Migrating from Solaris 9 Enterprise Edition on Sun Fire V440 with Oracle 9i to Red Hat Enterprise Linux 5.2 on Dell PowerEdge R900 with Oracle 11g (summary)

The Dell™ PowerEdge™ R900 is an excellent server for upgrading critical database applications from Oracle® 9i running on Solaris™ 9 to Oracle 11g, the latest release of Oracle's data management platform, running on Red Hat® Enterprise Linux® 5.2 (RHEL 5.2).

This document summarizes the approach that Principled Technologies® (PT) and Dell recommend for a tested and validated migration of Oracle 9i databases to Oracle 11g on the Dell PowerEdge R900 server and RHEL 5.2. For a full discussion of this approach and step-by-step instructions on this process, see our Migration Guide.

As this summary illustrates, and as the complete Migration Guide shows in detail, a basic migration is not difficult. Starting with a bare Dell PowerEdge R900, we were able to install RHEL 5.2 and Oracle 11g and migrate a sample database in less than a day.

As a migration solution, the PowerEdge R900 provides a much more expandable and capable platform. For example, it can support 256 GB of RAM, as opposed to 32 GB in the Sun Fire V440, and eight internal drives instead of four. It also provides a much more capable RAID controller.

Migrating applications

You are likely to face several types of application challenges when moving from Solaris 9 on SPARC-based systems to RHEL 5.2 on x86 (64-bit) systems.

Java-based applications. These applications should run as is.

When you have the source code for applications. Frequently, applications for which you have source are those your organization developed. Because Linux and Solaris are both UNIX- based systems, porting an application requires less work than porting to a non-UNIX-based operating system, such as Windows. One big advantage is the availability of the GNU tool set on both Solaris and Linux. If the developer built your application using the Solaris versions of the GCC tools, you will not encounter language issues when you port. However, you may have to contend with differences in the system APIs.

When you do not have the source code for applications. You will not typically have the source for an application you purchased. If such an application is available in an x86 (64-bit) version, you have the option of moving to the native version.

Oracle, of course, is a prime example of an application that both Solaris 9 (SPARC) and RHEL 5.2 (x86 64-bit) support. Both the complete Migration Guide and this summary focus on how to migrate an Oracle installation from the Solaris 9 SPARC environment to the RHEL 5.2 x86 (64-bit) environment.

You may be able to run your application using QuickTransit from Transitive (http://www.transitive.com). QuickTransit for Solaris/SPARC-to-Linux/x86-64 can transparently run many Solaris SPARC applications on Linux without re-compilation. QuickTransit may also be useful when a software package's installer is missing, because

it can successfully run many applications that you simply copy from the SPARC environment. Because we are migrating from Solaris 9, you should verify that QuickTransit supports your legacy application, and that the application vendor supports the application running in this configuration. For specific information about QuickTransit for Solaris/SPARC-to-Linux/x86-64, see http://www.transitive.com/products/sol_sparc_lin_x8664.

Migrating Oracle databases

We used the export-and-import method as a safe and effective way to move the database across different processor architectures, operating systems, and versions of Oracle.

Installing and setting up RHEL 5.2 and Oracle 11g

Our legacy server was a Sun Fire™ V440 with 4 x UltraSparc™ IIIi 1.59 GHz processors, 32 GB of RAM, and four Fujitsu® Ultra320 SCSI, 73GB disks. It ran Solaris 9 9/05 Operating System for SPARC-based systems (64-bit) and Oracle 9i Enterprise Edition Release 9.2.0.1.0 for Solaris on SPARC-based systems (64-bit).

Our destination server was a PowerEdge R900 with 4 x 6-Core E7450 Intel® Xeon® 2.4 GHz processors, with 64 GB of RAM, and eight Seagate® SAS, 15K RPM, 73GB disks. It ran Red Hat Enterprise Linux 5.2 for x86-64 and Oracle 11g Enterprise Edition Release 11.1.0.6.0 for Linux on x86_64-based systems.

Configuring the RAID drives

We had eight internal disk drives in our PowerEdge R900. We configured them as four RAID 1 arrays of two drives each. The first array holds the OS and Oracle software. We used the next two RAIDs to create an Automatic Storage Management, or ASM, disk group. Oracle 11g's ASM can take much of the responsibility for allocating and managing the storage. We reserved the remaining RAID to hold the dump file from our Oracle 9i server. After importing our 20GB database into an Oracle 11g database, we added the array to the ASM diskgroup.

Installing RHEL 5.2

This section provides an overview of the operating system installation process. We include approximate wait times for each step. We downloaded the operating system from http://rhn.redhat.com and burned it to a DVD, from which we installed. You must register with the Red Hat Network to download the OS; the following instructions assume you have a valid installation number.

1. Insert the RHEL 5.2 DVD into the DVD drive, and reboot the system. When the installer prompts you, press Enter to install in graphical mode.
2. Select English as the language and U.S. English as the default keyboard.
3. Enter your installation number.

4. Accept the default of installing Red Hat Enterprise Linux. Modify the default disk layout to give Oracle the swap space it requires.
5. Accept the default installation locations for the operation system and boot loader.
6. Configure your network information.
7. Set your time zone and enter the root password. Because we will not be installing Oracle in a VM, we deselect Virtualization. Click Next to start the installation. The installer should eject the DVD automatically.
8. After the reboot, accept the license agreement, enable secure http, and disable SELinux. ASM will not be able to mount the disks if SELinux is running.
9. Set the date and time. Register with the Red Hat Network (RHN) if appropriate.
10. Create a user account. Accept the remaining defaults, and click Finish to reboot the system. Make sure that the DVD is not in the system.

Oracle pre-installation tasks

Before you can install Oracle, you must first perform a number of preliminary tasks, which we list below. For further details, see *Oracle® Database Installation Guide 11g (11.1) for Linux*, Chapter 2 Oracle Database Preinstallation Requirements at http://download.oracle.com/docs/cd/B28359_01/install.111/b32002/pre_install.htm#BABFDGHJ

1. Using the xhost command to make sure that Oracle has access to the X server
2. Installing operating system packages that were not part of the default install
3. Verifying that the networking is configured correctly and is working
4. Modifying the kernel parameters
5. Creating the Oracle account, its related groups, and login script
6. Modifying the security limits and profile of the Oracle owner account

Configuring the data drives

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

1. Use fdisk command to let us modify the partition table for each disk.
2. Because we just formatted it, there are no partitions on the disk. Use fdisk's n command to edit the partition table. We created a single primary partition and gave it all the space on the drive.
3. Use fdisk's `w` command to make the changes permanent.
4. Once the fdisk utility finishes, use the Linux chown and chmod commands to give the Oracle account rights and ownership to the partition on each disk, effectively giving the Oracle account control of all the space on the disk.

Installing Oracle 11g on the PowerEdge R900 running RHEL 5.2

We downloaded Oracle 11g from http://www.oracle.com/technology/software/products/database/index.html. We copied the linux.x64_11gR1_database.zip file to the PowerEdge R900, and unzipped it locally by right-clicking the file and choosing Extract Here.

1. Working as the Oracle user, go to the directory where you unzipped the Oracle 11g distribution and type `./runInstaller` to start the Oracle Universal Installer. The command is case-sensitive, and the `./` prefix is necessary. You are doing an Advanced installation, but you are not creating a starter database.
2. Accept the defaults on the next few screens.
3. Configure Automatic Storage Management (ASM), enter the ASM password, and configure your diskgroup.
4. Review your settings and start the installation. (15 minutes)
5. When the progress bar completes, Oracle asks you to run two scripts as root. Open a terminal as root, then cut and paste the paths to the scripts into the command line terminal.
6. The two configuration assistants should start, and you will automatically advance to the next screen. At the End of Installation screen, click Exit.

Creating an empty database

1. Set your Oracle environment variables. Type `dbca` to launch the Database Configuration Assistant.
2. When the Welcome screen appears, click Next. Create a custom database and give it a name.
3. Accept the defaults for the Management Options, enter a password for the database, and select ASM for the storage. Enter the ASM password, and then select the diskgroup you selected earlier.
4. Accept the remaining defaults and then click Finish. The Database Configuration Assistant screen will show a progress bar. (30 minutes)
5. When the Database creation complete screen appears, click Exit.

Migrating to Oracle 11g

Exporting your Oracle 9i database

Oracle refers to the user data and its associated metadata as a *schema*. Using the Sun Fire V440 server, export the schema using the command line utility exp. Export times vary. Exporting our 20GB schema on our Sun Fire V440 took 42 minutes.

Importing the database into Oracle 11g server

On the RHEL 5.2 PowerEdge R900 server, perform the following steps:

1. In the empty database you created earlier, create the database user for the schema you will import.
2. Create the tablespaces, using ASM managed storage.
3. Run the command line import utility, imp. Import times vary. Importing our 20GB schema on our Dell PowerEdge 900 took 60 minutes.

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.

For more information see the following:
http://download.oracle.com/docs/cd/B28359_01/server.111/b28300/toc.htm

Backing up your database

Having successfully migrated to RHEL 5.2 and Oracle 11g, you should make a full backup of your production database. This will ensure that you not have to repeat the import should any problems occur. It will also serve as a baseline for all future backups.