ORACLE OPTIMIZED SOLUTIONS ORACLE SOLARIS

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Simplify the Migration of Oracle Database and Oracle Applications from AIX to Oracle Solaris

ORACLE

Introduction

Oracle’s tagline, Hardware and Software, Engineered to Work Together, is a promise of dramatic improvements in cost reduction, risk reduction, and productivity of application and business systems. Oracle applications, along with industry-leading middleware and database software technologies, operate on a wide variety of non-Oracle hardware platforms. But it is Oracle’s investment in deep application-to-disk integration, end-to-end testing with fault injection and documented best practices for running Oracle software on Oracle hardware that helps customers most effectively manage the ever-increasing pressure to consistently deliver more with less cost and risk.

Oracle Solaris is a key component of the integration of Oracle's hardware and software technology that creates enormous value for customers. Moreover, for customers who are overdue for an upgrade of their AIX/Power Systems running Oracle technology and/or Oracle applications, the opportunity for improvement by migrating to Oracle Solaris is even greater.

But many do not migrate because of fear of downtime for their always-on applications and fear of the increase in their already long IT projects backlog. This paper discusses the four simple steps customers can take to migrate from AIX to Oracle Solaris to get this value quickly and simply. Additionally, the paper includes an example migration of an Oracle Database instance from AIX to Oracle Solaris that highlights the steps, effort, duration, and benefits from actual systems migrations.

Why Move to Oracle Solaris?

For organizations operating an IBM Power AIX environment that need to modernize or expand their infrastructure, Oracle offers a leading alternative that delivers higher performance, reduces risk to IT operations, and has a lower total cost of ownership than similar IBM solutions. Through Oracle's new infrastructure offerings, customers can reduce CapEx by up to 1.6x, lower their total cost of ownership by up to 2.6x, and benefit from world record OLTP and data warehouse performance that is up to 2.4x faster than IBM's Power AIX systems. With published, long-term, system product roadmaps, Oracle represents the safest platform choice for mission-critical business applications.

These benefits are a result of Oracle's focused long-term investments on integration between products from applications to silicon, optimizing Oracle applications, Oracle Database, middleware, operating system, and infrastructure systems to deliver the best results possible when deployed together. Customers who migrate to Oracle realize significant cost savings, achieve major performance improvements, and benefit from lower risk, by deploying complete solutions engineered to work together—reducing the need for significant, high-cost, custom consulting services.

Oracle is investing heavily in R&D to extend the unique mission-critical cloud capabilities of Oracle Solaris operating system and server and storage technologies, and in the process is changing the economics of computing landscape for the better. Traditionally, large-scale, multiprocessor systems were only available at a significant premium per compute power compared to smaller systems. Simply put, traditionally, a 16-processor system was priced significantly higher than an eight 2-processor system. With the heavy investments made in R&D, Oracle now can deliver much higher performing systems that are more efficient and work better at a lower cost, and is passing those benefits on to its customers.

IBM has delivered most performance gains and enhancements in its Power servers and AIX systems. Meanwhile, Oracle has delivered radical improvements in Oracle Solaris and SPARC performance, focusing on ease of lifecycle management, virtualization, and networking. Additionally, it has extended its lead with the best-performing and most reliable platform for running business applications and databases. While Intel is focused on desktop and mobile computing markets, and IBM is making only modest gains in its system performance, Oracle increased and focused R&D on the enterprise infrastructure market—stepping out with the strongest technology portfolio for the enterprise IT customer. Oracle's infrastructure portfolio reflects ideas and strategic designs that continuously provide new innovations for running core business application environments, ultimately delivering the best and fastest results.

Customers can learn more about the business benefits to be achieved by migrating from AIX to Oracle Solaris in this solution brief:

http://www.oracle.com/us/products/servers-storage/servers/sparc/aixtosolarismigrationfinal22514-2150472.pdf

Migration Planning Overview

One of the largest single success factors for any IT project is quality planning. And the same is true for migration projects like moving business systems from IBM's AIX to Oracle Solaris. Breaking down a migration project into the key steps can help customers realize that migration effort, risk, and duration are often more about where one is currently than where one is planning to go! And customers are in the best position to describe their business needs and determine where they are today with their IT infrastructure supporting Oracle software technology. As such, a plan needs to start with a scoping assumption of which parts of an IT infrastructure need to be included in a plan: a system on which the migration process is to be tested, a key system that needs the benefits of migration now, or multiple systems in the IT landscape. Additionally, having some objectives for the migration duration time and migration recovery point requirements for each of the scoped systems can help in making the right planning tradeoffs. Whatever the case, this inventory should be brought into the planning flow as shown below in Figure 1.

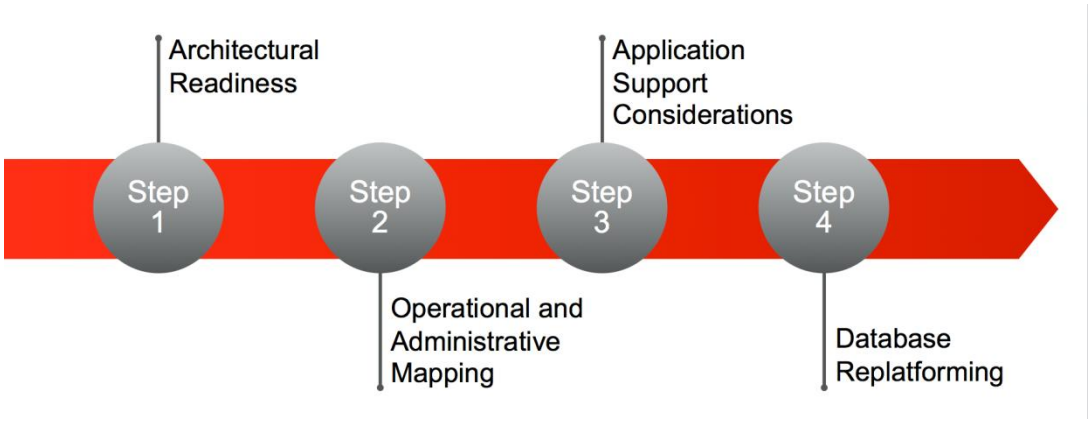

Figure 1. Simplified migration—four high-level steps

Each of these steps uses the knowledge acquired in current IT deployments to help customers make decisions about how to perform a migration. Each of these steps is covered in more depth later in this paper. But one of the first decisions to make is whether to invest in consulting and/or professional services for a migration or to simply do it yourself.

Oracle Migration Factory

Oracle Migration Factory is a professional service that brings three key advantages to a migration:

- A dedicated team of migration experts that can be deployed in a flexible onsite or offsite model
- Proven factory methodology and reusable tools built from 25 years of hands-on migration experience
- Real-time management tools and visibility to ensure both timely and quality delivery of migration projects

Tradeoffs of time, resource, and budget may dictate that investments in professional services are required for some or all of the scoping, planning, and execution of a migration. Customers can find out more about how Oracle Migration Factory can help at: http://oracle.com/migrationfactory.

Architectural Readiness

This first step is about recognition of the shared services and common frameworks that support an operating model but can affect a migration's effort, duration, and risk. Depending on the nature of the systems(s) being scoped for migration, customers may find, for example, that high availability, disaster recovery, storage management, and even systems management frameworks and architectures are very interdependent on the current platforms to be migrated. Examples of the range of impact are shown in Table 1 below.

TABLE 1. RANGE OF IMPACTS OF EXISTING ARCHTECTURES

	MINIMAL IMPACT: MODERN ORACLE ARCHTECTURES	MODERATE IMPACT: MODERN SINGLE OR THIRD PARTY	LARGE IMPACT: OLDER, CUSTOM, OR MULTIPARTY
DISASTER RECOVERY	Maximum Availability Architecture • Oracle Active Data Guard • Oracle GoldenGate • Plus data protection and HA	Replication and Geo Editions • EMC RecoverPoint • IBM Storage System Replication • Plus data protection and HA	Home Grown/Proprietary • rsync and other tools with modifications • In-house or custom code Proprietary practices
DATA PROTECTION	Maximum Availability Architecture • Oracle Automatic Storage Management • Oracle Secure Backup • Oracle Recovery Manager (Oracle RMAN)	Storage System or Software • Symantec Veritas NetBackup • IBM ProtecTIER • IBM Tivoli Storage Software	Storage Management Software • Software not yet certified for Oracle Solaris 11 (Tivoli) • Software binaries not yet available for Oracle Solaris
HIGH AVAILABILITY	Maximum Availability Architecture • Oracle Real Application Clusters • Oracle Clusterware • Oracle WebLogic Server clustering	Clustering Technologies • Symantec Veritas Cluster • IBM HACMP/PowerHA	Hodge-Podge • Part of in-house developed applications and practices • Old, multivendor solution

Depending upon the current dependencies of some or all of the architectures used in deployments to be migrated, customers may find the impact on migration to be nearly nonexistent in cases when Oracle Maximum Availability Architecture is already used. This low impact on migration due to the

fact that Oracle Maximum Availability Architecture is highly integrated with Oracle software technology and inherently platform independent.

On the other hand, if migration leads customers to the need to update some or all of their architectures and frameworks, this can be one of the largest steps in migration that could need its own plan. In this case, customers may also be gaining many benefits of modern architectures, but with the need for additional investments beyond just those of migration.

Many times, architectures that apply to the systems planned for migration are based on third-party products that are supported in depth on both AIX and Oracle Solaris 11. These usually have a moderate impact upon a migration as customers need to work with a third party to identify the dependencies, integration, and testing with the third-party or storage-centric technologies.

Customers can learn more about Oracle's architectures and best practices for backup and recovery along with disaster recovery at:

http://www.oracle.com/us/solutions/oos/oracle-backup-and-recovery/overview/index.html and http://www.oracle.com/us/solutions/oos/disaster-recovery/overview/index.html

Operational and Administrative Mapping

This second step is the one most think of when contemplating a migration. And while it is one of the most pervasive—affecting not only operations but also training of your administrative staff for the migrating systems—it is also one of the most mechanical, straightforward, and simple. There are four reasons why mapping AIX to Oracle Solaris is straightforward:

- Both are RISC UNIX
- Both are System V based
- Both are 64 bit
- Both are big-endian

The heritage of both AIX and Oracle Solaris insures that AIX- or Linux-familiar IT staff will find Oracle Solaris easy to learn. And, based on experience, Oracle Solaris will end up becoming a preferred platform to manage due to the sophistication that comes from relentless investments and the innovations that make Oracle Solaris the most advanced of UNIX technologies.

Of course, like they have to do with AIX, staff needs to become familiar with Oracle Solaris OS distribution, installation, and management; data management; virtualization (i.e., LPARs to LDOMs/zones) availability, and security tools.

Training Resources

A great place to start this training is the Oracle Learning Library. An excellent 30-minute introduction to the fundamentals of migrating to Oracle Solaris from AIX can be found here: http://oracle.com/oll/migrate2sparc.

Next, a review of the IBM AIX to Oracle Solaris Technology Mapping Guide is recommended. It is located here: http://www.oracle.com/technetwork/server-storage/solaris11/documentation/aix-solaris-mapping-guide-1896780.pdf.

Finally, staff members deserve the best: training and certification from Oracle University that covers all aspects of using Oracle Solaris 11. Resources can be found here:

http://www.oracle.com/technetwork/server-storage/solaris11/training/index.html.

Application Support Considerations

The third step involves customers' software applications, which are often the critical component of their businesses. Depending on where application code is hosted, customers may need to migrate application software from AIX to Oracle Solaris. How this is approached depends on whether these are applications provided by Oracle, provided by third parties (ISVs), or whether the application is unique to the business: home grown or proprietary. It is worth noting that many times, only the database portion of the application may be on AIX, so only the database needs to be migrated to Oracle Solaris.

If customers are fortunate enough to be using Oracle applications on AIX, they will find deep support for Oracle Solaris for virtually all Oracle applications. This is because many key systems at Oracle run on Oracle hardware. For example, Oracle's global single instance ERP system runs on Oracle Solaris on Oracle'sSPARC.

When using third-party applications that run on AIX, customers can review their application to see if they are certified for Oracle Solaris 11 here:

http://www.oracle.com/technetwork/server-storage/solaris11/applications-1551831.html.

Oracle Solaris has one of the largest ISV communities. This means third-party applications often are already certified to run on Oracle Solaris 11.

Finally, if in the past applications have run on Oracle Solaris, the Oracle Solaris Binary Application Guarantee reflects Oracle's confidence in the compatibility of applications from one release of Oracle Solaris to the next and is designed to make requalification a thing of the past.

If a binary application runs on an OS release of Oracle Solaris 2.6 or later, including the initial release and all updates, it will run on the latest releases of Oracle Solaris, including their initial releases and all updates, even if the application has not been recompiled for those latest releases. Binary compatibility between releases of Oracle Solaris helps protect customers' long-term investments in the development, training, and maintenance of their applications.

Database Replatforming

The fourth step concerns business data—the crown jewels of enterprise and business owners. Great care is given to migrating these assets across platforms. Happily, Oracle provides a variety of tools and utilities to migrate Oracle Database between heterogeneous platforms. Stated another way, this is all

about choices. Customers choose mechanisms depending on the size and complexity of the database(s) planned for migration, in addition to the business requirements for migration time objectives and migration restore point objectives for each database. Each available choice has strengths and limitations for including data types, time required, and potential costs.

Database Migration Methods

Database migration can occur as part of an Oracle version upgrade: Oracle Database 10*g* Release 2 to Oracle Database 12*c* or within the same Oracle version: Oracle Database 11*g* Release 2 to Oracle Database 11*g* Release 2. Oracle assumes most migrations will separate database version upgrades from database migrations.

There is no migration utility script or database upgrade assistant to perform a cross-platform migration of Oracle Database. Changing platforms requires the database to be rebuilt and/or the data to be moved using one of the following methods:

Export/Import with Oracle Data Pump

All Oracle Database versions support export/import, but for Oracle Data Pump, Oracle Database 10.1.0.2 or higher is required on AIX. Oracle Data Pump provides fast data and metadata movement between instances of Oracle Database. Customers can move specific tables or an entire database or set of databases. A detailed example using Oracle Data Pump for migration between heterogeneous operating systems is included in the next section.

Transportable Tablespaces

Oracle Database 10*g* and later versions support the Transportable Tablespaces feature of Oracle Database that can be used to copy a set of tablespaces from one Oracle Database to another.

Oracle RMAN Convert Database Functions

If Oracle Recovery Manager (Oracle RMAN) is used with Oracle Database 10*g* or later, Oracle RMAN can be used to transport tablespaces and entire databases between disparate platforms. Note that the RMAN 'Convert Database' function can be used because AIX and Solaris are both big-endian.

Streams Replication

Replication is the process of sharing database objects and data among multiple databases. And it can work well to move relational data between heterogeneous databases.

Create Table As Select (CTAS)

Using SQL statements such as *Create Table As Select* can facilitate migrations of simpler databases in much the same ways as database administrators use Extract, Transform, and Load (ETL) on a daily basis.

Oracle Active Data Guard Heterogeneous Primary and Physical Standbys

Oracle Active Data Guard can be used to facilitate migrations from one platform to another with minimal downtime or risk. If Oracle Active Data Guard is already part of disaster recovery, this can be a great choice to support heterogeneous data replication for migration.

Oracle GoldenGate

Oracle GoldenGate is a comprehensive software package for real-time data integration and replication in heterogeneous IT environments. Oracle recommends that customers get assistance with Oracle GoldenGate by working with an Oracle representative. Many times, this is an opportunity to use the Oracle Migration Factory to design and deploy real-time migration capability.

Migration Example: Oracle Database

Now, a real world example to highlight the steps required to migrate Oracle Database 11*g* Release 2 from an AIX system to an Oracle Solaris system using Oracle Data Pump. In this configuration, multiple databases on an IBM Power 740 system running AIX 7.1 with two 4.2 GHz Power7+ processor modules with 8 cores each were migrated to Oracle's SPARC T5-2 server running Oracle Solaris 11.1 with two 3.6 GHz SPARC T5 processor chips with 16 cores each. Both of these server platforms were connected for client access for validation and testing using a gigabit Ethernet network. SAN storage was configured using disk groups built from a single high-performance storage system for each server using 8 Gb Fibre Channel. These disk groups were built using Oracle Automatic Storage Management upon Oracle Grid Infrastructure. The configuration as tested is shown below in Figure 2.

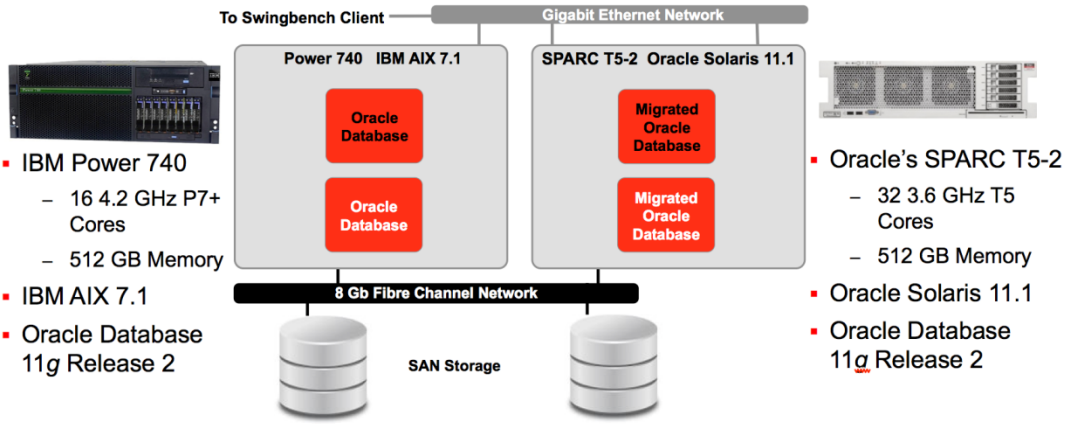

Figure 2. Migration testing configuration

While multiple databases were created and migrated as part of these tests, for the sake of brevity, the results and steps shown below are to migrate a single 100+ GB database with Oracle System ID (SID) of 'odbonaix'.

To facilitate reproducible results, Swingbench 2.5 was used to build a 100+ GB Order Entry database that was tested with a 1,000 user order entry OLTP workload that is part of Swingbench. Swingbench can be found here: http://dominicgiles.com/swingbench.html. For an example of how Swingbench

has been used on AIX systems, customers may refer to: http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WP101624.

Swingbench was installed on a single socket SPARC T5 server instance so it could access both the database server running on AIX and the database server created below on Oracle Solaris via the gigabit Ethernet network.

The Oracle Database 11*g* Release 2 server was installed on a bare metal AIX instance (no LPARs) with access to all the cores and memory of the IBM Power 740 server. Installation was per standard practices outlined in the Oracle Database installation documentation. Swingbench's Order Entry Install Wizard was used to create the 100+ GB order entry schema. Below is a screenshot showing the completion of the creation of the order entry database used for this testing. Note the total run time for this schema creation process was 86 minutes and 32 seconds.

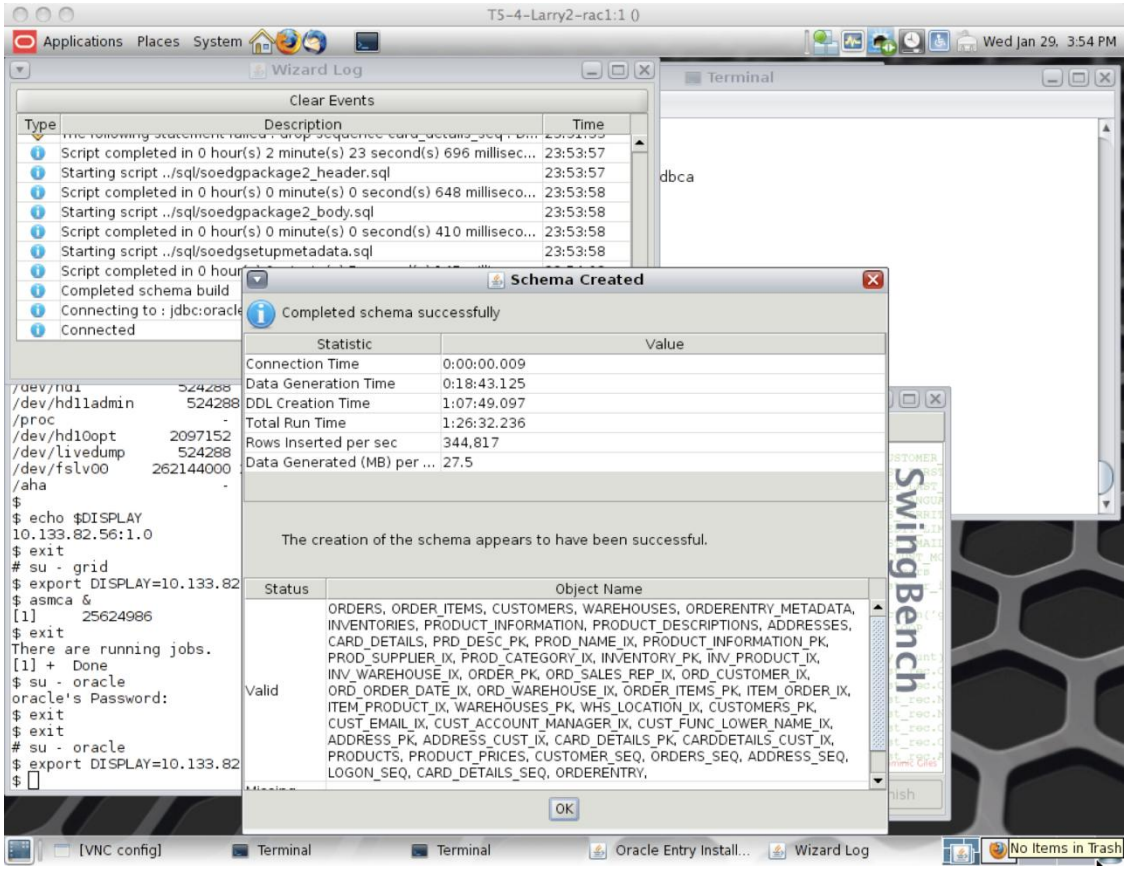

Figure 3. Creation of a 100+ GB order entry schema on AIX

Finally, prior to exporting the database using Oracle Data Pump, the database on AIX was validated using Swingbench's order entry benchmark with the successful test results shown below.

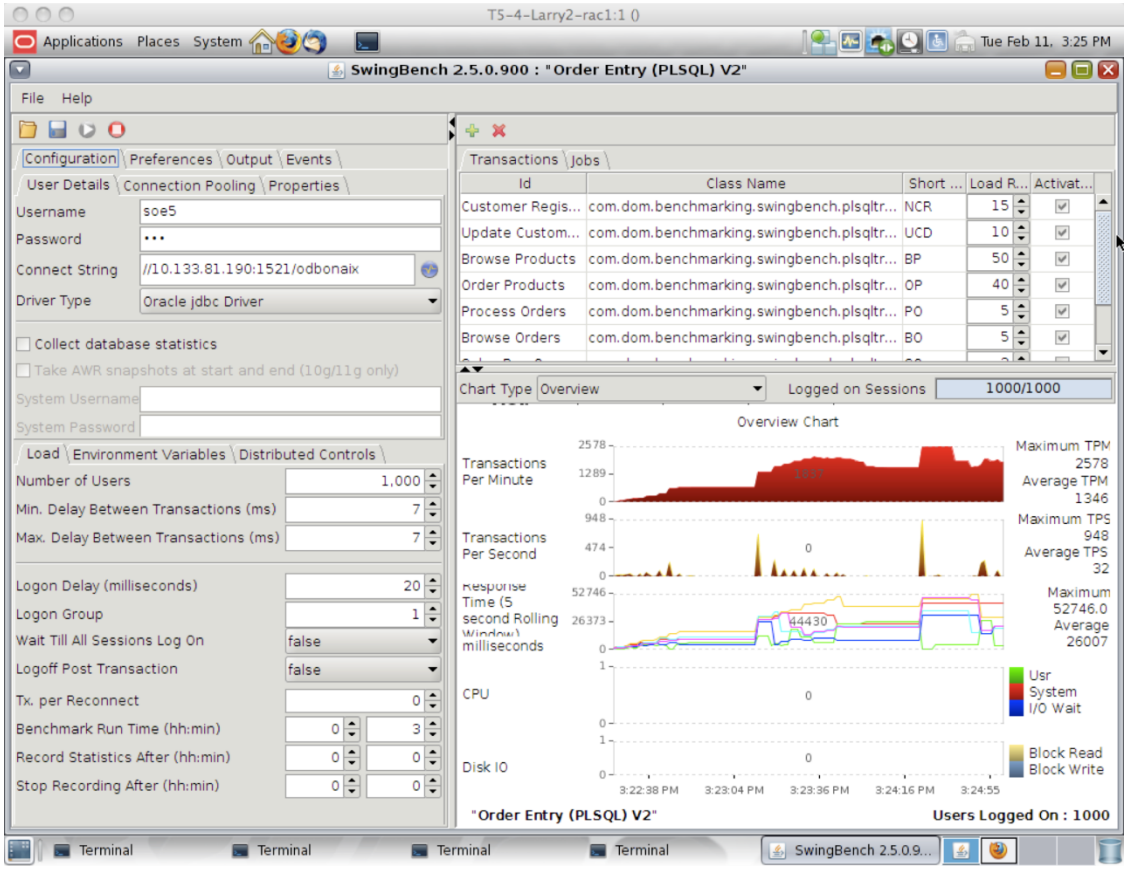

Figure 4. Validating Oracle Database on AIX using Swingbench

Preparing Oracle Solaris Database Infrastructure

One powerful artifact of jointly engineering Oracle software technology—in this case, the Oracle Database 11*g* Release 2 and Oracle systems: storage, servers, virtualization, operating systems, and networking—is Oracle Optimized Solutions. To insure the lowest risk, getting the most performance with the least resource, and to insure optimum productivity, the Oracle Optimized Solution for Oracle Database was used to build and install the Oracle Database on Oracle Solaris and Oracle's SPARC T5-2 server. Detailed information about this solution that covers Oracle's reference architecture and best practices for configuration and installation of Oracle Database, in this case specifically on Oracle's SPARC T5-2 server, can be found at:
http://www.oracle.com/us/solutions/oos/database/overview/index.html.

Like the AIX-based database server above, the Oracle Solaris instance and the Oracle Database installed on that instance had access to all the cores and memory in the SPARC T5-2 server.

It is worth noting that Oracle also tested importing into a virtualized instance consisting of a single SPARC T5 socket using Oracle VM Server for SPARC (logical domains or LDOMs). Detailed information about this type of Oracle Optimized Solution for Enterprise Database Cloud can be found here:

http://www.oracle.com/us/solutions/oos/edb-cloud/overview/index.html.

Oracle Data Pump Operations

As was mentioned earlier, exporting and importing databases using Oracle Data Pump provides a fast and simple way to move databases between systems. In this case all aspects of the database were migrated between heterogeneous operating systems, each running Oracle Database 11*g* Release 2. The 'full' option was used to export and import not only the actual relational data, but also all the metadata:

- Database profiles
- Database stored procedures
- Database links
- Database synonyms
- Database roles
- Database rollback segment definitions
- Database system audit options
- Database system privileges
- Database tablespace definitions
- Database tablespace quotas
- Database user definitions
- All database user schemas
- All database objects in the user schemas: tables, data, grants, and indexes

Because the source database on AIX to be migrated has been functionally validated using the order entry benchmark in Swingbench, the database can be prepared for export.

First verify the correct SID:

```
$ ORACLE_SID=odbonaix
$ echo $ORACLE_SID
odbonaix
```

Then connect to the database on the AIX system:

```
$ sqlplus / as sysdba
SQL*Plus: Release 11.2.0.1.0 Production on Mon Feb 10 09:48:30 2014
Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.1.0 - 64bit
Production
With the Partitioning, Automatic Storage Management, OLAP, Data Mining
and Real Application Testing options

SQL>
```

Create a directory in the database where to export the data files:

```
SQL> create directory dpump_dir as '/hdisk0/datafiles/bkp';

Directory created.
```

Create a user, in this case, 'soe5' with privileges on the database:

```
SQL> alter user soe5 account unlock;

User altered.

SQL> grant connect, resource to soe5;

Grant succeeded.

SQL> grant read,write on directory dpump_dir to soe5;

Grant succeeded.

SQL> grant create session, resource, export full database to soe5;

Grant succeeded.

SQL> grant EXP_FULL_DATABASE to soe5;

Grant succeeded.

SQL> exit
Disconnected from Oracle Database 11g Enterprise Edition Release
11.2.0.1.0 - 64bit Production
With the Partitioning, Automatic Storage Management, OLAP, Data Mining
and Real Application Testing options
$
```

The command used (expdp) to export the database on AIX was:

```
expdp system/oracle1@odbonaix full=Y
directory='dpump_dir'dumpfile=par_odbonaix%U.bmp parallel=4
logfile=par_expdp-odbonaix.log
```

The 'full=Y' option indicates that a complete database export is requested. 'directory' indicates the directory where the database files to be exported are located. 'dumpfile' indicates the names of the data files that are exported from AIX, and will be used for import. With the 'parallel=4' option, the Oracle Data Pump will pump data using four different threads, which speeds up the export operation. The 'logfile' parameter will include the results of the execution of this command. Note that compression or encryption options were not used with this baseline export test.

For the 100+ GB Swingbench order entry database, this export operation took 11 minutes.

After the export operation, the following appears:

```
-rw-r-----    1 oracle   oinstall 7800848384 Feb 10 12:12 par_odbonaix01.bmp
-rw-r-----    1 oracle   oinstall 5790195712 Feb 10 12:12 par_odbonaix02.bmp
-rw-r-----    1 oracle   oinstall 7517241344 Feb 10 12:12 par_odbonaix03.bmp
-rw-r-----    1 oracle   oinstall  636608512 Feb 10 12:12 par_odbonaix04.bmp
```

```
-rw-r-----    1 oracle   oinstall 1348444160 Feb 10 12:12 par_odbonaix05.bmp
-rw-r-----    1 oracle   oinstall  751849472 Feb 10 12:11 par_odbonaix06.bmp
```

As above, the Oracle Solaris system needs to be prepared by creating the user, privileges, and directory to place these files for import. The steps are very similar to AIX above.

First verify the correct SID:

```
-bash-4.1$ echo $ORACLE_SID
odbonaix
```

Then connect to the database on the Oracle Solaris system:

```
-bash-4.1$ sqlplus / as sysdba
SQL*Plus: Release 11.2.0.2.0 Production on Tue Feb 10 10:39:40 2014
Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.1.0 - 64bit
Production
With the Partitioning, Automatic Storage Management, OLAP, Data Mining
and Real Application Testing options

SQL>
```

Create a directory in the database where to export the data files:

```
SQL> create directory dpump_dir as '/downloads/datafiles/aix;

Directory created.
```

Create a user, in this case, 'soe5' with privileges on the database:

```
SQL> alter user soe5 account unlock;

User altered.

SQL> grant connect, resource to soe5;

Grant succeeded.

SQL> grant read,write on directory dpump_dir to soe5;

Grant succeeded.

SQL> grant create session, resource, import full database to soe5;

Grant succeeded.

SQL> grant create table to soe5;

Grant succeeded.

SQL> grant IMP_FULL_DATABASE to soe5;

Grant succeeded.

SQL> grant Execute Any Procedure to soe5;
```

```
Grant succeeded.
```

The following command is to insure that Swingbench runs.

```
SQL> grant execute on sys.rdms_lock to soe5 with grant option;

Grant succeeded.

SQL> exit
Disconnected from Oracle Database 11g Enterprise Edition Release
11.2.0.2.0 - 64bit Production
With the Partitioning, Automatic Storage Management, OLAP, Data Mining
and Real Application Testing options
-bash-4.1$
```

'ftp' was used to copy the files as binaries from the AIX server to the Oracle Solaris server, validating that all the files above are the right size and placed in the location defined above: '/downloads/datafiles/aix'.

The command used (impdp) to import the database on Oracle Solaris was:

```
impdp system/password@odbonaix full=Y directory='dpump_dir'
dumpfile=par_odbonaix%U.bmp parallel=4 logfile=par_impdp-odbonaix.log
```

The parameters are nearly identical to those used for the export on AIX. This import of the complete 100+ GB database took 36 minutes and 22 seconds, again with no compression or encryption.

Post-Migration Validation

After the migration is complete, the database can be brought online. The database is queried directly to check the number of rows, etc., to make sure the database appears intact. And finally, there is one additional step that is required before the migrated database can be validated with the Swingbench order entry benchmark:

```
SQL> grant execute on sys.dbms_lock to soe5 with grant option;

Grant succeeded.
```

Below is the 1,000 active user validation on the 100+ GB with Swingbench:

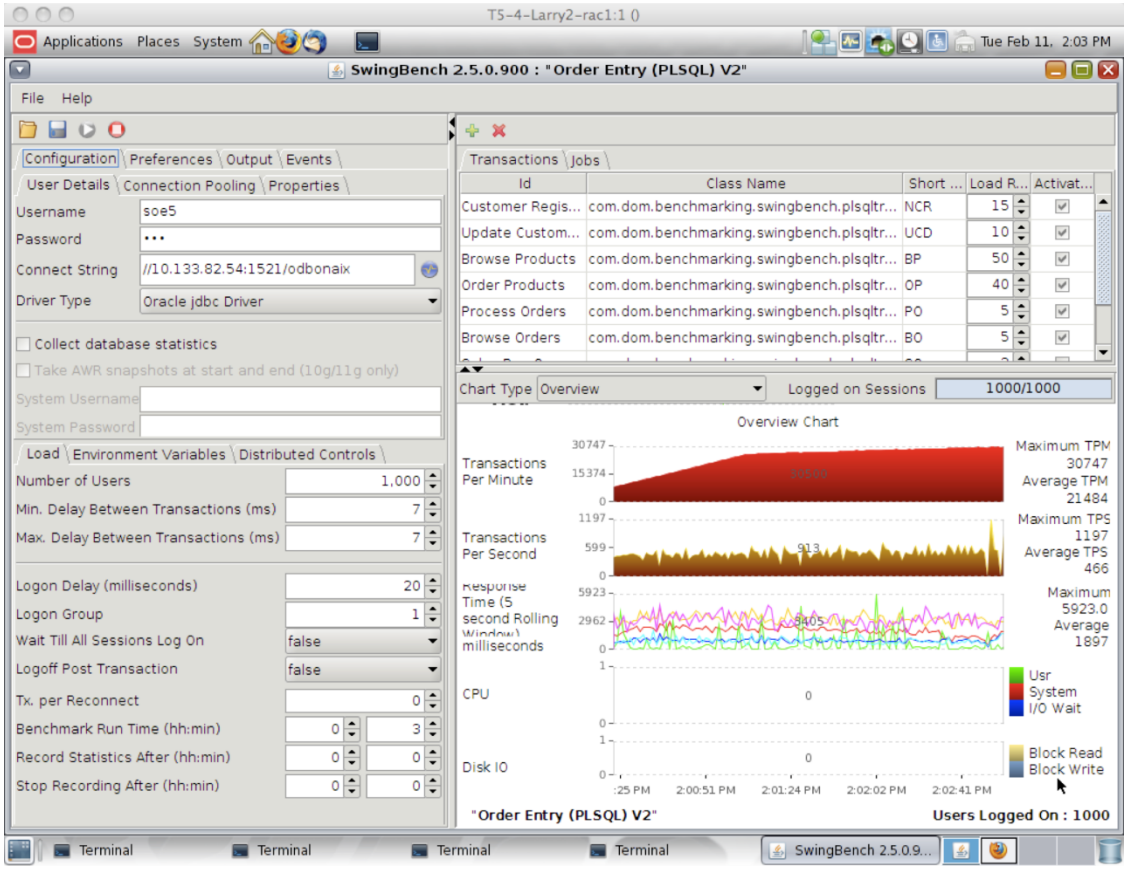

Figure 5. Post-migration validation of Oracle Database on Oracle Solaris

Table 2 summarizes and compares times to create and migrate a 100+ GB Swingbench 2.5 order entry database.

TABLE 1. KEY TIMINGS FOR 100+ GB SWINGBENCH ORDER ENTRY DATABASE

TABLE 2. KEY TIMINGS FOR 100+ GB SWINGBENCH ORDER ENTRY DATABASE

STEP	DURATION	% CREATION TIME
Database Creation	86 minutes, 32 seconds	-
Exporting Database	11 minutes	12%
Importing Database	36 minutes, 22 seconds	42%

In this case, it is much quicker to export and import than to create the database with a sophisticated benchmark tool like Swingbench. Results will vary with each situation, but what is evident is the ease, speed, and simplicity of migrating a running Oracle Database from AIX to Oracle Solaris.

Conclusion

Customers can simply and easily achieve dramatic improvements in cost reduction, risk reduction, and productivity of application and business systems by migrating from AIX to Oracle Solaris. And if an upgrade is overdue of AIX/Power systems running Oracle technology and/or Oracle applications, the opportunity for improvements in cost, risk and productivity by migrating is even greater.

With the proper planning and assessment, customers can migrate with ease and confidence. And by using training resources available from Oracle University and by applying Oracle Optimized Solutions as end-state architecture, customers have all the tools to migrate to a better future. Moreover, customers have the Oracle Migration Factory experts to assist with their deep experience, tools and and methods for migration.

To find out more about how to begin migration now and receive the benefits of Hardware and Software, Engineered to Work Together, customers can check out: http://www.oracle.com/aixtosolaris.

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