

# Deploying an Oracle 10g RAC Database on Solaris with an LSI Logic Storage Array

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Installation and Configuration Guide

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## DEPLOYING AN ORACLE 10G RAC DATABASE ON SOLARIS WITH AN LSI LOGIC STORAGE ARRAY

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# *Deploying an Oracle 10g RAC Database on Solaris with an LSI Logic Storage Array*

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## **Introduction**

IT departments that already run an Oracle 10g database on Solaris might want to upgrade their storage array to an LSI Logic storage array. Any proposed upgrade raises the question of interoperability with the existing system.

Using a test setup, this document shows that it is possible to successfully install Oracle 10g Clusterware and the Oracle 10g database application with an LSI Logic Fibre Channel storage array.

This document shows how to overcome the following key obstacles to a successful installation:

- **Incorrect configuration of Solaris kernel parameters for Oracle.** The key challenge of this configuration is tuning the Oracle kernel parameters on the hosts. Kernel parameters must fit the needs of your database environment to achieve the best performance optimization. Only certain minimum requirements for kernel tuning must be met to install correctly. Theoretically, you could wait to adjust the kernel parameters until after installation. However, kernel tuning needs to be understood in the beginning as much as possible. Kernel tuning's biggest impact is on performance.
- **Incorrect file permissions for the various components.** When the Oracle Cluster Register OCR file permission is set improperly, installation of Oracle Cluster might fail, or, even if the installation completes, CRS does not run properly. The same rules apply to the voting disks.
- **Not getting disk access to the storage array from all shared devices.** If you do not map all shared volumes to the host group, not all hosts see the correct LUNs. Also, if the Host Bus Adapter (HBA) driver you install is not compatible with the BIOS and firmware or does not use the recommended settings, the host might have problems discovering the LUNS or might experience unexpected errors. Furthermore, if you forget to disable auto failback when you install and configure the failover driver, LUN thrashing could result in the event of a path failure on a single host.

- **Incorrect partition of the LSI Logic storage array.** Map all shared LUNs through SANshare storage partitioning to the host group to which all hosts in the cluster belong. If a shared LUN is mapped only to a single host, the other LUNs can not access this LUN, causing problems during installation.
- **Problems installing Oracle Clusterware and Oracle Database software.** Errors during configuration of a host setup and SANshare storage partitioning cause various problems during installation of Oracle Clusterware and Oracle Database software. As mentioned in previous bullets, disk access to the correct hosts is crucial. File permissions and ownership are just as important. Kernel parameters must meet the minimum levels that Oracle recommends. An experienced database administrator can identify the correct kernel parameter settings for your environment.

## Benefits

This method of deploying Oracle 10g database on Solaris allows you to use an LSI Logic storage array and thus reap their many benefits. The LSI Logic storage array combined with Oracle RAC provides a reliable solution for the high availability needs of the small-to-medium business installation.

Performance benefits of the LSI Logic storage array:

- Performs among the fastest storage arrays in its class
- Includes front-to-back 4-gigabit storage array controllers that are capable of sustained throughput of up to 1600MB/s
- Delivers up to 42,254 sustained IOPS (demonstrated per SPC-1 benchmarking)

Benefits of the SANshare Storage Partitioning premium feature:

- Provides the ability to map individual LUNs (volumes) to a specific host or to a group of hosts, also known as Host Groups
- Specifies each host with an operating system allowing a single LSI Logic storage array to support volumes mapped to multiple hosts safely running a myriad of operating systems. The Oracle Database application is supported across all operating systems for a given controller firmware. Please refer to the compatibility matrix for the supported operating system and the controller firmware you are running. Applications do not manage or manipulate the data path. Oracle RAC is not considered an application and therefore is supported on only the operating systems that have been tested. Tested operating systems are as follows:
  - Windows 2003
  - Redhat Linux Advanced Server 3 and 4
  - SUSE Linux Enterprise Server 8 and 9
  - Solaris Sparc 8, 9, and 10

Benefits of the Remote Volume Mirroring (RVM) premium feature:

- Allows data mirroring from one storage array to another.
- Relieves the host of creating a mirror copy and allows the system administrator to keep an exact copy of the production data.

## Disclaimers

This document serves as an example only, *not* as a best practices guide or as a configuration guide. The steps in this document were performed on a test setup. There was no live data involved. This document implies no warranties. These instructions are not guaranteed to work in every situation. For the latest information and instructions on installing Oracle products, refer to Oracle installation guides. Go to: <http://otn.oracle.com>

This document does not cover the following situations:

- An existing non-RAC Oracle installation with an LSI Logic storage array  
(This situation requires support from Oracle to convert the database to a RAC database.)
- An existing Oracle RAC and/or Oracle install with an LSI Logic storage array

The complexity of the installation described in this document requires that the installer have considerable prior expertise. Do not attempt to follow this procedure unless you are properly qualified. Installing this type of configuration for production requires special expertise for tuning an LSI Logic storage array, tuning the Oracle Database parameters, and tuning the host server to best fit the needs of your configuration. This type of installation requires expertise on both data migration and on Oracle. The installer must have worked with Oracle Databases, Oracle Clusterware, Solaris, and LSI Logic Fibre Channel storage arrays.

## Test Bed

The test setup consists of Solaris (Sparc) 10. However, the instructions in this document also are applicable to Solaris 8 and Solaris 9. For the latest patches and updates, go to: <http://otn.oracle.com>. Raw devices are used for all registry files, voting files, and database files.

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**NOTE** The test setup uses the cluster software supplied with Oracle 10gR2. In previous releases of Oracle, this cluster software was called Cluster Ready Services (CRS). However, the cluster software has been renamed to Oracle Clusterware. Therefore, the terms *Clusterware* and *CRS* are used interchangeably in this document.

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## Software

Oracle 10g DB - 10.1.0.4.0, 10.2.0.1.0

Oracle 10g Clusterware - 10.1.0.4.0, 10.2.0.1.0

## Two Servers

SunFire 280R

Solaris 10\*

\*Solaris 8 and 9 are also supported based on this testing.

## Two LSI Logic Storage Arrays

Firmware – 6.15, 6.16, or 6.19

SANtricity Storage Manager – 9.15, 9.16 or 9.19

RDAC Failover Driver on Solaris 8 and 9

MPXIO Failover only on Solaris 10

## Two QLogic 2342 Fibre Channel HBAs

Refer to the Engenio Interoperability Matrix for detailed driver version and settings information. Go to:

[http://www.engenio.com/html/partners/compatible\\_matrix/interop.asp](http://www.engenio.com/html/partners/compatible_matrix/interop.asp)

## Configuring the Host

To completely configure the host, you must install and configure the operating system, the HBA driver, and the SANtricity Storage Manager software.

- 1 Install the operating system. Refer to the operating system documentation. Verify with Oracle that the operating system is certified.
- 2 Install the HBA driver. For supported HBAs and drivers, refer to the Engenio Interoperability Matrix. Go to:

[http://www.engenio.com/html/partners/compatible\\_matrix/interop.asp](http://www.engenio.com/html/partners/compatible_matrix/interop.asp)

For the HBA Settings document, contact Support. See “[Contact Information](#)” on page 17.

- 3 Install the multipath driver. For supported multipath drivers, refer to the Engenio Interoperability Matrix. Go to:  
[http://www.engenio.com/html/partners/compatible\\_matrix/interop.asp](http://www.engenio.com/html/partners/compatible_matrix/interop.asp)
- 4 Install the SANtricity Storage Manager software. Also known as SMinstaller, it consists of the following individual packages:
  - SMclient – Manages the storage array. Only needs to be installed on a single management storage array.
  - SMutils – Collection of utilities to verify what the host sees from the storage array. Installing SMutils is highly recommended, and SMutils can be installed independently of the other packages.
  - SMruntime – Java runtime environment
  - SMagent – Required for inband management of the storage array
  - RDAC – Host multipath failover software
  - MPXIO – Included with Solaris 10, this is the only supported failover driver with Solaris 10 (Sparc)

## Configuring the Storage Array

- 1 Using the SANtricity Storage Manager Client, create the following volumes on the storage array.
  - a Oracle Home Volume – Install Oracle on a volume from an LSI Logic storage array. Each node should have its own Oracle “Home” volume.
  - b Oracle System Volume, Oracle Data Volume – Depending on the configuration, Oracle System Volume and Oracle Data Volume can be raw devices, clustered file system devices, or *Automatic Storage Management* (ASM) devices.

**NOTE** Automatic Storage Management (ASM) is a feature in Oracle Database 10g that provides the database administrator with a simple storage management interface that is consistent across all server and storage platforms. As a vertically integrated file system and a volume manager, purpose-built for Oracle database files, ASM provides the performance of asynchronous I/O with the easy management of a file system. ASM provides capability that saves the database administrator time and provides flexibility to manage a dynamic database environment with increased efficiency. File systems and volume managers utilize the disk that is served up from the storage array. The disk is then filtered through the multi-path driver. As long as the operating system, the HBA, and the multi-path driver are supported by LSI Logic, Oracle ASM will work.

- For supported HBAs, go to:

[http://www.engenio.com/html/partners/compatible\\_matrix/interop.asp](http://www.engenio.com/html/partners/compatible_matrix/interop.asp)

- For documentation on ASM go to:

<http://www.oracle.com/technology/products/database/asm/index.html>

Configurations for production vary depending on the following factors:

- Percentage of reads and writes
- Size of the database
- Expected growth
- Purpose of the database, that is, data warehousing, OLTP and so forth.
- Number of simultaneous connections
- Server configuration (memory, number of processors, speed of the processors)
- Network infrastructure
- Whether queries are optimized to utilize indexes

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**IMPORTANT** Consult with an experienced Oracle database administrator to determine the best configuration.

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- 2** Create host port partitions on the storage array to map the volumes to a single host or to a group of hosts for Oracle RAC.
  - a** In the host group partition, include a host partition for each node in the cluster.
  - b** To each host partition, add the appropriate World Wide Port Names for volume-to-LUN mappings.
- 3** Map the appropriate volumes to the hosts and the host groups.
  - a** Map Oracle Home volumes to the individual hosts.
  - b** Map shared Oracle Data volumes to the host group.

Figure 1 shows how volumes are mapped for the test setup. In the test setup, all of the volumes are mapped to the **Host Group Shrek-Donkey\_Cluster**. All hosts in this host group can access these volumes.

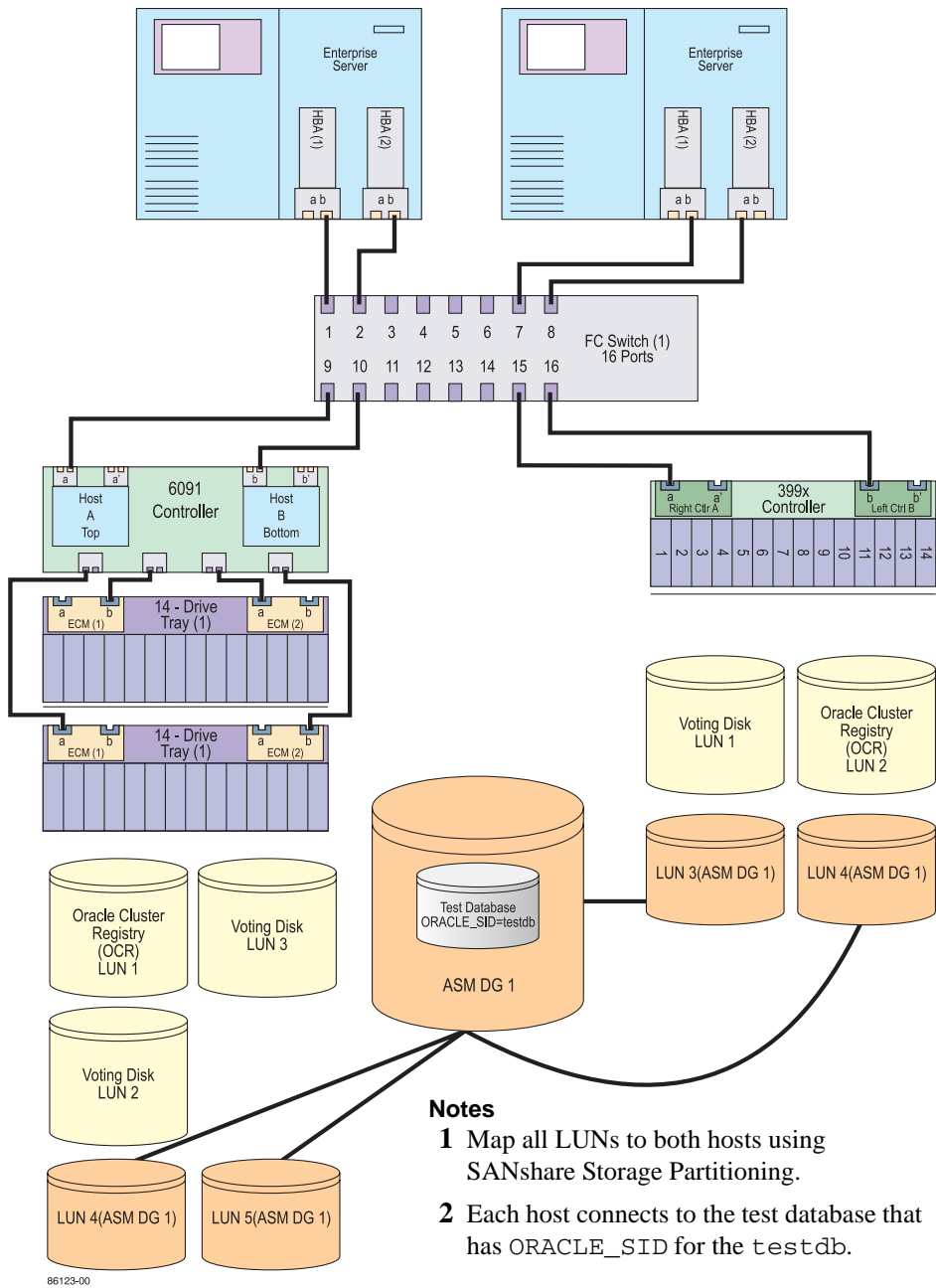


Figure 1 Mapping for the Test Setup Verifying the Host and Storage Array Setup

Verify the storage array access by verifying that the host has access to the mapped volumes.

- 1 Run the `SMdevices` command to see all of the volumes that are visible to the host.

---

**NOTE** The `SMdevices` command might not work with all multipath drivers. `SMdevices` works with RDAC, MPXIO, and Veritas DMP.

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- 2 Examine the `SMdevices` output to verify that the hosts see the shared volumes as having the same device identification.

For example, to a Solaris host, LUN 1 (Volume Name = Oracle Index) is seen as `/dev/rdsk/c1t1d0s0` on host #1. The same volume-to-LUN mapping must be `/dev/rdsk/c1t1d0s0` on host #2. *Oracle RAC is not set up correctly unless all shared volumes have the same device identification.*

- 3 Double-check to confirm that the shared volumes have the same device identification.
  - If the Oracle Cluster File System (OCFS) is supported on your operating system, use OCFS to verify that the shared volumes have the same device identification.
  - If the OCFS is not supported on your operating system, use soft links from common named access points. For example, host 1 sees LUN 1 as `/dev/rdsk/c1t1d0s0` and host 2 sees LUN 1 as `/dev/rdsk/c1t1d0s0`. Create a directory called `/ora-index` and link the new directory to the `/dev/rdsk/c1t1d0s0` on each host. Oracle uses `/ora-index` as the configured access to that device.

## Setting up and Installing Oracle

Refer to the Oracle documentation for the latest information on prerequisites and installation of Oracle Database and Oracle Clusterware packages.

### Preparing for Installation

Table 1 Overview of the Test Setup

RAC NODE Public/Private	Database	ORACLE_BASE	Oracle Datafile Location	ORACLE_SID
roswell/roswellprv	orcl	/db1/oracle	/database	orcl1
area51/area51prv	orcl	/db1/oracle	/database	orcl2

## Setting up the Oracle User

- 1 As the root user, add a dba group and an oracle account to both hosts.
  - a To add the dba group, run this command: `groupadd -g 500 dba`
  - b To add the oracle account, run this command:  
`useradd -d /orahome -m -g 500 -u 1040 -s /bin/bash oracle`
- 2 Set the password for the oracle user by running the `passwd oracle` command.

---

**IMPORTANT** Correct password setup is crucial. See “[Appendix A: Example Oracle User Profile](#)” on page 18.

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## Setting up the Host Network

### Sample /etc/hosts/ File

```

127.0.0.1      localhost
172.22.203.93 chad
172.22.203.94 orihime
172.22.203.91 ichigo      loghost
172.22.203.92 ishida
192.168.1.94  orihime-priv
192.168.1.91  ichigo-priv
192.168.1.92  ishida-priv
192.168.1.93  chad-priv
172.22.203.193 chad-vip
172.22.203.194 orihime-vip
172.22.203.191 ichigo-vip
172.22.203.192 ishida-vip
172.22.188.68 area51
172.22.188.69 clapton
192.168.1.69  claptonprv  clapton
192.168.1.68  area51prv   area51

```

---

**NOTE** Oracle requires a virtual IP address, which is entered during the installation of Oracle Clusterware. The virtual ethernet interface must be on the public network and on a valid IP address.

---

## Granting Both Hosts Access to One Another

On each node for the oracle user account, enable the following services:

- 1 Enable `rsh` and `rlogin`.
- 2 Create an `/etc/hosts` `equiv` file on each node.

Input	Comments
<code>+area51 oracle</code>	<code>#Public hostname for node 1</code>
<code>+area51prv oracle</code>	<code>#Private hostname for node 1</code>
<code>+clapton oracle</code>	<code>#Public hostname for node 2</code>
<code>+claptonprv oracle</code>	<code>#Private hostname for node 2</code>

- 3 To verify that both hosts have access to one another, run the following commands from each host as the oracle user:

```
rsh <public_nodename> ls /  
rsh <private_nodename> ls /
```

## Installing Oracle Clusterware

Before you install Oracle Clusterware, you must ensure that all your servers are seeing the same devices. Due to multiple factors, sometimes different servers do not recognize the same LUN as the same device. For Oracle RAC to operate properly, the servers must recognize each device through the same discovery path. To prevent this problem, you must create links to each device on each server. These links must be the same on all servers.

Table 2 shows the devices that Oracle uses to configure the voting disks and the registry disks for RAC, with the links you must create. LUN 1, LUN 3, and LUN 4 have different names for each server. However, because the same link is used by each server, the situation remains workable.

Table 2 Oracle Devices

Storage Array LUN #	Devices Seen by Server A	Devices Seen by Server B	Link
0	/dev/rdisk/c3t1d0s1	/dev/rdisk/c3t1d0s1	/db1/reg_master
1	/dev/rdisk/c1t1d1s1	/dev/rdisk/c2t1d1s1	/db1/reg_bkup
2	/dev/rdisk/c3t1d0s1	/dev/rdisk/c3t1d0s1	/db1/ vote_master
3	/dev/rdisk/c1t1d3s1	/dev/rdisk/c2t1d3s1	/db1/vote_bkup1
4	/dev/rdisk/c1t1d4s1	/dev/rdisk/c2t1d4s1	/db1/vote_bkup2

Device persistence is another issue. After you reboot a single host, devices sometimes do not remain the same. For information on persistent binding, consult the manual for the Fibre Channel HBA in use.

After you make sure that the essential devices are linked and are persistent, install the Oracle Clusterware according to the following instructions.

- 1 Make sure that all volumes are mounted and that all directories are owned by `oracle:oinstall` and have the right permissions.
- 2 Store the Oracle Clusterware and Oracle Database images in the `oracle` user's home directory and have them be owned by `oracle:oinstall`.
- 3 Log in as the `oracle` user. *Do not* use `su - oracle`. Use `ssh oracle@nodename`.
- 4 Run the `unset` command to clear the following environment variables:
  - `unset ORA_CRS_HOME`
  - `unset ORACLE_HOME`
  - `unset ORA_NLS10`
  - `unset TNS_ADMIN`
- 5 Verify that `ORACLE_SID` is unique on each host and that `ORACLE_BASE` is set to the correct location.
- 6 Go to the Oracle Clusterware image's location, and run `runInstaller` to start the **Oracle Universal Installer** wizard. The following table shows the options you must choose on each page of the wizard.

Table 3 Oracle Universal Installer Wizard

Page	Action
initial screen	Click <b>Next</b> .
<b>Specify Inventory Directory and Credentials</b>	Accept the default inventory location. This location is shared between the Oracle Clusterware home and the Oracle Database home. The location shown should be \$ORACLE_BASE/oraInventory.
<b>Specify Home Details</b>	Specify the Oracle Clusterware mount point (/crs in this case).
<b>Product-Specific Prerequisite Checks</b>	All checks should pass if everything is configured correctly. If not, fix the issue and click <b>Retry</b> .
<b>Specify Cluster Configuration</b>	Specify the hosts. Click <b>Use Cluster Configuration File</b> if you have many hosts. A “nodes are not clusterable” error appears if SSH or RSH are not configured correctly.
<b>Specify Network Interface Usage</b>	Specify the Interface Type appropriately as Public or Private.
<b>Specify Oracle Cluster Registry (OCR) Location</b>	Choose <b>External Redundancy</b> . In the <b>Specify OCR Location</b> field, type the pathway and filename to the registry mount point. In the <b>Specify OCR Mirror Location</b> field, type the pathway and filename to the backup registry mount points.
<b>Specify Voting Disk Location</b>	Specify the location of the voting disk files that you created when you created the volume on this volume group.
<b>Execute Configuration Scripts</b>	Follow the on-screen directions to run scripts on both servers. Scripts might take up to ten minutes to run completely. After the scripts have run, <i>do not</i> click <b>OK</b> yet.

- 7 Run the vipca application manually. Running vipca manually is necessary because Oracle 10.2.0.1 has a known bug (4437727) at the end of running the scripts. The last host you run the scripts on shows the following message:

---

```
The given interface(s), "eth0" is not public. Public
interfaces should be used to configure virtual IPs.
```

---

- a As root user on the last host the scripts were run on (Host2 in this setup), run the following command:

`$ORA_CRS_HOME/bin/vipca`

- b** Click **Next** on the initial screen.
- c** Use the **VIP Configuration Assistant** wizard to configure virtual IP addresses through `vipca`. The following table shows the options you must choose on each page of the wizard.

Table 4 VIP Configuration Assistant Wizard

Page	Action
<b>Network Interface</b>	Select both interfaces, and then click <b>Next</b> .
<b>Virtual IPs for Cluster Nodes</b>	Configure the IP Alias Name and the virtual IP address as you specified in <code>/etc/hosts</code> .
<b>Summary</b>	Confirm your actions.
<b>Progress Dialog</b>	Watch as <code>Vipca</code> creates the appropriate application resources.
final screen shows configuration results	Click <b>Finish</b> .
<b>Execute Configuration Scripts</b>	Click <b>OK</b> . The configuration assistants verify proper configuration.

- 8** Check the Oracle Clusterware status by running the following command on either host:

`$ORA_CRS_HOME/bin/crs_stat -t`

- 9** Go to [“Installing the Oracle Database Software”](#) on page 14.

## Installing the Oracle Database Software

- 1 Verify that you unset the environment variables as you did before you ran the Oracle Clusterware installer. The Oracle Database software image or folder should be owned by `oracle:oinstall`.
- 2 As the `oracle` user, run `runInstaller` to open the **Oracle Universal Installer** wizard. The following table shows the options you must choose on each page of the wizard.

Table 5 Oracle Universal Installer Wizard

Page	Action
initial screen	Click <b>Installed Products</b> to make sure that the Oracle Clusterware is installed successfully.
<b>Select Installation Type</b>	Select <b>Enterprise Edition</b> .
<b>Specify Home Details</b>	Specify <code>\$ORACLE_BASE/&lt;any folder&gt;</code> as the location of the SW home directory for your database.
<b>Specify Hardware Cluster Installation Mode</b>	Select <b>Cluster Installation</b> and select all hosts.
<b>Product-Specific Prerequisite Checks</b>	All checks should pass if everything is configured correctly. If not, fix the issue and click <b>Retry</b> .
<b>Select Configuration Option</b>	Choose <b>Install database software only</b> . You will configure the database later with DBCA.
<b>Execute Configuration Scripts</b>	Follow the on-screen directions.

- 3 Go go [“Creating the Oracle Database with DBCA.”](#)

## Creating the Oracle Database with DBCA

For the test setup, the Database Configuration Assistant (DBCA) was used to create the clustered database. As the `oracle` user, run `dbca` (`$ORACLE_HOME/bin/dbca`) to open the Oracle Database Configuration Assistant, which guides you through the process of the creating the database. The following table shows the options you must choose on each page of the wizard.

Table 6 Database Configuration Assistant Wizard (1 of 2)

Page	User Action
<b>Welcome</b>	Select <b>Oracle Real Application Clusters database</b> .
<b>Operations</b>	It is best to set up ASM <i>before</i> setting up the database. <ul style="list-style-type: none"> <li>• If you are using ASM, select <b>Configure Automatic Storage Management</b>.</li> <li>• If you are not using ASM, skip ahead in this table to the next instance of the Operations page for instructions.*</li> </ul>
<b>Node Selection</b>	Click <b>Select All</b> to select all hosts.
<b>Create ASM Instance</b>	Specify a password. The test setup uses an SPFILE (Oracle recommended) for the ASM instance. You must specify a shared OCFS2 location for the SPFILE. In the test setup, the location is / <i>vote</i> /db <sub>s</sub> , where / <i>vote</i> is the OCFS2 mount point for the voting disk.
<b>Create Disk Group</b>	Configure ASM disks into disk groups. DBCA recognizes these disks. Choose a <b>Redundancy</b> option:  If you choose <b>External</b> , create at least 2-3 disk groups, dividing the disks as you wish.  If you choose <b>High</b> or <b>Normal</b> redundancy, you must specify failover groups (see ASM documentation). Create at least one failover group per storage array used.
<b>ASM Disk Groups</b>	Click <b>Finish</b> to mount and use the ASM disk groups.
<b>Operations*</b>	Select <b>Create a Database</b> .
<b>Node Selection</b>	Click <b>Select All</b> to select all hosts.
<b>Database Templates</b>	Select the database type to create.
<b>Database Identification</b>	Name the database and SID. The SID prefix <i>must be exactly the same string</i> that you specified in the \$ORACLE_SID environment variable without the numbers.
<b>Management Options</b>	Choose and configure the management options that you want.
<b>Database Credentials</b>	Specify passwords.
<b>Storage Options</b>	Choose the storage option that is appropriate for your environment.
<b>ASM Disk Groups</b>	(This page only shows if you are using ASM.) Select one of the ASM disk groups that you created to use as main storage for database files. You can create and modify new disks and groups at this point as well.
<b>Database File Locations</b>	Confirm that the storage option you choose is correct.
<b>Recovery Configuration</b>	Choose and configure a recovery option appropriate for the environment. If you intend to run hot backups of the database, you must check <b>Enable Archiving</b> .

Table 6 Database Configuration Assistant Wizard (2 of 2)

Page	User Action
<b>Database Content</b>	In the <b>Database Components</b> tab, you can select and configure components. However, these can also be added and configured later. If you are in a hurry or have not decided yet what you want, just accept the defaults.  In the <b>Custom Scripts</b> tab, you can select any samples to include and any custom scripts that you wish to run at the time of database creation. However, scripts can also be added or edited later. If you are in a hurry or have not decided yet what you want, accept the defaults.
<b>Database Services</b>	Create any database services that you want or just skip this page for now.
<b>Initialization Parameters</b>	Use the default values for initialization parameters unless you have good reasons to change them.
<b>Database Storage</b>	Click an item in the left panel to see its details in the right panel. You can reconfigure in the right panel if necessary.
<b>Summary</b>	View the summary information and save if you want a permanent record.
<b>Copying database files</b>	Watch as the database is created.
<b>Database creation complete</b>	Take notice when the database is successfully created.

## Conclusion

By following the instructions and the test setup provided in this paper, a system administrator can properly configure and install Oracle RAC using an LSI Logic storage array as the primary storage. Careful planning and execution of the prerequisites help to ensure a successful installation of this solution. The following items should be verified on the host setup:

- Solaris kernel parameters for Oracle
- File permissions for all Oracle devices, such as the Oracle Cluster Register (OCR) disks, voting disks
- Storage array disk access for all shared devices. This includes the proper HBA driver and failover driver installation and configuration.

Provisioning the LSI Logic storage array is also a vital step in the configuration. Verify that the SANshare storage partitioning of each storage array are configured to grant access to all shared LUNs by all hosts in the cluster. SANshare<sup>®</sup> Storage Partitioning is a premium feature of the LSI Logic storage array that allows mapping of LUNs to a specific host or hosts.

The final step is installing Oracle Clusterware and Oracle Database software. If the host and the storage array setup have been completed correctly, the installation should go smoothly without errors. Typically, errors encountered during this step of the process are a result of errors during host setup or storage array provisioning. The key challenge of this configuration is tuning the Oracle kernel parameters on the hosts to fit the needs of your database environment to achieve the optimal performance.

Use this document to configure the host and the storage array so that Oracle installation becomes simple. Plan to upgrade to an LSI Logic storage array so that you can take advantage of fast performance and premium features. If you have a complex system with multiple hosts and multiple operating systems, you can use the SANshare Storage Partitioning premium feature to map these to a single LSI Logic storage array. If you want to fully protect your production database, you can use the Remote Volume Mirroring premium feature to provide complete data replication on or off site.

## Contact Information

For more information and sales office locations, visit the LSI Logic web sites at:

<http://www.lsi.com/cm/ContactSearch.do>

### **North American Headquarters**

Milpitas, CA

Tel: 866 574 5741 (within U.S), 408 954 3108 (outside U.S.)

### **LSI Logic KK Headquarters**

Tokyo, Japan

Tel: 81 3 5463 7165

### **LSI Logic Europe Ltd. European Headquarters**

United Kingdom

Tel: 44 1344 413200

## Appendix A: Example Oracle User Profile

Example Oracle User Profile (~oracle/.bash\_profile)

```

# .bash_profile
# Get the aliases and functions
if [ -f ~/.bashrc ]; then
    . ~/.bashrc
fi

# User specific environment and startup programs
PATH=/sbin:/usr/bin:/usr/ucb:/etc/::db1/oracle/product/DB/bin
PATH=$PATH:/usr/local/bin:/usr/lbin:/bin::
export PATH
unset USERNAME
export ORACLE_SID=eng2
export ORACLE_BASE=/db1/oracle;
export ORACLE_HOME=$ORACLE_BASE/DB;
export TNS_ADMIN=$ORACLE_BASE/network/admin;
export ORACLE_ADMIN=$ORACLE_BASE/admin;
export ORACLE_PFILE=$ORACLE_ADMIN/$ORACLE_SID/pfile;
export ORACLE_ADHOC=$ORACLE_ADMIN/adhoc;
export ORACLE_ARCH=$ORACLE_ADMIN/arch;
export ORACLE_BKUP=$ORACLE_ADMIN/bkup;
export ORACLE_EXP=$ORACLE_ADMIN/exp;
export ORACLE_TERM=vt100;
ulimit -n 63536
ulimit -u 16384

PATH=$PATH:$ORACLE_HOME/bin;
export PATH
PS1='$HOSTNAME:$ORACLE_SID:[$LOGNAME]:>'
if [[ ! -d $ORACLE_HOME ]]; then
    echo "\n>> * * * * * WARNING * * * * * <<"
    echo "\n>> ORACLE_HOME DOES NOT EXIST '$ORACLE_HOME'"
    echo "\n>> * * * * * WARNING * * * * * <<"
fi
CDPATH=.:$HOME:$ORACLE_HOME:${CDPATH}:
MANPATH=/usr/man:/usr/share/man:/usr/local/man:/usr/
openwin/share/man:/usr/dt/share/man

```

## Appendix B: References

Automatic Storage Management - Oracle Technical Library

<http://www.oracle.com/technology/products/database/asm/index.html>

*Build Your Own Oracle RAC 10g Release 2 Cluster on Linux and FireWire*

[http://www.oracle.com/technology/pub/articles/hunter\\_rac10gr2.html](http://www.oracle.com/technology/pub/articles/hunter_rac10gr2.html)

HBA Settings

The HBA Settings document is not available on an external link. Customers who want it should contact Support. To contact Support, see “[Contact Information](#)” on page 17.

Engenio Interoperability Matrix

[http://www.engenio.com/html/partners/compatible\\_matrix/interop.asp](http://www.engenio.com/html/partners/compatible_matrix/interop.asp)

*OCFS2 User's Guide*

Go to: <http://oss.oracle.com>, and then click on OCFS2.

Oracle Documentation Library

<http://www.oracle.com/pls/db102/homepage>



## **Document Description**

This document explains the setup and configuration of an LSI Logic storage array with an Oracle 10g RAC database on a Solaris operating system (“the Document”).

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