
ENHANCING MANAGEABILITY WITH ORACLE10^G ENTERPRISE MANAGER GRID CONTROL

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A Technical White Paper

EXECUTIVE OVERVIEW

Enterprise Management of database and Information Technology infrastructure targets, in general, has normally been congruent with the usage of many different monitoring, capacity planning and administration tools. However, the level of integration among these tools is constrained by many different factors, such as, for instance an unsupported data communications protocol, an isolation layer such as Virtual Private Network (VPN) or firewall, a virtualization layer, or an authentication on service or application provisioning security issue. As a result, Grid Computing emerges as a new technology, which can integrate, simplify, and make manageability be the driving criteria to enhance operational effectiveness and performance. This document also briefly analyzes important considerations concerning technology benefits on the basis of forecasted Return on Investment (ROI) as some important research studies have shown [3].

INTRODUCTION

The Grid Computing Enterprise Management initiative starts right from the original grid layout and installation. Therefore, this document will first contemplate installation process options and core Oracle10g Grid Computing concepts, architecture and functionality.

This document is intended to accomplish the following key objectives, namely:

- ⇒ To provide a consistent and concise set of instructions to approach the Oracle10g Enterprise Manager Grid Control installation specific to the information technology environment.
- ⇒ To enhance enterprise resource planning and management consistently via Oracle10g growth to achieve 24/7 reliability, manageability and benchmark-shattering performance.
- ⇒ To anticipate a solution for short and long-term enterprise management of database, application servers, portals, applications, middleware, and other IT resources with a dynamic 24/7 approach, which also comprehends IT technology in networking, media, wireless technology, and future applications upgrades among others.

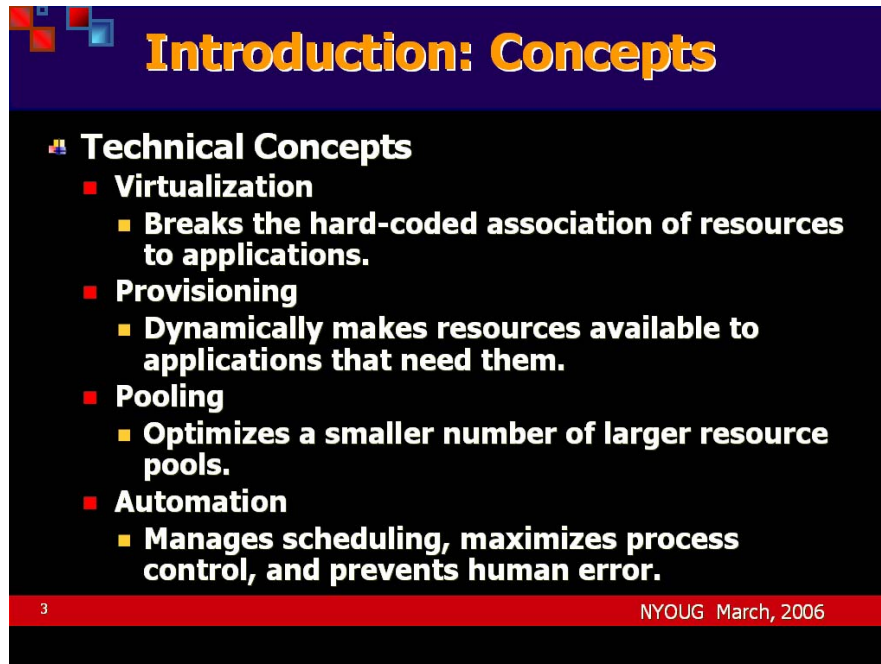
Understanding how Oracle10g Grid Computing works means to comprehend core aspects of its infrastructure, application, and information components architecture and functionality. The key concepts that build Grid Computing are virtualization and provisioning [2], [4]. The former concept, virtualization, means that accessibility and usability of core tenets are transparent to Grid users at any level, both valuable at the high-end administrative level and low-end user's level, via a thin client browser interface, while the latter —namely, provisioning [4]— conveys the functionality and services provided transparently over the grid architecture.

Thus, installing Oracle10g Enterprise Manager Grid Control could become a rather tricky task if not all pre-requisites are met prior to installation. Besides, there are a few of constraints that could result in installation bottlenecks past the repository database creation, which are either recommended or required installation components.

Therefore, the Oracle10g Grid Control shows a middleware infrastructure that utilizes utilities such as `emctl` to control the Oracle Management Server and the Oracle Intelligent Agent, `opmnctl` to control the messaging notification processes, and the `dcmctl` which enables the management the RAC cluster [6] components, and requires the DCM schema to be installed in each node involved.

From the business perspective related DBA, J2EE, SOA, Portal, and Application Services career path involvement, employee efficiency can be enhanced by systematically spanning on control, support, accountability, and influence, as highlighted by Harvard University Professor Robert Simmons in his “four spans view” [7][8]. Oracle10g Grid Control critically and consistently emphasizes manageability and

accountability as a key effectiveness outcome to career success in this remarkably useful paradigm.




Introduction: Concepts

- **Technical Concepts**
 - **Virtualization**
 - Breaks the hard-coded association of resources to applications.
 - **Provisioning**
 - Dynamically makes resources available to applications that need them.
 - **Pooling**
 - Optimizes a smaller number of larger resource pools.
 - **Automation**
 - Manages scheduling, maximizes process control, and prevents human error.

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Exhibit 1. Technical Concepts .



Introduction: Concepts

- **Business Concepts**
 - Integrate
 - Standardize
 - Automate
- **Business Outcome**
 - Increased Manageability
 - Optimized benchmarking performance
 - Maximum Reliability

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Exhibit 2. Business Concepts.

STEP-BY-STEP INSTALLATION PROCESS

PRE-REQUISITES AND OTHER RELEVANT REQUIREMENTS

In preparation for the Oracle10g installation, capacity planning, and overall configuration and settings, the following list includes a set of pre-requisites and requirements necessary to perform a successful Oracle10g Enterprise Manager Grid Control installation, which consistently estimates the initial capacity and future grid growth:

HARDWARE REQUIREMENTS

Component	Hard Disk Space Requirements	Operating Memory and CPU Requirements
Management Repository	1 GB of hard disk space for the Management Repository should be enough for small environments with fewer than 25 managed targets. This requirement grows as the number of targets increases. The Management Repository tablespaces involve the MGMT_TABLESPACE (20 MB) and the MGMT_ECM_DEPOT_TS (100MB).	For a reasonably sized enterprise of around 500 targets, the <i>minimum</i> operating memory required for the repository node is 1 GB; the <i>recommended</i> size is 2 GB. Improved performance can be achieved with a larger repository.
Management Service	At least 1.4 GB of initial disk space is required for Solaris; at least 500 MB for Windows.	For the host running the Management Service, the minimum memory recommended is 1 GB. The minimum processor speed for the host is 1 GHz. For each additional Management Service, another 0.5 GHz is recommended.
Management Agent	At least 350 MB of initial disk space is required for Solaris; at least 270 MB for Windows. Allocate an additional 50MB for logging, tracing, and temporary storage.	The Management Agent requires approximately 20 MB of operating memory to monitor a database, and more to monitor an Application Server. This requirement increases as the number of targets monitored increases.
Application Server Core	Approximately 500 MB of initial disk space is required.	For the host running the Application Server Core, the minimum memory recommended is 512 MB.

Table 1. Oracle10g Grid Control Installation options and Related Requirements

SOFTWARE REQUIREMENTS

The following are required software components, namely:

The Management Server will require an Oracle9i or later (Oracle10g) database instance for the creation and holding of the Management Repository. The following database versions are supported, namely:

- ⇒ Operating System Configuration¹
- ⇒ Oracle 10g Database Release 1 (10.1.0.3 or higher), Enterprise Edition, e.g., Oracle 10g Database Release 2 (10.2.0), Enterprise Edition²
- ⇒ Oracle 10g Real Application Clusters Database Release 1 (10.1.0.3 or higher)
- ⇒ Oracle9i Database Release 2 (9.2.0.4 or higher), Enterprise Edition
- ⇒ Oracle9i Real Application Clusters Database Release 2 (9.2.0.4 or higher)

And the embedded Oracle9i Database Release 1 (9.0.1.5), Enterprise Edition, is supported for Management Repository creation, and provided with a version of the Oracle10g Enterprise Manager Grid Control software.

The versions 8 and 9 of the Solaris operating system are certified as both SPARC 32-bit and SPARC 64-bit types.

PATCHES

When started, Oracle10g Enterprise Manager verifies that all required Solaris components are installed. If a required library is missing, Solaris could automatically stop the installation process. The list of required patches is discussed in a later session.

Solaris9

The following patches³ are recommended in Solaris:

108652-66
108921-16
108940-53
108773-18
111310-01
109147-24
111308-03
111111-03
112396-02
110386-03
111023-02
108987-13
108528-21
108989-02
108993-18

Table 2. Solaris9 Required Patches

¹ This document covers the Solaris9 recommended configuration.

² Best compatibility with latest Oracle Enterprise Manager Grid Control 10.0.3

³ Solaris required patches are updated periodically as needed and reported by Oracle via Metalink.

Solaris8

Patch 112138-01 is only needed for Solaris 8, but it may be listed as a missing patch for Solaris 9 when the patch verification script runs, which should be disregarded.

KERNEL PARAMETERS

The following is a sample configuration for system Kernel parameters, in congruency with Oracle requirements and as allowed by the hardware and OS Platform version.

Kernel Parameter Name	Value
set shmsys:shminfo_shmmax	4294967295
set shmsys:shminfo_shmmin	1 **
set shmsys:shminfo_shmmni	100 *
set shmsys:shminfo_shmseg	40 *
set semsys:seminfo_semmni	100 *
set semsys:seminfo_semmsl	512 *
set semsys:seminfo_semmnu	30 *
set semsys:seminfo_semmap	200 *
set semsys:seminfo_semume	10 *
set semsys:seminfo_semmns	8192 *
set semsys:seminfo_semopm	100 *
set semsys:seminfo_semvmx	32767
set msgsys:msginfo_msgmap	2048
set msgsys:msginfo_msgmax	65536
set msgsys:msginfo_msgmni	1024
set msgsys:msginfo_msgtql	1024
set msgsys:msginfo_msgmnb	65536
set msgsys:msginfo_msgmni	1024
set msgsys:msginfo_msgtql	1024

Table 3. List of Basic Recommended values for required pre-set Solaris Kernel Parameters⁴.

* Recommended parameters settings are marked with a star.

⁴ These values are subject to adjustments based on environment-specific constraints and requirements.

REQUIRED FILE SYSTEM SUPPORTING ORACLE OFA ARCHITECTURE

It is necessary to configure the appropriate environment variables, as discussed, in the next session.

PRE-INSTALLATION TASKS

ENVIRONMENT VARIABLE SETTINGS

Configure the following environment variables as follows, namely:

VARIABLE NAME	DESCRIPTION OR VALUE
ORACLE_SID	The database System Identified to be used by the Management Repository instance
ORACLE_HOME	The path to the Oracle Home directory
ORACLE_BASE	The directory containing the Oracle Home
TMPDIR	/tmp
TMP	/tmp
LD_LIBRARY_PATH	See example
JAVA_HOME	The directory path to your JVM.
TNS_ADMIN	The Oracle net services administrative directory
PATH	The path to binary files.

Table 4. List of Required Environment Variables.

The following *.profile* Solaris configuration file shows the current configuration file used by the corporate Oracle10g Grid Control Server running from the Oracle10g Grid Control server, hypothetically named, emadn1, as follows:


```

#      This is the default standard profile provided to a user.
#      They are expected to edit it to meet their own needs.
#      ...
#      ...
MAIL=/usr/mail/${LOGNAME:?}
ORACLE_BASE=/u01/app/oracle/product/10.2.0
ORACLE_HOME=/u01/app/oracle/product/10.2.0/emadn1
JAVA_HOME=/u01/app/oracle/product/10.2.0/emadn1/jdk
PATH=/usr/bin:/usr/sbin:/u01/app/oracle/product/10.2.0/emadn1/bin: \
/u01/app/oracle/product/10.2.0/emadn1/opmn/bin:

LD_LIBRARY_PATH=/usr/lib:/u01/app/oracle/product/10.2.0/emadn1/lib: \
/u01/app/oracle/product/10.2.0/emadn1/jdk/bin/java: \
/u01/app/oracle/product/10.2.0/emadn1/lib: \
/u01/app/oracle/product/10.2.0/emadn1/jdk/lib: \
/u01/app/oracle/product/10.2.0/emadn1/jdk/lib/jre/lib: \
/u01/app/oracle/product/10.2.0/emadn1/lib: \
/u01/app/oracle/product/10.2.0/emadn1/network/lib: \
/u01/app/oracle/product/10.2.0/emadn1/lib/em.ear: \
/u01/app/oracle/product/10.2.0/emadn1/webcache/examples: \
/u01/app/oracle/product/10.2.0/emadn1/JRE/lib: \
/u01/app/oracle/product/10.2.0/emadn1/j2ee:/usr/java/jre/lib: \
/u01/app/oracle/product/10.2.0/emadn1/j2ee/lib:.

CLASSPATH=/u01/app/oracle/product/10.2.0/emadn1/ifs/ememadn1/lib/ifs_jwf.jar: \
lib/ojsp.jar,lib/classgen.jar,ds/lib/ds.jar,ds/lib/dsgw.jar: \
rdbms/jlib/jmscommon.jar:j2ee/home/ldap.jar:lib/ojsputil.jar: \
lib/oracle.xsql.jar:jlib/providerutil.jar:jlib/regexp.jar: \
syndication/lib/syndserver.jar,lib/xschema.jar,rdbms/jlib/xsul2.jar: \
portal/jlib/pdkjava.jar:portal/jlib/ptlshare.jar:jlib/share.jar: \
jlib/uix2.jar:jlib/ohw.jar:network/jlib/netcfg4eml2.jar:oui/jlib/OraInstaller.jar: \
/u01/app/oracle/product/10.2.0/emadn1/j2ee/*.zip,*.jar: \
/u01/app/oracle/product/10.2.0/emadn1/sysman/jlib/log4j-core.jar: \
/u01/app/oracle/product/10.2.0/emadn1/jdk/javavm/lib/*.zip,*.jar: \
/u01/app/oracle/product/10.2.0/emadn1/jlib/*.zip,*.jar: \
/u01/app/oracle/product/10.2.0/emadn1/jdbc/lib/*.jar,*.zip: \
/u01/app/oracle/product/10.2.0/emadn1/j2ee/home/*.jar,*.zip:.
JRE_LIBHOME=/u01/app/oracle/product/10.2.0/emadn1/jdk/jre/lib
JRE_LIB=/u01/app/oracle/product/10.2.0/emadn1/jdk/jre/lib
JRE_BIN=/u01/app/oracle/product/10.2.0/emadn1/jdk/jre/bin
JDK_HOME=/u01/app/oracle/product/10.2.0/emadn1/jdk
EM_REPOS_DBSYSPWD=$SYSPWD_ID
EM_REPOS_PWD=$REPOSPWD_ID
TMP=/tmp
TMPDIR=/tmp
ORACLE_SID=emadn1
TNS_ADMIN=/u01/app/oracle/product/10.2.0/emadn1/network/admin
export ORACLE_HOME ORACLE_BASE PATH LD_LIBRARY_PATH MAIL JAVA_HOME \
CLASSPATH JRE_LIBHOME JRE_LIB JRE_BIN JDK_HOME ORACLE_SID TMP TMPDIR \
EM_REPOS_PWD EM_REPOS_DBSYSPWD TNS_ADMIN

```

Exhibit 3. Sample .profile settings for host holding the Oracle10g Grid Control Server.

OTHER PRE-INSTALLATION CONSIDERATIONS

Browser Certifications for Grid Control

Operating System	Browser	Version
Solaris	Netscape Navigator	7.0.1, 7.1.0
Windows	Netscape Navigator	4.78, 4.79, 7.0.1, 7.1.0
	Microsoft Internet Explorer	5.5 (Service Pack 1); 6.0 (Service Pack 1)
Linux	Mozilla	1.3.1
Microsoft Pocket PC	Pocket Internet Explorer	2.0 (for HTTP), 3.0 (for HTTPS)

Table 5. Browser Certification Product Matrix.

Certified Oracle Targets

Supported Targets	Version
Oracle Application Server	9.0.2.x 9.0.3.x 9.0.4.x
Supported Targets	Version
Oracle Database, Listener	8.1.7.4 9.0.1.5 and higher 9.2.0.4 and higher 10.1.0.2 and higher 10.0.2.1 and higher
Oracle Real Application Clusters Database	9.2.0.4 and higher 10.1.0.2 and higher
Oracle Collaboration Suite	Release 1 (9.0.3.x) Release 2 (9.0.4.x)
Management Services and Repository	10.1.0.3 /10.2.0.1
Management Agent	10.1.0.2 and higher
Enterprise Manager Website	10.1.0.3 /10.2.0.1
Host	All supported platforms.

Table 6. Oracle Target Certification Matrix by Version.

INSTALLATION TASKS

The following table lists and describes the set of installation types that can be performed through this software.

1. Locate the installation directory, and move under the Disk1 subdirectory.
2. List the runInstaller executable file.
3. Type runInstaller and hit enter⁵.
4. Verify that the XML product installation file is products.xml.
5. Enter the name of your desirable Oracle Home.
6. Enter the location for your new Oracle Home, where the product software will be installed.
7. Click Next.

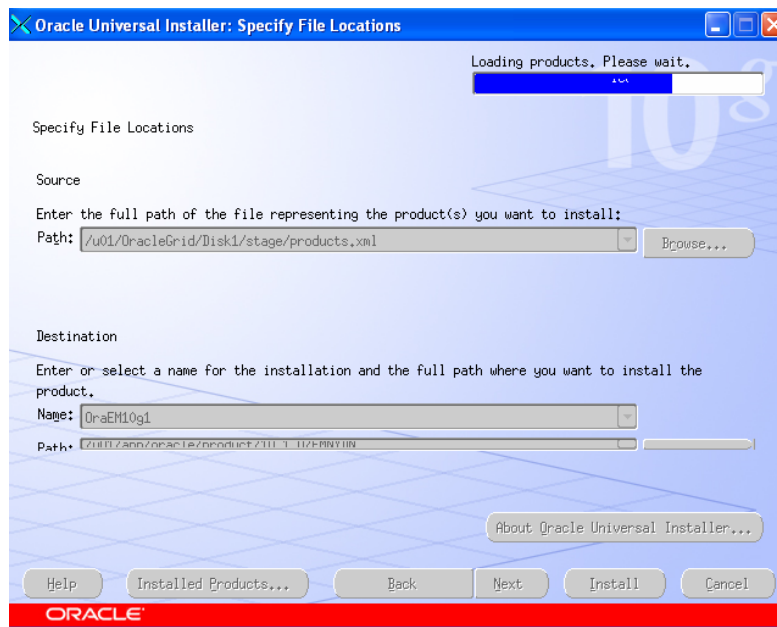


Exhibit 4. Oracle10g Enterprise Manager Home Settings and Products Load Progress Bar.

8. Decide whether the database holding the repository will either be a new database or the repository will be installed in an existing database, by making the relevant selection as shown below⁶.

⁵ You must use the runInstaller executable right below the Disk1 directory. Using other runInstaller executable in the disk, such as the one in the Disk1/install subdirectory could possibly result in a run time failure once the database repository is created, and while installing one of the two control utilities, namely, dcmctl and opmnctl. This is a know bug in the installation software. The error is caused by a failure to have permission to access to a file previously generated.

⁶ When installing Oracle10g Enterprise Manager Grid Control on an existing database, there is a need to make some adjustments, such as, namely: a) disabling dispatchers; b) Disabling the GATHER_STATS_JOB with DBMS_SCHEDULER, i.e., by running DBMS_SCHEDULER.disable('gather_stats_job',true); c) Resizing certain memory structures, such as setting the SHARED_POOL_SIZE to at least 160M, AQ_TM_PROCESSES=1, and SESSION_CACHED_CURSORS=200, among others. If TNS_ADMIN is set, the installer may ask you to rename the tnsnames.ora file while performing the installation.

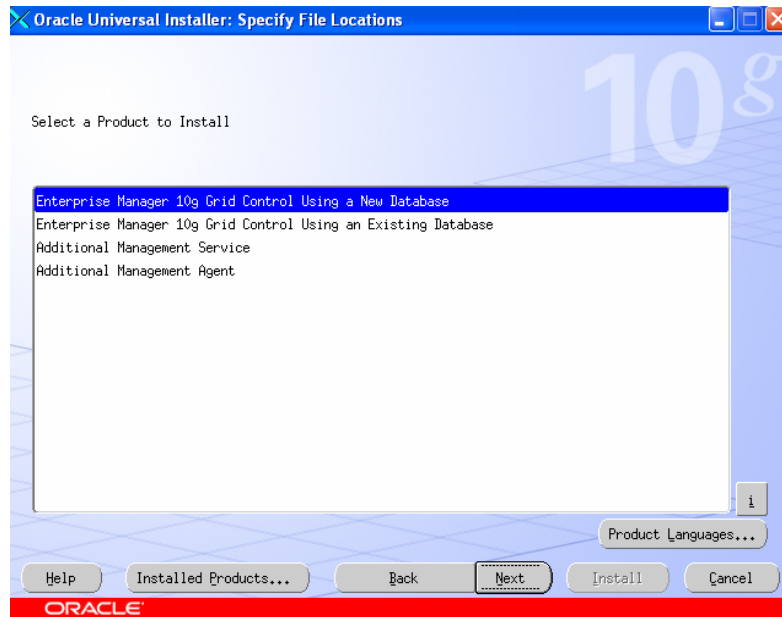


Exhibit 5. Selecting Oracle10g Grid Control Installation on a new database

9. Enter the SID name for the database holding the Oracle10g Grid Enterprise Manager Repository.
10. Enter the port number associated with the Oracle10g Enterprise Manager Grid Control http listener. This Apache listening port defaults to 4889 in most installations.
11. Monitor the installation for every component installed.
12. When installing on an existing database the DBA needs to enter a TNS connective string or a JDBC URL identifying the remote database. There is also a previous need to ensure that the SYSMAN user and schema do not exist in the database instance used, from a previous Oracle Enterprise version, since the Oracle10g Grid Control installation will fail.
13. When completing the server installation, you are required to configure the Oracle Intelligent Agent.
14. The installer will then automatically configure all other services including Oracle Process Monitor Notification, the RAC services DCM Control, the Oracle Management Services, and once the creation of the database is completed it will also automatically create the Oracle Management Server repository.

Enterprise Manager 10g Grid Control Using a New Database	Installs Enterprise Manager Grid Control onto the host machine, creating the Management Repository on a new Enterprise Edition Oracle9i/Database Release 1 (9.0.1.5).	3.9 GB (Solaris) 2.4 GB (Win)	1024 MB
Enterprise Manager 10g Grid Control Using an Existing Database	Installs Enterprise Manager Grid Control onto the host machine, creating the Management Repository on a qualified existing database, which may be local to the host or remote. Note: If the repository is on the same machine as the host, allow for an extra 1 GB of memory.	1.75 GB (Solaris) 770 MB (Win)	512 MB
Additional Management Service	Installs Enterprise Manager Grid Control, without the Management Repository, onto the host machine. Allows you to specify an existing Management Repository, either local or remote.	1.75 GB (Solaris) 770 MB (Win)	512 MB
Additional Management Agent	Installs the Management Agent on the target machine you want to monitor with the Grid Control Console.	350 MB (Solaris) 270 MB (Win)	No minimum

Table 7. Selecting Oracle10g Grid Control Installation type on a new database

POST-INSTALLATION TASKS

Once installation is completed, you need to perform the configuration of additional management agent for each node to be added to the grid. A separate document has been prepared for this purpose. Perform the additional agent installation locally at each node to be added to the grid.

Ensure that the following process report a successful state:

```
opmnctl status all
```

```

xterm
Sun Microsystems Inc. SunOS 5.9 Generic May 2002
You have new mail.
$
$
$ opmnctl status

Processes in Instance: EnterpriseManager0.dnlnvntools
-----
ias-component | process-type | pid | status
-----
WebCache     | WebCacheAdmin | 29702 | Alive
WebCache     | WebCache      | 29700 | Alive
OC4J         | OC4J_EM       | 29701 | Alive
OC4J         | home          | 29699 | Alive
dcm-daemon   | dcm-daemon    | 169   | Alive
LogLoader    | logloaderd    | N/A   | Down
HTTP_Server  | HTTP_Server   | 29698 | Alive
$ █
    
```

Exhibit 6. Validating Overall Status for all Oracle10g Grid Control processes

```

$ emctl status oms
TZ set to US/Eastern
Oracle Enterprise Manager 10g Release 10.2.0.1.0.
Copyright (c) 1996, 2004 Oracle Corporation. All rights reserved.
Oracle Management Server is Up
    
```

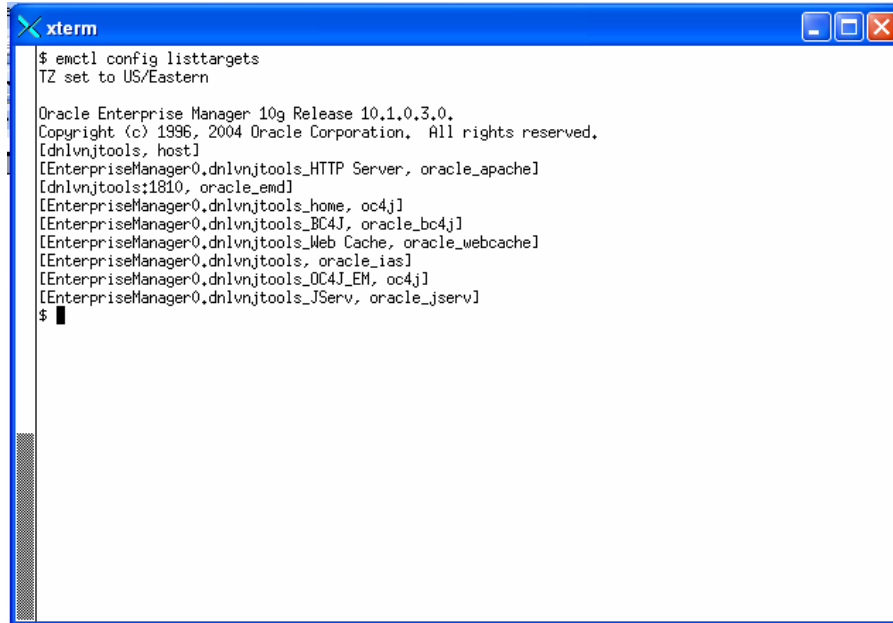
Exhibit 7. Checking on the Overall Status of Oracle Management Server and Service

```

xterm Encoding: ISO8859-1 Connection Time: 324 sec.
$ emctl status oms
TZ set to US/Eastern
Oracle Enterprise Manager 10g Release 10.1.0.3.0.
Copyright (c) 1996, 2004 Oracle Corporation. All rights reserved.
Oracle Management Server is Up
$
$ emctl status agent
TZ set to US/Eastern
Oracle Enterprise Manager 10g Release 10.1.0.3.0.
Copyright (c) 1996, 2004 Oracle Corporation. All rights reserved.
-----
Version           : 4.0.1.0.0
Agent Home        : /u01/app/oracle/product/10.1.0/EMNVDN
Agent Process ID  : 26911
Parent Process ID : 26910
Agent URL         : http://dnlnvntools:1810/emd/main/
Started at       : 2005-08-02 10:19:19
Started by user  : oracle
Last Reload      : 2005-08-02 10:35:28
Last successful upload      : (none)
Last attempted upload      : (none)
Total Megabytes of XML files uploaded so far : 0.00
Number of XML files pending upload : 0
Size of XML files pending upload(MB) : 0.00
Available disk space on upload filesystem : 40.81%
-----
Agent is Running and Ready
$ █
    
```

Exhibit 8. Verifying overall the Oracle Management Serve, Service, and Agent Status

Character-based, i.e., non-GUI, manual listing of available targets can be performed using the OS command interface via `emctl config listtargets`, as exhibited below. A list of available of configuration options can be listed by simply entering `emctl config` at the Solaris prompt.



```
$ emctl config listtargets
TZ set to US/Eastern

Oracle Enterprise Manager 10g Release 10.1.0.3.0,
Copyright (c) 1996, 2004 Oracle Corporation. All rights reserved.
[dnlnjtools, host]
[EnterpriseManager0.dnlnjtools_HTTP Server, oracle_apache]
[dnlnjtools;1810, oracle_emd]
[EnterpriseManager0.dnlnjtools_home, oc4j]
[EnterpriseManager0.dnlnjtools_BC4J, oracle_bc4j]
[EnterpriseManager0.dnlnjtools_Web Cache, oracle_webcache]
[EnterpriseManager0.dnlnjtools, oracle_ias]
[EnterpriseManager0.dnlnjtools_OC4J_EM, oc4j]
[EnterpriseManager0.dnlnjtools_JServ, oracle_jserv]
$
```

Exhibit 9. Verifying overall Configuration for the Oracle Management Serve, Service, and Agent Status

A DBA can log onto the OEM repository database as a DBA, either `SYS` or `SYSTEM`, and reset the password for `SYSMAN`, as needed, or use the one enter during installation. Then log onto the Oracle Grid control as `SYSMAN` rather than as `IAS_ADMIN`, since `SYSMAN` will by default offer a wide variety of target visualization.

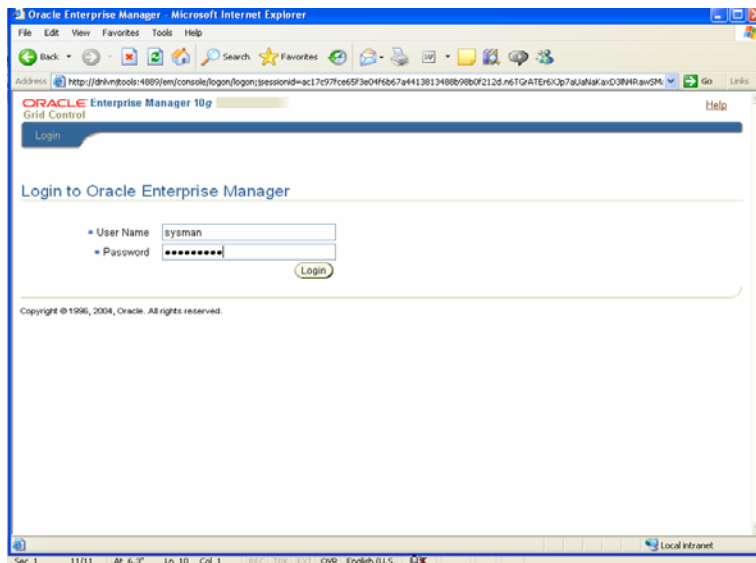


Exhibit 10. Logging onto the Oracle10g Enterprise Manager Grid Control

```
$ emctl blackout
TZ set to US/Eastern
Oracle Enterprise Manager 10g Release 10.1.0.3.0.
Copyright (c) 1996, 2004 Oracle Corporation. All rights reserved.
Usage :
    emctl start blackout <Blackoutname> [-nodeLevel]
    [<Target name>[:<Target Type>]].... [-d <Duration>]
    emctl stop blackout <Blackoutname>
    emctl status blackout [<Target name>[:<Target_Type>]]....
The following are valid options for blackouts
<Target name:Target type> defaults to local node target if not specified.
If -nodeLevel is specified after <Blackoutname>,the blackout will be
applied to all targets and any target list that follows will be ignored.
Duration is specified in [days] hh:mm
Example, to blackout the dmgnss listener when the command runs, you can
issue the following command to start the blackout:
$ start blackout emadn1 bko1 pmds listener:oracle listener -d
TZ set to US/Eastern
Oracle Enterprise Manager 10g Release 10.1.0.3.0.
Copyright (c) 1996, 2004 Oracle Corporation. All rights reserved.
Usage :
    emctl start blackout <Blackoutname> [-nodeLevel]
    [<Target name>[:<Target Type>]].... [-d <Duration>]
    emctl stop blackout <Blackoutname>
    emctl status blackout [<Target name>[:<Target Type>]]....
The following are valid options for blackouts
<Target name:Target type> defaults to local node target if not specified.
If -nodeLevel is specified after <Blackoutname>,the blackout will be
applied to all targets and any target list that follows will be ignored.
Duration is specified in [days] hh:mm
```

Exhibit 11. Setting Target Blackouts

For instance, to blackout the researchportal.adncorp.com adm1's listener when the command runs, you can issue the following command to start the blackout:

```
$emctl start blackout emadn1_bko1 adm1 listener:oracle_listener -d 10:00
```

Then end that blackout period by running:

```
$emctl stop blackout emadn1_bko1
```


PATCH UPDATES NEEDED

The following table lists all Oracle patches recommended by Oracle as needed.

Patches to Apply				
Patch	Type	Product	Release	Platform
2632931	Patchset	Oracle Database	9.2.0.2	Solaris Operating System (SPARC 32-bit)
2642117	Patch	RDBMS Server	9.2.0.2	Solaris Operating System (SPARC 32-bit)
2642267	Patch	CORE	9.2.0.2	Solaris Operating System (SPARC 32-bit)
2642439	Patch	CORE	9.2.0.2	Solaris Operating System (SPARC 32-bit)
2701372	Patch	Oracle HTTP Server(OHS) and mods	9.2.0.1	Generic Platform
2701717	Patch	XML Developers Kit	9.2.0.1	Generic Platform
2701717	Patch	XML Developers Kit	9.2.0.2	Generic Platform
2749511	Patch	Oracle Net Services	9.2.0.2	Solaris Operating System (SPARC 32-bit)
2761332	Patchset	Oracle Database	9.2.0.3	Solaris Operating System (SPARC 32-bit)

Table 8. Recommended update patches for default installation and configuration.

AGENT MASS DEPLOYMENT

PRE-REQUISITES

1. Have available the following environment information, namely:
2. Name of node (host) where agent is to be installed
3. IP Address of node (host) where agent is to be installed.
4. Name of Oracle10g Grid control server, i.e., the node holding the Management Service and directly managing the repository.
5. The IP address of the Oracle Grid control server.
6. The notification (email) server name (required for verification purposes only)
7. The IP address of the notification (email) server (required for verification purposes only).

8. The email address associated with the notification server.
9. SID of databases in agent (required only for verification purposes).
10. Ensure that the TNS_ADMIN variable is set to point to read the database server network configuration.
11. Verify that all system pre-requisites are met, as per table 7.
12. A GUI interface, such as an X-Server provided by Hummingbird Exceed or an X server that is reachable to the agent node during installation.
13. Ensure that the TMP and TMPDIR variables are set to /tmp, and that there is enough space available for this installation.

PRE-INSTALLATION TASKS

- ⇒ Get the X-Windows GUI environment variables set or skip these steps if running from an X client directly, as follows:
- From the OS prompt, type: export DISPLAY=:1 or export DISPLAY=0.0 and hit [Enter].
 - Similarly, enter: xhost +localhost.

INSTALLATION TASKS

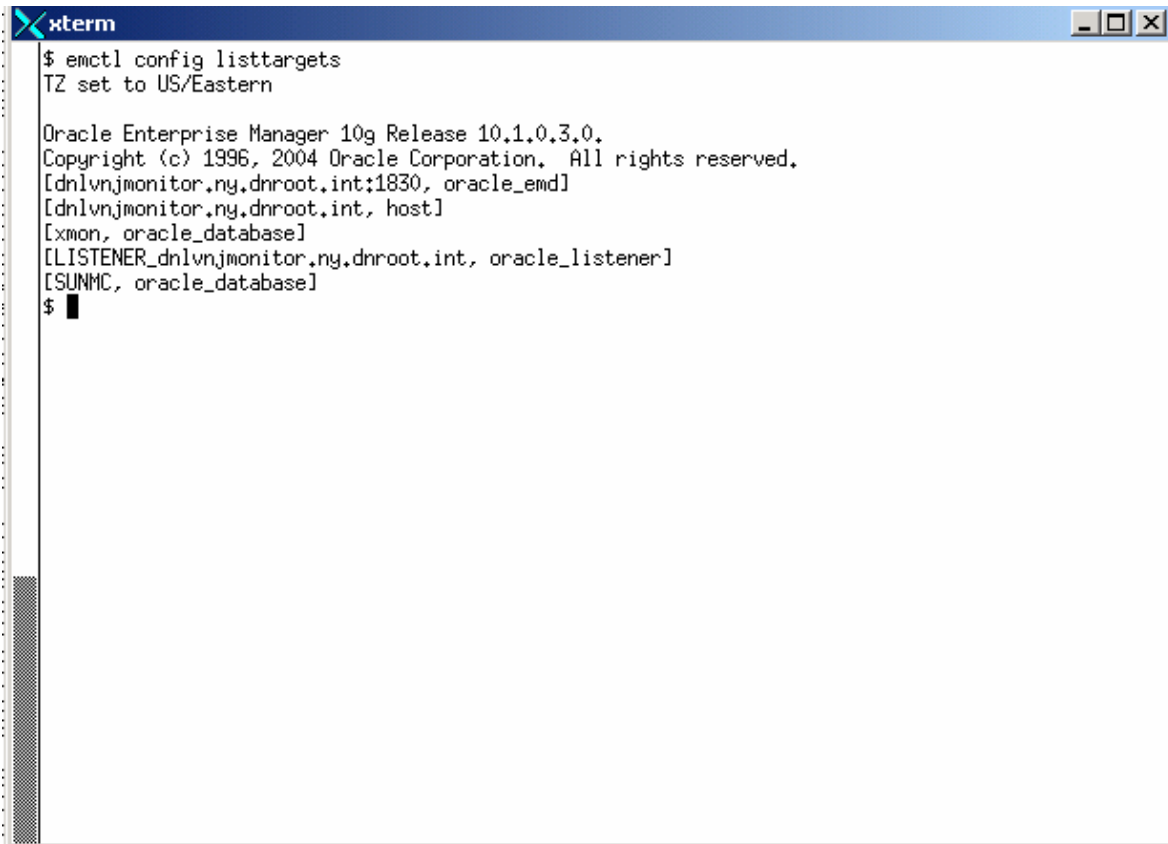
1. Move to the /Disk1 installing subdirectory in your installation file system or locate it in your mounted CD-ROM⁷.
2. Type runInstaller and hit [Enter].
3. In the dialog box, enter the new Oracle home and related directory installation for the agent to be established at this node.
4. At the next screen, from the installation options listed, select Additional Management Agent.
5. Enter the target name and port to be used as Oracle10g Enterprise Manager Grid control server.
6. Review the list of products to be installed and click on the install button.
7. Optionally, review the read-me file at the specified location.
8. Exit the installation.
9. Provided that the selected Oracle10g Grid Control has already been installed, the relevant Oracle10g Grid Control will automatically discover it, and therefore it can be found as an item in its refreshed target list.⁸

⁷ In Windows, it is necessary to set up the binary source in a network-shared folder.

⁸ It is important to highlight that more than one agent can be installed in one target, and each agent can point to a selected Oracle10g Enterprise Manager Grid Control Server.

POST-INSTALLATION TASKS

To verify the success of the agent installation locally, run the `$emctl config listtargets` command to ensure that success of the install (See figure 2 for details). To verify that the node and databases in the node are targets, simply node onto the Oracle10g Grid Control console and located them as targets.



```
xterm
$ emctl config listtargets
TZ set to US/Eastern

Oracle Enterprise Manager 10g Release 10.1.0.3.0.
Copyright (c) 1996, 2004 Oracle Corporation. All rights reserved.
[dnlnjmonitor.ny.dnroot.int;1830, oracle_emd]
[dnlnjmonitor.ny.dnroot.int, host]
[xmon, oracle_database]
[[LISTENER_dnlnjmonitor.ny.dnroot.int, oracle_listener]
[SUNMC, oracle_database]
$
```

Exhibit 12. Verifying that agent was installed successfully.

RESOURCES MANAGED BY ORACLE10G GRID CONTROL

Generically, Oracle10g Grid control can manage the following resources, namely:

INFRASTRUCTURE

This relates to the hardware, middleware, and software involved in the building of a data storage and program execution environment. These can involve hosting hardware, database servers, web, portal, and applications servers, middleware applications such as Entity EJBs/EJB's 3.0, cached XML-based SOA middleware components, and various others. With the introduction of Automatic Storage Management (ASM), Oracle10g introduced the concept of disk groups, which essentially eliminates the need for a volume manager and relevant software.

APPLICATIONS

Overall corporate programmed logic and flow running on specific business processes, such as Supply Chain Management (SCM), Enterprise Resource Planning (ERP) [3], Customer Relationship Management (CRM) and proprietary corporate applications and legacy systems.

INFORMATION

The diversity data and their relevant semantics used when doing business with the involved infrastructure and applications.

ORACLE10G GRID CONTROL CORPORATE CUSTOMIZATION

A practical approach to comprehensive customization, in order to achieve optimal manageability, can include —and is not limited to— the following corporate tasks, namely:

1. Custom Enhanced Firewall support

To fulfill specific security needs, Oracle 10g Grid computing provides simplified custom support for targets that reside beyond the limits configured for a specific domain and constrained by a firewall or Virtual Private Network (VPN) infrastructure. Besides, Oracle is by far certified as the most secure database.

2. Custom Virtualization Support

Additionally, Oracle10g Computing can support enhanced meta frames virtual environments, including Virtual Servers, such as VMWare, IBM VMs, VNC, Microsoft Virtual Servers, Citrix, and various others, each of which define a different flavor of virtualization. Therefore, the support for each

virtualization approach will be respectively alike to match each approach's requirements accordingly.

3. Further customization for blackout based on operating processes, accessibility, and security needs.

An important capability that Oracle10g Grid Computing provides is to be able to control windows of time from a virtual central repository. Unlike other monitoring tools, applications and other database driven and oriented processes will effectively and consistently integrate windows of time in a seamlessly fashion, avoiding lack of synchrony among components.

4. Enhanced Security

Additionally, enhanced security via LDAP-based Internet Directory usage, if desirable as a key point for corporate identity management. The benefit of utilizing LDAP-driven security is to further entice and enforce the powerful capabilities underlying the Oracle Identity Management paradigm, which enables administrators, managers, and end-users to achieve a consistent level of performance and operational confidence with further customized accessibility control with an associated Virtual Private Database (VPD).

5. Supplied Plug-in Extensions

Usage of Oracle10g Grid plug-in, including —but not limited to— IBM DB2, Microsoft products such as Active Directory, IIS, .net, Commerce Server and SQL Server.

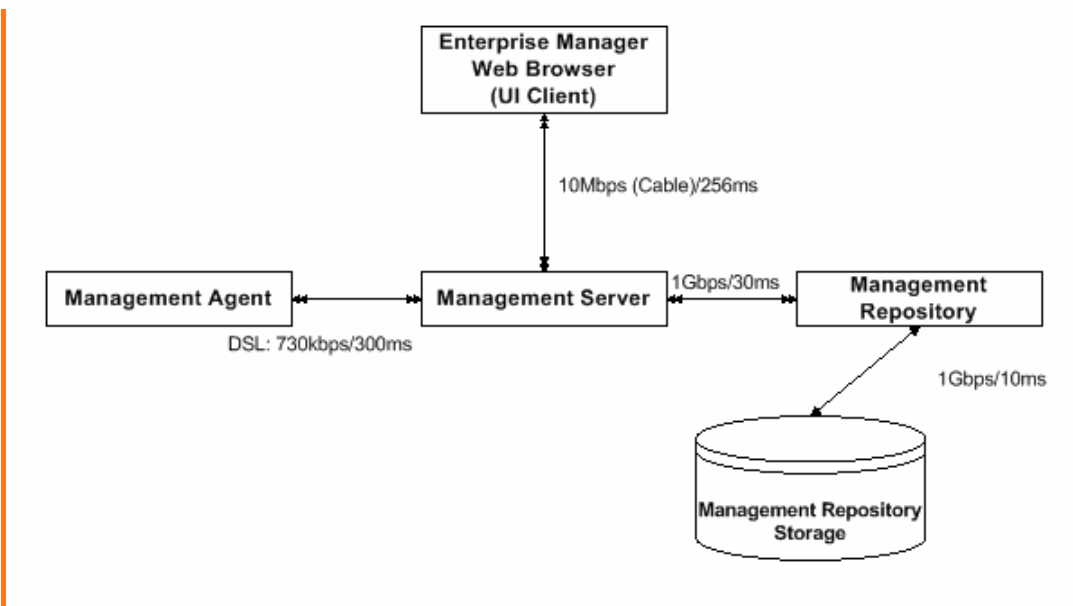


Exhibit 13. Hypothetical Scenario for Oracle10g Grid Network Performance

BUSINESS PROCESS IMPROVEMENT

An important measure of business process improvement and operational effectiveness is stress reduction among IT resources, and not necessarily human resources. Oracle10g Grid Computing can ease and eliminate potential bottlenecks that can derive day-to-day IT process overhead and IT staff stress, by simplifying the process usability and visualizing enhance process functionality for administrators, managers and end users [5].

BENEFITS AND IMPLICATIONS

Among the key benefits and implications derived from establishing an Oracle10g Grid Computing platform, it is possible to highlight the following:

1. The burden of both day-to-day automated process validation and human monitoring is reduced by the capability to visualize the complex corporate infrastructure and functionality.
2. The consistency validating and verifying process success or failure via the provisioning of a real-time messaging architecture makes an Oracle10g Grid environment extremely reliable but also contributes to its 24/7 functional effectiveness.
3. The capability to provision, deliver, deploy, and support processes and services that were extremely comprehensive or complex and require special skills is now highly simplified, such as replacing a standby database with a new one, adding a Real Application Cluster (RAC) [4] node, adding a node to the grid, adding an application component or patching an existing application.
4. Once the Grid Computing environment is properly tuned, the overall business process can contribute to the on-demand productivity via a robust but lightweight business process layer, which enhances effectiveness while driving performance up.

MIGRATING APPLICATIONS TO ORACLE

In response to the Oracle comprehensive suite market leadership, some companies [1] may choose to further utilize Oracle as their backend platform as well. As a result, migrating to Oracle as a base backend platform appears as a major consideration when integrating applications over grid computing, which simplifies, secures, and enhances the corporate overall information technology resources.

Besides, the evolution of database technology indicates that RDBMS systems that lose about 10% of more market share in five-year span are likely to disappear from the market, and likely to lack support as companies could be acquired or simply dissolved. In addition to this, market trends show Oracle as the only RDBMS growing in all platforms, while Windows and Linux have become the fastest operating system platforms of growth with Unix platform remaining a steady percent growth, where HP-UX, AiX, and Solaris lead the market. As a result, the

comprehensive future support that Oracle can provide for many years, including life-time support, conveys an increased percent in the investing corporation's ROI and ROIC for projects where Oracle10g Grid Computing is the selected platform.

CONCLUDING REMARKS

This document has been focused on the issues of how Oracle10g Grid Computing can enhance manageability to consistently support the corporate operational and performance goals and the way to make them more reliable.

The installation process was highlighted as a way to establish a link between existing and future upgraded infrastructure over the course of the next few years. The installation guidelines were essential to understand the goals of grid computing while understanding grid interaction with existing and future infrastructure.

The most critical remarks concerning manageability from the grid perspective involve, but are not limited to the following, namely:

- ⇒ Oracle10g Grid Computing simplifies, integrates while enhancing manageability, reliability, and performance.
- ⇒ Existing and future upgraded environments become targets in the Oracle10g Grid visualization of IT complexity.
- ⇒ Provisioning of applications and services is widely enhanced with solid processes reliability and robustness.
- ⇒ Provisioning is enhanced by the linking of Oracle10g Grid Computing with other technologies such as the Fusion Middleware, with Oracle already leading the market as a comprehensive e-business suite provider.
- ⇒ The Oracle10g Grid paradigm values shareholder's investment by provided a significant increase in ROI and ROIC.
- ⇒ Over the course of several years, Oracle10g early adopters expects ROIC between 145% through 512%, which is highly significant and congruent with concurrent savings and strategic management.

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