

**MIGRATING TO
ORACLE[®] SOLARIS[™]
WITH ORACLE DATABASE 11^g
ON INTEL[®] XEON[®] PROCESSORS**



FROM IBM[®] AIX[®] WITH DB2[®] ON AN IBM POWER[®] SYSTEM



A migration guide commissioned by Intel Corp. and Oracle

Table of Contents

Table of Contents	2
Introduction	4
Scope of this Guide	4
A move that will yield real benefits	5
Features of the Oracle Sun Fire X4450 Server with the Intel Xeon Processor 7400 series	5
The new Intel Xeon Processor 7500 series (Nehalem-EX).....	6
Features of Oracle Solaris 10	6
Planning the migration	8
Considerations for moving your applications.....	8
<i>Java-based applications</i>	8
<i>A note about application data</i>	8
Considerations for moving platforms	8
<i>Application compatibility</i>	8
<i>Difference in operating systems</i>	8
Considerations for moving your database.....	9
<i>Database Administration</i>	9
<i>Inexpensive Disk Storage</i>	9
<i>Limitations</i>	9
Moving from IBM AIX to Oracle Solaris 10	9
<i>Database size/storage</i>	10
<i>Downtime</i>	10
<i>Method of database migration</i>	10
<i>Complexity of applications</i>	10
Installing and setting up Oracle Solaris 10 and Oracle Database 11g Release 2	11
Configuring the IBM storage.....	11
<i>Overview</i>	11
Installing Oracle Solaris 10.....	11
Installing Oracle Solaris 10 patches	13
Oracle Database 11g pre-installation tasks	14
Configuring the data drives.....	14
Installing Oracle Database 11g Release 2 on the Oracle Sun Fire X4450 Server running Oracle Solaris 10 OS	15
Creating an empty database	17
Migrating the Oracle Database 11g database	18
Migrating your data	18
<i>Importing the database into Oracle Database 11g Release 2</i>	19

Post-migration considerations	21
Environmental and configuration changes.....	21
<i>Updating environment variables.....</i>	<i>21</i>
<i>Connecting to the database.....</i>	<i>21</i>
<i>Creating new users.....</i>	<i>21</i>
<i>Updating SSL users.....</i>	<i>21</i>
<i>Changing passwords on DBA accounts.....</i>	<i>22</i>
<i>Updating the initialization parameter file.....</i>	<i>22</i>
<i>Oracle Database 11g performance tuning.....</i>	<i>22</i>
Backing up your database.....	22
Summing up.....	23
<i>Considerations.....</i>	<i>23</i>
<i>Conclusion.....</i>	<i>23</i>
Appendix A. Defining the test environment	25
Appendix B. Methodology: Configuring the IBM storage.....	27
Appendix C. Methodology: Installing Oracle Solaris 10 on the Oracle Sun Fire X4450 Server	28
Appendix D. Methodology: Installing Oracle Solaris patches.....	32
Installing Oracle Solaris recommended patch clusters.....	32
Installing specific Oracle Solaris patches	32
Appendix E. Methodology: Pre-Installing Oracle Database 11g Release 2 on the Oracle Sun Fire X4450 Server.....	33
Oracle Database 11g Release 2 pre-installation tasks.....	33
Preparing disks for Automatic Storage Management	35
Appendix F. Methodology: Installing Oracle Database 11g Release 2 on the Oracle Sun Fire X4450 Server running Oracle Solaris 10	36
Installing Oracle Database 11g Release 2.....	37
Creating an empty database.....	38
Appendix G. Methodology: Migrating the DS2 data	40
Exporting schema and data on the IBM Power Server running AIX DB2 V9.7	40
Importing data on the Oracle Sun Fire X4450 Server running Oracle Solaris 10 and Oracle Database 11g Release 2.....	41
About Principled Technologies.....	42

Introduction



Oracle Sun Fire X4450

The Oracle[®] Sun Fire™ X4450 Server is excellent for upgrading critical applications running on IBM[®] AIX Power[®] Systems to Oracle Solaris™. Migrating to an Intel[®] Xeon[®] Processor 7400 series on an Oracle Sun Fire x4450 Server is a straightforward process that can yield significant benefits, such as increased performance, reduced implementation time, and reduced cost. Such a migration also presents opportunities for server consolidation that can reduce server footprint while also lowering hardware, maintenance, and support costs.

To help you evaluate options for replacing your older IBM AIX Power systems (such as a Power 5), Principled Technologies (PT) has performed hands-on testing and research of a migration to the Intel Xeon platform. We also present an example of the significant cost savings you may realize by moving to the Intel Xeon Processor-based server from the IBM Power-based servers.

The Oracle Sun Fire X4450 Server, based on the Intel Xeon Processor 7400 series, is a much more capable system than the IBM Power System we tested. (See Appendix A in this Guide for detailed system information.) The Oracle Sun Fire X4450 Server is a small quad-socket server that still supports up to 24 processor cores, 256 GB of RAM, and over 2 TB of internal storage. With Intel's recent launch of the new Intel Xeon Processor 7500 series (codename: Nehalem-EX), we expect to see even greater functionality and an even greater performance increase over the Intel Xeon Processor 7400 series.

Oracle Solaris provides an impressive combination of price, features, and flexibility--all on industry standard x86 hardware. We describe below some of the Oracle Solaris features, such as Predictive Self Healing, and Oracle Solaris Containers.

Scope of this Guide

This guide reviews the approach that we recommend for planning and implementing the migration of applications on an IBM Power System running AIX to the Oracle Sun Fire X4450 Server with the Intel Xeon Processor 7460 running Oracle Solaris Operating System (OS). We explain how to move a sample application with an IBM DB2 database on an IBM Power System to an Oracle Database 11g Release 2 database on an Oracle Sun Fire X4450 Server running Oracle Solaris 10. We also explain how to install Oracle Solaris 10 and Oracle Database 11g Release 2 on the Oracle Sun Fire X4450 Server and migrate user databases from the IBM Power System to the Oracle Sun Fire X4450 Server.

A move that will yield real benefits

This migration has the potential to deliver considerable cost and performance benefits. The combination of the Intel Xeon Processor, which is based on the industry-standard Intel Architecture, and the Oracle Solaris operating system (OS), will let you boost performance while lowering costs. Current IBM Power-based systems typically have a high ratio of price to performance, because they are expensive to purchase and maintain. The IBM Power systems are also only available from one vendor, whereas the Xeon Processor-based servers are available from a variety of vendors. The Oracle Sun Fire Server with Intel Xeon Processors, by contrast, is less expensive to acquire and easier to maintain.

The Oracle Sun Fire Servers can cost 70 to 95 percent less than current IBM Power systems, based on list prices as of March 22, 2010. For example, consider these two comparably equipped servers (both prices exclude tax and shipping) which illustrates a 78 percent reduction in cost:

Oracle Sun Fire X4450 Server - \$31,683

IBM Power 550 Express - \$145,234

NOTE

Please keep in mind that lists prices are often discounted by vendors.

In addition, when we compare four-socket configurations, the Intel Xeon Processor 7400 series-based Oracle Sun Fire X4450 Server provides up to 26 percent higher performance on standard benchmarks than the IBM Power 6.¹ The Intel Xeon Processor 7460 also provides 15 percent higher performance compared to the IBM Power 6 on the eight-socket SAP-SD two tier benchmark, and it delivers 28 percent greater performance than the IBM Power 6 on the four-socket SAP-SD two tier benchmark.²

Features of the Oracle Sun Fire X4450 Server with the Intel Xeon Processor 7400 series

The Oracle Sun Fire X4450 Server is excellent for consolidation, virtualization, database applications, and Web service. In only a 2RU form factor it provides enterprise-class configurations: up to 24 processing cores, 64-bit computing, and 256GB of RAM (in 32 slots). Additionally, it supports up to eight internal SAS disk drives.

¹ Based on SPECint_rate2006base as of June 5, 2009:

<http://www.spec.org/cpu2006/results/res2009q2/cpu2006-20090427-07259.html>,

<http://www.spec.org/cpu2006/results/res2008q4/cpu2006-20080915-05319.html>

² Results from: <http://www.sap.com/solutions/benchmark/index.epx>

The Intel Xeon Processor 7400 series itself provides plenty of headroom for consolidation via virtualization of business-critical applications. The Intel Xeon Processor 7400 series offers up to 48 percent better performance and up to 40 percent better performance in a virtualized environment compared to earlier processor generations.³ Some of its other features include 16 MB of L3 cache and reduction in power consumption.

The new Intel Xeon Processor 7500 series (Nehalem-EX)

A new Oracle Sun Fire Server will take full advantage of the new Intel Xeon Processor 7500 series (codename: Nehalem-EX). 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. In addition, the newer processors and systems are even more power efficient, providing even better performance while consuming less energy depending on the configuration.

Features of Oracle Solaris 10

Oracle Solaris 10 introduces a wide variety of features. Some of the Oracle Solaris 10 features, such as Oracle Solaris Containers, which offers operating system-level virtualization, are not available in AIX 5L, but are comparable to Workload Partitions (WPAR) offered as a standard feature starting with AIX 6. Furthermore, there is usually a cost associated with purchasing different components for AIX, while most Oracle Solaris features are included or free to download. Most of these key features can save you time and money while giving you better functionality in your operating system. While there are far too many features to discuss in this guide, the following list mentions some of the more significant ones associated with Oracle Solaris 10:

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 you to examine both kernel and user-level activity. Oracle Solaris DTrace was designed to run on live production servers with often negligible impact on performance. Per Oracle's documentation, for disabled probes, there is no performance impact at all.

Oracle Solaris Containers. Oracle Solaris 10 provides operating system-level virtualization. Solaris Containers combine the isolation of Solaris Zones with resource controls. Because Solaris Containers are not bound to processors

³ Extracted from the Intel Xeon Processor 7400 series product brief at: http://www.intel.com/Assets/en_US/PDF/prodbrief/7400-prodbrief.pdf

or host bus adapters (HBAs), they can be configured dynamically. If an application requires a separate processor, the container can be assigned one. Additional features of attach, detach, and clone make it easier to get different applications or databases up and running quickly without impacting a production environment. In addition, Oracle Solaris Containers can be used inside VMware® to extend and compliment the features of virtualization of both products.

When migrating, you may want to take advantage of this virtualization feature to create separate containers in which you can install the application, database, or multiple database instances. This will allow greater isolation and flexibility in security, services, and administration. The added ability to clone zones greatly expedites setting up and installing multiple containers, therefore decreasing your migration time if you choose to take advantage of these containers.

Predictive Self Healing. Oracle Solaris 10 can diagnose and assist in the recovery from many hardware and software problems. The Oracle Solaris Fault Manager can automatically detect many hardware and application problems, while the 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 Oracle Solaris product. These allow combined mandatory access control with fine-grained control of user privileges.

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. This Oracle Solaris 10 feature 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 necessary.

Outside of possibly using Oracle Solaris Containers for installation, most of these features do not have a direct bearing on migrating from one system to another or database migration, but do offer great benefits in administering the systems once implemented.

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 Oracle Solaris for x86 (64-bit) environments. 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. As an example, DB2 provides portable export formats that Oracle Solaris has the ability to import. The restore/import process on the target system is likely to resolve any issues with the data layout. In our example, we show how easy this process is by using the Oracle SQL developer tools that take advantage of the performance of the system.

Considerations for moving platforms

Application compatibility

One benefit of moving from the IBM AIX to Oracle Solaris is a greater range of available applications. While this means that there is a good chance that all of your applications in AIX are supported, there is no guarantee. Before migrating, make sure that your other AIX applications have an Oracle Solaris version or find compatible programs. On the x86 platform alone, there are already close to 8,000 applications available for Oracle Solaris 10.⁴ Please reference Oracle's website at the following link for more on available applications: <http://solutions.oracle.com>.

Difference in operating systems

Oracle Solaris and AIX are both UNIX-based operating systems, and both are derived from BSD UNIX and System V. However, there are differences in the

⁴ Oracle Solaris 10 Applications Library – Oracle Partner Network – Solutions Catalog <http://solutions.oracle.com>

way that they operate, both in some of the commands and in the configuration files.

For a quick reference guide to commands, refer to Rosetta Stone for Unix (<http://bhamsi.com/rosetta.html>). All the Oracle Solaris System Administrator documentation is freely downloadable at <http://docs.sun.com/app/docs/coll/47.16>.

Considerations for moving your database

Database Administration

A key benefit for moving from IBM DB2 to Oracle Database 11g is in the ease and fewer operating steps involved in the administration of your database. This includes installation and day-to-day tasks. Oracle Database 11g has a single point of management in its Oracle Enterprise Manager tool, where IBM DB2 has a Command Center that gives access to individual consoles. The Oracle Enterprise Manager can also be accessed via a web interface while the DB2 Command Center console tools have to be installed at the client.

Inexpensive Disk Storage

Taking advantage of the Automatic Storage Management (ASM) that is part of Oracle Database 11g, you can greatly reduce related storage cost. A prime example is that of benefiting from the decreasing price of high-volume, low-cost SATA drives. You can utilize many different storage options and can even take advantage of configuring existing storage you may already have.

Limitations

Depending on the complexity of the application and size of your data, you should consider several factors when using the Oracle SQL Developer Tool. Stored procedures and functions may not port easily and may need to be rewritten to run in Oracle Database 11g. Very large databases will take more time to process, which leads to longer downtime for migration and possibly a different manual method for moving the data, which increases the time and complexity of the migration.

Moving from IBM AIX to Oracle Solaris 10

In planning the move, some key points to keep in mind are the following:

- Database size/storage
- Downtime
- What method to use for migrating the database?
- How complex are the applications and any related stored procedures that may reside in the associated database, if any?

All of these points are inter-related and relevant to a successful migration.

Database size/storage

Make sure your storage is adequate to accommodate current size of your data and, if using same storage, you must have room to host existing and new data that will be converted.

Downtime

The associated downtime greatly depends on the amount of data and complexity of applications to be moved. In most cases, you will be able to get both systems operational and plan for when the final data will be migrated.

Method of database migration

In most cases, using Oracle's Development Tool will suffice and is very easy to use, as our example demonstrates. If your databases are fairly large, a more manual process may be required in exporting and importing the data, using command line tools on each database server.

Complexity of applications

More complex applications and large terabyte databases may require the assistance from Oracle Services and Support.

Installing and setting up Oracle Solaris 10 and Oracle Database 11g Release 2

In this section, we focus on how to install and set up Oracle Solaris 10 and Oracle Database 11g Release 2 on the Oracle Sun Fire X4450 Server. We begin by defining the specific environment we used in our work. Next, we present an overview of the steps needed to configure both Oracle Solaris 10 and Oracle Database 11g Release 2.

Configuring the IBM storage

Overview

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

We used the already existing IBM disk array for our configuration. We split it into two LUNs and used the second LUN for our ASM drive.

NOTE

Plan on at least 45 minutes for drive configuration.

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 96 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 C](#) provides complete, detailed installation instructions.) We downloaded the operating system from [Oracle's](#) website and burned DVDs from which we installed.

NOTE

Plan on at least 40 minutes for installing Oracle Solaris 10 on the Oracle Sun Fire X4450 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 the Oracle Solaris 10 DVD into the DVD drive, and reboot the system. Several command-line options for the Oracle Solaris install will appear. Select the default to run an interactive graphical installation.
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 reverts to a command-line installation. Then,

configure your network information, as well as time and date (Figure 1).

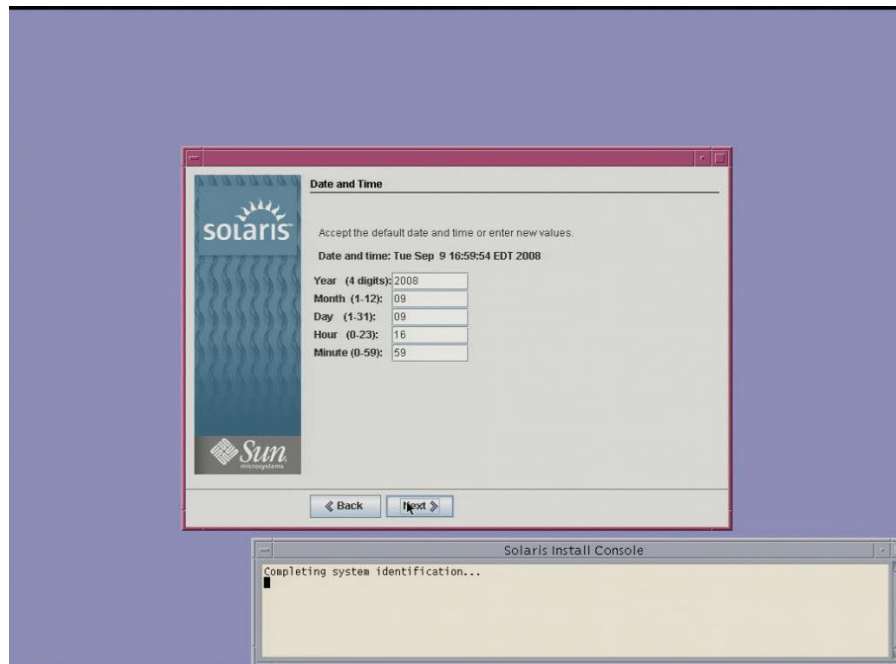


Figure 1. Confirming time and date.

3. Set the root password, and then 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 2. Review your information, and click Install Now to start the installation.

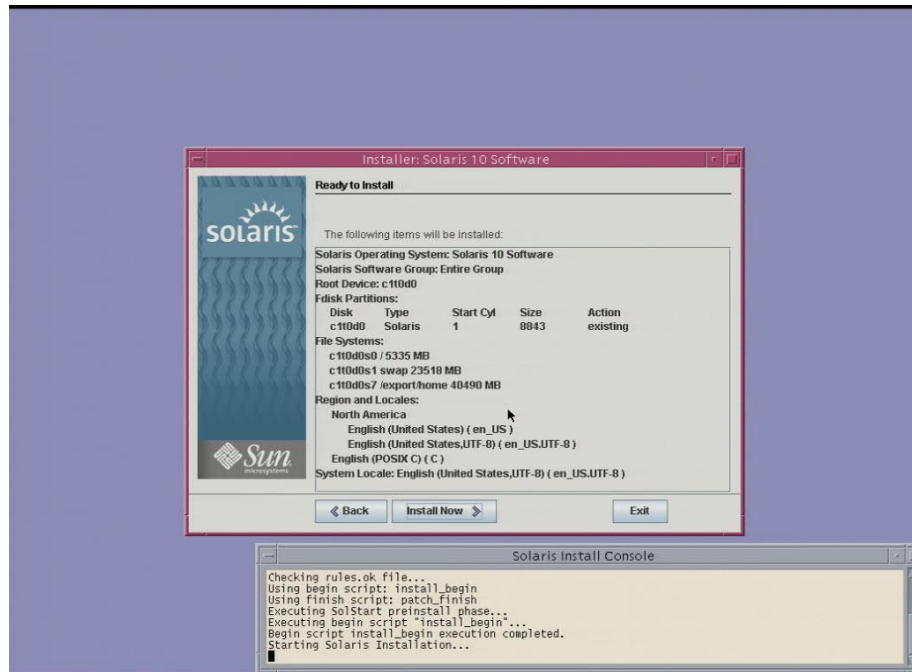


Figure 2. Ready to install.

TIP

When the system reboots, remember to eject the disk. Otherwise, Oracle Solaris will try to install itself again.

5. After the system finishes booting, log on as root, and select your desktop.
6. Configure all database servers with static IP addresses. Doing so assures that Oracle Database 11g 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 instructions for an overview. For more detailed instructions, or to install a specific patch, please refer to [Appendix D](#).

1. Go to the Patch Cluster & Patch Bundle download page of the SunSolve Web site (found at <http://sunsolve.sun.com/show.do?target=patches/patch-access>) and download the most recent patch cluster.
2. Unzip the patch cluster, and change the system to single-user mode to prevent complications.
3. Type `./install cluster` to install the Recommended Patch Cluster.

Oracle Database 11g pre-installation tasks

Before you can install Oracle Database 11g, you must first perform a number of preliminary tasks. For further details, see *Oracle Database Installation Guide 11g Release 2 (11.2) for 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.

We provide detailed instructions for these tasks in [Appendix E](#).

NOTE

Our server met many of the prerequisites for installing Oracle Database 11g Release 2, so we do not discuss checking those prerequisites in our document. The Oracle document we cite above covers that topic in detail.

Configuring the data drives

The next step is to prepare the data drives for Oracle Database 11g to use. We used the Oracle Solaris format utility to do the following to each disk:

1. Use format's fdisk command to create a Oracle Solaris partition on the disk.
2. Use format's partition command to edit the partition table.
3. Label the disk to make the changes permanent.
4. Once the format utility finishes, use the Oracle Solaris chown and chmod commands to give the Oracle Solaris account rights and ownership to slice 6 on each configured disk.

Installing Oracle Database 11g Release 2 on the Oracle Sun Fire X4450 Server running Oracle Solaris 10 OS

We provide an overview of installing Oracle Database 11g Release 2 here. For detailed instructions, see [Appendix F](#). We downloaded the following files from <http://www.oracle.com/technology/software/products/database/index.html>, copied them to the Oracle Sun Fire X4450 Server, and unzipped them locally:

```
solaris.x64_11gR2_grid.zip
solaris.x64_11gR2_database_1of2.zip
solaris.x64_11gR2_database_2of2.zip
```

1. Working as the Oracle user, go to the directory where you unzipped the Oracle Grid Infrastructure 11g R2 distribution and type `./runInstaller` to start the Oracle Universal Installer.
2. Select option for doing a Grid Infrastructure installation, as shown in Figure 3.

NOTE

The command is case-sensitive, and the `./` prefix is necessary

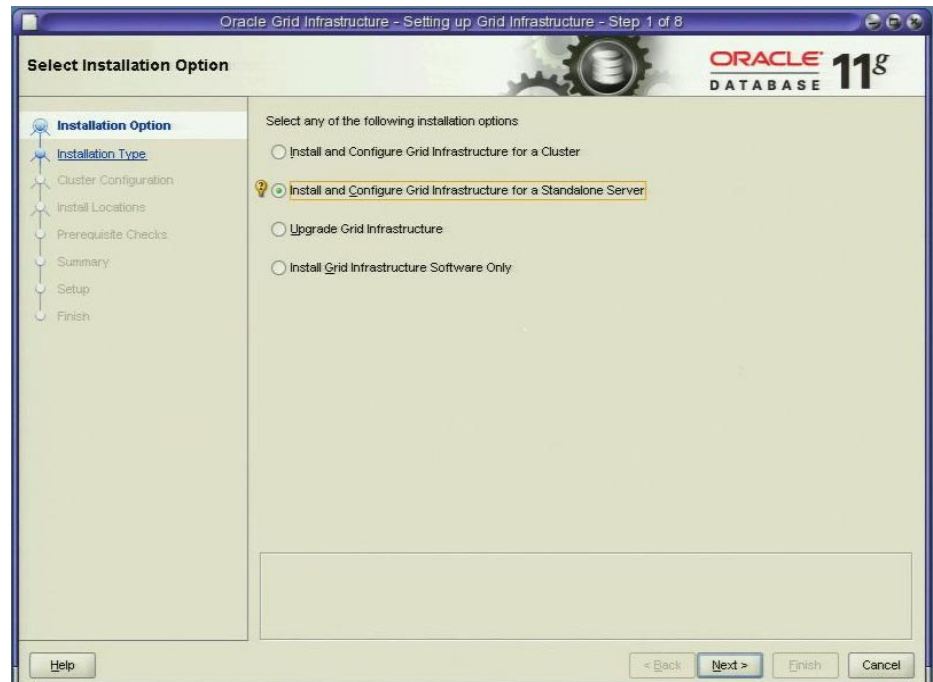


Figure 3. Select Install database software only.

3. Accept the defaults on the next few screens.

NOTE

On the Product-Specific Prerequisite Checks screen, we received one warning that some of our kernel settings were above, rather than at, the values the install checked for. If you receive such a message, ignore it.

4. Review your settings, and start the installation. (15 minutes)
5. At the End of Installation screen, click Exit, and click Yes to confirm that you really want to exit.
6. After the installation completes, go to the directory where you unzipped the Oracle Grid Infrastructure 11g R2 distribution, and type `./runInstaller` to start the Oracle Universal Installer.

NOTE

As before, the command is case-sensitive, and the `./` prefix is necessary.

7. Accept the defaults for the next several screens.
8. Review the settings for the database installation, and start the installation. (See Figure 4.) (15 minutes)
9. When the progress bar completes, the install asks you to run two more scripts as root. Open a terminal as root, and cut and paste the paths to the scripts into the command line terminal. Click OK.

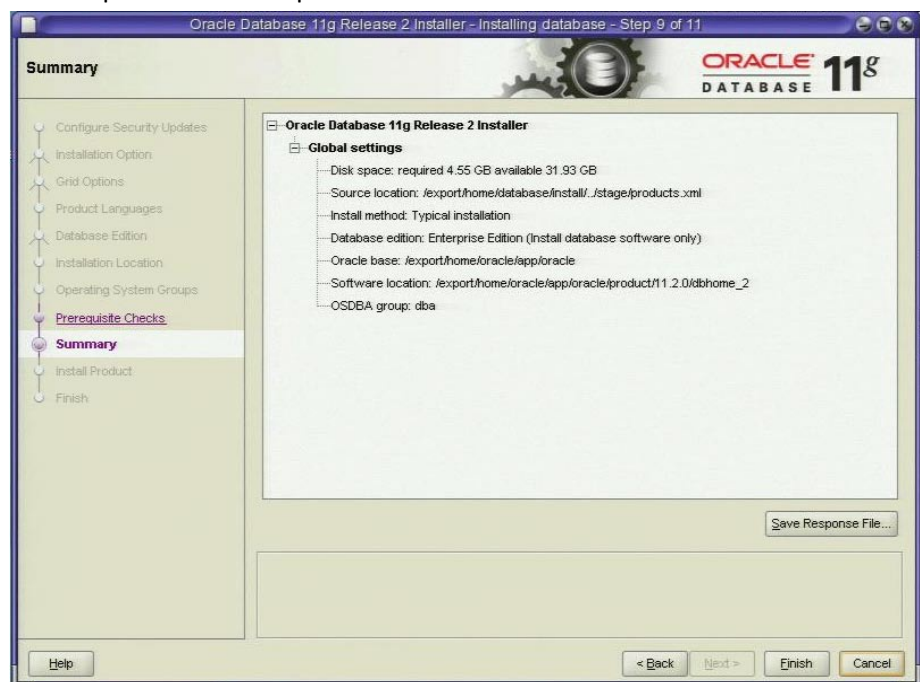


Figure 4. Review the database settings.

10. At the End of Installation screen, click Exit, and click Yes to confirm that you really want to exit.

Creating an empty database

1. After exiting, set your Oracle Database 11g environment variables as we describe in [Appendix E](#). From a command prompt, type `dbca` to launch the Database Configuration Assistant. (See Figure 5.)

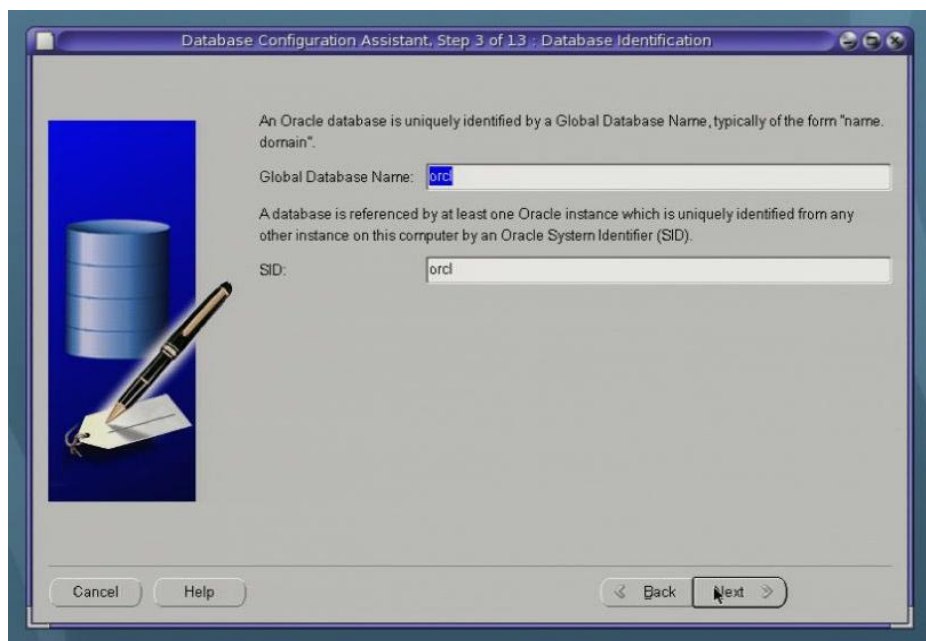


Figure 5. Naming the database.

2. Accept the defaults for the Management Options, enter a password for the database, and select ASM for the storage. Enter the ASM password, and select the diskgroup you selected earlier.
3. Accept the default for the remaining screens, and click Finish. (30 minutes)
4. When the “Database creation complete” screen appears, click Exit.

Migrating the Oracle Database 11g database

In this section, we provide details about migrating an IBM DB2 user database. We demonstrate the ease of this process by moving a sample application and database running on AIX 5L V5.3 to Oracle Solaris 10 and Oracle Database 11g Release 2 on the Sun Fire X4450 Server using Oracle's SQL Developer Migration Tools. We include a more detailed process in [Appendix G](#). The Oracle SQL Developer is an excellent tool for helping manage Oracle databases and database migration. Depending on the size and complexity of your application and data, you should also consider using the services available through Oracle support and services.

Migrating your data

For our example, we used Oracle's SQL Developer Migration Tools application, which is a free download from Oracle's website at <http://www.oracle.com/technology/software/products/sql/index.html>. We provide detailed instructions in [Appendix G](#). For more information on the sample application and database, please refer to [Appendix A](#), where we define our test environment.

NOTE

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

1. Export and convert your IBM DB2 database. Create a set of offline capture scripts using SQL Developer. Go to Tools → Migration → 3rd part database offline capture → Create database capture scripts. It will prompt you for a location to store the exported files. (See Figure 6.)

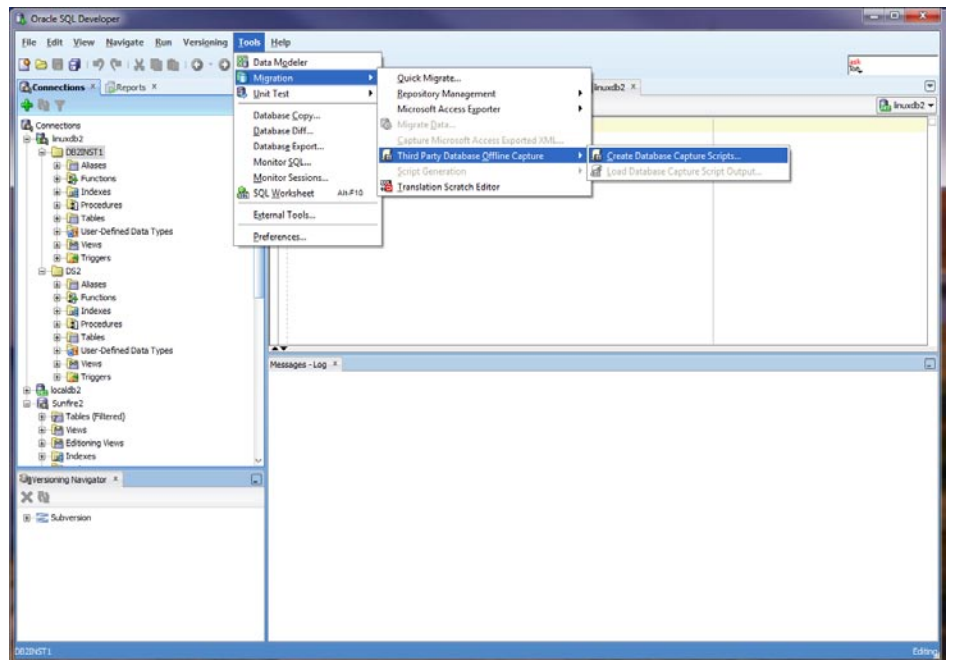


Figure 6. Oracle SQL Developer Generate Database scripts for DB2 to Oracle Database 11g migration.

2. Copy files to database server, and run the startDump.sh that was created from the location the files were copied to. This will generate folders and DAT files containing the schema and table structures for the database you selected.
3. Copy files back to the Oracle SQL Developer machine and load files to generate captured model by going to Tools → Migration → 3rd part database offline capture → LOAD database capture script output...
4. Convert the IBM DB2 model to an Oracle Database 11g model. Right-click the captured model, and select Convert to Oracle Database 11g Model.
5. Create and run the unload_script.sh to extract the data from the database on the source machine and store the data in a delimited ASCII file. It will also generate the control files that the SQL*Loader will use to import the data back into the correct location on the target server.
6. Copy all files to the target server in a directory.

Importing the database into Oracle Database 11g Release 2

1. Generate the scripts for creating the database and schema by right-clicking Converted Model and selecting "Generate." This displays the script in the right-hand pane.
2. Select the connection that the user has privileges to execute the scripts, create users, and grant privileges by choosing the

connection from the drop-down list on the top right corner of the workspace pane. Right-click, and select Run Script.

3. On the Oracle Sun Fire X4450 Server, take the following step: Using Oracle SQL Developer, import the offline exported data. It should automatically create the appropriate schema and data. See [Appendix G](#) for details.



NOTE

Once your import is complete, check your database, and verify that all the components imported correctly. You may have to correct some problems. For example, we had to recompile some of our procedures.

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/afteru.p.htm#i1008954.

Environmental and configuration changes

Updating environment variables. In the Oracle Solaris environment, you will need to make sure that the following environment variables point to the new Oracle Database 11g directories:

```
ORACLE_HOME  
PATH  
ORA_NLS10  
LD_LIBRARY_PATH
```

Connecting to the database. Oracle Database 11g has several connection methods. Locally, there is SQL*Plus, accessible by typing `sqlplus` in a properly pathed terminal. On a client machine, you can use `xclient` or Oracle's freely available database tool, Oracle SQL Developer, to connect to the database.

Creating new users. While the export scripts will move the schema and data from your AIX server to your Oracle Sun Fire X4450 Server, it will not move users. You will have to create new users for your database. You can create new users in SQL Plus with the following command:

```
SQL>CREATE USER username IDENTIFIED BY password;
```

You can modify user privileges with the following command:

```
SQL>GRANT privilege1, privilege2, ...  
TO user1, user2, ...;
```

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 Database 11g -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. Tuning would be required on the database based on the load and utilization metrics of the system. This can include reviewing and making changes to your init.ora parameter file to make changes necessary to support your particular system.

Oracle Database 11g performance tuning. To get an additional boost in performance, you may want to consider some best practices like partitioning and compression. For more detailed performance tuning details, please see the Oracle Database Performance Tuning Guide 11g at http://download.oracle.com/docs/cd/B28359_01/server.111/b28274/toc.htm.

Backing up your database

After the successful migration of the DB2 database from the AIX environment to the Oracle Solaris/Oracle Database 11g 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. Oracle provides excellent tools in Recovery Manager (RMAN) and using the Enterprise Manager to configure RMAN backups in just a few clicks. Please see the Oracle Database Backup and Recovery User's Guide for detailed information at http://download.oracle.com/docs/cd/E11882_01/backup.112/e10642/toc.htm.

Summing up

Do you want better performance at a lower cost, as well as lower maintenance and support costs for hardware? Moving to the Oracle Sun Fire X4450 Server with the Intel Xeon processor 7460 can provide you all of these benefits. The forthcoming Intel Xeon processor 7500 series should increase these benefits.

Considerations

Although moving across platforms, moving applications, and moving databases can be a challenging task, moving to Oracle Solaris on the Oracle Sun Fire X4450 Server from IBM AIX and DB2 can be accomplished with manageable effort considering the size of application and databases. The hardware and operating system are easy to configure, and, with proper planning, migrating applications and/or data is straightforward. As this Guide has explained and demonstrated, the process of deploying these products on an Oracle Sun Fire X4450 Server, including migrating your database to the Oracle Database 11g environment, may take less than a day. Spending up-front time planning can help you avoid potential problems during your migration. Please note that larger potential terabyte size databases or more complex applications may require Oracle Services and support.

Conclusion

Some of the biggest benefits of changing platforms are better performance and a lower price tag for comparable systems. Lower energy consumption and the possibilities of virtualization further reduce the server footprint in the data center. If it is time to implement replacement systems, or for a first time installation, the Intel Xeon Processor 7400 series running in the Oracle Sun Fire X4450 Server is a good combination for a low-cost, high-performance system. You will also find database administration of Oracle Database 11g to be much more efficient, therefore reducing costs associated with day-to-day administration.

You can take advantage of the Automatic Storage Management feature of Oracle Database 11g to assist in managing your database storage. Additionally, you can reduce your time associated with administrating the operating system and the database by using the inherent and freely downloadable features available from Oracle. Tools like the Oracle SQL Developer and the Oracle Systems Management console will make any migration and administration more manageable and will prove to be great assets.

The Intel Xeon Processor 7400 and 7500 series on the Oracle Sun Fire Servers can provide better performance while also reducing costs. The combined performance enhancement coupled with the added benefits of the OS and database administration features will help solidify and capitalize

on this investment, which is much less than that for comparable IBM Power systems.

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Appendix A. Defining the test environment

Our test bed starting point consisted of an IBM System p5 505 Express server running AIX 5L V5.3 and DB2 connected to an IBM TotalStorage® DS4300 storage array. Our destination server was an Oracle Sun Fire X4450 Server running Oracle Solaris 10 Operating System for x86-based systems (64-bit) and Oracle Database 11g Release 2 Enterprise Edition for Oracle Solaris on x86_64-based systems. We connected all components via a gigabit switch. Figure 7 illustrates our setup.

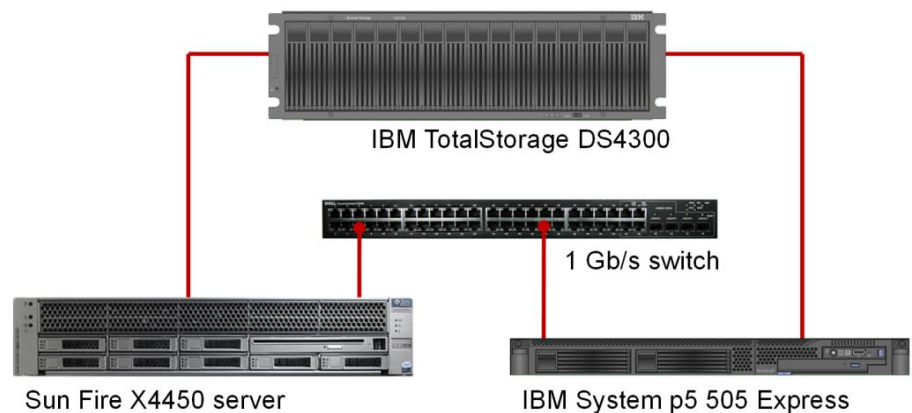


Figure 7. The setup we used in our hands-on testing and research for this Migration Guide.

TIP

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://www.sun.com/servers/x64/x4450/downloads.jsp>.

Figures 8 and 9 present the hardware and software we used in our Oracle Database 11g servers.

Server	Processor	Memory	Disk
IBM System p5 505 Express	2 x POWER5 2.1 GHz	16 GB	2 x IBM 80P6321, 10K SCSI, 146 GB
Oracle Sun Fire X4450	4 x Intel Xeon 7460 (2.66 GHz)	64 GB	4 x Seagate SAS, 10K SCSI, 146 GB

Figure 8. Servers we used in our hands-on testing and research for this Guide.

Server	Server operating system	Database version
IBM System p5 505 Express	AIX 5L V5.3 operating system	DB2 Enterprise Edition 9.1 AIX systems (64-bit)
Oracle Sun Fire X4450	Oracle Solaris 10 10/09 operating system for x86-based systems (64-bit)	Oracle11g R2 Enterprise Edition Release 11.2.0.1.0 for Oracle Solaris on x86-64 based systems

Figure 9. Software we used in our hands-on testing and research for this Guide.

For our test data, we migrated a 20GB database that we generated using the DVD Store Version 2 (DS2) test tool. (For more information about DS2, please see <http://www.delltechcenter.com/page/DVD+Store.>)

Appendix B. Methodology: Configuring the IBM storage

Allow at least 45 minutes to prepare the disks.

1. Using IBM DS Storage Manager (<http://www-947.ibm.com/systems/support/supportsite.wss/docdisplay?Indocid=MIGR-5082865&brandind=5000028>), right-click the attached storage subsystem, and select Manage Storage Subsystem.
2. In the new window that opens, right-click Total Unconfigured Capacity in the Logical pane on the left, and select Create Logical Drive.
3. In the Introduction window, select **Next**.
4. In the Specify Array window, choose your RAID level (we chose 5), select the number of drives you wish to add to the array (we chose the maximum allowed), and select **Next**.
5. If an informational window about selecting drive space appears, click **OK** to continue.
6. In the Specify Capacity/Name window, accept the default of the maximum available capacity, name your logical drive, and select **Next**.
7. In the Specify Logical Drive-to-LUN Mapping window, make sure that the Default Mapping radio button is selected, chose Solaris in the Host type drop-down menu, and select **Finish**.
8. If a Completed information window appears, select **OK** to continue.

NOTE

Depending on the size of the logical drive, it can take from 30 minutes to several hours for the logical drive to complete creation.

9. While the drive is initializing, select the Mappings View tab in the storage manager, right-click Default Group, and select Define Host.
10. In the Introduction window, select **Next**.
11. In the Specify Host Name/HBA Attributes window, write a name for your host in the Host name text box, select the host you are trying to add, select **Add**, and select **Edit**.
12. In the Edit Identifier/Alias window, enter a name that will help you to identify your server, and select **OK**.
13. Back at the Specify Host Name/HBA Attributes window, select **Next**.
14. In the Preview window, review your changes, and click **Finish**.
15. If you see an information window asking you to define another host, select **No**.

Appendix C. Methodology: Installing Oracle Solaris 10 on the Oracle Sun Fire X4450 Server

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 40 minutes to complete the installation. We used version Oracle Solaris 10 10/09 Operating System for x86-based systems (64-bit), which we downloaded from <http://www.sun.com/software/solaris/get.jsp> 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. To complete this installation, you will need to download the driver for the RAID controller and burn it to a CD. Assuming that your server also uses a MegaRAID SAS 8888ELP RAID controller, you can select the correct driver and download it from

http://www.lsi.com/storage_home/products_home/internal_raid/megaraid_sas/megaraid_sas_8888elp/index.html?remote=1&locale=EN.

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. Although the Oracle Solaris install DVD does not support the Broadcom NetExtreme II NICs in the Oracle Sun Fire X4450 Server, it tries to configure the NICs anyway. 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 notification of If the screen is legible, press ENTER in this window appears onscreen, 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, select choice 0, English, 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

An Oracle 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 Oracle 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 Americas→United States→Eastern Time, 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.
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 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. Because 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 will start installing itself again.

47. After the system has booted, log in as root.
48. Select your desktop. We accepted the default of Sun Java Desktop System Release 3.
49. If a message with the following text appears, click Log in anyway: Could not look-up Internet address for <hostname>. This will prevent GNOME from operating correctly. It may be possible to correct the problem by adding <hostname> to /etc/hosts. You will fix the /etc/hosts file below.
50. On the Welcome to the Sun Java Desktop System splash screen, click Close.

Appendix D. Methodology: Installing Oracle Solaris patches

Installing Oracle Solaris recommended patch clusters

1. Go to the Patch Cluster & Patch Bundle download page of the SunSolve Web site (<http://sunsolve.sun.com/show.do?target=patches/patch-access>)
2. Maximize Recommended Patch Clusters, and select Download for the Solaris 10 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 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 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.

Appendix E. Methodology: Pre-Installing Oracle Database 11g Release 2 on the Oracle Sun Fire X4450 Server

Oracle Database 11g Release 2 pre-installation tasks

Before you can install Oracle Database 11g Release 2, you must first perform a number of preliminary tasks. For further details, see *Oracle® Database Installation Guide 11g Release 2 (11.2) for 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 Database 11g, 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 Database 11g on a system using DHCP or on a multihomed system, you will need to take additional steps. Please see the Oracle Database 11g Release 2 Preinstallation tasks document for further details.

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

```
mkdir /export/home/oracle
chown -R oracle:oinstall
/export/home/oracle
chmod -R 775 /export/home/oracle
usermod -d /export/home/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 the following command: `id nobody`
11. Because this is a fresh install, we would not expect an Oracle project to exist. Create one with the following command: `projadd -U oracle user.oracle`
12. Verify the Oracle user's project ID with the following command: `id -p oracle`
13. You should see output of the form `uid=100(oracle) gid=100(oinstall) projid=100(user.oracle)`.
14. 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.
15. 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 the following command to do that:

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

Create the Oracle Database 11g base directory with the following commands:

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

Using a text editor, create the file `.profile` in `/export/home/oracle`. Type the following lines, and save the file:

```
umask 022
DISPLAY=:0.0
export DISPLAY
```

Give the Oracle user ownership of the file with the following 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 [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 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 the following commands:

```
chown oracle:dba /dev/rdisk/c1t1d0s6
chmod 660 /dev/rdisk/c1t1d0s6
chown -h oracle:dba /dev/rdisk/c1t1d0s6
```

Appendix F. Methodology: Installing Oracle Database 11g Release 2 on the Oracle Sun Fire X4450 Server running Oracle Solaris 10

We downloaded Oracle Database 11g Release 2 from <http://www.oracle.com/technology/software/products/database/index.html>. We copied the `solaris.x64_11gR2_grid.zip` file to the Oracle Sun Fire X4450 Server, 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 11g Release 2

We downloaded Oracle Database 11g Release 2 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 Oracle Sun Fire X4450 Server, and unzipped them locally by right-clicking the files and choosing Extract Here.

Allow at least 30 minutes to complete the Oracle Database 11g 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, the install 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 Database 11g Release 2 on a system. Should you need to reinstall the database software, 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=/export/home/oracle/oracle/product/11.2.0/dbhome_1; export ORACLE_HOME`)
2. Set your `PATH` variable by typing `PATH=$ORACLE_HOME/bin:$PATH`
3. Type `dbca` to launch the Database Configuration Assistant.
4. When the Database Configuration Assistant: Welcome screen appears, click Next.
5. On the Database Configuration Assistant, step 1 of 12: Operations screen, select Create a Database, and click Next.
6. On the Database Configuration Assistant, step 2 of 12: Database Templates screen, select Custom Database, and click Next.
7. 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.
8. On the Database Configuration Assistant, step 4 of 12: Management Options screen, accept the defaults, and click Next.
9. 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. Click Next.
10. 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.
11. When the ASM Credentials screen pops up, enter the ASM password, and click OK.
12. On the Database Configuration Assistant, step 7 of 12: Recovery Configuration screen, accept the default, and click Next.
13. 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.

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

Appendix G. Methodology: Migrating the DS2 data

Exporting schema and data on the IBM Power Server running AIX DB2 V9.7

1. Install and launch Oracle SQL Developer. (Make sure to install proper drivers to connect to DB2 database.)
2. Create a migration user in Oracle Database 11g and assign the role of Resources and system privileges of 'Create View' and 'Create Session'.
3. Make a new connection to the database using the migration user you just created and create repository by right-clicking on connection and selecting Migration Repository→Associate Migration Repository... This will build and create the repository for the migration while associating it to the migration user just created.
4. Make a new connection to your source database with user that is owner of the database.
5. Make another connection to the target database you intend to migrate to as well.
6. Now we went to Tools→Migration→Third Party Offline Capture→Create Database Capture Scripts... This will generate the files needed in a directory to be moved and executed on the source machine.
7. Copy folder and files to source machine and launch the startDump program to create the model to be used for recreating the schema on the Oracle server.
8. Copy folder, which should not contain dat files, back to the SQL Developer machine.
9. We then loaded the offline captured information to create the Capture Model by going to Tools→Migration→Third Part Offline Capture→Load Database Offline Capture Scripts...
10. Now that the Captured model is loaded, we ran the conversion process by right-clicking on Captured Model and selecting "Convert to Oracle Model..." We verified the data rules and pressed Apply to continue.
11. Review Migration Log for any errors that can be addressed before scripts are generated for the actual migration and creation of the Oracle objects. (Note: Oracle SQL Developer comes with a 'Translation Scratch Editor' that may assist you in procedural syntax when converting the code to Oracle Database 11g platform.)
12. We then generated the scripts by right-clicking on Converted Model and then selecting "Generate". Which then displays the script in the right-hand pane.
13. Select connection that the user has privileges to execute the script and be able to create users and grant privileges by choosing the

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We provide industry-leading fact-based marketing and technology assessment services that help technology vendors and buyers understand the real differences among products. We bring to every assignment extensive experience with and expertise in all aspects of technology marketing, testing, and analysis; from researching new technologies, to developing new methodologies, to testing with existing and new tools, to delivering the results in whatever form best communicates them.

When the assessment is complete, we know how to present the results to a broad range of target audiences. We provide our clients with the materials they need, from market-focused data to use in their own collateral to custom sales aids, such as test reports, performance assessments, white papers, PowerPoint presentations, and videos. Every piece of collateral reflects the results of our trusted independent analysis.

We customize our services to focus on each client's requirements. Whether the technology involves hardware, software, Web sites, or services, we offer the experience, expertise, and tools to assess how it will fare against its competition and to highlight its strengths.

Our founders, Mark L. Van Name and Bill Catchings, have worked together in technology assessment for 25 years. As journalists, they published over a thousand articles on a wide array of technology subjects. They created and led the Ziff-Davis Benchmark Operation, which developed such industry-standard benchmarks as Ziff Davis Media's Winstone and WebBench. They founded and led eTesting Labs, and after the acquisition of that company by Lionbridge Technologies were the head and CTO of VeriTest.

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