:\st\a
Recovery Mode:                    Recover Always
Current Log Gap:                  0
Last Archived Log RecID:          1318
Last Archived Log Sequence#:      28
Last Recovered Log RecID:         1318
Last Recovered Log Sequence#:     28
Last Recovered Log Timestamp:     08/19/2008 12:43:10
```

2. The Error Log

The Standby Agent Error Log exists for the standby agent to report any errors that it encounters to the outside world. Remember that the standby agent exists in a read-only database and can only record its activity through Operating System files. Hopefully you will not see one of these logs for a while, they have the naming convention:

> <standby_host>_<standby sid>_error.txt

As with the Audit Log on the primary database, if synchronization is occurring we can ignore most errors that may be encountered by the standby agent.

3. The Standby Working Directory Spool Files

In the *standby working directory* there will exist a .lst file for every shell script that has been run at least once. If your mount, startup, shutdown, or recovery scripts fail you will most likely see this at the end of the Standby Wizard script output stream:

> OPEN_MODE
> ----------
> MOUNTED
>
> SQL> Spool Off
> SQL> Exit;

If this situation occurs, you will need to debug the error because synchronization between your primary host and standby database cannot occur until your standby instance is open in read-only mode. The easiest way to debug an error like this is to simply view the .lst

file extension of the script executed. If we ran the script: *rdc2_standby_startup.sh* and we received the above error, we would first look in *rdc2_standby_startup.lst* to determine the exact SQL error that was encountered by the Standby Wizard.

4. The Administration Screen Auditing Parameters

From the main menu, you can enter Administration, and edit three valuable debugging parameters:

1. **Audit Remote Procedure Calls**

    This option will audit procedure calls to your standby made via a database link. Use this option if you see all the database and archive files on the standby but can't ping the database.

2. **Audit File Copy Commands**

    If your datafiles and/or archived logs don't seem to be copying to the standby, use this option to view the exact copy commands being used.

3. **Audit All OS Commands**

    This option will audit all commands from the Standby Wizard to the Operating System.

Once you set these flags, future actions of the standby wizard will be inserted into the System Log for you to view. Turn these flags off after debugging or the System Log will grow large.

Tip:

If your troubleshooting efforts fail, you can simply attempt an incremental rebuild of your standby database. This process will copy over a new control file and will attempt to send all the logs necessary to make your standby database valid again. See Chapter 9 titled: Rebuilding Your Standby Database*, for more information.*

5. Default Standby Wizard Dump File

If the Standby Wizard experiences an Oracle error or auditing event before it can identify its own schema, the message will appear in: oracle_home\RDC$StandbyWizard.log.

6. Test Database Link to Standby Database

The Standby Wizard creates a database link between the primary database and each of its standby databases. Without this link, the primary agent cannot recover the standby database it manages. To test these links from SQL*Plus, simply run the following script, found in the client installation directory:

SQL>@rdc_standby_testlinks.sql

DB_LINK	STANDBY_HOST_NAME	STANDBY_SID
rdc8_stand10_Standby	rdc8	stand10

Chapter Nine

Rebuilding Your Standby Database.

One of the most powerful features of the Standby Wizard is its ability to perform incremental rebuilds whenever the data file structure of your primary database changes or users perform *nologging* operations. You can also use this feature if synchronization between your primary and standby databases fail and you can't figure out why - by employing the very quick incremental *rebuild* offered by the Standby Wizard.

In the past, during the life-cycle of a production database, if any user renamed, added, or dropped a data file (tablespace), all standby databases built against the modified production database were not valid until they were rebuilt.

Fortunately for the Standby Wizard user, the above scenario is a thing of the past. All you need to do when your primary database file structure changes or for some other reason your standby database becomes invalid – is to follow these two simple steps:

1. Step One - Perform a Rebuild With the Standby Database Manager

The Standby Wizard allows you to perform standby database rebuilds directly from the Standby Wizard User Interface and the Standby Database Manager. Whenever you enter the Standby Database Manager, the Standby Wizard compares the current standby database configuration to your existing primary database. If there are any changes to the data files or redo log structure, the column labeled "Rebuild?" will be marked with a "YES".

Tip:

You may also use the incremental rebuild feature to edit any data file mappings on your standby host. Although once you have edited the datafile, it will need to be copied again to the standby host. For large data files, use the "alter database rename datafile" command to avoid having to perform an incremental rebuild.

Caution:

if you add or drop any control files on your primary database, you should perform a partial rebuild with the Standby Wizard. If you do not do this, then not all control files will be automatically replaced by the Standby Wizard during graceful switchback. You will have to manually copy your control file to any locations defined after you created your initial standby database.

Before you perform any rebuild on a standby database, stop the standby agent on the standby host and make sure the standby database itself is shut down. If you rebuild a standby database that is open, the rebuild will probably fail and you will have to perform a partial or maybe even a complete rebuild all over again.

Once you have confirmed that your standby database is shutdown, you can start the rebuild process from the Standby Database Manager by clicking on the standby database

you wish to rebuild and then by clicking on the button within the "Rebuild Standby" group labeled either "Incremental" or "Complete."

If you choose to perform an *incremental rebuild*, only those data files that have changed will be copied over along with the new controlfile and any necessary redo logs. You will be guided through the Standby Wizard Creation steps 3 & 4 to allow any new mapping of your data files. Once this process is finished, click on the button labeled: "Next". Now you can start the incremental rebuild by clicking on the "Build Standby" button.

Just as with standby database creation, once you hit the button "Build Standby" you will lose screen control as the Standby Wizard re-copies the necessary data files over to the standby database and informs you of its progress.

Sometimes you may need to perform a complete rebuild. Simply answer "Yes" to the previous rebuild prompt. This will instruct the Standby Wizard to rebuild your entire standby database. A complete rebuild will take approximately the same time as standby database creation took.

A complete rebuild is necessary if your standby database is invalidated for other reasons than a modified data file or a *nologging* operation. For instance, a standby database may simply be destroyed - due to a total disk failure on the standby host. In this scenario, we would choose a complete rebuild once the standby host is running again.   It is also necessary to perform a complete rebuild - when rebuilding your *original* standby database *after* a disaster and graceful switchback.

2. Mount the Rebuilt Standby Database

After we finish an incremental or complete rebuild and the Standby Wizard recreates our standby database - we must mount the new standby database again from the standby host with the newly generated mount script located in the *standby working directory* with the naming convention of:

<standby host>_<standby sid>_mount.bat

Simply run the mount script as you did during the initial build of your standby database, either using the command-line prompt or Windows Exploerer. In the previous example our standby host was named *rdc2* and our standby sid was *standby*. Therefore we will always mount this standby with the following script as such:

>rdc2_standby_mount.bat [orapwd file password]

Once this mount is successful and the standby database is opened in read-only mode, synchronization should occur immediately between the host and the primary database supports.

Caution:

Delete any old PWD*sid*.ora files on the production OS, located in oracle_home\database, before mounting. This is due to an *oradim* error.

Chapter Ten

Creating Multiple Standby Databases From Your Primary Database

The Standby Wizard can create an unlimited number of synchronized standby databases, all receiving data from your primary host. This becomes vital if your high-availability needs are crucial. For instance, you might want to create a standby database on a machine located within your local area network for normal fail-over scenarios.

Yet, during physical disaster, you may require the ability to activate a standby database at a remote location. In this case, you would build two standby databases. Possibly, after these two standby databases were functioning, you would then build a third standby database on the primary host itself, yet located on another storage device to give you high-availability even during a complete network failure.

When you build your 2nd or Nth standby database with the Standby Wizard, there are no restrictions, aside from the already existing restrictions that apply. Remember that two standby databases cannot have the same ORACLE_SID on the same physical host. You also must have the same OS / File System / Oracle Version running on all nodes of your multiple standby database strategy.

As you go through the steps of building your standby databases, you should always define unique standby working directories for each standby database (step 2 of 4 in Standby Database Creation). This will avoid any user confusion due to the Standby Wizard scripts generated for the multiple standby databases. The Standby Wizard also enforces the rule of unique archive destinations for each standby database.

After you have successfully built your multiple standby database configurations, the Standby Wizard's primary agent on your primary database will simply communicate with more than one standby agent. The primary agent will transfer the archived redo logs from the primary database to all of your standby database's log archive destinations after any given log switch. Each standby database will recover these files on instructions from their respective *standby agents*.

Tip:

We strongly recommend that the Standby Wizard DBA first build and maintain a single standby database before attempting a multiple standby configuration.

Chapter Eleven

Emergency Fail-Over to a Standby Database (Activation)

In the event of a failure with the primary instance, the standby database must be activated before it becomes a normal database open in read-write mode. The Standby Wizard makes activation easy and gives you two avenues to activate a standby database.

1. Activation Using the Standby Wizard Scripts

This method of activation involves either a person or an application executing the standby wizard activation script from the standby stage directory that you defined in Step 2 of 4 in standby database creation. This script always has the naming convention of:

<standby host>_<standby sid>_activate.bat

In our previous examples, where the standby host is *rdc2* and our standby sid is *standby*, we would activate our standby database by double-clicking on the this script from Windows explorer or using the Windows command prompt as such:

>rdc2_standby_activate.bat

The final output of the activation script goes both to the screen and a spool file, in this case: rdc2_standby_activate.lst. This output should indicate that your standby database is now open in read-write mode and is now a fully functional Oracle instance:

```
OPEN_MODE
----------
READ WRITE

SQL> Spool Off
SQL> Exit;
```

2. Activation Using the Standby Wizard Interface

This method of activation is the easiest to perform for a live person. Simply enter the Standby Wizard User Interface main menu, but connect instead using your standby database SID and not your primary database SID. Once you connect directly to your standby database which must be started and in read-only mode, the Standby Wizard will be aware that you have connected to a standby database and you will receive the following prompt:

Activate Standby Database ☒

ⓘ **Would you like to activate this standby database?**

[**OK**]   [**Cancel**]
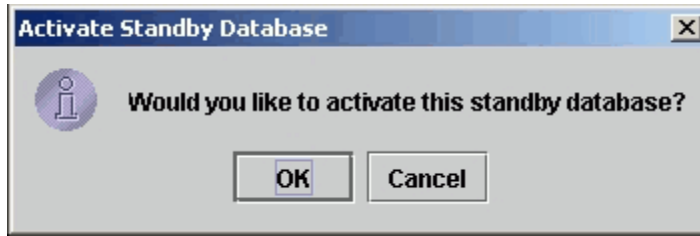
You can test for this prompt now by connecting to your standby host using the Standby Wizard User Interface - yet be aware that if you do activate your standby the following rule always applies:

Once a standby database is activated…it can never be a standby database again unless you perform a complete rebuild.

Tip:

You may have to wait for a short time to login to your standby database after a primary failure. The standby agent may be performing recovery and the database may not yet be in read-only mode which is required for a JDBC connection to Java.

Regardless of what method you use to activate your standby database, once you activate your standby database, the behavior of the network and your applications still need to be addressed. Activating a standby database only makes it a valid open database - the question as to how people, networks, or applications are going to access the new instance - is left to our constant reader.

Chapter Twelve

Graceful Switchback to the primary database

Because an activated standby database contains a copy of the Standby Wizard's schema from the primary database, the Standby Wizard already has all the necessary information needed to switch your standby database back to the primary database server after a disaster. In the Oracle world, a graceful switchback to a primary database is always accomplished by re-creating your primary database as a standby database and then mounting and activating it.

Caution!

Never perform an installation of the Standby Wizard on your activated standby database! This will wipe out your existing rdc_standby_user schema and prevent you from performing a graceful switchback to the primary host with the standby wizard.

In a switchback scenario, you will be running your Oracle applications from the standby database, maybe for a few days after a major failure at your primary site.   At some point, your primary host will be restored. Now you are ready to perform a graceful switchback and resume normal operations on your primary host.

If you are going to perform a graceful switchback using the Standby Wizard, You will need to grant the standby host Windows account that will be performing the graceful switchback, the same privileges granted to the primary host initially.

When you are ready to perform a graceful switchback, confirm that you have successfully restored your Oracle Installation, along with the init.ora file that your primary database is normally started with. If your init.ora file has a reference to the parameter *ifile,* make sure the *iifle* file mentioned is also restored and its path exists.
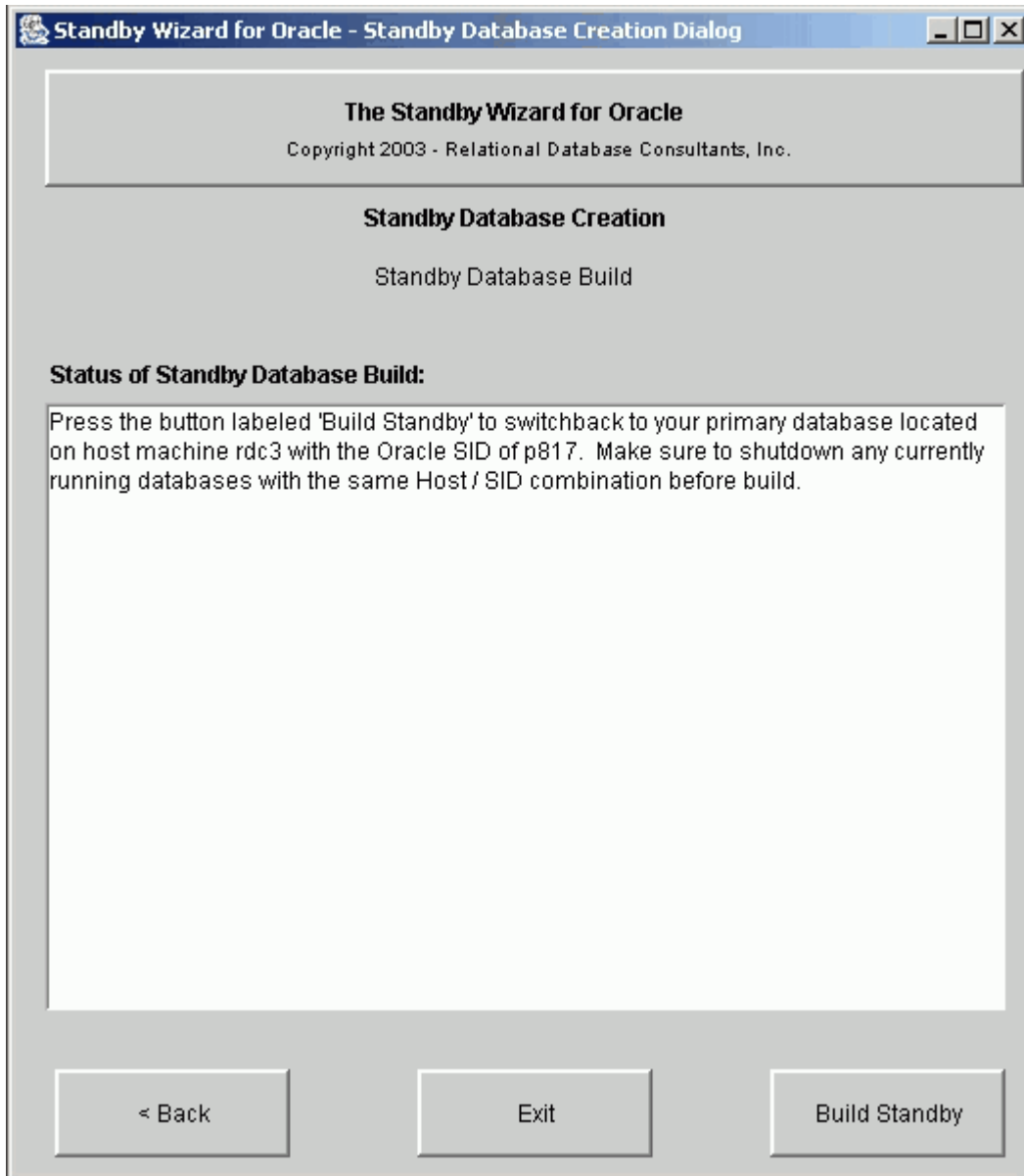
Tip:

If you don't have a valid init.ora file that was backed up before the loss of service, you can simply edit the Standby Wizard's initialization file for the new production database. The Standby Wizard init.ora file will be copied to the original primary working directory that you original defined during the switchback process.

Performing a graceful switchback, the Standby Wizard will actually create a standby database on the primary host from the currently running standby database. To accomplish this task, start the Standby Wizard User Interface and enter the main menu of the Standby Wizard. From here, click on the option labeled: "Switchback to Primary.

Once you have reviewed the information in Step One, enter the full path and file name of your original primary init.ora file (i.e. c:\oracle\ora10g\database\initprimary.ora) and then click on the button labeled "Next", and you will be transported to the data file screen.

Verify that the data mapping back to the primary host is correct and then click on the button labeled "Next" where you will enter the Data File Mapping screen. Make any optional changes to

your data files and click "Next". At this point, the Standby Wizard will inform you that you are ready to start the graceful switchback procedure:

The Standby Wizard for Oracle

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Standby Database Creation

Standby Database Build

Status of Standby Database Build:

Press the button labeled 'Build Standby' to switchback to your primary database located on host machine rdc3 with the Oracle SID of p817. Make sure to shutdown any currently running databases with the same Host / SID combination before build.

< Back   Exit   Build Standby

To start the actual switchback and transfer of data, simply click on the button labeled "Build Standby" that you initially used to build your standby database. Now the Standby Wizard will create the primary instance from scratch by transferring all of the data files back to the primary host from their current location on the standby host. This process will take approximately the same amount of time it took to initially build your Standby Database.

Tip:

If graceful switchback fails, you can always attempt the operation again once you have corrected the problem. Simply perform a complete rebuild of the primary database by running the Standby Database Manager from the standby host.

Once the graceful switchback build is finished, your primary database is ready to be started...but still, it is only standby database. The primary database needs to become an open production database again.

To transform your primary database from a standby database to an operational database you will need to run the Standby Wizard mount script now located on the primary host in the primary working directory (defined at standby database creation).

1. Starting the Mount Script on the Primary

This script will mount your primary database as a standby database.   The mount script has the naming convention:

<primary host>_<primary sid>_mount.bat

When running the mount script, specify a password for the orapwd password file as such:

> rdc2_prod_mount.bat *password*

Or simply allow the script to prompt you for this password.

After you build and mount the primary database as a standby database, you may chose to keep the database synchronized with the standby host that is now acting as a temporary production database.

 It is at this point that you can transfer and test any other applications, or prepare users for the re-connection they will need to perform when moving their work back to the primary database.

Caution:

Delete any old OraPWD files from the old primary database. They are usually located in $Oracle_Home/database directory. Oracle Version 10g's ORADIM command requires that these files be deleted.

2. Activating Your Rebuilt Production Database

Once you are ready to transform your primary database into a working production database, simply activate it, as discussed in Chapter 11**,** Emergency Fail-Over to a Standby Database

(Activation), using either the Standby Wizard User Interface or the Activation script now located in your original *primary working directory*, specified during the standby database build.

Once we have run these two scripts, the primary database is now open to the world for read/write operations . Allow for a few minutes for the new primary database's Windows service to restart the instance.

At this point, once operations are running smoothly again on our primary database, you can chose to perform a complete rebuild of your original standby database, or instead, chose to create a new standby database definition with the Standby Wizard.

Appendix A. The Standby Wizard Initialization File (init.ora file)

The Standby Wizard creates standby databases by cloning the primary database init.ora file as closely as possible. This file is always located in the *standby working directory* that you defined during standby database creation.

All parameters of your standby database init.ora file are equal to their values on the primary, aside from the following parameters that are given new values by the Standby Wizard:

1. service_names
2. instance_name
3. log_archive_dest
4. lock_name_space
5. control_files
6. db_domain

Feel free to modify the *service_names* parameter if you are using global names and Net*8 as long as the Standby SID is retained.

The following initialization parameters are removed from the init.ora file by the Standby Wizard, thus Oracle will assign them a default value:

1. Ifile
2. mts_dispatchers
3. mts_servers
4. core_dump_dest
5. backgroup_dump_dest
6. user_dump_dest
7. Audit_file_des
8. db_recovery_file_dest

You may add to the init.ora file any of these removed parameters. Be careful if you edit the *ifile* parameter, it will make the standby database dependent on another initialization file that could overwrite the first six parameters vital to your standby database's health.

You may wish to decrease the values of your performance-related initialization parameters, cloned from your primary database. This way you can limit memory usage of the Oracle SGA on your standby host. If you ever need to activate your standby database, you can increase these parameters again before you run the *activation* script.

Appendix B. Modifying the Operating System Parameters of the Standby Wizard

The Operating System parameters are contained in the package header with the file name:

rdc_standby_os.pkg

This file exists in the Installation directory of the Standby Wizard.

These parameters should not be modified unless either:

1. You need to change the command path or options of copy commands used by the Standby Wizard.

2. You would like to change the performance and/or sleep parameters of the Standby Wizard.

To change an operating system parameter of the Standby Wizard, complete the following steps:

1. Shutdown the *primary agent*.

2. Edit the parameter(s) you would like to test, paying careful attention to their datatype and length.

3. Log into SQL*Plus as *rdc_standby_user.*

3. Compile the package header rdc_standby_os.pkg without errors.

4. Start the script rdc_standby_compile.sql from SQL*Plus.

5. Test the changes on a non-production system.

Appendix C. Sample SQL*Net settings

Because the Standby Wizard uses database links to communicate with each standby database, The standby database must be listed in the *listener.ora* file on the standby host.

```
SID_LIST_LISTENER =
  (SID_LIST =
    (SID_DESC =
          (SID_NAME = PLSExtProc)
          (ORACLE_HOME = /home/oracle/ora10)
          (PROGRAM = extproc)
    )
    (SID_DESC =
          (GLOBAL_DBNAME = stand10)
          (ORACLE_HOME = /u01/oracle/ora10)
          (SID_NAME = stand10)
    )
    )

LISTENER =
  (DESCRIPTION_LIST =
    (DESCRIPTION =
      (ADDRESS = (PROTOCOL = IPC)(KEY = EXTPROC1))
      (ADDRESS = (PROTOCOL = TCP)(HOST = Remote1)(PORT = 1521))
    )
  )
```

Both the primary and standby database locations must be identified in the *tnsnames.ora* files, located on both servers: Here is an example of a standby service listing:

```
STAND10 =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP)(HOST = Remote1)(PORT = 1521))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = stand10)
    )
  )
```

Always use an alternate service name – if using the same Oracle SID for both your standby and your production databases -- make sure the tnsnames.ora file on the primary host can identify this aliased service:

```
STAND10 =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP)(HOST = Remote1)(PORT = 1521))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = production)
    )
  )
```

In both cases, Remote1 is the remote host. In the second example Stand10 is only a service alias pointing to the *production* SID on a remote machine.

Appendix D. Uninstalling the Standby Wizard

To uninstall the Standby Wizard perform the following tasks:

1.Confirm that you have stopped the primary agent and have verified that the Standby Wizard Oracle account *rdc_standby_user* is not logged into your production database. You can do this as follows:

SQL>Select Username from v$session where username = 'RDC_STANDBY_USER';

2. If you are running the Standby Wizard from a windows client, click on the Icon labeled "Database Uninstall" to drop the standby wizard user: *rdc_standby_user* and its objects from your database.

If you want to Uninstall the Standby Wizard from the command prompt, enter the following commands in the directory that contains the Standby Wizard installation:

C:\> sqlplus system/manager

SQL>@rdc_standby_uninstall.sql

2. After the database Uninstall, if you are using a Windows client - click on the "Uninstall" icon from the Standby Wizard program group to remove the Standby Wizard programs from your client machine.

Thank you for using the Standby Wizard. Please send us comments to:

swdemo@relationalwizards.com.