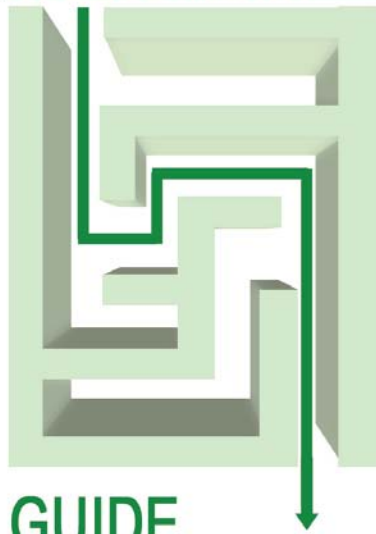


MIGRATION



**PLANNING AND MIGRATING FROM
HP-UX 11i v3 TO
THE ORACLE SOLARIS 10 OS ON THE
DELL POWEREDGE 11G SERVER
PLATFORM**



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Introduction



Dell PowerEdge R710

This Planning and Migration Guide reviews the approach that Principled Technologies (PT) and Dell, Inc. (Dell) recommend for a tested and validated migration from HP-UX 11i v3 to the Oracle Solaris™ 10 Operating System (OS). We present the ease of migration and features of the Oracle Solaris 10 OS that add functionality over HP-UX 11i v3. We used the Dell™ PowerEdge™ R710 as the server to support the Oracle Solaris 10 OS. The Dell PowerEdge R710, part of Dell's 11G Server platform, is an excellent server for upgrading critical database applications.

PT has performed hands-on testing and research and drawn on real-world experiences to document best practices and help systems administrators and database administrators simplify operations and take advantage of new features in the Oracle Solaris 10 OS and Oracle 11g R2. For our test data, we migrated a 20GB Oracle database that we generated using the DVD Store Version 2 (DS2) test tool. (For more information about DS2, see <http://www.delltechcenter.com/page/DVD+Store.>)

Scope of this Guide

This Migration Guide reviews the approach that Principled Technologies and Dell recommend for planning and migrating from HP-UX 11i v3 running on HP-RISC and HP-Itanium® platforms to the Dell PowerEdge R710 server running the Oracle Solaris 10 OS. We will demonstrate the migration by using an Oracle 11g R1 database on HP servers running HP-UX 11i v3 moving to an Oracle 11g R2 database on the Dell PowerEdge R710 server running Oracle Solaris 10. We cover detailed installation of Oracle Solaris 10 in comparison to HP-UX 11i v3 and installing Oracle 11g R2 on the Dell PowerEdge R710. We also address migrating user databases from the HP servers to the Dell PowerEdge R710.

Benefits of migrating to the Dell PowerEdge 11G Server platform

The Dell PowerEdge 11G Server platform will take full advantage of the new Intel® Nehalem-EX technologies. With twice the amount of memory capability and the ability to have up to 16 DIMMS per socket for a possible total of 64 DIMMS, this machine proves an effective replacement for more expensive, larger RISC systems. With the addition of MCA Recovery, the chips will have error-correcting capabilities to detect system errors originating in the CPU or system memory and will work with the operating system to correct them. "This should make the system more fault tolerant

and provide greater uptime,” according to Boyd Davis, General Manager of Intel server platforms marketing group at a press conference. Figure 1 shows an excerpt from Intel’s official release of the Nehalem-EX processor.¹

The Nehalem-EX Advantage

Intel Nehalem Architecture built on Intel's unique [45nm high-k metal gate technology process](#)

Up to eight cores per processor

Up to 16 threads per processor with [Intel Hyper-threading](#)

Scalability up to eight sockets via [QuickPath Interconnects](#) and greater with third-party node controllers

[QuickPath Architecture](#) with four high-bandwidth links

24 MB of shared cache

Integrated memory controllers

[Intel Turbo Boost Technology](#)

Intel scalable memory buffer and scalable memory interconnects

Up to 9x the memory bandwidth of previous generation

Support for up to 16 memory slots per processor socket

Advanced RAS capabilities including MCA Recovery

2.3 billion transistors

Figure 1. Intel’s Official Nehalem-EX Advantage press release

In addition, the newer processors and machines are more power efficient, providing better performance while consuming less energy depending on the configuration.

Features of the Oracle Solaris 10 Operating System and reasons to migrate

The Oracle Solaris 10 OS introduces a wide variety of features. While there are far too many to discuss in this Guide, the following list mentions some of the more significant ones:

Oracle Solaris DTrace. Oracle Solaris 10 provides a comprehensive view of application and operating system activity. In a single scriptable tool, Oracle Solaris DTrace allows to you to examine both kernel and user-level activity. Oracle

¹Intel Fact Sheet: Intel Previews Intel Xeon® 'Nehalem-EX' Processor

http://www.intel.com/pressroom/archive/releases/2009/20090526_comp.htm

Solaris DTrace is designed to run on live production servers with often negligible impact on performance. Per Sun's documentation, for disabled probes, there is no performance impact at all.

Oracle Solaris Containers. Oracle Solaris 10 provides operating system-level virtualization. Oracle Solaris Containers combine the isolation of Solaris Zones with resource controls.

Oracle Solaris ZFS. Oracle Solaris 10 combines enormous storage capacity, snapshots, integrity checking and repair, volume management, built-in copy-on-write support, and an integrated redundancy capability, RAID-Z.

Predictive Self Healing. Oracle Solaris 10 can diagnose and help you recover from many hardware and software problems. The Oracle Solaris Fault Manager can automatically detect many hardware problems, while the Oracle Solaris Service Manager gives administrators a uniform interface for managing application services.

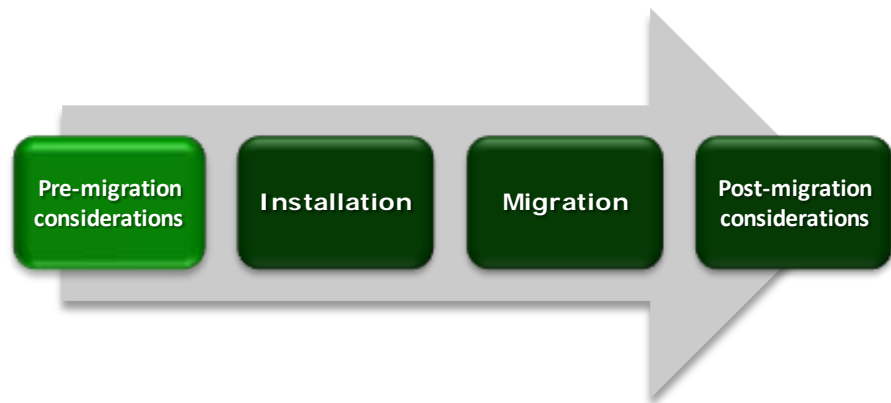
Oracle Solaris Trusted Extensions. Oracle Solaris 10 includes security capabilities that were formerly available only in the Trusted Solaris product. These allow you to combine mandatory access control with fine-grained control of user privileges. (Trusted Extensions for Mandatory Access Controls is not needed. This feature is in base Oracle Solaris 10.)

Service Management Facility. A replacement for UNIX init.d scripts, the Service Management Facility gives administrators a single interface for managing software services. Among the features it provides is the ability to limit the privileges available to a service, thus allowing non-root users to do more tasks.

Fault Management Architecture. Oracle Solaris 10 provides automated diagnosis of hardware and can take proactive measures to correct hardware faults it may find on the system. Features include the ability to offline memory pages or take a faulty CPU offline, if the agent deems it necessary.

Administration. Although HP-UX 11i v3 is a very robust operating system, we found navigating and administrating the Oracle Solaris 10 operating system to be much more user-friendly, therefore reducing time spent administrating the system and setting up any peripherals. Specific driver limitations and availability for HP-UX 11i v3 make it difficult to add any peripherals.

Planning the migration



This section reviews some of the topics you should consider prior to migrating your platform and any applications.

Considerations for moving your applications

Java-based applications

These applications should run as is in the new Oracle Solaris environment. Sun developed the original Java language in the 1990s and has maintained a strong commitment to Java ever since. Because Java applications run in a Java Virtual Machine, they are largely machine-independent.

A note about application data

You should never simply copy the raw data files from one system to another system of a different architecture. The data formats that applications write to disk are not generally portable. Bit orders, padding, and alignment are examples of elements that can differ as you move from one system to another. Most applications, however, provide some ability to back up or export data to portable formats. The restore/import process on the target system is likely to resolve any issues with the data layout.

Big-endian, little-endian

The x86 platform is little-endian for Oracle Solaris 10, while the HP-UX 11i v3 system is big-endian. In our example, we address this with the export/import of the Oracle tablespaces and data files.

Application availability

Numerous applications are available that will work right out of the box with Oracle Solaris 10. On the x86/x64 platform alone, there are already close to 8,000 applications available and close to 9,400

for the SPARC platform.² The total number of applications for both platforms is 11,120. (Applications that are available on both platforms are only counted once.)



NOTE: Using Oracle Solaris Containers, you can launch and run many applications intended to run for Linux on Oracle Solaris 10 with little or no adjustments needed. This will open up more application possibilities and assist in licensing and cost savings.

Considerations for moving platforms

Power consumption

One benefit of moving from the HP-UX RISC and Itanium servers to the new Dell PowerEdge 11G Server platform is power consumption. Depending on the configuration, less power should be consumed because of the energy efficiency. Comparing consistent power will demonstrate a unit with better performance.

Differences in operating systems

In addition to the ease of administration, the following should be noted:

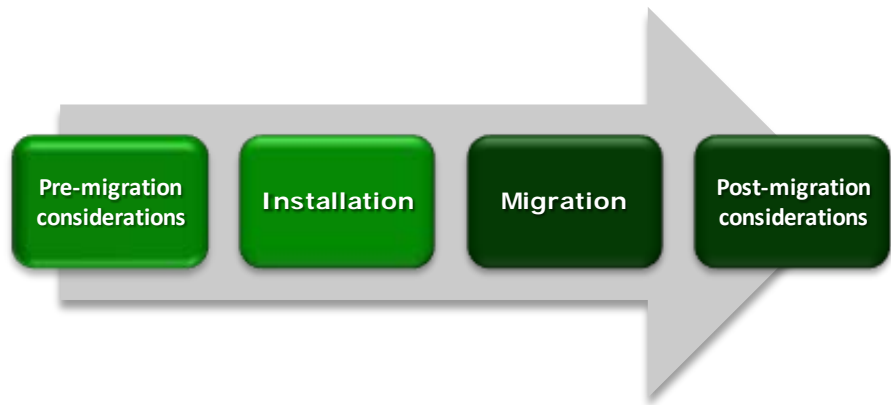
- During the setup, you will discover that key operating system files are stored in different locations.
 - Applications are installed in the /var or /opt directories on Oracle Solaris 10 instead of the /home directory as in HP-UX 11i v3.
 - User default home directories are also placed in the /export/home directory (Oracle Solaris) instead of the /home directory (HP-UX 11i v3).
- A lot of the basic Unix commands are the same, (i.e. – useradd, usermod, ls,...) but the command for stopping and starting services, for example, is very different. In Oracle Solaris 10, you can control services using the `svcadm` command for management. In HP-UX 11i v3, you would need to know the service and navigate to the /sbin/int.d or /etc/int.d directories to stop or start the service, and would need to modify configuration files in the /etc/rc.config.d/ directory to make permanent changes. Table 1 lists several command differences. More can be obtained from the following link: <http://bhami.com/rosetta.html>

² Oracle Solaris 10 Applications Library – BigAdmin System Administration Portal. <http://www.sun.com/bigadmin/apps/>

	<u>HP-UX</u>	<u>Oracle Solaris 10</u>
List hardware configuration	ioscan	prtconf -v
Read a disk label	diskinfo	prtvtoc
Disk partition	Lvcreate, sam	format
Check swap space	swapinfo	swap -s, swap -l
Show installed software	swlist	pkginfo
Add software	swinstall	pkgadd

Table 1. Command Reference.

Installing and setting up Oracle Solaris 10 and Oracle 11g R2 in this environment



In this section, we focus on installing Oracle Solaris 10 and setting up Oracle 11g R2 on the Dell PowerEdge R710 server. We begin by defining our environment. Next, we present an overview of the steps we took to configure the Dell EqualLogic™ Storage Array and to install and configure both Oracle Solaris 10 and Oracle 11g R2.

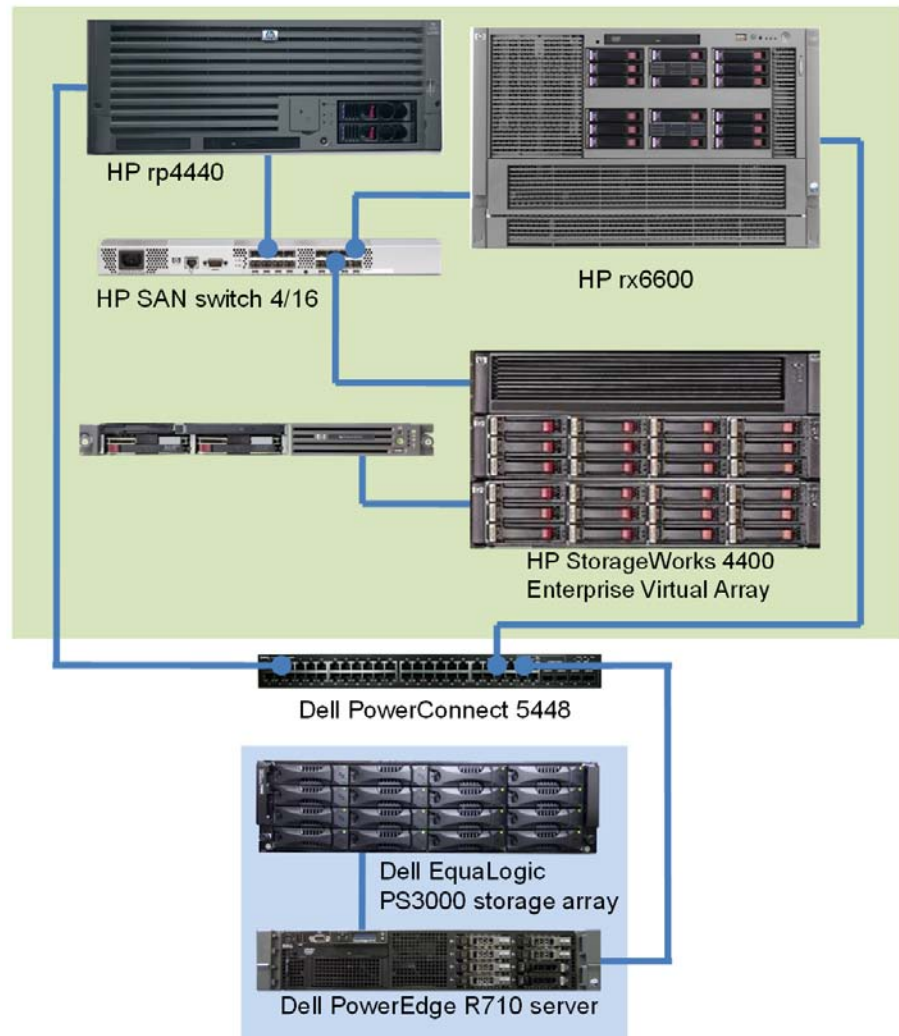


Figure 2. The setup we used in our hands-on testing and research for this Migration Guide.

Defining our environment

Our test bed starting point consisted of an HP rp4440-RISC server running HP-UX 11i v3 and Oracle 11g R1. We also used an HP rx6600 Itanium server running HP-UX 11i v3 and Oracle 11g R1. Both are connected to an HP StorageWorks EVA4400 storage array. Our destination server was a Dell PowerEdge R710 running Oracle Solaris 10 Operating System and Oracle 11g R2 Enterprise Edition Release for Oracle Solaris 10. We connected all components via a gigabit switch. Figure 2 illustrates our setup.

Figures 3 and 4 present the hardware and software we used in our Oracle 11g database servers.

Server	Processor	Memory	Disk
HP 9000 rp4440 (RISC database server)	2 x PA-8900 1.00 GHz	64 GB	2 x Seagate® Ultra320, 15K SCSI, 73 GB
HP Integrity rx6600 (Itanium database server)	2 x Intel Itanium 1.6 GHz	64 GB	2 x Seagate SAS, 10K SCSI, 72 GB
Dell PowerEdge R710 (migration database server)	2 x 4-Core Intel Xeon® 5500	64 GB	6 x Fujitsu® SAS, 10K RPM, 73 GB

Figure 3. Servers we used in our hands-on testing and research for this Guide.

Server	Server operating system	Oracle version
HP 9000 rp4440 (RISC database server)	HP-UX 11i v3 operating system	Oracle 11g R1 Enterprise Edition 11.1.0.6.0 for HP-UX PA-RISC systems (64-bit)
HP Integrity rx6600 (Itanium database server)	HP-UX 11i v3 operating system	Oracle 11g R1 Enterprise Edition 11.1.0.6.0 for HP-UX Itanium systems (64-bit)
Dell PowerEdge R710 (migration database server)	Oracle Solaris 10 10/09 operating system	Oracle11g R2 Enterprise Edition Release 11.2.0.1.0 for Oracle Solaris 10 OS

Figure 4. Software we used in our hands-on testing and research for this Guide.



BEST PRACTICE: Use the latest tested and validated software, firmware, and driver versions for NICs, storage arrays, and other components. You can find these software components at <http://support.dell.com/support/downloads/index.aspx?c=us&l=en&s=gen>.

Configuring the Dell EqualLogic Array

Overview

Oracle 11g R2's Automatic Storage Management, or ASM, relieves administrators of much of the responsibility for allocating and managing the storage. ([Appendix A provides more detail.](#))

We added a Dell EqualLogic PS3000 Disk Array to our configuration. We configured it as RAID 0 and created a single volume for our test. Figure 5 shows server layout.



NOTE: Plan on at least 45 minutes for drive configuration.

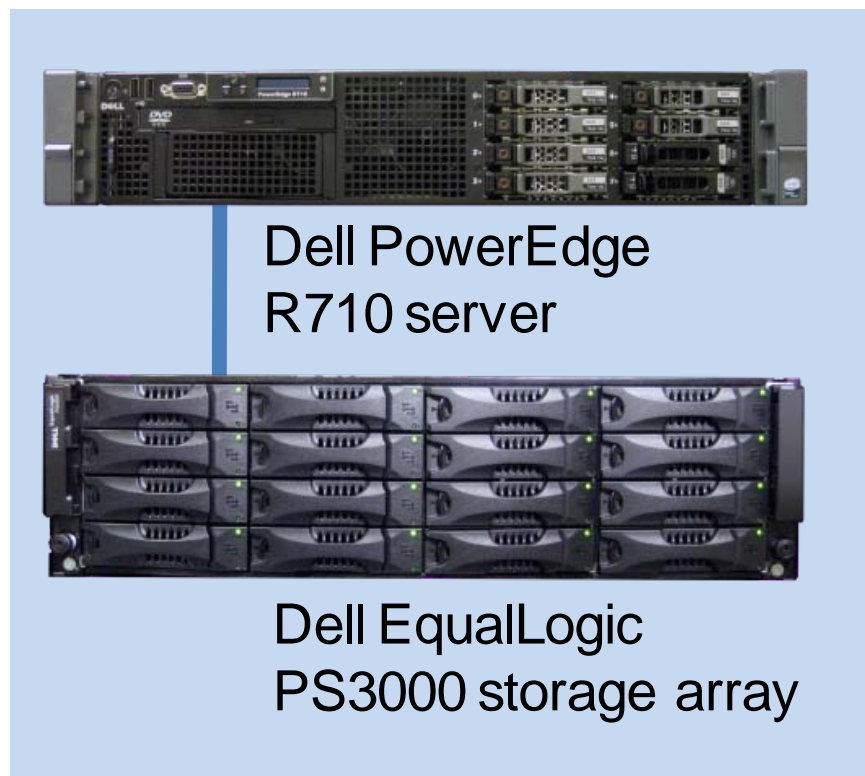


Figure 5. The server and storage configuration we used for this Guide.



NOTE: Oracle recommends that you allocate an amount of swap space equal to three-quarters of the RAM for servers with more than 8 GB of RAM. In our case, that was 48 GB.

Installing Oracle Solaris 10

This section provides an overview of the operating system installation process. We include approximate wait times for each step. ([Appendix B](#) provides complete, detailed installation instructions.)

NOTE: Plan on at least 40 minutes for installing Oracle Solaris 10 on the Dell PowerEdge R710 server. Each step below takes at least 1 minute. We provide the approximate amount of time each step takes in parentheses. These times exclude data entry time.

1. Insert an Oracle Solaris 10 DVD into the DVD drive, and reboot the system.
2. Select English as the language, and respond to the tests for screen legibility. These tests time out after 30 seconds, at which point Oracle Solaris 10 reverts to a command-line installation. Then, configure your network information, as well as time and date, as shown in Figure 6.

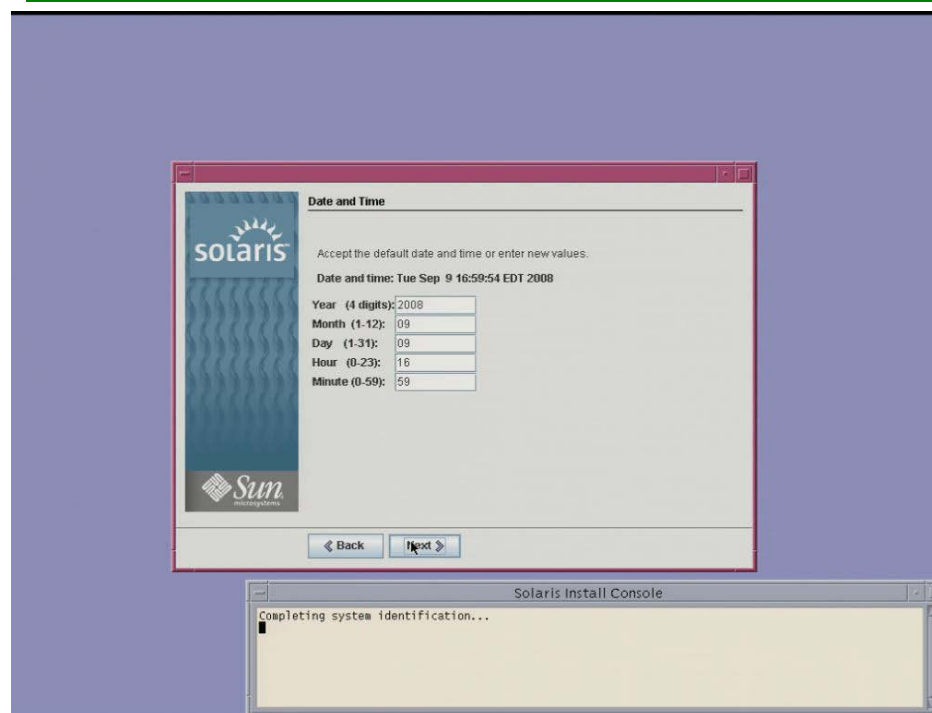


Figure 6. Confirming time and date.

3. Set the root password, and verify and confirm all your information. Accept the license agreement, and choose to perform an initial, custom install. Select the character set and products you want to install.
4. Select and customize your disk layout. When you are done, you should see a screen similar to Figure 7. Review your information, and click Install Now to start the installation.

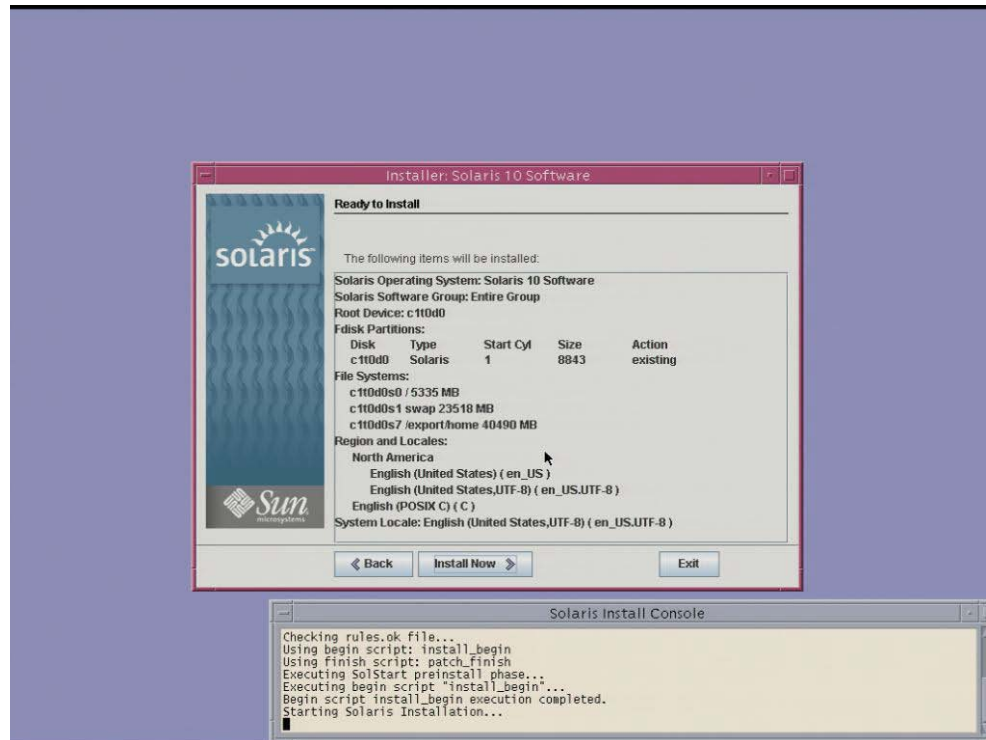


Figure 7. Ready to install.

5. When the system reboots, remember to eject the disk. Otherwise, Oracle Solaris 10 will try to install itself again.
6. After the system finishes booting, log on as root, and select your desktop.



BEST PRACTICE: Configure all database servers with static IP addresses. Doing so assures that Oracle resources remain available even in the event of a DHCP server failure. It also increases the stability of your networking and DNS environments.

Installing Oracle Solaris 10 patches

For new Oracle Solaris 10 installations, refer to the following Installing Oracle Solaris Recommended Patch Clusters section. If not, or if you need to install a specific patch, please refer to the Installing specific Oracle Solaris patches section below.



NOTE: In order to access these patches, you will need to have a valid support contract.

Installing Oracle Solaris recommended patch clusters

1. Go to the Patch Cluster & Patch Bundle download page of the SunSolve webpage (<http://sunsolve.sun.com/show.do?target=patches/patch-access>)
2. Maximize Recommended Patch Clusters, and select Download for the Oracle Solaris 10 on x86 Recommended Patch Cluster.
3. While the patch cluster is downloading, refer to the README file for the patch cluster.
4. After downloading the patch cluster, type `unzip -q 10_x86_Recommended .zip` to unzip it.
5. Type `init s` in the system console to change Oracle Solaris to single user mode.
6. Type `./install_cluster` to install the Recommended Patch Cluster. There may be patch failures during installation. Return codes 2 and 8 are common and can be ignored. For other errors, refer to the README file.

Installing specific Oracle Solaris patches

1. Go to the Oracle Solaris SunSolve Patches and Updates webpage (<http://sunsolve.sun.com/show.do?target=patchpage>).
2. After the patch has downloaded, type `unzip patchfile.zip`, replacing `patchfile` with the name of the patch you downloaded.
3. Once the patch has unzipped, type `patchadd patchfile` to install the patch to your server, replacing `patchfile` with the fully qualified path to the patch directory.

In comparison, loading patches on HP-UX 11i v3 required downloading tar files, expanding them, and creating a depot in order to run the `swinstall` utility to install the patches from the depot.

Oracle pre-installation and installation tasks

Before you can install Oracle, you must first perform a number of preliminary tasks. For further details, see *Oracle Database Installation Guide 11g Release 2 (11.2) for Oracle Solaris Operating System (x86-64)*, Chapter 2: Preinstallation tasks, at http://download.oracle.com/docs/cd/E11882_01/install.112/e10848/pre_install.htm#BABFDGHJ. Please see [Appendix C](#) for detailed instructions on preparing the system for an Oracle installation. For detailed instructions on installing Oracle 11g R2 on Oracle Solaris 10, please see [Appendix D](#).

Migrating your data using Transportable Tables and Data Pump

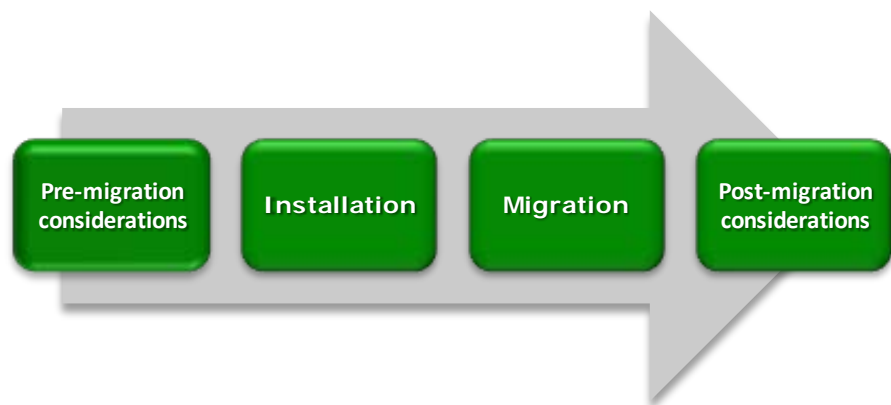
We provide detailed migration instructions for using transportable tables in [Appendix E](#). In most cases, the best practice is to convert the datafiles on the source system. In our case, the x86-64-bit format conversion was unavailable on the source system and the datafile conversion was performed on the destination system.

We migrated 1 GB of data we generated using the DVD Store Version 2 (DS2) test tool. For more information about DS2, see <http://www.delltechcenter.com/page/DVD+Store>.



NOTE: Oracle refers to the user data and its associated metadata as a schema. We use that term where appropriate.

Post-migration considerations



After you have completed your side-by-side migration, you will typically need to perform some additional tasks. Your specific list of post-migration tasks will depend heavily on your pre-migration research and planning. In this section, we briefly discuss a few of the most common tasks, but this list is not comprehensive. For

more information, see

http://download.oracle.com/docs/cd/E11882_01/server.112/e10819/afterup.htm#i1008954.

Please see [Appendix F](#) more detailed information.

Summing up

Moving to Oracle Solaris 10 on a Dell PowerEdge 11G Server platform server from HP-UX 11i v3 running either RA_RISC or Itanium can be accomplished with minimal effort considering the size of application and databases. The hardware and operating system are fairly easy to configure, and, with proper planning, migrating applications and/or data will be straightforward. As this Guide has explained, the process of deploying these products on a Dell PowerEdge R710 Server and the demonstration of migrating your Oracle 11g database to the new environment is relatively straightforward; you can perform a basic installation and migration in less than a day. Spending some up-front time planning can help you avoid potential problems during your migration.

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Appendix A. Methodology: Configuring the Dell EqualLogic Array

Allow at least 15 minutes to prepare the disks.

1. Set up the Dell EqualLogic PS3000 to accept any connection.
 - a. Open admin console.
 - b. Expand Volume header in left pane, and click desired volume name.
 - c. Double-click volume name in the window on the right.
 - d. Uncheck all boxes, and press OK.
2. Copy down iSCSI target information from the Dell EqualLogic PS3000.
3. Type the following command at the command line prompt to set up iSCSI discovery: `iscsiadm add discovery-address [ipaddress]`
4. Set the iSCSI discovery to static mode: `iscsiadm modify discovery --static enable`
5. Create an iSCSI device link for the local system: `devfsadm -i iscsi`
6. Add the static discovery target information using iSCSI target information from storage array:
`iscsiadm add static-config iqn.2001-05.com.equallogic:0-8a0906-074329302-b53000000b4b201-vol1,10.80.128.105:3260`

Appendix B. Methodology: Installing Oracle Solaris 10 on the Dell PowerEdge R710

Install Oracle Solaris 10 by following these steps. We provide approximate times for each group of steps in the first step of that group.

Allow at least 60 minutes to complete the installation. We used the Oracle Solaris 10 10/09 Operating System , which we downloaded from the [Oracle Web site](#) and burned to a DVD.



NOTE: In this appendix, we use the primary network interface name, which in our case was bnx0. You should use the name of the primary network interface that you encounter, which may differ slightly from what we present here.

1. Reboot, and wait for the GNU GRUB boot screen to appear. (1 minute)
2. At the next menu, select menu item 1, Solaris interactive (default). This is the default and the system automatically uses it after 30 seconds. The system then continues its initialization.
3. The Solaris 10 install DVD will configure the NICs at this point. Then, it sets up Java and does other initialization. (7 minutes)
4. At the Configure Keyboard Layout Screen, select US-English. This is the default, and there is no timeout. Press function key 2 (F2) to continue.
5. When “Starting Solaris Interactive (graphical user interface) Installation” appears onscreen, press Enter.
6. When the “If the screen is legible, press ENTER in this window screen” appears, move the mouse inside the box, and press Enter. You have 30 seconds, after which the system reverts to a command-line based install.
7. At the “Select a Language” prompt, choose language for installation, and press Enter. After this, a Please Wait While the System Information is Loaded screen appears. (less than 1 minute)
8. After a few seconds, a Welcome message appears. Click Next.



NOTE: A Solaris Install Console message screen appears during many of these steps. It presents messages, but you do not interact with it.

9. On the Configure Multiple Network Interfaces screen, select bnx0, and click Next.
10. On the DHCP for bnx0 screen, accept the default of No. The default agrees with the best practice of using hard-coded addresses for database servers. Click Next.
11. On the Host Name for bnx0 screen, enter a valid name for the interface. **DO NOT use any upper-case letters. An upper-case or mixed-case host name can cause the installation to fail.** Click Next.
12. On the IP Address for bnx0 screen, enter a valid IP address, and click Next.
13. On the Netmask for bnx0 screen, enter the correct netmask for your network. The default is 255.255.255.0, which may not be correct for you. Click Next.
14. On the IPv6 for bnx0 screen, accept the default of No, and click Next.
15. On the Set the Default Route for bnx0 screen, select Specify One, and click Next.
16. On the Set the Default Route for bnx0 screen, fill in the appropriate address for your network, and click Next.
17. For the remaining network interfaces, specify the network information as you did for the primary interface. This may be similar or different from the primary interface information, depending on your situation. (In our case, only the IP addresses differed.) Click Next.
18. On the Kerberos screen, accept the default of No. Click Next.



NOTE: Because this choice affects network security, check with your administrator regarding this setting.

19. On the Name Service screen, select None. Because you have to enable your NICs later, you will add your DNS information then as well. Click Next.
20. On the NFSv4 Domain Name screen, accept the default of Use the NFSv4 domain derived by the system, and click Next.
21. On the Time Zone screen, accept the default of Geographic Continent/Country/Region, and click Next.

22. On the Continent and Country screen, select Country and Time zone of installation, and click Next.
23. On the Date and Time screen, accept the date and time displayed, and click Next.
24. On the Root Password screen, enter the root password for your server, confirm it, and click Next.
25. On the Enabling Remote Services screen, accept the default of Yes, and click Next.



BEST PRACTICE: Oracle recommends that you choose “NO” for enabling Remote Services and to check with your Network Administrator for options regarding this section.

26. On the Confirm Information screen, verify that all the information for your interfaces is correct. Resize the window to view all the information if necessary. Click Confirm. The following message appears onscreen: Please wait while the system is configured with these settings.
27. The dialog disappears and the screen is blank for a few seconds before a Welcome screen appears. On the Welcome screen, click Next.
28. On the Installer Options screen, accept the default of Yes for Reboot automatically after software installation? and Eject additional CDs/DVDs automatically after software installation? Click Next.



NOTE: We received a notice saying You must also manually eject the CD/DVD or select a different boot device after reboot to avoid repeating the installation process. We clicked OK.

29. On the Specify Media Screen, accept the default of CD/DVD, and click Next.
30. On the License screen, select Accept to accept the license agreement, and click Next.
31. On the Select Upgrade or Initial Install screen, select Initial Install, and click Next.
32. On the Select Type of Install screen, select Custom Install, and click Next.
33. On the Select Software Localizations screen, select North America (or the appropriate selection for your location), and click Next.

34. On the Select System Locale screen, select English (United States, UTF-8) (en_US.UTF-8) (or the appropriate language), and click Next.
35. On the Additional Products Screen, select None, and click Next.
36. On the Select Oracle Solaris Software Group screen, select Default Packages Entire Group, and click Next.
37. On the Disk Selection screen, accept the default, and click Next.



NOTE: In our case, the default was c0t0d0, which we use in the examples below.

38. On the Select Disks for fdisk Partition Customization screen, select c1t0d0, and click Next.
39. On the Customize fdisk Partitions – Disk c0t0d0 screen, accept the default, and click Next.
40. On the Preserve Data screen, select No.
41. On the Layout File Systems screen, click Modify.
42. On the Disk c0t0d0 screen, increase the swap to Oracle's recommended level, and click Apply. Oracle recommends three-quarters of RAM for systems with more than 8 GB of RAM. Since our server had 64 GB of RAM, we allocated 48 GB. We took the space from /export/home. Click OK to exit the layout File systems screen. Click Next to continue.
43. On the Ready to Install screen, review the information, and click Install Now. (40 minutes)
44. The Installing... screen appears, with a progress bar. After the installation completes, the system pauses for 90 seconds. You can skip the pause by clicking Continue in the Pausing dialog box.
45. After installing any additional software, the system again pauses, this time for 30 seconds. You can skip the pause by clicking Continue in the Pausing dialog box.
46. Before rebooting, the system pauses for 90 seconds. You can skip the pause by clicking Continue in the Pausing dialog box.



NOTE: Remember to eject the DVD during the reboot, or Oracle Solaris 10 will start installing itself again.

47. After the system has booted, log in as root.

48.Select your desktop. We accepted the default of Java Desktop System Release 3.

49.On the Welcome to the Java Desktop System splash screen, click Close.

Appendix C. Methodology: Pre-Installing Oracle 11g R2 on the Dell PowerEdge R710

Oracle pre-installation tasks

Before you can install Oracle 11g, you must first perform a number of preliminary tasks. For further details, see *Oracle® Database Installation Guide 11g Release 2 (11.2) for Oracle Solaris Operating System (x86-64)*, Chapter 2 Preinstallation tasks at http://download.oracle.com/docs/cd/E11882_01/install.112/e10848/pre_install.htm#BABFDGHJ. Please note that our server met many of the prerequisites for installing Oracle 11g R2, so we do not discuss checking those prerequisites here. The Oracle document we cite above covers this topic in detail.

Allow at least 30 minutes to complete the preparation.

1. Log in as root.
2. The server needs to display X applications. To work locally, you can use the command `xhost local`:
3. Verify that networking is set up correctly, using the following set of commands:
 - `cat /etc/nsswitch.conf | grep hosts` The output should contain an entry for files.
 - `hostname` should list a hostname for this system.
 - `domainname` should not return any results.
 - `cat /etc/hosts | grep <hostname>` should have an entry for the fully qualified host name.



NOTE: If you install Oracle on a system using DHCP or on a multihomed system, you will need to take additional steps. Please see the Oracle 11g R2 Preinstallation tasks document for further details.

4. Create the Oracle inventory group with this command: `/usr/sbin/groupadd oinstall`
5. Create the Oracle dba group with this command: `/usr/sbin/groupadd dba`
6. Create the Oracle software owner user with this command: `/usr/sbin/useradd -g oinstall -G dba oracle`
7. Set the password of the Oracle user with this command: `passwd -r files oracle`

8. The command prompts you for the new password.
9. Create and set the home directory of the Oracle user with these commands:
 - `mkdir /u01/oracle`
 - `chown -R oracle:oinstall /u01/oracle`
 - `chmod -R 775 /u01/oracle`
 - `usermod -d /u01/oracle oracle`
10. Oracle requires that the nobody account exist. In our installation, Oracle Solaris 10 created it by default. You can verify the account exists with this command:
`id nobody`
11. Because this is a fresh install, we would not expect an Oracle project to exist. Create one with this command: `projadd -U oracle user.oracle`
12. Verify the Oracle user's project ID with this command: `id -p oracle`
You should see output of the form `uid=100(oracle) gid=100(oinstall) projid=100(user.oracle)`.
13. You now need to set the kernel parameters. Type `projmod`. See the Oracle documentation for a fuller explanation. You will use the `projmod` command instead of the `prctl` command because you want the changes to persist across reboots.
14. Increase the amount of shared memory available to the Oracle user.



NOTE: We found that `dbca`, when creating a database, would, by default, attempt to obtain 40 percent of RAM, so to be safe we gave the project a maximum shared memory segment size of 50 percent of RAM.) Use this command to do that:

```
projmod -s -K "project.max-shm-memory=(priv,32gb,deny)" user.oracle
```

15. Create the Oracle 11g *base* directory with these commands:

- `mkdir -p /u01/app/oracle`
- `chown -R oracle:oinstall /u01/app/oracle`
- `chmod -R 775 /u01/app/oracle`

16. Using a text editor, create the file `.profile` in `/u01/oracle`. Type the following lines, and save the file:
 - `umask 022`

- `DISPLAY=:0.0`
- `export DISPLAY`

17. Give the Oracle user ownership of the file with these commands:

- `chown -R oracle:oinstall /export/home/oracle/.profile`
- `chmod -R 770 /export/home/oracle/.profile`

Preparing disks for Automatic Storage Management

Allow at least 15 minutes to prepare the disks.

1. Type `format` at the command line prompt, and select 1. If you configured the drives as described in section [Appendix A](#), you will see four choices. The operating system will be on choice 0, so configure only the disk that was added using iSCSI.
2. Type `fdisk` to create the Oracle Solaris 10 partition.
3. Type `partition` and type `print` to see the partition table. Slice 2 will contain the entire drive. Do not modify slice 2, as this can destroy the partition table on your drive. However, look at its entry to get the number of cylinders on the disk. (In our case, it was 8,840.)
4. You will be updating partition 6, so type 6, and press Enter.
5. Accept the default of unassigned for the id tag.
6. Accept the default of `wm` for the permission flags.
7. Type 1 for the starting cylinder. Never start at cylinder 0, as you would overwrite the partition table.
8. Type `8840c`, and take all the space on the disk except for cylinder 0.
9. Type `label` to make the partition table changes permanent. When prompted, type `y`.
10. For ASM, Oracle must own the candidate drives. To give Oracle ownership, use these commands:
 - `chown oracle:dba /dev/rdisk/c1t1d0s6`
 - `chmod 660 /dev/rdisk/c1t1d0s6`
 - `chown -h oracle:dba /dev/rdisk/c1t1d0s6`

Appendix D. Methodology: Installing Oracle 11g R2 on the Dell PowerEdge R710 running Oracle Solaris 10

We downloaded Oracle 11g R2 from <http://www.oracle.com/technology/software/products/database/index.html>. We copied the solaris.x64_11gR2_grid.zip file to the Dell PowerEdge R710, and unzipped it locally by right-clicking the file and choosing Extract Here.

Allow at least 20 minutes to set up Oracle Grid Infrastructure.

1. In a terminal window, run the command `xhost [hostname]`, replacing `[hostname]` with the fully qualified domain name of your server.
2. Use the command `su oracle` to become the Oracle user. You cannot run the Oracle Universal Installer when logged in as root.
3. From the Oracle user's home directory, type `./profile` to set up your environment. The `./` (dot-space-dot-slash) is necessary.
4. Change your directory to the top level directory of the Oracle distribution you unzipped.
5. Type `./runInstaller`. The name is case sensitive and the leading `./` is required.
6. On the Select Installation Option screen, select Install and Configure Grid Infrastructure for a Standalone Server, and click Next.
7. On the Select Product Languages screen, leave the default of English, and click Next.
8. On the Create ASM Disk Group screen, leave the default name of DATA, select External redundancy, select your configured drives, and click Next.
9. On the Specify ASM Password screen, select Use same passwords for these accounts, put a password in the Specify Password and Confirm Password fields, and click Next.
10. On the Privileged Operating System Groups screen, select the groups for ASM access, and click Next (for simplicity, we changed the groups to dba. Ask your administrator before setting your groups to dba).
11. On the Specify Installation Location screen, leave the defaults, and click Next.
12. On the Create Inventory screen, leave the defaults, and click Next.
13. On the Summary screen, click Finish to start the installation.

14. After the installation is complete, follow the instructions on screen to run the two install scripts as root.
15. On the Finish screen, click Close to finish the installation.

Installing Oracle Database

We downloaded Oracle 11g R2 from <http://www.oracle.com/technology/software/products/database/index.html>. We copied the solaris.x64_11gR2_database_1of2.zip and solaris.x64_11gR2_database_2of2.zip files to the Dell PowerEdge R710, and unzipped it locally by right-clicking the files and choosing Extract Here.

Allow at least 30 minutes to complete the Oracle Database installation.

1. After the Oracle Grid Infrastructure install, change your directory to the top level directory of the Oracle distribution you unzipped.
2. Type `./runInstaller`. The name is case sensitive and the leading `./` is required.
3. On the Configure Security Updates screen, enter your Oracle username and password, and click Next.
4. On the Select Installation Method screen, select Install database software only.
5. On the Select Product Languages screen, click Next.
6. In the Select Installation Type screen, accept the default, Enterprise Edition, and click Next.
7. On the Specify Installation Location screen, accept the default, and click Next.



NOTE: On the Product-Specific Prerequisite Checks screen, you might see one warning. Some of the kernel settings we specified earlier were above, rather than at, the values Oracle expected. If you receive this warning, you can ignore it.

8. On the Create Inventory screen, accept the default, and click Next.
9. On the Privileged Operating System Groups screen, accept the default, and click Next.
10. On the Summary screen, review your settings, and click Install. The Install screen, which shows a progress bar, appears. (15 minutes)

- 11.**When the progress bar completes, Oracle asks you to run two scripts as root. Open a terminal by right-clicking the desktop and selecting Open Terminal. You can cut and paste the paths to the scripts into the command line terminal.
- 12.**The first script is `orainstRoot.sh`. You only see this script the first time you install Oracle on a system. Should you need to reinstall Oracle, you will not run it again.
- 13.**The second script is `root.sh`. It asks you to type in the name of the local bin directory, which is `/usr/bin`. Before this script completes, it starts the CSS service. Once you see the message Oracle CSS service is installed and running under `init(1M)`, you may close the terminal Window.
- 14.**In the Execute Configuration scripts dialog, click OK.
- 15.**Next, the Configuration Assistants screen appears. The three assistants should start successfully, and you will automatically advance to the next screen.
- 16.**On the End of Installation screen, click Exit, and click Yes to confirm that you really want to exit.

Creating an empty database

Allow at least 45 minutes to create the database.

- 1.** After exiting, set the `ORACLE_HOME` environment variable. (In our case, the correct command was `ORACLE_HOME=/u01/oracle/oracle/product/11.2.0/dbhome_1; export ORACLE_HOME`)
- 2.** Set your `PATH` variable by typing `PATH=$ORACLE_HOME/bin:$PATH`
- 1.** Type `dbca` to launch the Database Configuration Assistant.
- 2.** When the Database Configuration Assistant: Welcome screen appears, click Next.
- 3.** On the Database Configuration Assistant, step 1 of 12: Operations screen, select Create a Database, and click Next.
- 4.** On the Database Configuration Assistant, step 2 of 12: Database Templates screen, select Custom Database, and click Next.
- 5.** On the Database Configuration Assistant, step 3 of 12: Database Identification screen, enter the Global Database Name. By default, Oracle uses this name for the SID as well.

6. On the Database Configuration Assistant, step 4 of 12: Management Options screen, accept the defaults, and click Next.
7. On the Database Configuration Assistant, step 5 of 12: Database Credentials screen, enter a password. We changed the default of using the same password for the listed accounts, and click Next.
8. On the Database Configuration Assistant, step 6 of 12: Storage Options, select Automatic Storage Management (ASM), select the group you created during Grid Infrastructure installation, and click Next.
9. When the ASM Credentials screen pops up, enter the ASM password, and click OK.
10. On the Database Configuration Assistant, step 7 of 12: Recovery Configuration screen, accept the default, and click Next.
11. On the Database Configuration Assistant, step 8 of 12: Database Content screen, accept the default, and click Next.



NOTE: When you accept the default, the title of the window changes from step 8 of 12 to step 8 of 11.

12. On the Database Configuration Assistant, step 9 of 11: Initialization Parameters, accept the default, and click Next.
13. On the Database Configuration Assistant, step 10 of 11: Database Storage, click Next.
14. On the Database Configuration Assistant, step 11 of 11: Creation Options screen, click Finish.
15. On the Confirmation screen, click OK.
The Database Configuration Assistant screen appears and shows a progress bar. (30 minutes)
16. When the Database creation complete screen appears, click Exit.

Appendix E. Methodology: Migrating the DS2 data

Exporting tablespace and datafiles on the HP rp4440 running HP-UX 11i v3 and Oracle 11g

In our examples, we used a sample schema called DS2, which contained four tablespaces. The total size of our schema objects was about 1 GB. Exporting the 1GB Transportable Tablespace set on the HP rp4440 system was very simple.

In this example, the directory /u02 is an example. You may store the dump file wherever you wish. We also chose to put the workspaces in Read-Only mode. If you have a larger database and downtime is an issue, you can choose to run the same process from a backup of the database to minimize any inconvenience.

Allow at least an hour to complete the export.

1. Make tablespaces in the set Read-Only. Use the following command from a SQL*Plus command prompt: `ALTER TABLESPACE tablespacename READ ONLY;` (Note - You must repeat this step for all Tablespaces in the set.)
2. Create directory for dump, and set permissions in O/S and in Oracle. Use the following commands:

```
a. $ mkdir /u02
b. $ chmod 777 /u02
c. SQL>CREATE DIRECTORY dump_dir AS
   \u02';
d. SQL>GRANT READ,WRITE ON DIRECTORY
   dump_dir TO PUBLIC;
```

2. Use Data Pump export utility, and set selected tablespaces for transportable set. Use the following command:

```
$ expdp system/password DUMPFILE=expdat.dmp
DIRECTORY=dump_dir TRANSPORT_TABLESPACES =
tablespace1,tablespace2,...
```

Importing data on the Dell PowerEdge R710 running Oracle Solaris 10 and Oracle 11g R2

Make sure that you have copied expdat.dmp and data files to the Dell PowerEdge R710 before proceeding.

Create the directory for import dump, and set permissions in O/S and in Oracle. Use the following commands:

```
a. $ mkdir /u02
b. $ chmod 777 /u02
c. SQL>CREATE DIRECTORY dump_dir AS
   '/u02';
d. SQL>GRANT READ,WRITE ON DIRECTORY
   dump_dir TO PUBLIC;
```

Convert datafiles from big-endian format to little-endian format placing files with ASM:

- \$ rman TARGET /
- RMAN> CONVERT DATAFILE
tablespace1,tablespace2,...
2> FROM PLATFORM 'HP-UX(64-bit)'
3> FORMAT '+DATA/u02/data1.dbf'

(Note – Repeat for each tablespace)

2. Use Data Pump import utility, and set selected datafiles import. Use the following command:

```
$ impdp system/password DUMPFILE=expdat.dmp
DIRECTORY=dump_dir TRANSPORT_DATAFILES =
+DATA/u02/data1.dbf,+DATA/u02/data2.dbf,...
```

From SQL> prompt, put tablespaces back into read/write mode using the following command: ALTER

```
TABLESPACE tablespace1 READ WRITE;
```

(Note – Repeat for each tablespace.) -

Appendix F. Post-migration considerations

Environmental and configuration changes

Updating environment variables. In the Oracle Solaris environment, you'll need to make sure that the following environment variables point to the new Oracle directories:

```
ORACLE_HOME
PATH
ORA_NLS10
LD_LIBRARY_PATH
```

Updating SSL users. If you have externally authenticated SSL users, you must upgrade them as well. Do so with the following command:

```
$ORACLE_HOME/rdbms/bin/extusrupgrade --dbconnectstring
<hostname:port_no:sid> --dbuser <db admin> --
dbuserpassword <password> -a
```

Changing passwords on DBA accounts. Oracle recommends you change the passwords on all Oracle-supplied accounts. One good way to make sure this happens is to lock all those accounts, except for SYS and SYSTEM, and then set their passwords to expire immediately. This technique forces users to change those passwords the next time they log into those accounts.

You can use following SQL statement to check the status of the accounts:

```
SQL> SELECT username, account_status
FROM dba_users ORDER BY username;
```

To cause passwords to expire, issue the following SQL statement:

```
SQL> ALTER USER username PASSWORD EXPIRE ACCOUNT LOCK;
```

Updating the initialization parameter file. Starting with the release of Oracle 10g, Oracle introduced new initialization parameters and deprecated others. You will need to review your parameter file and make any changes necessary to support your particular system.

Backing up your database

After the successful migration of the Oracle database from the HP-UX environment to the Oracle Solaris environment, you should make a full backup of your production database. This will ensure that you do not have to repeat the import should any problems occur. It will also serve as a baseline for all future backups.

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