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EXADATA

Using SAP NetWeaver with Oracle Database 12c on Oracle Exadata

Key Guidelines

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Table of Contents

Preface	3
Prerequisites	4
Mixed Grid Infrastructure and RDBMS Versions	4
Character Set Requirements for SAP Databases	5
Non-Unicode SAP Installations	5
ASM Disk Group Recommendations for SAP Databases	5
SAP Specific OEDA Configuration	7
Configuration OEDA for SAP	7
Installation with OEDA for SAP	9
Shared File Systems in SAP environments	10
Shared File System with ACFS	10
Exadata Compute Node as an NFS Server	16
Exadata Compute Node as an NFS Client	17
Preparing Exadata Compute Nodes for SAP	18
SAP Monitoring for Oracle VM Domains	18
SAP Oracle Home Naming Requirements	19
Hostname Requirements	19
Running SAP Software Provisioning Manager (SWPM) on Oracle Exadata	19
SAP SWPM Preparation Exadata instance	19
Installation of SAP Central Services with SAP SWPM	37
Installation of the Oracle Database for SAP with SAP SWPM	45
Installation of SAP Primary Application for SAP with SAP SWPM	80

Life Cycle Management for SAP Databases	105
Installation of OPatch and MOPatch Utilities	106
Installation of the SAP Bundle Patch for Oracle Exadata	106
Migration of SAP Databases	107
Migration Approach 1: Oracle-to-Oracle (O2O) ACS and Customer Self-Service	107
O2O Technology	108
Migration Approach 2: Oracle-to-Oracle Online Migration (Triple-O) ACS Service	108
Triple-O Technology	109
Migration Approach 3: RMAN Transportable Tablespaces	111
Migration Approach 4: RMAN Duplicate Database	112
Migration Approach 5: Oracle Data Guard Physical Standby Database	113
Using additional SAP Instances with Oracle Exadata	113
Protection of SAP Central Services	113
Appendix 1:	115
Related White Papers	115
SAP Notes	115
MOS Notes	116

Preface

The Oracle Exadata Database Machine provides the following capabilities in an SAP environment:

- Extreme performance highly available active-active clustered database server for SAP Applications
- Highly available file server for SAP required shared file systems such as /sapmnt
- Complete clustering solution for SAP Central Services ASCS/SCS/ERS for both ABAP and JAVA stack

This document explains all the necessary steps to setup an SAP system based on the SAP NetWeaver technology using the Oracle Exadata Database Machine. All SAP products based from SAP NetWeaver 7.0 on are certified to use the Oracle Exadata Database Machine.

The paper describes the required Oracle software environment settings on the compute nodes, SAP specific database requirements, SAP specific requirements for virtual compute nodes, information on how to install SAP required database patches to the compute nodes, suggestions for the implementation of shared file systems for SAP installations and how to install, configure, manage and control the SAP central services on the compute nodes through Oracle Clusterware and its service program SAPCTL.

The Oracle Exadata Database Machine is used for storing the databases of the individual SAP systems.

The Oracle Exadata Database Machine cannot be used to run SAP Instances (PAS and/or Dialog Instances). SAP Instances have to run on separate machines which use the Ethernet or InfiniBand network to exchange data with the database(s) on the Exadata Database Machine. In SAP terminology this is called a three tier architecture. This flexible three tier architecture allows for any combination of hardware and operating systems running the SAP instances to be used with the Oracle Exadata Database Machine. So for instance you can run SAP Application servers on AIX or HP-UX against the Oracle Exadata Database Machine. This flexibility allows for an easy introduction of the Oracle Exadata Database Machine in existing SAP environments as it leaves the SAP layer unchanged.

The only SAP components which are supported to run on the compute nodes of the Oracle Exadata Database Machine are the SAP database administration tools (BR*Tools), required administration and monitoring agents of SAP and the SAP central services (ASCS/SCS/ERS). SAP SWPM supports the installation of the Oracle Exadata Database Machine as the database server for an SAP system. Databases from already installed SAP systems have to be migrated from existing database servers to the Oracle Exadata Database Machine. Existing SAP databases using Oracle 11204 can be upgraded to Oracle 12102 using the standard upgrade procedure for SAP database documented in the SAP Upgrade Guides (SAP Note 2086029) and SAP Note 2064206.

No changes to the standard database schema of the SAP database should be done when being migrated to the Oracle Exadata Database Machine. Changes should not be done to the table and/or index design, the partitioning concept or storage attributes of tables, indexes and partitions. The standard schema of the SAP database is very well designed, tested and proven with thousands of customers. In addition many SAP administration, monitoring and upgrade tasks depend on the standard database schema layout. Any change to the standard SAP database schema therefore has to be discussed with SAP and an SAP support calls should be opened.

Overall this documentation complements the existing standard documentation on the Oracle Exadata Database Machine and therefore it is assumed that the reader is familiar with the standard Oracle Exadata documentation.

Prerequisites

To use Oracle Database 12c on Oracle Exadata for an SAP NetWeaver based system the following prerequisites must be met:

- Oracle Database 12c Release 1 Patchset 1 (12.1.0.2)
 - Requires supported SAP Bundle Patch for Oracle Exadata listed in SAP Note 2145628
- Oracle Exadata software 12.1 (12.1.2.1.0 and higher) for **Bare Metal** Deployments (no use of VMs)
 - New installations using SWPM supported with minimum SWPM version 70SWPM10SP08 Patch Level 3 or SWPM10SP08 Patch Level 3 (both dated 23.06.15)
- Oracle Exadata software 18.1 (18.1.6.0.0 and higher) for **Virtual** Deployments (refer to chapter “SAP Monitoring for Oracle VM domains” for additional installation and configuration steps required)
 - Dom0 minimum Oracle Exadata software version 18.1.6.0.0.180529
 - DomU minimum Oracle Exadata software version 12.1.2.3.0.160207.3
 - SAP Host Agent 7.21 Patch Level 37 and higher
 - It is not recommended to use more than 8 VMs per Exadata compute node. In the extreme case where more than 8 VMs per Exadata compute node are needed then it is mandatory to add the disk expansion kit to the Exadata compute node.
- Supported SAP Solutions and Products:
 - New installations using SWPM supported with minimum SWPM version 70SWPM10SP08 Patch Level 3 or SWPM10SP08 Patch Level 3 (both dated 23.06.15)
 - Reporting Data Source for SAP Business Objects BI 4.0 (minimum SP06 for Oracle 11.2, minimum SP10 for Oracle 12.1), BI 4.1 (minimum SP04 for Oracle 12.1) and higher.
 - Repository, source and target databases for SAP Data Services 4.1 (Oracle 11.2 only), SAP Data Services 4.2 (Oracle 11.2 and Oracle 12.1 (minimum SP03) and higher). SAP Data Services programs cannot run on Exadata compute nodes and must be configured on separate servers (outside Exadata).
 - SAP NetWeaver 7.x or higher including SAP products which are based on SAP NetWeaver 7.x. Please check the SAP Product Availability Matrix (www.service.sap.com/PAM) for details regarding supported SAP product releases. In addition the PAM provides information about supported operating system releases and supported Unicode/non-Unicode configurations.

Please check SAP Note 1590515 for more details. SAP Note 1590515 will be updated on a regular basis. Before deploying an Oracle Exadata system for SAP consult SAP Note 1590515 for latest changes.

Mixed Grid Infrastructure and RDBMS Versions

Starting with Grid Infrastructure (GI) version 12.1.0.2 it is now supported to use a certain mix of GI and RDBMS versions for SAP databases.

With GI 12.1.0.2 it is supported to either use RDBMS 11.2.0.4 or RDBMS 12.1.0.2 for an SAP database.

With GI 12.2 it is supported to either use RDBMS 11.2.0.4, RDBMS 12.1.0.2 or RDBMS 12.2.0.1 for an SAP database. More information can be found in SAP Note 1677978.

Oracle Database 18c (both Grid Infrastructure and RDBMS) is not yet certified and supported by SAP.

Character Set Requirements for SAP Databases

New installations of SAP systems from SAP NetWeaver 7.0 on are Unicode installations only. For an SAP Unicode installation it is required that both the character and the national character set in the database is set to UTF8. When deploying or creating an SAP database on the Oracle Exadata Database Machine for Unicode installations of SAP it is therefore mandatory to use UTF8 for both the character and the national character set.

Deploying an SAP database with the SAP Software Provisioning Manager (SWPM) always guarantees that the SAP required database character sets are used.

Non-Unicode SAP Installations

Existing Non-Unicode SAP installations according to SAP Note 2033243 can be migrated to the Oracle Exadata Database Machine. New SAP installations have to be Unicode only.

For migrations of Oracle databases of existing Non-Unicode installations the character set and the national character of the Oracle database on the Oracle Exadata Database Machine must not change. The Oracle database created on the Oracle Exadata Database Machine must have the same character set and national character set as in the Oracle database to be migrated. The character set of the Oracle database on the Oracle Exadata Database Machine will either be **WE8DEC** or **UTF8** depending which character set had been used in the database to be migrated. The national character set must always be **UTF8**.

For migrations of non-Oracle databases of existing Non-Unicode installations to the Oracle Exadata Database Machine the Oracle database on the Oracle Exadata Database Machine must use UTF8 for the character set and UTF8 for the national character set.

Only three-tier SAP installations are supported. SAP Application Servers have to be installed on separate servers running the IBM AIX, HP-UX, Microsoft Windows, Oracle Solaris SPARC, RHEL Linux or SLES Linux operating system. It is highly recommended to not change the hardware or operating system for the SAP layer. Only the existing database server and storage layer should be changed to the Oracle Exadata Database Machine

SAP Central Services (ASCS/SCS/ERS) cannot be installed and configured on the Oracle Exadata compute nodes.

ASM Disk Group Recommendations for SAP Databases

Although there are no specific requirements for ASM Disk Groups storing the SAP databases on the Oracle Exadata Database Machine, it is a best practice to use a redundancy level of high for a production SAP database to achieve the highest level of protection against any type of storage failure. Other SAP databases used for development, test and QA may use a normal ASM redundancy level.

As there is no need for storage based replication with the Oracle Exadata Database Machine the following ASM Disk Groups for each SAP database should be used. In line with the standard Oracle Exadata setup you should have at least one ASM Disk Group DATA (Example: DATAC1) and another ASM Disk Group RECO (Example: RECOC1). The DATA Group should contain all data files, control files, online redo log files, spfiles, OCR and voting disks. The RECO Group should contain temporary files, archive logs, flashback files and backups. The DATA Group should use a redundancy level of high and the RECO Group a redundancy level of normal.



When storing more than one SAP database (for instance an SAP ERP database and an SAP BW database or an SAP ERP database with an SAP CRM database or multiple SAP ERP databases) on the Oracle Exadata Database Machine all files of each of these SAP databases should follow the above recommendation and therefore files should be stored in the DATA and RECO Group.

For performance and throughput reasons it is recommended to only have two control files and non-multiplexed online redo log files for each SAP database all stored in the DATA Group. As standard SAP installations use three control files in the database it is recommended to remove one control file from the spfile or init.ora. Standard SAP installations also use two members for each online redo log file. On the Oracle Exadata Database Machine it is therefore necessary to remove one member of each online redo log file for each redo thread. The source database will have multiple redo threads if it was a RAC database. Three control files and multiplexed online redo log files are not needed on the Oracle Exadata Database Machine as the control files and the online redo log files are stored in the DATA Group which already provides three way mirroring for each file at the Oracle ASM level due to the redundancy level of high.

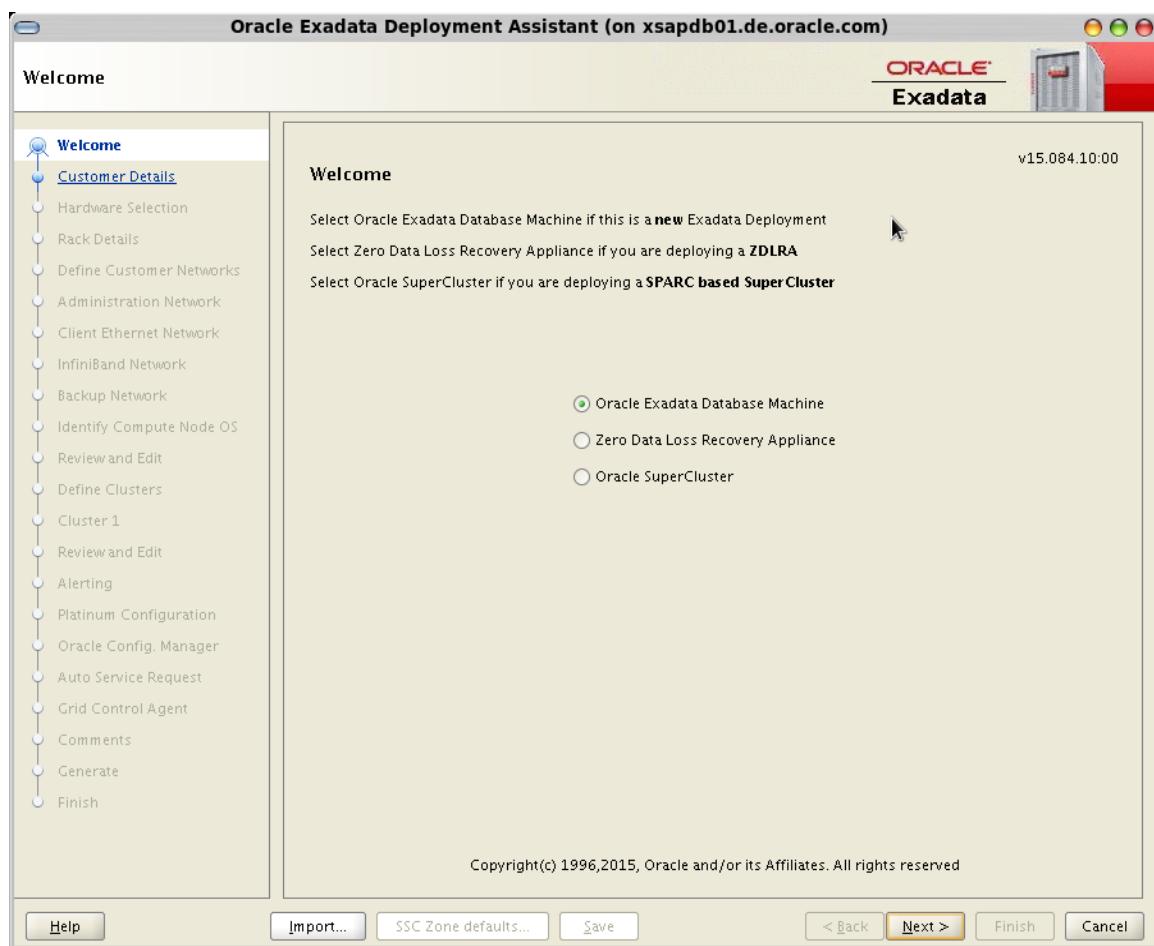


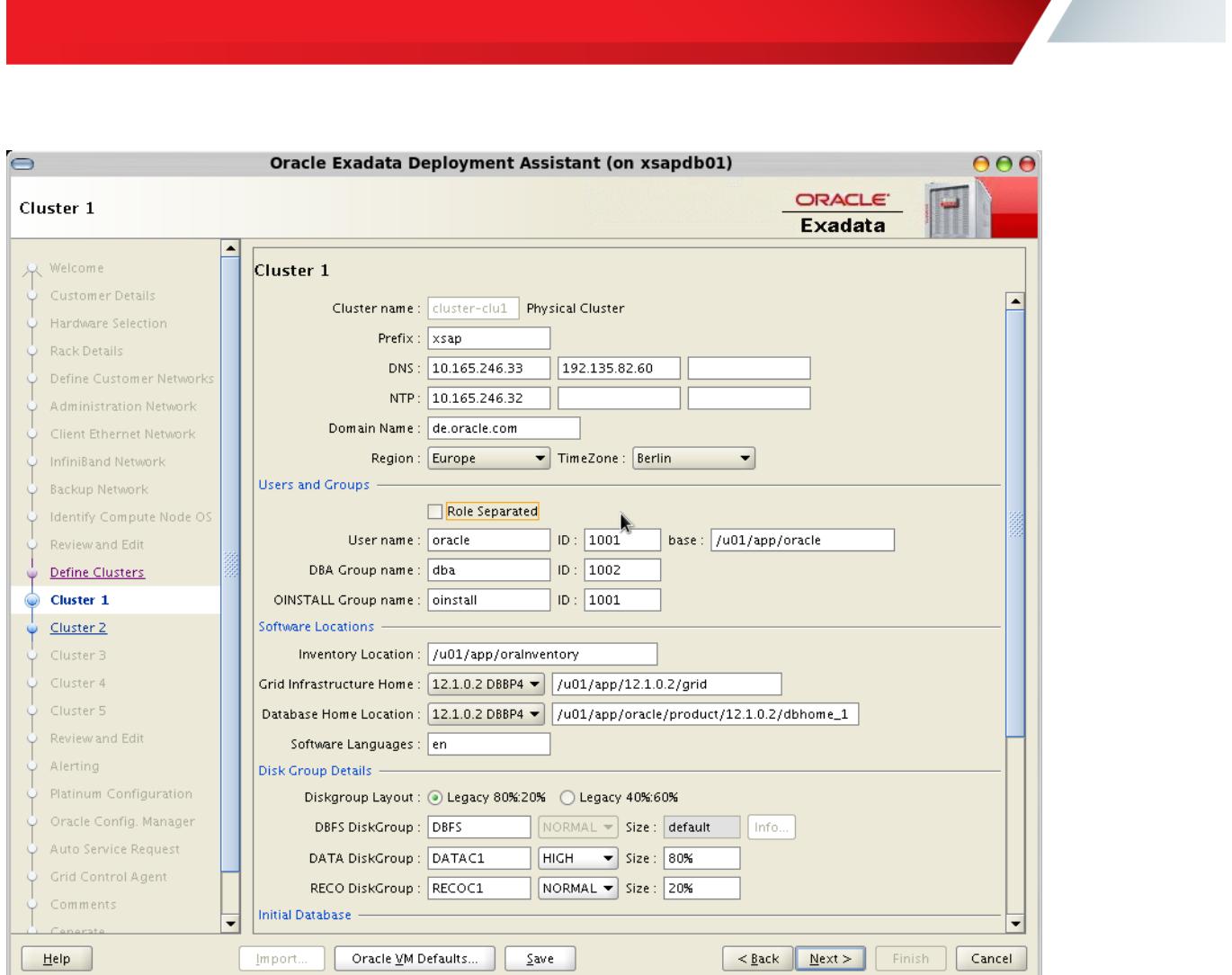
SAP Specific OEDA Configuration

To prepare a new Oracle Exadata Database Machine for SAP the minimum Oracle Exadata Deployment Assistant (OEDA) release March 2015 v15.084 has to be used (MOS 888828.1). OEDA has two phases, the configuration phase and the installation phase. The installation will be done using the configuration file created during the configuration phase.

Configuration OEDA for SAP

Note: This chapter shows only those OEDA screens which are critical to a successful deployment of the Oracle Exadata Database Machine in an SAP landscape.





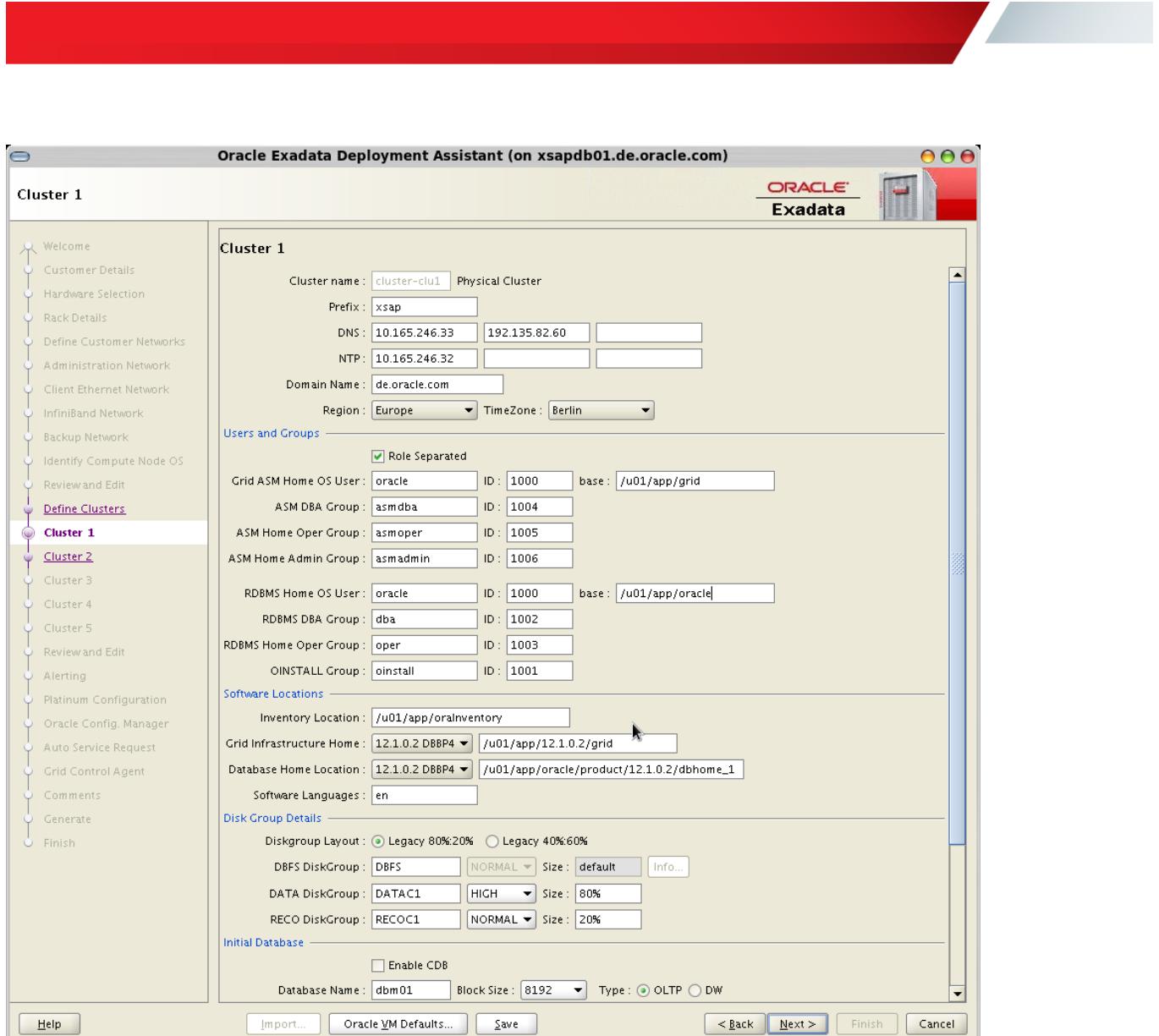
For Oracle GRID and Oracle Database you have to select version 12.1.0.2 DBBP4 as the initial SAP certification is based on 12.1.0.2 DBBP4 and the mandatory initial SAP Bundle Patch for Exadata is built on top of 12.1.0.2 DBBP4. In the future newer DBBPs can be used. Please check SAP Note 2145628 for regular updates.

You can also adjust here the redundancy level for the Oracle ASM Disk Groups. ASM Disk Group DATAC1 is set to HIGH and ASM Disk Group RECOC1 is set to normal. These redundancy levels are recommended for an SAP production database.

Note: DBFS cannot be used in an SAP environment as it is not a POSIX compliant file system missing important features like file locking or memory mapped files all required by SAP.

You have to select the check box "Role Separated" for the required OS user and group settings when using Oracle Databases for SAP on Oracle Exadata Database Machine.

It is mandatory to specify the OS user oracle for both the Oracle GRID and the Oracle RDBMS homes with different Oracle BASE directories /u01/app/grid and /01/app/oracle.



Installation with OEDA for SAP

Run the Oracle Exadata Deployment Assistant (OEDA) in the installation phase without step 18:

```
[root@xsapdb01 linux-x64]# ./install.sh -l -cf /u01/deploy/oeda_march_2015/linux-x64/WorkDir/Oracle-Sap_Development-xsap-cluster-clu1.xml
```

1. Validate Configuration File
2. Setup Required Files
3. Create Users
4. Setup Cell Connectivity
5. Verify Infiniband
6. Calibrate Cells
7. Create Cell Disks
8. Create Grid Disks

- 
- 9. Install Cluster Software
 - 10. Initialize Cluster Software
 - 11. Install Database Software
 - 12. Relink Database with RDS
 - 13. Create ASM Diskgroups
 - 14. Create Databases
 - 15. Apply Security Fixes
 - 16. Install Exachk
 - 17. Create Installation Summary
 - 18. Resecure Machine

[root@xsapdb01 linux-x64]#

Note: OEDA step 18 “Resecure Machine” increases the security level of all Oracle Exadata compute nodes. Especially the requirements of the password quality will be changed for all users. The SAP Software Provisioning Manager (SWPM) is not able to handle the changes to the length of the passwords.

Shared File Systems in SAP environments

In an SAP environment it is common that all SAP Application Servers have access to a shared file system (/sapmnt, /usr/sap/trans) which store the SAP kernels, profiles, trace files and provide the global SAP transport directory. In typical SAP installations such a shared file system is implemented using a NAS appliance, a clustered file system or through an NFS exported file system from the database server. For high availability reasons a cluster file system is being used or the source of the NFS location is protected by special configurations such as HA-NFS to not be a single point of failure in an SAP environment.

If you already have an existing shared file system solution in your SAP environment not using an NFS exported file system from the database server it is recommended to continue to use this solution when moving to the Oracle Exadata Database Machine.

Note: DBFS cannot be used in an SAP environment as it is not a POSIX compliant file system missing important features like file locking or memory mapped files all required by SAP.

Shared File System with ACFS

Oracle Exadata offers the Oracle Cloud File System (formerly known as ACFS). ACFS can be used for /sapmnt, /usr/sap/trans on all application servers, if it is NFS exported from the Oracle Exadata compute nodes. This file system has to be created before the deployment. You can add additional file systems like /usr/sap/trans using Advanced Storage Management Configuration Assistant (asmca).

Note: Before making any changes to the Linux kernel versions for instance by applying a new QFSDP verify that a version of the ACFS file systems exist for the changed kernel versions. See MOS Note 1369107.1 for more details.

Here you can find an example how to create an ACFS file system with the size of 50GB from the ASM Disk Group RECO1 and the mount point /sapmnt. Create a mount point for the ACFS file system and set the graphical environment to use the graphical ASM Configuration Assistant (asmca). Change to user oracle and set the GRID environment to run asmca.

ASM Configuration Assistant: Configure ASM: Disk Groups

ASM Instances | **Disk Groups** | Volumes | ASM Cluster File Systems

You can choose to create a new disk group or add disks to an existing disk group. To create dynamic volumes, you need disk groups with 11.2 ASM compatibility or higher.

Tip: To perform operations on a disk group, right mouse click on the row.

Disk Group Name	Size (GB)	Free (GB)	Usable (GB)	Redundancy	State
RECO1	5073.00	4903.25	2398.78	NORMAL	MOUNTED(2 of 2)
DATA1	20304.00	17825.15	8701.08	NORMAL	MOUNTED(2 of 2)
DBFS_DG	1165.00	1155.11	562.99	NORMAL	MOUNTED(2 of 2)

ASM Configuration Assistant: Configure ASM: Volumes

ASM Instances | Disk Groups | **Volumes** | ASM Cluster File Systems

ASM volumes are typically formatted with ASM Cluster File System (ACFS). ACFS can be used to store files such as Executables, Oracle Diagnostic files, Application configuration files, etc. To create an ASM Cluster File System, you need to create an ASM Volume first.

Tip: To perform operations on a volume, right mouse click on the row.

Volume	Volume Device	Disk Group	State	Usage	Mount Point	Size (C)

Help **Exit**

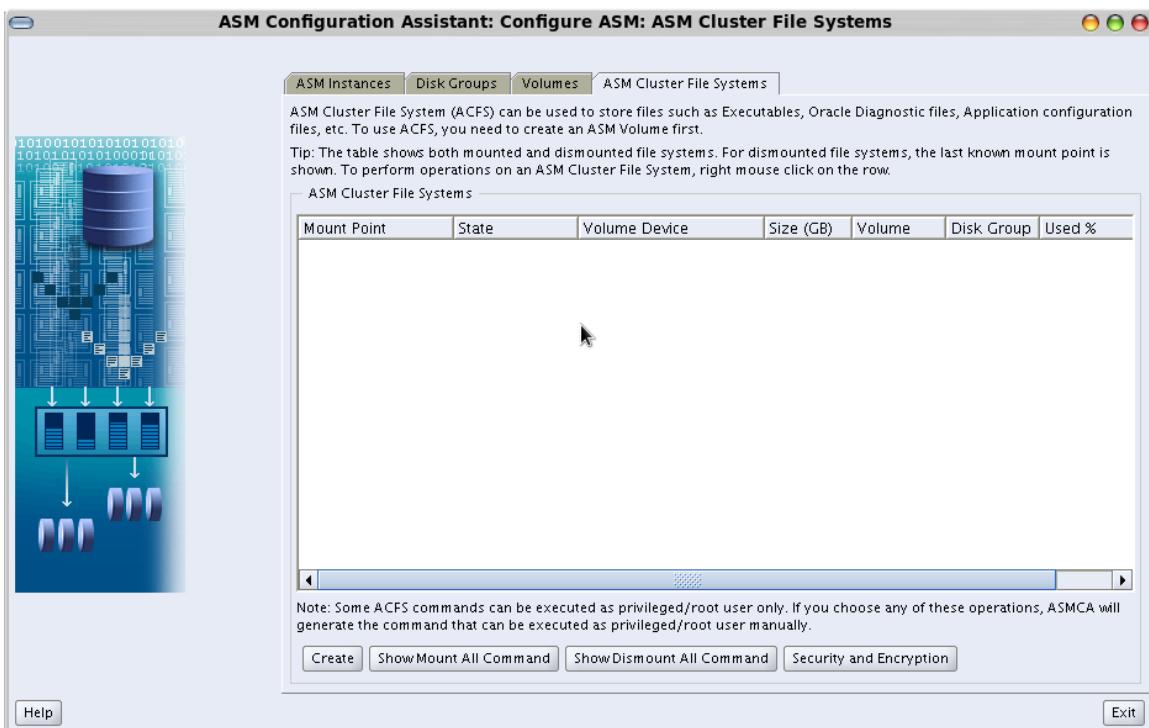
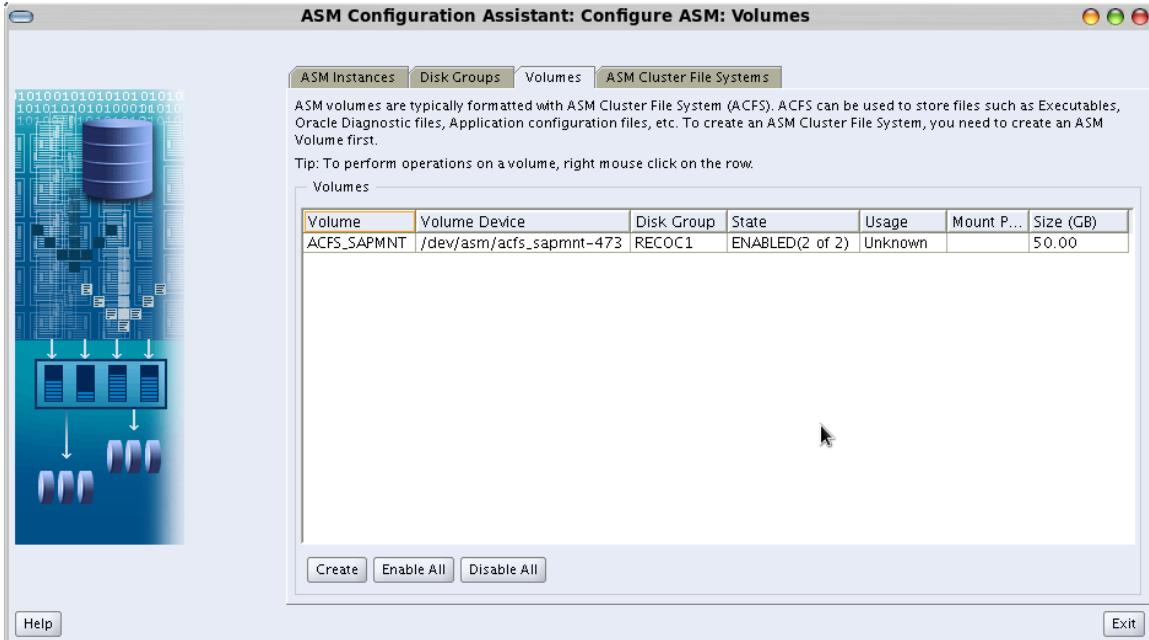
Help **Exit**

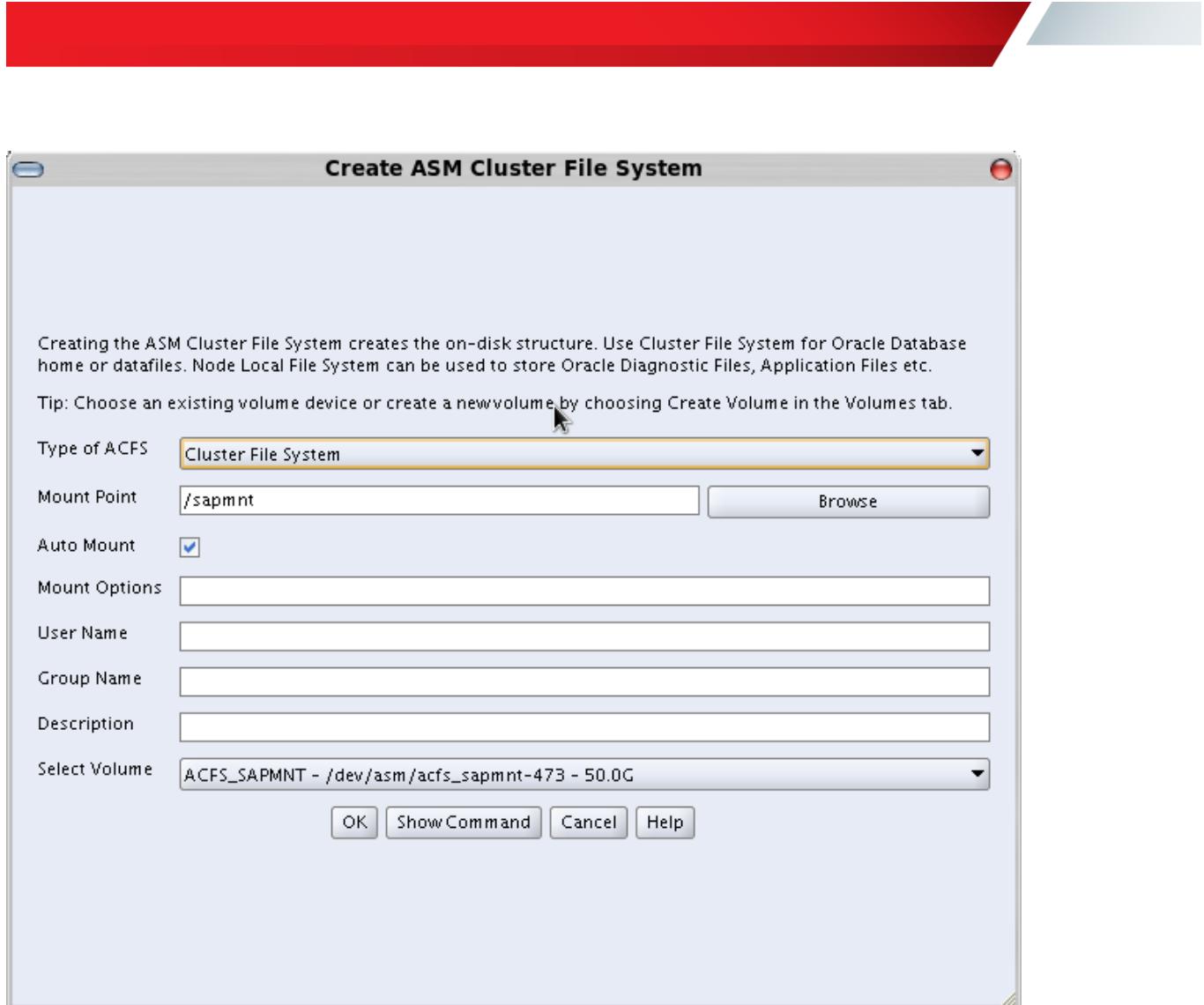
Create Volume

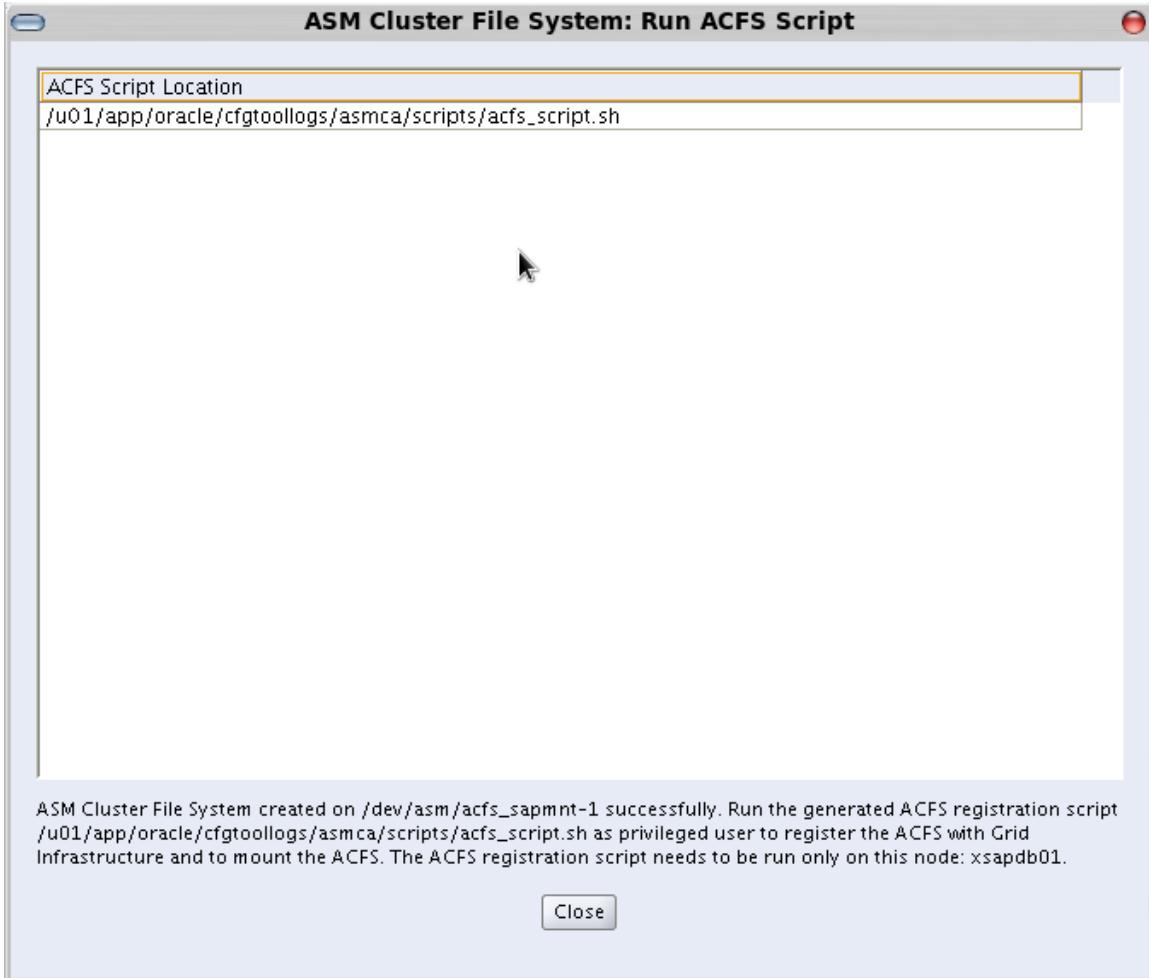
Volume Name	acfs_sapmnt
Disk Group Name	RECO1
Disk Group Free Space (GB)	4903.25
Disk Group Usable Space (GB)	2398.78
Size	50 G Bytes
Redundancy	<input checked="" type="radio"/> Mirror <input type="radio"/> High <input type="radio"/> Unprotected
Striping	<input type="radio"/> Stripe Columns: 8 <input type="radio"/> Stripe Width: 1M

Hide Advanced Options **OK** **Cancel** **Help**









Run the acfs_script.sh as root in command line; check the mount status and the new ACFS cluster resource.

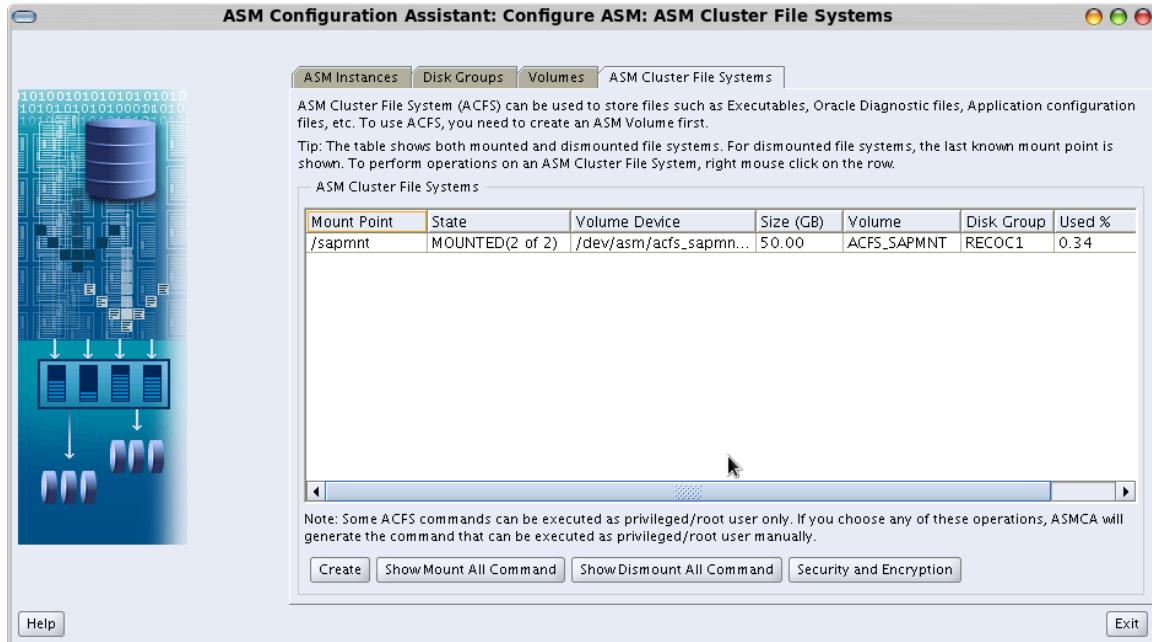
```
[root@xsapdb01 bin]# /u01/app/oracle/cfgtoollogs/asmca/scripts/acfs_script.sh
ACFS file system /sapmnt is mounted on nodes xsapdb01,xsapdb02
[root@xsapdb01 bin]# mount | grep acfs
/dev/asm/acfs_sapmnt-1 on /sapmnt type acfs (rw)
[root@xsapdb01 bin]# ./crsctl stat res ora.recoc1.acfs_sapmnt.acfs -t
```

Name	Target	State	Server	State details

Local Resources				

ora.recoc1.acfs_sapmnt.acfs				
ONLINE	ONLINE	xsapdb01		mounted on /sapmnt,STABLE
ONLINE	ONLINE	xsapdb02		mounted on /sapmnt,STABLE

```
[root@xsapdb01 bin]#
```



The file system can be used from all Oracle Exadata Database Machine compute nodes and is a registered CRS resource.

Exadata Compute Node as an NFS Server

To provide the ACFS file system to external SAP application servers you have to configure the NFS Server on one of the Oracle Exadata Database Machine compute nodes and mount it on the application servers.

Create an entry for the /sapmnt in the NFS export table /etc/exports:

```
/sapmnt *(rw,sync,no_root_squash)
```

Register all services in the host access control file of the compute node, where you would like to run the NFS server:

```
[root@xsapdb01 ~]# cat /etc/hosts.allow
sshd : ALL
snmpd : ALL
ALL : localhost
rpcbind : ALL
mountd : ALL
lockd : ALL
rquotad : ALL
statd : ALL
[root@xsapdb01 ~]#
```

Start the relevant services rpcbind, rpcidmapd and nfs for NFS server:

```
[root@xsapdb01 ~]# service rpcbind start
Starting rpcbind: [ OK ]
[root@xsapdb01 ~]# service rpcidmapd start
Starting RPC idmapd: [ OK ]
```

```
[root@xsapdb01 ~]# service nfs restart
Shutting down NFS daemon: [FAILED]
Shutting down NFS mountd: [FAILED]
Shutting down NFS quotas: [FAILED]
Starting NFS services: [ OK ]
Starting NFS quotas: [ OK ]
Starting NFS mountd: [ OK ]
Starting NFS daemon: [ OK ]
[root@xsapdb01 ~]#
```

Register the services for starting after a reboot:

```
[root@xsapdb01 ~]# chkconfig --list | grep "rpcbind|rpclmapd|nfs"
nfs          0:off    1:off    2:on     3:on     4:on     5:on     6:off
nfslock      0:off    1:off    2:on     3:on     4:on     5:on     6:off
rpcbind      0:off    1:off    2:on     3:on     4:on     5:on     6:off
rpclmapd     0:off    1:off    2:on     3:on     4:on     5:on     6:off
[root@xsapdb01 ~]#
```

You can check the result of the export of /sapmnt with NFS still exists:

```
[root@xsapdb01 ~]# showmount -e xsapdb01
Export list for xsapdb01:
/sapmnt *
[root@xsapdb01 ~]#
```

On the SAP application servers you can choose your preferred NFS version 2, 3 and 4. But SAP recommends use version 4 with /usr/sap/trans (SAP Note 132536). You must be aware that user and groups for the shared files with NFS still exists with the same userid and groupid on both the compute nodes and SAP application server. The SAP SWPM provides you with the Preparation Step Create SAP Users.

A possible mount for your NFS mount on the client could look like this with using NFS version 4:

```
[root@xsapadm03v05 ~]# mount | grep xsapdb01
xsapdb01:/sapmnt on /sapmnt_xsapdb01 type nfs (rw,vers=4,addr=10.165.76.134,clientaddr=10.165.76.171)
[root@xsapadm03v05 ~]#
```

Exadata Compute Node as an NFS Client

Check that the needed software is available:

```
[root@xsapdb01 ~]# rpm -qa | grep "nfs|rpcbind"
rpcbind-0.2.0-11.el6.x86_64
nfs-utils-1.2.3-54.el6.x86_64
nfs-utils-lib-1.1.5-9.el6.x86_64
[root@xsapdb01 ~]#
```

```
[root@xsapdb01 ~]# mkdir /u01/deploy/sap/media
[root@xsapdb01 ~]# chmod 755 /u01/deploy/sap/media
[root@xsapdb01 ~]# showmount -e sapstore
```

Export list for sapstore:

```
/export/Oracle_Data (everyone)
/export/Oracle_Home (everyone)
[root@xsapdb01 ~]# 

[root@xsapdb01 ~]# service rpcbind start
Starting rpcbind: [ OK ]
[root@xsapdb01 ~]# 

[root@xsapdb01 ~]# mount sapstore:/export/Oracle_Home /u01/deploy/sap/media
[root@xsapdb01 ~]# mount
/dev/mapper/VGExaDb-LVDbSys1 on / type ext4 (rw)
proc on /proc type proc (rw)
sysfs on /sys type sysfs (rw)
devpts on /dev/pts type devpts (rw,gid=5,mode=620)
tmpfs on /dev/shm type tmpfs (rw,size=96491m)
/dev/sda1 on /boot type ext4 (rw,nodev)
/dev/mapper/VGExaDb-LVDbOra1 on /u01 type ext4 (rw,nodev)
none on /proc/sys/fs/binfmt_misc type binfmt_misc (rw)
/dev/asm/acfs_sapmnt-473 on /sapmnt type acfs (rw)
sunrpc on /var/lib/nfs/rpc_pipefs type rpc_pipefs (rw)
sapstore:/export/Oracle_Home on /u01/deploy/sap/media type nfs (rw,vers=4,addr=10.165.110.74,clientaddr=10.165.76.6)
[root@xsapdb01 ~]#
```

Preparing Exadata Compute Nodes for SAP

SAP Monitoring for Oracle VM Domains

For virtual deployments i.e. the use of Oracle VMs on the Oracle Exadata Database Machine, SAP requires an active monitoring of configuration and performance metrics of the Exadata compute node. The necessary vmetrics service is included as an RPM in Exadata software version 18.1.6.0.0.180529. The vmetrics service runs on Dom0 of each Exadata compute node to collect the required statistics, and pushes them to the xenstore. This allows the DomU's to access the statistics. On each Exadata compute node where Oracle VMs will be used you have to copy vm-dump-metrics using the command scp from Dom0:/opt/oracle.vmetrics/vm-dump-metrics to each DomU:/usr/sbin.

In addition it is required to install SAP Host Agent version 7.21 Patch Level 37 or higher in each DomU domain. The SAP Host Agent is installed through the SAP Software Provisioning Manager (SWPM) step RAC/ASM/Exadata Database Instance Preparation.

To update the SAP Host Agent to the latest version please check SAP Note 2598404.

In the [Exadata Database Machine Maintenance Guide](#) you can find more details about vmetrics and how to deploy Oracle VM Domains on the Oracle Exadata Database Machine.

SAP Oracle Home Naming Requirements

The successful installation and operation of any SAP utility such as SWPM or BR*Tools on the compute nodes of the Oracle Exadata Database Machine requires some preparation for the correct setting of the ORACLE_HOME environment variable in the SAP environment. The SAP environment requires the ORACLE_HOME environment variable to be set to /oracle/<DBSID>/<release>.

SAP utilities look for the RDBMS software in /oracle/<DBSID>/<release> the standard path of SAP for the Oracle RDBMS software. The Oracle Exadata deployment installs the RDBMS software under /u01/app/oracle/product/12.1.0.2/dbhome_1.

Therefore you need to create a symbolic link on ALL database nodes.

On the first node execute the following steps (we use E12 as DBSID in this example):

```
root@xsapdb01 ~]# mkdir -p /oracle/E12
[root@xsapdb01 ~]# chown -R oracle:oinstall /oracle
[root@xsapdb01 ~]# ls -l / | grep oracle
drwxr-xr-x 3 oracle oinstall 4096 Mar 27 14:27 oracle
[root@xsapdb01 ~]# ls -l /oracle
total 4
drwxr-xr-x 2 oracle oinstall 4096 Mar 27 14:27 E12
[root@xsapdb01 ~]# su - oracle
[oracle@xsapdb01 ~]$ ln -s /u01/app/oracle/product/12.1.0.2/dbhome_1 /oracle/E12/121
[oracle@xsapdb01 ~]$ ls -l /oracle/E12/
total 0
lrwxrwxrwx 1 oracle oinstall 41 Mar 27 14:30 121 -> /u01/app/oracle/product/12.1.0.2/dbhome_1
[oracle@xsapdb01 ~]$
```

Important: Make sure to execute above steps on ALL compute nodes of the Oracle Exadata Database Machine.

Hostname Requirements

In an SAP environment it is mandatory that the hostnames of the database server fulfill the requirements of SAP (SAP Support Note 611361). For SAP it is required that the hostnames of the compute nodes of the Oracle Exadata Database Machine are configured correctly. Please see SAP Note 1996481. The hostnames cannot use the Fully Qualified Domain Name (FQDN). So the hostname and hostname -s commands must provide the same output and may not show the FQDN info. Only the hostname -f command may show the FQDN info.

Running SAP Software Provisioning Manager (SWPM) on Oracle Exadata

The following steps are run with the latest available version of the SAP Software Provisioning Manager SP08 available from the SAP Service Marketplace. The Oracle Instant Client 11.2 can be used to run with Oracle Database 12c (12.1.0.2).

SAP SWPM Preparation Exadata instance

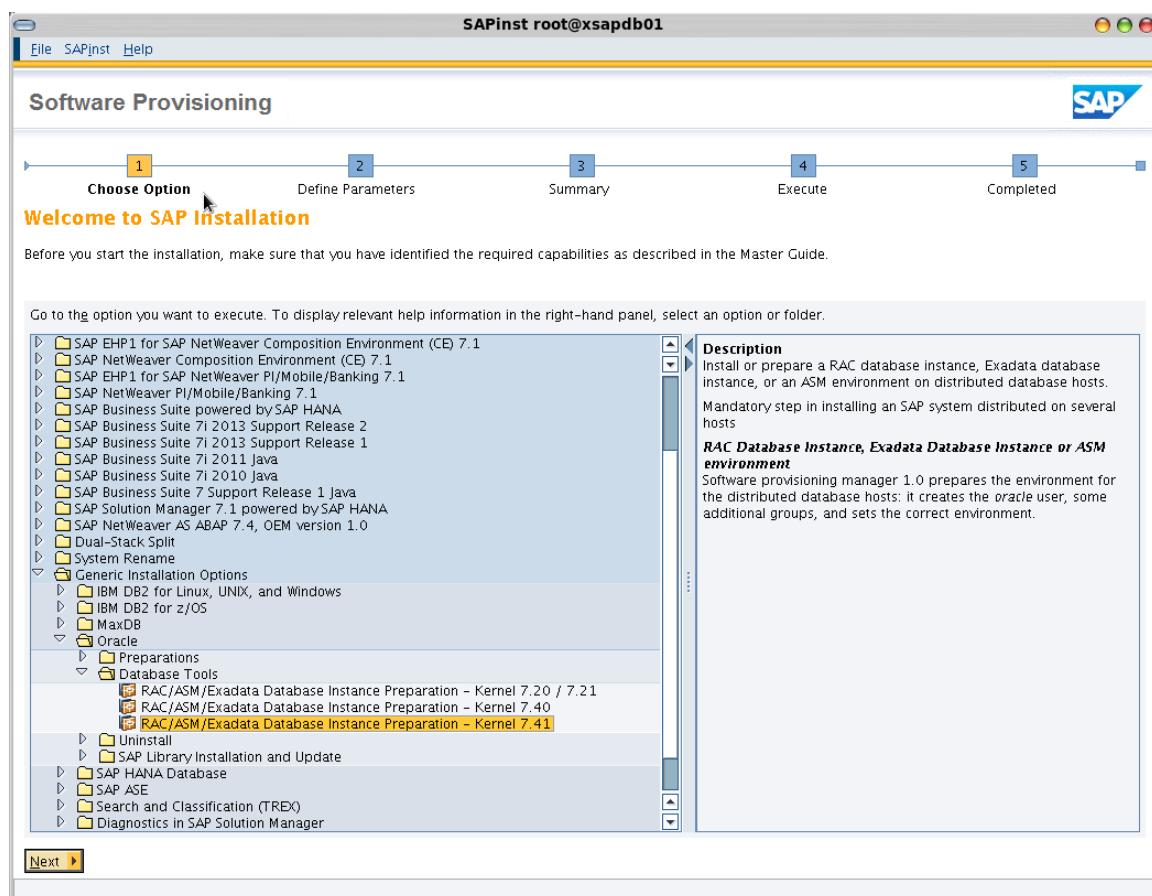
The SAP Software Provisioning Manager (SWPM) provides you with the step RAC/ASM/Exadata Database Instance Preparation to

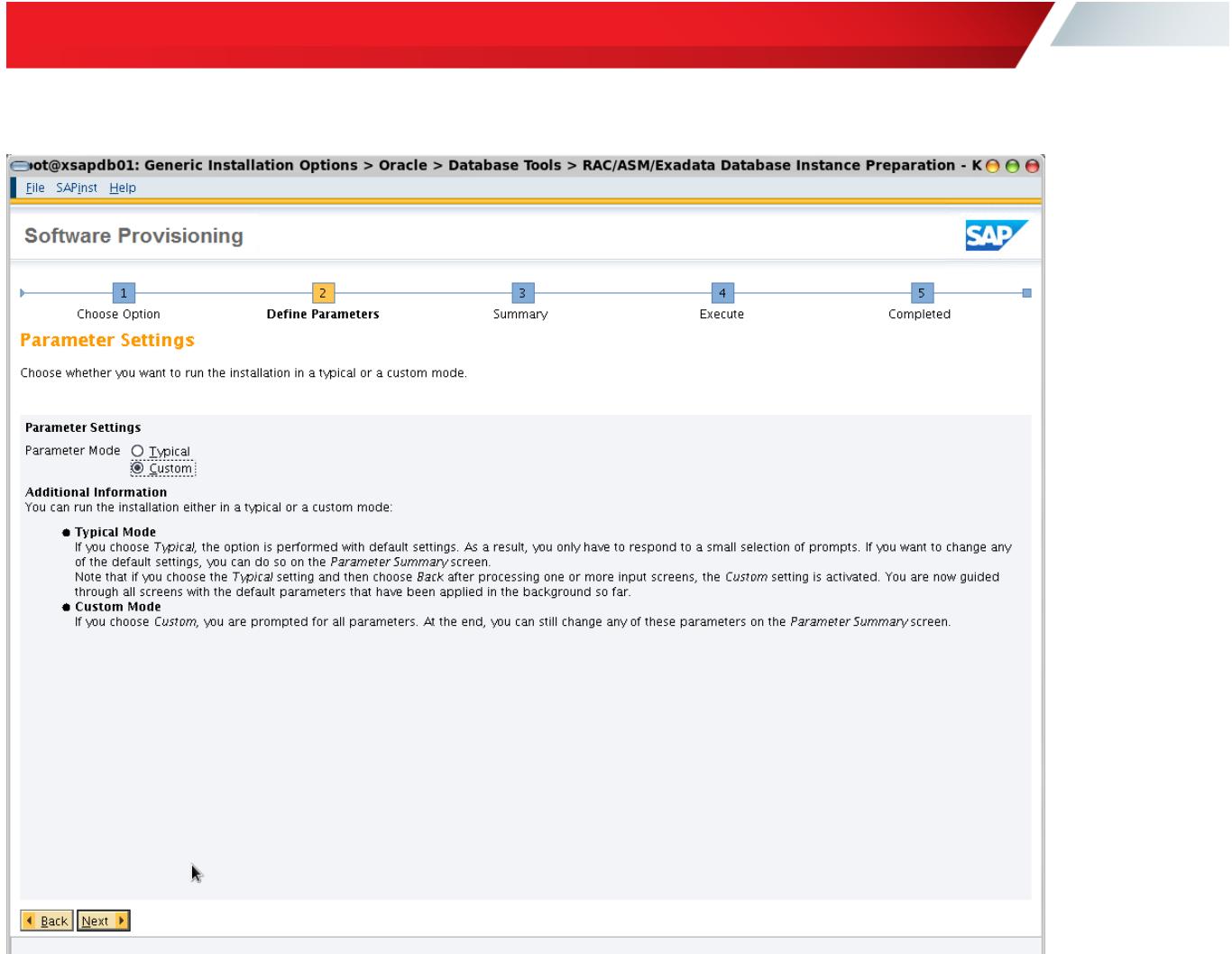
- install SAP Kernel independent and database dependent parts of the SAP Kernel

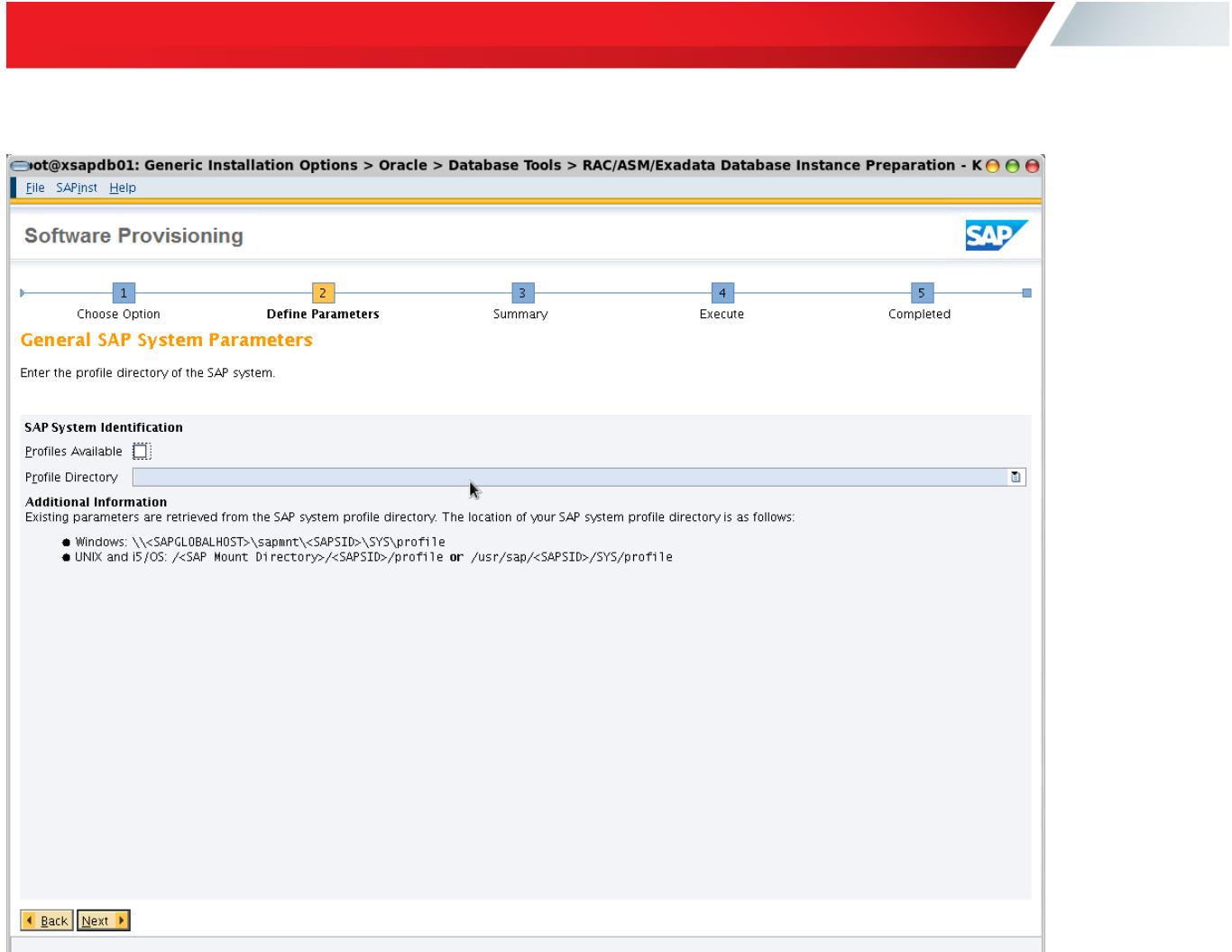
- install the BR*Tools as on portion of the database dependent part
- install the Oracle Instant Client
- install the SAP Host Agent
- create SAP users and groups
- prepare the environment for running the SAP database on ASM with RAC

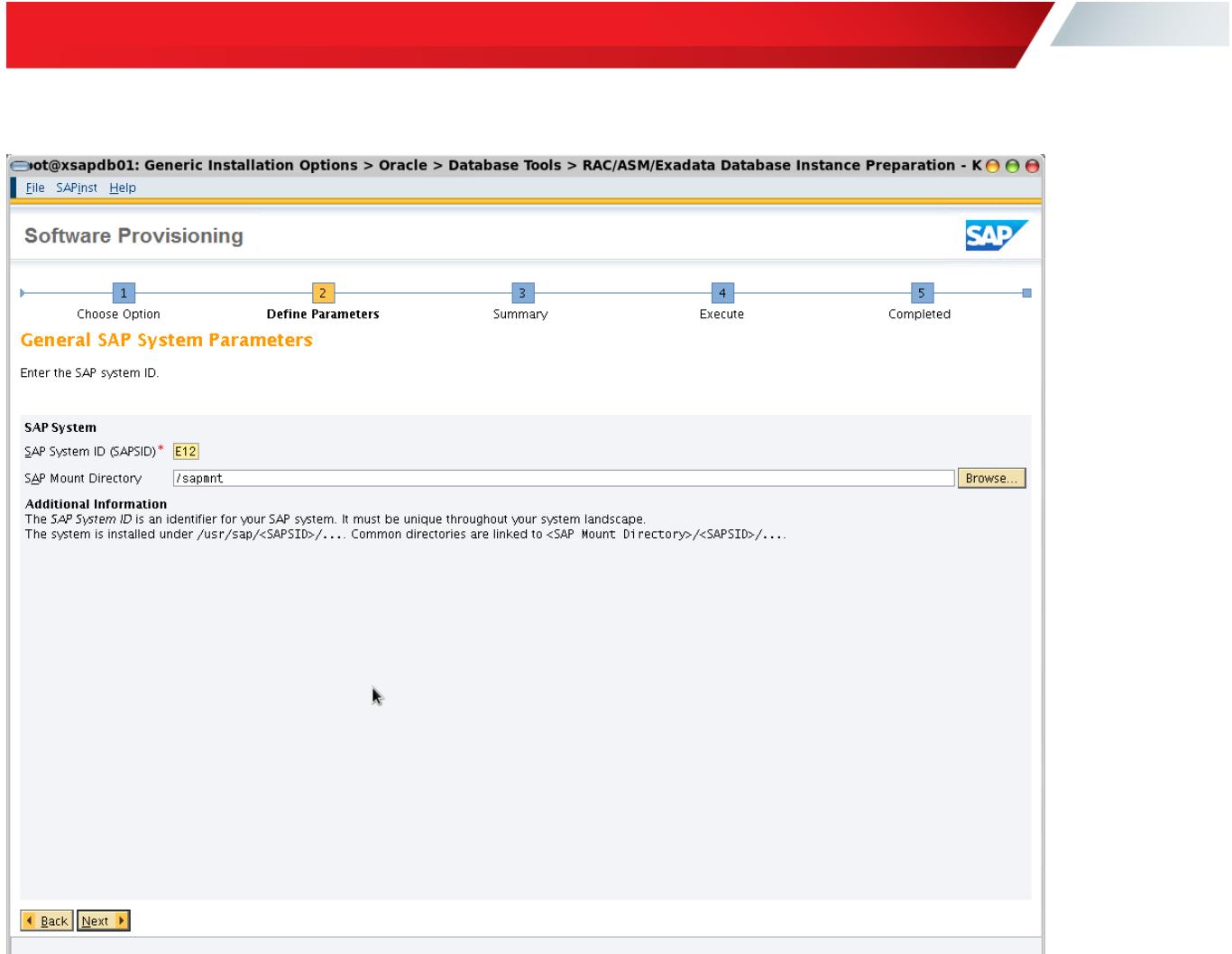
on the Oracle Exadata Database Machine compute nodes.

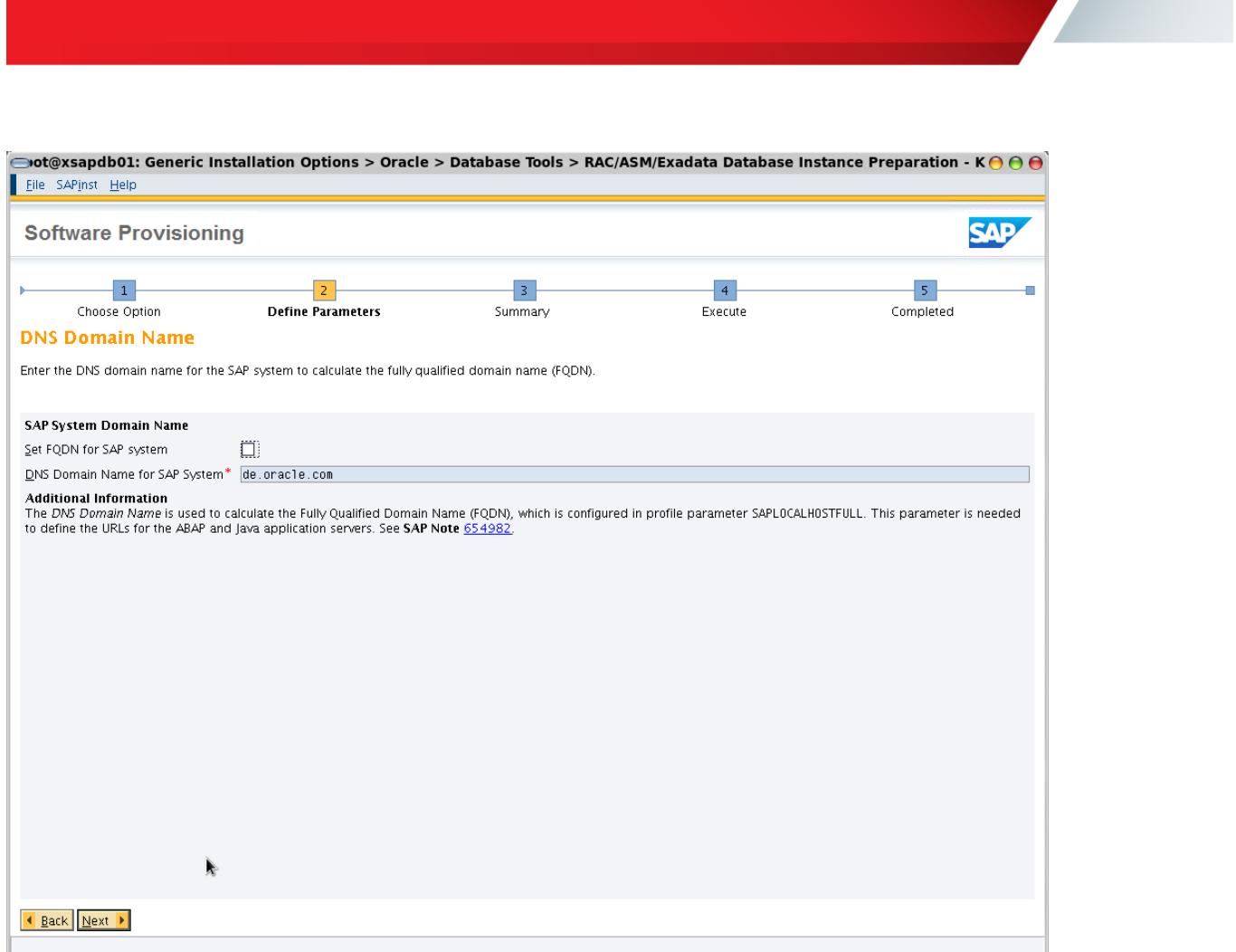
Important: Execute above steps on ALL compute nodes of the Oracle Exadata Database Machine.

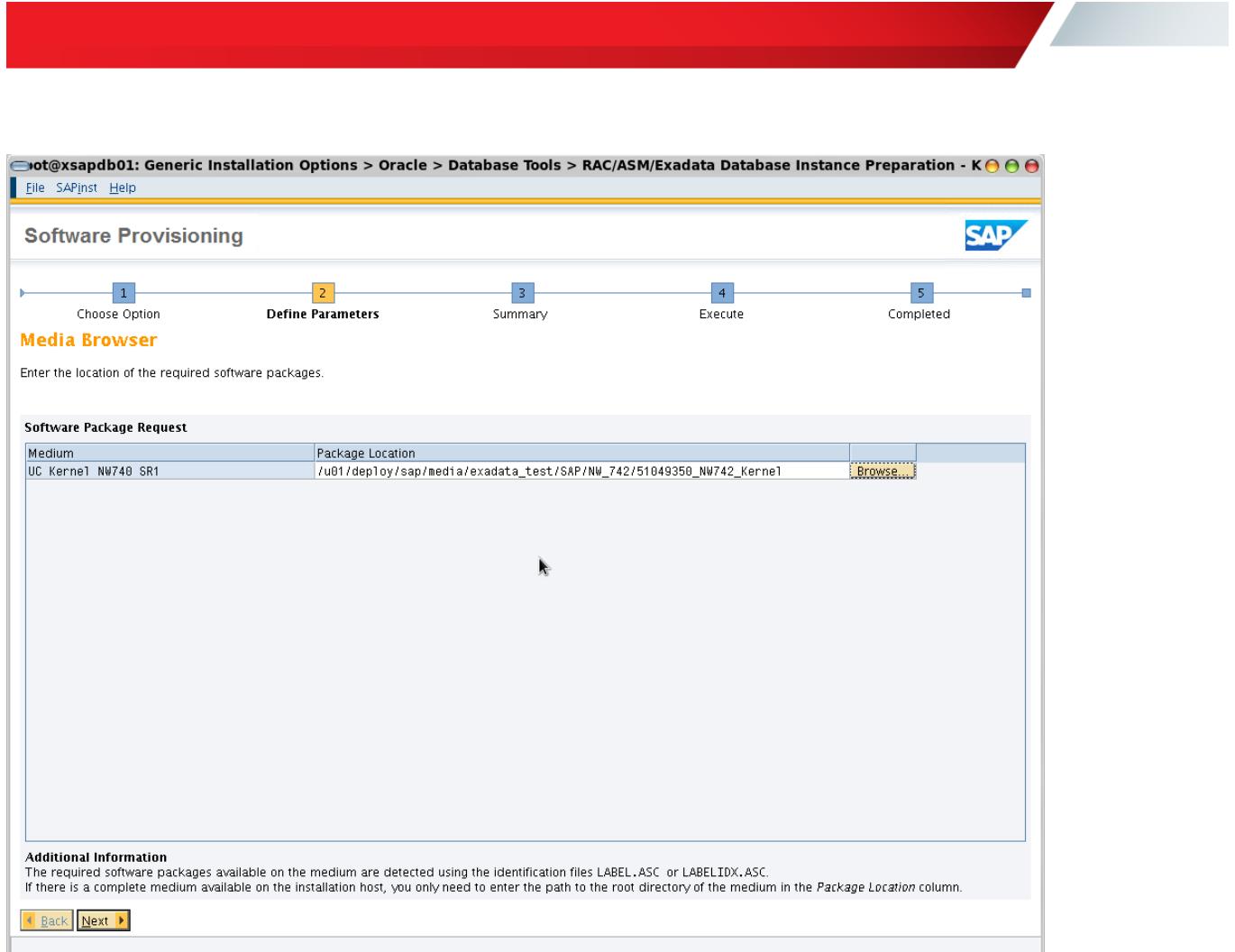


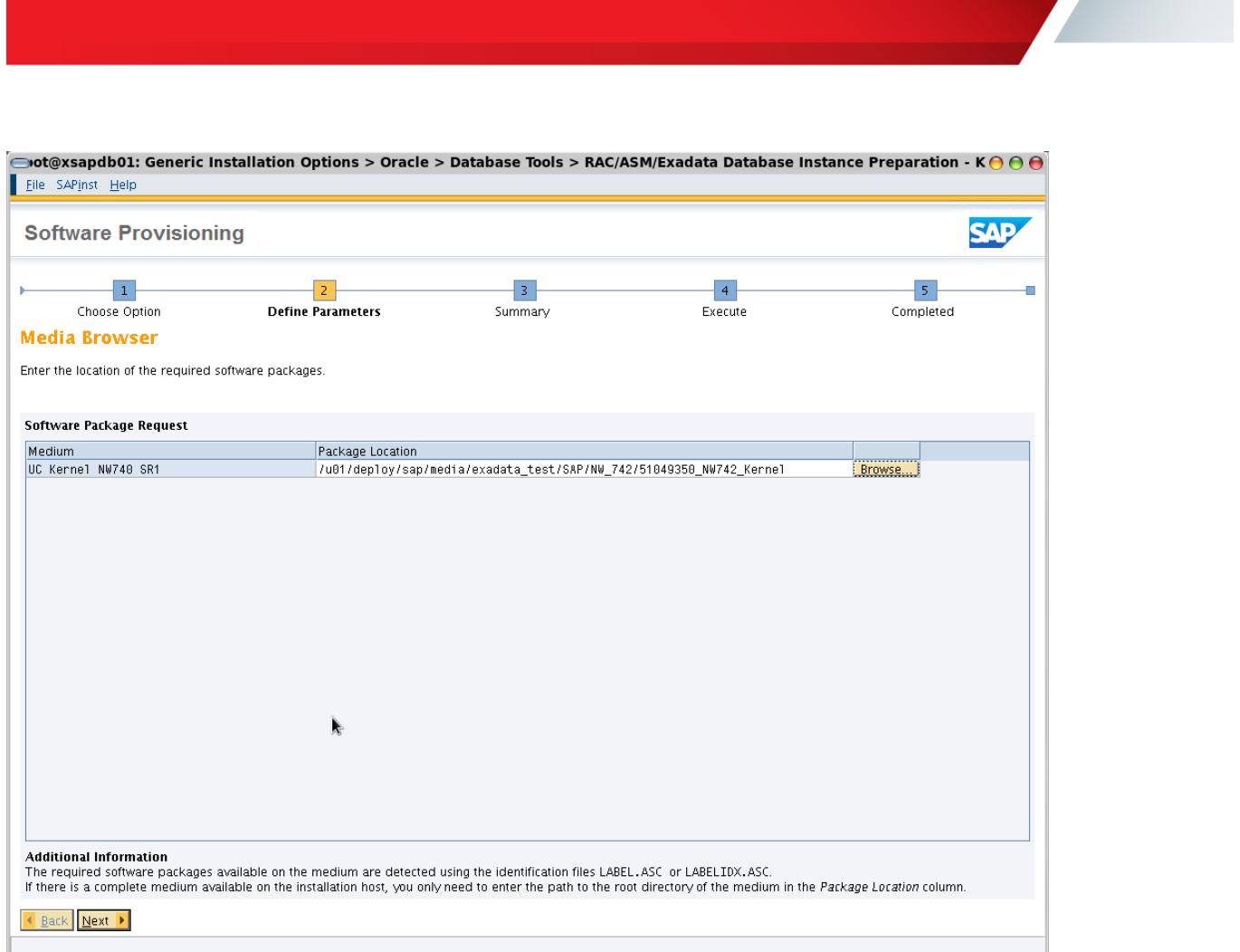


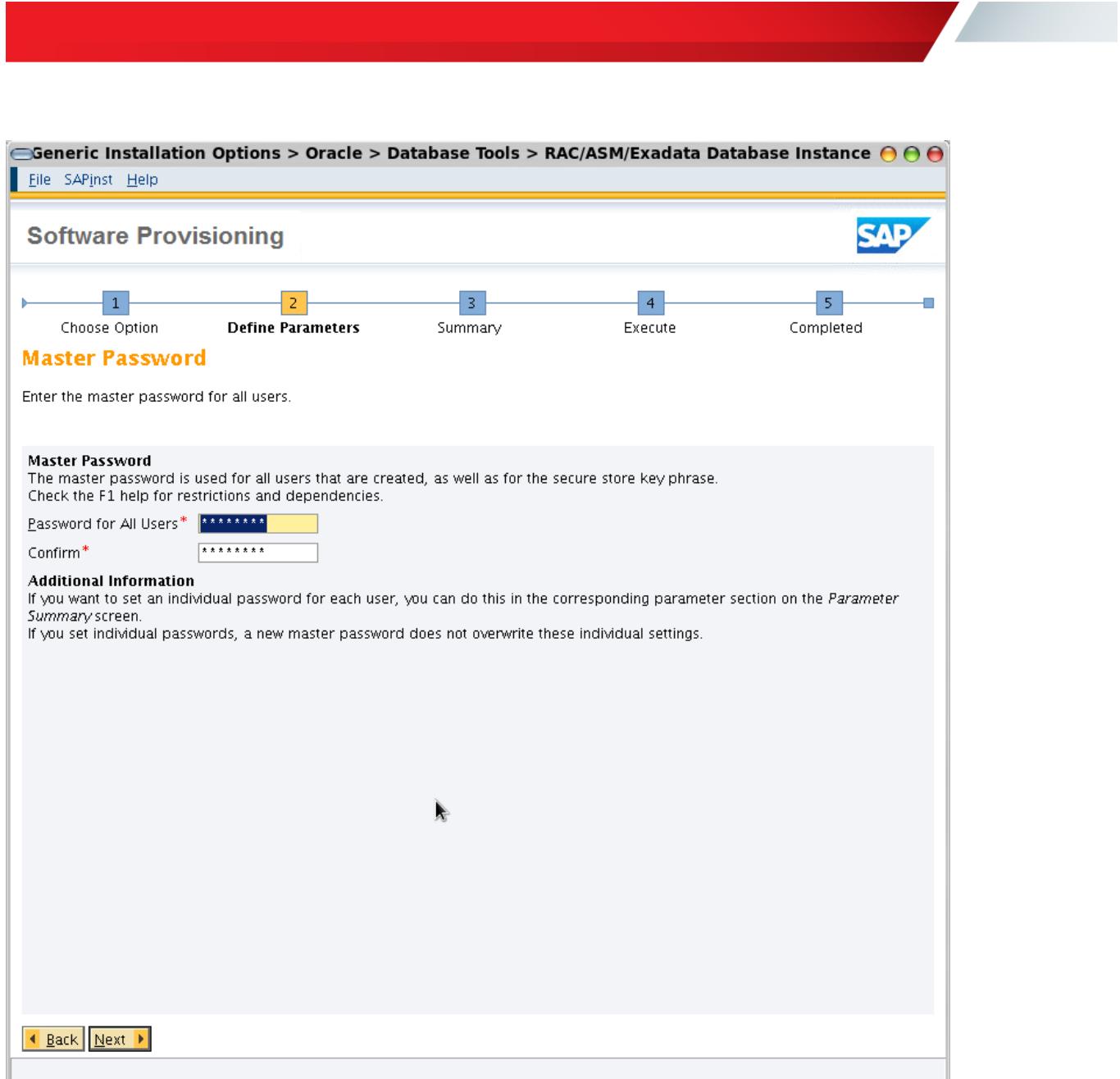












Generic Installation Options > Oracle > Database Tools > RAC/ASM/Exadata Database Instance

File SAPinst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

Operating System Users

Enter the account parameters.

SAP System Administrator

Account: e12adm

Password of SAP System Administrator* *********

Confirm* *********

User ID

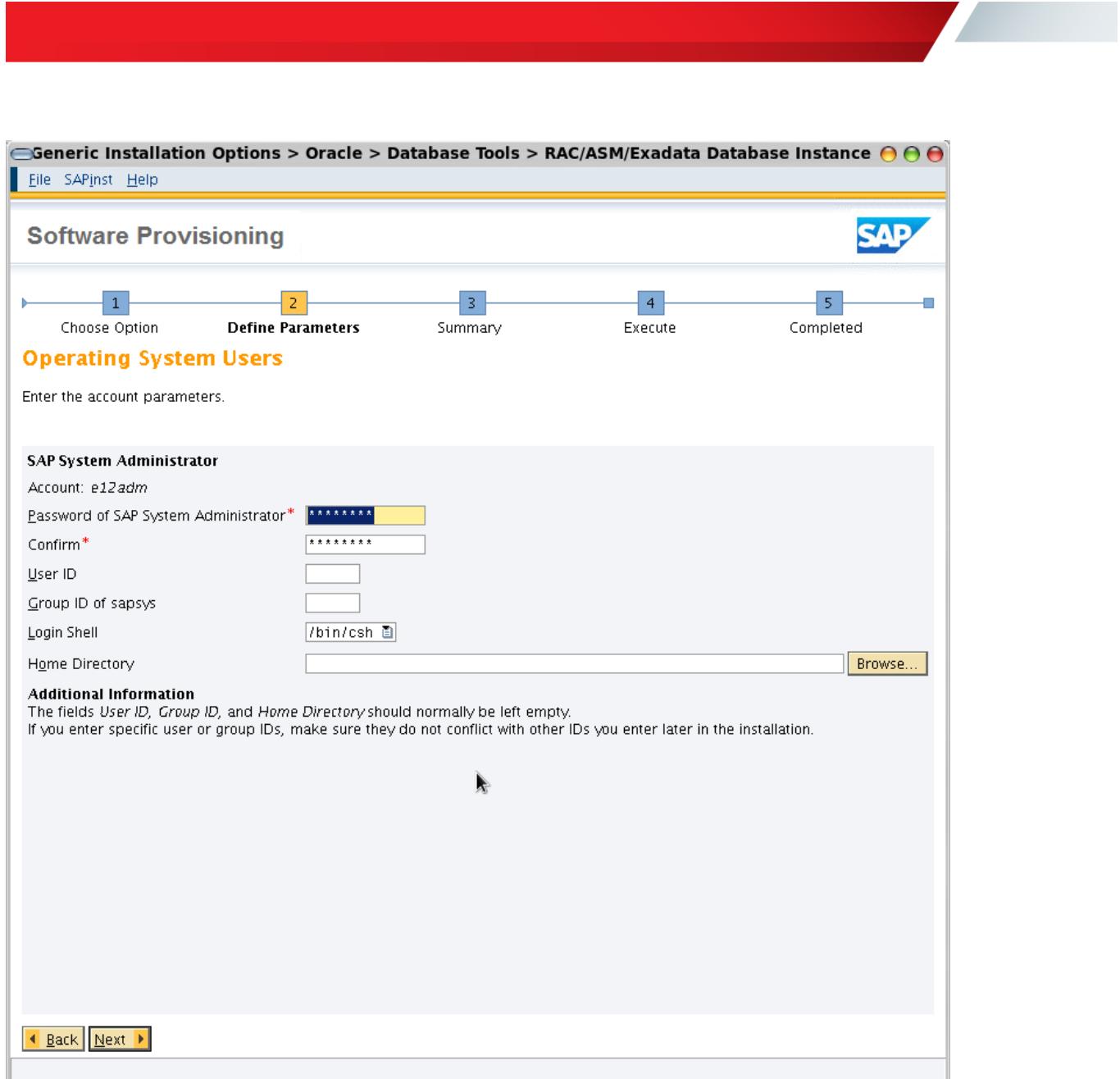
Group ID of sapsys

Login Shell /bin/csh

Home Directory

Additional Information
The fields *User ID*, *Group ID*, and *Home Directory* should normally be left empty.
If you enter specific user or group IDs, make sure they do not conflict with other IDs you enter later in the installation.

Back



Generic Installation Options > Oracle > Database Tools > RAC/ASM/Exadata Database Instance

File SAPinst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

SAP System Database

Enter the database parameters.

Database Identification

Database ID (DBSID)* E12

Oracle Database Installation for RAC on Oracle ASM

Install DB with ora<dbsid> User

Install DB with oracle User

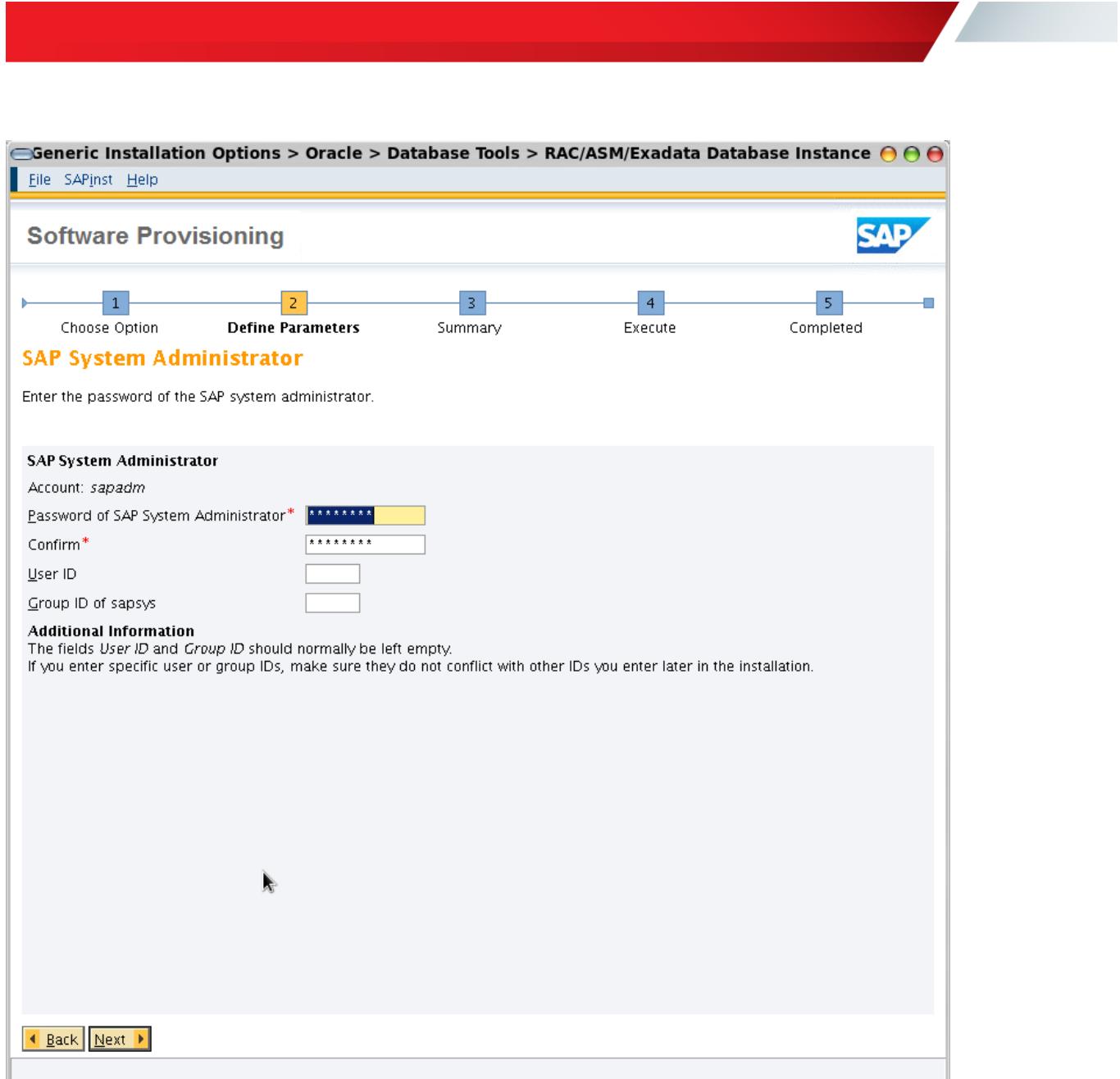
Type of RAC RAC on Engineered Systems (Exadata, SPARC SuperCluster, Database Appliance)

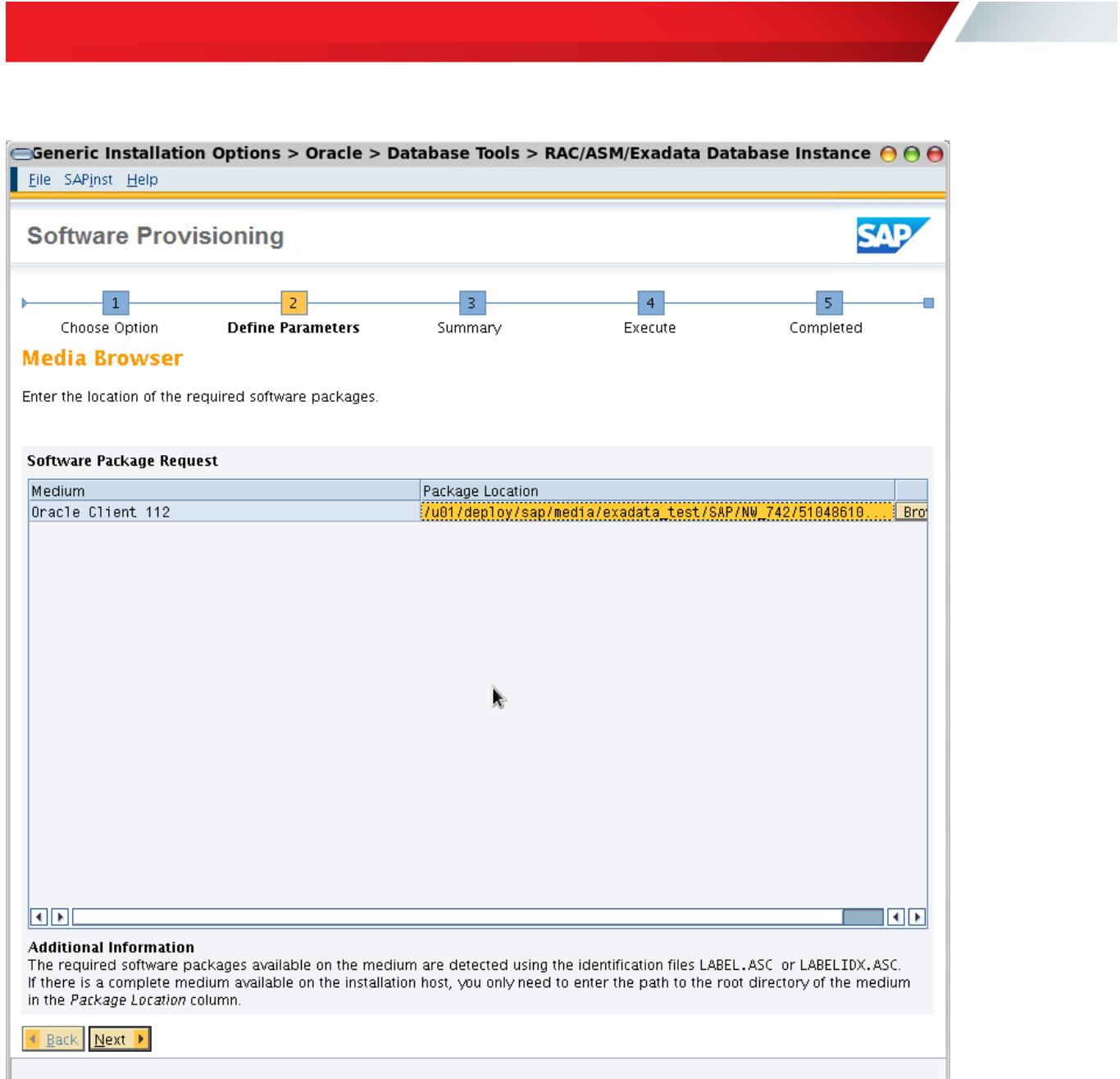
Database Host xsapdb01

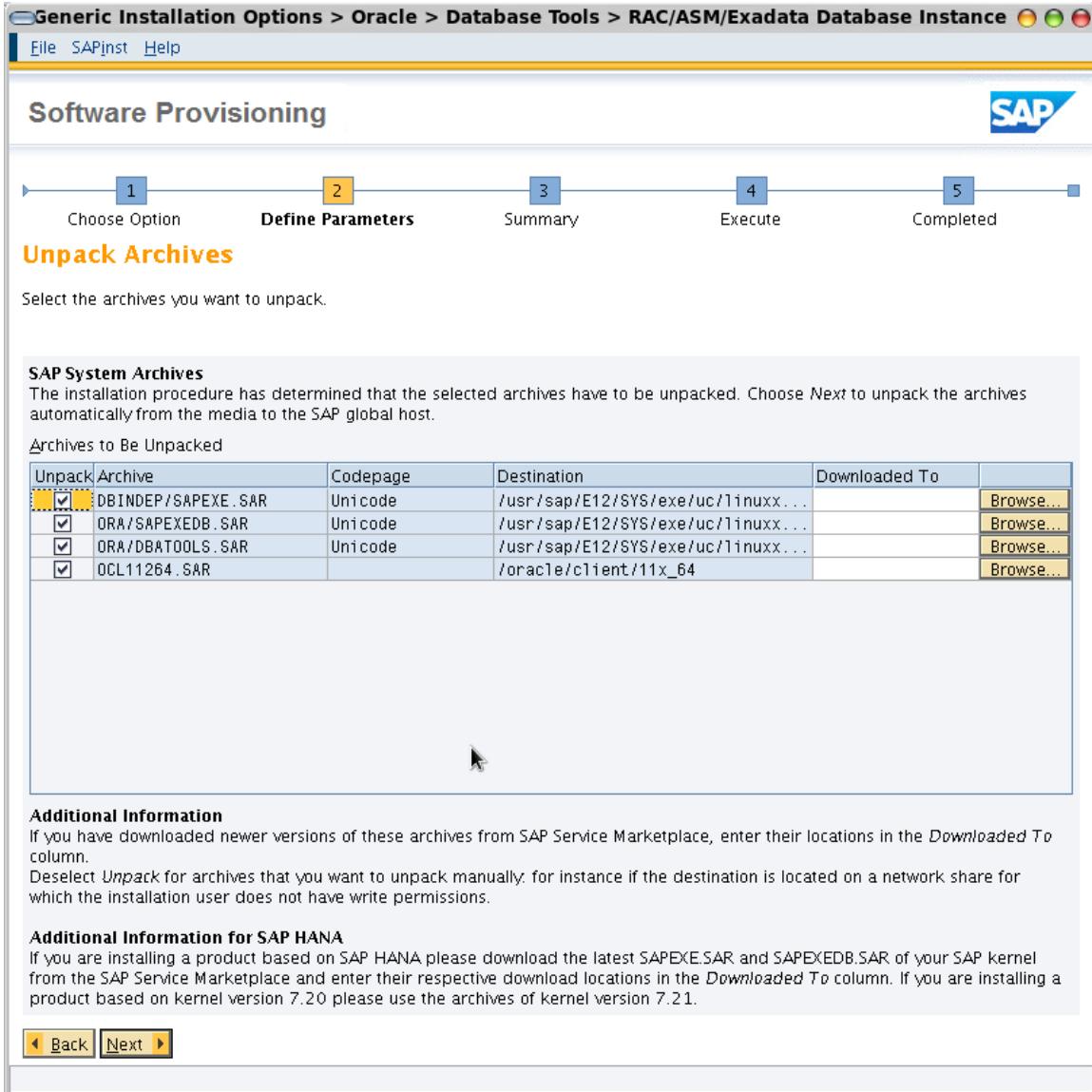
Additional Information

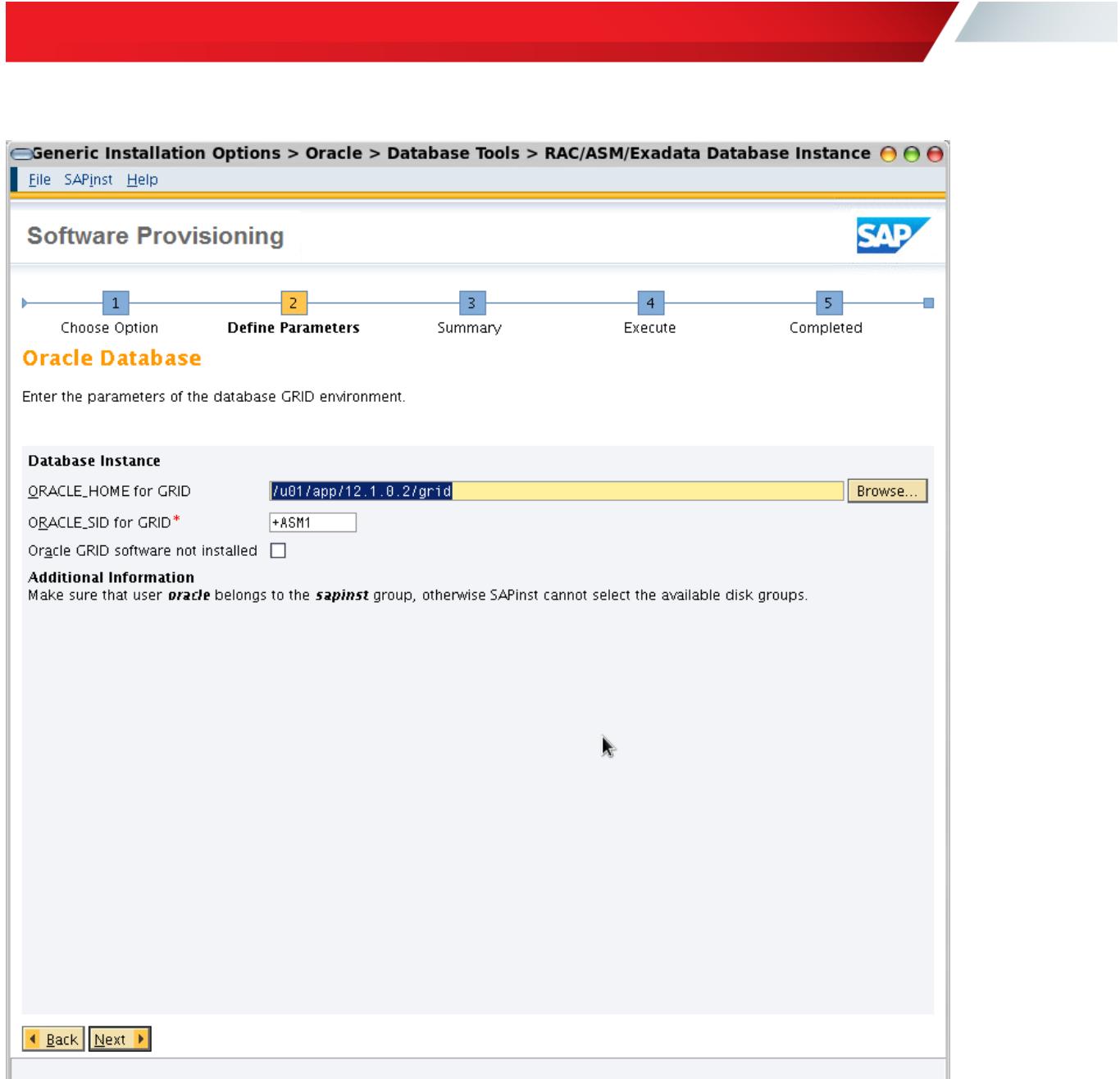
- For SAP system with a **new** database instance, enter the database ID (DBSID) for the database instance to be created.
- You can also enter the DBSID of an **existing** database instance and add the SAP system there.

Back Next









Generic Installation Options > Oracle > Database Tools > RAC/ASM/Exadata Database Instance

File SAPinst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

Oracle > Database RAC Parameters

Enter the parameters of the database RAC – for Oracle experts only

Database RAC Parameters

Database Name	E12
Number of Instances	2
Scan Listener*	xsap-scan1
Scan Listener Port	1521
Length of Instance Number	<input type="radio"/> One Character (1...9) <input checked="" type="radio"/> Three Characters (001 .. 009)

Additional Information
Enter the number of Oracle database instances. The value should be between 2 and 9. The default is 2.

Back Next

Generic Installation Options > Oracle > Database Tools > RAC/ASM/Exadata Database Instance

File SAPinst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

Oracle > Database RAC Parameters

Enter the parameters of the database RAC – for Oracle experts only

Database Parameters for RAC

Host Name	Instance No.
xsapdb01	001
xsapdb02	002

Additional Information
Modify all @@ parameters (Host Name).

Back Next

Generic Installation Options > Oracle > Database Tools > RAC/ASM/Exadata Database Instance

File SAPinst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

Parameter Summary

Choose 'Next' to start with the values shown. Otherwise, select the parameters to be changed and choose 'Revise'. You are then taken to the screen where you can change the parameter. You might be guided through other screens that have so far been processed.

<input checked="" type="checkbox"/> URAV/DBA100LS.SAR	Unicode	/usr/sap/E12/515/ex...
<input checked="" type="checkbox"/> OCL11264.SAR		/oracle/client/11x_64

Oracle Database
 ORACLE_HOME for GRID
 /u01/app/12.1.0.2/grid
 ORACLE_SID for GRID
 +ASM1
 Oracle GRID software not installed

Oracle > Database RAC Parameters
 Number of Instances
 2
 Scan Listener
 xsap-scan1
 Scan Listener Port
 1521
 Length of Instance Number
 Three Characters (001 .. 009) ▾

Oracle > Database RAC Parameters

Host Name	Instance No.
xsapdb01	001
xsapdb02	002

[Back](#) [Next](#) [Revise](#) [Show Detail](#)

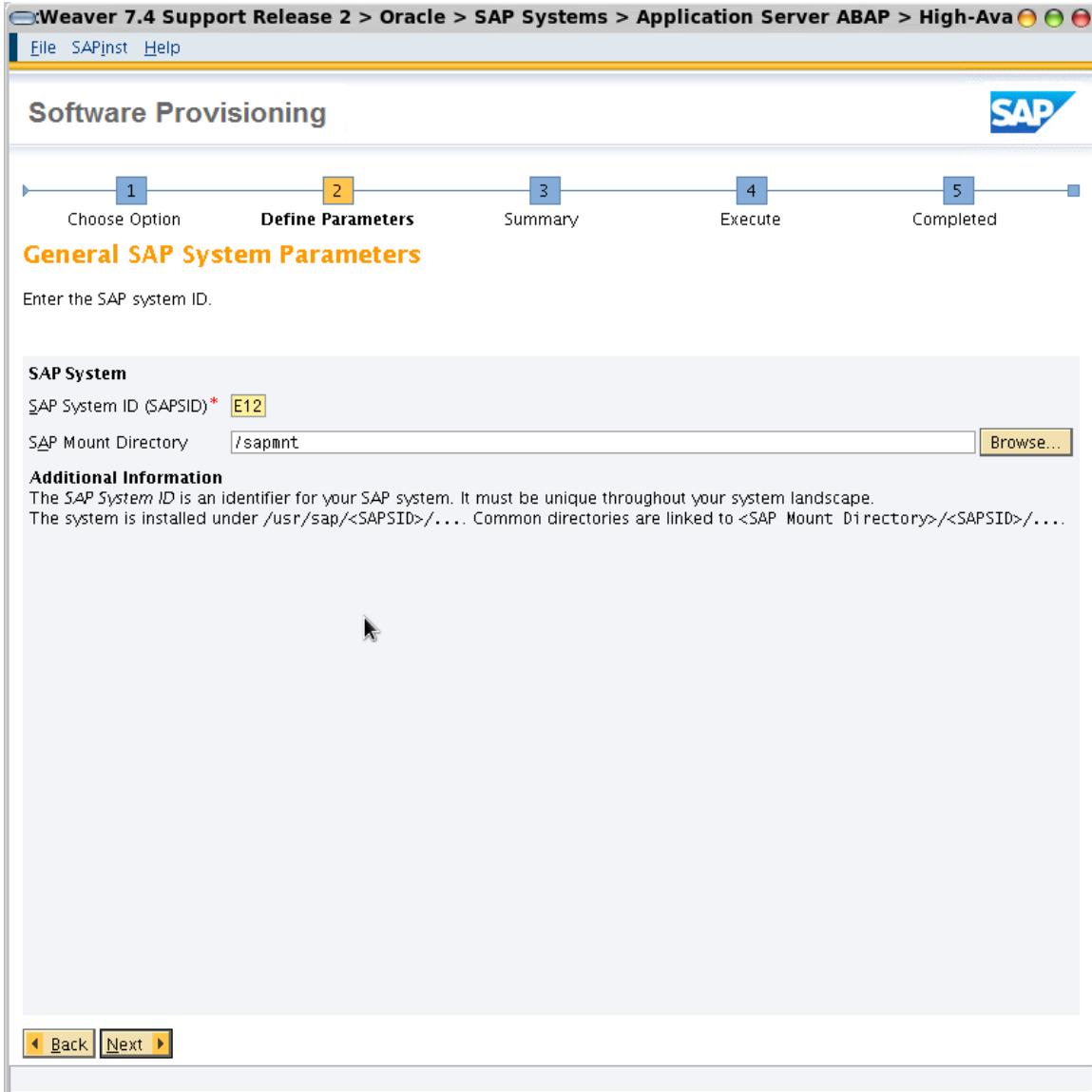
Note: It may be necessary to download a more current version of BR*Tools to be used for Oracle Database 12c and Oracle Exadata. As a minimum you need BR*Tools 7.40 Patch 14 for Oracle Database 12c. You should always use the most current version of BR*Tools. See SAP Note 12741 for more information.

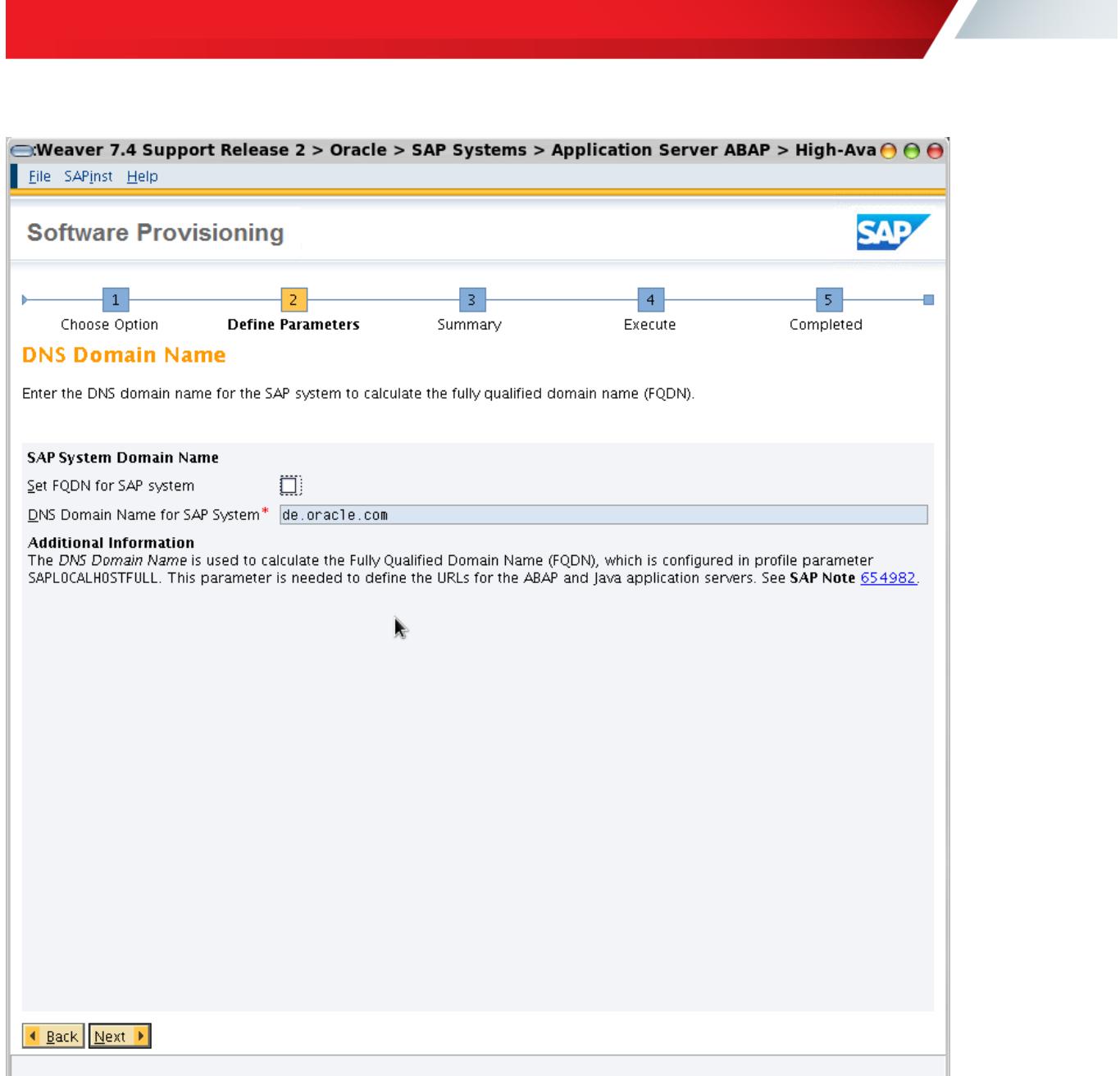


Installation of SAP Central Services with SAP SWPM

The following screens show an installation of the ABAP central services ASCS. Installation of JAVA central services SCS works the same.

The screenshot shows the SAP Installation Master Software Provisioning interface. The title bar reads "SAPinst root@xsapdb01". The main window is titled "Software Provisioning" with the SAP logo in the top right. A progress bar at the top indicates steps 1 through 5: "Choose Option" (yellow), "Define Parameters" (blue), "Summary" (blue), "Execute" (blue), and "Completed" (blue). Below the progress bar, the text "Welcome to SAP Installation" is displayed in orange. A note below it says: "Before you start the installation, make sure that you have identified the required capabilities as described in the Master Guide." A descriptive message on the right side states: "Go to the option you want to execute. To display relevant help information in the right-hand panel, select an option or folder." The left pane shows a tree view of installation options under "SAP NetWeaver 7.4 Support Release 2", including "IBM DB2 for Linux, UNIX, and Windows", "MaxDB", and "Oracle" with sub-options like "Preparations", "SAP Systems", "Application Server ABAP" (which has "Standard System", "Distributed System", and "High-Availability System" sub-options, with "ASCS Instance" highlighted in yellow), "Process Integration", "Application Server Java", "Standalone Engines", "Optional Standalone Units", "Additional SAP System Instances", "System Copy", "SAP HANA Database", and "SAP ASE". The right pane, titled "Description", provides details about the selected "ASCS Instance": "Installs the ABAP central services instance (ASCS instance). First step in installing a high-availability (HA) SAP NetWeaver 7.4 Support Release 2 ABAP system. You must install the ASCS instance on a shared disk. Make sure that you assigned a **virtual host name** using command line option SAPINST_USE_HOSTNAME when you started software provisioning manager 1.0 to execute this option." It also defines "ASCS Instance" as "The ASCS instance is the main point of communication and synchronization for the ABAP application server instances. It consists of the message server and the enqueue server for the ABAP stack." At the bottom left is a "Next >" button.





The screenshot shows a SAP NetWeaver interface titled "Software Provisioning". The top navigation bar includes "File", "SAPinst", and "Help" buttons, along with a SAP logo. A progress bar at the top indicates five steps: 1. Choose Option, 2. Define Parameters (which is highlighted in yellow), 3. Summary, 4. Execute, and 5. Completed.

Media Browser

Enter the location of the required software packages.

Software Package Request

Medium	Package Location	Actions
UC Kernel NW740 SR2	/u01/deploy/sap/media/exadata_test/SAP/...	Browse...

Additional Information

The required software packages available on the medium are detected using the identification files LABEL.ASC or LABELIDX.ASC. If there is a complete medium available on the installation host, you only need to enter the path to the root directory of the medium in the *Package Location* column.

[Back](#) [Next](#)

Weaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > High-Ava

File SAPinst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

Master Password

Enter the master password for all users.

Master Password
The master password is used for all users that are created, as well as for the secure store key phrase.
Check the F1 help for restrictions and dependencies.

Password for All Users* *****

Confirm* *****

Additional Information
If you want to set an individual password for each user, you can do this in the corresponding parameter section on the Parameter Summary screen.
If you set individual passwords, a new master password does not overwrite these individual settings.

Back Next

Weaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > High-Availability

File SAPinst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

ASCS Instance

Enter the instance parameters for the ABAP central services (ASCS) instance.

The following SAP system instances already exist on this host:

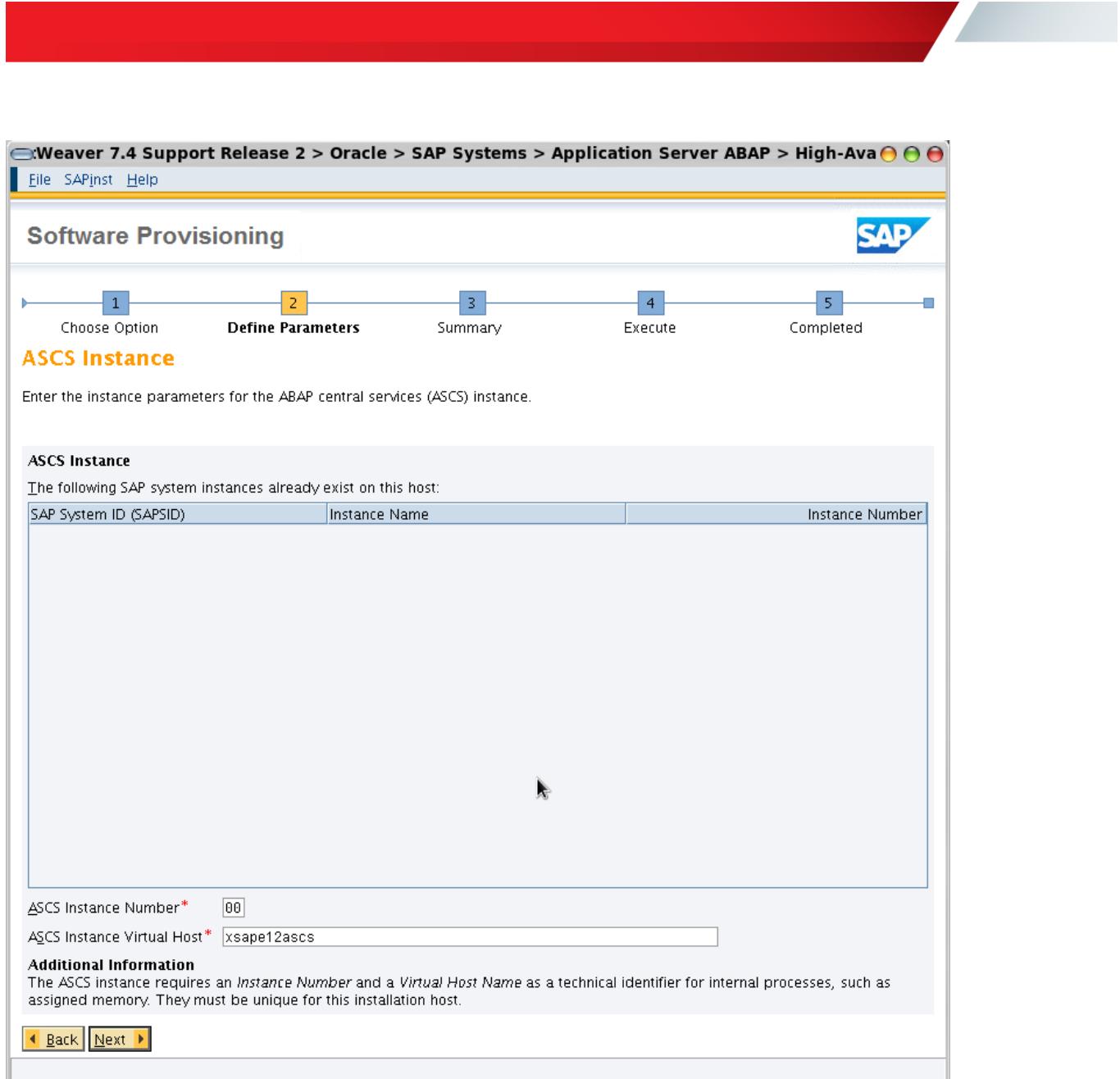
SAP System ID (SAPSID)	Instance Name	Instance Number

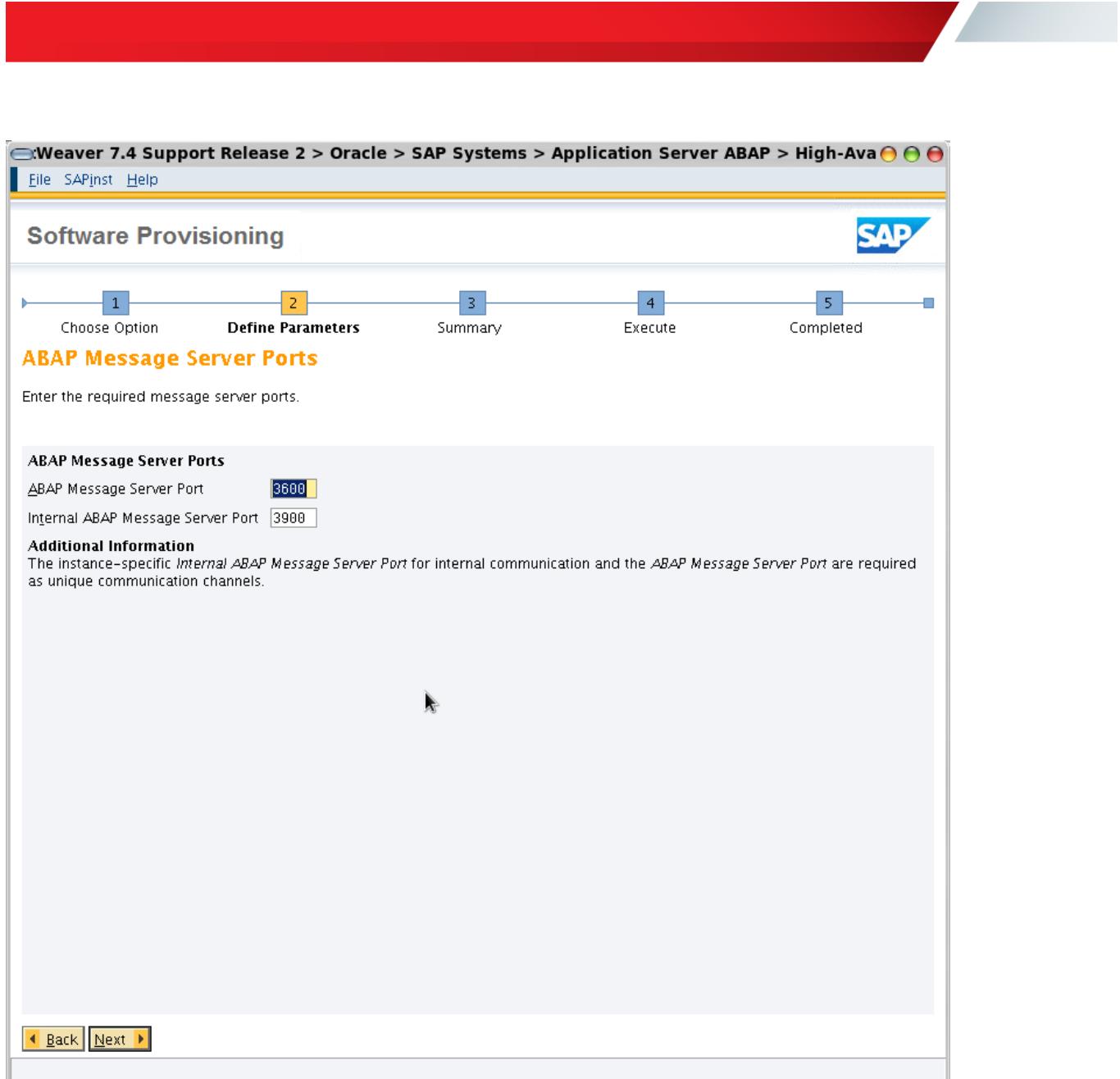
ASCS Instance Number*: 00

ASCS Instance Virtual Host*: xsape12ascsc

Additional Information
The ASCS instance requires an *Instance Number* and a *Virtual Host Name* as a technical identifier for internal processes, such as assigned memory. They must be unique for this installation host.

Back Next





Weaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > High-Availability

[File](#) [SAPinst](#) [Help](#)

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

Parameter Summary

Choose 'Next' to start with the values shown. Otherwise, select the parameters to be changed and choose 'Revise'. You are then taken to the screen where you can change the parameter. You might be guided through other screens that have so far been processed.

Parameter list

General SAP System Parameters

SAP System ID (SAPSID)
E12

SAP Mount Directory
/sapmnt

DNS Domain Name

Set FQDN for SAP system

Master Password

Password for All Users

ASCS Instance

ASCS Instance Number
00

ASCS Instance Virtual Host
xsape12ascos

ABAP Message Server Ports

ABAP Message Server Port
3600

Internal ABAP Message Server Port
3900

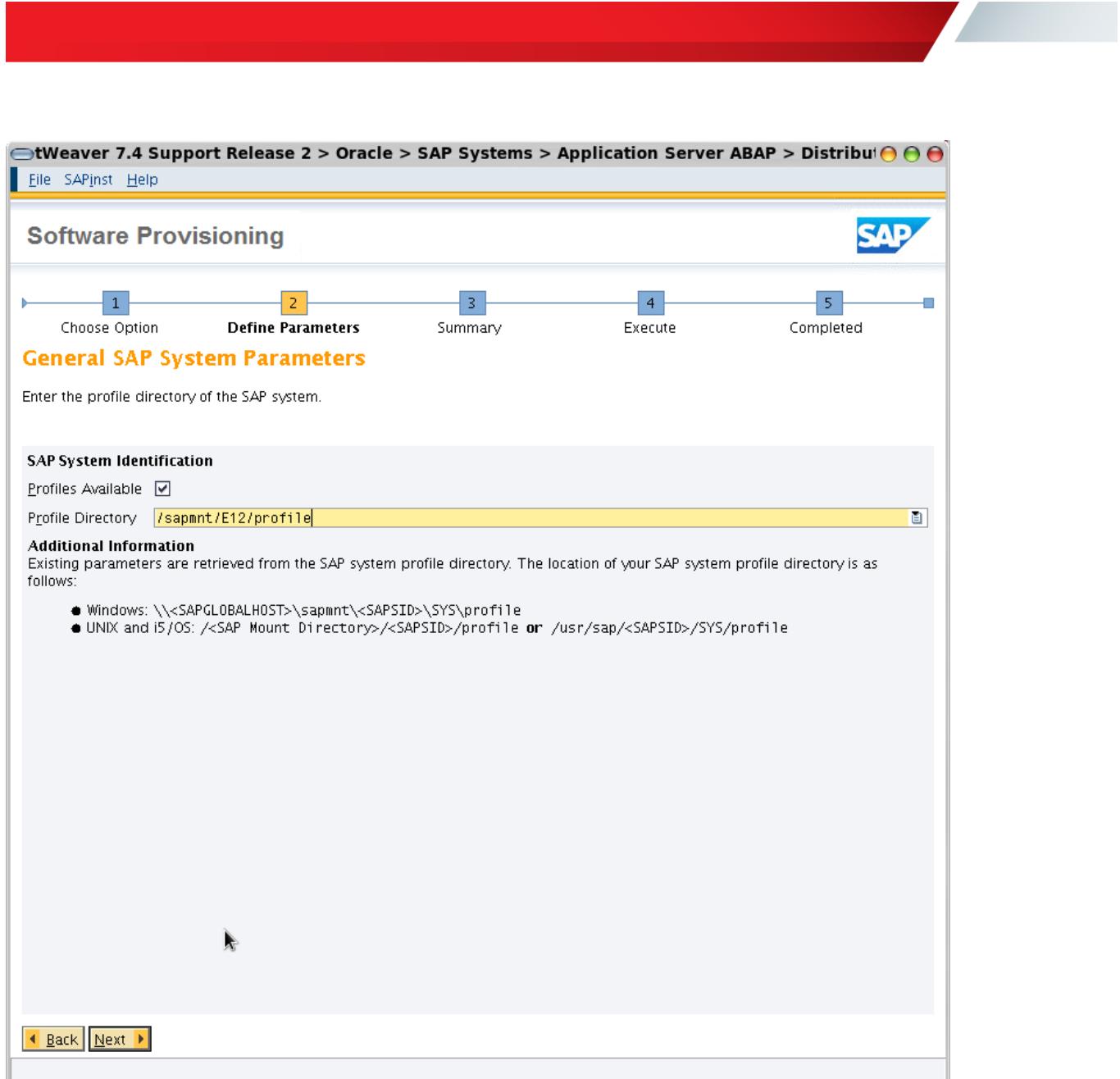
[Back](#) [Next](#) [Revise](#) [Show Detail](#)



Installation of the Oracle Database for SAP with SAP SWPM

The following screens show the installation of an Oracle 12c database with SAP SWPM on the Oracle Exadata Database Machine.

The screenshot shows the SAP NetWeaver interface for Oracle Database distribution. The title bar reads "tWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distribution". The main area is titled "Software Provisioning" with the SAP logo. A progress bar at the top indicates five steps: 1 Choose Option, 2 Define Parameters (which is highlighted in yellow), 3 Summary, 4 Execute, and 5 Completed. Below the progress bar, the section "Parameter Settings" is displayed. It contains a heading "Parameter Settings" and a "Parameter Mode" section with two radio buttons: "Typical" (unchecked) and "Custom" (checked). A note below says "Choose whether you want to run the installation in a typical or a custom mode." Under "Additional Information", it says "You can run the installation either in a typical or a custom mode:" followed by two bullet points: "● Typical Mode" and "● Custom Mode". The "Typical Mode" point describes the process of choosing default settings. The "Custom Mode" point describes the process of being prompted for all parameters. At the bottom of the screen are "Back" and "Next" buttons.



tWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distribution

File SAPinst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

Master Password

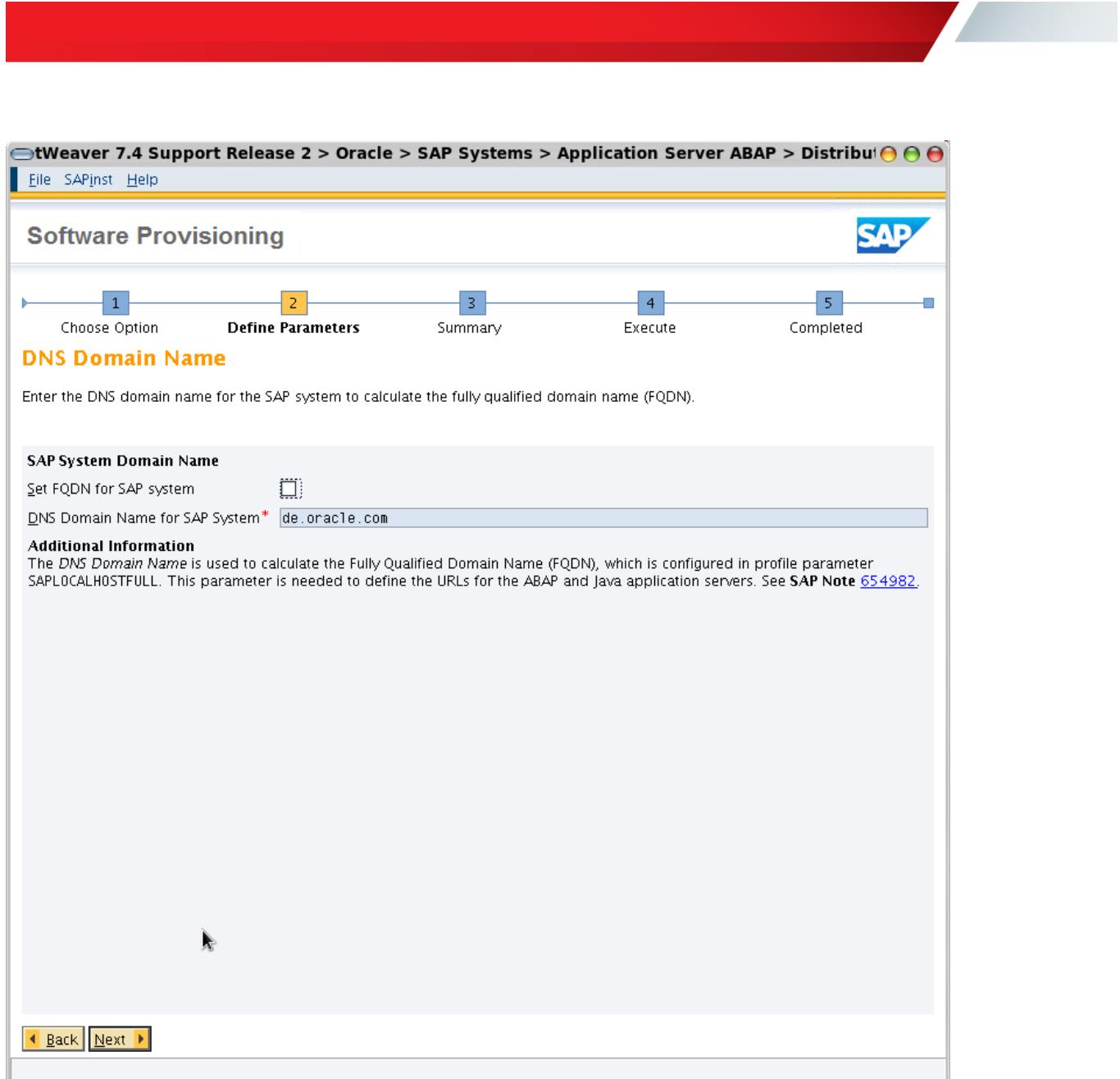
Enter the master password for all users.

Master Password
The master password is used for all users that are created, as well as for the secure store key phrase.
Check the F1 help for restrictions and dependencies.

Password for All Users* Confirm*

Additional Information
If you want to set an individual password for each user, you can do this in the corresponding parameter section on the Parameter Summary screen.
If you set individual passwords, a new master password does not overwrite these individual settings.

Back Next



The screenshot shows a SAP NetWeaver interface titled "Software Provisioning". The top navigation bar includes "File", "SAPinst", and "Help" buttons, along with a SAP logo. A progress bar at the top indicates five steps: 1. Choose Option, 2. Define Parameters (which is highlighted in yellow), 3. Summary, 4. Execute, and 5. Completed.

Media Browser

Enter the location of the required software packages.

Software Package Request

Medium	Package Location	Actions
UC Kernel NW740 SR2	/u01/deploy/sap/media/exadata_test/SAP/...	Browse...

Additional Information

The required software packages available on the medium are detected using the identification files LABEL.ASC or LABELIDX.ASC. If there is a complete medium available on the installation host, you only need to enter the path to the root directory of the medium in the *Package Location* column.

[Back](#) [Next](#)

Software Provisioning

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

SAP System Database

Enter the database parameters.

Database Identification

Database ID (DBSID)* E12

Oracle Database Installation for

- Single Instance on Filesystem
- Single Instance on Shared Oracle Home
- Single Instance on Oracle ASM
- RAC on Filesystem
- RAC on Oracle ASM

Type of RAC RAC on Engineered Systems (Exadata, SPARC SuperCluster, Database Appliance)

Database Host xsapdb01

Additional Information

- For SAP system with a **new** database instance, enter the database ID (DBSID) for the database instance to be created.
- You can also enter the DBSID of an **existing** database instance and add the SAP system there.

Back

tWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distribution

File SAPinst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

Media Browser

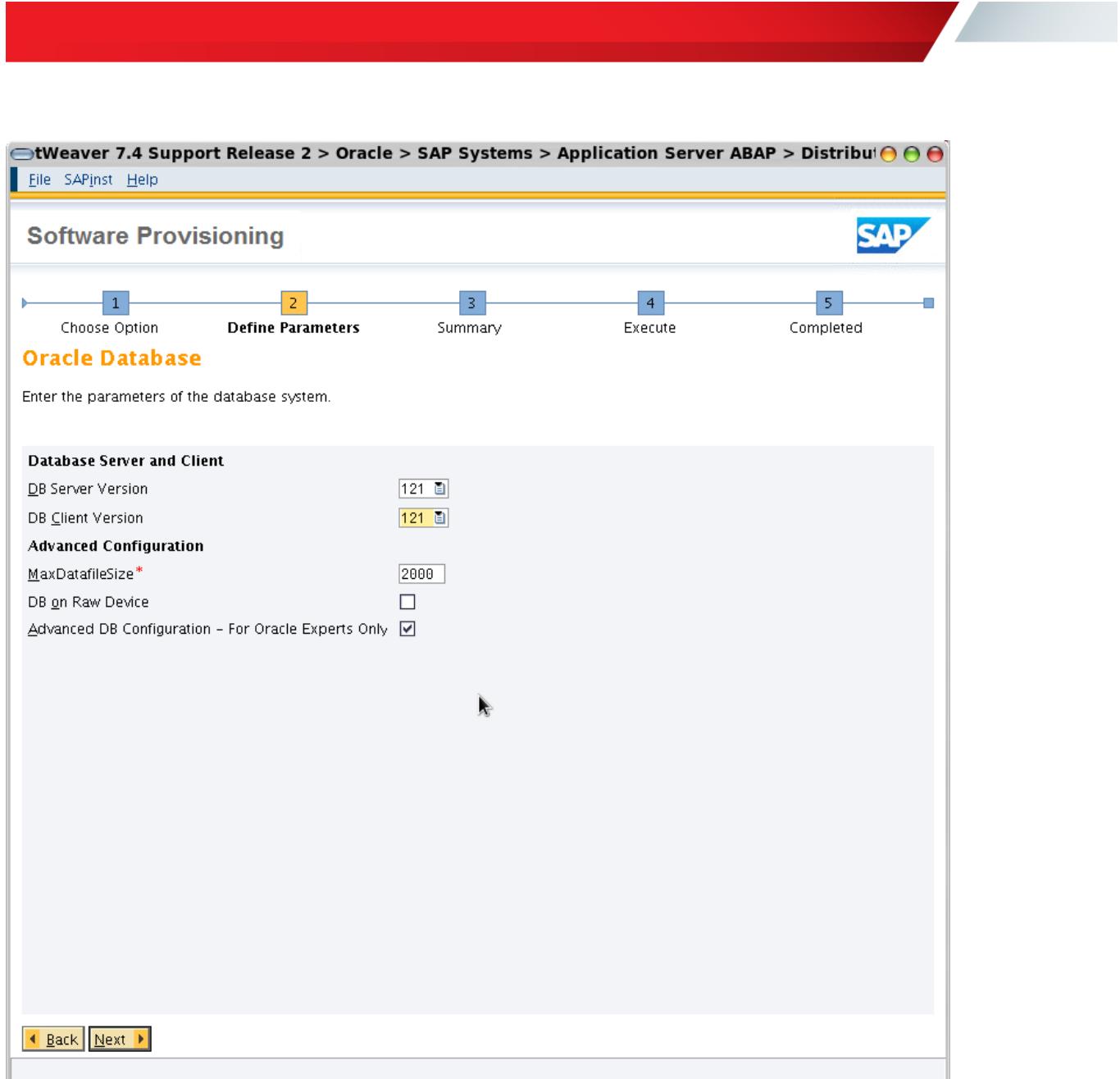
Enter the location of the required software packages.

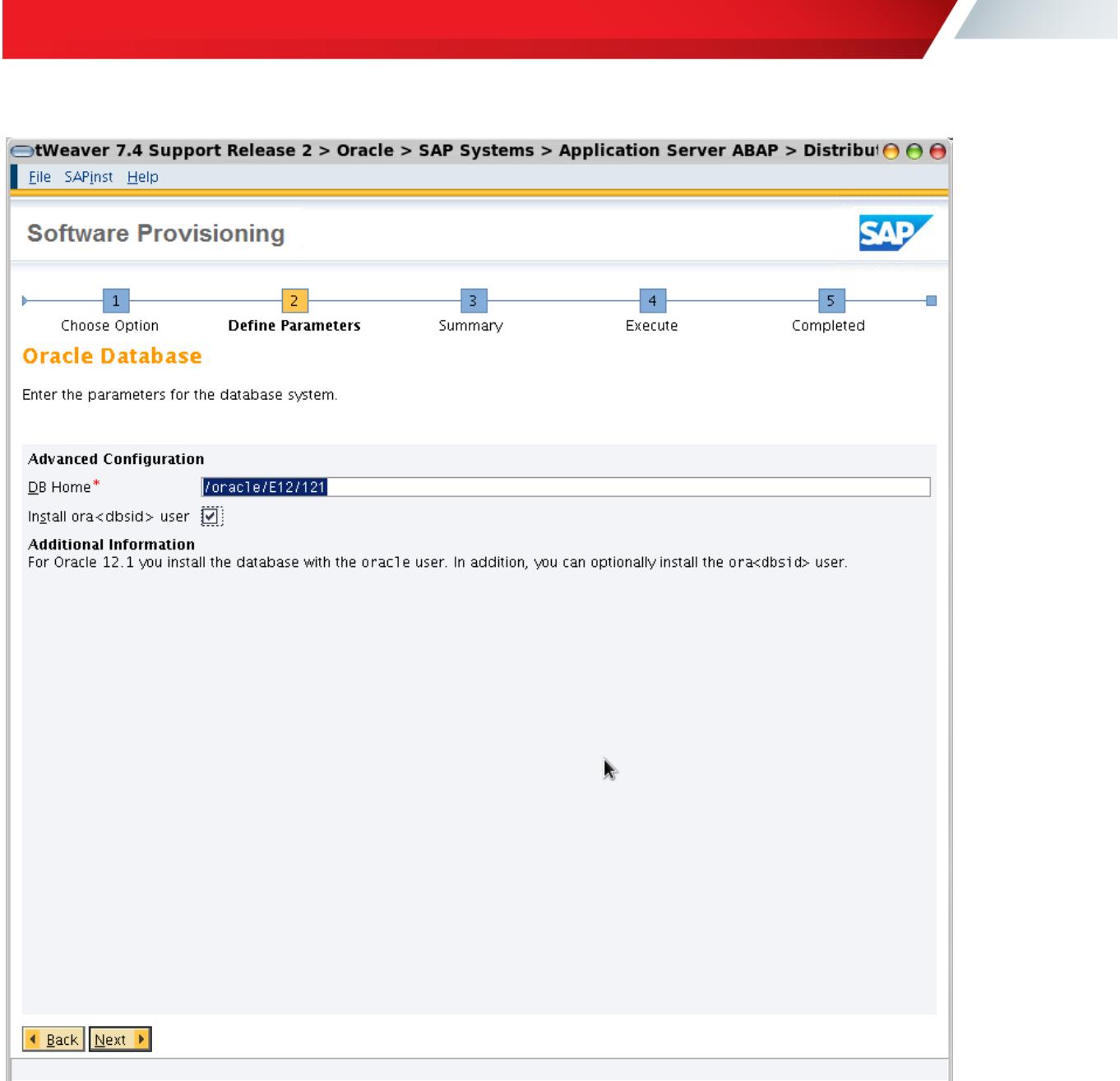
Software Package Request

Medium	Package Location	Check Location
Installation Export NW740 SR2 (folder EXP1)	/u01/deploy/sap/media/exadata_test/SAP... Browse...	<input checked="" type="checkbox"/>

Additional Information
The required software packages available on the medium are detected using the identification files LABEL.ASC or LABELIDX.ASC. If you do not want to check the locations of the software packages now, deselect the flag in the Check Location column. Later, you are prompted again to check the locations of the software packages.

Back Next





Note: Make sure that the ora<dbsid> user gets created. Therefore make a checkmark at “Install ora<dbsid> user” in above screen. Without the ora<dbsid> user certain SAP discovery functionality at OS and database level does not work correctly.

tWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distribution

Software Provisioning

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

Oracle Database

Enter the parameters of the database system.

Attention
An existing database cannot be detected.

Reuse Database Install MCOD (Multiple Components in One Database) Install Database (Recreate if exists);

Sidadm User for RAC MCOD connect
sidadm or db connect user

Length of Instance No. One Character (1...9) Three Character (001 ... 009)

Database Instance RAM
Total RAM [MB]
Instance RAM [MB]

Database Schemas
The new default for ABAP Schema is SAPSR3.
As of Oracle server version 12.1, ABAP SSFS is set automatically.

ABAP Schema*
Password of ABAP Schema*
Confirm*
ABAP SSFS

Navigation: Back Next

tWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distribution

File SAPinst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

Oracle Database Accounts

Enter the passwords of the standard database users.

Oracle Database Users

Password of 'sys'*: *****

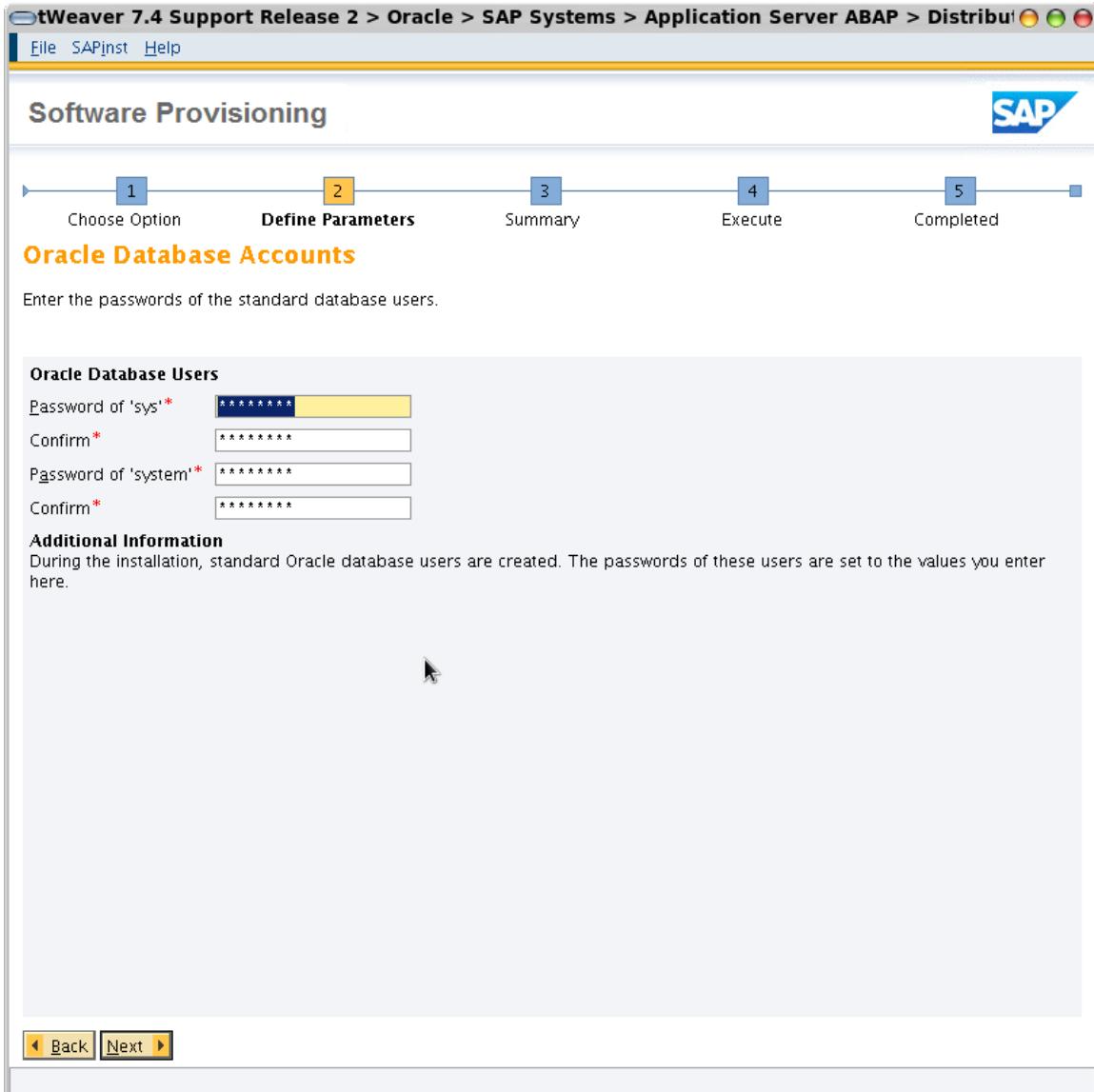
Confirm*: *****

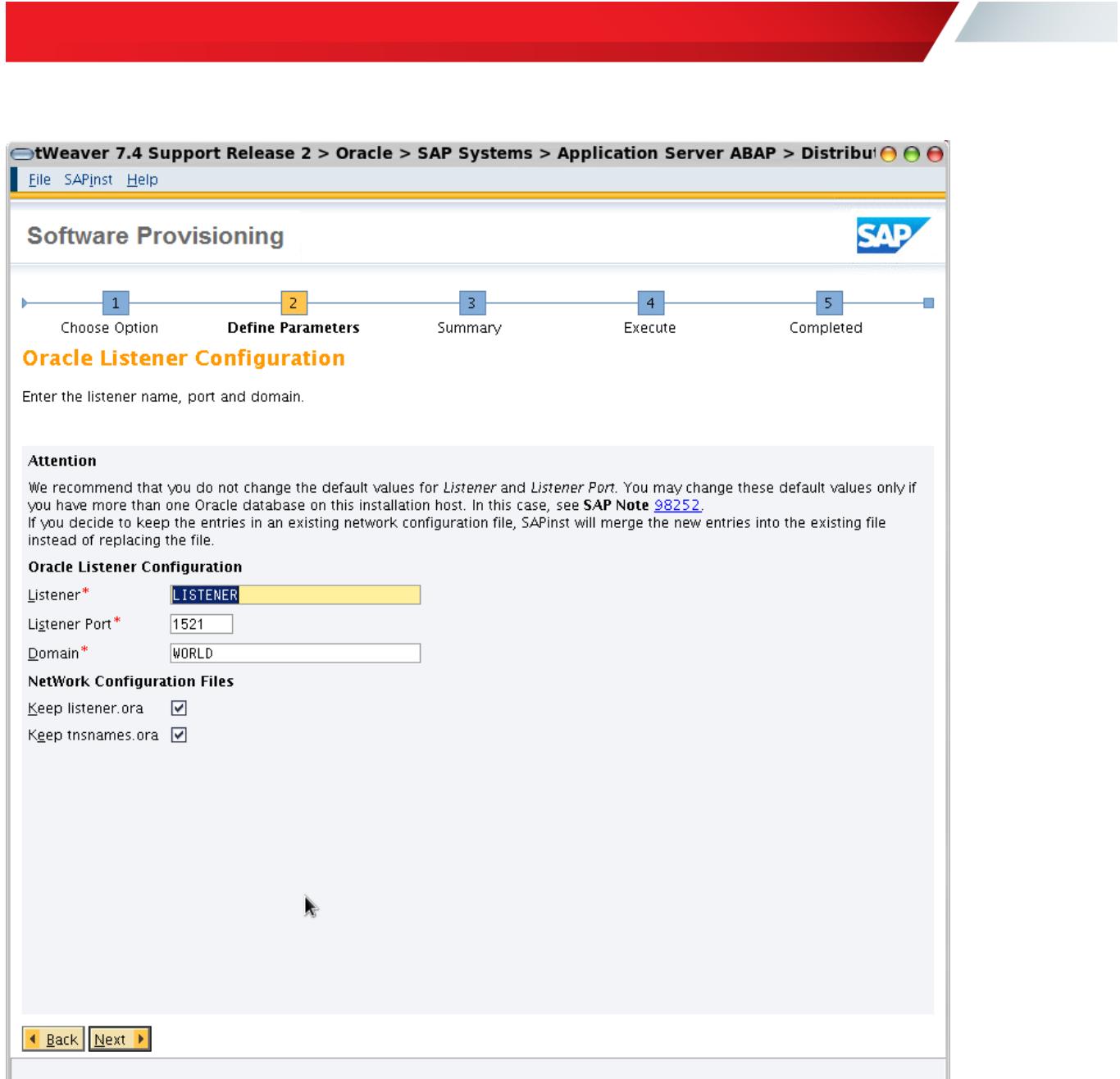
Password of 'system'*: *****

Confirm*: *****

Additional Information
During the installation, standard Oracle database users are created. The passwords of these users are set to the values you enter here.

Back Next





The screenshot shows the SAP NetWeaver 7.4 Support Release 2 software provisioning interface. The title bar indicates the path: **tWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distribution**. The main header is **Software Provisioning**, with the SAP logo in the top right corner.

A progress bar at the top shows five steps: **1 Choose Option**, **2 Define Parameters** (which is currently selected), **3 Summary**, **4 Execute**, and **5 Completed**.

Oracle Database

Enter the parameters of the database GRID environment.

Database Instance

ORACLE_HOME for GRID: /u01/app/12.1.0.2/grid

ORACLE_SID for GRID *: +ASM1

Oracle GRID software not installed:

Additional Information
Make sure that user **oracle** belongs to the **sapinst** group, otherwise SAPinst cannot select the available disk groups.

At the bottom left, there are navigation buttons: **Back** and **Next**.

tWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distribution

Software Provisioning

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

Oracle > ASM Diskgroup

Enter the available ASM Diskgroups - for Oracle exports only

ASM Diskgroup Configuration

Default ASM diskgroup for +DATA	+DATAC1
Default ASM diskgroup for +RECO	+RECOC1
Default ASM diskgroup for +ARCH	+RECOC1
Parameter compatible in init.ora	11.2.0.2.0

ASM Diskgroup Information

DiskGroup	Freespace in MB	Compatibility
+DATAC1	6958977	11.2.0.2.0
+DBFS	576224	11.2.0.2.0
+RECOC1	1796160	11.2.0.2.0

Add Remove

Back Next

Note: There is no need to change the value of 11.2.0.2.0 in the line "Parameter compatible in init.ora". This value describes the minimum version of the database which can be created on the existing ASM disk groups. Later on during the SWPM installation the compatible parameter in the init.ora of the RDBMS instance will be set to 12.1.0.2.0 as we are installing a Oracle 12c database. For an Oracle 12c database in an SAP environment the compatible parameter will be set to minimum 12.1.0.2.0 (see SAP Note 1888485).

tWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distribution

File SAPinst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

Oracle > Database RAC Parameters

Enter the parameters of the database RAC – for Oracle experts only

Database RAC Parameters

Database Name	E12
Number of Instances	2
Scan Listener*	xsap-scan1
Scan Listener Port	1521
Length of Instance Number	<input type="radio"/> One Character (1...9) <input checked="" type="radio"/> Three Characters (001 .. 009)

Additional Information
Enter the number of Oracle database instances. The value should be between 2 and 9. The default is 2.

Back Next

SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed System

File SAPInst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

Oracle > Database RAC Parameters

Enter the parameters of the database RAC – for Oracle experts only

Database Parameters for RAC						
Host Name	Grid SID	Instance No.	Service Name	Undo Tablespace	DiskGroup Undo Tablespace	Size in MB
xsapdb01	+ASM1	001	E12_E12001	PSAPUND0001	+DATAC1	700
xsapdb02	+ASM2	002	E12_E12002	PSAPUND0002	+DATAC1	700

Init.ora RAC Parameters

Parameter	Value
cluster_database	false
remote_listener	xsap-scan1:1521
E12001.instance_number	001
E12001.thread	001
E12001.instance_name	E12001
E12001.undo_tablespace	PSAPUND0001
E12001.service_names	(E12, E12001)
E12002.instance_number	002
E12002.thread	002
E12002.instance_name	E12002
E12002.undo_tablespace	PSAPUND0002
E12002.service_names	(E12, E12002)

Add Remove

Additional Information
 Modify all @@ parameters (Host Name).
 Do not change parameter cluster_database. It will be set by the installer.

Back Next

The screenshot shows the SAP NetWeaver 7.4 Support Release 2 interface for Oracle Database configuration. The title bar indicates the path: SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed System. The main title is "Software Provisioning". A progress bar at the top shows five steps: 1 Choose Option (blue), 2 Define Parameters (orange), 3 Summary (grey), 4 Execute (grey), and 5 Completed (grey). The current step is "Define Parameters".

Advanced Oracle Configuration

Enter the general check parameters – for Oracle experts only.

Advanced Configuration Enablement

Select what you want to configure in advance:

Create Database Parameters

Create Database	<input checked="" type="checkbox"/>
Control Files	<input checked="" type="checkbox"/>

Tablespace Parameters

Create Tablespaces	<input checked="" type="checkbox"/>
Autoextent	<input checked="" type="checkbox"/>
General Storage	<input checked="" type="checkbox"/>
Default Storage	<input checked="" type="checkbox"/>
Extent Management	<input checked="" type="checkbox"/>
Compress Tablespace	<input checked="" type="checkbox"/>

InitOra Parameters

Change/Add init.ora Parameter	<input checked="" type="checkbox"/>
-------------------------------	-------------------------------------

Additional Parameters

Windows Drives	<input type="checkbox"/>
Sapdata Directory Mapping	<input checked="" type="checkbox"/>
Database Instance File Systems	<input checked="" type="checkbox"/>

Navigation

Back Next

The screenshot shows the SAP NetWeaver 7.4 Support Release 2 Software Provisioning interface. The title bar indicates the path: SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed System. The main title is "Software Provisioning". A progress bar at the top shows five steps: 1 Choose Option, 2 Define Parameters (which is currently selected), 3 Summary, 4 Execute, and 5 Completed.

File System of the Oracle Database Instance

Specify the database instance directories.

Database Instance File Systems

\$ORACLE_HOME Directory	/oracle/E12/121	Browse...
Oracle Stage Directory	/oracle/stage/121	Browse...
Sapdata Home Directory	/oracle/E12	Browse...

Additional Information

The \$ORACLE_HOME Directory is the location where the database software is installed. The default value for \$ORACLE_HOME is /oracle/<DBSID>/<Version>_<Bit>. The Oracle Stage Directory is the location to which the Oracle stage is extracted before you start the database software installation. The default location for stage is /oracle/stage/<Version>_<Bit>.

Back Next

The screenshot shows the SAP NetWeaver 7.4 Software Provisioning interface. The title bar indicates the path: SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed System. The main title is "Software Provisioning". A progress bar at the top shows five steps: 1 Choose Option, 2 Define Parameters (which is currently selected), 3 Summary, 4 Execute, and 5 Completed.

Oracle Database Destination

Enter the parameters of the sapdata directory distribution.

Database Directories

Oracle Sapdata Directories

Sapdata Key	ASM Data Path
SAPDATA1	+DATAC1
SAPDATA2	+DATAC1
SAPDATA3	+DATAC1
SAPDATA4	+DATAC1

Buttons at the bottom include Add, Remove, Back, and Next.

SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed System

File SAPInst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

Oracle Database Instance

Enter the database instance-specific information – for Oracle experts only.

Create Database Parameters

MaxLogFiles*	255
MaxLogMembers*	3
MaxLogHistory*	1000
DB Character Set	UTF8
MaxInstances*	50
MaxDataFiles*	1000
MaxControlFileSize*	20
Reuse Control Files	<input checked="" type="checkbox"/>

Redo Log File Configuration

We strongly recommend that you enable the *Mirror Redo Log Files* option. Normally you use the *Reuse Control Files* option only if you are re-creating a database, rather than creating one for the first time.

ASM directory for Redologs	+DATA1
Number of Redo Log Groups	4
Size of Redo Log Files [MB]	4096
Reuse Redo Log Files	<input checked="" type="checkbox"/>
Mirror Redo Log Files	<input checked="" type="checkbox"/>

Path to Mirror Redo Log Files

ASM directory for 2. member of RedoLogs	+RECO1
---	--------

Buttons: Back Next

The screenshot shows the SAP NetWeaver 7.4 Support Release 2 interface. The title bar reads "SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Syst". The menu bar includes "File", "SAPinst", and "Help". The main title is "Software Provisioning" with the SAP logo. A progress bar at the top indicates steps 1 through 5: "Choose Option" (blue), "Define Parameters" (orange, currently selected), "Summary" (light blue), "Execute" (light blue), and "Completed" (light blue). The sub-section title "Oracle Control Files" is highlighted in orange. A note below it says "Enter the control file location – for Oracle experts only." The "Tablespace Definition" section contains a table titled "Oracle Control Files". The table has three columns: "Database ID (DBSID)*", "Control File Directory", and "Control File Name". It lists two entries: E12 (highlighted with a yellow dotted border) with directory "+DATAE1" and name "/E12/cntr1E12.dbf", and E12 with directory "+RECOE1" and name "/E12/cntr1E12.dbf". Below the table are "Add" and "Remove" buttons. At the bottom are "Back" and "Next" navigation buttons.

SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed System

File SAPInst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

Oracle Tablespaces

Enter the general tablespace parameters – for Oracle experts only.

Tablespace Definition

Oracle Tablespaces

Tablespace	Size [MB]	Sapdata Directory
PSAPSRSR3	2000	SAPDATA2
PSAPSRSR3	1540	SAPDATA2
PSAPSRSR3740	2000	SAPDATA3
PSAPSRSR3740	2000	SAPDATA3
PSAPSRSR3740	2000	SAPDATA3
PSAPSRSR3740	1010	SAPDATA3
PSAPSRSR3USR	20	SAPDATA4
PSAPUNDO	700	SAPDATA1
PSAPTEMP	350	SAPDATA1
SYSTEM	350	SAPDATA1
SYSAUX	200	SAPDATA1
PSAPUND0001	700	SAPDATA1
PSAPUND0002	700	SAPDATA1

Add Remove

Back Next

SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed System

File SAPInst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

Tablespace Extensions

Enter the autoextent configuration of the tablespaces – for Oracle experts only.

Tablespace Extensions Definition

Oracle Tablespace Extension

TblspName	Autoextent	AutoExtNextSize	AutoExtMaxSize	AutoExtUnit
PSAPSR3	ON	20	10000	M
PSAPSR3	ON	20	10000	M
PSAPSR3	ON	20	10000	M
PSAPSR3	ON	20	10000	M
PSAPSR3	ON	20	10000	M
PSAPSR3	ON	20	10000	M
PSAPSR3740	ON	20	10000	M
PSAPSR3740	ON	20	10000	M
PSAPSR3740	ON	20	10000	M
PSAPSR3740	ON	20	10000	M
PSAPSR3740	ON	20	10000	M
PSAPSR3740	ON	20	10000	M
PSAPSR3740	ON	20	10000	M
PSAPR3USR	ON	20	10000	M
PSAPUNDO	ON	20	10000	M
PSAPTEMP	ON	20	10000	M
SYSTEM	ON	20	10000	M
SYSAUX	ON	20	10000	M
PSAPUND0001	ON	20	32700	M
PSAPUND0002	ON	20	32700	M

Back Next

SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Syst

File SAPInst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

General Tablespace Storage

Enter the general storage parameters of the tablespaces – for Oracle experts only.

Tablespace Storage Definition

Oracle General Storage

TblspName	MinExtent	Unit	Log Mode	TblspStatus	TblspType	SegmemtSpaceMgmt
PSAPSR3	1	M	LOGGING	ONLINE	PERMANENT	AUTO
PSAPSR3740	1	M	LOGGING	ONLINE	PERMANENT	AUTO
PSAPSR3USR	1	M	LOGGING	ONLINE	PERMANENT	AUTO
PSAPUNDO	1	M	LOGGING	ONLINE	PERMANENT	AUTO
PSAPTEMP	1	M	LOGGING	ONLINE	TEMPORARY	AUTO
SYSTEM	1	M	LOGGING	ONLINE	PERMANENT	AUTO
SYSAUX	1	M	LOGGING	ONLINE	PERMANENT	AUTO
PSAPUNDO001	1	M	LOGGING	ONLINE	PERMANENT	AUTO
PSAPUNDO002	1	M	LOGGING	ONLINE	PERMANENT	AUTO

Back Next

SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Syst

File SAPInst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

Default Tablespace Storage

Enter the default storage parameters of the tablespaces – for Oracle experts only.

Tablespace Storage Definition

Oracle Default Storage

TblspName	DefStorInitial	DefStorNext	DefStorUnit	DefStorMinextents	DefStorMaxextents	Pctincrease
PSAPSR3	1	1	M	1	505	0
PSAPSR3740	1	1	M	1	505	0
PSAPSR3USR	1	1	M	1	505	0
PSAPUND0	1	1	M	1	505	0
PSAPTEMP	1	1	M	1	505	0
SYSTEM	1	1	M	1	505	0
SYSAUX	1	1	M	1	505	0
PSAPUND0001	1	1	M	1	505	0
PSAPUND0002	1	1	M	1	505	0

Back Next

SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Syst

File SAPInst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

Extended Tablespace Management

Enter the extended management parameters of the tablespaces – for Oracle experts only.

Tablespace Management Definition

Oracle Extended Tablespace Management

TblspName	ExtMgmtMode	ExtMgmtAllocMode	ExtMgmtSize	ExtMgmtUnit
PSAPSR3	LOCAL	AUTOALLOCATE	20	M
PSAPSR3740	LOCAL	AUTOALLOCATE	20	M
PSAPSR3USR	LOCAL	AUTOALLOCATE	20	M
PSAPUNDO	LOCAL	AUTOALLOCATE	20	M
PSAPTEMP	LOCAL	UNIFORM	20	M
SYSTEM	LOCAL	AUTOALLOCATE	20	M
SYSAUX	LOCAL	AUTOALLOCATE	20	M
PSAPUNDO001	LOCAL	AUTOALLOCATE	20	M
PSAPUNDO002	LOCAL	AUTOALLOCATE	20	M

Back Next

sapdb01: SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed System > Da

File SAPinst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

init.ora Parameters

Change, add or remove the init.ora parameters – for Oracle experts only.

Configure init.ora Parameters

Init.ora Key	Value
#	##### # (c)Copyright SAP AG, Walldorf # \$Id: /inst/inst_scripts/1mts_004_REL/tpls/ora/INITS...
shared_pool_size	13659191377
open_cursors	2000
#	# processes = ABAP-Workprozesse * 2 + J2EE-Serverprozesse * # <max-connections> + PARALLEL_MAX_SERVERS + 40
processes	350
#	# session = 2 * processes
sessions	700
db_name	E12
db_block_size	8192
#	# retention time for RMAN backup information in control file
control_file_record_keep_time	30
log_checkpoints_to_alert	true
compatible	12.1.0.2.0
parallel_execution_message_size	16384
query_rewrite_enabled	false
replication_dependency_tracking	false
star_transformation_enabled	true
log_archive_dest_1	'LOCATION=+RECO1/E12/oraarch'
log_archive_format	\$t_%s_%r.dbf
pga_aggregate_target	18212255170
db_cache_size	13659191377
remote_login_passwordfile	exclusive
recyclebin	off
FILESYSTEMIO_OPTIONS	setall
diagnostic_dest	/oracle/E12/saptrace
audit_file_dest	/oracle/E12/saptrace/audit
OPTIM_DDL_USER_BINDS	false

Add Remove

Back Next

SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed System

File SAPInst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

Declustering / Depooling Option

If you want to use optimizations for SAP Business Suite, you can enable table declustering / depooling for your SAP system.

ABAP Table Declustering and Depooling

Do not decluster/depool ABAP tables
 Force declustering/depooling of all ABAP tables

Additional Information

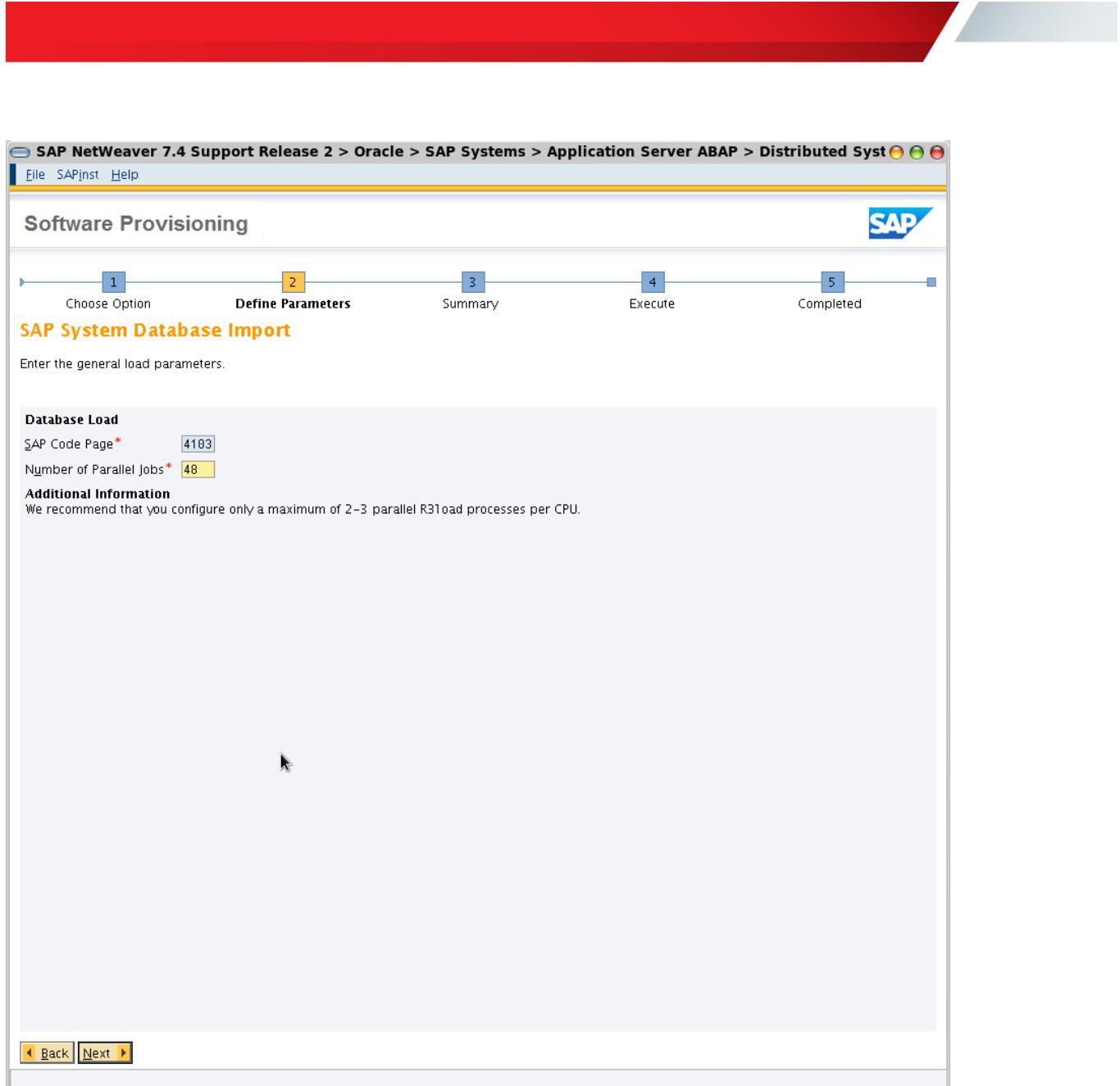
Table declustering / depooling converts SAP cluster and pool tables to transparent database tables.

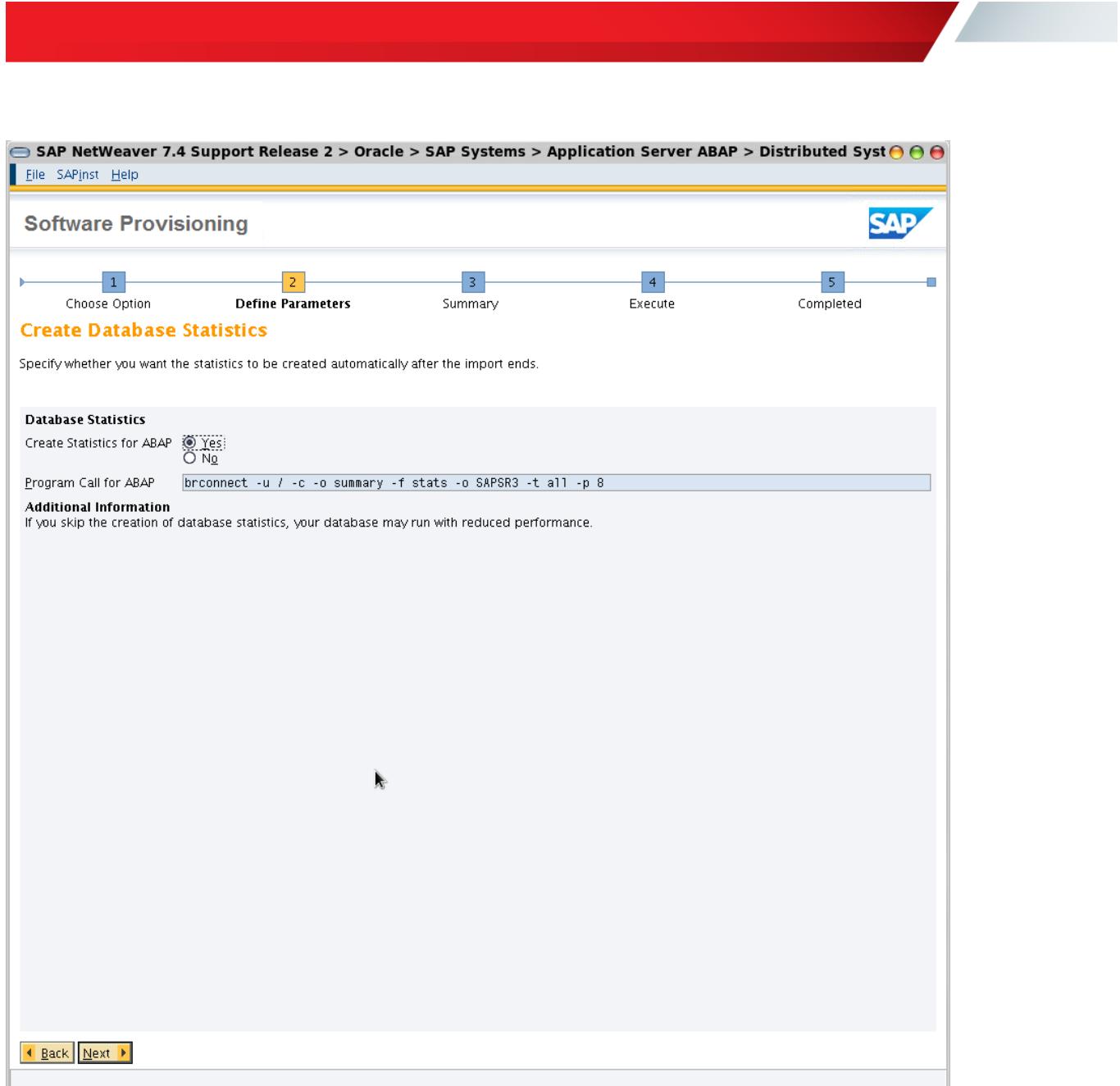
Select *Do not decluster/depool ABAP tables* in the following cases:

- You want to install the target system without using declustering / depooling.
- The table types of your target system are the same as in the source system.

Select *Force declustering/depooling of all ABAP tables* if you want to decluster / depool all ABAP tables in your target system. To compensate for the increased space consumption of your declustered / depooled SAP system, we recommend that you activate database compression features as described in SAP note [1892354](#).

Back Next





The screenshot shows a SAP NetWeaver 7.4 Support Release 2 interface. The title bar reads "SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Syst". The menu bar includes "File", "SAPinst", and "Help". The main title is "Software Provisioning" with the SAP logo. A progress bar at the top shows five steps: 1 Choose Option, 2 Define Parameters (highlighted in orange), 3 Summary, 4 Execute, and 5 Completed. Below the progress bar, a section titled "Media Browser" contains the instruction "Enter the location of the required software packages." A table titled "Software Package Request" lists one item: "Medium" (Oracle Client 121) and "Package Location" (/u01/deploy/sap/media/exadata_test/SAP/SAP_media_Oracle_CLIENT_12102). A "Browse..." button is next to the package location field. At the bottom left, there are "Back" and "Next" buttons.

SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed System

File SAPInst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

Unpack Archives

Select the archives you want to unpack.

SAP System Archives
The installation procedure has determined that the selected archives have to be unpacked. Choose Next to unpack the archives automatically from the media to the SAP global host.

Archives to Be Unpacked

Unpack Archive	Codepage	Destination	Downloaded To
<input checked="" type="checkbox"/> DBINDEP/SAPEXE.SAR	Unicode	/usr/sap/E12/SYS/exe/uc/linuxx86_64	Browse...
<input type="checkbox"/> ORA/SAPEXEDB.SAR	Unicode	/usr/sap/E12/SYS/exe/uc/linuxx86_64	Browse...
<input type="checkbox"/> ORA/DBATOOLS.SAR	Unicode	/usr/sap/E12/SYS/exe/uc/linuxx86_64	Browse...
<input checked="" type="checkbox"/> OCL12164.SAR		/oracle/client/12x	Browse...

Additional Information
If you have downloaded newer versions of these archives from SAP Service Marketplace, enter their locations in the Downloaded To column.
Deselect Unpack for archives that you want to unpack manually: for instance if the destination is located on a network share for which the installation user does not have write permissions.

Additional Information for SAP HANA
If you are installing a product based on SAP HANA please download the latest SAPEXE.SAR and SAPEXEDB.SAR of your SAP kernel from the SAP Service Marketplace and enter their respective download locations in the Downloaded To column. If you are installing a product based on kernel version 7.20 please use the archives of kernel version 7.21.

Back [Next](#)

SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed System

File SAPInst Help

Software Provisioning

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

Parameter Summary

Choose 'Next' to start with the values shown. Otherwise, select the parameters to be changed and choose 'Revised'. You are then taken to the screen where you can change the parameter. You might be guided through other screens that have so far been processed.

Parameter list

- Parameter Settings**
 - Parameter Mode
 - Custom
- General SAP System Parameters**
 - Profiles Available
 - Profile Directory
 - /sapmnt/E12/profile
- Master Password**
 - Password for All Users
 - *****
- DNS Domain Name**
 - Set FQDN for SAP system
- SAP System Database**
 - Database ID (DBSID)
 - E12
 - Oracle Database Installation for
 - RAC on Oracle ASM
 - Type of RAC
 - RAC on Engineered Systems (Exadata, SPARC SuperCluster, Database Appliance)
- Oracle Database**
 - DB Server Version
 - 121
 - DB Client Version
 - 121
 - MaxDatafileSize
 - 2000
 - DB on Raw Device
 - Advanced DR Configuration – For Oracle Experts Only

SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Syst

File SAPInst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

Task Progress

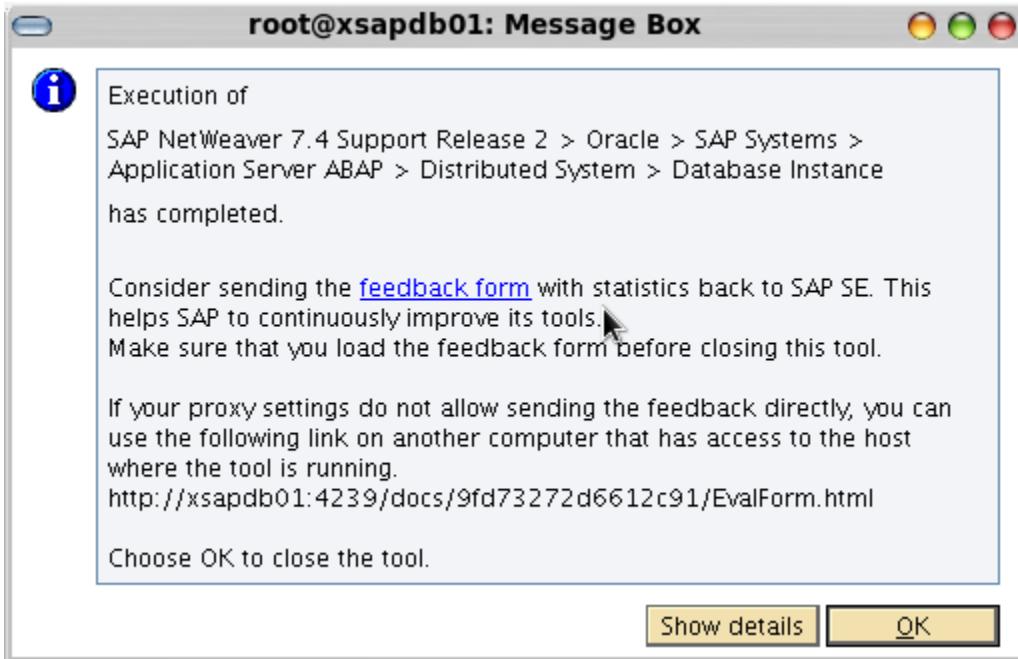
Running phase: Create database

Phase 10 of 23

- ✓ Create users for SAP system
- ✓ Install common system files
- ✓ Unpack SAP archives
- ✓ Create and load database
- ✓ Install/Check database
- ✓ Evaluate database parameters
- ✓ Install Oracle client software
- ✓ Configure Oracle server network
- ✓ Prepare database server configuration
- ✓ Create database
- ◊ Create/Check tablespaces
- ◊ Oracle Account installation
- ◊ Oracle ASM installation
- ◊ Update database in RAC environment
- ◊ Check Oracle NLS_CHARACTERSET
- ◊ Adapt database schema
- ◊ Check Oracle patch
- ◊ Install DBA tools
- ◊ Create ABAP secure store
- ◊ Import ABAP
- ◊ Perform post-load activities
- ◊ Perform Oracle post-load activities
- ◊ Create database statistics



Back Next



After that step you can see both Oracle database instances on the Exadata compute nodes controlled by the CRS:

```
[oracle@xsapdb01 bin]$ ./crsctl stat res ora.e12.db -
```

```
-----  
Name Target State Server State details
```

```
Cluster Resources
```

```
ora.e12.db
```

1	ONLINE	ONLINE	xsapdb01	Open,STABLE
2	ONLINE	ONLINE	xsapdb02	Open,STABLE

```
[oracle@xsapdb01 bin]$
```

Installation of SAP Primary Application for SAP with SAP SWPM

The following screens show the installation of a SAP Primary Application Server with SAP SWPM to use an Oracle 12c database running on an Oracle Exadata database machine.

The screenshot shows the SAP Software Provisioning Manager (SWPM) interface. The title bar indicates the path: SAP 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sy... . The main window is titled "Software Provisioning" and displays a progress bar with five steps: 1 Choose Option (highlighted in yellow), 2 Define Parameters, 3 Summary, 4 Execute, and 5 Completed.

Welcome to SAP Installation

Before you start the installation, make sure that you have identified the required capabilities as described in the Master Guide.

Go to the option you want to execute. To display relevant help information in the right-hand panel, select an option or folder.

Description

Installs the primary application server instance for a SAP NetWeaver 7.4 Support Release 2 ABAP system distributed over several hosts

You must have already installed the following SAP system instances:

- ABAP central services instance (ASCS instance)
- Database instance

Primary Application Server Instance

The primary application server instance is the core component of an SAP system. It provides all SAP system utilities. At least one application server instance must exist in each SAP system.

You can have one or more additional application server instances. You can find the installation option for additional application server instances in *Additional SAP System Instances*.

Navigation

Next >

The screenshot shows the SAP NetWeaver Application Server ABAP Software Provisioning interface. The title bar reads "SAP ERP 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sy...". The menu bar includes "File", "SAPinst", and "Help". The main title is "Software Provisioning" with the SAP logo. A progress bar at the top shows five steps: 1 Choose Option, 2 Define Parameters (highlighted in orange), 3 Summary, 4 Execute, and 5 Completed. The "Parameter Settings" section contains a heading "Parameter Settings" and a note: "Choose whether you want to run the installation in a typical or a custom mode." It includes a "Parameter Mode" section with radio buttons for "Typical" (unchecked) and "Custom" (checked). The "Additional Information" section notes: "You can run the installation either in a typical or a custom mode:" followed by two bullet points: "● Typical Mode" and "● Custom Mode". The "Typical Mode" point describes the process of choosing default settings. The "Custom Mode" point describes the process of choosing individual parameters. At the bottom are "Back" and "Next" buttons.

The screenshot shows the SAP NetWeaver Application Server ABAP Software Provisioning interface. The title bar reads "SAP ERP 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed System". The main title "Software Provisioning" is displayed above a progress bar. The progress bar consists of five numbered steps: 1 Choose Option, 2 Define Parameters (which is highlighted in yellow), 3 Summary, 4 Execute, and 5 Completed. The sub-title "General SAP System Parameters" is shown in orange. A note says "Enter the profile directory of the SAP system." Below this, under "SAP System Identification", there is a text input field containing "/sapmnt/E12/profile" with a browse icon. Under "Additional Information", it says "Existing parameters are retrieved from the SAP system profile directory. The location of your SAP system profile directory is as follows:" followed by two bullet points: "Windows: \\<SAPGLOBALHOST>\sapmnt\<SAPSID>\SYS\profile" and "UNIX and i5/OS: /<SAP Mount Directory>/<SAPSID>/profile or /usr/sap/<SAPSID>/SYS/profile". At the bottom left, there are "Back" and "Next" buttons.

SAP ERP 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sy... ● ○ ●

File SAPinst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

Master Password

Enter the master password for all users.

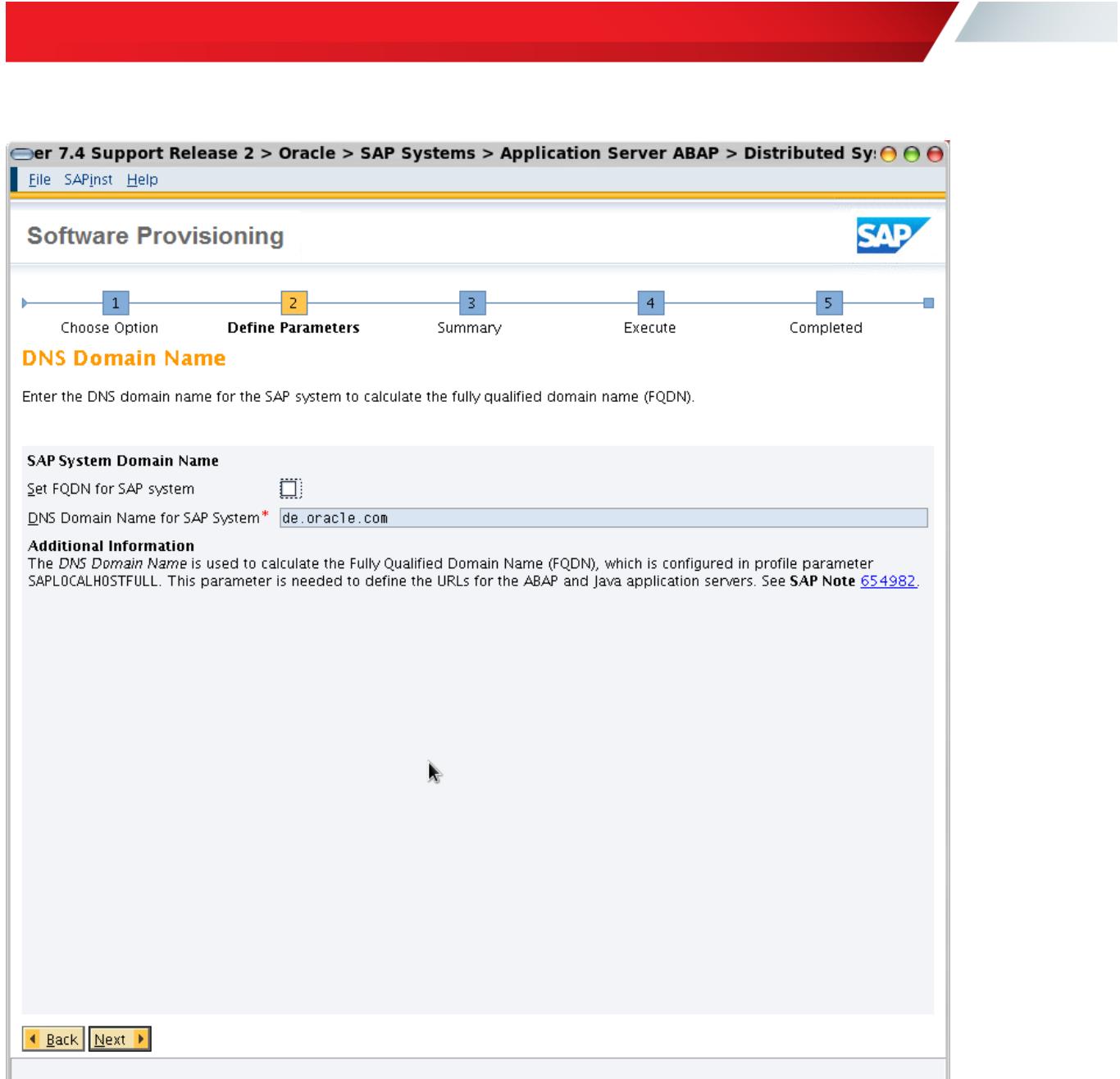
Master Password
The master password is used for all users that are created, as well as for the secure store key phrase.
Check the F1 help for restrictions and dependencies.

Password for All Users* *****

Confirm* *****

Additional Information
If you want to set an individual password for each user, you can do this in the corresponding parameter section on the Parameter Summary screen.
If you set individual passwords, a new master password does not overwrite these individual settings.

◀ Back Next ▶



SAP ERP 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed System

File SAPinst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

Media Browser

Enter the location of the required software packages.

Software Package Request

Medium	Package Location	
UC Kernel NW740 SR2	/media/nfs/exadata_test/SAP/NW_742/51049350_NW742_Kernel	Browse...

Additional Information
The required software packages available on the medium are detected using the identification files LABEL.ASC or LABELIDX.ASC. If there is a complete medium available on the installation host, you only need to enter the path to the root directory of the medium in the Package Location column.

Back Next

SAP ERP 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sy... ● ○ ●

File SAPinst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

SAP System Database

Enter the database parameters.

Database Identification

Database ID (DBSID)* E12

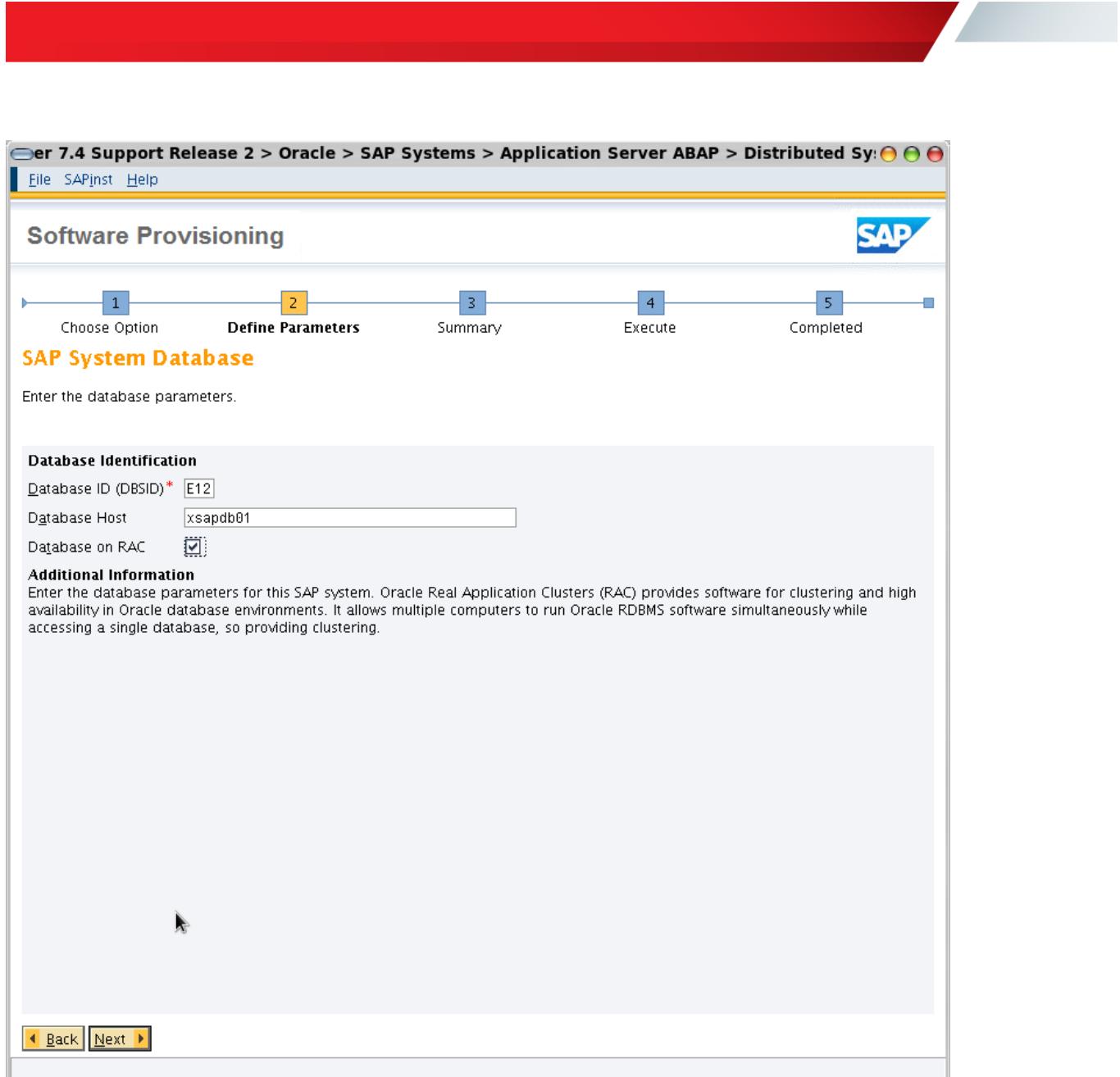
Database Host xsapdb01

Database on RAC

Additional Information

Enter the database parameters for this SAP system. Oracle Real Application Clusters (RAC) provides software for clustering and high availability in Oracle database environments. It allows multiple computers to run Oracle RDBMS software simultaneously while accessing a single database, so providing clustering.

Back Next



The screenshot shows the SAP NetWeaver Application Server ABAP Software Provisioning interface. The title bar reads "SAP ERP 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed System". The main title is "Software Provisioning". A progress bar at the top indicates five steps: 1 Choose Option, 2 Define Parameters (which is active and highlighted in orange), 3 Summary, 4 Execute, and 5 Completed.

Oracle Database Configuration

Enter the parameters of the ABAP database system.

Database Schema

The ABAP schema is used for the operating system environment of the application server instance.

ABAP Schema*: SAPSR3

DB Server Version: 121

DB Client Version: 121

At the bottom left, there are "Back" and "Next" buttons.

SAP ERP 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sy... ● ○ ●

File SAPinst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

Oracle > Database RAC Parameters

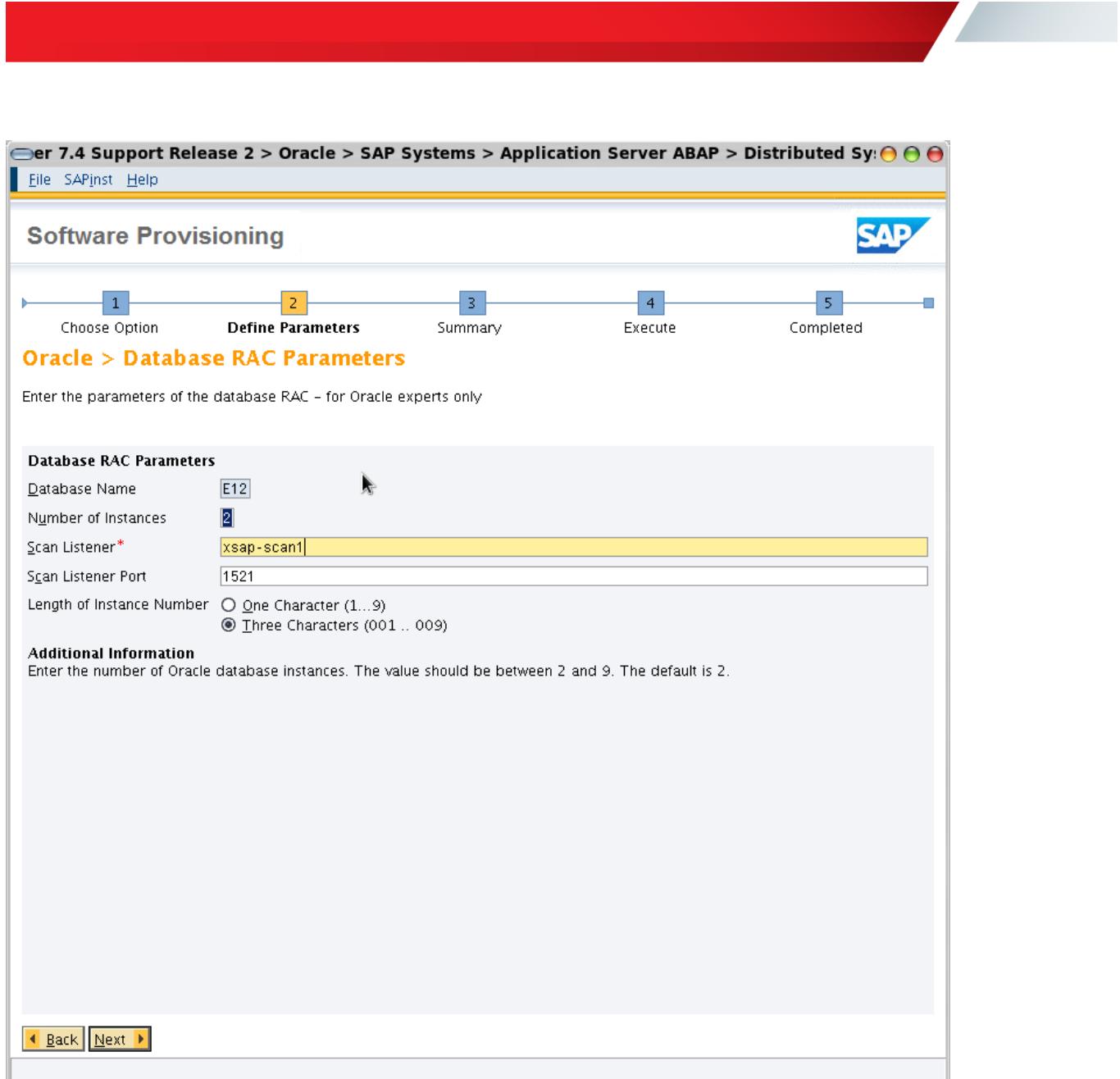
Enter the parameters of the database RAC – for Oracle experts only

Database RAC Parameters

Database Name	E12
Number of Instances	2
Scan Listener*	xsap-scan1
Scan Listener Port	1521
Length of Instance Number	<input type="radio"/> One Character (1...9) <input checked="" type="radio"/> Three Characters (001 .. 009)

Additional Information
Enter the number of Oracle database instances. The value should be between 2 and 9. The default is 2.

Back Next



The screenshot shows the SAP NetWeaver Application Server ABAP Software Provisioning interface. The title bar reads "SAP ERP 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sy...". The menu bar includes "File", "SAPinst", and "Help". The main title is "Software Provisioning" with the SAP logo. A progress bar at the top indicates five steps: 1 Choose Option, 2 Define Parameters (highlighted in orange), 3 Summary, 4 Execute, and 5 Completed. The sub-section title is "Oracle > Database RAC Parameters". A note says "Enter the parameters of the database RAC – for Oracle experts only". The "Database Parameters for RAC" table lists host names and instance numbers:

Host Name	Instance No.
xsapdb01	001
xsapdb02	002

Additional Information: Modify all @@ parameters (Host Name). Navigation buttons at the bottom are "Back" and "Next".

SAP ERP 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed System

File SAPinst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

Primary Application Server Instance

Enter the instance parameters for the primary application server (PAS) instance.

Primary Application Server Instance

The following SAP system instances already exist on this host:

SAP System ID (SAPSID)	Instance Name	Instance Number

PAS Instance Number*

PAS Instance Virtual Host*

Additional Information
The *Instance Number* and *Virtual Host* are technical identifiers for controlling internal processes, such as assigned memory. They must be unique for this installation host.

The screenshot shows the SAP NetWeaver Application Server ABAP Software Provisioning interface. The title bar reads "SAP ERP 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sy". The menu bar includes "File", "SAPinst", and "Help". The main title is "Software Provisioning" with the SAP logo. A progress bar at the top shows five steps: 1 Choose Option, 2 Define Parameters (highlighted in orange), 3 Summary, 4 Execute, and 5 Completed. The current step, "Define Parameters", is titled "ABAP Message Server Ports". It contains two input fields: "ABAP Message Server Port" set to 3600 and "Internal ABAP Message Server Port" set to 3900. Below these fields is a section titled "Additional Information" with the note: "The instance-specific Internal ABAP Message Server Port for internal communication and the ABAP Message Server Port are required as unique communication channels." At the bottom left are "Back" and "Next" buttons.

SAP ERP 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sy... ● ○ ○

File SAPinst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

ICM User Management

Enter the password of the web administration user 'webadm'.

Internet Communication Manager (ICM) User Management

Password of 'webadm'*: *****

Confirm*: *****

Additional Information
An administration user webadm is created to use the web administration interface for Internet Communication Manager (ICM) and Web Dispatcher.

Back Next

SAP ERP 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed System

File SAPinst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

SLD Destination for the SAP System OS Level

Enter the destination of the System Landscape Directory (SLD).

Register in System Landscape Directory

Use existing SLD for registration
 No SLD destination

Connect Data for Existing SLD

Use HTTPS

SLD Host*

SLD HTTP(S) Port*

SLD Data Supplier User*

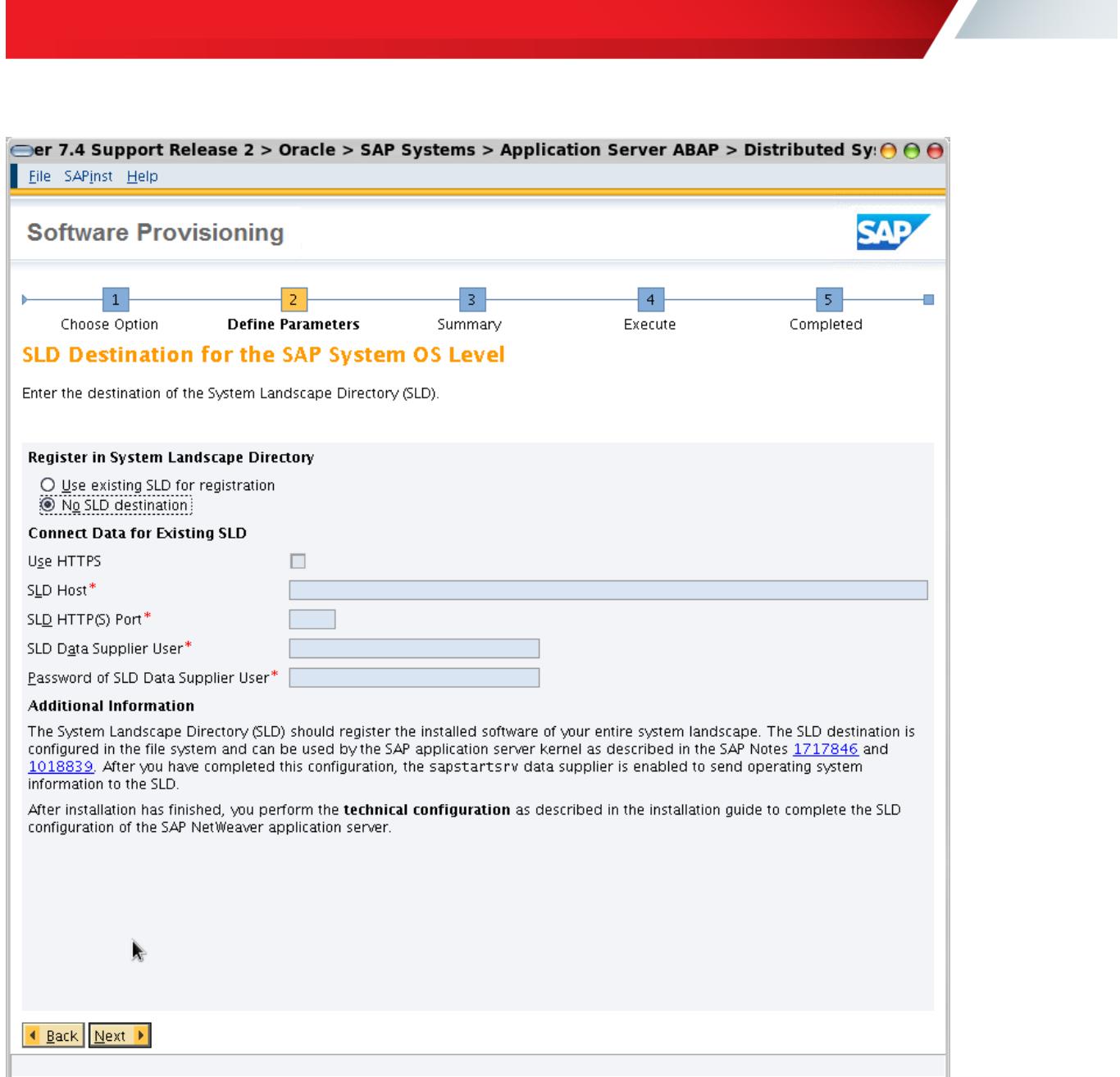
Password of SLD Data Supplier User*

Additional Information

The System Landscape Directory (SLD) should register the installed software of your entire system landscape. The SLD destination is configured in the file system and can be used by the SAP application server kernel as described in the SAP Notes [1717846](#) and [1018839](#). After you have completed this configuration, the sapstartsrv data supplier is enabled to send operating system information to the SLD.

After installation has finished, you perform the **technical configuration** as described in the installation guide to complete the SLD configuration of the SAP NetWeaver application server.

Back Next



SAP ERP 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed System

File SAPinst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

Message Server Access Control List

Specify if you want a message server Access Control List (ACL) created.

Message Server Access Control List

Create Message Server Access Control List
 Do not create Message Server Access Control List

Additional Information

The ACL will be created as a file in the /<sapmnt>/<SAPSID>/global directory. If it exists, it defines the hosts from which the message server accepts requests.

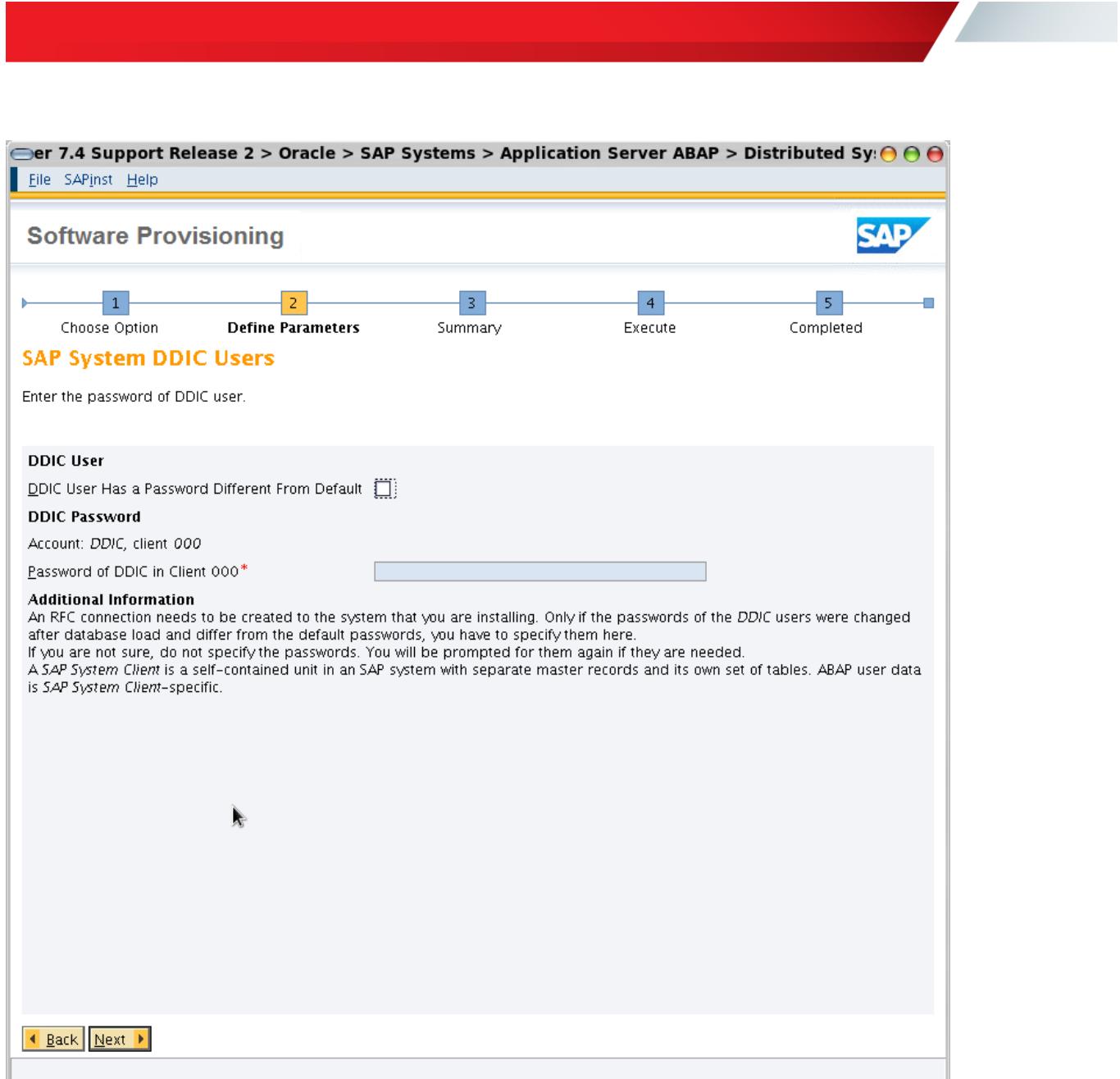
Caution: Only trigger the creation of this file if you do not plan to install any additional instances for this system. With the creation of this ACL, you overwrite existing settings and prevent instances from being installed on additional hosts.

If you decide to add an additional instance later, you need to remove this file manually before the installation and have it recreated afterwards.

For more information, see the information about ms/acl_info in SAP Notes [1495075](#) and [826779](#).

Back Next

The screenshot shows the SAP NetWeaver Application Server ABAP Software Provisioning interface. The title bar reads "SAP ERP 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sy". The menu bar includes "File", "SAPinst", and "Help". The main title is "Software Provisioning" with the SAP logo on the right. A progress bar at the top shows five steps: 1 Choose Option, 2 Define Parameters (highlighted in orange), 3 Summary, 4 Execute, and 5 Completed. The current step is "Depooling Option". A sub-section titled "ABAP Table Depooling" contains a checkbox labeled "Execute ABAP reports for depooling". Below it, "Additional Information" states: "To benefit from SAP Business Suite optimizations, you can apply ABAP table depooling, see SAP Note [1892354](#). ABAP table depooling is **recommended** in combination with ABAP table declustering. Select this option if you chose to decluster / depool all database tables during one of the following, previously executed steps:" followed by two bullet points: "● Installation of the database instance of a distributed SAP system" and "● System copy export of a distributed SAP system". At the bottom left are "Back" and "Next" buttons.



The screenshot shows the SAP NetWeaver Application Server ABAP Software Provisioning interface. The title bar indicates the path: SAP Systems > Application Server ABAP > Distributed Sys. The main title is "Software Provisioning". A progress bar at the top shows five steps: 1 Choose Option, 2 Define Parameters (highlighted in orange), 3 Summary, 4 Execute, and 5 Completed.

Media Browser

Enter the location of the required software packages.

Software Package Request

Medium	Package Location	
Installation Export NW740 SR2 (folder EXP1)	/media/nfs/exadata_test/SAP/NW_742/51048524_NW742_Export	Browse...

Additional Information

The required software packages available on the medium are detected using the identification files LABEL.ASC or LABELIDX.ASC. If there is a complete medium available on the installation host, you only need to enter the path to the root directory of the medium in the *Package Location* column.

[Back](#) [Next](#)

The screenshot shows the SAP NetWeaver 7.4 Support Release 2 interface for Oracle SAP Systems. The current step is 'Define Parameters' (Step 2). The section 'Secure Storage Key Generation' contains two options: 'Individual Key (Recommended for Productive Systems)' and 'Default Key'. The 'Default Key' option is selected. Below this, 'Additional Information' provides instructions for new installations and system copies.

Secure Storage Key Generation

Decide whether you want to generate an individual key for the secure store of the SAP system.

Secure Storage Individual Key Information

Individual Key (Recommended for Productive Systems)
 Default Key

Additional Information

You can choose between using an *Individual Key* for the encryption of confidential data or keeping the *Default key*, which provides obfuscation only.

- New installation from scratch, target system installation for system copy, system rename:
If you choose *Individual Key (Recommended for Productive Systems)*, you must back up the displayed key in the upcoming message **before** it is used to encrypt the secure storage in the file system.
- New installation from scratch:
The key is also used to encrypt the secure storage in the database.

For more information, see the installation, system copy, system rename guides for SAP systems based on SAP NetWeaver 7.1 and higher at: <http://service.sap.com/sitoolset>

Back **Next**

SAPVER 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sys

File SAPinst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

Oracle > Database RAC Parameters

Enter the parameters of the instance RAC service – for Oracle experts only

Service Name and Preferred RAC Instance

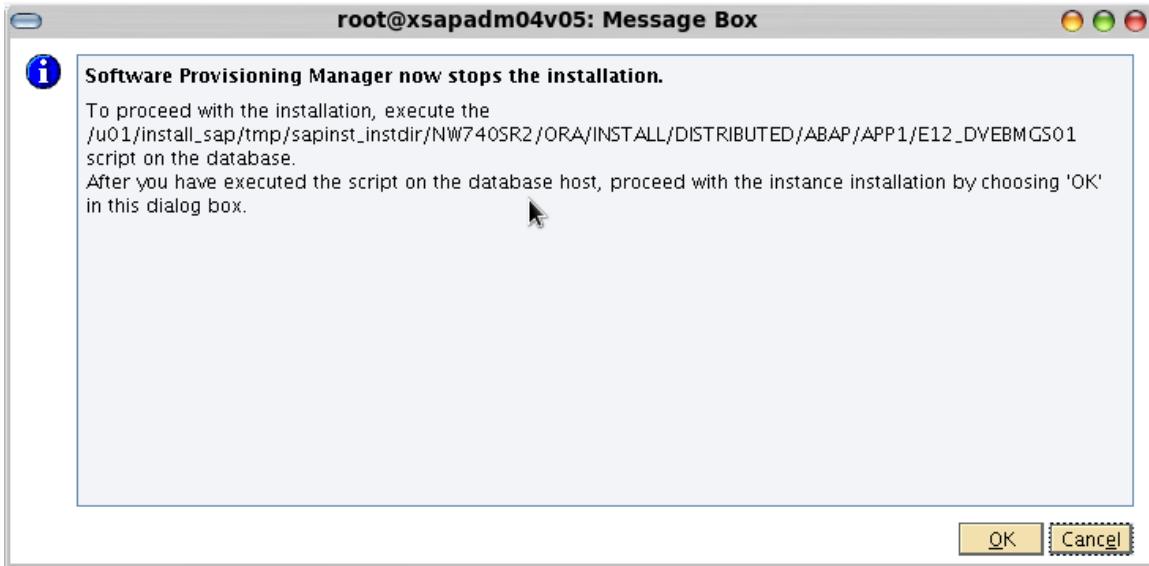
Database Name: E12
Instance Name: DVEBMGS01
Service Name*: E12_DVEBMGS01
Preferred RAC Instance: E12001

Shell Script Execution on Database Host

Shell Script Name: E12_DVEBMGS01.sh
Create Shell Script:

Additional Information
Enter the Service Name of the RAC service instances. The default value should be <Database Name>_<Instance Name>. Make sure that you execute the shell script on the database host.

Back Next



SAP ERP 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sys

File SAPinst Help

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

Media Browser

Enter the location of the required software packages.

Software Package Request

Medium	Package Location	
Oracle Client 121	/media/nfs/exadata_test/SAP/SAP_media_Oracle_CLIENT_12102	Browse...

Additional Information
The required software packages available on the medium are detected using the identification files LABEL.ASC or LABELIDX.ASC. If there is a complete medium available on the installation host, you only need to enter the path to the root directory of the medium in the *Package Location* column.

[Back](#) [Next](#)

SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed System

File SAPinst Help

Software Provisioning

Step 2: Define Parameters

Choose Option **Define Parameters** Summary Execute Completed

Unpack Archives

Select the archives you want to unpack.

SAP System Archives

The installation procedure has determined that the selected archives have to be unpacked. Choose Next to unpack the archives automatically from the media to the SAP global host.

Archives to Be Unpacked

Unpack Archive	Codepage	Destination	Downloaded To
<input checked="" type="checkbox"/> DBINDEP/SAPEXE.SAR	Unicode	/usr/sap/E12/SYS/exe/uc/linux...	Browse...
<input type="checkbox"/> ORA/SAPEXEDB.SAR	Unicode	/usr/sap/E12/SYS/exe/uc/linux...	Browse...
<input checked="" type="checkbox"/> DBINDEP/IGSEXSE.SAR	Unicode	/usr/sap/E12/SYS/exe/uc/linux...	Browse...
<input checked="" type="checkbox"/> DBINDEP/IGSHELPER.SAR	Unicode	/usr/sap/E12/DWEBMGS01	Browse...
<input type="checkbox"/> OCL12164.SAR		/oracle/client/12x	Browse...

Additional Information

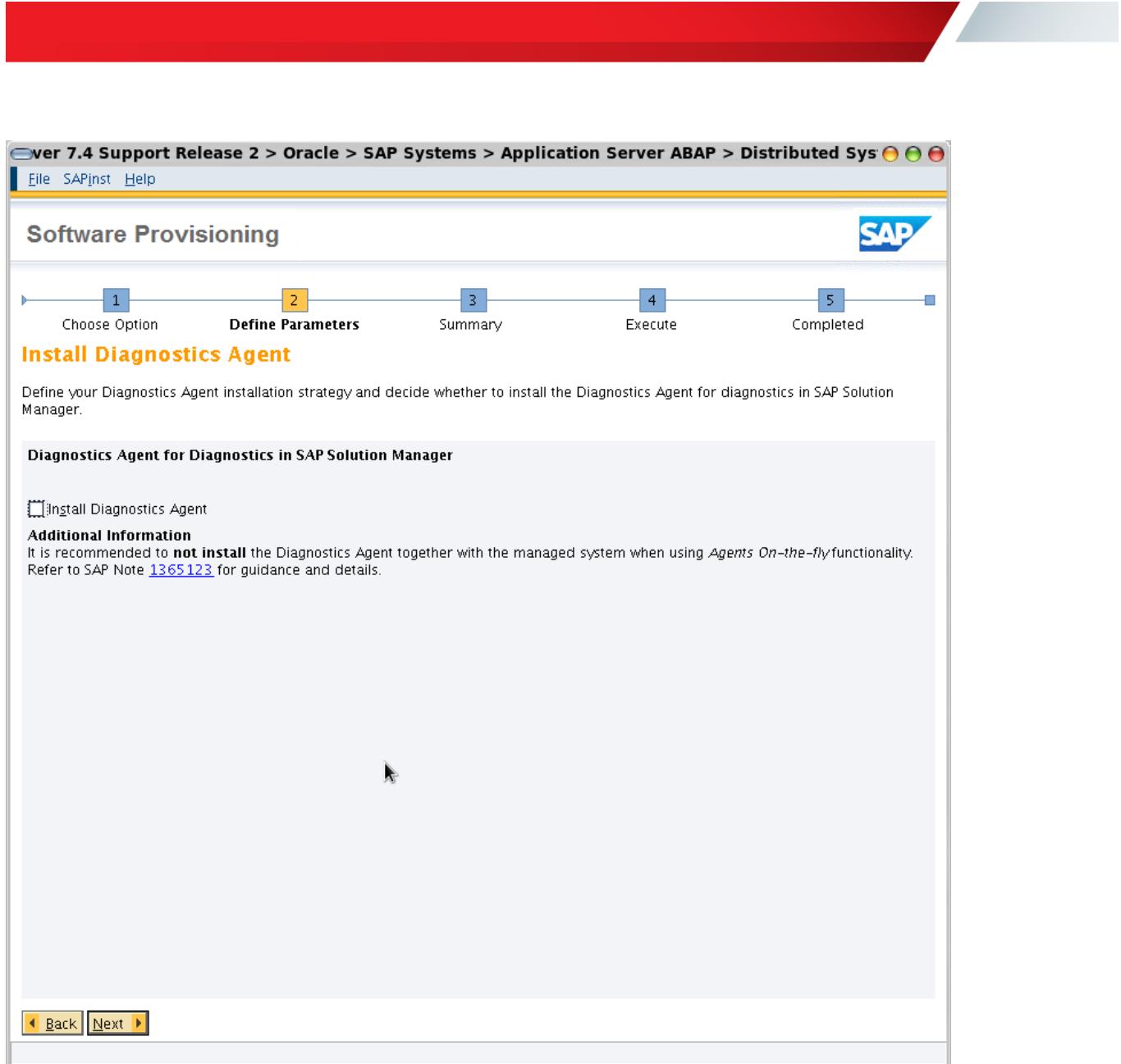
If you have downloaded newer versions of these archives from SAP Service Marketplace, enter their locations in the Downloaded To column.

Deselect *Unpack* for archives that you want to unpack manually, for instance if the destination is located on a network share for which the installation user does not have write permissions.

Additional Information for SAP HANA

If you are installing a product based on SAP HANA please download the latest SAPEXE.SAR and SAPEXEDB.SAR of your SAP kernel from the SAP Service Marketplace and enter their respective download locations in the Downloaded To column. If you are installing a product based on kernel version 7.20 please use the archives of kernel version 7.21.

[Back](#) [Next](#)



Over 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sys

[File](#) [SAPinst](#) [Help](#)

Software Provisioning

SAP

1 Choose Option 2 Define Parameters 3 Summary 4 Execute 5 Completed

Parameter Summary

Choose 'Next' to start with the values shown. Otherwise, select the parameters to be changed and choose 'Revise'. You are then taken to the screen where you can change the parameter. You might be guided through other screens that have so far been processed.

Parameter list

Parameter Settings
Parameter Mode
 Custom

General SAP System Parameters
Profile Directory
 /sapmnt/E12/profile

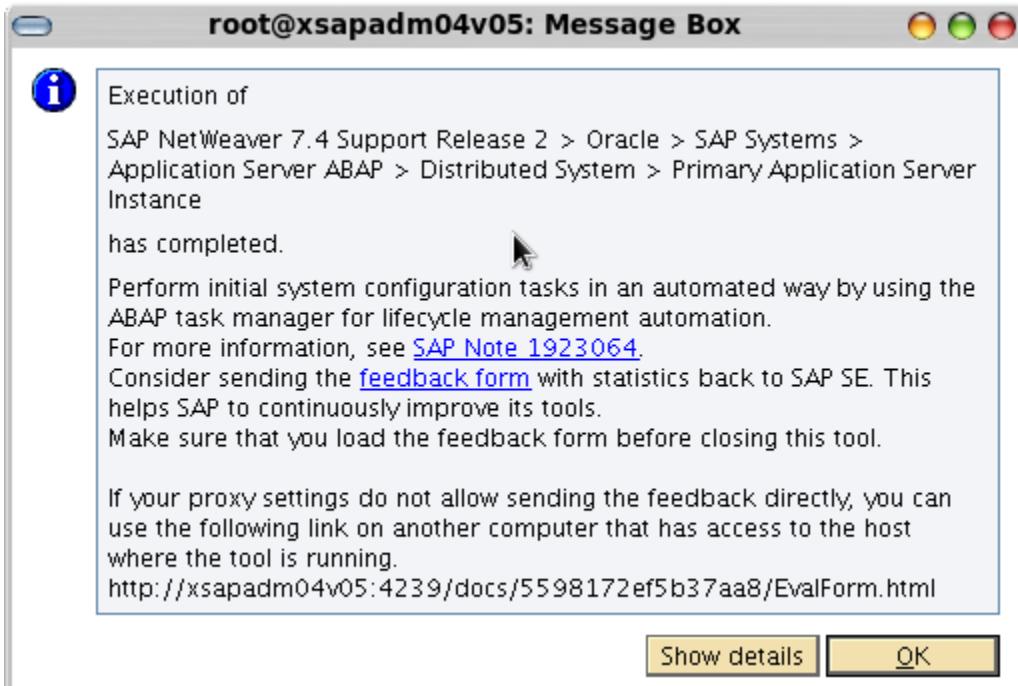
Master Password
Password for All Users

DNS Domain Name
 Set FQDN for SAP system

SAP System Database
Database ID (DBSID)
 E12
Database Host
 xsapdb01
 Database on RAC

Oracle Database Configuration
ABAP Schema
 SAPSR3
DB Server Version

[Back](#) [Next](#) [Revise](#) [Show Detail](#)



After the Installation the Oracle database service for the SAP Primary Application Server is registered in the CRS and runs on the first Oracle Exadata compute node:

```
[oracle@xsapadb01 bin]$ ./crsctl stat res ora.e12.e12_dvebmgs01.svc -t
```

```
-----  
Name      Target  State       Server          State details  
-----  
Cluster Resources  
-----  
ora.e12.e12_dvebmgs01.svc  
1      ONLINE  ONLINE    xsapadb01        STABLE
```

```
[oracle@xsapadb01 bin]$
```

Life Cycle Management for SAP Databases

An Oracle Exadata Database Machine requires lifecycle management at several levels of its hardware and software stack:

- Oracle Storage Server
- Oracle Database Server
- Operating system and firmware
- InfiniBand switch
- Additional components

This section focuses on the Oracle Database Server and describes how to install Oracle Database Server software patches into the Grid Infrastructure Oracle Home and the RAC Oracle Home of an SAP database. For more

information on the other components mentioned above, see MOS note 1262380.1 ("Exadata Patching Overview and Patch Testing Guidelines").

The Oracle Database Server of an SAP database requires installation of the SAP Bundle Patch for Oracle Exadata. Oracle tests and certifies that bundle patch on a regular basis and makes it available for SAP customers on the SAP Service Marketplace. You can find up-to-date release information and its download location in SAP Note 2145628 ("Exadata/SuperCluster: Patches for 12.1.0.2").

Installation of OPatch and MOPatch Utilities

The installation of the SAP Bundle Patch for Oracle Exadata requires up-to-date versions of the OPatch and the MOPatch utilities. Appropriate versions of both utilities are available in the SAP Bundle Patch for Oracle Exadata itself. See section "OPatch and MOPatch Utility Information" in the Readme document of the SAP Bundle Patch for Oracle Exadata for instructions on how to extract and install these utilities.

Installation of the SAP Bundle Patch for Oracle Exadata

Note: The SAP Bundle Patch for Oracle Exadata is not installed by the Oracle Exadata Deployment Assistant.

The SAP Exadata Bundle Patch contains patches which must be installed in the Grid Infrastructure Oracle Home (GI Home) and patches which must be installed in the RAC Oracle Home (RAC Home) of an SAP database. Use the MOPatch utility as described in section "Patch Installation and Deinstallation" of the Readme document to install the patches into all Oracle Homes of the Oracle Exadata Database Machine.

Finally, follow the post-installation steps in section "Executing Post-Installation Instructions" of the Readme document to run all required SQL statements, update the database dictionary, and maintain the database initialization parameters.

Migration of SAP Databases

Although there are several possibilities to migrate an existing SAP database to the Oracle Exadata Database Machine it is recommended to choose one of the following approaches as these have been successfully tested.

Migration Approach 1: Oracle-to-Oracle (O2O) ACS and Customer Self-Service

This way of database migration exists for many years and is being used to migrate an SAP database between different systems. The method is also described in the SAP note 1508271 "Oracle to Oracle Online Migration -Triple-O".

The O2O database migration method was developed by the Oracle ACS service, to offer customers, having very large database, a fast, smooth and reliable migration method. This method offers a migration speed of more than 1 TB/h and reduces the efforts which must be spent into in configuration and testing of the migration.

O2O supports all operating systems SAP products are certified on. Because O2O is operating system independent, it can be used to perform homogenous and heterogeneous system copies. A homogenous system copy is a migration where the source and target must be spent into in configuration and testing of the migration operating system is the same. A heterogeneous system copy is a migration where the source and target system have different operating systems. With a heterogeneous system copy you can for example migrate an existing SAP AIX database to an Oracle Exadata Database Machine database.

The advantage of this method is that you can combine the operating system change with multiple options to get most out of the migration:

- » As part of the database migration, the whole database is reorganized. This can free up a significant amount of space within tables and indexes.
- » The tablespace layout can be changed to the new SAP standard or to a customer own customized one. It is also possible to move single tables and indexes to separate tablespaces or to merge them into existing or new ones. This allows you to unify the SAP landscape by using a default tablespace name like "PSAPSR3" in all SAP systems
- » The SAP schema name can be changed for instance to "SAPSR3" to unify the SAP landscape.
- » The number of data files and mount points can be significantly reduced, by either optimizing the tablespace layout or the size of the data files and file systems
- » Tablespaces are created with LMTS and ASSM
- » Data files will be converted from file system to Oracle ASM
- » LOB or LONG data types can be converted to Secure files
- » You can compress tables and indexes on the target system. The compression will compress all SAP tables and indexes as recommended in SAP Note 1431296.
- » With O2O it is possible to combine a platform migration with a release upgrade. The migration method supports every combination of Unix, Windows or Linux on source and target system. So you can migrate an existing Oracle 10.2 database on HP-UX to an Oracle Exadata database.
- » It is possible to upgrade directly to a higher database release. Currently with the O2O method direct database migrations are possible between different Oracle versions. So it is possible to upgrade directly from Oracle 9i to Oracle 12c by using O2O. You also do not need the most current patchset of the lower Oracle release to run the migration. A complete overview about the upgrade paths between different Oracle versions is given at the end of this chapter.

The downtime needed to migrate a database with the O2O method is depending on the database size, the included database objects (SAP cluster tables, partitioned tables) and the available hardware resources(CPU, Memory,

Storage, Network). Up to 1TB/hour is possible. Although O2O was originally developed to perform database migrations, it can be an interesting method to perform a simple database upgrade, because you can implement all new database features you want into a single step:

- » database upgrade directly from 9i, 10g, 11g to 12c. There is no need for a special
- » database release on the source, which can save additional time, because you
- » don't have to patch the current database release before you can upgrade
- » Reorganization of the complete database to free up unused space
- » Implementation of index and table compression, which will result in a 50% smaller database size

O2O Technology

The O2O method is based on the following few steps approach:

- » Prepare the source system, by defining the needed Oracle directories on the file system and load the PL/SQL into the source system. The package is only a few MB in size. To hold the scripts on the file system, only a few MB are needed (Typically less than 50 MB)
- » Define the basic conditions for the migration, e.g. definition of the setup of target database, (ASM configuration, usage of table and index compression, or other database features). The PL/SQL package is then executed to generate the needed migration scripts. A typically package run will take 30 min – 1h on an SAP system.
- » Creation of an empty target database, either with the provided scripts generated by the PL/SQL package or with your own scripts
- » After the scripts are created, they are copied to the target system, to run the database migration itself. To run the migration process a program named "scheduler" is available, which runs all needed migration scripts in the correct order and controls also the correct execution of each script. Using this scheduler you have full control over the migration. This includes the possibility to restart failed scripts or to set it to "Done". The scheduler is written in ksh and runs on all Unix or Linux operating systems. It's also possible to run the scheduling software on a remote machine, e.g. if Windows is used on source or target. The throughput depends on the available hardware on source and target machine. In best case you can build up the target database with more than 1 TB/ hour. Typically the throughput will be between 250 GB/h and 500 GB/h in average. To achieve this throughput, different migration methods are used for the database tables. Based on the table size and datatype (e.g. SAP cluster tables), the best migration for the particular tables is chosen to achieve the best migration performance. Typically most of the data is transferred directly over the network, not using a dumpfile for the migration. This saves space on the file system. To verify the migration, source and target databases are compared on object level (based on the object name) to ensure the correctness of the migration. In a second step, In addition all tables on source and target are compared based on the number of rows. So at the end of the migration you can prove the correctness of the migration based on object and row level.
- » Once the migration is completed the post SAP migration tasks can be started. The system are fully supported by SAP as mentioned in SAP note 1508271
- » "Oracle to Oracle Online Migration - Triple-O"
- » The O2O method is developed and maintained by the Oracle ACS service in Walldorf. O2O is either available as an ACS service or can also be used by customers themselves.

Migration Approach 2: Oracle-to-Oracle Online Migration (Triple-O) ACS Service

If the downtime requirements cannot be fulfilled with the O2O offline method, you can use as an alternative the Triple-O method, also described in SAP note 1508271 "Oracle to Oracle Online Migration - Triple-O". The estimate the downtime available for the technical database migration, you have to get the downtime for the application first. In this downtime not only the database migration must be performed, but in case of a heterogeneous system copy, user acceptance test, interface tests and post-SAP migration tasks must be performed. As a result the real available downtime for the technical database migration is much shorter than the application downtime.

So the Triple-O method was developed, to reduce the technical database migration time to a minimum. Typically the required downtime for the database migration is between 30 minutes and 1 hour, independent from the database size. On customer request the source and target database can be compared based on the row count after the migration is completed, to ensure the correctness of the online migration.

Triple-O Technology

Triple-O allows for online migration of the database. It uses Oracle GoldenGate software for the online synchronization of the changes and a modified O2O version, to perform a consistent initial database load. Oracle GoldenGate reads the online redo log or the archive log of the database and extracts DDL and DML changes, recorded in the redo log of the database. Oracle GoldenGate transforms the physical changes from the redo log file into a general description, which is operating system and database release independent, and saves these changes into trail files. The volume of the trail files is typically 30% - 50% of the redo log volume. To use Oracle GoldenGate supplemental logging must be enabled on the database.

The Oracle Golden Gate trail files are sent to the target database server, either with Oracle GoldenGate, using a network connection, or by providing the trail files via NFS to the target system.

On the target side the trails files are read by apply processes, which execute native SQL statements, generated out of the contents of the trail file on the target system. So each DML is transformed into the appropriate insert, update or delete command. That allows use of Oracle GoldenGate for heterogeneous system copies as well.

It's possible to start or stop an online migration at any time. There is no downtime needed for the start or the stop of the migration. Furthermore the migration method doesn't need any special database patches, or a special database patch level. Triple-O runs on any 9i, 10g or 11g version and supports DML and DDL changes. So there are no limitations (e.g. transport stop) on the usage of the SAP system during the migration. All operations can be performed quite normal. Both, R/3 and BW systems are fully supported.

Because GoldenGate is operating system independent, also heterogeneous database migrations are supported. The minimum Oracle release on source is 9.2. Direct database upgrades to 10g and 11g are possible. When using Triple-O, you can make use of all features listed for the O2O method. So the basic configuration is very similar between O2O and Triple-O. Beside the migration scripts, for Triple-O also the GoldenGate configuration scripts will be generated automatically.

The online migration is running in a very similar way, as the previously described O2O migration. A PL/SQL package is loaded in to the database, and creates all necessary script, to perform the online migration. Instead of running the migration scripts offline (SAP is down), these scripts are now executed, while SAP is up and running. To allow a consistent export of the data, Oracle flashback capabilities are used. This allows on one side a consistent export of the tables to a specific SCN (System Change Number), on the side it's possible to configure the GoldenGate processes for each table to the table specific SCN, to guarantee an error free apply. The fetch of an individual SCN for each table and the update of the GoldenGate configuration files is executed by the scheduler software, which runs the migration.

One challenge in an online migration is to handle the additional load, generated by the GoldenGate processes and the initial dataload. Very often the current hardware on the source system is outdated and already fully used by the current application load. So it's not possible to add additional load on the system, without harming the production. To allow an online migration even under these circumstances, it's possible to run a downstream capture of the GoldenGate processes. In such a configuration, the archive files from the production system are analyzed and extracted on a different server. This server must not have the same OS but only the same endian byte order. So it's possible to process database archive files from HP-UX, AIX and Sun Solaris (big endian) and Linux, Windows (little

endian) cross-platform. Therefore it's possible to run the GoldenGate processes on a different hardware, to unload the productive environment and preserve the resources on the production system.

If it's even a problem to handle the initial data unload on the productive system, a shadow database can be used instead. So it's possible to run a Triple-o migration completely outside of the productive systems, which allows to perform an online migration even on old and outdated hardware.

To support also very large databases with a huge system load it's possible to configure GoldenGate in many different ways. To increase the capabilities to process a larger redo log volume, up to 34 GoldenGate processes can be defined. Each process gets a number of tables, to extract the DML and DDL changes of these tables. The PL/SQL package will perform a load distribution, based on the recorded DML changes in the database for each table. It's possible to configure up to 34 processes for the redo log extraction. One GoldenGate extract process is capable to handle up to 1 TB of redo within 24h.

For apply on the target system in general more processes are needed, than to extract the redo log file. Typically for a normal SAP system 5 up to 10 "apply processes" are needed.

For large BW systems more than 20 "apply processes" can be needed. To allow a maximum flexibility for the GoldenGate configuration, for each extract process up to 34 "apply processes" can be defined. Once again, the assigned tables in each extract are assigned to the number of defined apply processes by performing a work load balancing. So with a 2tier architecture more than 1000 apply processes would be possible.

The typical project plan for an online migration has typically four phases:

1. Prepare the migration, generate migration scripts
2. Start the GoldenGate processes to record the database changes either on the productive system or downstream on a different server. The recorded changes, listed in the trail files are sent over the network to the target machine, where they are stored in the file system. To optimize the usage of the network bandwidth, the GoldenGate transfer can be compressed by a factor of approx. 5-7
3. Run the SCN-based initial data unload either from the productive server or from a shadow database. To save the band width the database is dumped out to a NAS server in multiple dump files. With a single NAS device you can achieve a throughput of 150 GB/h.
4. Once the initial unload is completed, the NAS device is detached from the source system and transported to the target data centre.
5. The NAS device is attached to the target system and the target database is loaded from the NAS device.
6. Once the initial load is completed, these applies are started on the target machine.
7. There must be now enough time to close the time gap between source and target database. The needed time is depending from the amount of changes, which have to apply, the kind of operations, which have to apply, the number of "apply processes" and the performance of the target system.
8. If the time gap between source and target system is closed, both systems can run in parallel up to the final switch.

Using this approach it's possible to migrate even database between date centers, which are connected only by a limited network connection. Using the enhanced configuration option for GoldenGate (downstream capturing, usage of a shadow database for the initial database load), even very large databases with a very critical performance can be migrated with a minimum downtime. Because all operations are taking place online, even under difficult conditions an online migration can be performed, on the costs of a longer duration of the migration project, but without a longer downtime.

Migration Approach 3: RMAN Transportable Tablespaces

By using Transportable Tablespaces, it is possible to migrate an existing database from any UNIX or Windows platform to the Oracle Exadata Database Machine. This migration will create a new database on the target platform the old source database is kept in place, so it is overall like a heterogeneous copy process.

As an overview the main facts and limitations when using Transportable Tablespaces (TTS):

- » offline process, source database and tablespaces to be exported, must be set read only during the process
- » homogeneous and heterogeneous migrations possible
- » supported platforms are given in database view v\$transportable_platform
- » RMAN must be used in this process
- » target database must be created freshly before source tablespaces can be plugged in
- » network connection and shared filesystem storage (NFS) is used for RMAN reading datafiles from source database
- » single tablespace or a set of tablespaces can be transferred
- » 'system' tablespaces, temporary and undo tablespaces cannot be transferred. This also applies to redo logs, which certainly aren't tablespaces
- » the set of transferred tablespaces must be self-contained, means no object included in the tablespace set must refer to an object not included in the tablespace set

The migration process includes the following steps:

- » Check prerequisites, e.g. supported platforms
- » On source select from v\$transportable_platform, to verify if the source platform is supported. Target platform is 'Linux x86 64-bit for Oracle Exadata.'
- » Identify all tablespaces to be transferred
 - Select tablespace_name from dba_tablespaces or dba_tables to determine the tablespaces to be transferred. Usually all tablespaces containing objects of SAP schema (e.g. SAPSR3, OPS\$<SAPSID>-ADM) belong to the tablespace set. A transfer of a subset of tablespaces / data is technically possible but might corrupt SAP dictionary. So this is not supported.
- » Optional: copy 'sapuser' table into a tablespace, which will be transported
- » To copy a complete SAP system, SAP login data from old database must be copied into new database. If the table 'sapuser' resides in the tablespace 'system', it must be moved to a tablespace included in the tablespace set first. Otherwise it would not be transferred.
- » Verify the set to be self-contained
 - Use PL/SQL procedure dbms_tts.transport_set_check to verify no object in the tablespace set has references to an object not included in the set.
- » Open source database read-only
 - To ensure for data consistency, the database must be opened in read-only mode.
- » RMAN convert script must be created for migrating between platforms
- » The 'convert database' RMAN command includes all tablespaces in the convert script, so after script generation, all non-transferred 'system'- undo tablespaces must be deleted from the final script
- » Set tablespaces to be transferred read only

Before tablespace metadata can be exported and convert procedure can be started, it must be for sure, that metadata of the tablespace cannot change. So additionally each transported tablespace must be set read-only.

- » Create export of metadata describing all objects included in the tablespace set

This has two internal steps, first an export of metadata describing all non-table objects, second a metadata export of all tables.

- » Create parameterfile for target database

This is the first step to be executed on the Oracle Exadata Database Machine. All steps before were done on the old source machine, this and all following steps are executed on the Exadata. As RMAN needs a running database instance, first a parameter file has to be created, so the new instance can be started on the Exadata. This is a single instance (non-RAC, cluster_database=false) only. An integration into CRS (Cluster manager is not needed). However it's recommended to prepare the instance with final data like instance name (SID), e.g. KCM1. Memory parameters can be adjusted later. Also migration single instance to RAC will be done later. There are several parameters needed for ASM migration (file creation).

- » RMAN copy into ASM and convert process

- » After checking that the instance can be started, the final convert RMAN script is executed. All the source datafiles noted in the convert script must be accessible using the exact path from the script. So a NFS mount is needed. The RMAN output has to be kept, because new ASM filenames will be needed for import later.

- » Create target database with 'system' tablespace only on Oracle Exadata

- » Plug transported tablespaces into new database on Oracle Exadata

This needs again two import steps. First import the non-table metadata are imported as described in the white paper. All objects are created without table data. Before the second import can be started, 'sapconn' and 'sapdba' roles have to be granted. It's recommended to provide a script for the second import of table data. The import command needs all ASM paths of transported tablespace files to be specified. For this reason, the RMAN output of the convert-run should be kept.

- » Some post steps

After the second import, the tablespaces of the database on Oracle Exadata should be checked. If all tablespaces and datafiles are known, the read-only flag must be removed. Don't forget to adjust tablespace settings for imported users. RMAN can be used for validation of the database. Missing is a setup of the final spfile, migration to RAC (adding more instances) and integration into CRS. This is described below.

Migration Approach 4: RMAN Duplicate Database

The RMAN 'duplicate from active database' approach is a very simple method to create a full copy of a complete database. It can be used offline or online, so the source database can be in open state and operating during copy process. That shortens overall downtime of migration drastically. However this approach is limited to specific platforms using the same byte endian format if used for a migration to Oracle Exadata.

Generally the RMAN 'duplicate database' command is used for creation of a database copy. This copy is created by RMAN influenced by database parameter settings, which can define a new storage structure like an ASM Destination. So this approach can be used for a migration from a file system based database into ASM or Oracle Exadata. Specific topics of this approach are listed below with a short overview.

Requirements and limits:

- » Currently supported source operating systems are Solaris, Linux and Windows on x86-64 platform
- » Network (TCP/IP) connection must exist between source and target hosts

- » Instead of the above described Transportable Tablespace approach, network will be used by RMAN, so no shared file system storage (like NFS) is needed.
- » Both database – source database and target database must use the same Oracle RDBMS version.
- » Online / offline migration
- » The RMAN option ‘from active database’ enables an online copy process, so the source database is open and operable. Online migration reduces certainly the downtime of the migration. If the source database is in mount state during duplicate execution, a consistent database copy is created, if the source is in open state, recovery must be executed which is automatically done by RMAN.

Migration Approach 5: Oracle Data Guard Physical Standby Database

If the source database is running on a platform which is compatible with Oracle Exadata compute nodes then you can create a Oracle Data Guard physical standby database on one of the Oracle Exadata compute nodes. As the Oracle Exadata compute nodes are using Linux on x86-64 architecture you can create a physical standby database from any database running on x86-64 hardware using the Linux, Windows or Solaris operating system. For a complete list of combinations of supported standby databases check MOS Note 413484.1.

Using physical standby database allows you to migrate to Oracle Exadata with minimal downtime.

Please refer to the standard Oracle Data Guard documentation on how to install, configure and manage a physical standby database.

Using additional SAP Instances with Oracle Exadata

The configuration of additional SAP instances on separate servers (Note: You cannot install and use SAP instances on the Oracle Exadata) to be used with RAC databases on Oracle Exadata is described in the white paper “Oracle Net Configuration for SAP on Oracle Real Application Clusters version 11.2 and 12.1”.

Protection of SAP Central Services

In an SAP system environment certain components such as the Enqueue (SCS, ASCS) or Message Server or the Web Dispatcher expose a single point of failure. These components can be monitored and controlled by non-SAP high availability software to make the whole SAP system highly available. In typical SAP environments this high availability software is running either on the clustered database server or outside the database server on a separate cluster of servers.

If a separate cluster other than the database cluster is already used for the SAP Central Services then it is recommended to continue to use this separate cluster for the SAP Central Services when deploying the Oracle Exadata Database Machine.

An alternative for Unicode-only SAP installations is to use the Oracle Clusterware running on the compute nodes of the Oracle Exadata Database Machine along with the Oracle Clusterware utility SAPCTL to protect the SAP Central Services. The implementation uses Oracle Clusterware modeling features so that each managed entity is represented as a resource. SAPCTL implements unique Oracle Clusterware resources, one each for the Enqueue Service of type ABAP or JAVA, the Replication Service for ABAP or JAVA, and the unique VIP resources for both types of Enqueues Service.

The management policy for the Enqueue Service and VIP are configured so that the two are co-located, while the policy for the Replication Service resource ensures that it is never running on the same node as the associated Enqueue Service. The failover policy for the Enqueue Service resource guarantees that upon failure, the Enqueue Service is restarted on the node that is currently hosting the belonging Replication Service, if any. The Replication Service will be subsequently relocated to a different node if one is available. This applies to both the ABAP and JAVA application server type of SAP NetWeaver.

For all types of supported SAP Instances, e.g. ASCS, SCS or ERS, an additional resource for the SAP Start Service is defined in CRS. Every SAP Instance has a dependency on the associated SAP Start Service and is always co-located if the SAP instance is running. The SAP Start Service for an SAP Instance should always be running on one node in the cluster, so the SAPCTL command line interface does not provide a function to start or stop the SAP Start Service.

The SAPCTL utility is made available through the SAP support portal. See SAP Support note 1496927 for latest information. Only the latest available version SAPCTL V8 has support for Oracle Clusterware 12c.

Complete documentation on installation and configuration along with a working example is contained in the download package attached to SAP Support note 1496927.

Note: Please be aware that any Oracle Exadata Storage Software change (patch, patch bundle or upgrade) may affect the configuration and the operation of the SAP Central Services on the compute nodes of the Oracle Exadata Database Machine. So please check the configuration and correct operation of the SAP Central Services on the compute nodes after an Exadata Software change was applied.

Appendix 1:

Related White Papers

Related White Papers	SAP SCN http://scn.sap.com/community/oracle
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	Upgrade of SAP NetWeaver Installation to Oracle Grid Infrastructure 12.1.0.2 with Oracle Real Application Clusters 12c Release 1
	Providing High Availability for SAP Resources with Oracle Clusterware 11g Release 2 and Oracle Clusterware 12c Release 1
	Oracle Net Configuration for SAP on Oracle Real Application Clusters version 11.2 and 12.1

SAP Notes

SAP Notes	SAP Related Notes
1590515	SAP Software and Oracle Exadata
1914631	Central Technical Note for Oracle Database Release 12c Release 1 (12.1)
2470660	Central Technical Note for Oracle Database Release 12c Release 2 (12.2)
2145628	Exadata/SuperCluster: Patches for 12.1.0.2
2573150	Exadata/SuperCluster: Patches for 12.2.0.1
1888485	Oracle 12c: Database Parameter 12.1.0.2
2470718	Oracle Database Parameter (12.2)
2064206	Database Upgrade to 12.1.0.2 with Grid Infrastructure
2086029	Oracle 12c: Additional Info / Corrections to Oracle 12c (12.1.0.2) Upgrade
1677978	Mixed GI/RDBMS Versions or Mixed SAP/Non-SAP Environments on Exadata
12741	Current versions of BR*Tools
1996481	Using correct hostnames for Oracle Exadata Database Nodes
1496927	Protection of SAP instances through Oracle Clusterware
2598404	How to update SAP Host Agent

MOS Notes

MOS Notes	Related My Oracle Support (MOS) Notes
888828.1	Exadata Database Machine and Exadata Storage Server Supported Versions
1929629.1	Oracle ACFS Support on Oracle Exadata Database Machine
1369107.1	ACFS Support on OS Platforms
1900335.1	Exadata: How to create a NFS Mount on a Database Node
413484.1	Data Guard Support for Heterogeneous Primary and Physical Standbys in Same Data Guard Configuration



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Hardware and Software, Engineered to Work Together

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Using SAP NetWeaver with Oracle Database 12c on Oracle Exadata
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