

Oracle 11g Release 2

-

Install Guide

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The information outlined in this document are from the authors experience and research.

At this point of time this document is in an early development state.

You can use the information freely without WARRANTY!

The author

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- > 7 years experience with Oracle Databases and UNIX operating systems
 - experience with 8i to 11g Release 2
 - High Availability (RAC, Data Guard)
 - Backup and Cloning (RMAN, custom Scripts, Storage-based Cloning)
 - Database Upgrades
- EMC Networker expert
 - Planning and implementing company-wide backup concepts
 - Backing up all kinds of data (including databases, exchange server, sql server, ...) to tape / virtual tape libraries / disk based storage, ...

Contents

- Overview
- Part 1 – Single Database installation and creation
- Part 2 – ASM (including ACFS and ADVMDiskgroup) installation, configuration and tests
- Part 3 – ADVMDiskgroup and ACFS
- Part 4 – RAC with ASM installation and configuration

Overview

Overview

- Oracle Database 11g Release 2 released on 1st September 2009
- Download from <http://otn.oracle.com> (requires registration but no support identifier)
- Currently available platforms:
 - Linux x86 (32-bit)
 - Linux x86_64 (64-bit)

Overview – New Features

- Announcement on OTN:

www.oracle.com/global/de/community/dbadmin/tipps/11gr2/index.html

- New Features – a non-complete overview:
 - Automatic Block repair in data guard scenarios (i.e. Replace defective block on standby with valid block from primary database or vice versa)
 - Automatic determination of parallelism degree based on object size, query complexity and hardware resources
 - RAC installation complexity dramatically reduced → we will evaluate this :-)
 - Storage of Oracle Cluster Registry and Voting Disk in ASM
 - „Oracle Restart“: automatically (re)starts database instance, ASM, listener and so on
 - Utility for complete uninstallation of Oracle RAC
 - Reduced („zero downtime“) for patching RAC clusters

Overview – New Features

- New Features – a non-complete overview (con't):
 - Instance Caging: Limit number of CPUs used
 - Scheduler improvements (emailing, file watch, run procedures on remote db)
 - ACFS (ASM Cluster File System): Cluster file system based on ASM for non-database datafiles, i.e. (Oracle) Binary installations, trace files, alert logs and so on
 - ASM Dynamic Volume Manager: create volumes out of disk groups and use it to create a file system (ext3, reiserfs, etc pp) on top of it
 - ASM FS Snapshots
 - Intelligent data placement: frequently accessed blocks are placed on the edge of the disk where I/O performance is higher by ASM
 - ASM File Access Control
 - New compression algorithm (LZO) offers fast compression and de-compression
 - → most „cool“ ASM features require 11g release 2 database and asm compatible level (= everything 11.2)

Overview - Components

- Oracle Database
 - traditional database (rdbms)
 - ASM module
 - Listener et al
- Oracle Infrastructure
 - foundation for Oracle RAC
 - Includes
 - Clusterware
 - ASM Module
 - Oracle Restart

Overview - Conclusion

- ?? Is 11g Release 2 ready for production yet ??
 - From the Authors point of view: NO!
 - Release of 11g Release 2 was driven by marketing and promise „release in September 2009“
 - Latest beta of 11g R2 (released two weeks before „productive release“ still contained critical bugs
 - 11.2.0.1.0 good for testing and educational purpose
 - For productive environments:

Wait at least until 11.2.0.2.0!
(i.e. The first patchset)

Part 1 – Single Database installation

Installation Overview

- Local System configuration
 - Installation took place on laptop with CentOS 5 x86_64 (Kernel 2.6.18-128.2.1.el5)
 - 4 GB Memory
 - 500 GB local disk

Installation Overview

- Steps required to install Oracle 11g Release 2
 1. Configure Storage
 2. Check and fulfill pre-requirements
 3. Binary installation of database
 4. Listener configuration
 5. Creation of database

Installation Prerequisites

- Storage Requirements
 - As always - recommendation: SAME (stripe and mirror everything)
 - Valid storage options for single database instance:
 - file system (ext3, reiser, xfs, etc al)
 - ASM
 - ACFS → only for non-database files (i.e. Binary files, trace files and so on)
 - NFS
 - ISCSI
 - RAW Disks

Installation Prerequisites

- SWAP
 - Between 1 and 2 GB RAM → 1.5 times the size of RAM
 - Between 2 and 16 GB RAM → equal to size of RAM
 - > 16 GB RAM → 16 GB SWAP
- Automatic Memory Management
 - Required /dev/shm with appropriate size (i.e. SGA of 16 GB required /dev/shm to be 16 GB+)
 - Huge Pages and autom. Memory Management are INCOMPATIBLE

Installation Prerequisites

- Supported Operating Systems
 - on 32-bit Linux
 - Asianux 2 Update 7 (Kernel 2.6.9 or later)
 - Asianux 3 (Kernel 2.6.18 or later)
 - Oracle Enterprise Linux 4 Update 7 (Kernel 2.6.9 or later)
 - Oracle Enterprise Linux 5 Update 2 (Kernel 2.6.18 or later)
 - Red Hat Enterprise Linux 4 Update 7 (Kernel 2.6.9 or later)
 - Red Hat Enterprise Linux 5 Update 2 (Kernel 2.6.18 or later)
 - SUSE Linux Enterprise Server 10 SP2 (Kernel 2.6.16.21 or later)
 - SUSE Linux Enterprise Server 11 (2.6.27.19 or later)

!! ACFS and ADVM are ONLY supported on RHEL 5 and OEL 5 !!

Installation Prerequisites

- Supported Operating Systems
 - on 64-bit Linux
 - Asianux 2 (Kernel 2.6.9 or later)
 - Asianux 3 (Kernel 2.6.18 or later)
 - Oracle Enterprise Linux 4 Update 7 (Kernel 2.6.9 or later)
 - Oracle Enterprise Linux 5 Update 2 (Kernel 2.6.18 or later)
 - Red Hat Enterprise Linux 4 Update 3 (Kernel 2.6.9 or later)
 - Red Hat Enterprise Linux 5 Update 2 (Kernel 2.6.18 or later)
 - SUSE Linux Enterprise Server 10 SP2 (Kernel 2.6.16.21 or later)
 - SUSE Linux Enterprise Server 11 (2.6.27.19 or later)

!! ACFS and ADVM are ONLY supported on RHEL 5 and OEL 5 !!

Installation Prerequisites

- Required Packages - refer to:

http://download.oracle.com/docs/cd/E11882_01/install.112/e10840/pre_install.htm

- Multihoming (i.e. System with multiple network cards)
 - Recommended to set ORACLE_HOSTNAME
 - If not set – first entry from /etc/hosts is taken

Installation Prerequisites

- Users and Groups
 - For separation of rights (i.e. Manage ASM storage, manage database instance)
 - Available groups:
 - OSDBA (typical: „dba“; have SYSDBA privileges on database)
 - SYSOPER (typical: „sysoper“; optional, limited set of administrative priv)
 - OSDBA for ASM (typical: „asmdba“; full administrative access to ASM instance)
 - OSASM for ASM (typical: „asmadmin“; administrative access to ASM instance via SQL*Net)
 - OSOPER for ASM (typical: „asmoper“; optional, like SYSOPER group for limited access)
 - Minimal group needed: OSDBA group
(in this document the osdba group is named „dba“)

Installation Prerequisites

- Shell Limits

- In `/etc/security/limits.conf`

```
oracle      soft  nproc  16384
oracle      hard  nproc  16384
oracle      soft  nofile 65536
oracle      hard  nofile 65536
```

(replace „oracle“ with user holding the installation)

- In `/etc/pam.d/login` add if not exists

```
session    required  pam_limits.so
```

Installation Prerequisites

- Kernel Limits (MINIMUM values)

- /etc/sysctl.conf

```
kernel.sem=250 32000 100 128
kernel.shmall=2097152
kernel.shmmax=536870912
kernel.shmmni=4096
fs.file-max=6815744
fs.aio-max-nr=1048576
net.ipv4.ip_local_port_range=9000 65500
net.core.rmem_default=262144
net.core.rmem_max=4194304
net.core.wmem_default=262144
net.core.wmem_max=1048576
```

- SuSE only -

```
vm.hugetlb_shm_group=<gid of osdba group>
```

- The values in /etc/sysctl.conf should be tuned (i.e. according to the number of instance, available memory, number of connections,...)

Installation Prerequisites

- Kernel Limits
 - The values in `/etc/sysctl.conf` should be tuned (i.e. according to the number of instance, available memory, number of connections,...)
 - see Part 2 for guides how to calculate the kernel parameters

Installation Prerequisites

- User Profile file (minimum file)

- ~/.bash_profile (RHEL, OEL) or ~/.profile (SuSE)

```
export ORACLE_BASE=/u01/app/oracle
export
ORACLE_HOME=$ORACLE_BASE/product/11.2/ora11r2p
export ORACLE_SID=ORA11R2P
export PATH=$ORACLE_HOME/bin:
$ORACLE_HOME/OPatch:$PATH
umask 022
```

- ATTENTION: This profile file is for use with a dedicated user for each database binary installation. If you wish to install several binary installation under one single user make sure ORACLE_HOME and TNS_ADMIN is unset

Installation – notes before installation

- We will install an Oracle 11g Release 2 database (stand-alone without grid infrastructure, without asm), operating system user is named „ora11“, osdba group named „dba“ with home directory „/u01/app/oracle/product/11.2.0/ora11“
- Note: According to OFA the directory shall be named „...11.2.0/db_1“. For easy management we install a dedicated binary installation under a dedicated user for every database which runs on the system and name them accordingly.

For instance binary database installation for database with SID „ORA11“ is held by operating system user named „ora11“ with home directory „...11.2.0/ora11“. The binary installation for the database with SID „ORA11T“ is held by the user named „ora11t“ with home directory „...11.2.0/ora11t“.

You can – of course – use one single user on operating system level for having one or more binary installations. It's up to you.

Installation – the actual installation

- Create User

```
mkdir -p /u01/app/oracle/product/11.2.0/ora11
useradd -g dba -d /u01/app/oracle/product/11.2.0/ora11 ora11
passwd ora11
```

- Create profile file

```
export ORACLE_BASE=/u01/app/oracle
export ORACLE_HOME=$ORACLE_BASE/product/11.2.0/ora11
export ORACLE_SID=ORA11
export NLS_LANG=AMERICAN_AMERICA.WE8MSWIN1252
export TMP=$ORACLE_HOME/tmp
export TNS_ADMIN=$ORACLE_HOME/network/admin
export TEMP=$TMP
export PATH=$ORACLE_HOME/bin:$ORACLE_HOME/OPatch:$PATH
```

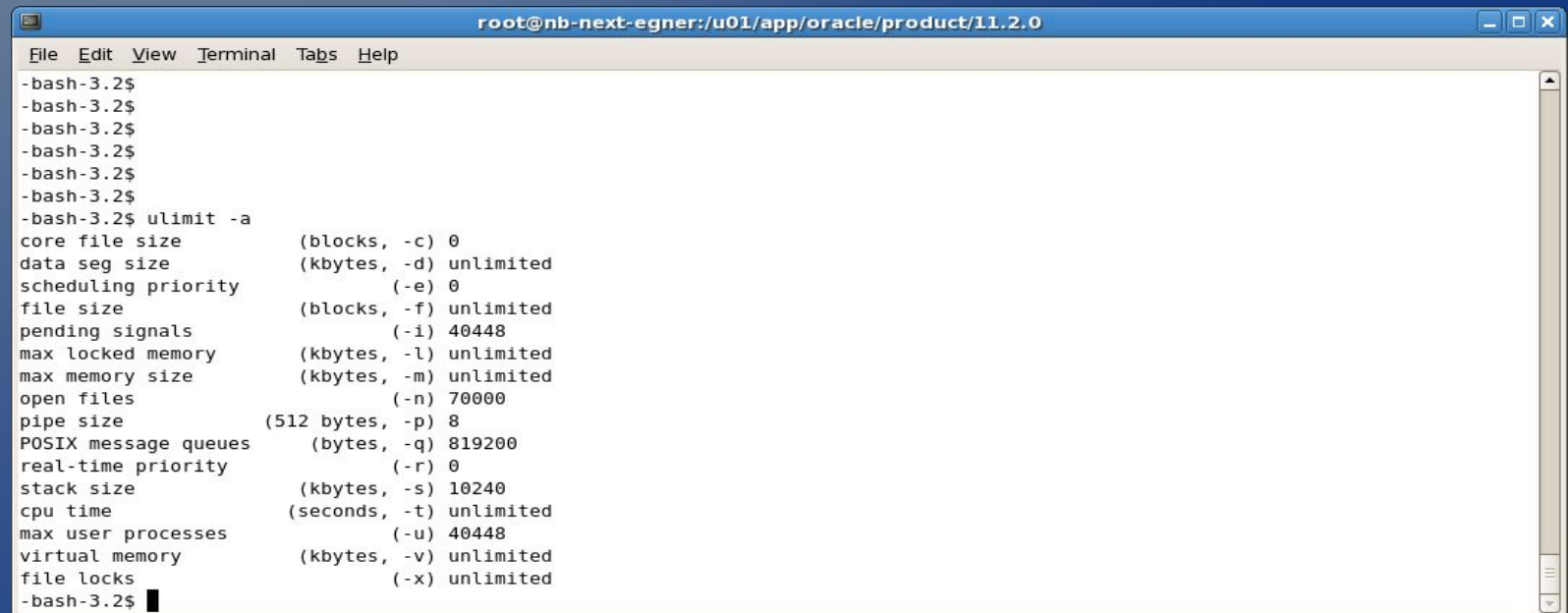
Installation – the actual installation

- Check, if X11 works

```
export DISPLAY=localhost:0.0  
xterm
```

- Check

```
ulimit -a      (as user „ora11“)
```



The image shows a terminal window with the following output for the 'ulimit -a' command:

```
root@nb-next-egner:/u01/app/oracle/product/11.2.0  
File Edit View Terminal Tabs Help  
-bash-3.2$  
-bash-3.2$  
-bash-3.2$  
-bash-3.2$  
-bash-3.2$  
-bash-3.2$  
-bash-3.2$ ulimit -a  
core file size          (blocks, -c) 0  
data seg size           (kbytes, -d) unlimited  
scheduling priority     (-e) 0  
file size               (blocks, -f) unlimited  
pending signals         (-i) 40448  
max locked memory       (kbytes, -l) unlimited  
max memory size         (kbytes, -m) unlimited  
open files              (-n) 70000  
pipe size               (512 bytes, -p) 8  
POSIX message queues    (bytes, -q) 819200  
real-time priority      (-r) 0  
stack size              (kbytes, -s) 10240  
cpu time                (seconds, -t) unlimited  
max user processes      (-u) 40448  
virtual memory          (kbytes, -v) unlimited  
file locks              (-x) unlimited  
-bash-3.2$
```

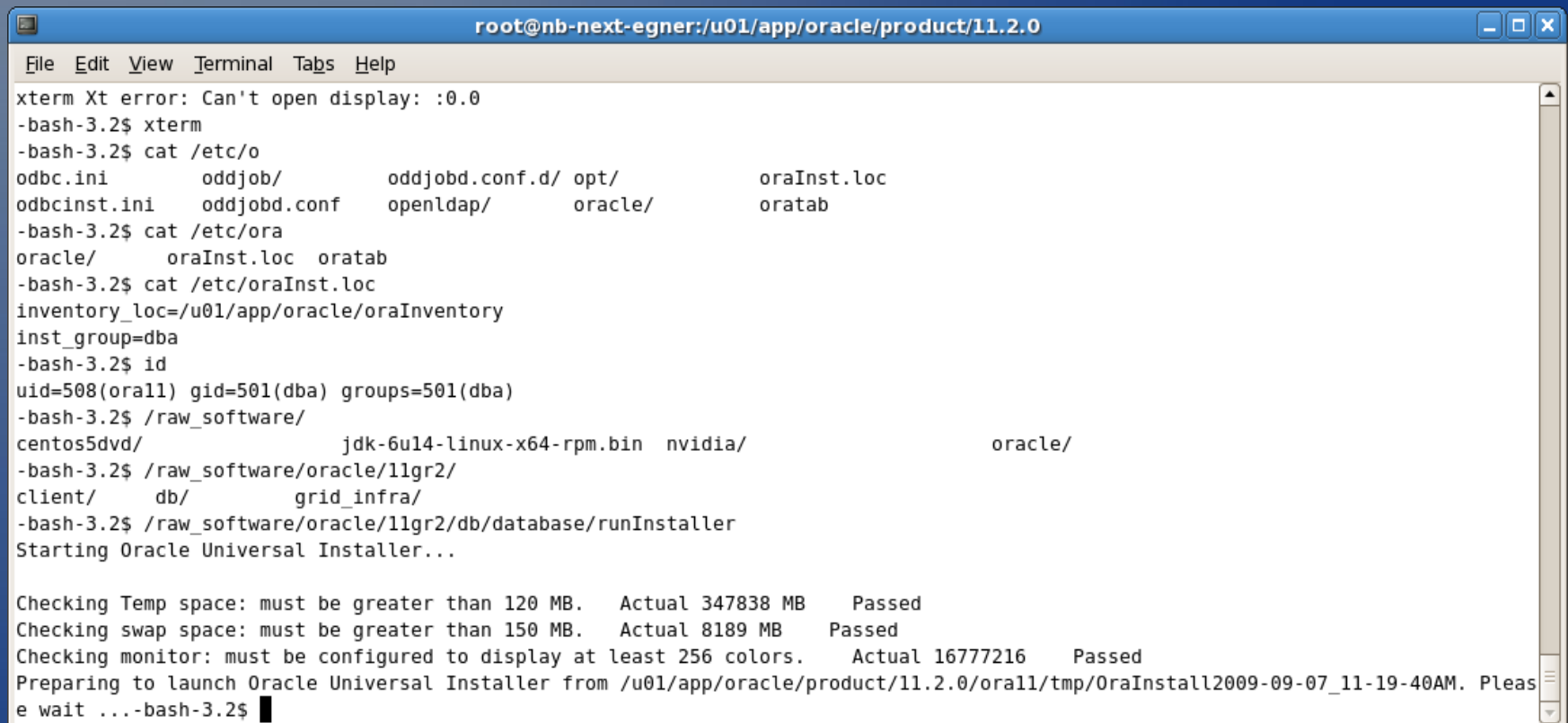
„open files“ and „max user processes“ should show values greater or equal the requisites

Installation – the actual installation

- Check, if X11 works

```
export DISPLAY=localhost:0.0
xterm
```

- Start Installation



```
root@nb-next-egner:/u01/app/oracle/product/11.2.0
File Edit View Terminal Tabs Help
xterm Xt error: Can't open display: :0.0
-bash-3.2$ xterm
-bash-3.2$ cat /etc/o
odbc.ini          oddjob/          oddjobd.conf.d/  opt/             oraInst.loc
odbcinst.ini      oddjobd.conf     openldap/        oracle/          oratab
-bash-3.2$ cat /etc/ora
oracle/          oraInst.loc      oratab
-bash-3.2$ cat /etc/oraInst.loc
inventory_loc=/u01/app/oracle/oraInventory
inst_group=dba
-bash-3.2$ id
uid=508(oracle) gid=501(dba) groups=501(dba)
-bash-3.2$ /raw_software/
centos5dvd/          jdk-6u14-linux-x64-rpm.bin  nvidia/          oracle/
-bash-3.2$ /raw_software/oracle/11gr2/
client/      db/          grid_infra/
-bash-3.2$ /raw_software/oracle/11gr2/db/database/runInstaller
Starting Oracle Universal Installer...

Checking Temp space: must be greater than 120 MB.   Actual 347838 MB   Passed
Checking swap space: must be greater than 150 MB.   Actual 8189 MB   Passed
Checking monitor: must be configured to display at least 256 colors.   Actual 16777216   Passed
Preparing to launch Oracle Universal Installer from /u01/app/oracle/product/11.2.0/ora11/tmp/OraInstall2009-09-07_11-19-40AM. Please wait ...-bash-3.2$ █
```

Installation – the actual installation

Oracle Database 11g Release 2 Installer - Installing database - Step 1 of 9

Configure Security Updates

Provide your email address to be informed of security issues, install the product and initiate configuration manager. [View details.](#)

Email:

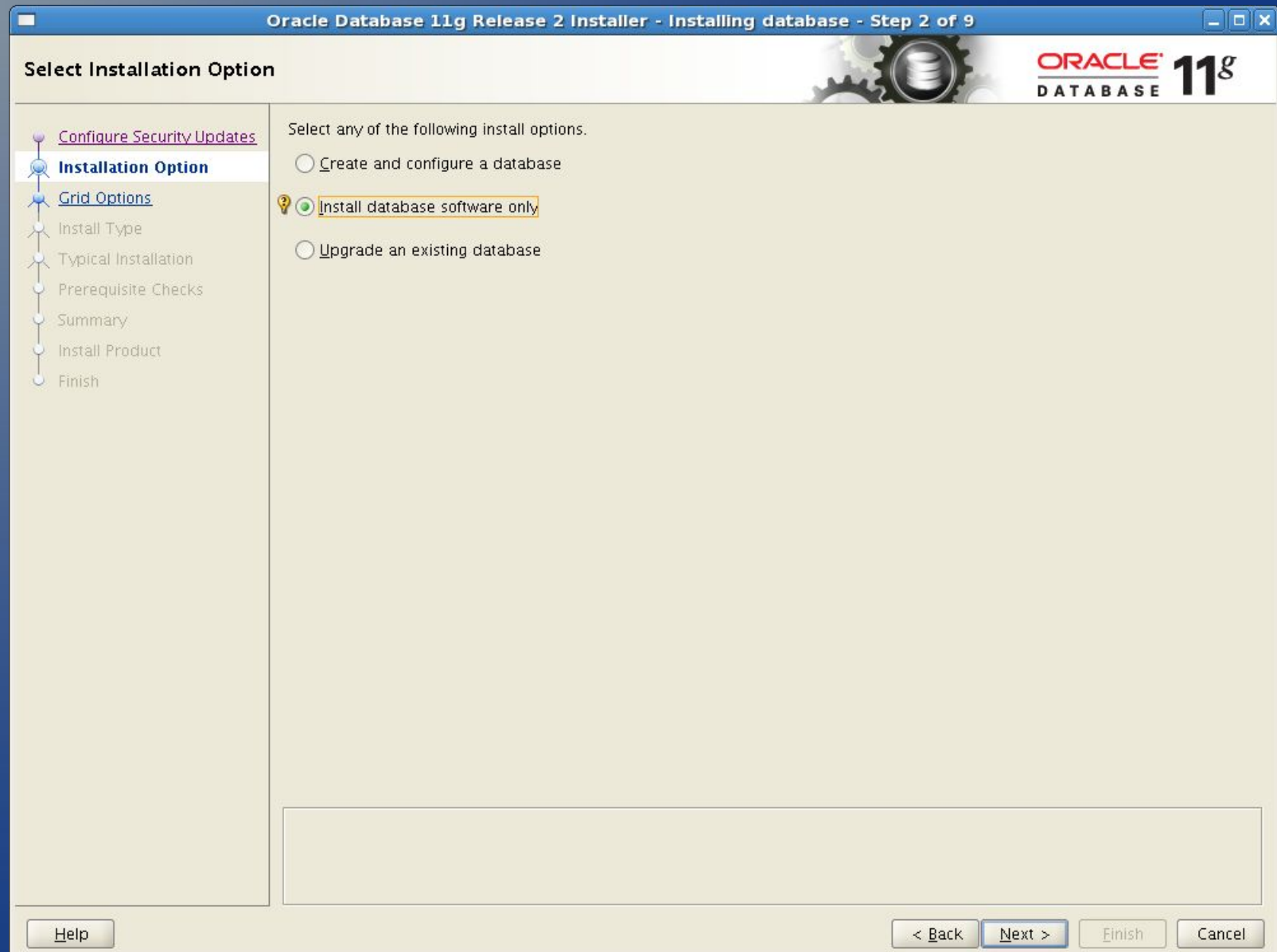
Easier for you if you use your My Oracle Support email address/username.

I wish to receive security updates via My Oracle Support.

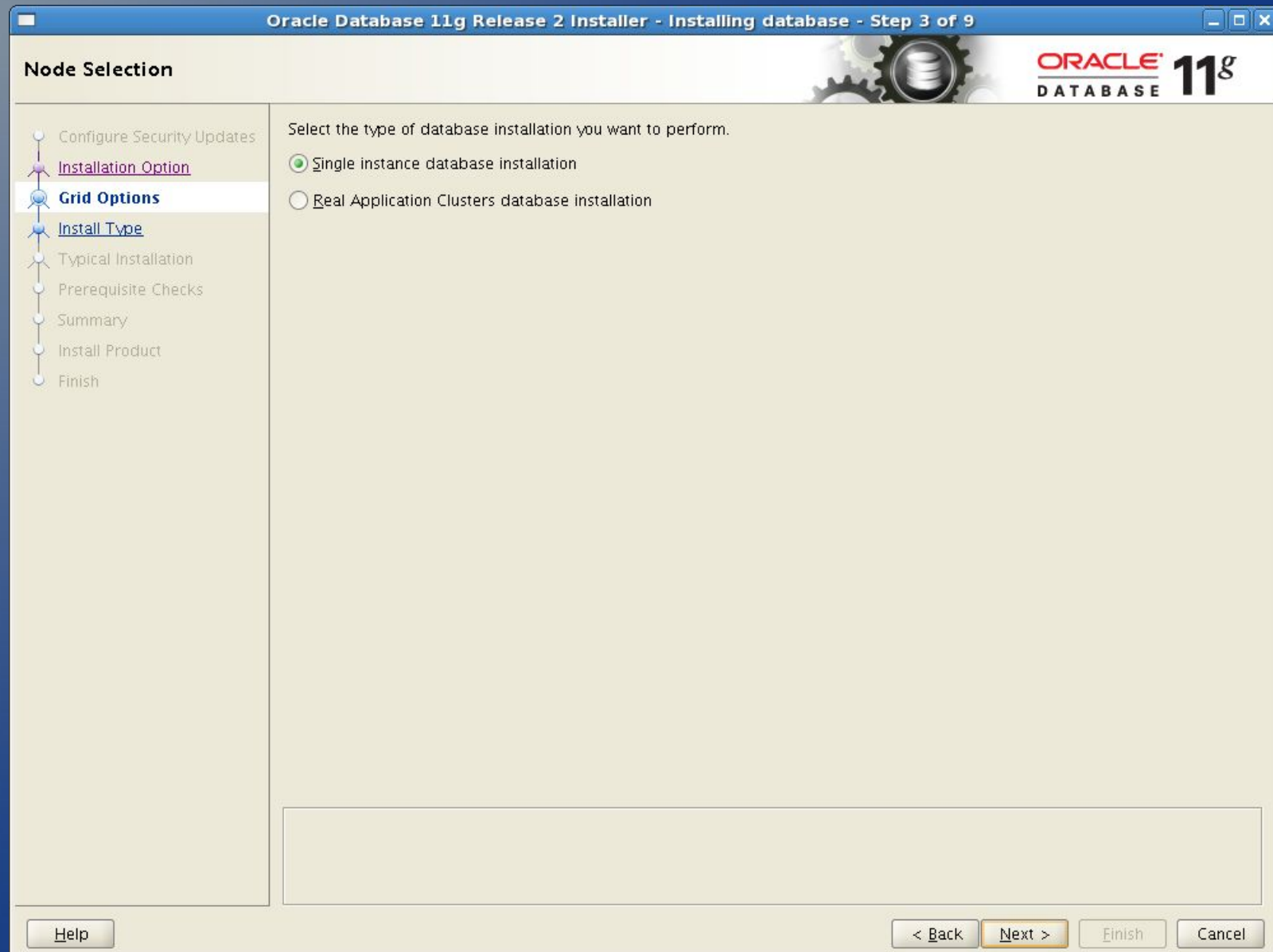
My Oracle Support Password:

Help < Back Next > Finish Cancel

Installation – the actual installation



Installation – the actual installation



Installation – the actual installation

Oracle Database 11g Release 2 Installer - Installing database - Step 4 of 11

Select Product Languages

Select the languages in which your product will run.

Available Languages:

- Arabic
- Bengali
- Brazilian Portuguese
- Bulgarian
- Canadian French
- Catalan
- Croatian
- Czech
- Danish
- Dutch
- Egyptian
- English (United Kingdom)
- Estonian
- Finnish
- French
- Greek
- Hebrew
- Hungarian
- Icelandic
- Indonesian
- Italian
- Japanese
- Korean
- Latin American Spanish
- Latvian
- Lithuanian
- Malay
- Mexican Spanish

Selected Languages:

- English
- German

Help < Back Next > Finish Cancel

Installation – the actual installation

The screenshot shows the Oracle Database 11g Release 2 Installer window at Step 5 of 11, titled "Select Database Edition". The window has a blue title bar with the text "Oracle Database 11g Release 2 Installer - Installing database - Step 5 of 11" and standard window controls. The main area is divided into a left sidebar and a main content area. The sidebar contains a vertical list of steps: "Configure Security Updates", "Installation Option", "Grid Options", "Product Languages", "Database Edition" (highlighted in blue), "Installation Location", "Operating System Groups", "Prerequisite Checks", "Summary", "Install Product", and "Finish". The main content area has a header "Select Database Edition" and the Oracle Database 11g logo. Below the header, the question "Which database edition do you want to install?" is displayed. Three radio button options are listed: "Enterprise Edition (4.29GB)" (selected), "Standard Edition (4.22GB)", and "Standard Edition One (4.22GB)". Each option has a descriptive paragraph. A "Select Options..." button is located in the bottom right of the main content area. At the bottom of the window, there are four buttons: "Help", "< Back", "Next >", and "Finish", with "Finish" and "Cancel" also present.

Oracle Database 11g Release 2 Installer - Installing database - Step 5 of 11

Select Database Edition

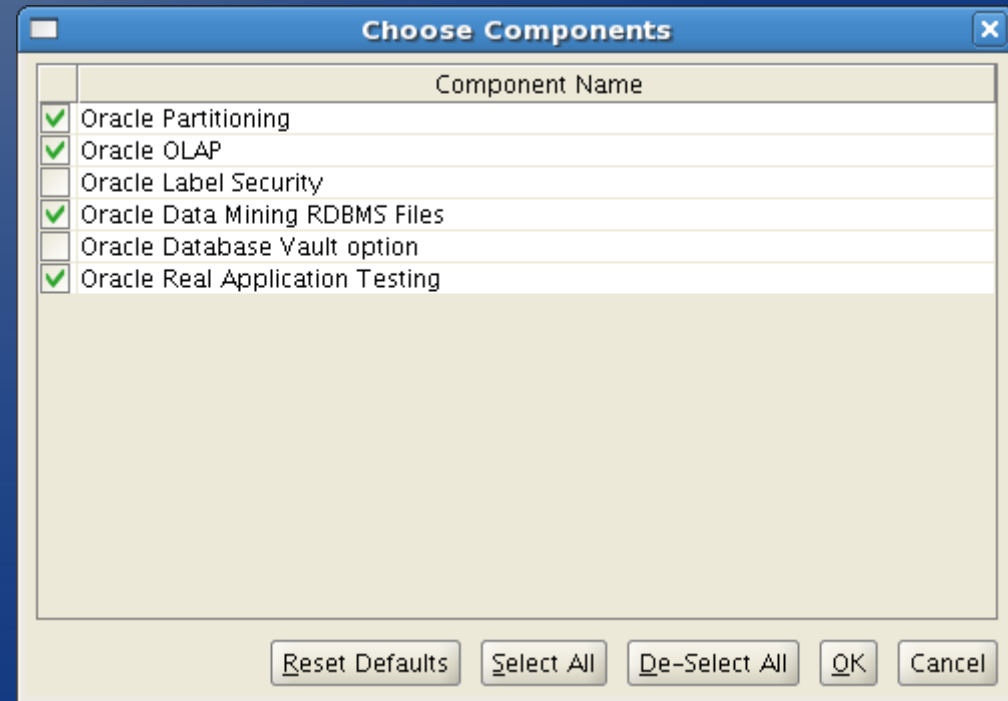
Which database edition do you want to install?

- Enterprise Edition (4.29GB)
Oracle Database 11g Enterprise Edition is a self-managing database that has the scalability, performance, high availability, and security features required to run the most demanding, mission-critical applications.
- Standard Edition (4.22GB)
Oracle Database 11g Standard Edition is ideal for work groups, departments, and small to medium-sized businesses looking for lower-cost solutions.
- Standard Edition One (4.22GB)
Oracle Database 11g Standard Edition One is ideal for work groups, departments, and small to medium-sized businesses looking for lower-cost solutions.

Select Options...

Help < Back Next > Finish Cancel

Installation – the actual installation



Installation – the actual installation

Oracle Database 11g Release 2 Installer - Installing database - Step 6 of 11

Specify Installation Location

ORACLE DATABASE 11g

- Configure Security Updates
- Installation Option
- Grid Options
- Product Languages
- Database Edition
- Installation Location**
- Operating System Groups
- Prerequisite Checks
- Summary
- Install Product
- Finish

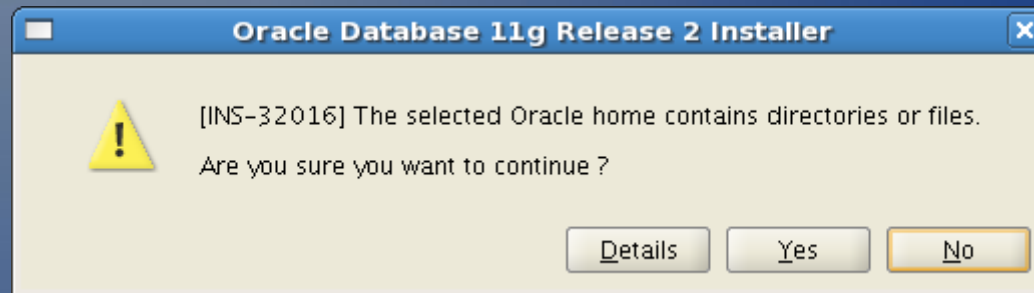
Specify an Oracle base path to place all Oracle software and configuration-related files. This location is the Oracle base directory.

Oracle Base: Browse...

Specify a location for storing Oracle software files. This location is the Oracle home directory.

Software Location: Browse...

Installation – the actual installation



Installation – the actual installation

Oracle Database 11g Release 2 Installer - Installing database - Step 7 of 11

Privileged Operating System Groups

Configure Security Updates
Installation Option
Grid Options
Product Languages
Database Edition
Installation Location
Operating System Groups
Prerequisite Checks
Summary
Install Product
Finish

SYSDBA and SYSOPER privileges are required to create a database using operating system (OS) authentication. Membership in OSDBA grants the SYSDBA privilege, and membership in OSOPER grants the SYSOPER privilege, which is a subset of SYSDBA privileges. Select the name of the OSDBA group to grant the SYSDBA privilege. You must be a member of this group.

Database Administrator (OSDBA) Group:

Database Operator (OSOPER) Group:

Help

< Back Next > Finish Cancel

Installation – the actual installation

Oracle Database 11g Release 2 Installer - Installing database - Step 8 of 11

Perform Prerequisite Checks

Some of the minimum requirements for installation are not completed. Review and fix the issues listed in the following table, and recheck the system.

Ignore All

Checks	Status	Fixable
Checks		
Packages		
Package: pdksh-5.2.14	Failed	

This is a prerequisite condition to test whether the package "pdksh-5.2.14" is available on the system. [\(more details\)](#)
Expected Value : pdksh-5.2.14
Actual Value : missing

Installation – the actual installation

The screenshot shows the Oracle Database 11g Release 2 Installer window at Step 9 of 11. The window title is "Oracle Database 11g Release 2 Installer - Installing database - Step 9 of 11". The Oracle logo and "11g DATABASE" are visible in the top right corner. The main content area is titled "Summary" and displays the following information:

- Oracle Database 11g Release 2 Installer**
 - Global settings**
 - Disk space: required 4.29 GB available 339.28 GB
 - Source location: /raw_software/oracle/11gr2/db/database/install/./stage/products.xml
 - Install method: Typical installation
 - Database edition: Enterprise Edition (Install database software only)
 - Oracle base: /u01/app/oracle
 - Software location: /u01/app/oracle/product/11.2.0/ora11
 - OSDBA group: dba

On the left side, a navigation pane shows the installation steps: Configure Security Updates, Installation Option, Grid Options, Product Languages, Database Edition, Installation Location, Operating System Groups, Prerequisite Checks, **Summary** (highlighted), Install Product, and Finish. At the bottom right, there is a "Save Response File..." button. At the bottom of the window, there are navigation buttons: < Back, Next >, Finish, and Cancel. A Help button is located at the bottom left.

Installation – the actual installation

The image displays three overlapping screenshots of the Oracle Database 11g Release 2 Installer, specifically the 'Install Product' step (Step 10 of 11). The screenshots show the progress of the installation at different stages: 0%, 46%, and 94%.

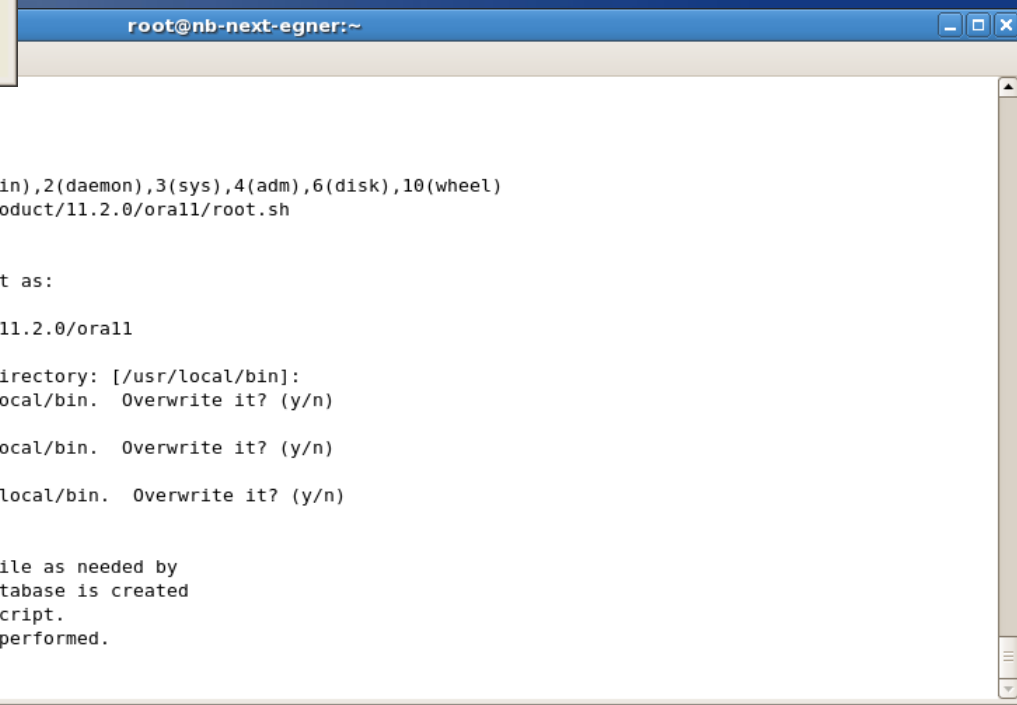
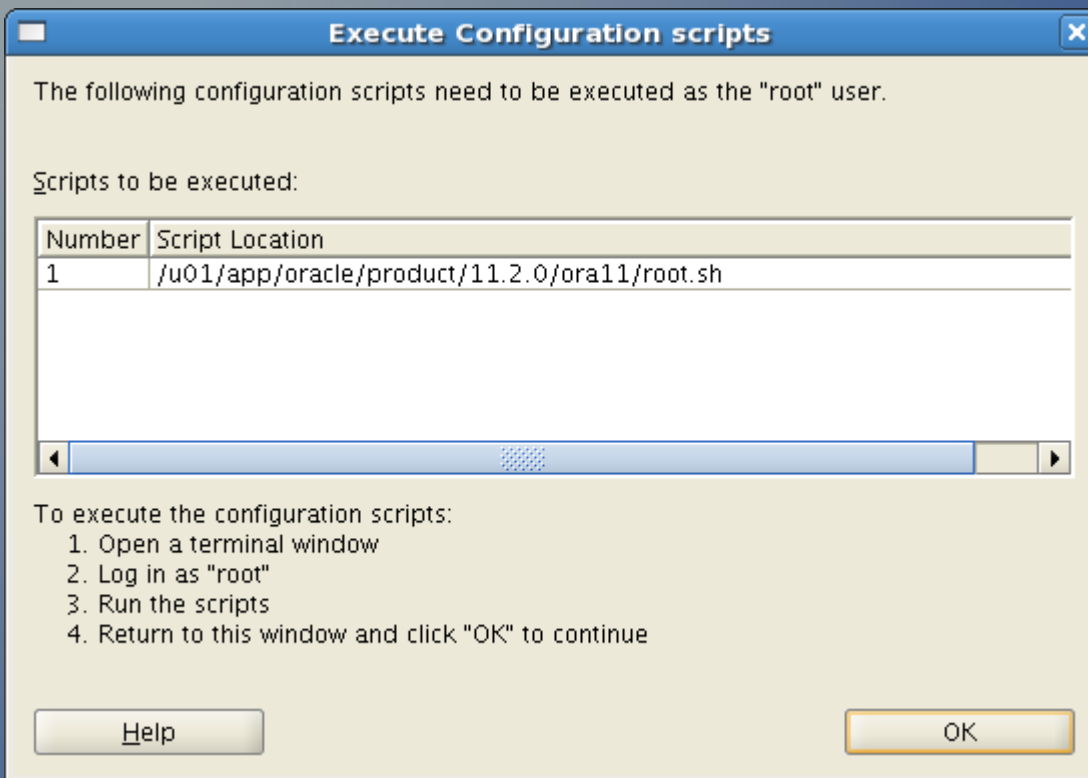
0% Progress: The progress bar is at 0%. The status section shows 'Oracle Database Installation' with sub-tasks: Prepare, Copy files, Link binaries, and Setup files. The 'Execute Root Scripts for Oracle Database installation' task is listed as 'Pending'.

46% Progress: The progress bar is at 46%. The status section shows 'Extracting files to 'u01/app/oracle/product/11.2.0/ora11''. The 'Execute Root Scripts for Oracle Database installation' task is listed as 'Pending'.

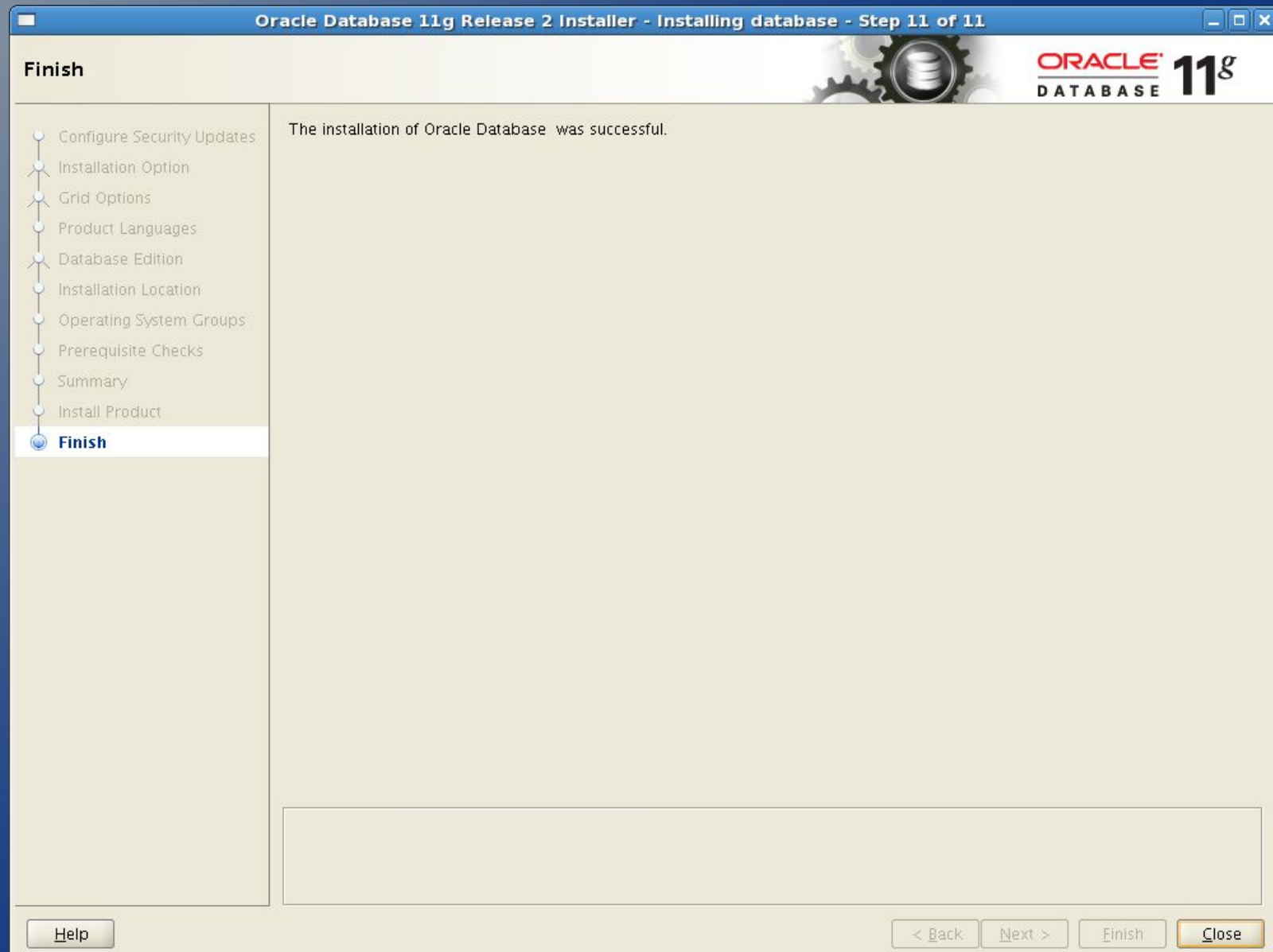
94% Progress: The progress bar is at 94%. The status section shows 'Setting up 'Oracle Database 11g 11.2.0.1.0''. The 'Execute Root Scripts for Oracle Database installation' task is listed as 'Pending'.

The installer interface includes a navigation pane on the left with the following steps: Configure Security Updates, Installation Option, Grid Options, Product Languages, Database Edition, Installation Location, Operating System Groups, Prerequisite Checks, Summary, **Install Product**, and Finish. The bottom of the installer features the Oracle Database 11g logo and a banner for 'Extreme Performance Integrated Analytics Enterprise-Ready' and 'Control Data Access, Classification, and Encryption'.

Installation – the actual installation



Installation – the actual installation



Installation – configure the listener

```
root@nb-next-egner:~  
File Edit View Terminal Tabs Help  
-bash-3.2$  
-bash-3.2$  
-bash-3.2$  
-bash-3.2$ id  
uid=508(oracle) gid=501(dba) groups=501(dba)  
-bash-3.2$ lsnrctl start  
  
LSNRCTL for Linux: Version 11.2.0.1.0 - Production on 07-SEP-2009 11:52:41  
  
Copyright (c) 1991, 2009, Oracle. All rights reserved.  
  
Starting /u01/app/oracle/product/11.2.0/oracle11/bin/tnslnsr: please wait...  
  
TNSLSNR for Linux: Version 11.2.0.1.0 - Production  
Log messages written to /u01/app/oracle/diag/tnslnsr/nb-next-egner/listener/alert/log.xml  
Listening on: (DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=nb-next-egner.local)(PORT=1521)))  
  
Connecting to (ADDRESS=(PROTOCOL=tcp)(HOST=)(PORT=1521))  
STATUS of the LISTENER  
-----  
Alias                LISTENER  
Version              TNSLSNR for Linux: Version 11.2.0.1.0 - Production  
Start Date           07-SEP-2009 11:52:42  
Uptime               0 days 0 hr. 0 min. 0 sec  
Trace Level          off  
Security              ON: Local OS Authentication  
SNMP                 OFF  
Listener Log File    /u01/app/oracle/diag/tnslnsr/nb-next-egner/listener/alert/log.xml  
Listening Endpoints Summary...  
  (DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=nb-next-egner.local)(PORT=1521)))  
The listener supports no services  
The command completed successfully  
-bash-3.2$
```

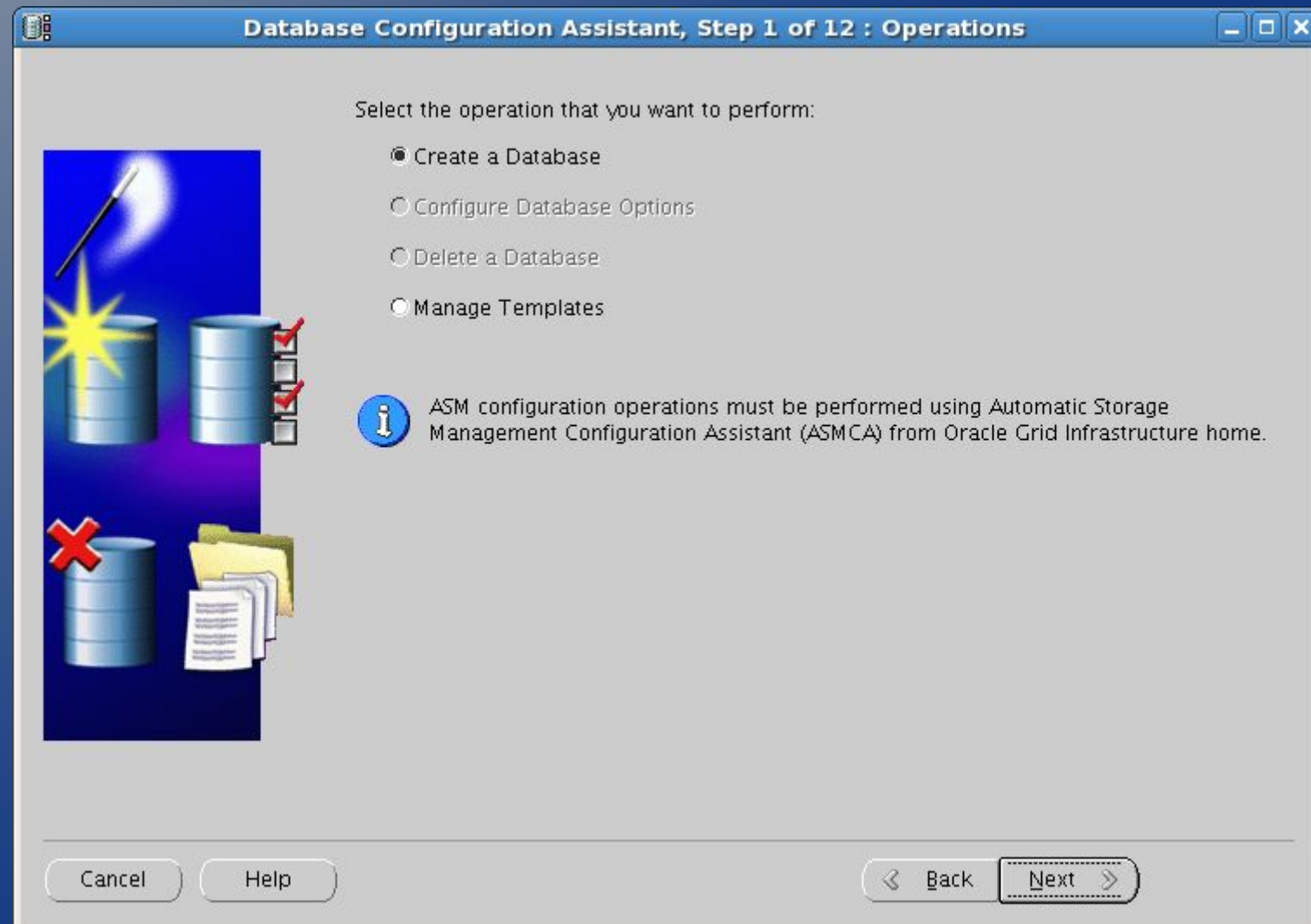
Installation – create the database



Installation – create the database



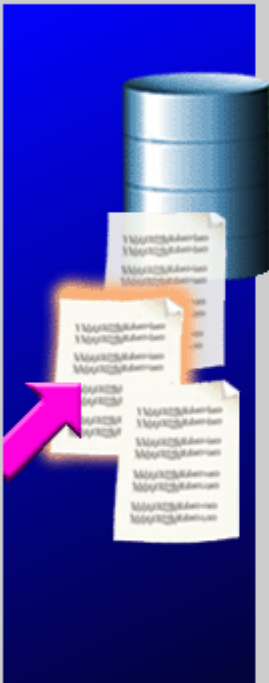
Installation – create the database



Installation – create the database

Database Configuration Assistant, Step 2 of 12 : Database Templates

Templates that include datafiles contain pre-created databases. They allow you to create a new database in minutes, as opposed to an hour or more. Use templates without datafiles only when necessary, such as when you need to change attributes like block size, which cannot be altered after database creation.




Select	Template	Includes Datafiles
<input type="radio"/>	General Purpose or Transaction Processing	Yes
<input checked="" type="radio"/>	Custom Database	No
<input type="radio"/>	Data Warehouse	Yes

Show Details...

Cancel Help < Back Next >

Installation – create the database

Database Configuration Assistant, Step 3 of 12 : Database Identification



An Oracle database is uniquely identified by a Global Database Name, typically of the form "name.domain".

Global Database Name:

A database is referenced by at least one Oracle instance which is uniquely identified from any other instance on this computer by an Oracle System Identifier (SID).

SID:

Cancel Help < Back Next >

Installation – create the database

Database Configuration Assistant, Step 4 of 12 : Management Options

Enterprise Manager Automatic Maintenance Tasks

Configure Enterprise Manager

Register with Grid Control for centralized management

Management Service: No Agents Found

Configure Database Control for local management

Enable Alert Notifications

Outgoing Mail (SMTP) Server:

Recipient Email Address:

Enable Daily Disk Backup to Recovery Area

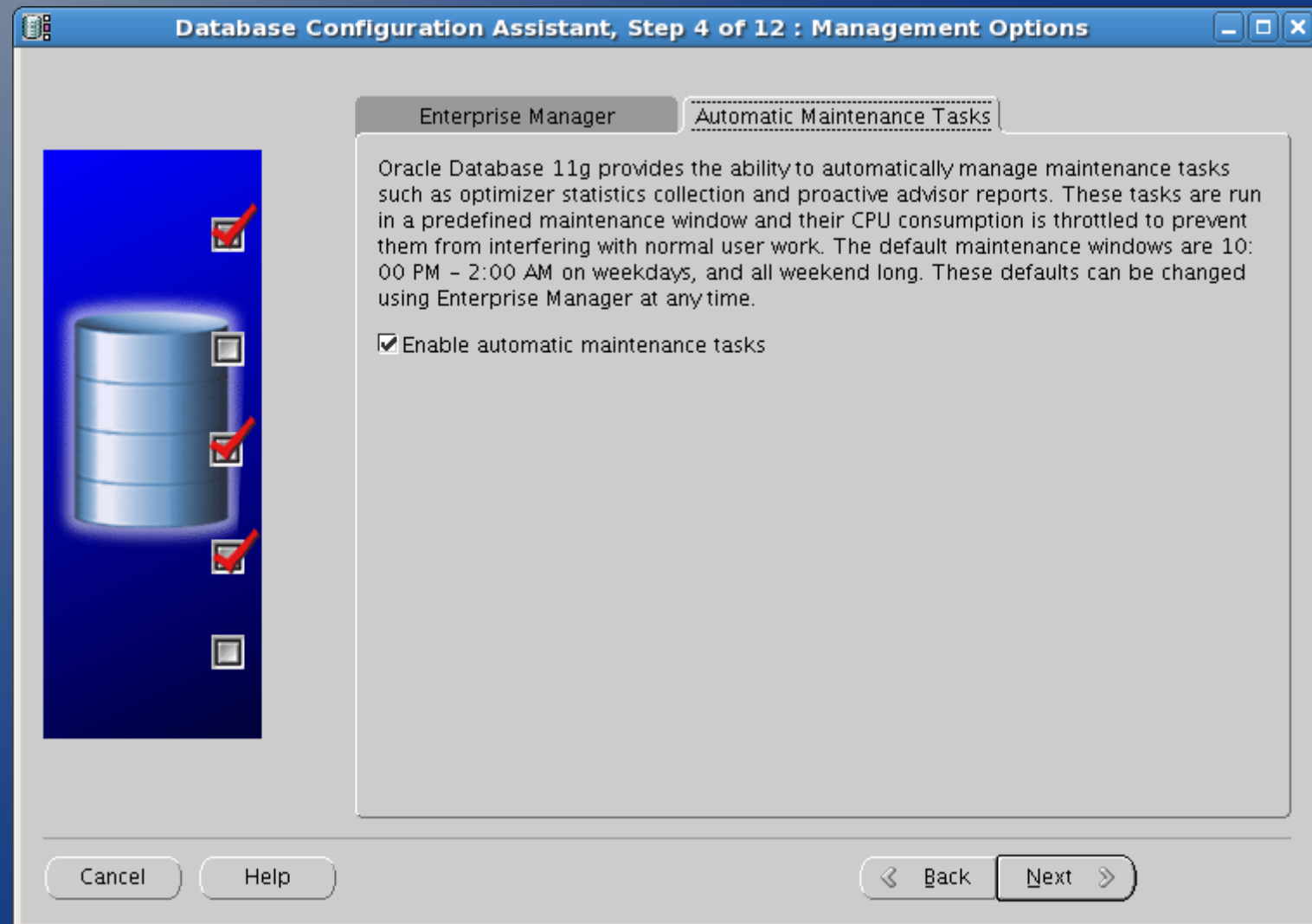
Backup Start Time: 02:00 AM AM PM

OS Username:

OS Password:

Cancel Help < Back Next >

Installation – create the database



Installation – create the database

Database Configuration Assistant, Step 5 of 12 : Database Credentials

For security reasons, you must specify passwords for the following user accounts in the new database.


Use Different Administrative Passwords

User Name	Password	Confirm Password
SYS	***	***
SYSTEM	*****	*****
DBSNMP	*****	*****
SYSMAN	*****	*****

Use the Same Administrative Password for All Accounts

Password:

Confirm Password:



Cancel Help < Back Next >

Installation – create the database

Database Configuration Assistant, Step 6 of 12 : Database File Locations

Specify storage type and locations for database files.

Storage Type:

Storage Locations:


Use Database File Locations from Template

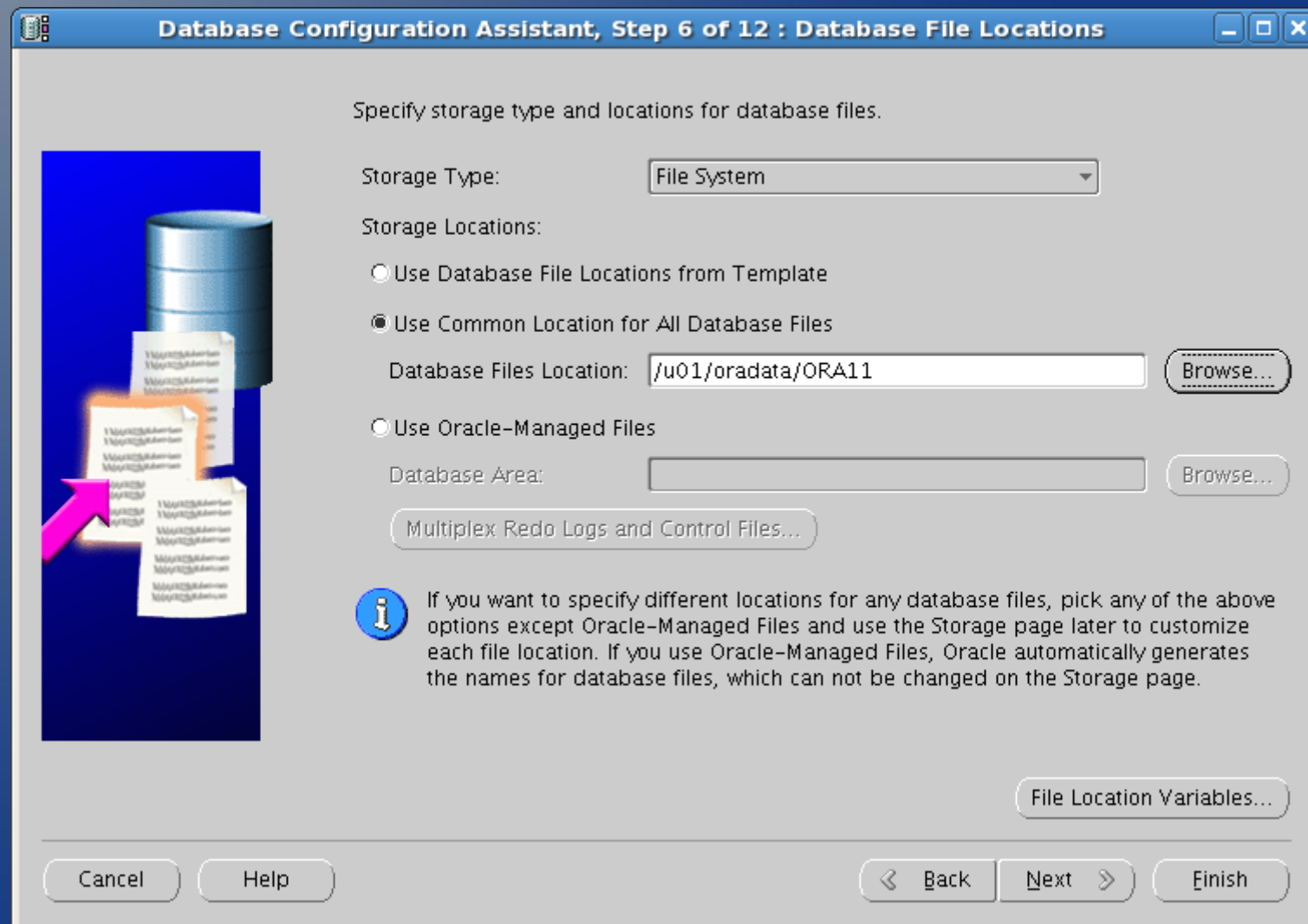
Use Common Location for All Database Files

Database Files Location:

Use Oracle-Managed Files

Database Area:

 If you want to specify different locations for any database files, pick any of the above options except Oracle-Managed Files and use the Storage page later to customize each file location. If you use Oracle-Managed Files, Oracle automatically generates the names for database files, which can not be changed on the Storage page.



Installation – create the database

Database Configuration Assistant, Step 7 of 12 : Recovery Configuration

Choose the recovery options for the database:

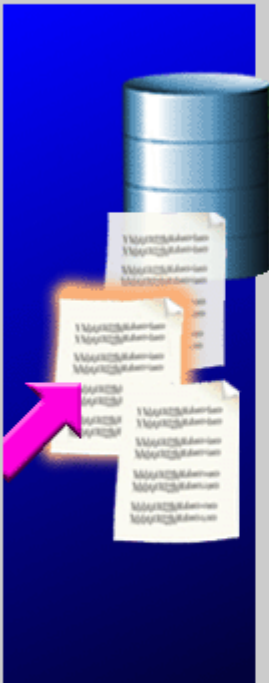
Specify Flash Recovery Area

This is used as the default for all disk based backup and recovery operations, and is also required for automatic disk based backup using Enterprise Manager. Oracle recommends that the database files and recovery files be located on physically different disks for data protection and performance.

Flash Recovery Area:

Flash Recovery Area Size:

Enable Archiving



Installation – create the database

Database Configuration Assistant, Step 8 of 12 : Database Content

Database Components | Custom Scripts

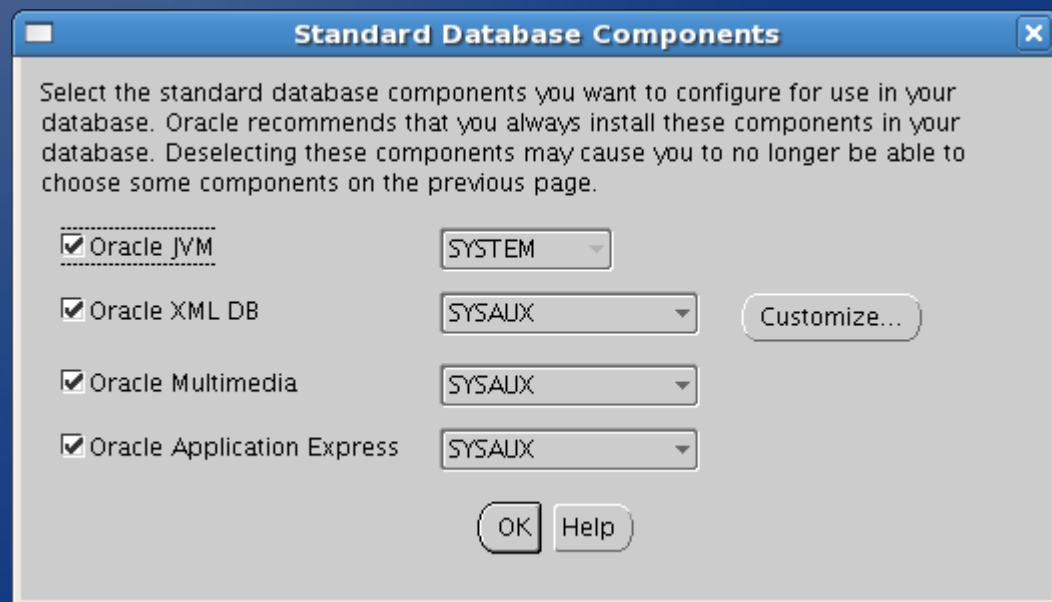
Select the components you want to configure for use in your database. Provide the tablespace in which you want the component to reside. Components which appear disabled are either not installed or depend on components which are not selected.

<input checked="" type="checkbox"/> Oracle Text	SYSAUX
<input checked="" type="checkbox"/> Oracle OLAP	SYSAUX
<input checked="" type="checkbox"/> Oracle Spatial	SYSAUX
<input type="checkbox"/> Oracle Label Security	SYSTEM
<input type="checkbox"/> Sample Schemas	SYSAUX
<input checked="" type="checkbox"/> Enterprise Manager Repository	SYSAUX
<input checked="" type="checkbox"/> Oracle Warehouse Builder	SYSAUX
<input type="checkbox"/> Oracle Database Vault	SYSAUX

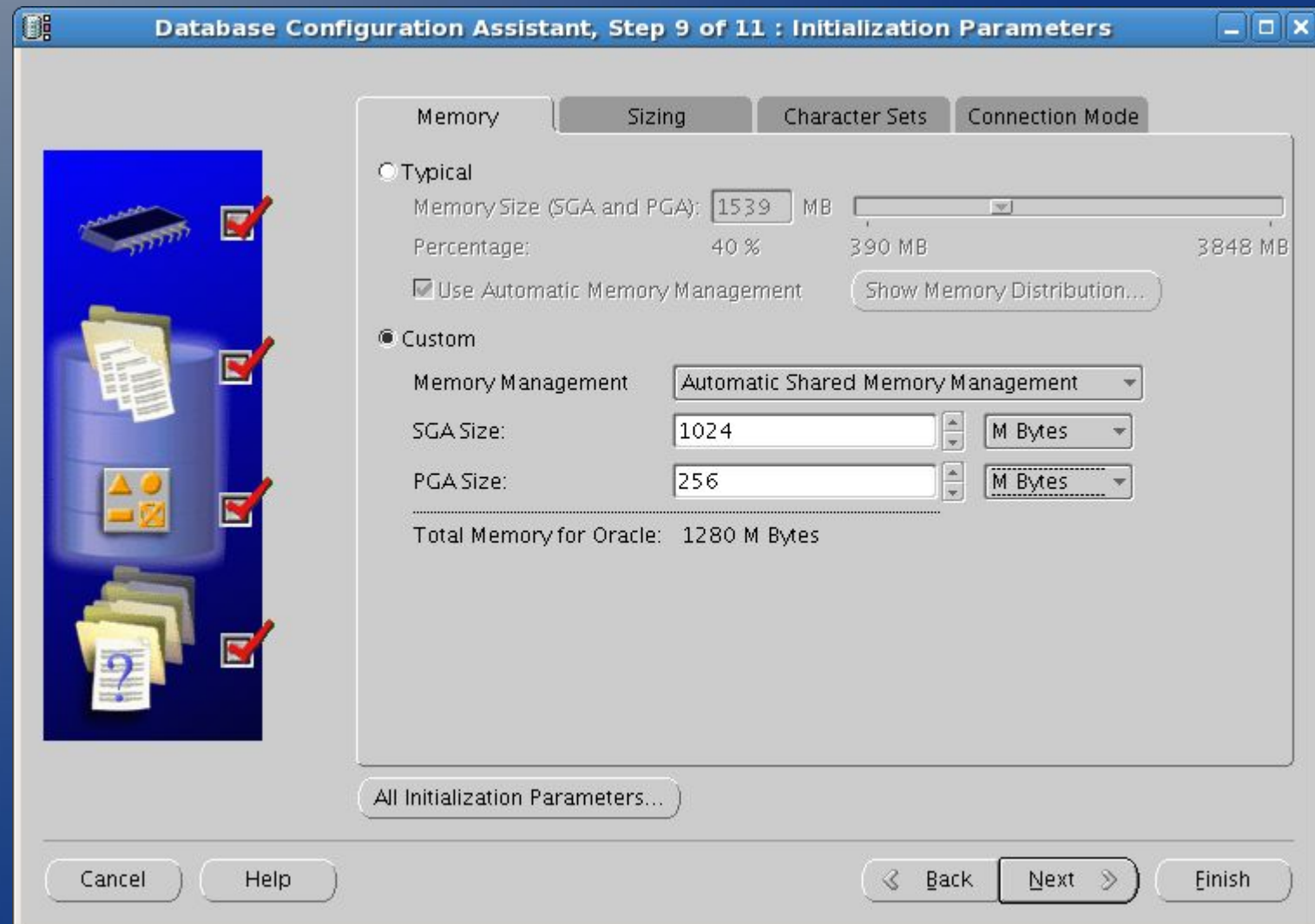
Standard Database Components...

Cancel Help < Back Next > Finish

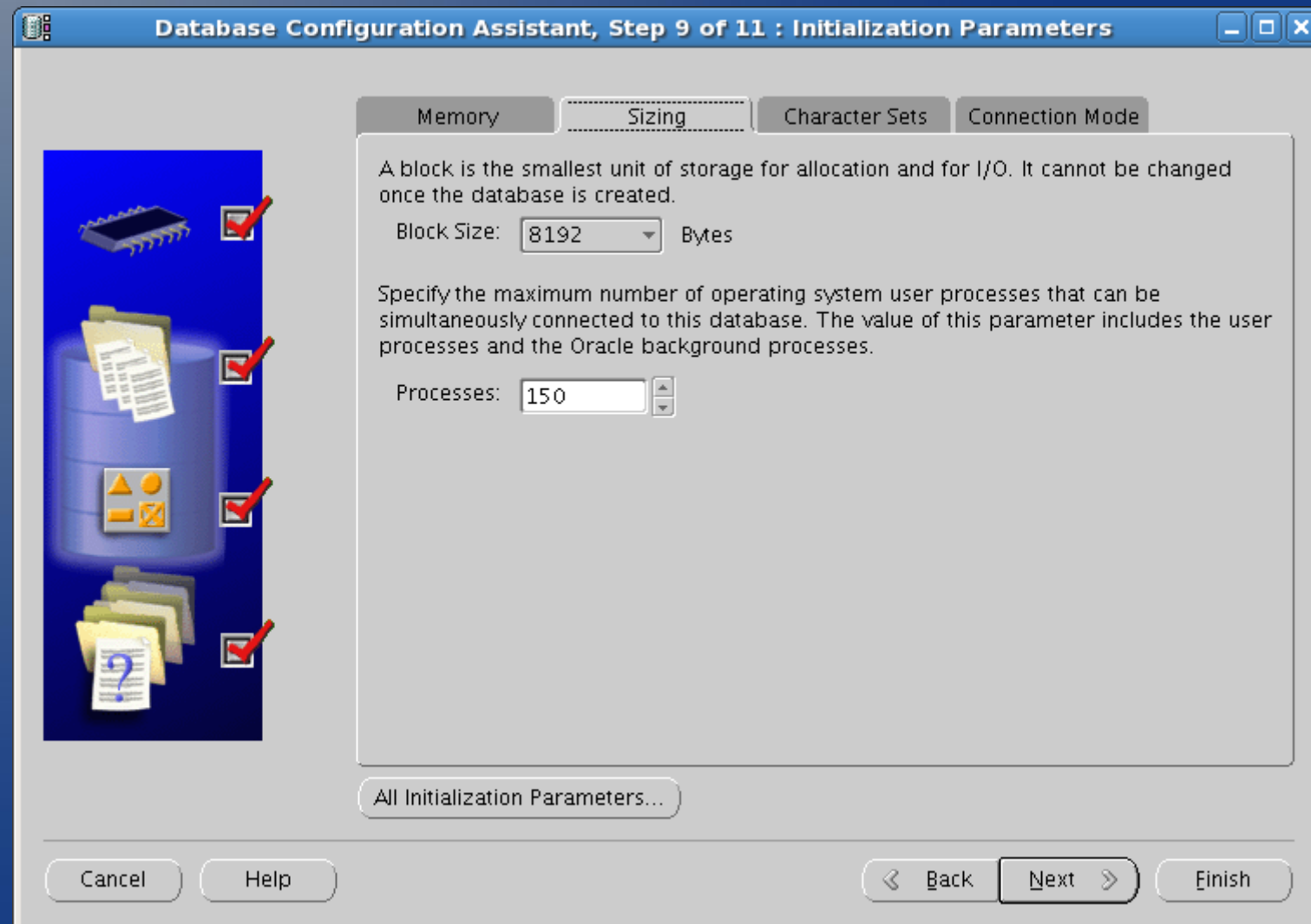
Installation – create the database



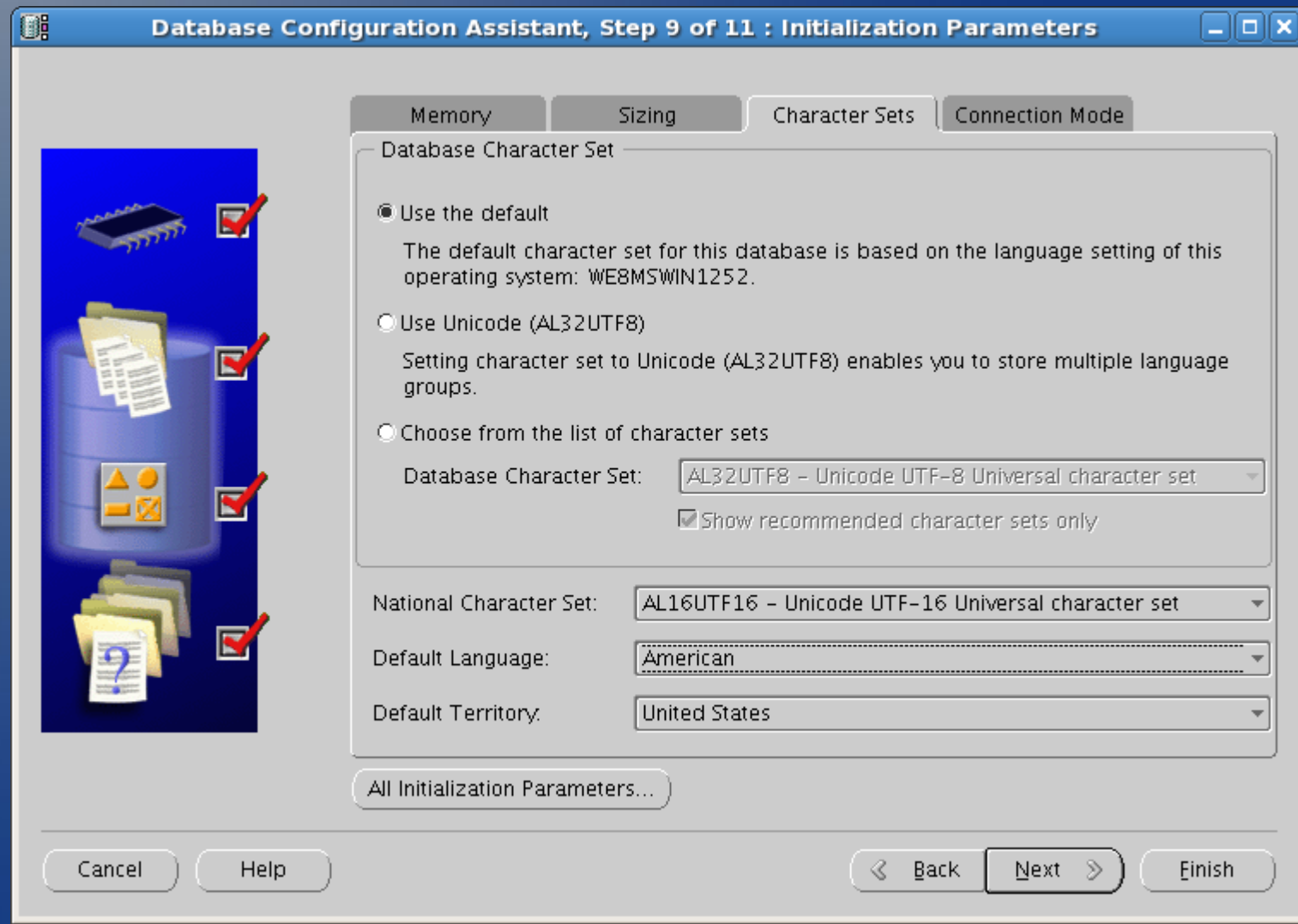
Installation – create the database



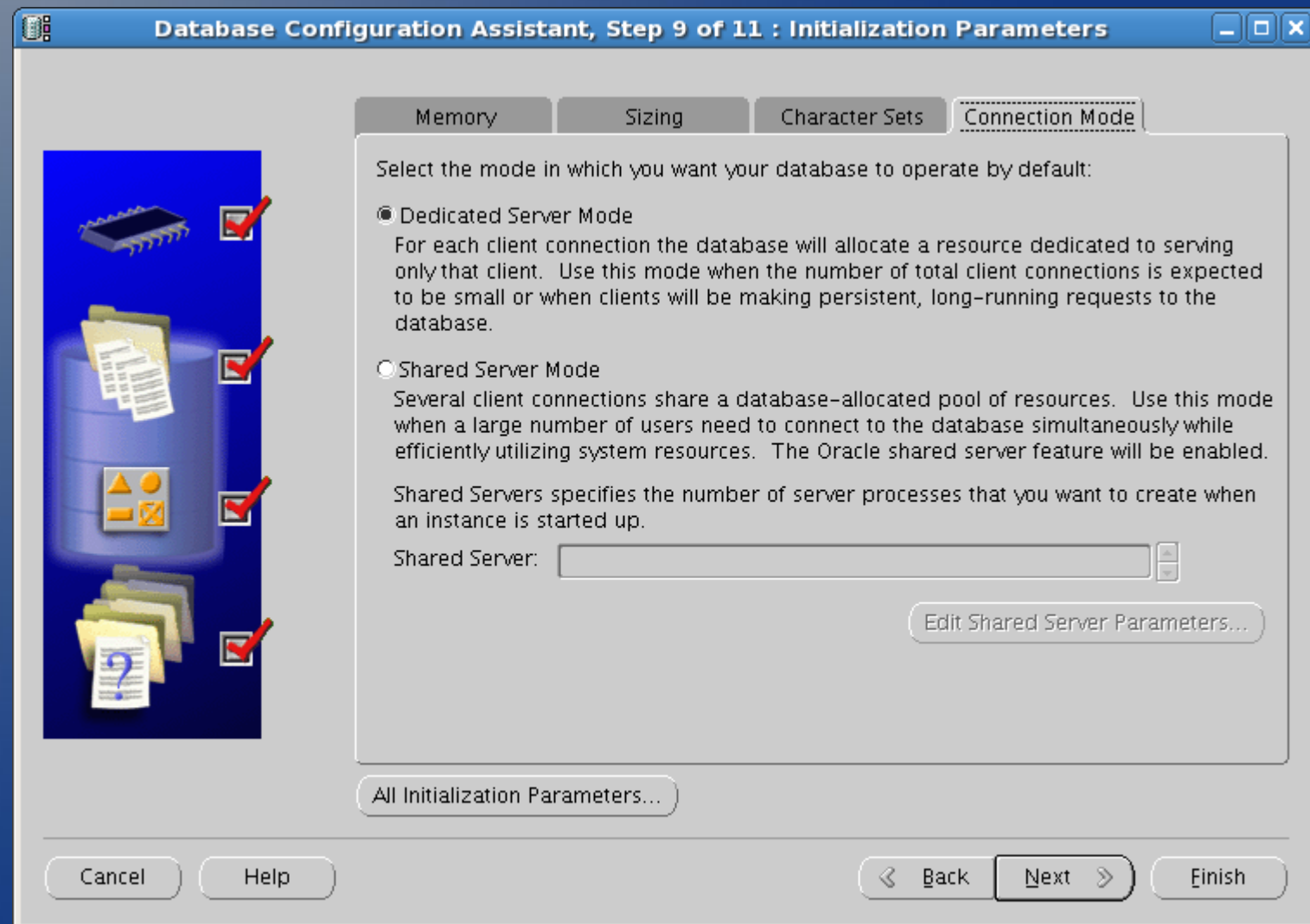
Installation – create the database



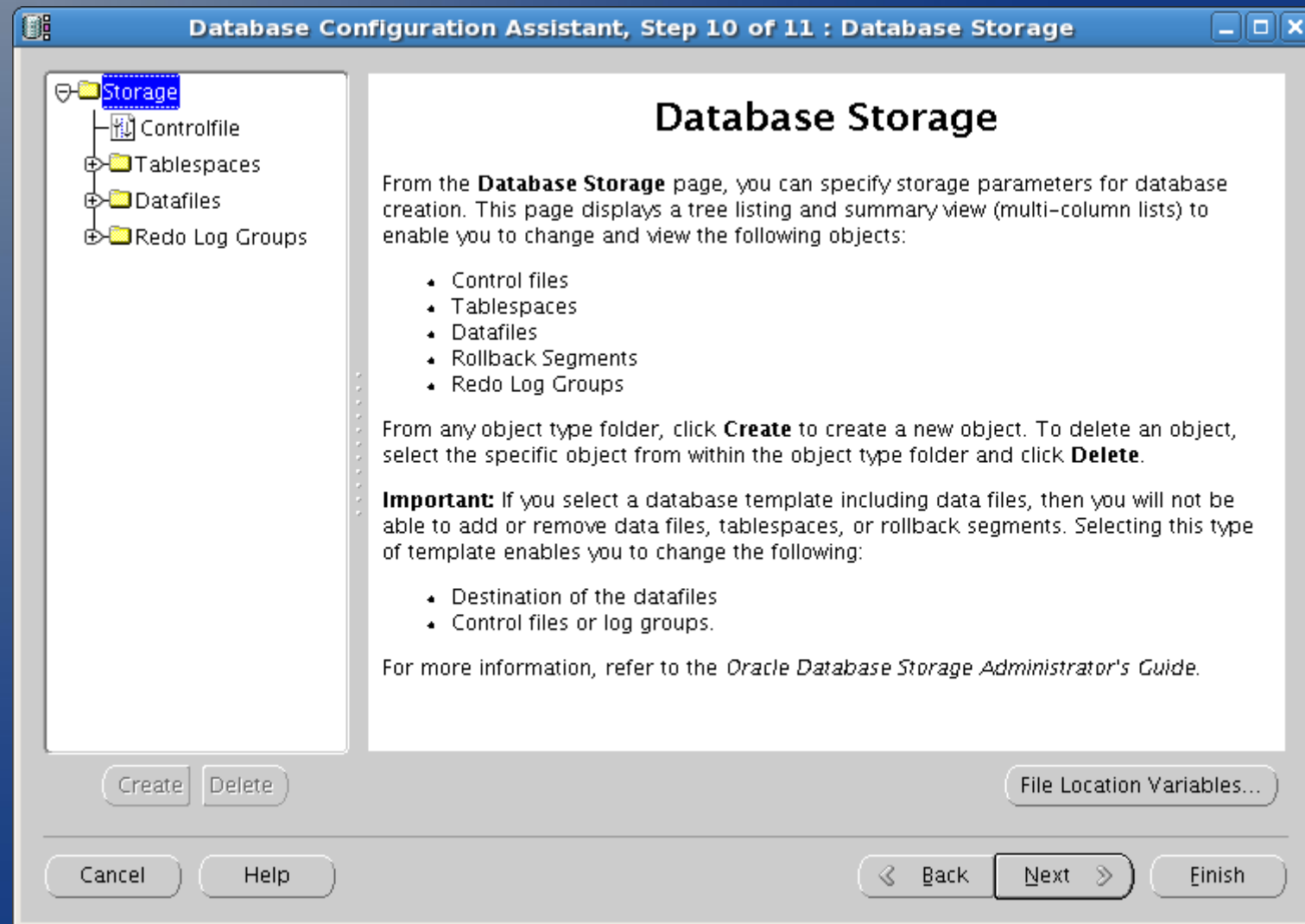
Installation – create the database



Installation – create the database



Installation – create the database



Installation – create the database

Database Configuration Assistant, Step 11 of 11 : Creation Options

Select the database creation options:

Create Database


Save as a Database Template

Name:

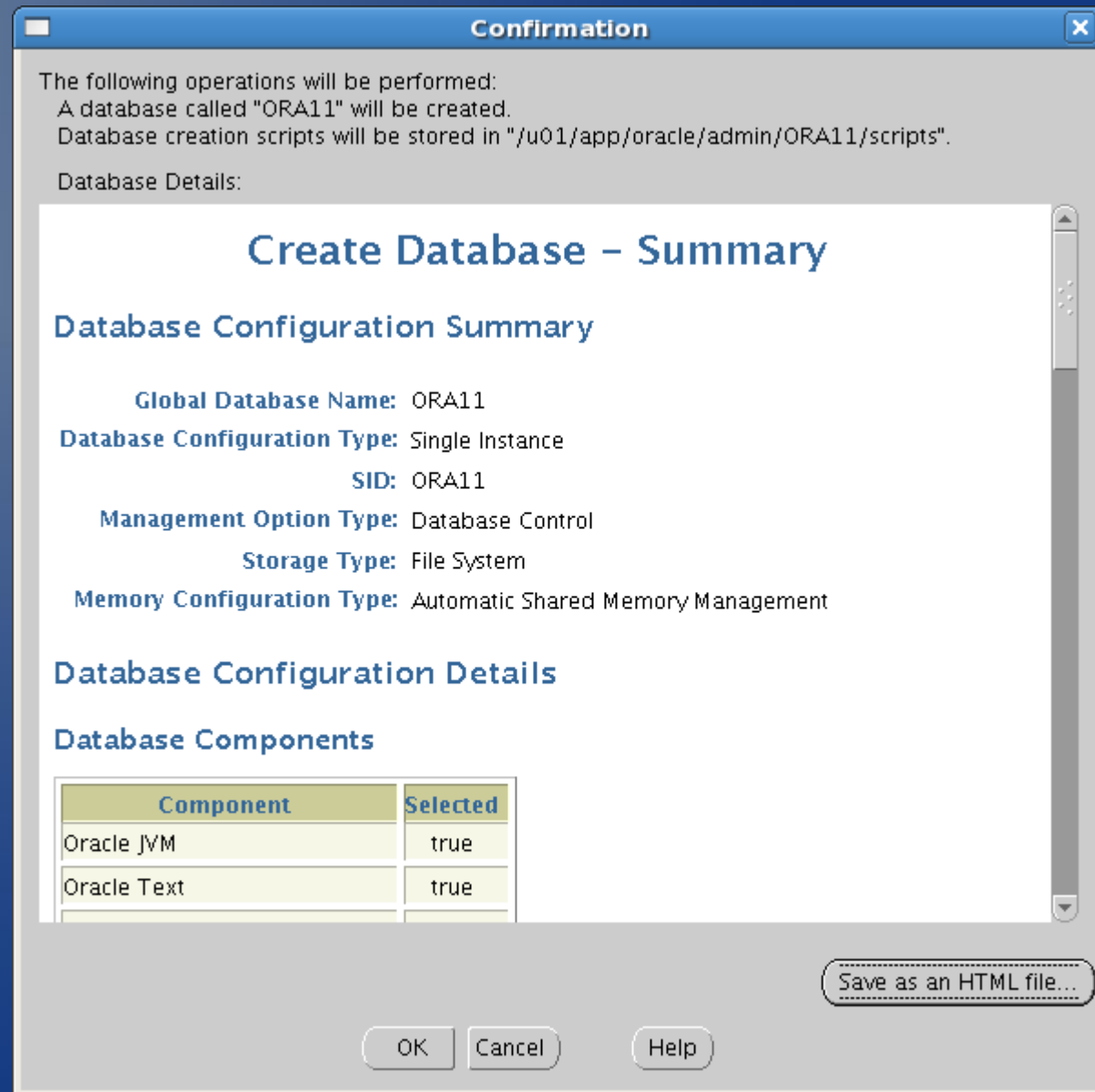
Description:

Generate Database Creation Scripts

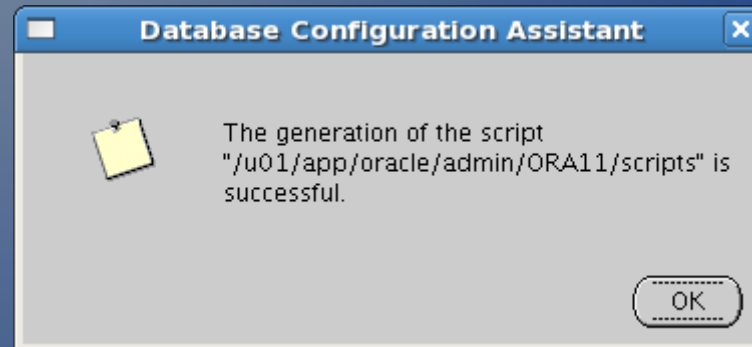
Destination Directory:



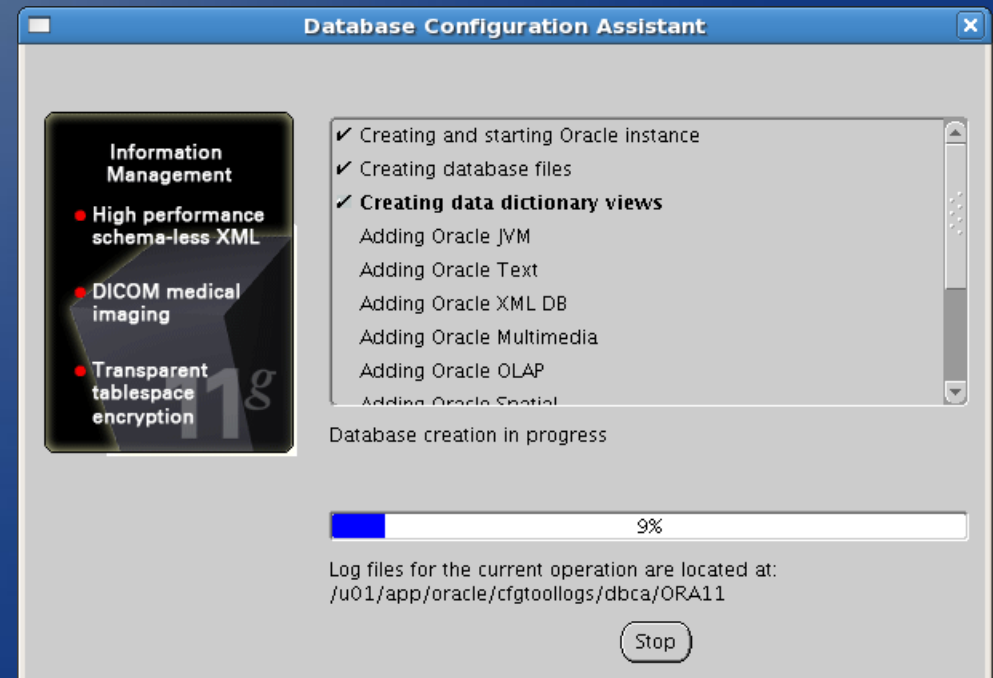
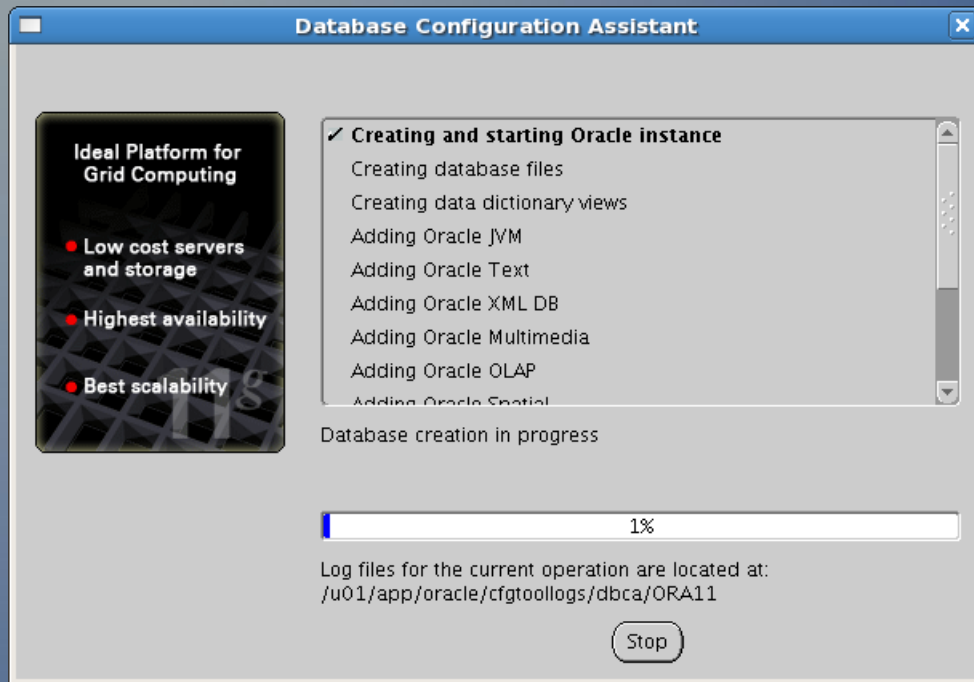
Installation – create the database



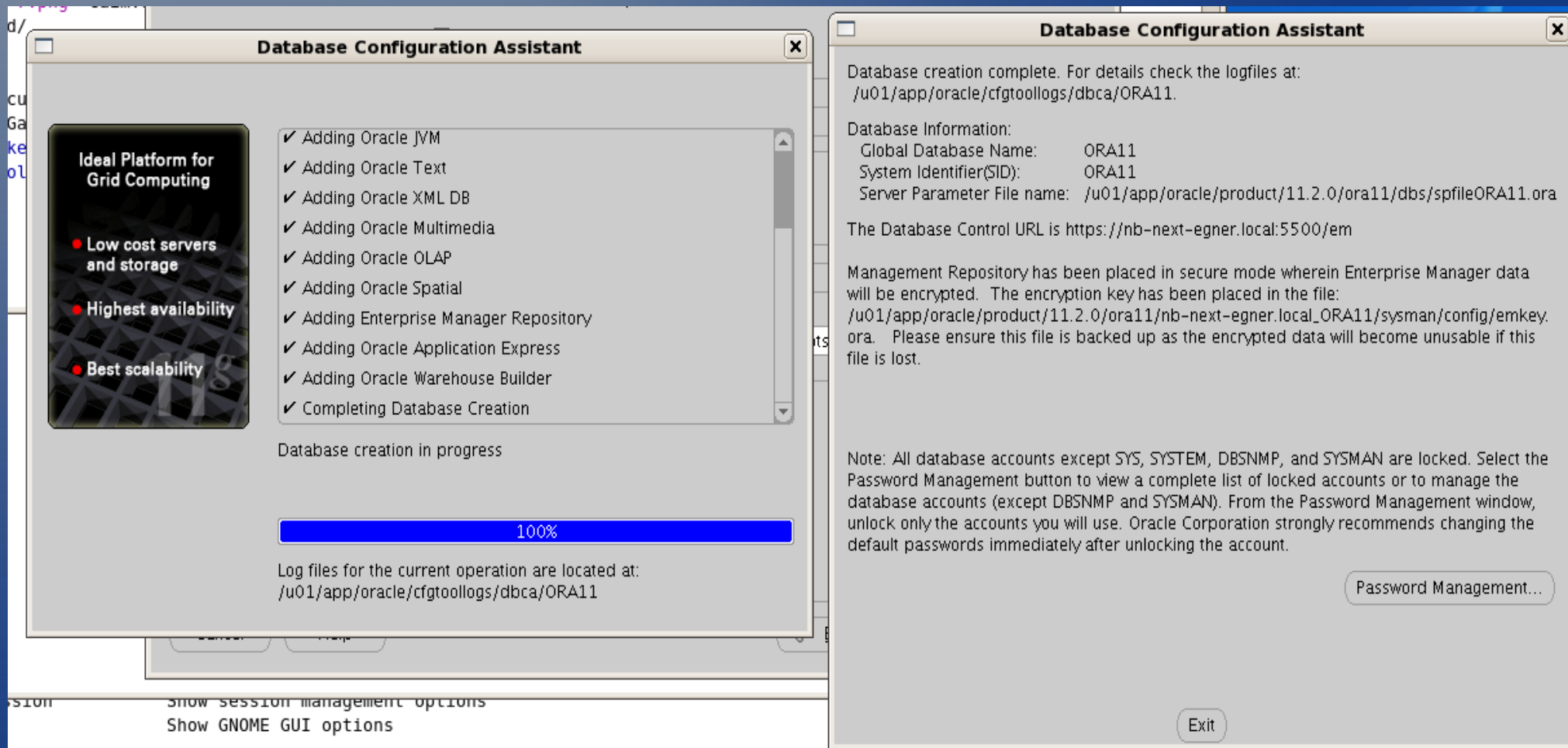
Installation – create the database



Installation – create the database



Installation – create the database



Part 2 – Oracle Grid Infrastructure

System configuration

- System configuration:
 - two virtual machines (VMWARE)
 - 1 vCPU
 - 2 GB RAM → bare minimum possible
 - 40 GB Disk
 - Storage exported via ISCSI
 - 4 LUNs with 2 GB each
 - 2 LUNs with 30 GB each
 - Operating system configuration
 - Oracle Enterprise Linux 5.3 x86_64 (Kernel 2.6.18-128.el5)
 - Installed packages: default system + development packages
 -

System configuration

- System configuration:
 - Cluster Name: „RAC“
 - Binary installation on local disk
 - OCR, Voting and datafiles stored in ASM

Installation Overview

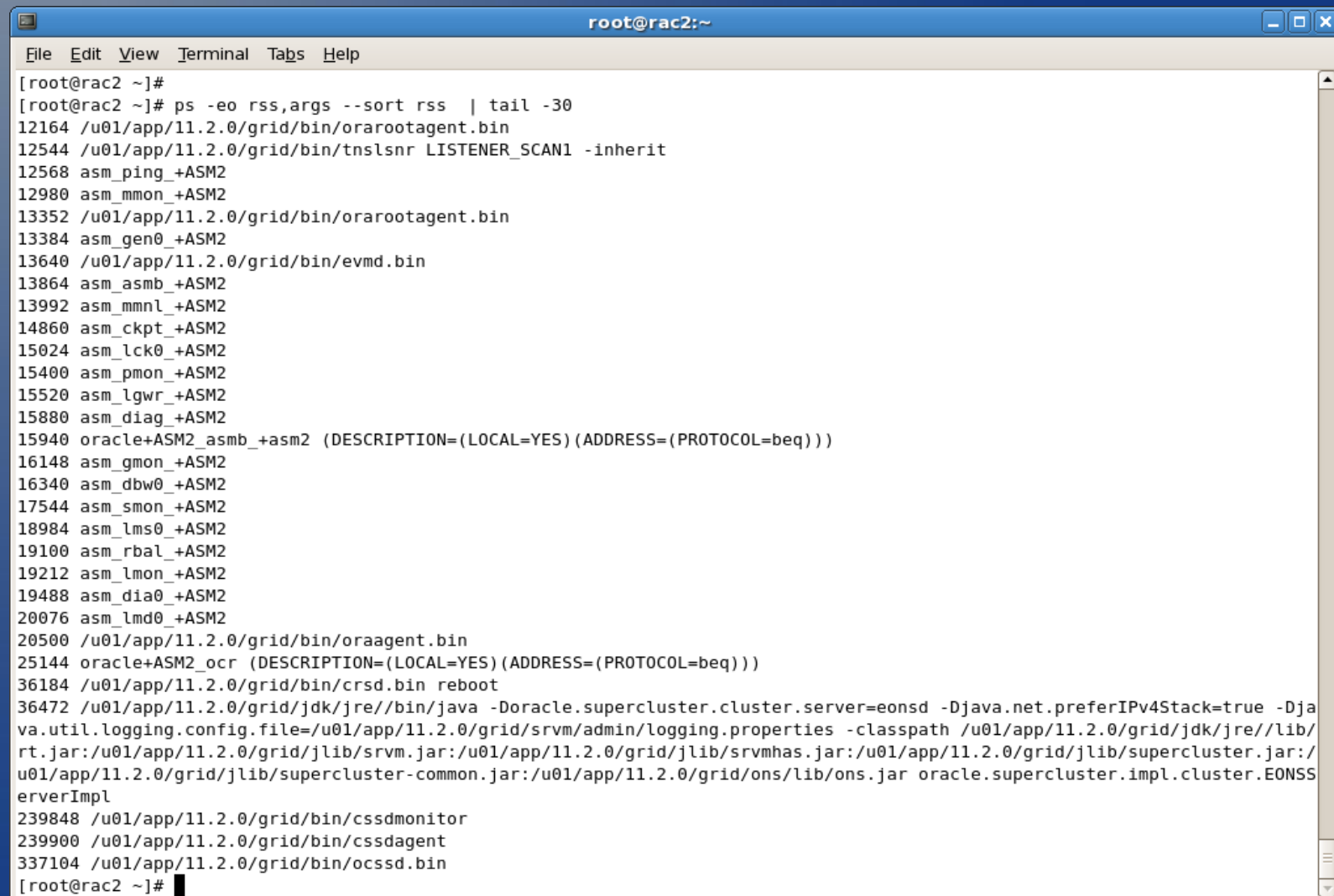
- Installation of Oracle 11g Release 2 Grid Infrastructure
 - Configure Linux and pre-requirements
 - Configure Storage
 - Binary installation of grid infrastructure
- Installation of Oracle 11g Release 2 Database (either single or rac installation)

Installation – configure linux and requirements

- SWAP
 - Between 1 and 2 GB RAM → 1.5 times the size of RAM
 - Between 2 and 16 GB RAM → equal to size of RAM
 - > 16 GB RAM → 16 GB SWAP
- Memory
 - according to grid infrastructure documentation „>= 1 GB Memory“
 - bare minimum from authors experience:
 - 1 GB for grid infrastructure components
 - 500 MB for operating system
 - 1 GB for cluster database SGA/PGA/UGA= 2,5 GB bare minimum!

Installation – configure linux and requirements

- Memory (con't)
 - See below for memory consumption with grid infrastructure installed → > 800 MB for infrastructure processes



```
root@rac2:~  
File Edit View Terminal Tabs Help  
[root@rac2 ~]#  
[root@rac2 ~]# ps -eo rss,args --sort rss | tail -30  
12164 /u01/app/11.2.0/grid/bin/orarootagent.bin  
12544 /u01/app/11.2.0/grid/bin/tnslsnr LISTENER_SCAN1 -inherit  
12568 asm_ping_+ASM2  
12980 asm_mmon_+ASM2  
13352 /u01/app/11.2.0/grid/bin/orarootagent.bin  
13384 asm_gen0_+ASM2  
13640 /u01/app/11.2.0/grid/bin/evmd.bin  
13864 asm_asmb_+ASM2  
13992 asm_mnml_+ASM2  
14860 asm_ckpt_+ASM2  
15024 asm_lck0_+ASM2  
15400 asm_pmon_+ASM2  
15520 asm_lgwr_+ASM2  
15880 asm_diag_+ASM2  
15940 oracle+ASM2_asmb_+asm2 (DESCRIPTION=(LOCAL=YES) (ADDRESS=(PROTOCOL=beq)))  
16148 asm_gmon_+ASM2  
16340 asm_dbw0_+ASM2  
17544 asm_smon_+ASM2  
18984 asm_lms0_+ASM2  
19100 asm_rbal_+ASM2  
19212 asm_lmon_+ASM2  
19488 asm_dia0_+ASM2  
20076 asm_lmd0_+ASM2  
20500 /u01/app/11.2.0/grid/bin/oraagent.bin  
25144 oracle+ASM2_ocr (DESCRIPTION=(LOCAL=YES) (ADDRESS=(PROTOCOL=beq)))  
36184 /u01/app/11.2.0/grid/bin/crsd.bin reboot  
36472 /u01/app/11.2.0/grid/jdk/jre//bin/java -Doracle.supercluster.cluster.server=eonsd -Djava.net.preferIPv4Stack=true -Djava.util.logging.config.file=/u01/app/11.2.0/grid/srvm/admin/logging.properties -classpath /u01/app/11.2.0/grid/jdk/jre//lib/rt.jar:/u01/app/11.2.0/grid/jlib/srvm.jar:/u01/app/11.2.0/grid/jlib/srvmhas.jar:/u01/app/11.2.0/grid/jlib/supercluster.jar:/u01/app/11.2.0/grid/jlib/supercluster-common.jar:/u01/app/11.2.0/grid/ons/lib/ons.jar oracle.supercluster.impl.cluster.EONSServerImpl  
239848 /u01/app/11.2.0/grid/bin/cssdmonitor  
239900 /u01/app/11.2.0/grid/bin/cssdagent  
337104 /u01/app/11.2.0/grid/bin/ocssd.bin  
[root@rac2 ~]#
```

Installation – configure linux and requirements

- Automatic Memory Management
 - Required /dev/shm with appropriate size (i.e. SGA of 16 GB required /dev/shm to be 16 GB+)
 - Huge Pages and autom. Memory Management are INCOMPATIBLE

Installation – configure linux and requirements

- Checking required packages (see required packages for single database installation; this applies here as well cause we will end up install a database in the end)
 - According to the documentation the following packages are needed:

Binutils-2.17.50.0.6, compat-libstdc++-33-3.2.3, compat-libstdc++-33-3.2.3 (32 bit), elfutils-libelf-0.125, elfutils-libelf-devel-0.125, gcc-4.1.2, gcc-c++-4.1.2, glibc-2.5-24, glibc-2.5-24 (32 bit), glibc-common-2.5, glibc-devel-2.5, glibc-devel-2.5 (32 bit), glibc-headers-2.5, ksh-20060214, libaio-0.3.106, libaio-0.3.106 (32 bit), libaio-devel-0.3.106, libaio-devel-0.3.106 (32 bit), libgcc-4.1.2, libgcc-4.1.2 (32 bit), libstdc++-4.1.2, libstdc++-4.1.2 (32 bit), libstdc++-devel 4.1.2, make-3.81, sysstat-7.0.2, unixODBC-2.2.11, unixODBC-2.2.11 (32 bit), unixODBC-devel-2.2.11, unixODBC-devel-2.2.11 (32 bit)
- On sample system with default + development packages installed only the following rpms were missing:


```
rpm -ihv libaio-devel-0.3.106-3.2.* libstdc++43-devel-4.3.2-7.el5.* sysstat-7.0.2-3.el5.x86_64.rpm unixODBC-2.2.11-7.1.* unixODBC-devel-2.2.11-7.1.*
```


Installation – configure linux and requirements

- Shell Limits

- In /etc/security/limits.conf

grid	soft	nproc	16384
grid	hard	nproc	16384
grid	soft	nofile	65536
grid	hard	nofile	65536
grid	soft	stack	10240
grid	hard	stack	10240

- In /etc/pam.d/login add if not exists

session	required	pam_limits.so
---------	----------	---------------

Installation – configure linux and requirements

- Kernel Limits (MINIMUM values)

- /etc/sysctl.conf

```
kernel.sem=250 32000 100 128
kernel.shmall=2097152
kernel.shmmax=536870912
kernel.shmmni=4096
fs.file-max=6815744
fs.aio-max-nr=1048576
net.ipv4.ip_local_port_range=9000 65500
net.core.rmem_default=262144
net.core.rmem_max=4194304
net.core.wmem_default=262144
net.core.wmem_max=1048576
```

- SuSE only -

```
vm.hugetlb_shm_group=<gid of osdba group>
```

- The values in /etc/sysctl.conf should be tuned (i.e. according to the number of instance, available memory, number of connections,...)

Installation – configure linux and requirements

- Kernel Limits on Linux (Calculate them) - „kernel.sem“

```
semmns = Total number of semaphores systemwide =
```

```
    2 * sum (process parameters of all database instances on the system)  
    + overhead for background processes  
    + system and other application requirements
```

```
semmsl = total semaphoren for each set
```

```
semmni = total semaphore sets =
```

```
    semmns divided by semmsl, rounded UP to nearest multiple to 1024
```

```
kernel.sem = <semmsl semmns semopm semmni>
```

semmsl	→ set to 256
semmns	→ set total number of semaphoren (see above!)
semopm	→ 100; in documentation not explicitly described
semmni	→ see calculation above

Installation – configure linux and requirements

- Kernel Limits on Linux (Calculate them) - „kernel.shmall

kernel.shmall = This parameter sets the total amount of shared memory **pages** that can be used system wide. Hence, SHMALL should always be at least `ceil(shmmax/PAGE_SIZE)`.
PAGE_SIZE is usually 4096 bytes unless you use Big Pages or Huge Pages which supports the configuration of larger memory pages.

(quoted from: www.puschitz.com/TuningLinuxForOracle.shtml)

Installation – configure linux and requirements

- Kernel Limits on Linux (Calculate them) - „kernel.shmmax“

`kernel.shmmax` = the maximum size of a single shared memory segment in bytes that a linux process can allocate

If not set properly database startup can fail with:

`ORA-27123: unable to attach to shared memory segment`

Installation – configure linux and requirements

- Kernel Limits on Linux (Calculate them) - misc parameter

`kernel.shmni` = system wide number of shared memory segments; Oracle recommendation for 11g Release 1 „at least to 4096“; i did not found anything for Release 2....

`fs.file-max` = maximum number of open files system-wide; must be at least „6815744“

`fs.aio-max-nr` = concurrent outstanding i/o requests; must be set to „1048576“

`net.ipv4.ip_local_port_range` = minimum and maximum ports for use; must be set to minimal „9000“ and „65500“ as maximum

`net.core.rmem_default` = the default size in bytes of the receive buffer; must be set at least to „262144“

`net.core.rmem_max` = the maximum size in bytes of the receive buffer; must be set at least to „4194304“

`net.core.wmem_default` = the default size in bytes of the send buffer; must be set at least to „262144“

`net.core.wmem_max` = the maximum size in bytes of the send buffer; must be set at least to „1048576“

Installation – configure linux and requirements

- Networking
 - Works completely different than 10g or 11g R1!
 - At least two separated networks (public and private) and therefore two network interfaces required
 - ATTENTION: Interface names must be equal on ALL nodes! (i.e. If private network interface on node A is eth2 the private network interface name on all other nodes must be eth2 as well....)
 - Recommendation: Use bonding for:
 - Static naming (even if you use only one interface per bond)
 - Failover / Load Sharing
 - → we will use network bonding with only one interface in the following
 - IP addresses can be given by two schemes:
 - GNS (grid naming service) – automatic ip numbering
 - Manual Mode
 - → we will use manual ip addressing mode in the following

Installation – configure linux and requirements

- Networking (con't)
 - GNS mode requires:
 - one fixed public IP for each node
 - one dhcp virtual IP for each node
 - one dhcp for fixed private IP for each node
 - three dhcp IP for the SCAN
 - Thoughts by the author:
 - new
 - more complex
 - if working quite easy adding of an node; at least from the ip numbering point of view – but how often do you add a node?

Installation – configure linux and requirements

- Networking (con't)
 - Manual Mode ip addressing requires:
 - one public IP for each node
 - one virtual IP for each node
 - one private IP for each node
 - one to three (recommended) IPs for providing the SCAN name

Installation – configure linux and requirements

- Networking (con't)
 - Naming schema used in the following (remember: 2-node-cluster)

Identity	Home Node	Host Node	Given Name	Type	Address
Node 1 Public	Node 1	Node 1	rac1	Public	192.168.180.10
Node 1 VIP	Node 1	sel. by clusterware	rac1-vip	Virtual	192.168.180.100
Node 1 Private	Node 1	Node 1	rac1-priv	Private	192.168.181.10
Node 2 Public	Node 2	Node 2	rac2	Public	192.168.180.20
Node 2 VIP	Node 2	sel. by clusterware	rac2-vip	Virtual	192.168.180.200
Node 2 Private	Node 2	Node 2	rac2-priv	Private	192.168.181.20
SCAN VIP 1	none	sel. by clusterware	rac-scan	Virtual	192.168.180.5
SCAN VIP 2	none	sel. by clusterware	rac-scan	Virtual	192.168.180.6
SCAN VIP 3	none	sel. by clusterware	rac-scan	Virtual	192.168.180.7

cluster name: „RAC“

Installation – configure linux and requirements

- Configure Network Bonding

- In `/etc/modprobe.conf` add line:

```
alias bond0 bonding
alias bond1 bonding
options bonding miimon=100 mode=1 max-bonds=2
```

(„mode=1“ means active/passive failover... see „bonding.txt“ in kernel sources for more options)

- `/etc/sysconfig/network-scripts/ifcfg-bond0` looks like:

```
DEVICE=bond0
BOOTPROTO=none
ONBOOT=yes
NETWORK=192.168.180.0
NETMASK=255.255.255.0
IPADDR=192.168.180.10
USERCTL=no
```

Installation – configure linux and requirements

- Configure Network Bonding (con't)

- /etc/sysconfig/network-scripts/ifcfg-eth0 looks like:

```
DEVICE=eth0
BOOTPROTO=none
ONBOOT=yes
MASTER=bond0
SLAVE=yes
USERCTL=yes
```

(Note: Add a second interface to achive real fault tolerance.... for our testing environment we use bonding to provide a consistent name schema)

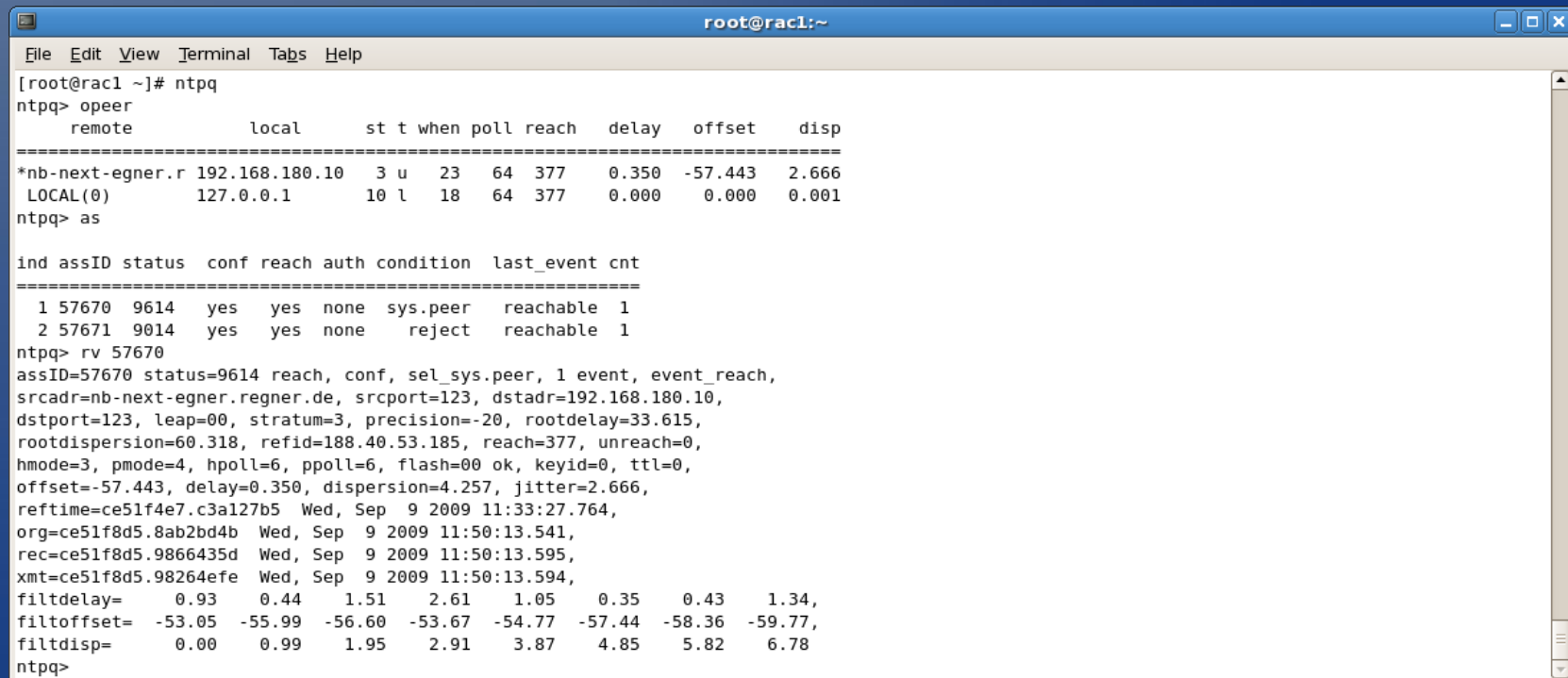
- configuration for bond1 is not shown... just alter interface names and IPs

Installation – configure linux and requirements

- Configure NTP
 - Grid Infrastructure provides ntp-like time synchronization with „ctssd“ (cluster time synchronization service)
 - ctssd is provided in case connections to ntp servers are not possible
 - If **no** running („chkconfig ntpd off“) and configured („rm /etc/ntp.conf“) ntpd is found ctssd will be used
 - If ntpd is found ctssd will start in observer mode
 - **ATTENTION:** Set the „-x“ flag if you use ntp to prevent ntp from stepping the clock in /etc/sysconfig/ntp

Installation – configure linux and requirements

- Check if NTP is working
 - start „ntpq“
 - enter „opeer“ to see list of all peers
 - In our example two peers: host „nb-next-egner“ and the local clock

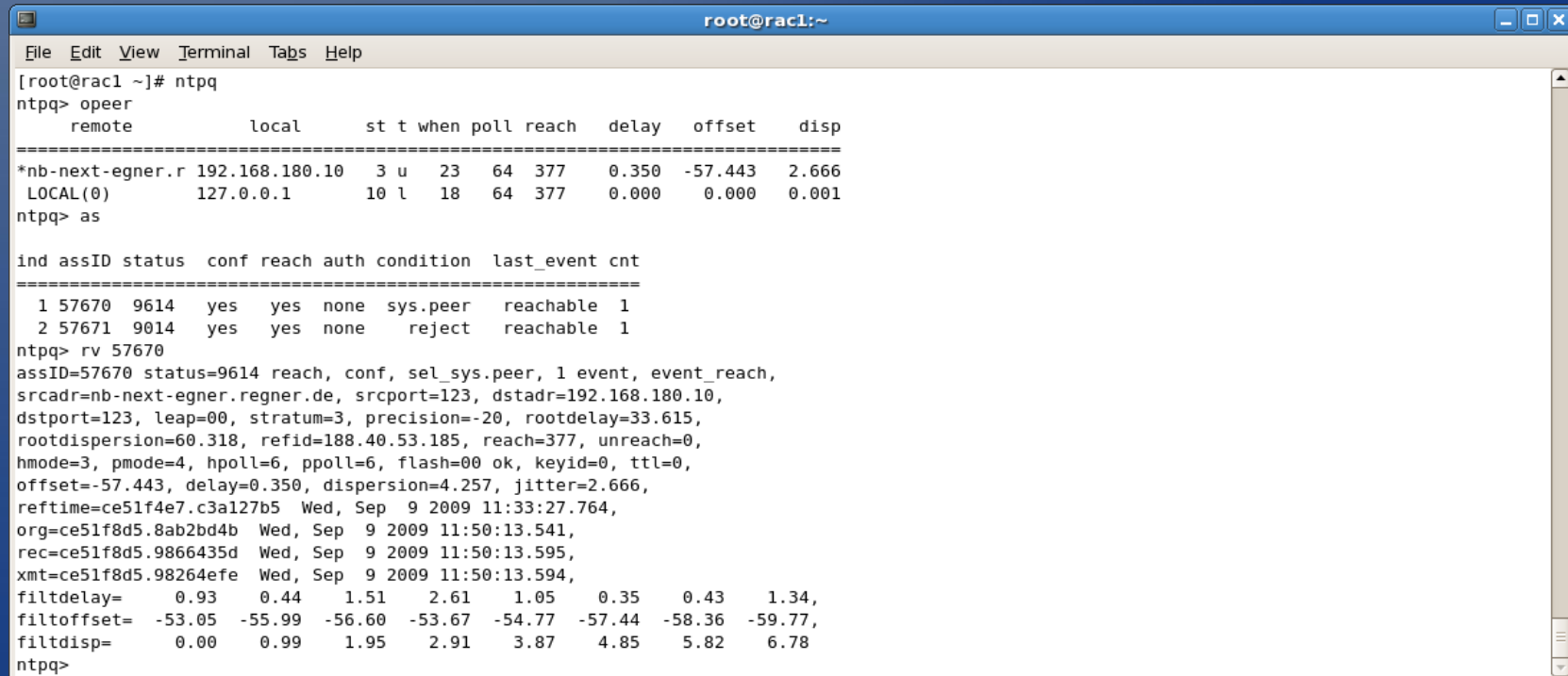
A terminal window titled 'root@rac1:~' showing the output of the 'ntpq' command. The user has entered 'ntpq' and 'opeer', resulting in a table of peers. The first peer is 'nb-next-egner.r' at IP 192.168.180.10, and the second is 'LOCAL(0)' at IP 127.0.0.1. The user then enters 'as' to show association details for the first peer, followed by 'rv 57670' to show detailed statistics for that peer.

```
[root@rac1 ~]# ntpq
ntpq> opeer
      remote           local         st t when poll reach  delay  offset  disp
-----
*nb-next-egner.r 192.168.180.10  3 u  23  64 377   0.350 -57.443  2.666
LOCAL(0)         127.0.0.1       10 l  18  64 377   0.000  0.000  0.001
ntpq> as

ind assID status  conf reach auth condition  last_event cnt
-----
  1 57670 9614   yes  yes none sys.peer  reachable  1
  2 57671 9014   yes  yes none reject  reachable  1
ntpq> rv 57670
assID=57670 status=9614 reach, conf, sel_sys.peer, 1 event, event_reach,
srcadr=nb-next-egner.regner.de, srcport=123, dstadr=192.168.180.10,
dstport=123, leap=00, stratum=3, precision=-20, rootdelay=33.615,
rootdispersion=60.318, refid=188.40.53.185, reach=377, unreach=0,
hmode=3, pmode=4, hpoll=6, ppoll=6, flash=00 ok, keyid=0, ttl=0,
offset=-57.443, delay=0.350, dispersion=4.257, jitter=2.666,
reftime=ce51f4e7.c3a127b5 Wed, Sep  9 2009 11:33:27.764,
org=ce51f8d5.58ab2bd4b Wed, Sep  9 2009 11:50:13.541,
rec=ce51f8d5.9866435d Wed, Sep  9 2009 11:50:13.595,
xmt=ce51f8d5.98264efe Wed, Sep  9 2009 11:50:13.594,
filtdelay=  0.93  0.44  1.51  2.61  1.05  0.35  0.43  1.34,
filtoffset= -53.05 -55.99 -56.60 -53.67 -54.77 -57.44 -58.36 -59.77,
filtdisp=   0.00  0.99  1.95  2.91  3.87  4.85  5.82  6.78
ntpq>
```

Installation – configure linux and requirements

- Check if NTP is working
 - enter „as“ to see associations
 - „sys.peer“ means the clock is synchronized against this; the order in which the entries appear is like „opeer“ - so first entry means host „nb-next-egner“ → fine!
 - reject means not synchronized against due to various reasons
 - enter „rv <assID>“ for detailed information



```
root@rac1:~  
File Edit View Terminal Tabs Help  
[root@rac1 ~]# ntpq  
ntpq> opeer  
remote local st t when poll reach delay offset disp  
-----  
*nb-next-egner.r 192.168.180.10 3 u 23 64 377 0.350 -57.443 2.666  
LOCAL(0) 127.0.0.1 10 l 18 64 377 0.000 0.000 0.001  
ntpq> as  
  
ind assID status conf reach auth condition last_event cnt  
-----  
1 57670 9614 yes yes none sys.peer reachable 1  
2 57671 9014 yes yes none reject reachable 1  
ntpq> rv 57670  
assID=57670 status=9614 reach, conf, sel_sys.peer, 1 event, event_reach,  
srcadr=nb-next-egner.regner.de, srcport=123, dstadr=192.168.180.10,  
dstport=123, leap=00, stratum=3, precision=-20, rootdelay=33.615,  
rootdispersion=60.318, refid=188.40.53.185, reach=377, unreach=0,  
hmode=3, pmode=4, hpoll=6, ppoll=6, flash=00 ok, keyid=0, ttl=0,  
offset=-57.443, delay=0.350, dispersion=4.257, jitter=2.666,  
reftime=ce51f4e7.c3a127b5 Wed, Sep 9 2009 11:33:27.764,  
org=ce51f8d5.8ab2bd4b Wed, Sep 9 2009 11:50:13.541,  
rec=ce51f8d5.9866435d Wed, Sep 9 2009 11:50:13.595,  
xmt=ce51f8d5.98264efe Wed, Sep 9 2009 11:50:13.594,  
filtdelay= 0.93 0.44 1.51 2.61 1.05 0.35 0.43 1.34,  
filtoffset= -53.05 -55.99 -56.60 -53.67 -54.77 -57.44 -58.36 -59.77,  
filtdisp= 0.00 0.99 1.95 2.91 3.87 4.85 5.82 6.78  
ntpq>
```

Installation – configure linux and requirements

- SCAN

- SCAN = Single Client Access Name; new concept in 11g R2
- DNS-based
- nameing notation: <name of cluster>-scan.<domain>

for our cluster named „rac“ with domain „regner.de“ this will be

„rac-scan.regner.de“

- You need at least ONE – better three IPs for the new database access schema called „SCAN“
- IPs are configured in DNS (forward and reverse lookup);
!! using local hosts file failed verification after grid installation !!

Installation – configure linux and requirements

- SCAN
 - Name in DNS „<rac-name>-scan.<domain>“
 - for our to be installed infrastructure we choose the name „rac“
 - forward- and reverse lookup needs to be configured
 - so scan name is „rac-scan“
 - excerpt from zone file:

rac-scan	IN A	192.168.180.6
rac-scan	IN A	192.168.180.7
rac-scan	IN A	192.168.180.8

Installation – configure linux and requirements

- SCAN (con't)
 - After installation we will find three listeners running from grid infrastructure home:

```
bash# srvctl status scan_listener
SCAN Listener LISTENER_SCAN1 is enabled
SCAN listener LISTENER_SCAN1 is running on node rac1
SCAN Listener LISTENER_SCAN2 is enabled
SCAN listener LISTENER_SCAN2 is running on node rac2
SCAN Listener LISTENER_SCAN3 is enabled
SCAN listener LISTENER_SCAN3 is running on node rac2
```

Installation – configure linux and requirements

- SCAN (con't)
 - Connection to database „RAC11P“ using SCAN would use this tnsnames entry

```
RAC11P =
(DESCRIPTION=
  (ADDRESS=(PROTOCOL=tcp)(HOST=rac-scan.regner.de)
(PORT=1521))
  (CONNECT_DATA=(SERVICE_NAME=RAC11P))
)
```

- The „old fashioned“ way still works:

```
RAC11P_old =
(DESCRIPTION=
  (ADDRESS_LIST=
    (ADDRESS=(PROTOCOL=tcp)(HOST=rac1-vip.regner.de)
(PORT=1521))
    (ADDRESS=(PROTOCOL=tcp)(HOST=rac2-vip.regner.de)
(PORT=1521))
  )
  (CONNECT_DATA=(SERVICE_NAME=RAC11P))
)
```

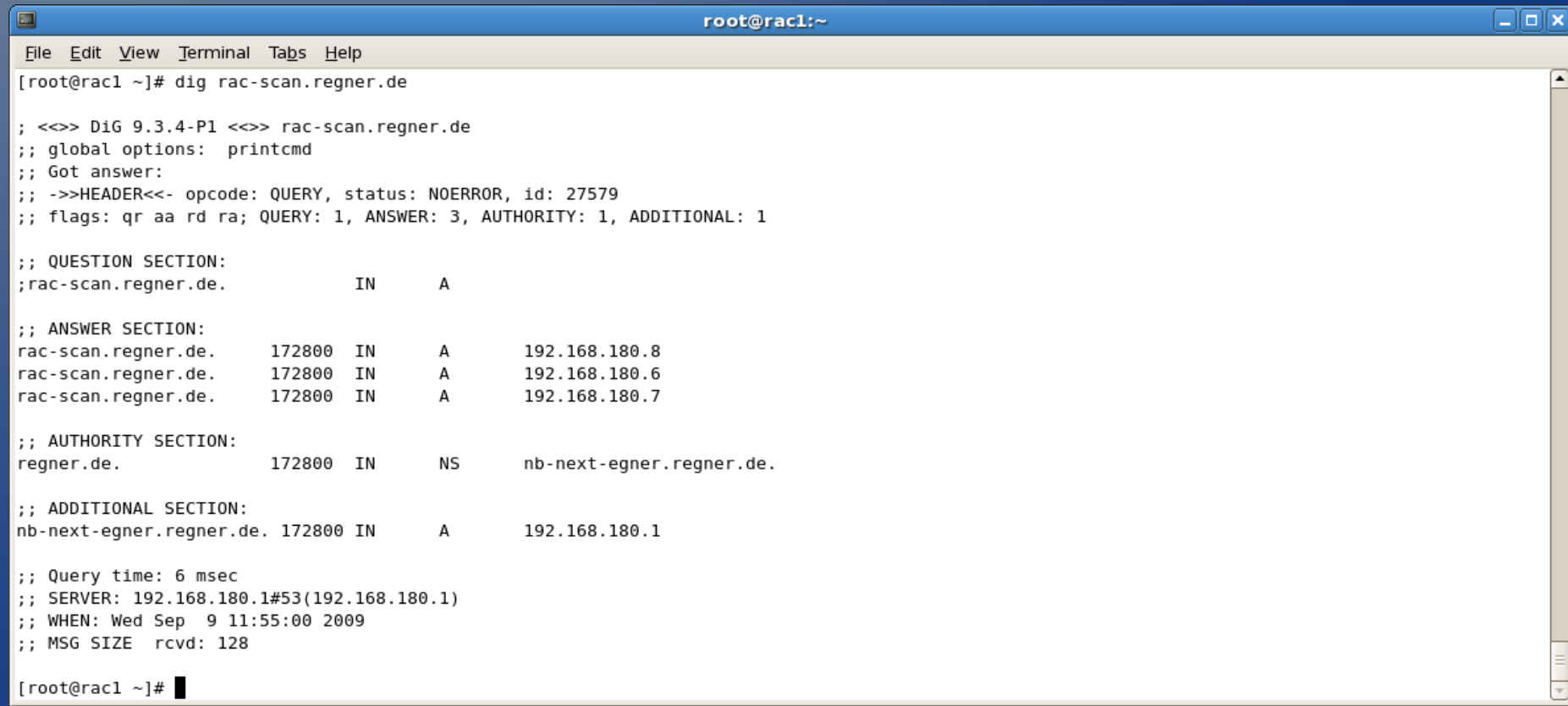
Installation – configure linux and requirements

- SCAN (con't)
 - Connecting to a named instance:

```
RAC11P =  
(DESCRIPTION=  
  (ADDRESS=(PROTOCOL=tcp)(HOST=rac-scan.regner.de)  
  (PORT=1521))  
  (CONNECT_DATA=(SERVICE_NAME=RAC11P)  
  (INSTANCE_NAME=RAC11P1))  
)
```

Installation – configure linux and requirements

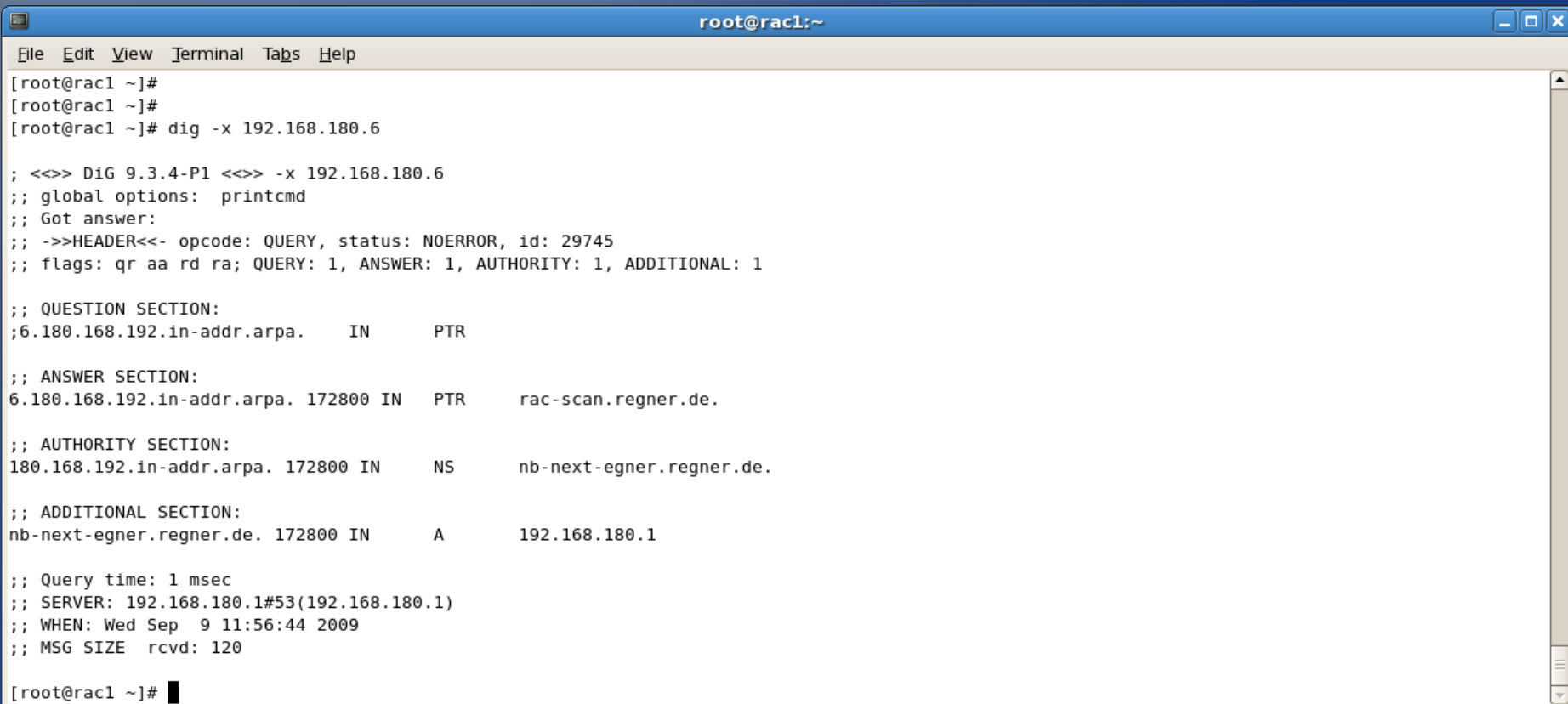
- Check DNS for SCAN
 - Forward lookup
 - Use „dig“ to check
 - „dig rac-scan.regner.de“



```
root@rac1:~  
File Edit View Terminal Tabs Help  
[root@rac1 ~]# dig rac-scan.regner.de  
  
; <<>> DiG 9.3.4-P1 <<>> rac-scan.regner.de  
;; global options: printcmd  
;; Got answer:  
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 27579  
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 1, ADDITIONAL: 1  
  
;; QUESTION SECTION:  
;rac-scan.regner.de.          IN      A  
  
;; ANSWER SECTION:  
rac-scan.regner.de.        172800 IN      A       192.168.180.8  
rac-scan.regner.de.        172800 IN      A       192.168.180.6  
rac-scan.regner.de.        172800 IN      A       192.168.180.7  
  
;; AUTHORITY SECTION:  
regner.de.                 172800 IN      NS      nb-next-egner.regner.de.  
  
;; ADDITIONAL SECTION:  
nb-next-egner.regner.de.  172800 IN      A       192.168.180.1  
  
;; Query time: 6 msec  
;; SERVER: 192.168.180.1#53(192.168.180.1)  
;; WHEN: Wed Sep  9 11:55:00 2009  
;; MSG SIZE rcvd: 128  
  
[root@rac1 ~]#
```

Installation – configure linux and requirements

- Check DNS for SCAN
 - Reverse lookup
 - Use „dig“ to check
 - „dig -x 192.168.180.6“
 - „dig -x 192.168.180.7“
 - „dig -x 192.168.180.8“



```
root@rac1:~  
File Edit View Terminal Tabs Help  
[root@rac1 ~]#  
[root@rac1 ~]#  
[root@rac1 ~]# dig -x 192.168.180.6  
  
; <<>> DiG 9.3.4-P1 <<>> -x 192.168.180.6  
;; global options: printcmd  
;; Got answer:  
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 29745  
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 1, ADDITIONAL: 1  
  
;; QUESTION SECTION:  
6.180.168.192.in-addr.arpa. IN PTR  
  
;; ANSWER SECTION:  
6.180.168.192.in-addr.arpa. 172800 IN PTR rac-scan.regner.de.  
  
;; AUTHORITY SECTION:  
180.168.192.in-addr.arpa. 172800 IN NS nb-next-egner.regner.de.  
  
;; ADDITIONAL SECTION:  
nb-next-egner.regner.de. 172800 IN A 192.168.180.1  
  
;; Query time: 1 msec  
;; SERVER: 192.168.180.1#53(192.168.180.1)  
;; WHEN: Wed Sep 9 11:56:44 2009  
;; MSG SIZE rcvd: 120  
  
[root@rac1 ~]#
```

Installation – configure linux and requirements

- Create Group

```
groupadd -g 500 dba
```

Note: For educational purposes we use only one group. In productive environments there should be more groups to separate administrative duties.

- Create User and directories

```
mkdir -p /u01/app/11.2.0/grid  
chown -R root:dba /u01  
chmod -R 775 /u01  
chown -R grid:dba /u01/app/11.2.0/grid  
useradd -g dba -u 500 -d /u01/app/11.2.0/grid grid  
passwd grid
```

Note: Oracle recommends different users for grid and database installation!

Make sure groupid and userid are the same on ALL nodes!

Installation – configure linux and requirements

- Create profile file (~/.bash_profile or ~/.profile on SuSE) for user „grid“

```
umask 022
if [ -t 0 ]; then
    stty intr ^C
fi
```


Installation – configure storage

- Prepare Storage – Requirements
 - must be visible on all nodes
 - as always - recommendation: SAME (stripe and mirror everything)
- Storage – what to store where:
 - OCR and Voting disk
 - ASM
 - NFS
 - RAW disks
 - Oracle Clusterware binaries
 - NFS
 - Local disk

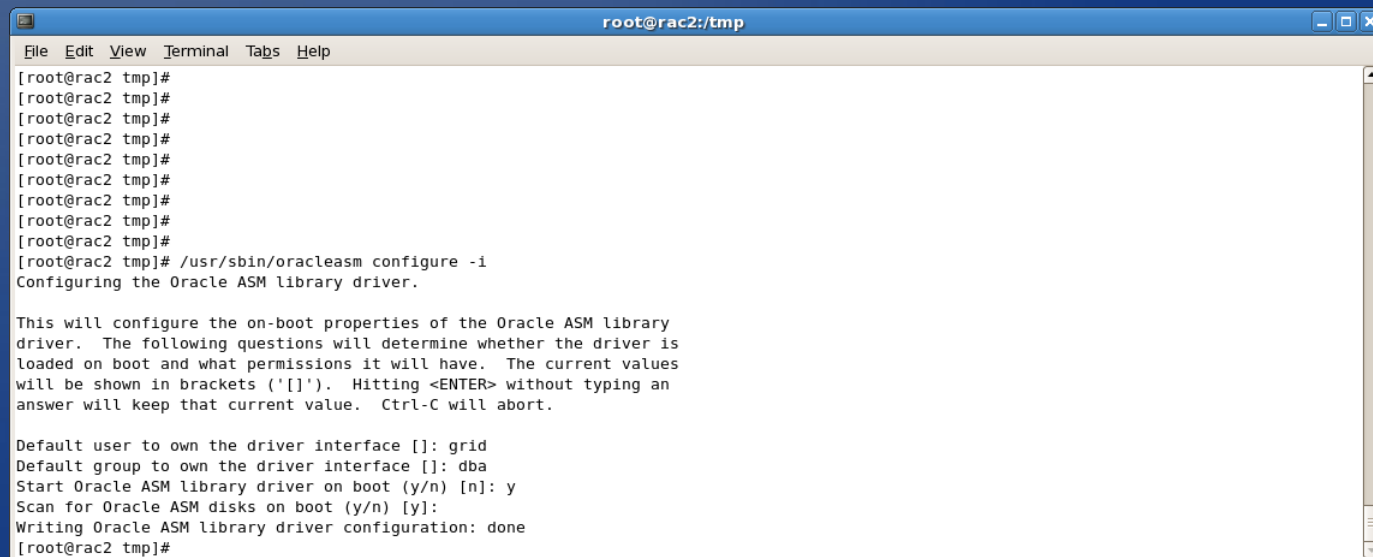
Installation – configure storage

- Storage – what to store where (con't):
 - Oracle RAC binaries
 - ACFS
 - NFS
 - local disk
 - Oracle database files
 - ASM
 - NFS
 - RAW disks
 - Oracle recovery files
 - ASM
 - NFS

Installation – configure storage

- Prepare and Configure Storage (for use with asm)
 - Install RPMs
 - oracleasm-support
 - oracleasm-lib
 - oracleasm-<kernel-version>
(see „Sources“ for download location“)
 - Configure ASM

`/usr/sbin/oracleasm configure -i`



```
root@rac2:/tmp
File Edit View Terminal Tabs Help
[root@rac2 tmp]#
[root@rac2 tmp]#
[root@rac2 tmp]#
[root@rac2 tmp]#
[root@rac2 tmp]#
[root@rac2 tmp]#
[root@rac2 tmp]#
[root@rac2 tmp]#
[root@rac2 tmp]#
[root@rac2 tmp]#
[root@rac2 tmp]# /usr/sbin/oracleasm configure -i
Configuring the Oracle ASM library driver.

This will configure the on-boot properties of the Oracle ASM library
driver. The following questions will determine whether the driver is
loaded on boot and what permissions it will have. The current values
will be shown in brackets ('[]'). Hitting <ENTER> without typing an
answer will keep that current value. Ctrl-C will abort.

Default user to own the driver interface []: grid
Default group to own the driver interface []: dba
Start Oracle ASM library driver on boot (y/n) [n]: y
Scan for Oracle ASM disks on boot (y/n) [y]:
Writing Oracle ASM library driver configuration: done
[root@rac2 tmp]#
```

Installation – configure storage

- Prepare and Configure Storage (for use with asm)
 - init ASM

```
/usr/sbin/oracleasm init
```

Installation – configure storage

- Prepare and Configure Storage (for use with asm)
 - Create Partitions on disk with fdisk
 - Query all available disks with „fdisk -l“
 - In the following example disk /dev/sde (this is our iSCSI storage) does not contain a partition at all – we will create one

```
root@rac2:/tmp
File Edit View Terminal Tabs Help

Disk /dev/sdc: 2097 MB, 2097152000 bytes
65 heads, 62 sectors/track, 1016 cylinders
Units = cylinders of 4030 * 512 = 2063360 bytes

  Device Boot      Start         End      Blocks   Id  System
/dev/sdc1          1         1016     2047209   83  Linux

Disk /dev/sdd: 2097 MB, 2097152000 bytes
65 heads, 62 sectors/track, 1016 cylinders
Units = cylinders of 4030 * 512 = 2063360 bytes

  Device Boot      Start         End      Blocks   Id  System
/dev/sdd1          1         1016     2047209   83  Linux

Disk /dev/sdb: 2097 MB, 2097152000 bytes
65 heads, 62 sectors/track, 1016 cylinders
Units = cylinders of 4030 * 512 = 2063360 bytes

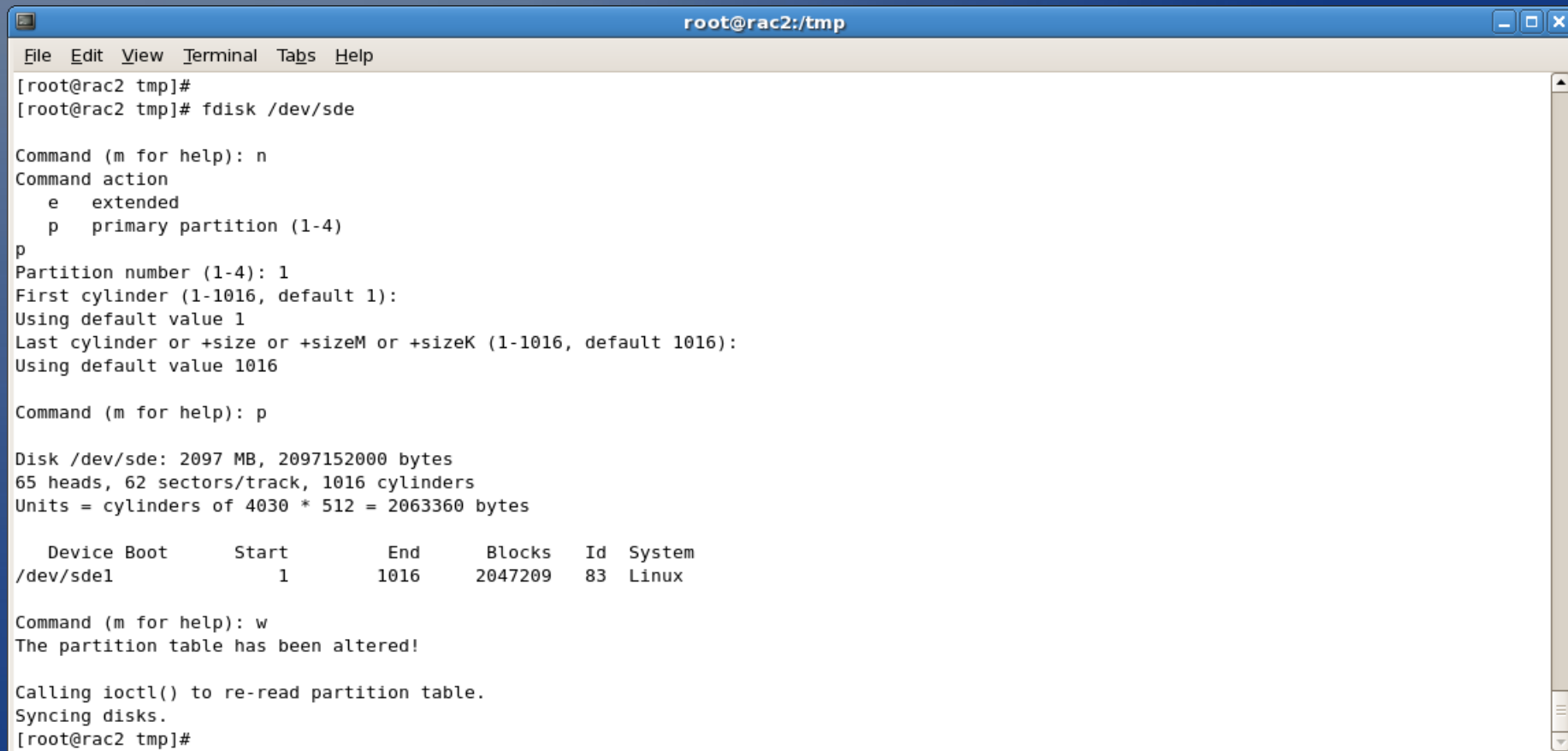
  Device Boot      Start         End      Blocks   Id  System
/dev/sdb1          1         1016     2047209   83  Linux

Disk /dev/sde: 2097 MB, 2097152000 bytes
65 heads, 62 sectors/track, 1016 cylinders
Units = cylinders of 4030 * 512 = 2063360 bytes

  Device Boot      Start         End      Blocks   Id  System
[root@rac2 tmp]#
```

Installation – configure linux operating system

- Prepare and Configure Storage (for use with asm)
 - Create Partitions on disk with fdisk
 - Create one whole disk partition on /dev/sde



```
root@rac2:/tmp
File Edit View Terminal Tabs Help
[root@rac2 tmp]#
[root@rac2 tmp]# fdisk /dev/sde

Command (m for help): n
Command action
   e   extended
   p   primary partition (1-4)
p
Partition number (1-4): 1
First cylinder (1-1016, default 1):
Using default value 1
Last cylinder or +size or +sizeM or +sizeK (1-1016, default 1016):
Using default value 1016

Command (m for help): p

Disk /dev/sde: 2097 MB, 2097152000 bytes
65 heads, 62 sectors/track, 1016 cylinders
Units = cylinders of 4030 * 512 = 2063360 bytes

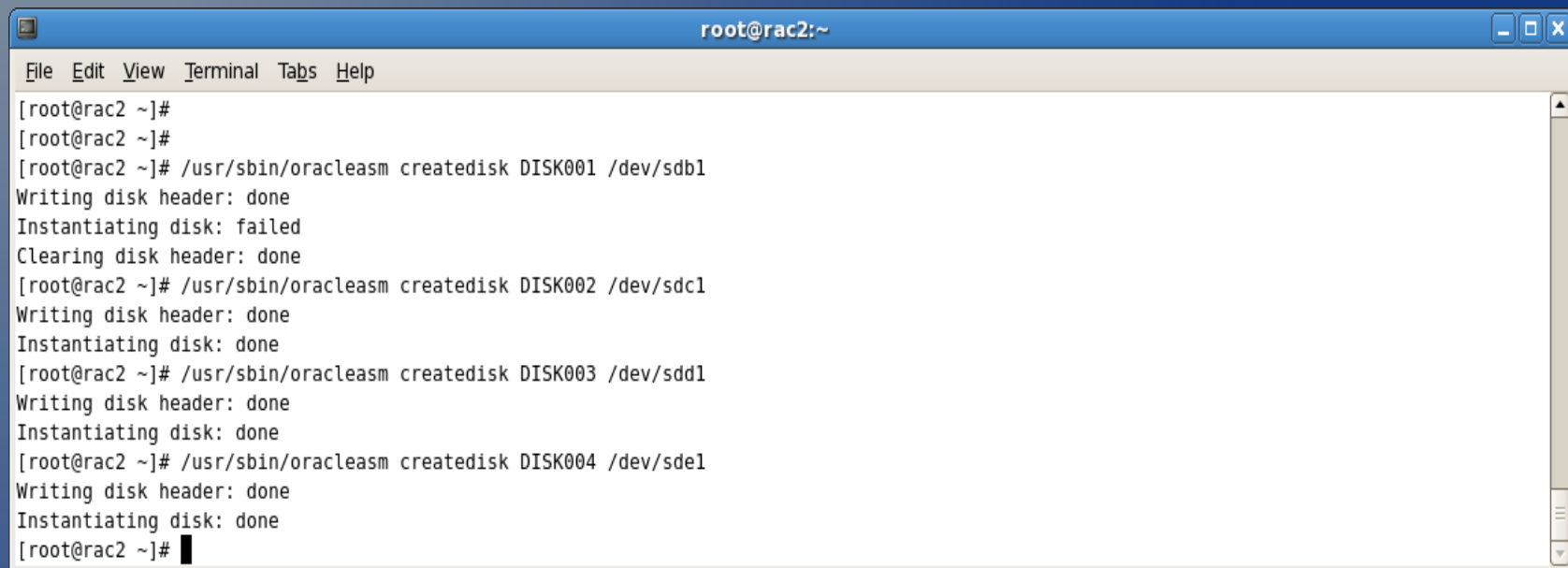
   Device Boot      Start         End      Blocks   Id  System
/dev/sde1            1         1016     2047209   83  Linux

Command (m for help): w
The partition table has been altered!

Calling ioctl() to re-read partition table.
Syncing disks.
[root@rac2 tmp]#
```

Installation – configure storage

- Prepare and configure Storage (for use with asm)
 - Label all disks with asm label



```
root@rac2:~  
File Edit View Terminal Tabs Help  
[root@rac2 ~]#  
[root@rac2 ~]#  
[root@rac2 ~]# /usr/sbin/oracleasm createdisk DISK001 /dev/sdb1  
Writing disk header: done  
Instantiating disk: failed  
Clearing disk header: done  
[root@rac2 ~]# /usr/sbin/oracleasm createdisk DISK002 /dev/sdc1  
Writing disk header: done  
Instantiating disk: done  
[root@rac2 ~]# /usr/sbin/oracleasm createdisk DISK003 /dev/sdd1  
Writing disk header: done  
Instantiating disk: done  
[root@rac2 ~]# /usr/sbin/oracleasm createdisk DISK004 /dev/sde1  
Writing disk header: done  
Instantiating disk: done  
[root@rac2 ~]# █
```

Installation – configure storage

- Prepare and configure Storage (for use with asm)
 - Query disks on all nodes
 - Node „rac1“



```
root@rac1:/tmp
File Edit View Terminal Tabs Help
[root@rac1 tmp]#
[root@rac1 tmp]#
[root@rac1 tmp]#
[root@rac1 tmp]#
[root@rac1 tmp]#
[root@rac1 tmp]#
[root@rac1 tmp]#
[root@rac1 tmp]# oracleasm init
Loading module "oracleasm": oracleasm
Mounting ASMLib driver filesystem: /dev/oracleasm
[root@rac1 tmp]# oracleasm scandisks
Reloading disk partitions: done
Cleaning any stale ASM disks...
Scanning system for ASM disks...
Instantiating disk "DISK003"
Instantiating disk "DISK002"
Instantiating disk "DISK004"
Instantiating disk "DISK001"
[root@rac1 tmp]# oracleasm listdisks
DISK001
DISK002
DISK003
DISK004
[root@rac1 tmp]#
```

→ all disks visible with correct label

Installation – configure storage

- Prepare and configure Storage (for use with asm)
 - Query disks on all nodes
 - Node „rac2“ (the second node)



```
root@rac2:~  
File Edit View Terminal Tabs Help  
[root@rac2 ~]#  
[root@rac2 ~]#  
[root@rac2 ~]#  
[root@rac2 ~]#  
[root@rac2 ~]#  
[root@rac2 ~]#  
[root@rac2 ~]#  
[root@rac2 ~]#  
[root@rac2 ~]#  
[root@rac2 ~]#  
[root@rac2 ~]# oracleasm listdisks  
DISK001  
DISK002  
DISK003  
DISK004  
[root@rac2 ~]# █
```

→ also all four LUNs visible

Installation – configure storage

- Prepare and configure Storage (for use with asm)
 - OCR and Voting disks
 - Will be placed in ASM (new in 11g R2)
 - three different redundancy levels:
 - External - 1 disk minimum needed
 - Normal - 3 disks minimum needed
 - High - 5 disks minimum needed
 - Storage Requirements
 - External - 280 MB OCR + 280 MB Voting Disk
 - Normal - 560 MB OCR + 840 MB Voting Disk
 - High - 840 MB OCR + 1,4 GB Voting Disk
 - plus Overhead for ASM Metadata

Installation – configure storage

- Prepare and configure Storage (for use with asm)

- Overhead for ASM metadata

```
total =  
  [2 * ausize * disks]  
+ [redundancy * (ausize * (nodes * (clients + 1) + 30) + (64 * nodes) + 533)]
```

```
redundancy = Number of mirrors: external = 1, normal = 2, high = 3.  
ausize = Metadata AU size in megabytes.  
nodes = Number of nodes in cluster.  
clients - Number of database instances for each node.  
disks - Number of disks in disk group.
```

- For example, for a four-node Oracle RAC installation, using three disks in a normal redundancy disk group, you require 1684 MB of space for ASM metadata

```
[2 * 1 * 3]  
+ [2 * (1 * (4 * (4 + 1) + 30) + (64 * 4) + 533)]  
= 1684 MB
```

Installation – configure storage

- Prepare and configure Storage (for use with asm)
 - OCR and Voting disks – recommendations
 - use high redundancy for OCR and Voting disks - the correct function of your cluster depends on it!
 - use 5 disks with 10 GB each – enough space for all files plus asm metadata plus space for further growth

Installation – binary installation of grid infra

- Checklist

- Storage visible ✓
- user and groups created ✓
- Kernel parameters configured ✓
- RPM Packages checked / installed ✓
- NTP working ✓
- DNS working ✓
- Connection (ping, ssh) between nodes working? ✓
- Backup available for rollback? ✓
- Alright! Lets start binary installation

Installation – binary installation of grid infra

- Start installation as user „grid“ on one node (here on node „rac1“)

```
root@rac1:~
File Edit View Terminal Tabs Help
32 packets transmitted, 9 received, +12 errors, 71% packet loss, time 31249ms
rtt min/avg/max/mdev = 0.093/341.997/2025.381/675.188 ms, pipe 3
[ronny@nb-next-egner ~]$ ssh root@rac1
root@rac1's password:
Last login: Tue Sep  8 15:03:01 2009 from 192.168.180.1
[root@rac1 ~]# df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/sda3        35G   5.4G   28G  17% /
/dev/sda1         99M   12M   83M  13% /boot
tmpfs            502M    0   502M  0% /dev/shm
[root@rac1 ~]# su - grid
(reverse-i-search)`e': cat .bash_profile
-bash-3.2$ export DISPLAY=192.168.180.1:0.0
-bash-3.2$ xterm
-bash-3.2$ /raw_software/grid/grid/
doc/          install/      response/    rpm/          runcluvfy.sh runInstaller sshsetup/    stage/
-bash-3.2$ /raw_software/grid/grid/runInstaller
Starting Oracle Universal Installer...

Checking Temp space: must be greater than 120 MB.   Actual 28293 MB   Passed
Checking swap space: must be greater than 150 MB.   Actual 4094 MB   Passed
Checking monitor: must be configured to display at least 256 colors.   Actual 16777216   Passed
Preparing to launch Oracle Universal Installer from /u01/app/oracle/product/11.2.0/grid/tmp/OraInstall2009-09-08_03-09-18PM. Please wait ...-b
ash-3.2$ █
```

Installation – binary installation of grid infra

The screenshot shows the Oracle Grid Infrastructure installation wizard. The window title is "Oracle Grid Infrastructure - Setting up Grid Infrastructure - Step 1 of 8". The main heading is "Select Installation Option". On the left, a navigation pane lists the steps: "Installation Option" (selected), "Installation Type", "Cluster Configuration", "Install Locations", "Prerequisite Checks", "Summary", "Setup", and "Finish". The main area contains the instruction "Select any of the following installation options" and four radio button options: "Install and Configure Grid Infrastructure for a Cluster" (selected), "Install and Configure Grid Infrastructure for a Standalone Server", "Upgrade Grid Infrastructure", and "Install Grid Infrastructure Software Only". The Oracle Database 11g logo is in the top right corner. At the bottom, there are buttons for "Help", "< Back", "Next >", "Finish", and "Cancel".

Oracle Grid Infrastructure - Setting up Grid Infrastructure - Step 1 of 8

Select Installation Option

ORACLE DATABASE 11^g

Select any of the following installation options

- Install and Configure Grid Infrastructure for a Cluster
- Install and Configure Grid Infrastructure for a Standalone Server
- Upgrade Grid Infrastructure
- Install Grid Infrastructure Software Only

Installation Option
Installation Type
Cluster Configuration
Install Locations
Prerequisite Checks
Summary
Setup
Finish

Help < Back Next > Finish Cancel

Installation – binary installation of grid infra

The screenshot shows the Oracle Grid Infrastructure installation wizard, titled "Oracle Grid Infrastructure - Setting up Grid Infrastructure - Step 2 of 8". The window includes the Oracle Database 11g logo and a gear icon. The main heading is "Select Installation Type".

On the left side, there is a vertical navigation pane with the following steps:

- Installation Option
- Installation Type** (highlighted)
- Cluster Configuration
- Install Locations
- Prerequisite Checks
- Summary
- Setup
- Finish

The main area displays two radio button options:

- Typical Installation
Perform a full grid infrastructure installation with basic configuration.
- Advanced Installation**
Allows advanced configuration options such as alternative storage choices, additional networking flexibility, integration with IPMI, and more granularity in specifying Automatic Storage Management roles.

At the bottom of the window, there are four buttons: "Help", "< Back", "Next >", "Finish", and "Cancel".

Installation – binary installation of grid infra

The screenshot shows the Oracle Grid Infrastructure installation wizard at Step 3 of 9, titled "Select Product Languages". The window title is "Oracle Grid Infrastructure - Setting up Grid Infrastructure - Step 3 of 9". The Oracle Database 11g logo is visible in the top right corner. The left sidebar contains a navigation tree with the following items: "Installation Option", "Installation Type", "Product Languages" (highlighted), "Operating System Groups", "Installation Location", "Prerequisite Checks", "Summary", "Setup", and "Finish". The main area contains the instruction "Select the languages in which your product will run." Below this, there are two lists: "Available Languages:" and "Selected Languages:". The "Available Languages:" list includes: Arabic, Bengali, Brazilian Portuguese, Bulgarian, Canadian French, Catalan, Croatian, Czech, Danish, Dutch, Egyptian, English (United Kingdom), Estonian, Finnish, French, Greek (highlighted), Hebrew, Hungarian, Icelandic, Indonesian, Italian, Japanese, Korean, Latin American Spanish, Latvian, Lithuanian, Malay, and Mexican Spanish. The "Selected Languages:" list includes: English and German (highlighted). There are four arrow buttons between the lists: a single right arrow, a double right arrow, a single left arrow, and a double left arrow. At the bottom of the window, there are buttons for "Help", "< Back", "Next >", "Finish", and "Cancel".

Oracle Grid Infrastructure - Setting up Grid Infrastructure - Step 3 of 9

Select Product Languages

Select the languages in which your product will run.

Available Languages:

- Arabic
- Bengali
- Brazilian Portuguese
- Bulgarian
- Canadian French
- Catalan
- Croatian
- Czech
- Danish
- Dutch
- Egyptian
- English (United Kingdom)
- Estonian
- Finnish
- French
- Greek
- Hebrew
- Hungarian
- Icelandic
- Indonesian
- Italian
- Japanese
- Korean
- Latin American Spanish
- Latvian
- Lithuanian
- Malay
- Mexican Spanish

Selected Languages:

- English
- German

Help < Back Next > Finish Cancel

Installation – binary installation of grid infra

- Remember: We choose not to use GNS; so it is deselected

The screenshot shows the 'Grid Plug and Play Information' window in the Oracle Grid Infrastructure installation wizard. The window title is 'Oracle Grid Infrastructure - Setting up Grid Infrastructure - Step 4 of 16'. The Oracle Database 11g logo is visible in the top right corner. On the left, a navigation pane lists various installation steps, with 'Grid Plug and Play' selected. The main area contains the following fields and options:

- Cluster Name:** rac
- SCAN Name:** rac-scan
- SCAN Port:** 1521
- Configure GNS** (This option is deselected, as noted in the slide.)
- GNS Sub Domain:** rac.regner.de (with a note: 'For example: grid.example.com')
- GNS VIP Address:** 192.168.180.1

At the bottom of the window, there are buttons for 'Help', '< Back', 'Next >', 'Finish', and 'Cancel'.

Installation – binary installation of grid infra

- the node the installer was started is already added by default; add here all other nodes (in our case we added „rac2“)

Oracle Grid Infrastructure - Setting up Grid Infrastructure - Step 5 of 16

Cluster Node Information

Provide the list of nodes to be managed by Oracle Grid Infrastructure with their Public Node Name and Virtual Host Name. If Oracle Grid Naming Service (GNS) has been selected and DHCP is enabled, then the Virtual Host Name is automatically configured for each Public Node.

Hostname	Virtual IP Name
rac1.regner.de	rac1-vip.regner.de
rac2.regner.de	rac2-vip.regner.de

SSH Connectivity... Use Cluster Configuration File... Add... Edit... Remove

Help < Back Next > Finish Cancel

Installation – binary installation of grid infra

- Click on „SSH Connectivity“, enter username and password and click on „Setup“

Oracle Grid Infrastructure - Setting up Grid Infrastructure - Step 5 of 16

Cluster Node Information

Provide the list of nodes to be managed by Oracle Grid Infrastructure with their Public Node Name and Virtual Host Name. If Oracle Grid Naming Service (GNS) has been selected and DHCP is enabled, then the Virtual Host Name is automatically configured for each Public Node.

Hostname	Virtual IP Name
rac1.regner.de	rac1-vip.regner.de
rac2.regner.de	rac2-vip.regner.de

Establishing SSH connectivity between the selected nodes. This may take several minutes. Please wait...

SSH Connectivity... Use Cluster Configuration File... Add... Edit... Remove

OS Username: grid OS Password: ****

User home is shared by the selected nodes

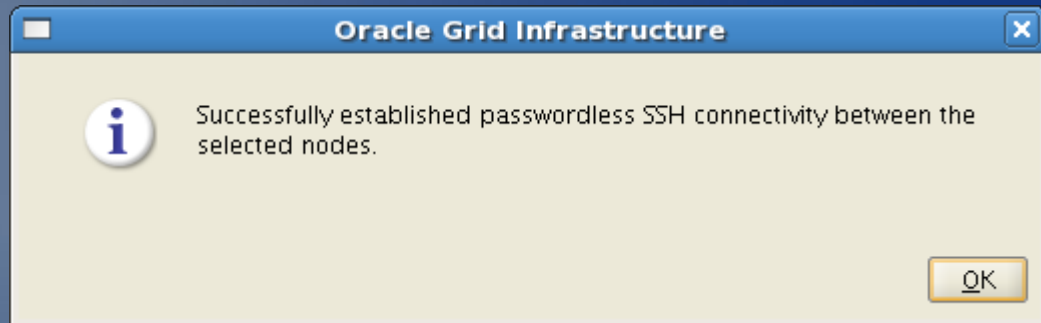
Reuse private and public keys existing in the user home

Test Setup

Help < Back Next > Finish Cancel

Installation – binary installation of grid infra

- If everything worked the following message appears



- If there are problems check:
 - Group ID and User ID on both nodes
 - Connectivity between both nodes
 - Passwords

Installation – binary installation of grid infra

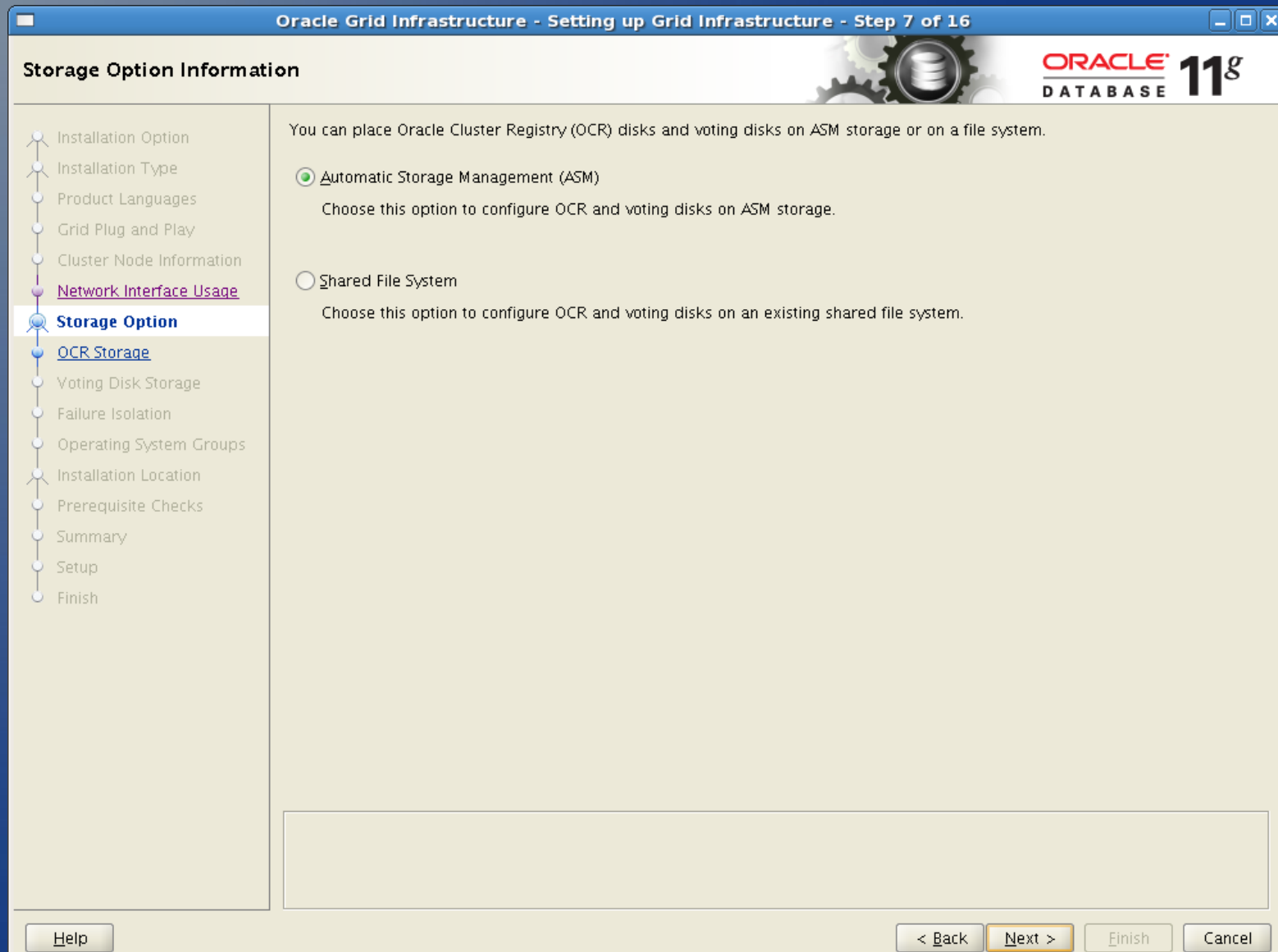
- Select which interface is the public and which the private one

The screenshot shows the 'Specify Network Interface Usage' step of the Oracle Grid Infrastructure installation. The window title is 'Oracle Grid Infrastructure - Setting up Grid Infrastructure - Step 6 of 16'. The Oracle Database 11g logo is in the top right. A navigation pane on the left lists steps from 'Installation Option' to 'Finish', with 'Network Interface Usage' selected. The main area contains instructions: 'Identify the planned use for each global interface shown in the box below as Public, Private, or Do Not Use. Private interfaces are used by Oracle Grid Infrastructure for internode traffic.' and 'If there is more than one subnet associated with an interface, then change the interface's attributes to associate the interface name with the additional subnets.' Below this is a table with columns 'Interface Name', 'Subnet', and 'Interface Type'. The table lists 'bond0' with subnet '192.168.180.0' and type 'Public', and 'bond1' with subnet '192.168.181.0' and type 'Private'. At the bottom are buttons for 'Help', '< Back', 'Next >', 'Finish', and 'Cancel'.

Interface Name	Subnet	Interface Type
bond0	192.168.180.0	Public
bond1	192.168.181.0	Private

Installation – binary installation of grid infra

- Where to place OCR and Voting disk... in our case we use ASM for everything



Installation – binary installation of grid infra

- For storing OCR and Voting disk we need to create a data group; our first data group is called „DATA1“ and consists of the four LUNs we prepared and labeled before... here we see the disk names we labeled the disks with again
- We choose „normal“ redundancy which will create a mirror

Oracle Grid Infrastructure - Setting up Grid Infrastructure - Step 8 of 15

Create ASM Disk Group

Select Disk Group Characteristics and select disks

Disk Group Name:

Redundancy: High Normal External

Add Disks

Candidate Disks All Disks

<input type="checkbox"/>	Disk Path	Size (in MB)	Status
<input checked="" type="checkbox"/>	ORCL:DISK001	1999	Candidate
<input checked="" type="checkbox"/>	ORCL:DISK002	1999	Candidate
<input checked="" type="checkbox"/>	ORCL:DISK003	1999	Candidate
<input checked="" type="checkbox"/>	ORCL:DISK004	1999	Candidate

Installation – binary installation of grid infra

- specify passwords for ASM and ASMSNMP.. choose strong passwords if possible (i was lazy and chose not that strong ones – acceptable for educational purposes but not in real productive scenarios)

Oracle Grid Infrastructure - Setting up Grid Infrastructure - Step 9 of 15

Specify ASM Password

The new Automatic Storage Management (ASM) instance requires its own SYS user with SYSASM privileges for administration. Oracle recommends that you create a less privileged ASMSNMP user with SYSDBA privileges to monitor the ASM instance.

Specify the password for these user accounts.

Use different passwords for these accounts

	Password	Confirm Password
SYS	****	****
ASMSNMP	*****	*****

Use same passwords for these accounts

Specify Password: Confirm Password:

Messages:

- ⚠ SYS[INS-30011] The password entered does not conform to the Oracle recommended standards.
- ⚠ ASMSNMP[INS-30011] The password entered does not conform to the Oracle recommended standards.

Help < Back Next > Finish Cancel

Installation – binary installation of grid infra

- Grid Infrastructure can use IPMI for fencing... VMWARE does not have IPMI

The screenshot shows the Oracle Grid Infrastructure installation wizard at Step 10 of 16, titled "Failure Isolation Support". The window title is "Oracle Grid Infrastructure - Setting up Grid Infrastructure - Step 10 of 16". The Oracle Database 11g logo is visible in the top right corner. On the left, a navigation pane lists the installation steps, with "Failure Isolation" selected and highlighted in blue. Below "Failure Isolation" is "Operating System Groups". The main content area contains the following text and options:

Choose one of the following Failure Isolation Support options.

Use Intelligent Platform Management Interface (IPMI)
To ensure successful installation with IPMI enabled, ensure your IPMI drivers are properly installed and enabled.

User Name :
Password :

Do not use Intelligent Platform Management Interface (IPMI)

At the bottom of the window, there are four buttons: "Help", "< Back", "Next >", and "Cancel".

Installation – binary installation of grid infra

- group mapping...for role separation... we have only „dba“ ... change accordingly to your needs

The screenshot shows the Oracle Grid Infrastructure installation wizard at Step 11 of 16, titled "Privileged Operating System Groups". The window title is "Oracle Grid Infrastructure - Setting up Grid Infrastructure - Step 11 of 16". The Oracle Database 11g logo is visible in the top right corner. On the left, a navigation pane lists various steps, with "Operating System Groups" selected and highlighted in blue. Below the navigation pane, the main content area contains the following text and controls:

Select the name of the operating system group of which you are a member to be used for OS authentication to Automatic Storage Management (ASM).

ASM Database Administrator (OSDBA) Group	dba ▼
ASM Instance Administration Operator (OSOPER) Group	dba ▼
ASM Instance Administrator (OSASM) Group	dba ▼

At the bottom of the window, there are four buttons: "Help", "< Back", "Next >", and "Finish", with "Next >" being the active button. A "Cancel" button is also present at the bottom right.

Installation – binary installation of grid infra

- Set Oracle Base and software (install) location... software location must not be under oracle base location... else the installer throws an error saying so

The screenshot shows the 'Specify Installation Location' step of the Oracle Grid Infrastructure installation wizard. The window title is 'Oracle Grid Infrastructure - Setting up Grid Infrastructure - Step 12 of 16'. The Oracle Database 11g logo is visible in the top right corner. On the left, a navigation pane lists various steps, with 'Installation Location' selected and highlighted in blue. The main area contains two sections for specifying paths:

Oracle Base: Specify a base location for storing all Oracle software and configuration-related files. This location is the Oracle base directory. Create one Oracle base for each operating system user. By default, software and configuration files are installed by version and database name parallel to the Oracle base directory. The text input field contains '/u01/app/oracle' and a 'Browse...' button is to its right.

Software Location: Specify a base location for storing Oracle software files separate from database configuration files in the Oracle base directory. This software directory is the Oracle Grid Infrastructure home directory. Change the defaults below either to specify an alternative location, or to select an existing grid infrastructure home. The text input field contains '/u01/app/11.2.0/grid' and a 'Browse...' button is to its right.

At the bottom of the window, there are four buttons: 'Help', '< Back', 'Next >', and 'Cancel'.

Installation – binary installation of grid infra

- Inventory location...

The screenshot shows the Oracle Grid Infrastructure installation wizard at Step 13 of 17, titled "Create Inventory". The window title is "Oracle Grid Infrastructure - Setting up Grid Infrastructure - Step 13 of 17". The Oracle Database 11g logo is visible in the top right corner.

Create Inventory

You are starting your first installation on this host. Specify a directory for installation files. This directory is called the "inventory directory". The installer automatically sets up subdirectories for each product to contain inventory data. The subdirectory for each product typically requires 150 kilobytes of disk space.

Inventory Directory:

Members of the following operating system group (the primary group) will have write permission to the inventory directory (orainventory).

orainventory Group Name: dba

The left sidebar shows a list of installation steps:

- Installation Option
- Installation Type
- Product Languages
- Grid Plug and Play
- Cluster Node Information
- Network Interface Usage
- Storage Option
- Create ASM Disk Group
- ASM Password
- Failure Isolation
- Operating System Groups
- Installation Location
- Create Inventory**
- Prerequisite Checks
- Summary
- Setup
- Finish

At the bottom of the window, there are buttons for "Help", "< Back", "Next >", "Finish", and "Cancel".

Installation – binary installation of grid infra

- Make sure you fix every issue reported here (memory and swap size are limited on virtual machine so this is not fixable...but should anyway)

Oracle Grid Infrastructure - Setting up Grid Infrastructure - Step 14 of 17

Perform Prerequisite Checks

Some of the minimum requirements for installation are not completed. Review and fix the issues listed in the following table, and recheck the system.

Checks	Status	Fixable
Checks		
Physical Memory	Ignored	
Swap Size	Ignored	

This is a prerequisite condition to test whether the system has at least 1.5 GB (1572864.0KB) of total physical memory. [\(more details\)](#)

Check Failed on Nodes: [rac2, rac1]

Installation – binary installation of grid infra

- Ready...

The screenshot shows the Oracle Grid Infrastructure installation wizard at Step 15 of 17, titled "Setting up Grid Infrastructure". The window title bar includes the Oracle Database 11g logo. The interface is divided into a left-hand navigation pane and a main content area.

Summary

Oracle Grid Infrastructure

- Global Settings**
 - Disk Space: required 2.95 GB available 27.22 GB
 - Install Option: Install and Configure Grid Infrastructure for a Cluster
 - Oracle base: /u01/app/oracle
 - Oracle home: /u01/app/11.2.0/grid
 - Source Location: /raw_software/grid/grid/install/./stage/products.xml
- Inventory information**
 - Inventory location: /u01/app/orainventory
 - Central inventory (orainventory) group:: dba
- Grid Infrastructure Settings**
 - Cluster Name: rac
 - Local Node: rac1
 - Remote Node(s): rac2
 - SCAN Name: rac-scan
 - SCAN Port: 1521
 - Public Interfaces: bond0
 - Private Interfaces: bond1

At the bottom right of the main content area, there is a button labeled "Save Response File...".

The left-hand navigation pane lists the following steps:

- Installation Option
- Installation Type
- Product Languages
- Grid Plug and Play
- Cluster Node Information
- Network Interface Usage
- Storage Option
- Create ASM Disk Group
- ASM Password
- Failure Isolation
- Operating System Groups
- Installation Location
- Create Inventory
- Prerequisite Checks**
- Summary**
- Setup
- Finish

At the bottom of the window, there are buttons for "Help", "< Back", "Next >", "Finish", and "Cancel".

Installation – binary installation of grid infra

- Installing...

Setup

- Installation Option
- Installation Type
- Product Languages
- Grid Plug and Play
- Cluster Node Information
- Network Interface Usage
- Storage Option
- Create ASM Disk Group
- ASM Password
- Failure Isolation
- Operating System Groups
- Installation Location
- Create Inventory
- Prerequisite Checks
- Summary
- Setup**
- Finish

Progress

8%

Loading products. Please wait.

Status

Install Grid Infrastructure for a Cluster	In Progress
• Prepare	Succeeded
• Copy files	Pending
• Link binaries	Pending
• Setup files	Pending
• Perform remote operations	Pending
Execute Root Scripts for Install Grid Infrastructure for a Cluster	Pending
Configure Oracle Grid Infrastructure for a Cluster	Pending

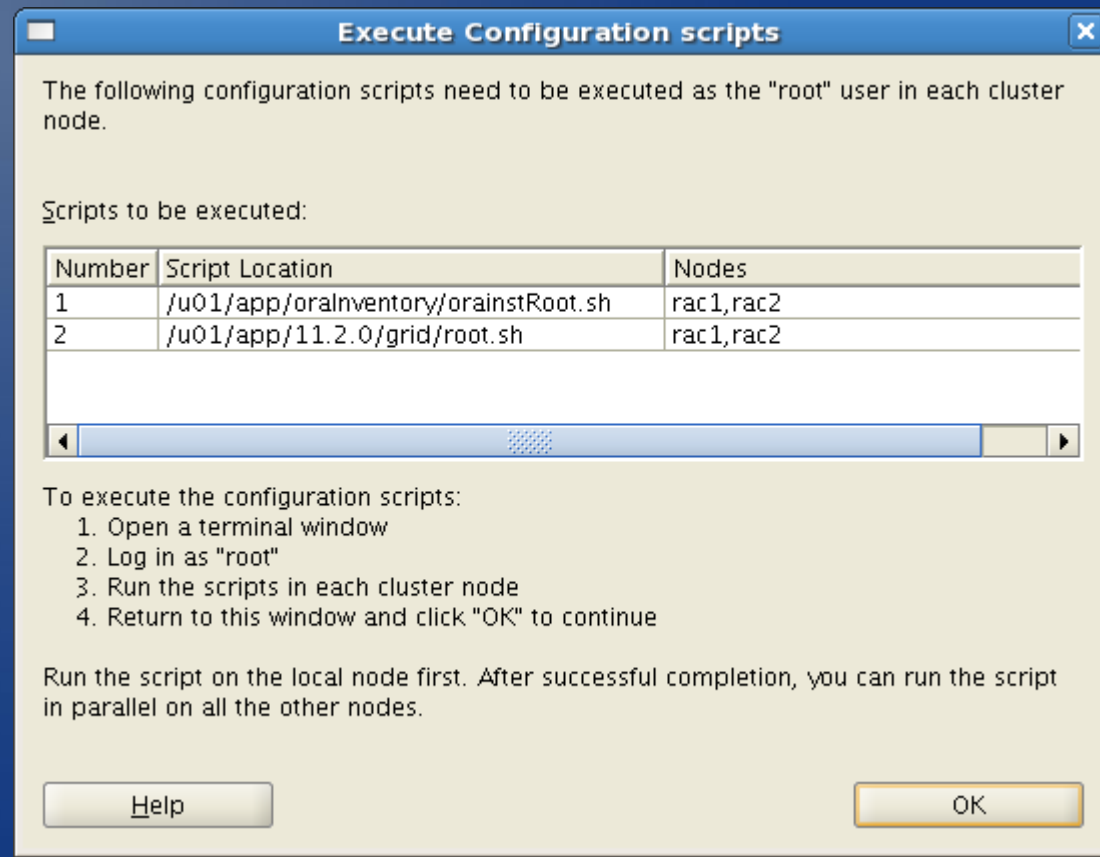
Oracle Database 11g

Consolidate
Compress
Control

Help < Back Next > Finish Cancel Details Retry Skip

Installation – binary installation of grid infra

- Post-Installation scripts to be started in the following order:
 - orainstRoot.sh on node rac1
 - orainstRoot.sh on node rac2
 - root.sh on node rac1
 - root.sh on node rac2



Installation – binary installation of grid infra

- Sample of root.sh output

```
root@rac1:~  
File Edit View Terminal Tabs Help  
The execution of the script is complete.  
[root@rac1 ~]# /u01/app/11.2.0/grid/root.sh  
Running Oracle 11g root.sh script...  
  
The following environment variables are set as:  
  ORACLE_OWNER= grid  
  ORACLE_HOME= /u01/app/11.2.0/grid  
  
Enter the full pathname of the local bin directory: [/usr/local/bin]:  
  Copying dbhome to /usr/local/bin ...  
  Copying oraenv to /usr/local/bin ...  
  Copying coraenv to /usr/local/bin ...  
  
Creating /etc/oratab file...  
Entries will be added to the /etc/oratab file as needed by  
Database Configuration Assistant when a database is created  
Finished running generic part of root.sh script.  
Now product-specific root actions will be performed.  
2009-09-09 07:30:40: Parsing the host name  
2009-09-09 07:30:40: Checking for super user privileges  
2009-09-09 07:30:40: User has super user privileges  
Using configuration parameter file: /u01/app/11.2.0/grid/crs/install/crsconfig_params  
Creating trace directory  
LOCAL ADD MODE  
Creating OCR keys for user 'root', privgrp 'root'..  
Operation successful.  
  root wallet  
  root wallet cert  
  root cert export  
  peer wallet  
  profile reader wallet  
  pa wallet  
  peer wallet keys  
  pa wallet keys  
  peer cert request  
  pa cert request  
  peer cert  
  pa cert  
  peer root cert TP  
  profile reader root cert TP  
  pa root cert TP  
  peer pa cert TP  
  pa peer cert TP  
  profile reader pa cert TP  
  profile reader peer cert TP  
  peer user cert  
  pa user cert  
Adding daemon to inittab
```

Installation – binary installation of grid infra

- Full output of root.sh on node 1

```
[root@rac1 ~]# /u01/app/11.2.0/grid/root.sh
Running Oracle 11g root.sh script...
The following environment variables are set as:
  ORACLE_OWNER= grid
  ORACLE_HOME= /u01/app/11.2.0/grid
Enter the full pathname of the local bin directory: [/usr/local/bin]:
  Copying dbhome to /usr/local/bin ...
  Copying oraenv to /usr/local/bin ...
  Copying coraenv to /usr/local/bin ...
Creating /etc/oratab file...
Entries will be added to the /etc/oratab file as needed by
Database Configuration Assistant when a database is created
Finished running generic part of root.sh script.
Now product-specific root actions will be performed.
2009-09-09 07:30:40: Parsing the host name
2009-09-09 07:30:40: Checking for super user privileges
2009-09-09 07:30:40: User has super user privileges
Using configuration parameter file: /u01/app/11.2.0/grid/crs/install/crsconfig_params
Creating trace directory
LOCAL ADD MODE
Creating OCR keys for user 'root', privgrp 'root'..
Operation successful.
root wallet
root wallet cert
root cert export
peer wallet
profile reader wallet
pa wallet
peer wallet keys
pa wallet keys
peer cert request
pa cert request
peer cert
pa cert
peer root cert TP
profile reader root cert TP
pa root cert TP
peer pa cert TP
pa peer cert TP
profile reader pa cert TP
profile reader peer cert TP
peer user cert
pa user cert
```

```
Adding daemon to inittab
CRS-4123: Oracle High Availability Services has been started.
ohasd is starting
CRS-2672: Attempting to start 'ora.gipcd' on 'rac1'
CRS-2672: Attempting to start 'ora.mdnsd' on 'rac1'
CRS-2676: Start of 'ora.gipcd' on 'rac1' succeeded
CRS-2676: Start of 'ora.mdnsd' on 'rac1' succeeded
CRS-2672: Attempting to start 'ora.gpnpd' on 'rac1'
CRS-2676: Start of 'ora.gpnpd' on 'rac1' succeeded
CRS-2672: Attempting to start 'ora.cssdmonitor' on 'rac1'
CRS-2676: Start of 'ora.cssdmonitor' on 'rac1' succeeded
CRS-2672: Attempting to start 'ora.cssd' on 'rac1'
CRS-2672: Attempting to start 'ora.diskmon' on 'rac1'
CRS-2676: Start of 'ora.diskmon' on 'rac1' succeeded
CRS-2676: Start of 'ora.cssd' on 'rac1' succeeded
CRS-2672: Attempting to start 'ora.ctssd' on 'rac1'
CRS-2676: Start of 'ora.ctssd' on 'rac1' succeeded
ASM created and started successfully.
DiskGroup DATA created successfully.

clscfg: -install mode specified
Successfully accumulated necessary OCR keys.
Creating OCR keys for user 'root', privgrp 'root'..
Operation successful.
CRS-2672: Attempting to start 'ora.crsd' on 'rac1'
CRS-2676: Start of 'ora.crsd' on 'rac1' succeeded
CRS-4256: Updating the profile
Successful addition of voting disk 6d8af7c66c874f28bfa9af46f39c5533.
Successful addition of voting disk 72b8bfad59be4f78bfd53ab49a9f064a.
Successful addition of voting disk 43ec07c3e81c4fcbbf2e03d640d75294.
Successfully replaced voting disk group with +DATA.
CRS-4256: Updating the profile
CRS-4266: Voting file(s) successfully replaced
## STATE File Universal Id File Name Disk group
--  -----
 1. ONLINE 6d8af7c66c874f28bfa9af46f39c5533 (ORCL:DISK001) [DATA]
 2. ONLINE 72b8bfad59be4f78bfd53ab49a9f064a (ORCL:DISK002) [DATA]
 3. ONLINE 43ec07c3e81c4fcbbf2e03d640d75294 (ORCL:DISK004) [DATA]

Located 3 voting disk(s).
```

Installation – binary installation of grid infra

- Full output of root.sh on node 1 (con't)

```
CRS-2673: Attempting to stop 'ora.crsd' on 'rac1'
CRS-2677: Stop of 'ora.crsd' on 'rac1' succeeded
CRS-2673: Attempting to stop 'ora.asm' on 'rac1'
CRS-2677: Stop of 'ora.asm' on 'rac1' succeeded
CRS-2673: Attempting to stop 'ora.ctssd' on 'rac1'
CRS-2677: Stop of 'ora.ctssd' on 'rac1' succeeded
CRS-2673: Attempting to stop 'ora.cssdmonitor' on 'rac1'
CRS-2677: Stop of 'ora.cssdmonitor' on 'rac1' succeeded
CRS-2673: Attempting to stop 'ora.cssd' on 'rac1'
CRS-2677: Stop of 'ora.cssd' on 'rac1' succeeded
CRS-2673: Attempting to stop 'ora.gpnpd' on 'rac1'
CRS-2677: Stop of 'ora.gpnpd' on 'rac1' succeeded
CRS-2673: Attempting to stop 'ora.gipcd' on 'rac1'
CRS-2677: Stop of 'ora.gipcd' on 'rac1' succeeded
CRS-2673: Attempting to stop 'ora.mdnsd' on 'rac1'
CRS-2677: Stop of 'ora.mdnsd' on 'rac1' succeeded
CRS-2672: Attempting to start 'ora.mdnsd' on 'rac1'
CRS-2676: Start of 'ora.mdnsd' on 'rac1' succeeded
CRS-2672: Attempting to start 'ora.gipcd' on 'rac1'
CRS-2676: Start of 'ora.gipcd' on 'rac1' succeeded
CRS-2672: Attempting to start 'ora.gpnpd' on 'rac1'
CRS-2676: Start of 'ora.gpnpd' on 'rac1' succeeded
CRS-2672: Attempting to start 'ora.cssdmonitor' on 'rac1'
CRS-2676: Start of 'ora.cssdmonitor' on 'rac1' succeeded
CRS-2672: Attempting to start 'ora.cssd' on 'rac1'
CRS-2672: Attempting to start 'ora.diskmon' on 'rac1'
CRS-2676: Start of 'ora.diskmon' on 'rac1' succeeded
CRS-2676: Start of 'ora.cssd' on 'rac1' succeeded
CRS-2672: Attempting to start 'ora.ctssd' on 'rac1'
CRS-2676: Start of 'ora.ctssd' on 'rac1' succeeded
CRS-2672: Attempting to start 'ora.asm' on 'rac1'
CRS-2676: Start of 'ora.asm' on 'rac1' succeeded
CRS-2672: Attempting to start 'ora.crsd' on 'rac1'
CRS-2676: Start of 'ora.crsd' on 'rac1' succeeded
CRS-2672: Attempting to start 'ora.evmd' on 'rac1'
CRS-2676: Start of 'ora.evmd' on 'rac1' succeeded
CRS-2672: Attempting to start 'ora.asm' on 'rac1'
CRS-2676: Start of 'ora.asm' on 'rac1' succeeded
CRS-2672: Attempting to start 'ora.DATA.dg' on 'rac1'
CRS-2676: Start of 'ora.DATA.dg' on 'rac1' succeeded
CRS-2672: Attempting to start 'ora.registry.acfs' on 'rac1'
CRS-2676: Start of 'ora.registry.acfs' on 'rac1' succeeded
```

```
rac1 2009/09/09 07:46:29 /u01/app/11.2.0/grid/cdata/rac1/backup_20090909_074629.olr
```

```
Preparing packages for installation...
```

```
Cvuqdisk-1.0.7-1
```

```
Configure Oracle Grid Infrastructure for a Cluster ... succeeded
```

```
Updating inventory properties for clusterware
```

```
Starting Oracle Universal Installer...
```

```
Checking swap space: must be greater than 500 MB. Actual 2801 MB Passed
```

```
The inventory pointer is located at /etc/orainst.loc
```

```
The inventory is located at /u01/app/orainventory
```

```
'UpdateNodeList' was successful.
```

Installation – binary installation of grid infra

- Full output of root.sh on node 2

```
[root@rac2 11.2.0]# /u01/app/11.2.0/grid/root.sh
Running Oracle 11g root.sh script...
```

The following environment variables are set as:

```
ORACLE_OWNER= grid
ORACLE_HOME= /u01/app/11.2.0/grid
```

Enter the full pathname of the local bin directory: [/usr/local/bin]:

```
Copying dbhome to /usr/local/bin ...
Copying oraenv to /usr/local/bin ...
Copying coraenv to /usr/local/bin ...
```

Creating /etc/oratab file...

Entries will be added to the /etc/oratab file as needed by Database Configuration Assistant when a database is created
Finished running generic part of root.sh script.

Now product-specific root actions will be performed.

2009-09-09 07:48:45: Parsing the host name

2009-09-09 07:48:45: Checking for super user privileges

2009-09-09 07:48:45: User has super user privileges

Using configuration parameter file: /u01/app/11.2.0/grid/crs/install/crsconfig_params

Creating trace directory

LOCAL ADD MODE

Creating OCR keys for user 'root', privgrp 'root'..

Operation successful.

Adding daemon to inittab

CRS-4123: Oracle High Availability Services has been started.

ohasd is starting

CRS-4402: The CSS daemon was started in exclusive mode but found an active CSS daemon on node rac1, number 1, and is terminating

An active cluster was found during exclusive startup, restarting to join the cluster

CRS-2672: Attempting to start 'ora.mdnsd' on 'rac2'

CRS-2676: Start of 'ora.mdnsd' on 'rac2' succeeded

CRS-2672: Attempting to start 'ora.gipcd' on 'rac2'

CRS-2676: Start of 'ora.gipcd' on 'rac2' succeeded

CRS-2672: Attempting to start 'ora.gpnpd' on 'rac2'

CRS-2676: Start of 'ora.gpnpd' on 'rac2' succeeded

CRS-2672: Attempting to start 'ora.cssdmonitor' on 'rac2'

CRS-2676: Start of 'ora.cssdmonitor' on 'rac2' succeeded

CRS-2672: Attempting to start 'ora.cssd' on 'rac2'

CRS-2672: Attempting to start 'ora.diskmon' on 'rac2'

CRS-2676: Start of 'ora.diskmon' on 'rac2' succeeded

CRS-2676: Start of 'ora.cssd' on 'rac2' succeeded

CRS-2672: Attempting to start 'ora.ctssd' on 'rac2'

CRS-2676: Start of 'ora.ctssd' on 'rac2' succeeded

CRS-2672: Attempting to start 'ora.drivers.acfs' on 'rac2'

CRS-2676: Start of 'ora.drivers.acfs' on 'rac2' succeeded

CRS-2672: Attempting to start 'ora.asm' on 'rac2'

CRS-2676: Start of 'ora.asm' on 'rac2' succeeded

CRS-2672: Attempting to start 'ora.crsd' on 'rac2'

CRS-2676: Start of 'ora.crsd' on 'rac2' succeeded

CRS-2672: Attempting to start 'ora.evmd' on 'rac2'

CRS-2676: Start of 'ora.evmd' on 'rac2' succeeded

```
rac2 2009/09/09 08:01:00 /u01/app/11.2.0/grid/cdata/rac2/backup_20090909_080100.olr
```

Preparing packages for installation...

cvuqdisk-1.0.7-1

Configure Oracle Grid Infrastructure for a Cluster ... succeeded

Updating inventory properties for clusterware

Starting Oracle Universal Installer...

Checking swap space: must be greater than 500 MB. Actual 2969 MB Passed

The inventory pointer is located at /etc/orainst.loc

The inventory is located at /u01/app/orainventory

'UpdateNodeList' was successful.

Installation – binary installation of grid infra

- If everything works as expected the result should look like this:

Oracle Grid Infrastructure - Setting up Grid Infrastructure - Step 16 of 17

Setup

Progress: 100%

Status:

✓ Install Grid Infrastructure for a Cluster	Succeeded
✓ • Prepare	Succeeded
✓ • Copy files	Succeeded
✓ • Link binaries	Succeeded
✓ • Setup files	Succeeded
✓ • Perform remote operations	Succeeded
✓ Execute Root Scripts for Install Grid Infrastructure for a Cluster	Succeeded
✓ Configure Oracle Grid Infrastructure for a Cluster	Succeeded
✓ • Oracle Net Configuration Assistant	Succeeded
✓ • Automatic Storage Management Configuration Assistant	Succeeded
✓ • Oracle Private Interconnect Configuration Assistant	Succeeded
✓ • Oracle Cluster Verification Utility	Succeeded

Buttons: Details, Retry, Skip

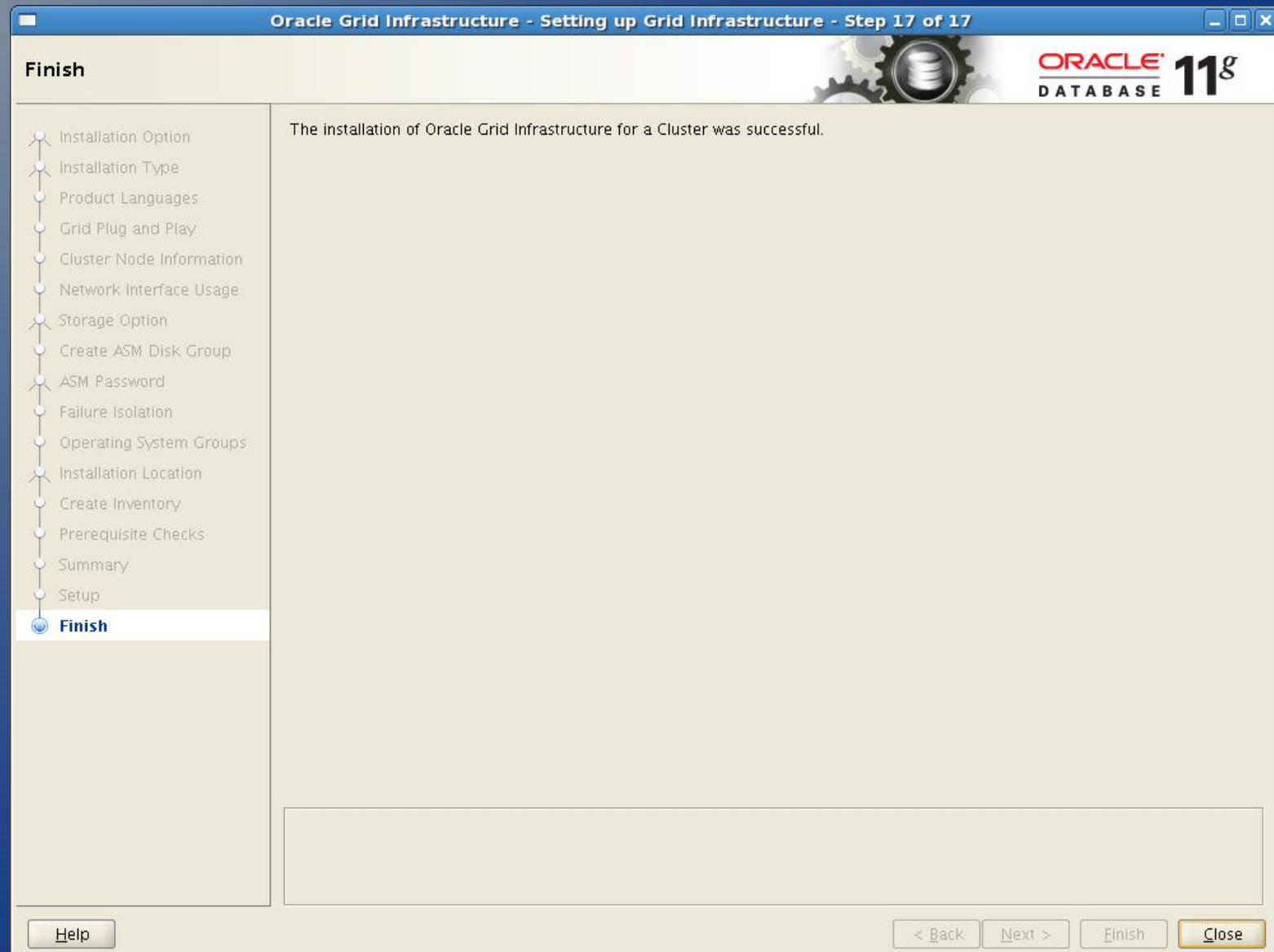
Oracle 11g Database Storage Management

Manage More Data...
Compress Data...
Access Data Faster

Buttons: Help, < Back, Next >, Finish, Close

Installation – binary installation of grid infra

- FINISHED!



Installation – binary installation of grid infra

- If there are problems:
 - Look at the log files located on `/u01/app/orainventory/logs`
 - Fix the issues noted here
 - If this does not work out: Search Metalink / Open SR

Installation – binary installation of grid infra

- Where to go now?
 - We just installed the Infrastructure needed for RAC, i.e. ASM and Clusterware
 - Install diagnostic utilities (strongly recommended)
 - OSWatcher
 - and RACDDT
 - Tune Kernel parameters (if not done before)
 - Create at least TWO more disk groups:
 - one for holding database files (i.e. datafiles and binary installation files)
 - one to be used as flashback recovery area
 - now we need to install a RAC database → this will be Part 4
 - Part 3 will cover ADVN (ASM Dynamic Volume Manager) and ACFS (ASM Cluster File system) shortly
 - Backup current configuration

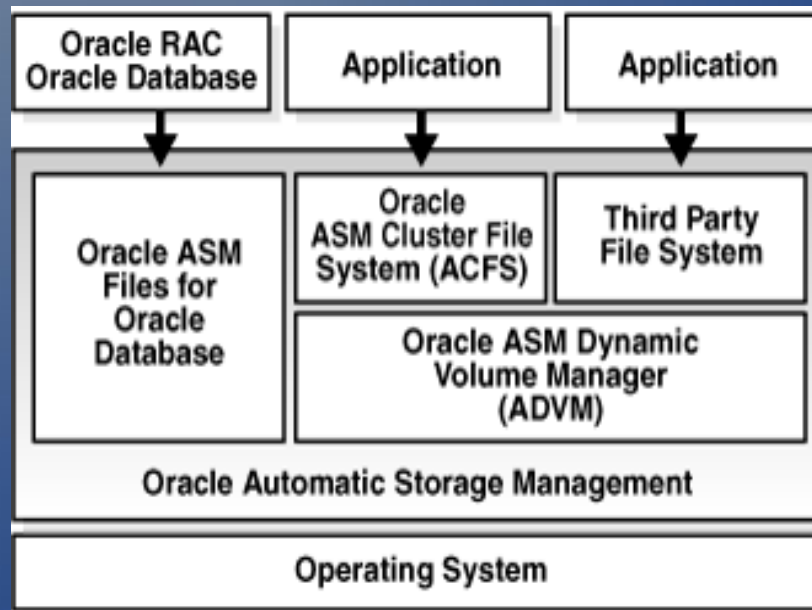
Part 3 –
ADVM and ACFS

System configuration - overview

- We will use the system configured and installed in part 2

ADVM and ACFS - what it is

- ADVM = ASM dynamic volume manager
- ACFS = ASM cluster file system
- Basic layout



(Source: Oracle Database Storage Administrator's Guide 11g Release 2)

ADVM and ACFS - what it is

- ADVM - Advantages
 - Integrated in ASM; this can be an disadvantage as well :-)
 - Inherits storage from ASM hence enables host-based mirroring (either 2- or 3-way-mirroring)
 - multiple volumes within a disk group can be created with an file system such as ext3, ext4, reiserfs, ... on top of it and will support storage of any file type as the file system normally would – EXCEPT files which can be place in ASM directly
 - ADVM volume dynamically resizeable

ADVM and ACFS - what it is

- ADVM - Disadvantages
 - ADVM volumes may be resized online; but the used file system must support it as well (ext3 on OEL 5 does support online resizing but does not support online shrinking)
 - Storing files which can be stored in ASM directly in ADVM + file system is not supported
 - NFS on top of ADVM is also not supported
 - ASM configuration assistant (asmca) only supports creation of volumes / file system... delete a volume / file system requires command line

ADVM and ACFS - what it is

- ACFS - Advantages

- cluster file system on top of ASM and ADVM
- as available as ASM is (inherits storage from ASM disk group and ADVM volume)
- Supports storage of files which cannot be directly stored in ASM, i.e.
 - executables
 - trace files
 - log files
 - ...
 - Supports even oracle database binary installations
- On ACFS read-only Snapshots can be created
- dynamically resizable

ADVM and ACFS - what it is

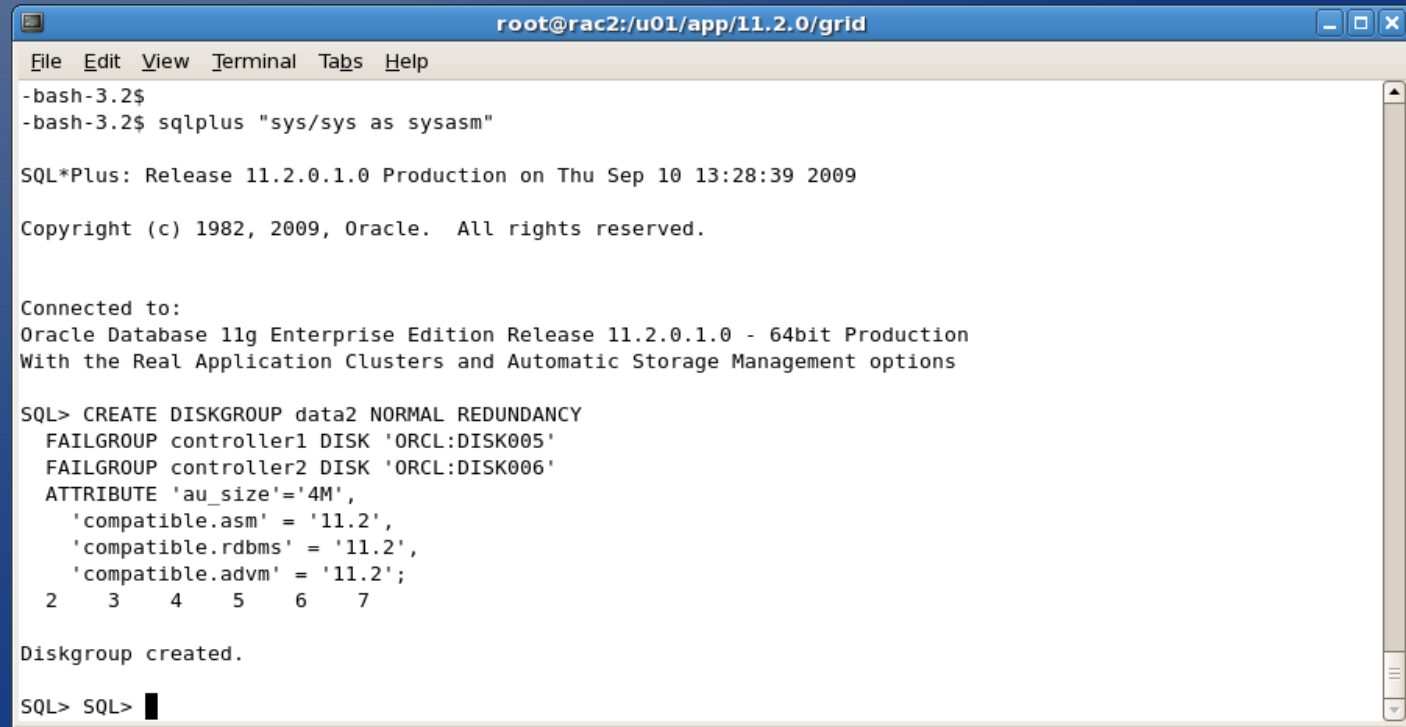
- ACFS - Advantages
 - Useable accross platforms
 - Thoughts
 - Do i need licenses for grid infrastructrue?
 - If not: What if grid infrastructure + ASM used to provide host-based mirroring and cluster file system for non-oracle applications, for instance web servers
 - ACFS Mount registry: used for mouting ACFS and ADVM file system across reboots

ADVM and ACFS - what it is

- ACFS – Disadvantages
 - for example storing database files in ACFS is not supported, according to the documentation
„Oracle Support Services will not take calls and development will not fix bugs associated with storing unsupported file types in Oracle ACFS“
 - Only available with RedHat Server 5 or Oracle Enterprise Linux 5 !
 - Disk group compatible parameter COPATBILE.ASM and COMPATIBLE.ADVM must be set so 11.2
 - ASM configuration assistant (asmca) only supports creation of volumes / file system... delete a volume / file system requires command line

ADVM and ACFS - some tests

- Lets first create an additional disk group called „DATA2“ which consists for two iSCSI LUNs with 30 GB each
 - Preparation:
 - LUNs visible with „fdisk -l“
 - Partition created (one on each LUN)
 - disk labeled with „oracleasm createdisk <name> <devpath>“
 - Create disk group in ASM
(remember to connect as „sys as sysASM“!)



```
root@rac2:/u01/app/11.2.0/grid
File Edit View Terminal Tabs Help
-bash-3.2$
-bash-3.2$ sqlplus "sys/sys as sysasm"

SQL*Plus: Release 11.2.0.1.0 Production on Thu Sep 10 13:28:39 2009

Copyright (c) 1982, 2009, Oracle. All rights reserved.

Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.1.0 - 64bit Production
With the Real Application Clusters and Automatic Storage Management options

SQL> CREATE DISKGROUP data2 NORMAL REDUNDANCY
      FAILGROUP controller1 DISK 'ORCL:DISK005'
      FAILGROUP controller2 DISK 'ORCL:DISK006'
      ATTRIBUTE 'au_size'='4M',
               'compatible.asm' = '11.2',
               'compatible.rdbms' = '11.2',
               'compatible.advm' = '11.2';
 2      3      4      5      6      7

Diskgroup created.

SQL> SQL>
```

ADVM and ACFS - some tests

- Notes on disk groups
 - AUSIZE of 4 MB recommended by Oracle documentation due to:
 - Increased I/O through the I/O subsystem if the I/O size is increased to the AU size.
 - Reduced SGA size to manage the extent maps in the database instance.
 - Faster datafile initialization if the I/O size is increased to the AU size.
 - Increased file size limits.
 - Reduced database open time.
 - Large AUSIZE requires as well
 - Increasing size of maximum IO request to at least 4 MB in operating system, drive, HBA, storage system
 - Larger stripe size in storage system (pre 11g R2: 1 MB stripe size, with 11g R2: 4 MB? → to be tested)
 - Read the documentation on COMPATIBLE parameters; most „cool“ features are only available with 11.2 COMPATIBLE parameter hence require 11g R2 database

ADVM and ACFS - some tests

- Creating ACFS
 - Requires ADVM in which ACFS can be created
 - volcreate creates ADVM volume



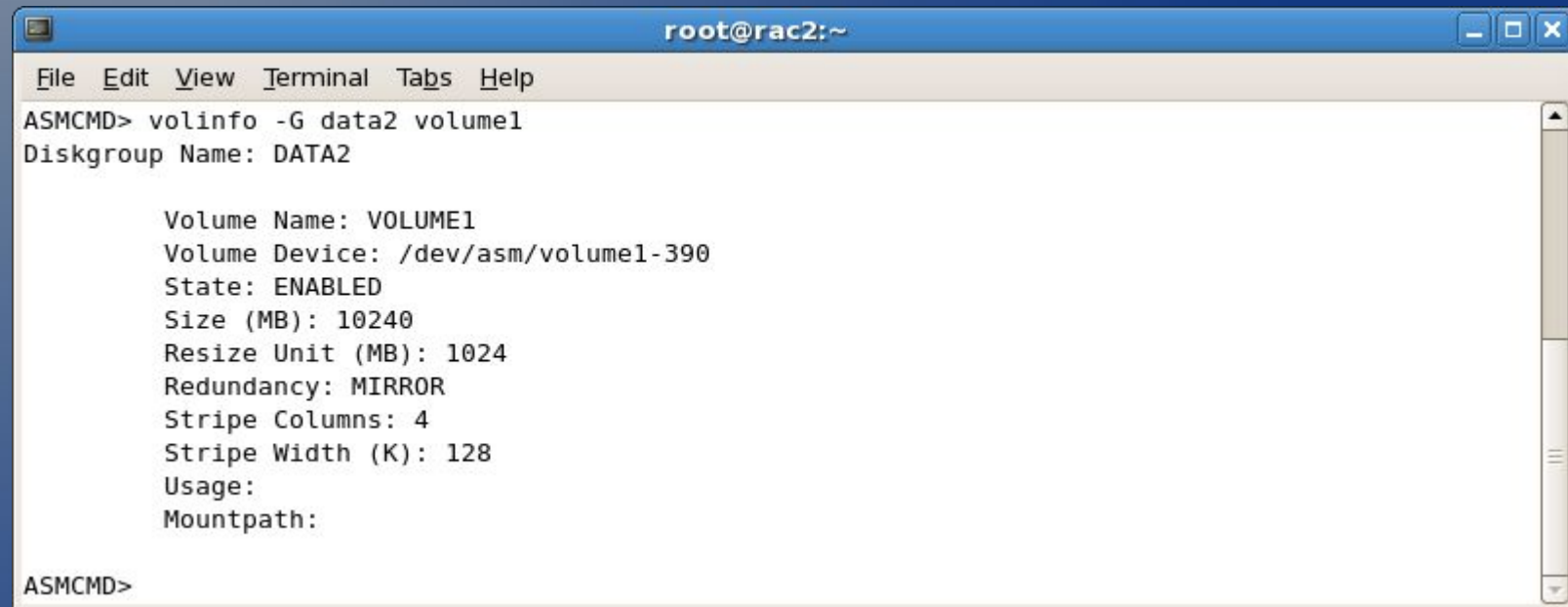
```
root@rac2:~  
File Edit View Terminal Tabs Help  
[root@rac2 ~]# su - grid  
-bash-3.2$ asmcmd  
ASMCMD> exit  
-bash-3.2$  
-bash-3.2$  
-bash-3.2$  
-bash-3.2$  
-bash-3.2$  
-bash-3.2$  
-bash-3.2$ asmcmd  
ASMCMD> volcreate -G data2 -s 10G volume1  
ASMCMD> █
```

(command above shows minimal command creating an ADVM volume; redundancy is derived from disk group, our data group was created with „normal“ redundancy so the volume inherits this as well)

- Creation with SQL also possible: „ALTER DISKGROUP data2 ADD VOLUME volume1 SIZE 10G;“

ADVM and ACFS - some tests

- Creating ACFS
 - Requires ADVM in which ACFS can be created
 - volinfo shows detailed information

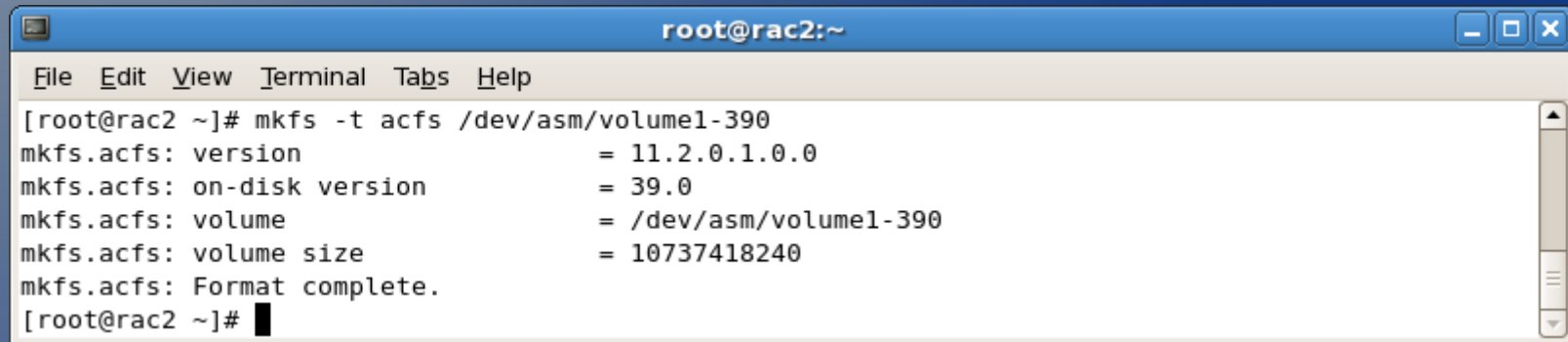


```
root@rac2:~  
File Edit View Terminal Tabs Help  
ASMCMD> volinfo -G data2 volume1  
Diskgroup Name: DATA2  
  
Volume Name: VOLUME1  
Volume Device: /dev/asm/volume1-390  
State: ENABLED  
Size (MB): 10240  
Resize Unit (MB): 1024  
Redundancy: MIRROR  
Stripe Columns: 4  
Stripe Width (K): 128  
Usage:  
Mountpath:  
  
ASMCMD>
```

- Especially device path is important for creating the file system

ADVM and ACFS - some tests

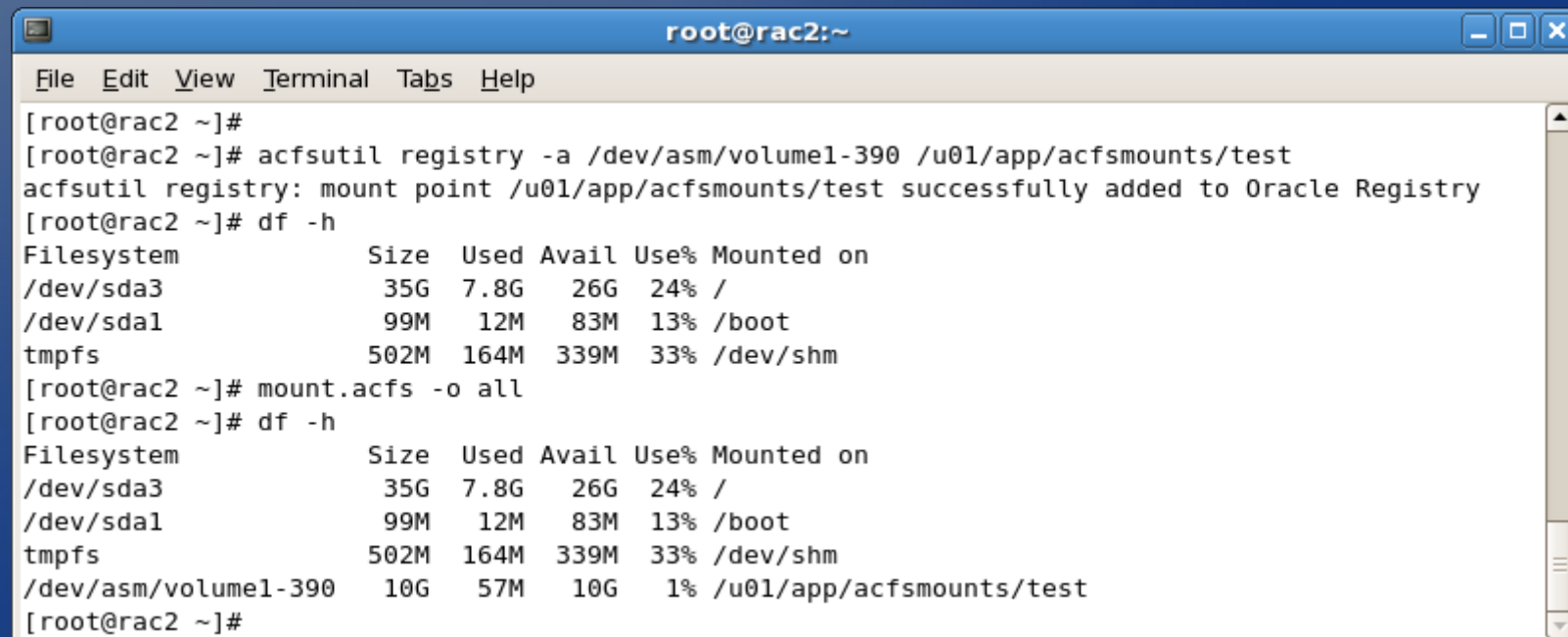
- Creating ACFS
 - Requires ADVM in which ACFS can be created
 - create ACFS from operating system (only on one node)



```
root@rac2:~  
File Edit View Terminal Tabs Help  
[root@rac2 ~]# mkfs -t acfs /dev/asm/volume1-390  
mkfs.acfs: version = 11.2.0.1.0.0  
mkfs.acfs: on-disk version = 39.0  
mkfs.acfs: volume = /dev/asm/volume1-390  
mkfs.acfs: volume size = 10737418240  
mkfs.acfs: Format complete.  
[root@rac2 ~]#
```

ADVM and ACFS - some tests

- Creating ACFS
 - Requires ADVM in which ACFS can be created
 - register acfs in registry to be mounted across reboots with „acfsutil“
 - ATTENTION: DO NOT register shared oracle home directories; this will be done by the clusterware
 - test of everything works by issueing „mount.acfs -o all“ on all nodes; the file system should be mounted and accessible



```
root@rac2:~  
File Edit View Terminal Tabs Help  
[root@rac2 ~]#  
[root@rac2 ~]# acfsutil registry -a /dev/asm/volume1-390 /u01/app/acfsmounts/test  
acfsutil registry: mount point /u01/app/acfsmounts/test successfully added to Oracle Registry  
[root@rac2 ~]# df -h  
Filesystem      Size  Used Avail Use% Mounted on  
/dev/sda3       35G   7.8G   26G   24% /  
/dev/sda1       99M   12M   83M   13% /boot  
tmpfs           502M  164M  339M   33% /dev/shm  
[root@rac2 ~]# mount.acfs -o all  
[root@rac2 ~]# df -h  
Filesystem      Size  Used Avail Use% Mounted on  
/dev/sda3       35G   7.8G   26G   24% /  
/dev/sda1       99M   12M   83M   13% /boot  
tmpfs           502M  164M  339M   33% /dev/shm  
/dev/asm/volume1-390 10G   57M   10G    1% /u01/app/acfsmounts/test  
[root@rac2 ~]#
```

ADVM and ACFS - some tests

- Simple Performance tests:

```
dd if=/dev/zero bs=1024k of=<path> count=1000 oflag=direct
```

→ direct I/O used; no caching, performed 10 times

- write to ACFS

- ACFS 2-way mirror: ~ 6 MB/s average

- ACFS unprotected: ~ 12 MB/s average

- → expected... one disk, double I/O halved throughput

- direct write to iSCSI LUN: ~ 14.3 MB/s average

- Tests were performed within a VMWare... so results are most likely not accurate... but we get an impression.. we will check this on real hardware later!

Part 4 –
Installation
Real Application Cluster
Database (RAC)

System configuration

- System configuration:
 - two virtual machines (VMWARE)
 - 1 vCPU
 - 4 GB RAM
 - 40 GB local Disk
 - Storage exported via ISCSI
 - 4 LUNs with 10 GB each
 - 2 LUNs with 30 GB each
 - Operating system configuration
 - Oracle Enterprise Linux 5.3 x86_64 (Kernel 2.6.18-128.el5)
 - Installed packages: default system + development packages

System configuration

- System configuration (con't):
 - Cluster Name: „RAC“
 - Grid Binary installation on local disk
 - OCR, Voting and datafiles stored in ASM
 - Oracle HOME stored on ACFS file system (this means we will have a SHARED home directory among all nodes!)
 - Oracle HOME will be installed under user „ora11p“

Installation Overview

- Installation of Oracle 11g Release 2 Grid Infrastructure
 - → done in chapter 2
- Installation of Oracle 11g Release 2 Database (rac installation)
 - Review system requirements
 - Install database software (aka „binaries“)
 - Create database

Installation – Review requirements

- All requirements from chapter 2 (grid infrastructure installation) applies here as well, for instance:
 - Kernel parameter
 - Limits (esp. configure limits for new user „ora11p“ which will hold the binary database installation)
 - Synchronous time
 - dns-resolvable SCAN name
 - working public and private interconnect
 - shared and accessible storage
 - at least ONE better two more disk groups created:
 - one for database files and binary installation
 - one for flashback recovery area
 - Note: SSH equivalence will be set up by installer

Installation – Install database binaries

- Create ACFS file system:
 - Create further ACFS mount directory

```
mkdir -p /u01/app/oracle/product/11.2.0/ora11p
```

- Create ADVM volume

```
-bash-3.2$  
-bash-3.2$  
-bash-3.2$  
-bash-3.2$ asmcmd  
ASMCMD> volcreate -G data2 -s 10g ora11p_home  
ASMCMD> █
```

- Create ACFS file system

```
[root@rac2 ~]#  
[root@rac2 ~]# mkfs.acfs /dev/asm/ora11p_home-132  
mkfs.acfs: version = 11.2.0.1.0.0  
mkfs.acfs: on-disk version = 39.0  
mkfs.acfs: volume = /dev/asm/ora11p_home-132  
mkfs.acfs: volume size = 10737418240  
mkfs.acfs: Format complete.  
[root@rac2 ~]# █
```

Installation – Install database binaries

- Create ACFS file system:
 - DO NOT register ACFS file system mountpoint for the shared oracle home; we will do this later (when creating the database) as a clusterware resource
 - Mount ACFS file system on both nodes

```
mount /dev/asm/ora11p_home-132  
/u01/app/oracle/product/11.2.0/orap11p
```

```
[root@rac1 ~]# df -h  
Filesystem              Size  Used Avail Use% Mounted on  
/dev/sda3                26G   8.8G   16G   37% /  
/dev/sda1                99M   12M   83M   13% /boot  
tmpfs                   1.9G  164M   1.7G    9% /dev/shm  
/dev/asm/ora11p_home-132  
                        10G   85M   10G    1% /u01/app/oracle/product/11.2.0/ora11p  
[root@rac1 ~]#
```

Installation – Install database binaries

- Create User on both nodes:

```
useradd -u 501 -g dba -d /u01/app/oracle/product/11.2.0/ora11p ora11p  
passwd ora11p
```

```
chown -R root:dba /u01/app/oracle/product  
chmod -R 775 /u01/app/oracle/product  
chown -R ora11p:dba /u01/app/oracle/product/11.2.0/ora11p
```

- Create .bash_profile for user ora11p (note: changes on node A will be visible on node B cause were using ACFS; so changing profile file is needed only once)

```
export ORACLE_BASE=/u01/app/oracle  
export ORACLE_HOME=$ORACLE_BASE/product/11.2.0/ora11p  
export ORACLE_SID=ORA11P  
if [ -t 0 ]; then  
stty intr ^C  
fi
```


Installation – Install database binaries

- One word on Cluster Verification utility (cluvfy):
 - should be used prior installation
 - At this point the user „ora11p“ does not have SSH equivalence configured
 - So there are two options:
 - start cluvfy after installer set up ssh equivalence
 - set up SSH equivalence manually
 - I personally prefer to run cluvfy after installer set up ssh equivalence
 - However the database installer seems to run a more or less complete check automatically
 - If you want to start cluvfy here is the syntax:

```
cluvfy stage -pre dbinst -fixup -n nodeA,nodeB -r <release> -osdba  
<name of sysdba group on unix> -verbose
```

```
<release> is: 10gR1, 10gR2, 11gR1, 11gR2
```

Installation – Install database binaries

- Start installer als user „ora11p“ on any node

```
-bash-3.2$ /raw_software/database/runInstaller
Starting Oracle Universal Installer...

Checking Temp space: must be greater than 120 MB.   Actual 15415 MB   Passed
Checking swap space: must be greater than 150 MB.   Actual 4094 MB   Passed
Checking monitor: must be configured to display at least 256 colors.   Actual 16777216   Passed
Preparing to launch Oracle Universal Installer from /tmp/OraInstall2009-09-14_10-21-53AM. Please wait .
..
```

Installation – Install database binaries

- For testing purposes i deselected update notifications... in productive environments this is highly recommended

Oracle Database 11g Release 2 Installer - Installing database - Step 1 of 9

Configure Security Updates

Provide your email address to be informed of security issues, install the product and initiate configuration manager. [View details.](#)

Email:

Easier for you if you use your My Oracle Support email address/username.

I wish to receive security updates via My Oracle Support.

My Oracle Support Password:

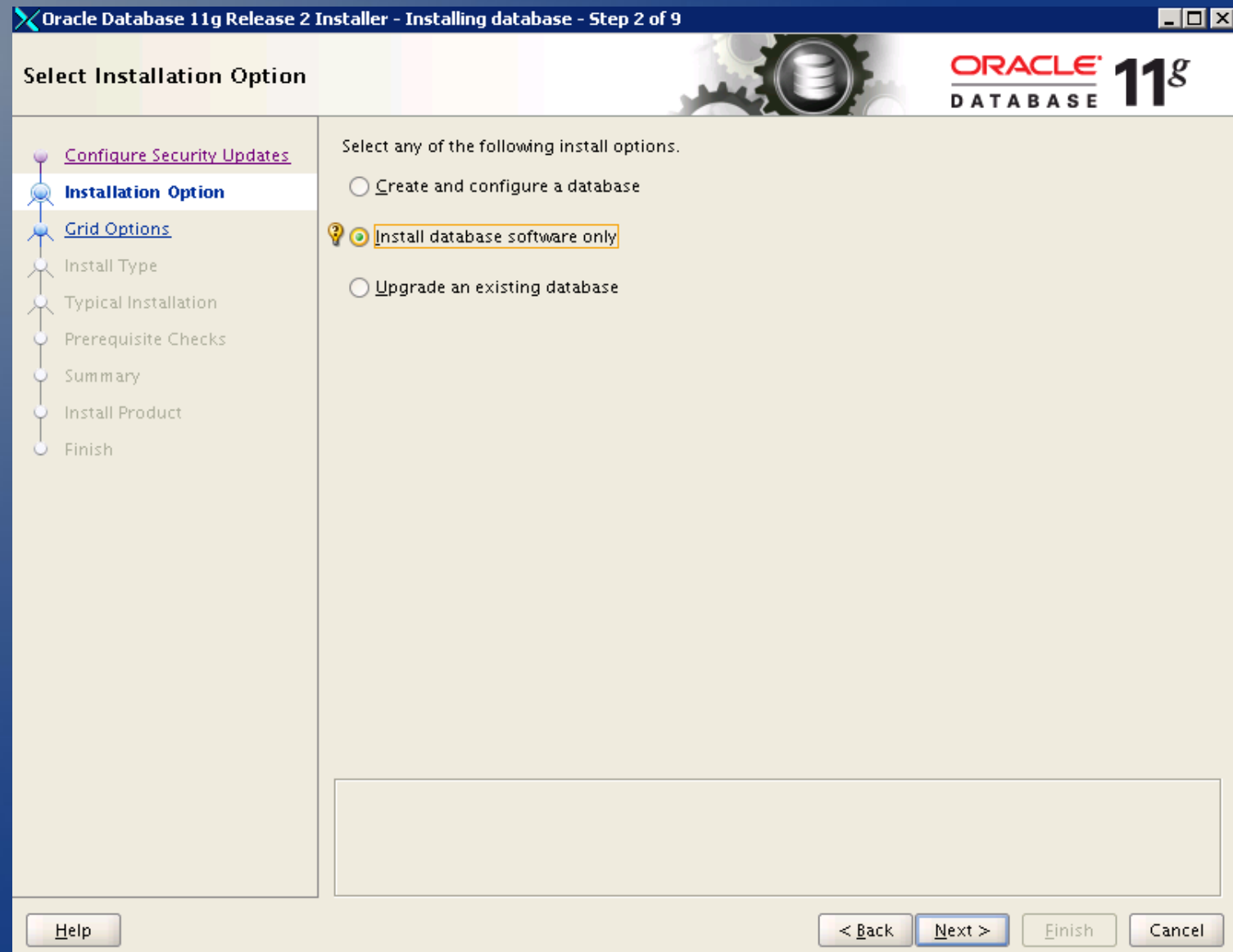
Navigation pane:

- Configure Security Updates
- Installation Option
- Grid Options
- Install Type
- Typical Installation
- Prerequisite Checks
- Summary
- Install Product
- Finish

Buttons: Help, < Back, Next >, Finish, Cancel

Installation – Install database binaries

- we will install database software only and create database later



Installation – Install database binaries

- both nodes were discovered correctly....

Oracle Database 11g Release 2 Installer - Installing database - Step 3 of 9

Node Selection

Select the type of database installation you want to perform.

Single instance database installation

Real Application Clusters database installation

Select nodes (in addition to the local node) in the cluster where the installer should install Oracle RAC.

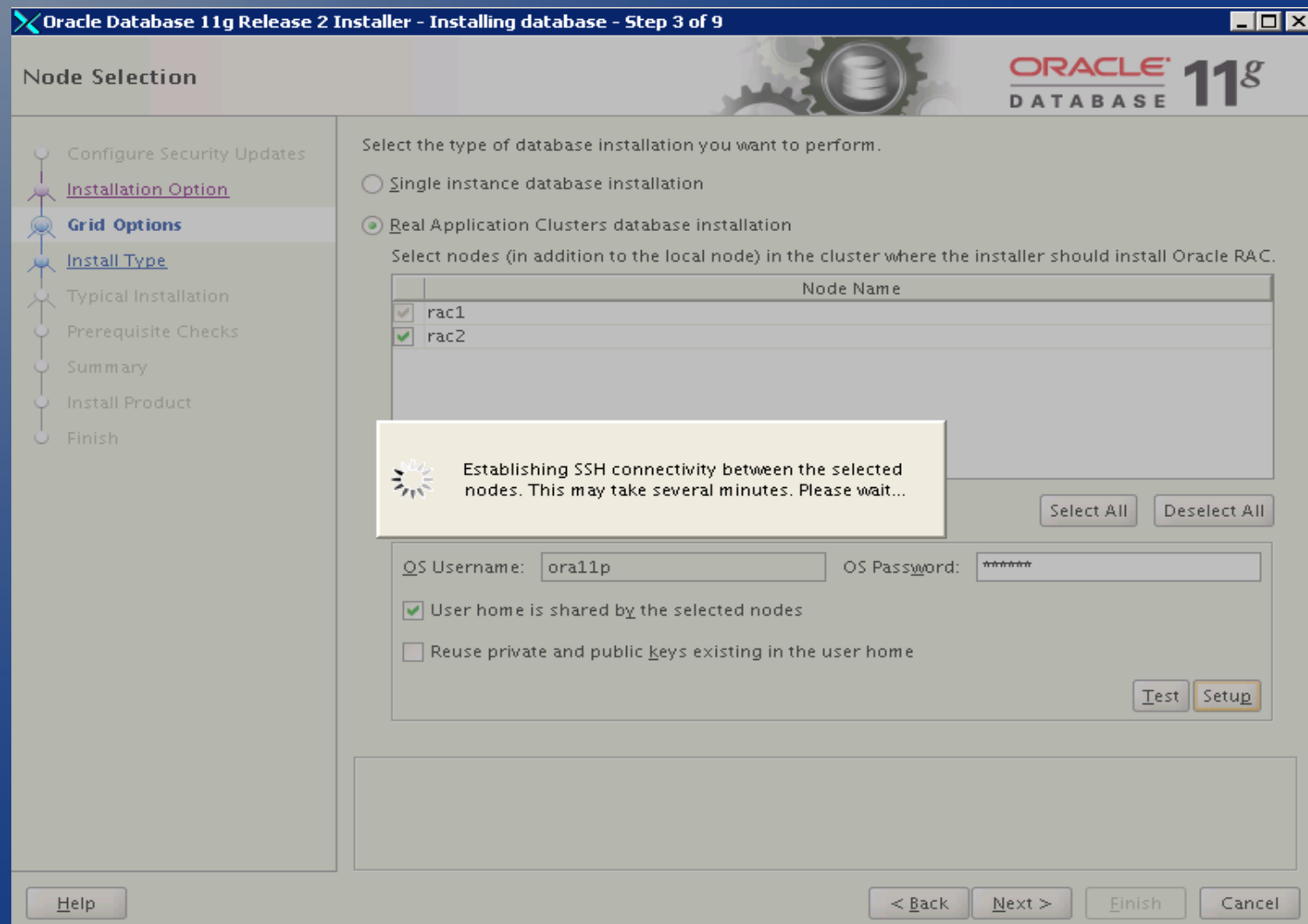
Node Name
<input checked="" type="checkbox"/> rac1
<input checked="" type="checkbox"/> rac2

SSH Connectivity... Select All Deselect All

Help < Back Next > Finish Cancel

Installation – Install database binaries

- because we were installing as user „ora11p“ which is different from the user holding our infrastructure installation we need to create passwordless ssh connectivity
- you also need to select „user home is shared“ cause we were using ACFS



Installation – Install database binaries

- SSH connectivity successfully established...

Oracle Database 11g Release 2 Installer - Installing database - Step 3 of 9

Node Selection

Configure Security Updates
Installation Option
Grid Options
Install Type
Typical Installation
Prerequisite Checks
Summary
Install Product
Finish

Select the type of database installation you want to perform.

Single instance database installation
 Real Application Clusters database installation

Select nodes (in addition to the local node) in the cluster where the installer should install Oracle RAC.

	Node Name
<input checked="" type="checkbox"/>	rac1
<input checked="" type="checkbox"/>	rac2

Successfully established passwordless SSH connectivity between the selected nodes.

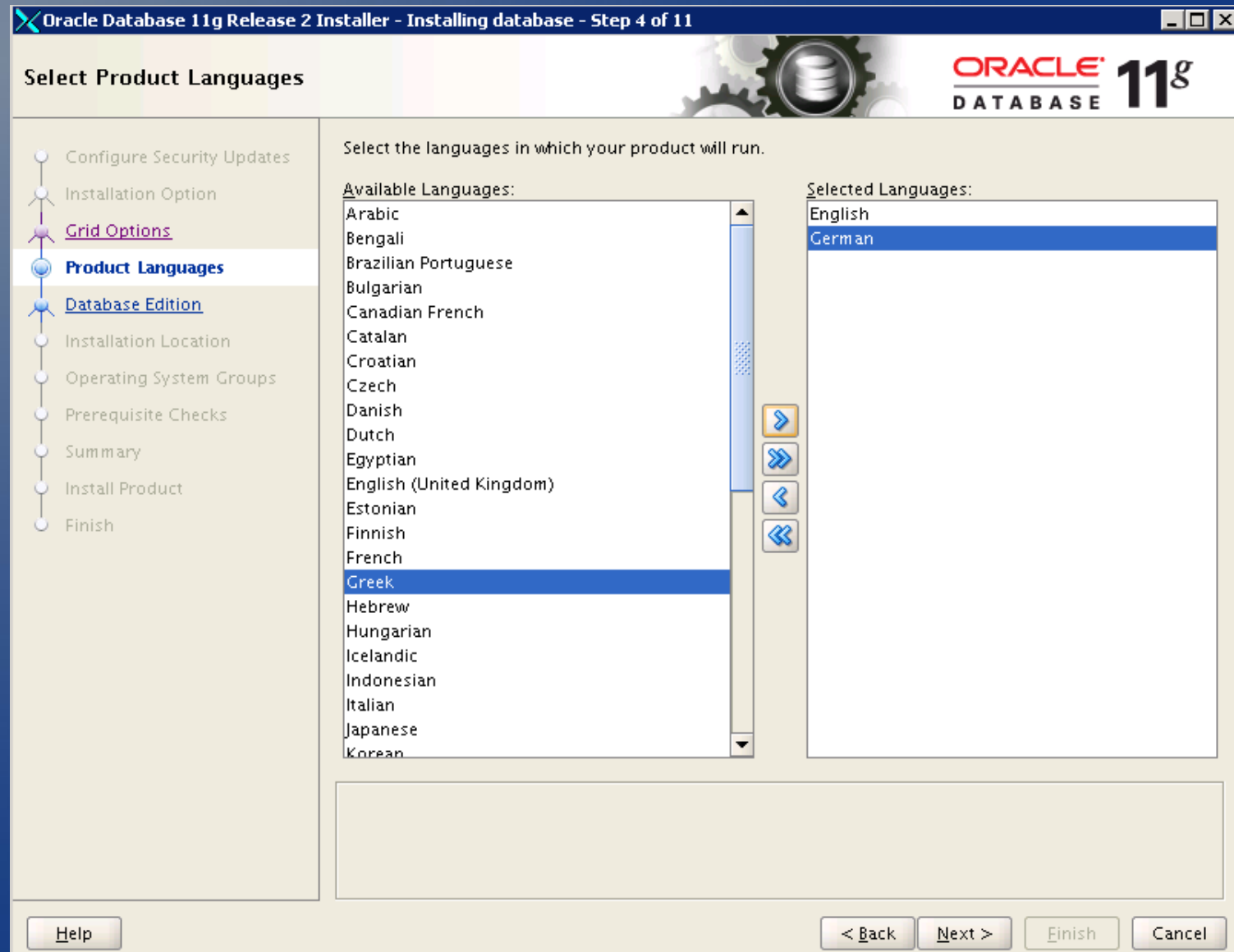
User home is shared by the selected nodes
 Reuse private and public keys existing in the user home

Test Setup

Help < Back Next > Finish Cancel

Installation – Install database binaries

- select language support



Installation – Install database binaries

- select edition

The screenshot shows the Oracle Database 11g Release 2 Installer window. The title bar reads "Oracle Database 11g Release 2 Installer - Installing database - Step 5 of 11". The main window has a header with the Oracle logo and "ORACLE 11g DATABASE". The title of the current step is "Select Database Edition".

On the left side, there is a vertical navigation pane with the following steps listed from top to bottom:

- Configure Security Updates
- Installation Option
- Grid Options
- Product Languages
- Database Edition** (highlighted)
- Installation Location
- Operating System Groups
- Prerequisite Checks
- Summary
- Install Product
- Finish

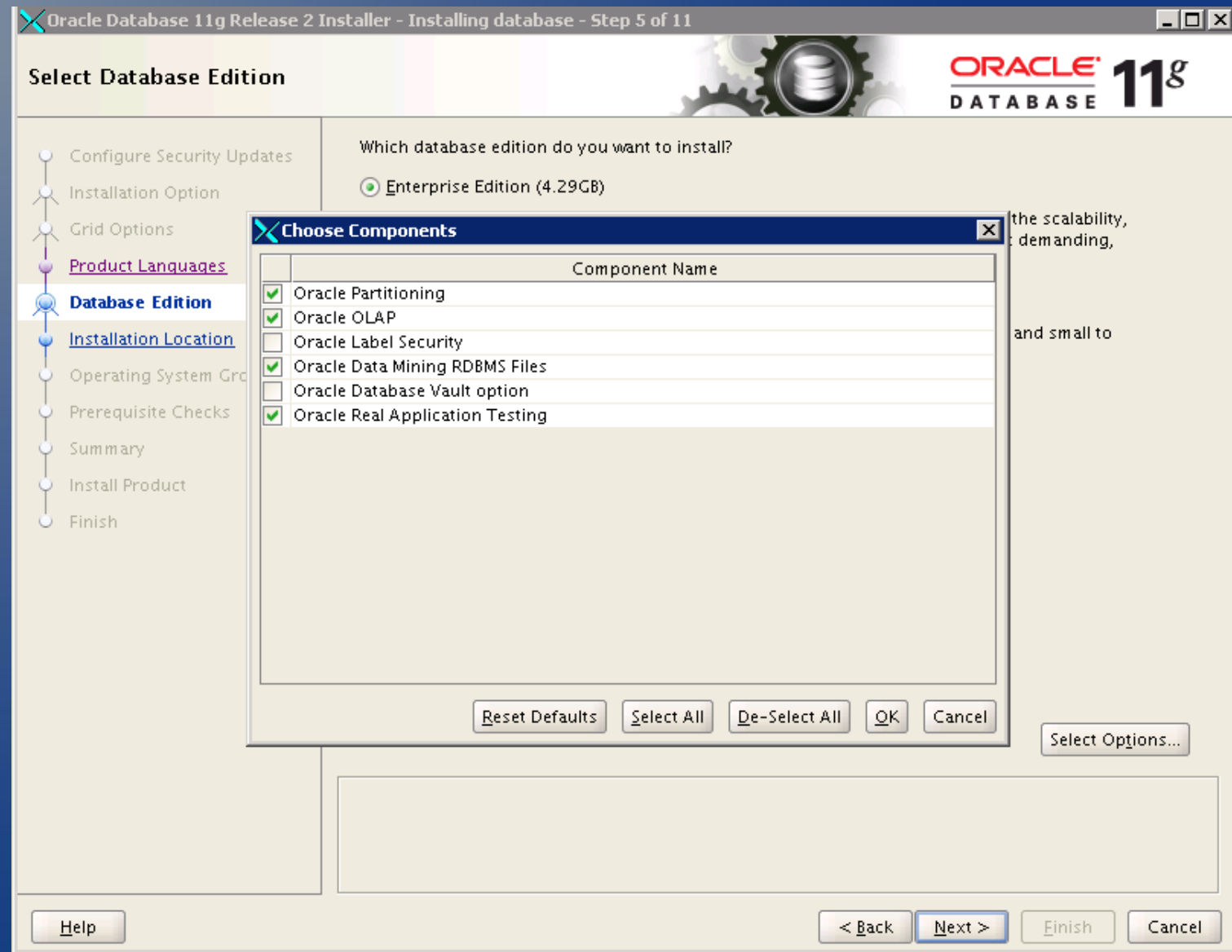
The main content area asks "Which database edition do you want to install?". There are two radio button options:

- Enterprise Edition (4.29GB)**
Oracle Database 11g Enterprise Edition is a self-managing database that has the scalability, performance, high availability, and security features required to run the most demanding, mission-critical applications.
- Standard Edition (4.22GB)**
Oracle Database 11g Standard Edition is ideal for work groups, departments, and small to medium-sized businesses looking for lower-cost solutions.

At the bottom right of the main content area, there is a "Select Options..." button. At the bottom of the window, there are four buttons: "Help", "< Back", "Next >" (highlighted), "Finish", and "Cancel".

Installation – Install database binaries

- select edition and options



Installation – Install database binaries

- select ORACLE_BASE and ORACLE_HOME; we set it in profile file so it is entered by the installer automatically

Oracle Database 11g Release 2 Installer - Installing database - Step 6 of 11

Specify Installation Location

Specify an Oracle base path to place all Oracle software and configuration-related files. This location is the Oracle base directory.

Oracle Base:

Specify a location for storing Oracle software files. This location is the Oracle home directory.

Software Location:

Installation – Install database binaries

Oracle Database 11g Release 2 Installer - Installing database - Step 7 of 11

Privileged Operating System Groups

ORACLE 11g DATABASE

- Configure Security Updates
- Installation Option
- Grid Options
- Product Languages
- Database Edition
- Installation Location
- Operating System Groups**
- Prerequisite Checks
- Summary
- Install Product
- Finish

SYSDBA and SYSOPER privileges are required to create a database using operating system (OS) authentication. Membership in OSDBA grants the SYSDBA privilege, and membership in OSOPER grants the SYSOPER privilege, which is a subset of SYSDBA privileges. Select the name of the OSDBA group to grant the SYSDBA privilege. You must be a member of this group.

Database Administrator (OSDBA) Group: dba ▼

Database Operator (OSOPER) Group: dba ▼

Help < Back Next > Finish Cancel

Installation – Install database binaries

- Installation Summary

The screenshot shows the Oracle Database 11g Release 2 Installer window at Step 9 of 11. The window title is "Oracle Database 11g Release 2 Installer - Installing database - Step 9 of 11". The Oracle logo and "11g DATABASE" are visible in the top right corner. The main area is titled "Summary" and contains a list of installation steps on the left and a summary of global settings on the right.

Summary

- Configure Security Updates
- Installation Option
- Grid Options
- Product Languages
- Database Edition
- Installation Location
- Operating System Groups
- [Prerequisite Checks](#)
- Summary**
- Install Product
- Finish

Oracle Database 11g Release 2 Installer

- Global settings**
 - Disk space: required 4.29 GB available 9.79 GB
 - Source location: /raw_software/database/install/./stage/products.xml
 - Install method: Typical installation
 - Database edition: Enterprise Edition (Install database software only)
 - Oracle base: /u01/app/oracle
 - Software location: /u01/app/oracle/product/11.2.0/ora11p
 - OSDBA group: dba

Save Response File...

Help < Back Next > Finish Cancel

Installation – Install database binaries

- Install process

The screenshot shows the Oracle Database 11g Release 2 Installer window. The title bar reads "Oracle Database 11g Release 2 Installer - Installing database - Step 10 of 11". The main window is titled "Install Product" and features a navigation pane on the left with the following steps: Configure Security Updates, Installation Option, Grid Options, Product Languages, Database Edition, Installation Location, Operating System Groups, Prerequisite Checks, Summary, **Install Product** (selected), and Finish.

The main content area is divided into two sections: "Progress" and "Status".

Progress: A progress bar shows 14% completion. Below it, the text reads: "Extracting files to '/u01/app/oracle/product/11.2.0/ora11p'".

Status: A table displays the installation progress:

Task	Status
Oracle Database installation	In Progress
• Prepare	Succeeded
• Copy files	In Progress
• Link binaries	Pending
• Setup files	Pending
Execute Root Scripts for Oracle Database installation	Pending

At the bottom right of the status section, there are buttons for "Details", "Retry", and "Skip".

The bottom of the window features a banner with the Oracle Database 11g logo and the text "Maximum Availability" on the left, and "Eliminate Downtime and Idle Redundancy" on the right. The banner also includes a clock icon and various network-related icons.

At the bottom of the window, there are buttons for "Help", "< Back", "Next >", "Finish", and "Cancel".

Installation – Install database binaries

- Install process (con't)

Oracle Database 11g Release 2 Installer - Installing database - Step 10 of 11

Install Product

Progress: 84%
Building Client Shared Libraries

Status:

➔ Oracle Database installation	In Progress
• Prepare	Succeeded
• Copy files	Succeeded
➔ • Link binaries	In Progress
• Setup files	Pending
Execute Root Scripts for Oracle Database installation	Pending

Buttons: Details, Retry, Skip

Oracle Database 11g
Grid Computing

Consolidate on Fast, Reliable, and Scalable Low-Cost Grids

Buttons: Help, < Back, Next >, Finish, Cancel

Installation – Install database binaries

- Installation nearly finished.. just start „root.sh“ as root on all nodes

Oracle Database 11g Release 2 Installer - Installing database - Step 10 of 11

Install Product

Progress
94%
Saving Cluster Inventory

Status

- ✓ Oracle Database installation
 - ✓ • Prepare
 - ✓ • Copy files
 - ✓ • Link binaries
 - ✓ • Setup files
- ➔ Execute Root Scripts for Oracle Database in

Execute Configuration scripts

The following configuration scripts need to be executed as the "root" user in each cluster node.

Scripts to be executed:

Number	Script Location	Nodes
1	/u01/app/oracle/product/11.2.0/ora11p/root.sh	rac1, rac2

To execute the configuration scripts:

1. Open a terminal window
2. Log in as "root"
3. Run the scripts in each cluster node
4. Return to this window and click "OK" to continue

Buttons: Help, OK, < Back, Next >, Finish, Cancel

Installation – Install database binaries

- root.sh sample output

```
[root@rac2 ~]# /u01/app/oracle/product/11.2.0/ora11p/root.sh
Running Oracle 11g root.sh script...

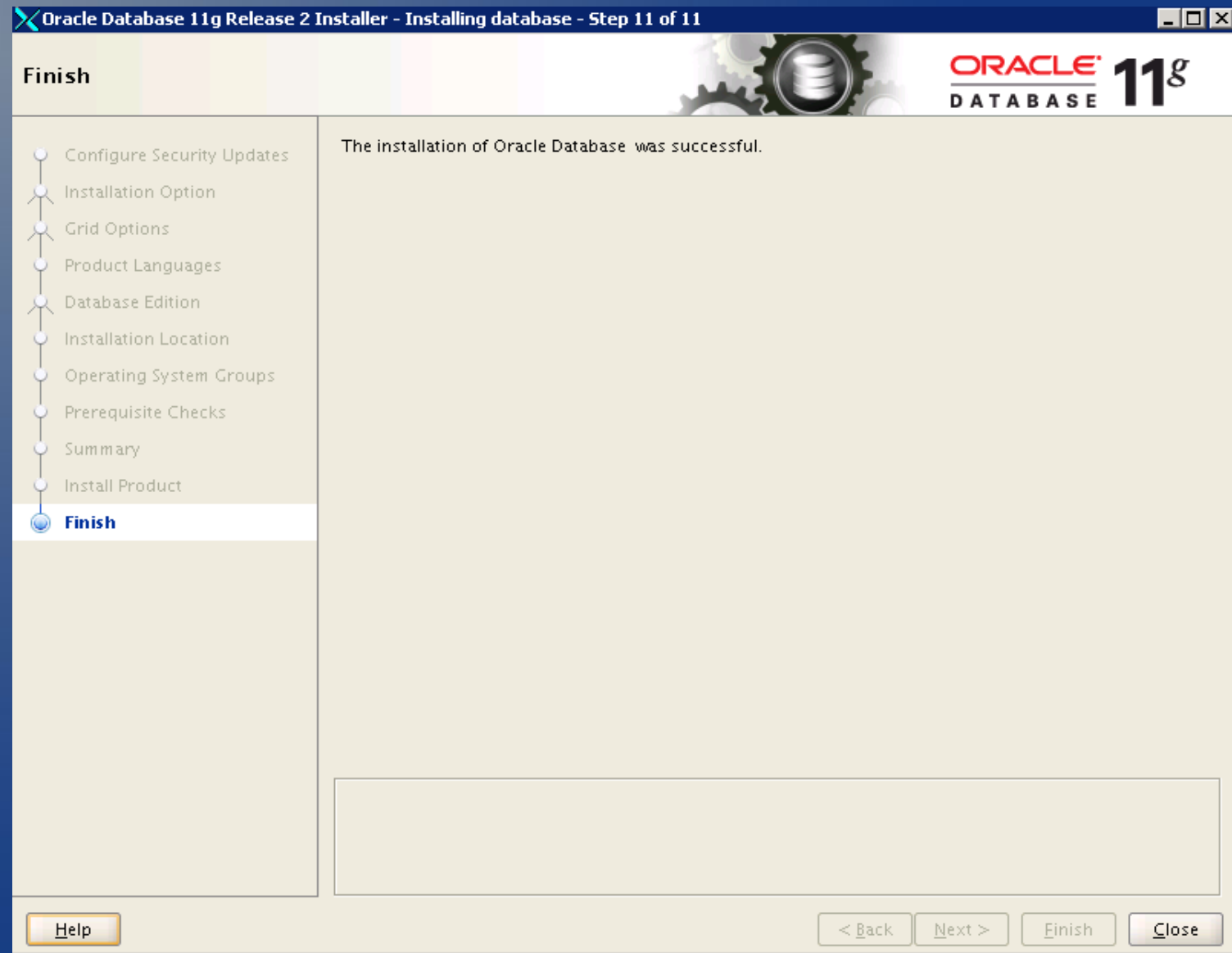
The following environment variables are set as:
  ORACLE_OWNER= ora11p
  ORACLE_HOME=  /u01/app/oracle/product/11.2.0/ora11p

Enter the full pathname of the local bin directory: [/usr/local/bin]:
The file "dbhome" already exists in /usr/local/bin.  Overwrite it? (y/n)
[n]:
The file "oraenv" already exists in /usr/local/bin.  Overwrite it? (y/n)
[n]:
The file "coraenv" already exists in /usr/local/bin.  Overwrite it? (y/n)
[n]:

Entries will be added to the /etc/oratab file as needed by
Database Configuration Assistant when a database is created
Finished running generic part of root.sh script.
Now product-specific root actions will be performed.
Finished product-specific root actions.
[root@rac2 ~]#
```

Installation – Install database binaries

- Finished



Installation – binary installation of grid infra

- Where to go now?
 - We just installed all necessary components for creating our first RAC database → this will be the next chapter
 - Backup current configuration

Part 5 –
Creation of a RAC database

Create a RAC database - Preparations

- Based upon previous chapters (especially grid infrastructure installation, advm/acfs, rac binary installation)
- Oracle database and grid infrastructure binaries are installed
- at least ONE or better two disk groups configured for:
 - database and binary files
 - flash recovery area
- desired database name: ORA11P

Create a RAC database – with dbua

- Preparations

- create directory for cfgtools

```
create /u01/app/oracle/cfgtoollogs  
mkdir -p /u01/app/oracle/cfgtoollogs  
chown root:dba /u01/app/oracle/cfgtoollogs  
chmod 775 /u01/app/oracle/cfgtoollogs
```

Create a RAC database – with dbua

- Preparations

- Check SSH equivalence once again – execute as user „ora11p“ (this is the user holding the oracle database binary installation):

```
/usr/bin/ssh -o FallBackToRsh=no -o PasswordAuthentication=no -o  
StrictHostKeyChecking=yes -o NumberOfPasswordPrompts=0 rac2  
/bin/date
```

```
/usr/bin/ssh -o FallBackToRsh=no -o PasswordAuthentication=no -o  
StrictHostKeyChecking=yes -o NumberOfPasswordPrompts=0 rac1  
/bin/date
```

Both commands should return the current date.

Create a RAC database – with dbua

- Preparations

- If there are errors like „connection refused“, check:

- network connectivity between both nodes
 - does a „normal“ SSH connection works?:

```
ssh root@rac1-priv  
ssh root@rac1  
ssh root@rac2-priv  
ssh root@rac2
```

both commands should prompt for a password

- If commands above prompt for password (they will most likely) something happend to the SSH equivalence configured by the installer

Create a RAC database – with dbua

- Preparations

- here is how to re-enable SSH equivalence:

```
<PATH_TO_DATABASE_INSTALLATION>/sshsetup/sshUserSetup.s  
h -user ora11p -hosts rac1.regner.de rac2.regner.de -shared
```

Arguments:

- user: the name of the user for ssh equivalence to be configured
- hosts: space separated list of node names
- shared: indicates a shared oracle home (on acfs or nfs)

Create a RAC database – with dbua

- Preparations

- add ACFS oracle home to cluster registry

```
$GRID_HOME/bin/srvctl add filesystem -d /dev/asm/ora11p_home-132  
-v ora11p_home -g DATA2 -m /u01/app/oracle/product/11.2.0/ora11p  
-u ora11p
```

Arguments:

-d: path of advm volume

-v: name of volume

-m: mount point path

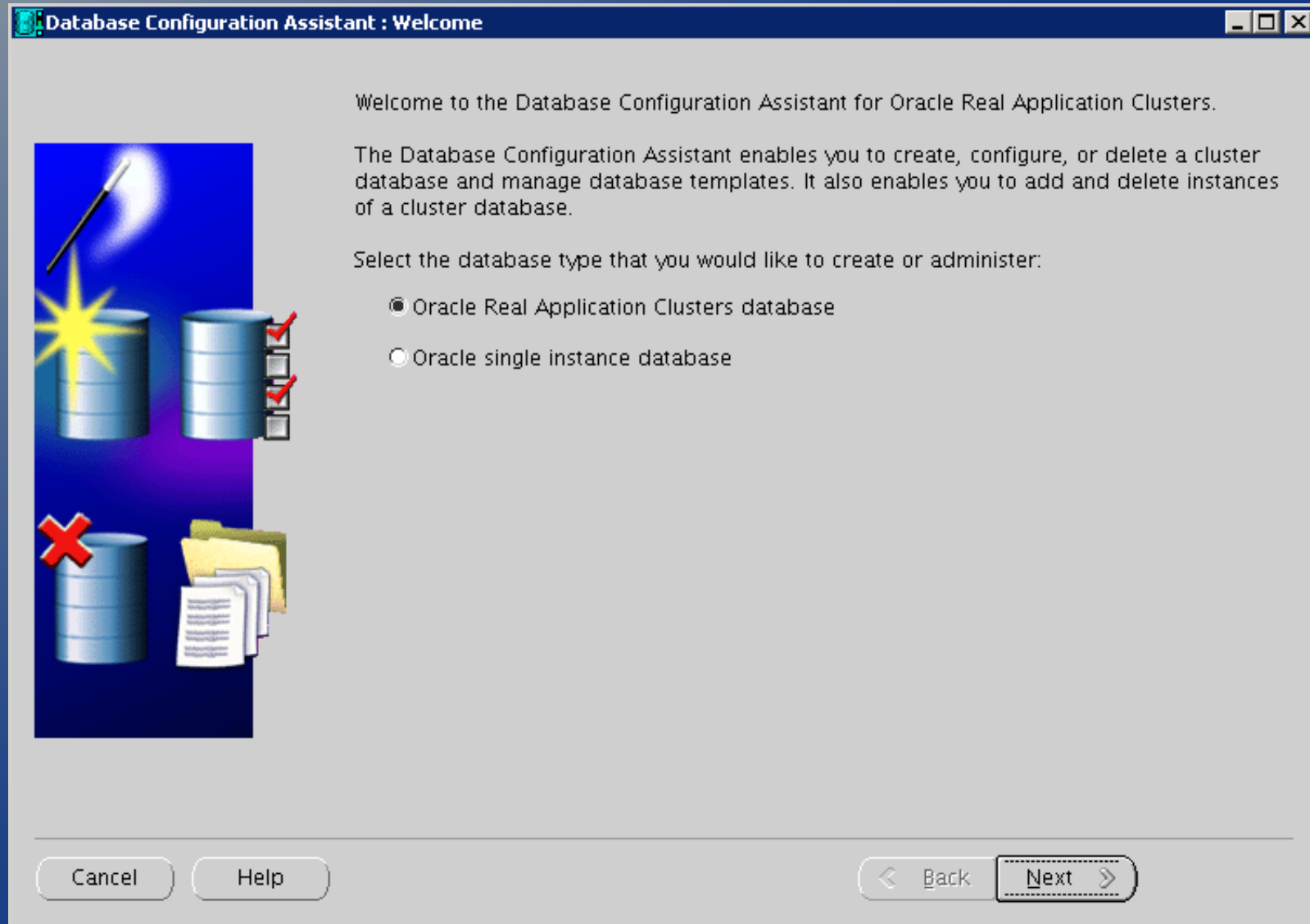
„-u ora11p“ ist important and must match the owner of the database binary installation; else dbca will raise error complaining about missing permissions

Create a RAC database – with dbua

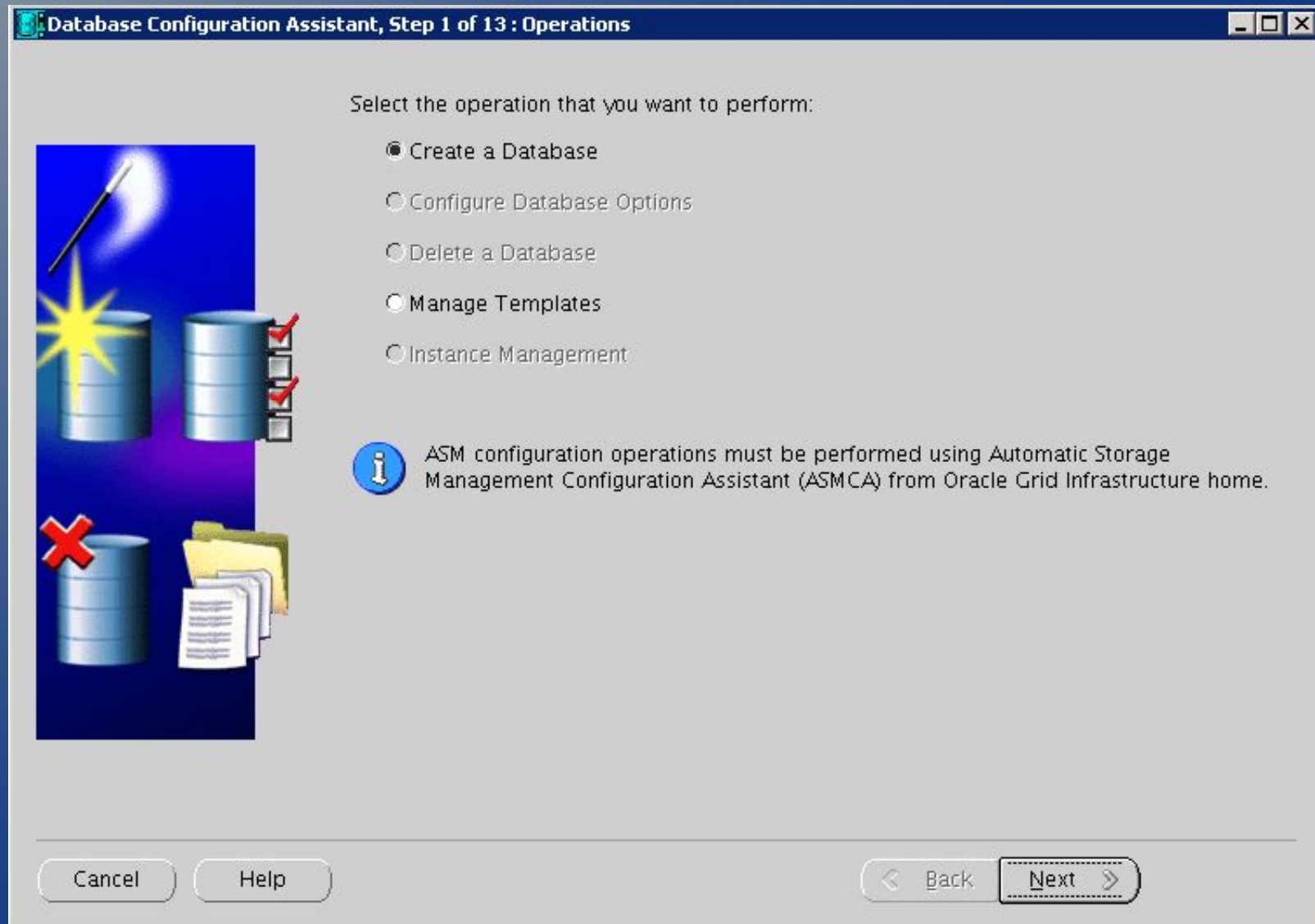
- Start dbca

```
-bash-3.2$  
-bash-3.2$  
-bash-3.2$ export DISPLAY=172.23.0.170:17.0  
-bash-3.2$ $ORACLE_HOME/bin/dbca &
```

Create a RAC database – with dbua




Create a RAC database – with dbua



Create a RAC database – with dbua

Database Configuration Assistant, Step 2 of 14 : Database Templates

Templates that include datafiles contain pre-created databases. They allow you to create a new database in minutes, as opposed to an hour or more. Use templates without datafiles only when necessary, such as when you need to change attributes like block size, which cannot be altered after database creation.



Select	Template	Includes Datafiles
<input type="radio"/>	General Purpose or Transaction Processing	Yes
<input checked="" type="radio"/>	Custom Database	No
<input type="radio"/>	Data Warehouse	Yes

Show Details...

Cancel Help < Back Next >

Create a RAC database – with dbua

Database Configuration Assistant, Step 3 of 13 : Database Identification

Cluster database configuration can be Policy-Managed or Admin-Managed. A Policy-Managed database is dynamic with instances managed automatically based on pools of servers for effective resource utilization. Admin-Managed database results in instances tied to specific servers.

Configuration Type: Admin-Managed Policy-Managed

An Oracle database is uniquely identified by a Global Database Name, typically of the form "name.domain".

Global Database Name:

A database is referenced by an Oracle instance on each cluster database node. Specify a prefix to be used to name the cluster database instances.

SID Prefix:

Select the nodes on which you want to create the cluster database. The local node "rac1" will always be used, whether or not it is selected.

rac1	<input type="button" value="Select All"/> <input type="button" value="Deselect All"/>
rac2	

Create a RAC database – with dbua

Database Configuration Assistant, Step 4 of 12 : Management Options

Enterprise Manager Automatic Maintenance Tasks

Configure Enterprise Manager

Register with Grid Control for centralized management

Management Service:

Configure Database Control for local management

Enable Alert Notifications

Outgoing Mail (SMTP) Server:

Recipient Email Address:

Enable Daily Disk Backup to Recovery Area

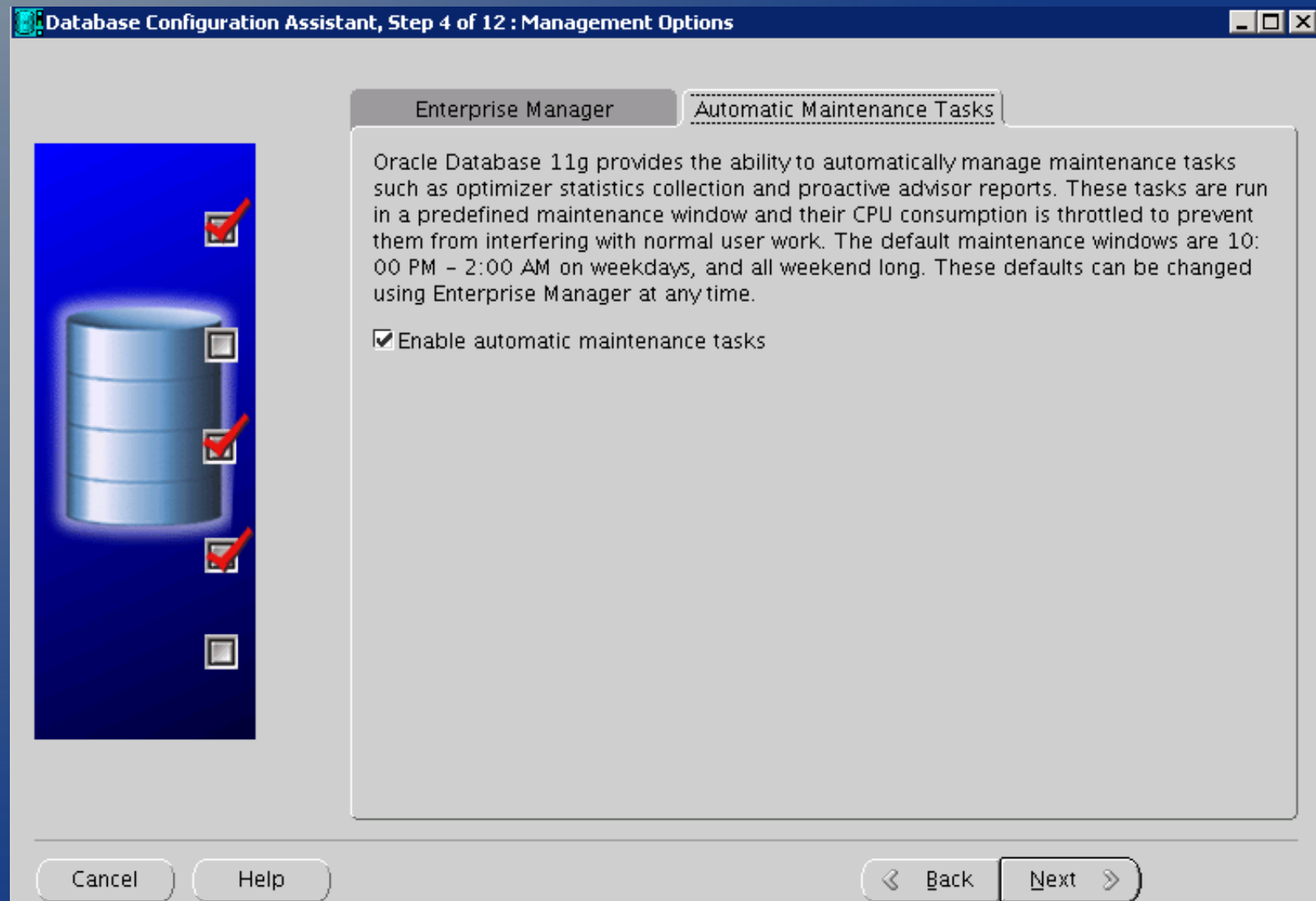
Backup Start Time: AM PM

OS Username:

OS Password:

Cancel Help < Back Next >

Create a RAC database – with dbua



Create a RAC database – with dbua

Database Configuration Assistant, Step 5 of 12 : Database Credentials

For security reasons, you must specify passwords for the following user accounts in the new database.


Use Different Administrative Passwords

User Name	Password	Confirm Password
SYS	***	***
SYSTEM	*****	*****
DBSNMP	*****	*****
SYSMAN	*****	*****

Use the Same Administrative Password for All Accounts

Password:

Confirm Password:



Cancel Help Back Next

Create a RAC database – with dbua

Database Configuration Assistant, Step 6 of 12 : Database File Locations

Specify storage type and locations for database files.


Storage Type:

Storage Locations:

- Use Database File Locations from Template
- Use Common Location for All Database Files
- Use Oracle-Managed Files

Database Files Location:

Database Area:

 If you want to specify different locations for any database files, pick any of the above options except Oracle-Managed Files and use the Storage page later to customize each file location. If you use Oracle-Managed Files, Oracle automatically generates the names for database files, which can not be changed on the Storage page.

Create a RAC database – with dbua

Database Configuration Assistant, Step 6 of 12 : Database File Locations

Specify storage type and locations for database files.

Storage Type: Automatic Storage Management (ASM)

Storage Locations:

Use Database File Locations from Template


Use Common Location for All Database Files

Database Files Location: Browse...

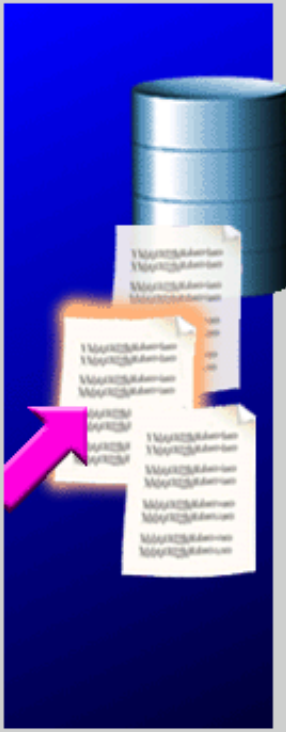
Use Oracle-Managed Files

Database Area: +DATA

Multiplex Redo Logs and Control Files...

 If you want to specify different locations for each file location, you can use Oracle-Managed Files and specify different locations for each file location. If you use Oracle-Managed Files, you can specify the names for database files, which can be different for each file location.

Cancel Help



File Location Variables

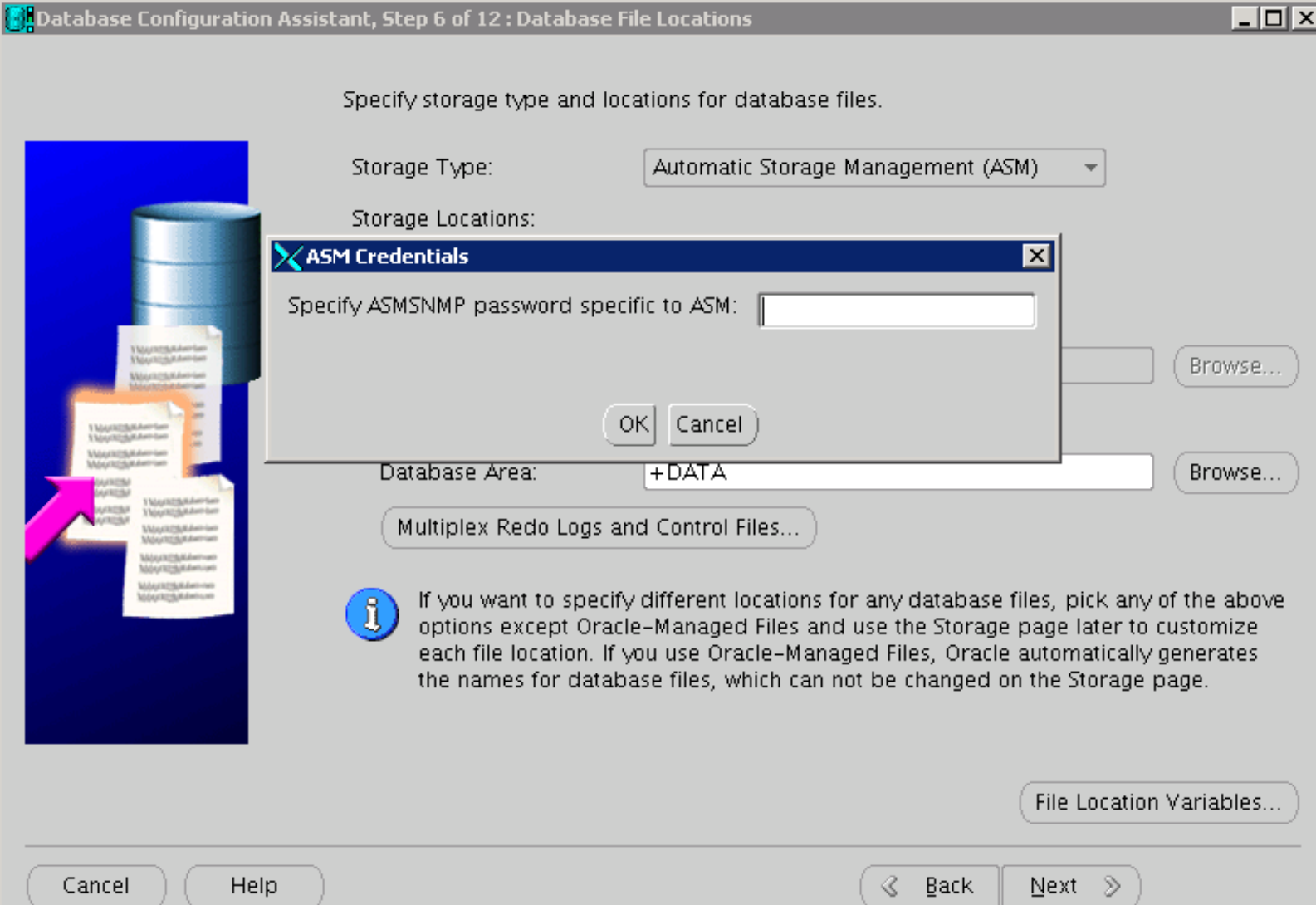
Variables are used to specify parameterized file locations for datafiles, control files, redo logs, and any other files used by database.

For example, a control file may be specified as
`{ORACLE_BASE}/oradata/{DB_NAME}/control01.ctl`

Variable	Value
ORACLE_BASE	/u01/app/oracle
ORACLE_HOME	/u01/app/oracle/product/11.2.0/ora11p
DB_NAME	ora11p
DB_UNIQUE_NAME	ora11p
SID	ora11p

OK Cancel Help

Create a RAC database – with dbua



Database Configuration Assistant, Step 6 of 12 : Database File Locations

Specify storage type and locations for database files.

Storage Type: Automatic Storage Management (ASM)

Storage Locations:

Database Area: +DATA

Multiplex Redo Logs and Control Files...

File Location Variables...

Cancel Help Back Next

ASM Credentials

Specify ASMSNMP password specific to ASM:

OK Cancel

Information: If you want to specify different locations for any database files, pick any of the above options except Oracle-Managed Files and use the Storage page later to customize each file location. If you use Oracle-Managed Files, Oracle automatically generates the names for database files, which can not be changed on the Storage page.

Create a RAC database – with dbua

Database Configuration Assistant, Step 7 of 12 : Recovery Configuration

Choose the recovery options for the database:


Specify Flash Recovery Area

This is used as the default for all disk based backup and recovery operations, and is also required for automatic disk based backup using Enterprise Manager. Oracle recommends that the database files and recovery files be located on physically different disks for data protection and performance.

Flash Recovery Area:

Flash Recovery Area Size:

Enable Archiving



Create a RAC database – with dbua

Database Configuration Assistant, Step 8 of 12 : Database Content

Database Components Custom Scripts

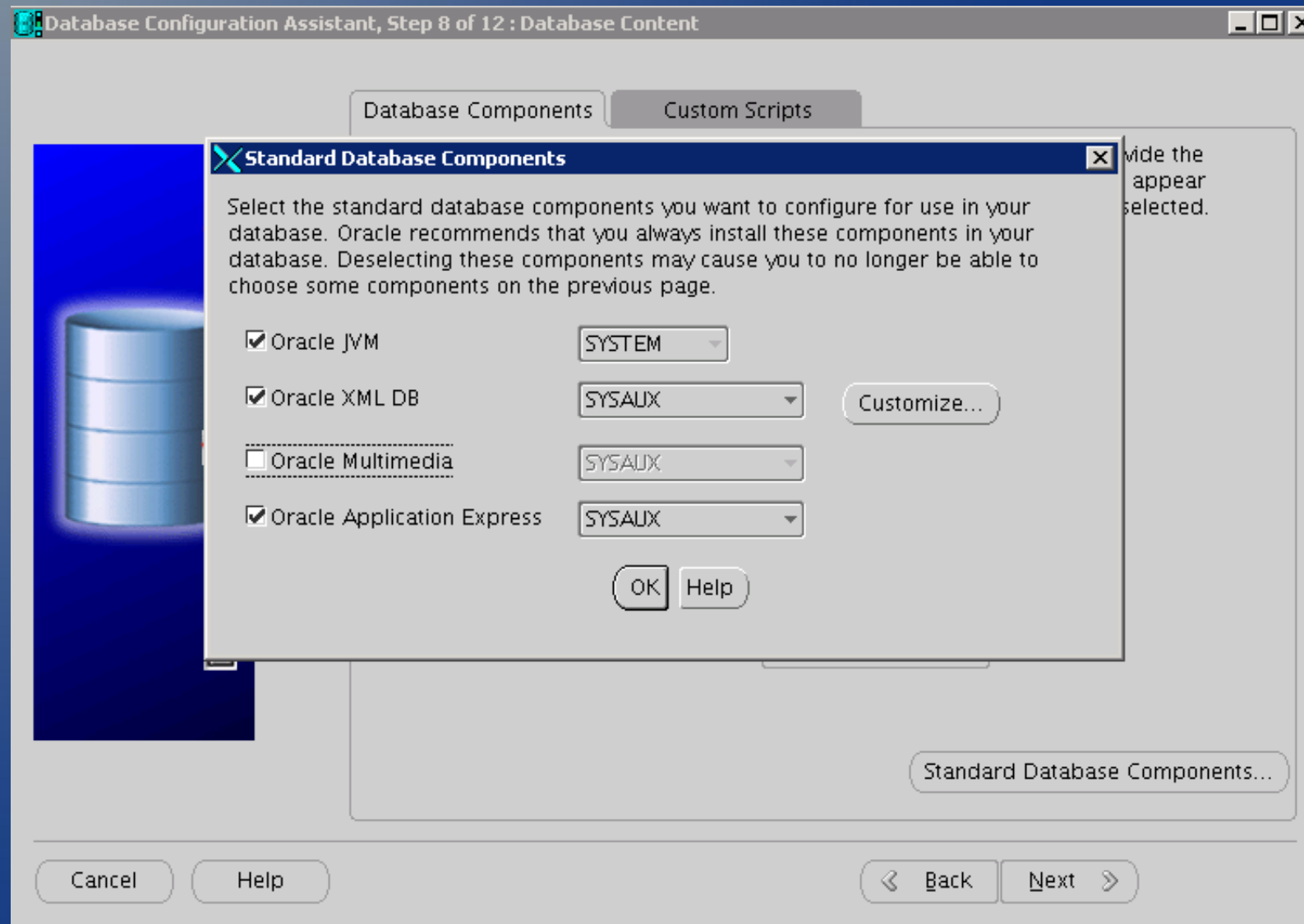
Select the components you want to configure for use in your database. Provide the tablespace in which you want the component to reside. Components which appear disabled are either not installed or depend on components which are not selected.

<input checked="" type="checkbox"/> Oracle Text	SYSAUX
<input type="checkbox"/> Oracle OLAP	SYSAUX
<input type="checkbox"/> Oracle Spatial	SYSAUX
<input type="checkbox"/> Oracle Label Security	SYSTEM
<input type="checkbox"/> Sample Schemas	SYSAUX
<input checked="" type="checkbox"/> Enterprise Manager Repository	SYSAUX
<input type="checkbox"/> Oracle Warehouse Builder	SYSAUX
<input type="checkbox"/> Oracle Database Vault	SYSAUX

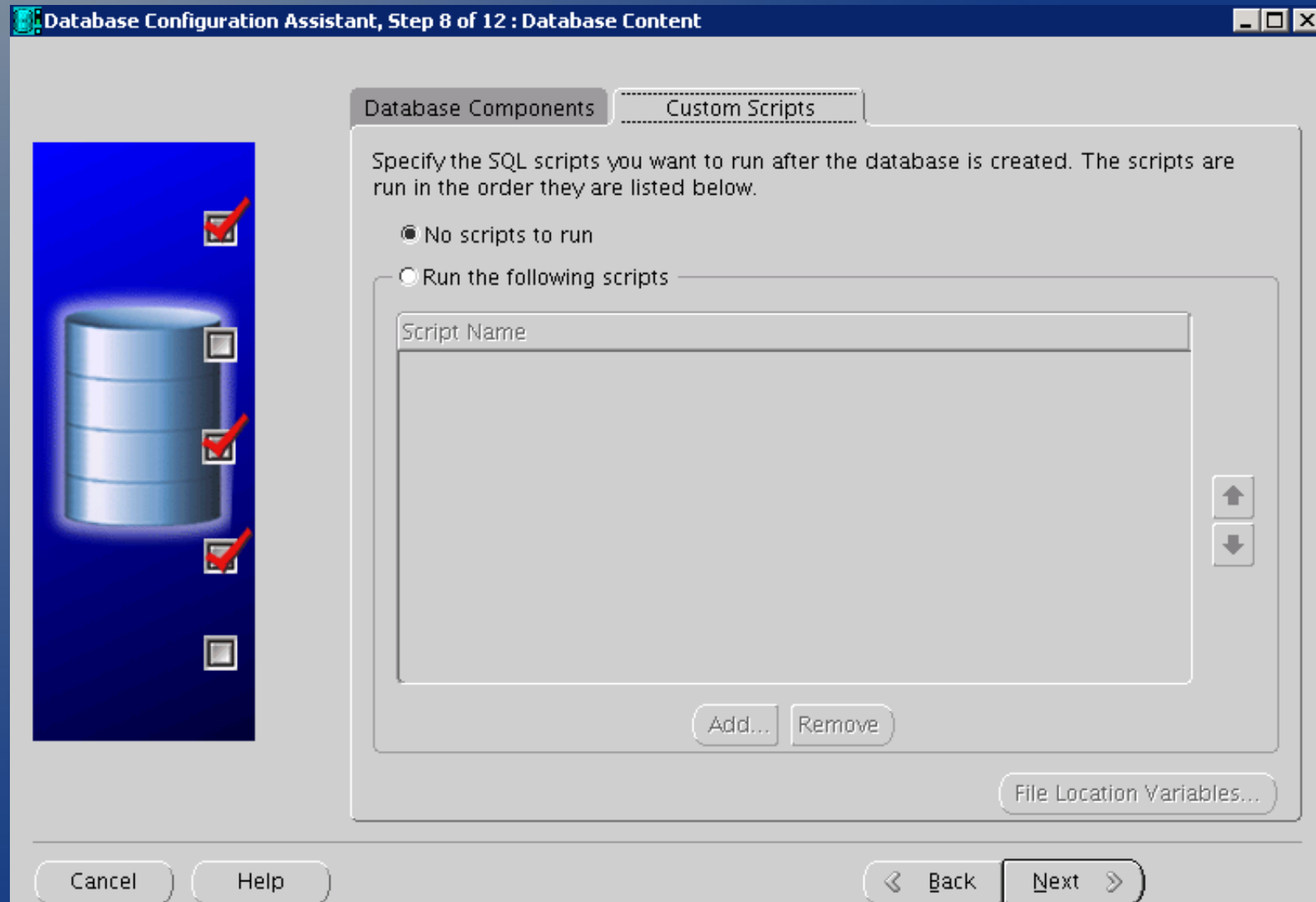
Standard Database Components...

Cancel Help < Back Next >

Create a RAC database – with dbua



Create a RAC database – with dbua



Create a RAC database – with dbua

Database Configuration Assistant, Step 9 of 11 : Initialization Parameters

Memory | Sizing | Character Sets | Connection Mode

Typical

Memory Size (SGA and PGA): MB

Percentage: 40 % 490 MB 3772 MB

Use Automatic Memory Management [Show Memory Distribution...](#)

Custom

Memory Management:


SGA Size: M Bytes

PGA Size: M Bytes

Total Memory for Oracle: 1508 M Bytes

[All Initialization Parameters...](#)

Cancel Help [Back](#) [Next](#)



Create a RAC database – with dbua

Database Configuration Assistant, Step 10 of 11 : Database Storage

Storage

- Controlfile
- Tablespaces
- Datafiles
- Redo Log Groups

Database Storage

From the **Database Storage** page, you can specify storage parameters for database creation. This page displays a tree listing and summary view (multi-column lists) to enable you to change and view the following objects:

- Control files
- Tablespaces
- Datafiles
- Rollback Segments
- Redo Log Groups

From any object type folder, click **Create** to create a new object. To delete an object, select the specific object from within the object type folder and click **Delete**.

Important: If you select a database template including data files, then you will not be able to add or remove data files, tablespaces, or rollback segments. Selecting this type of template enables you to change the following:

- Destination of the datafiles
- Control files or log groups.

For more information, refer to the *Oracle Database Storage Administrator's Guide*.

Create Delete File Location Variables...

Cancel Help Back Next

Create a RAC database – with dbua

Database Configuration Assistant, Step 11 of 11 : Creation Options

Select the database creation options:

- Create Database
- Save as a Database Template


Name:

Description:

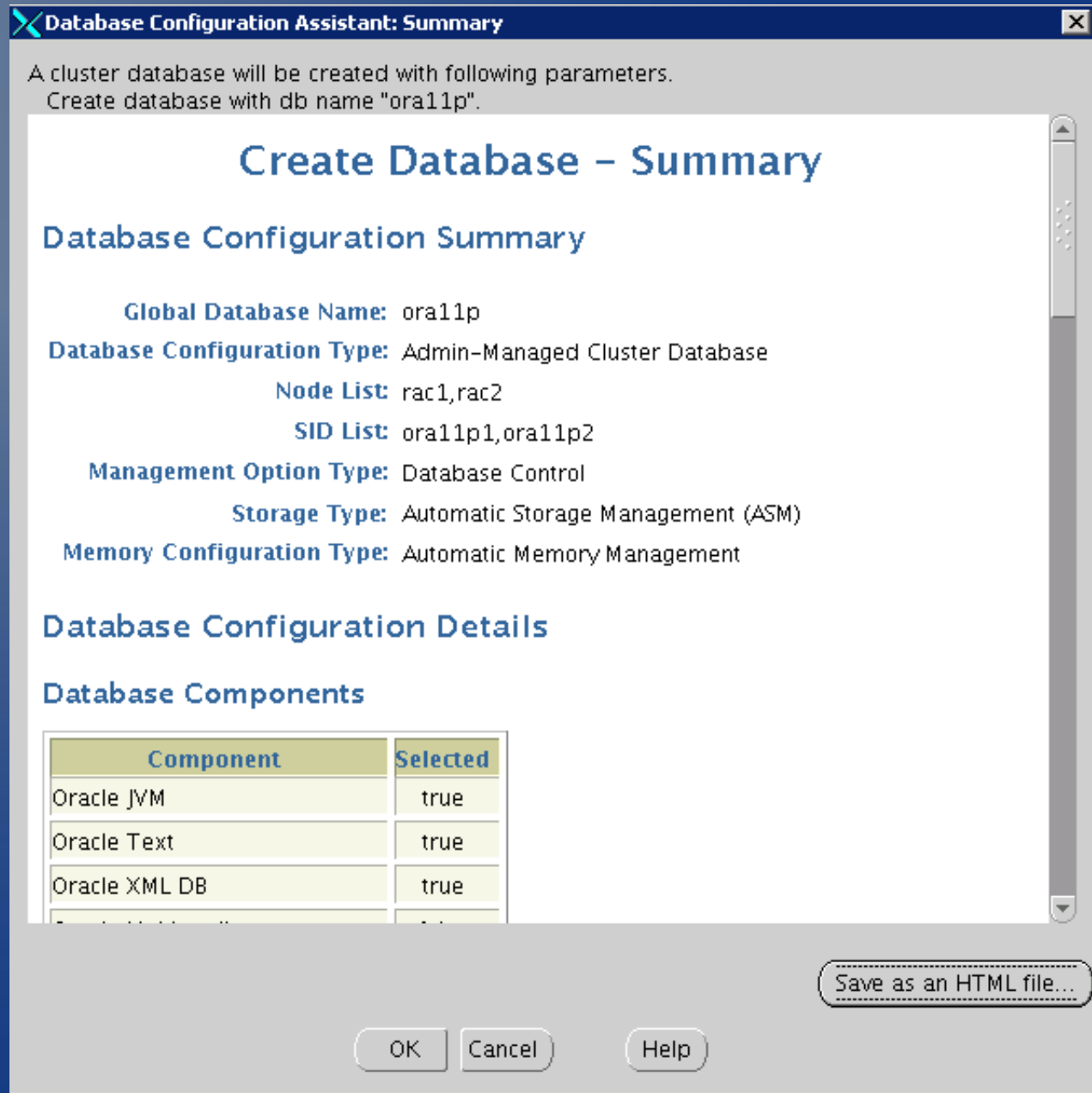
- Generate Database Creation Scripts

Destination Directory:

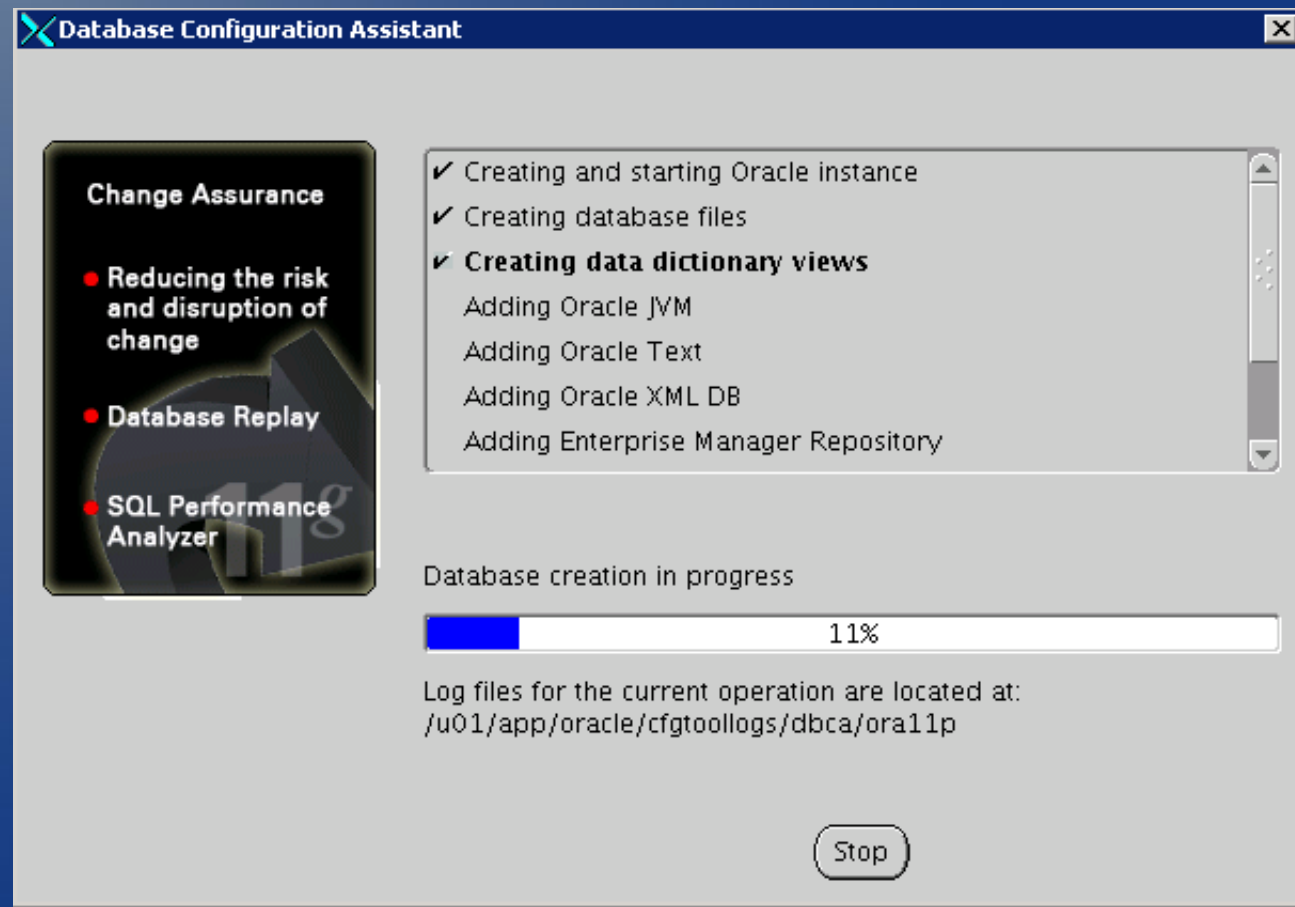
Cancel Help Back Next Finish



Create a RAC database – with dbua

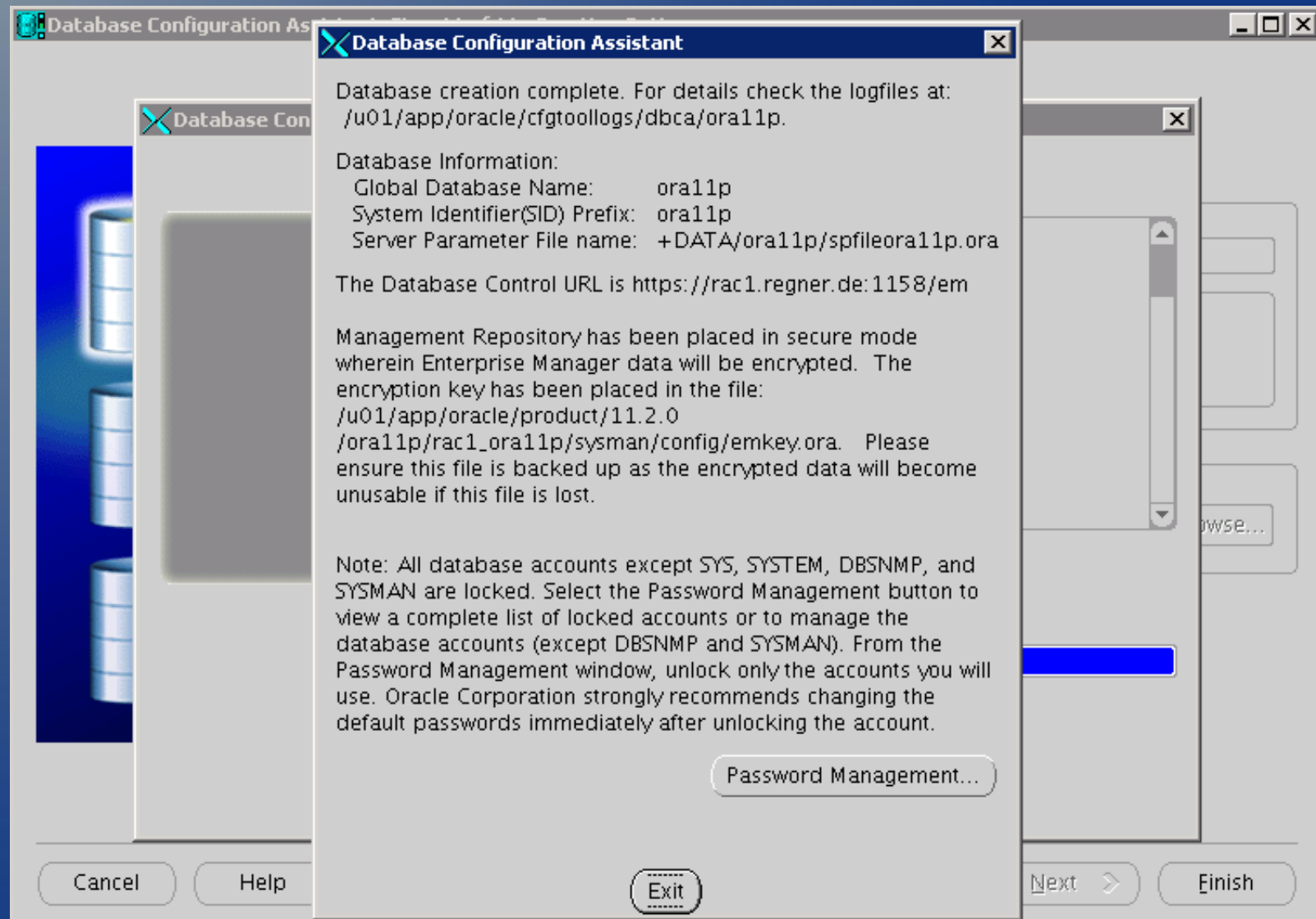


Create a RAC database – with dbua



Create a RAC database – with dbua

- Done!



Create a RAC database – with dbua

- Where to go now?
 - Tune Instance, for instance:
 - memory_target
 - db_writer_processes
 - sessions parameter
 - ...

Appendix

Sources

- General documentation

- Oracle Database 11g R2 book index

<http://www.oracle.com/pls/db112/homepage>

- Database Installation Guide for Linux

http://download.oracle.com/docs/cd/E11882_01/install.112/e10840/toc.htm

- Downloads

- ASM (asmlib and kernel modules)

<http://www.oracle.com/technology/tech/linux/asmlib/index.html>

Note: If you do not have access to the unbreakable linux update repository you can take the RPMs for Red Hat Enterprise Server 5... just make sure it matches your kernel version!

- Oracle Enterprise Linux (OEL)

<http://edelivery.oracle.com/linux>

Further questions?

Suggestions?

Comments?

Need help?

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