ORACLE EXADATA

Using SAP NetWeaver with Oracle Database 12c on Oracle Exadata

Key Guidelines

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ORACLE

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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.

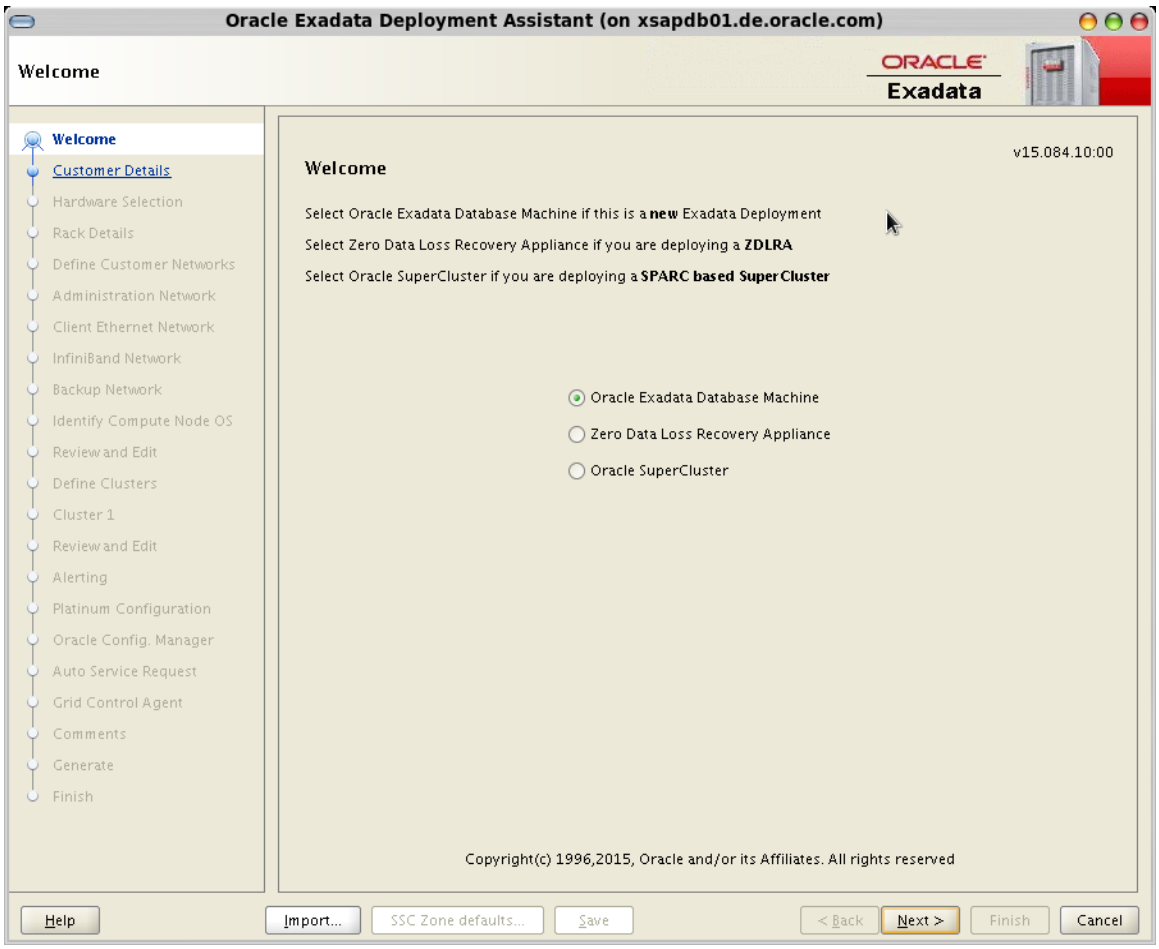
For performance and throughput reasons it is recommended to only have two control files and non-multiplexed online redo log files for each SAP database all stored in the DATA Group. As standard SAP installations use three control files in the database it is recommended to remove one control file from 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.

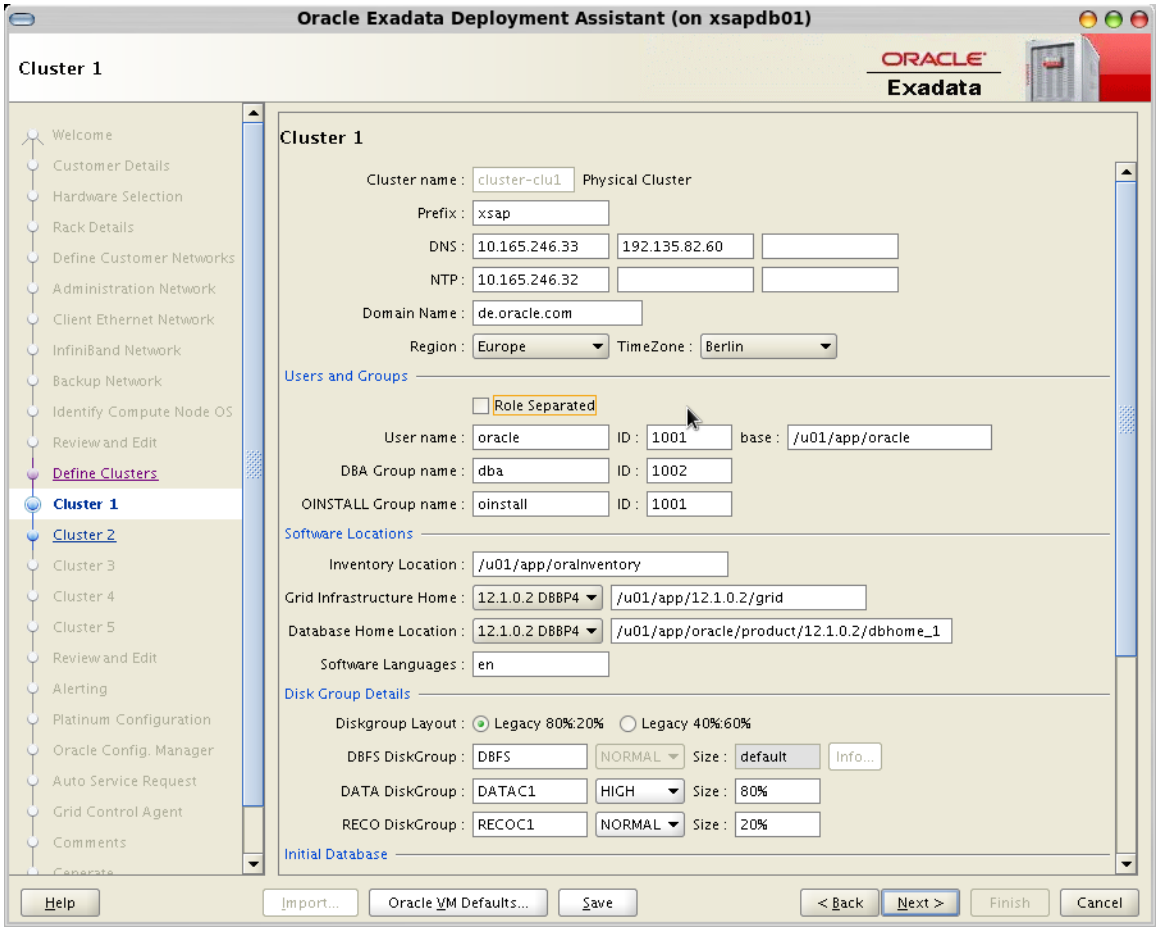
SAP Specific OEDA Configuration

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.





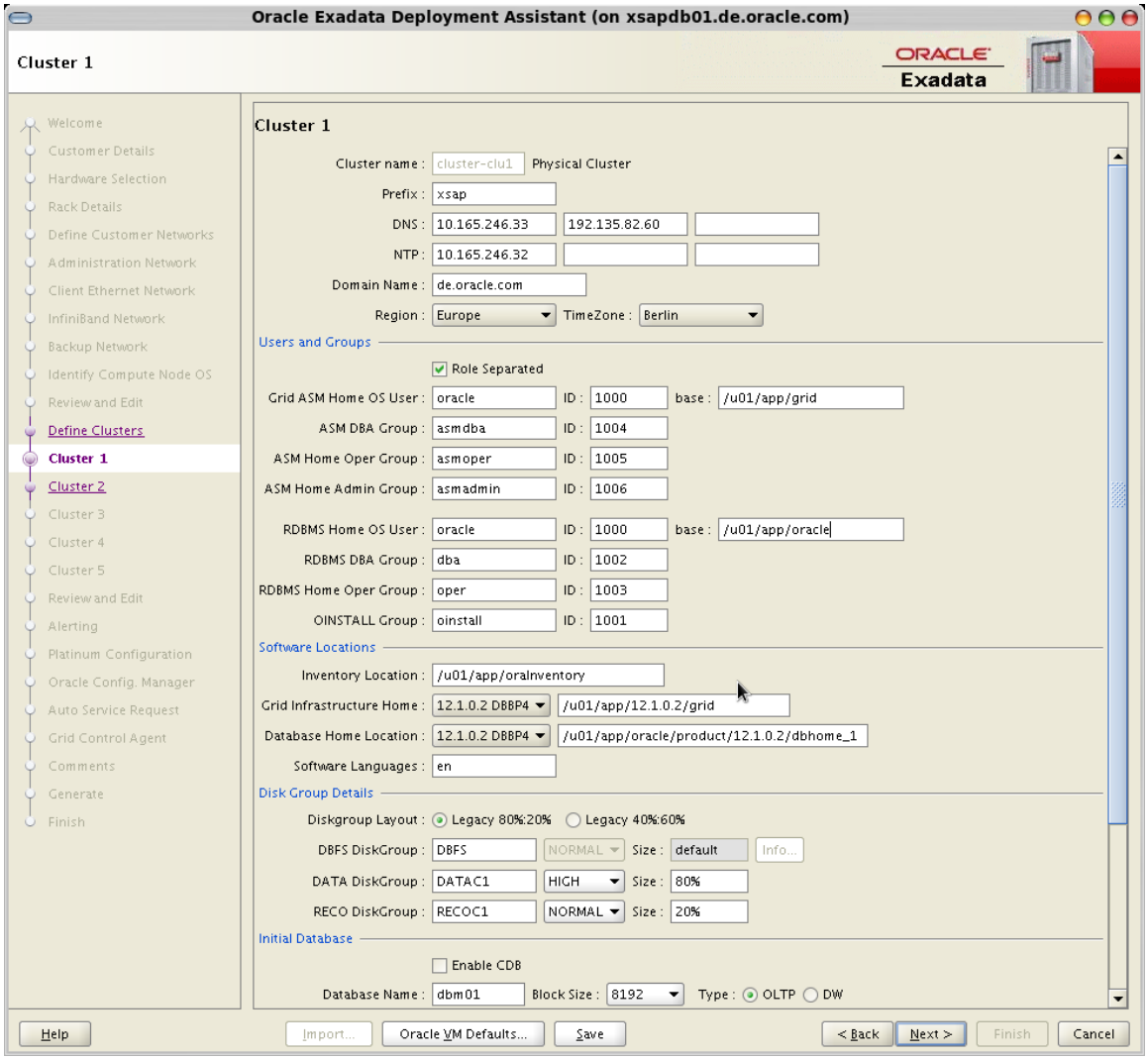
For Oracle GRID and Oracle Database you have to select version 12.1.0.2 DBBP4 as the initial SAP certification is based on 12.1.0.2 DBBP4 and the mandatory initial SAP Bundle Patch for Exadata is built on top of 12.1.0.2 DBBP4. In the future newer DBBPs can be used. Please check SAP Note 2145628 for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

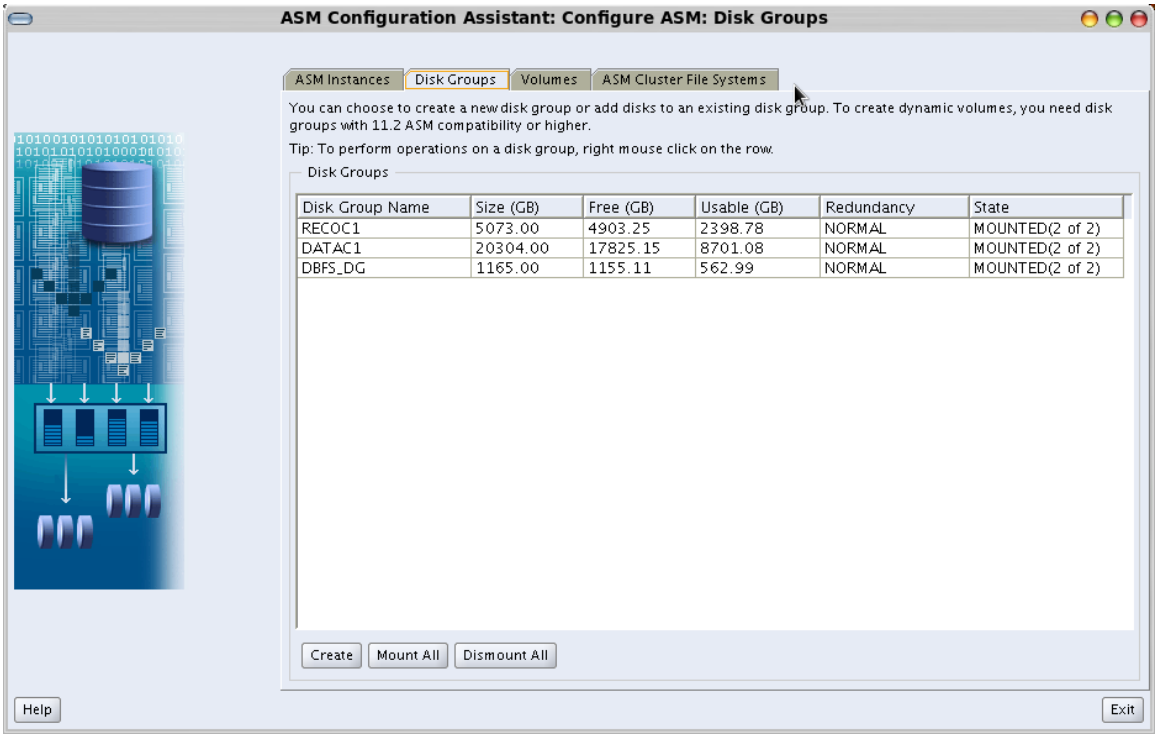
Note: DBFS cannot be used in an SAP environment as it is not a POSIX compliant file system missing important features like file locking or memory mapped files all required by SAP.

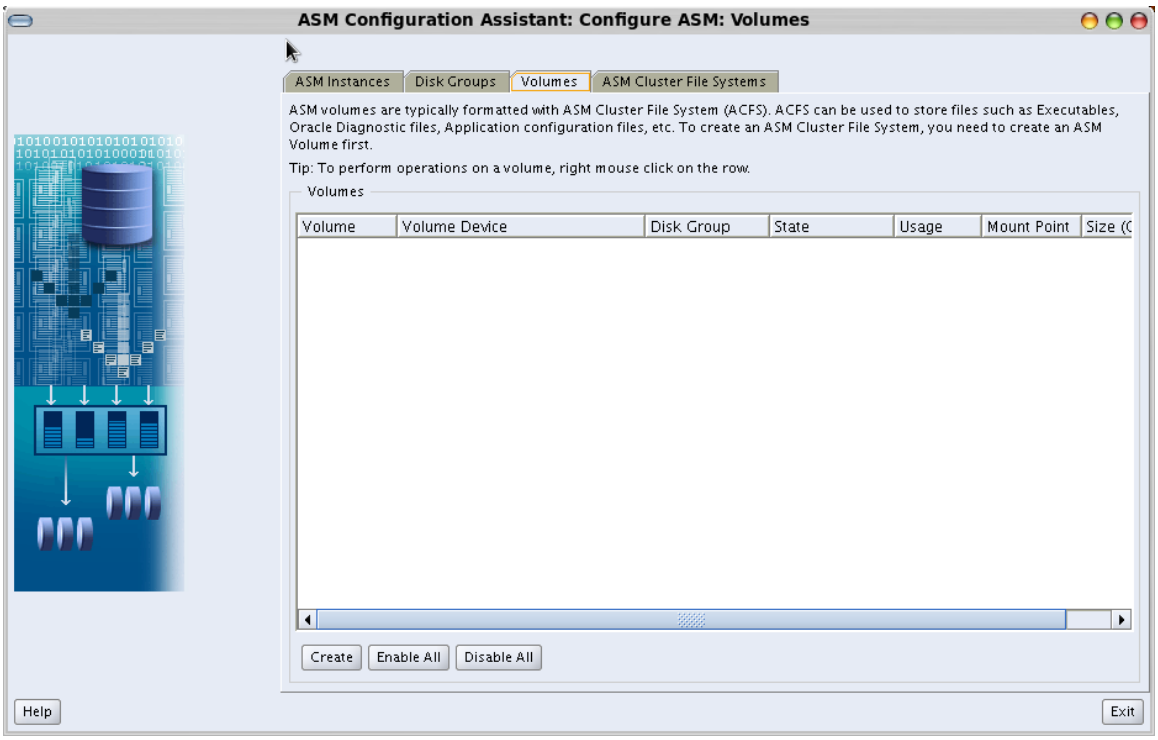
Shared File System with ACFS

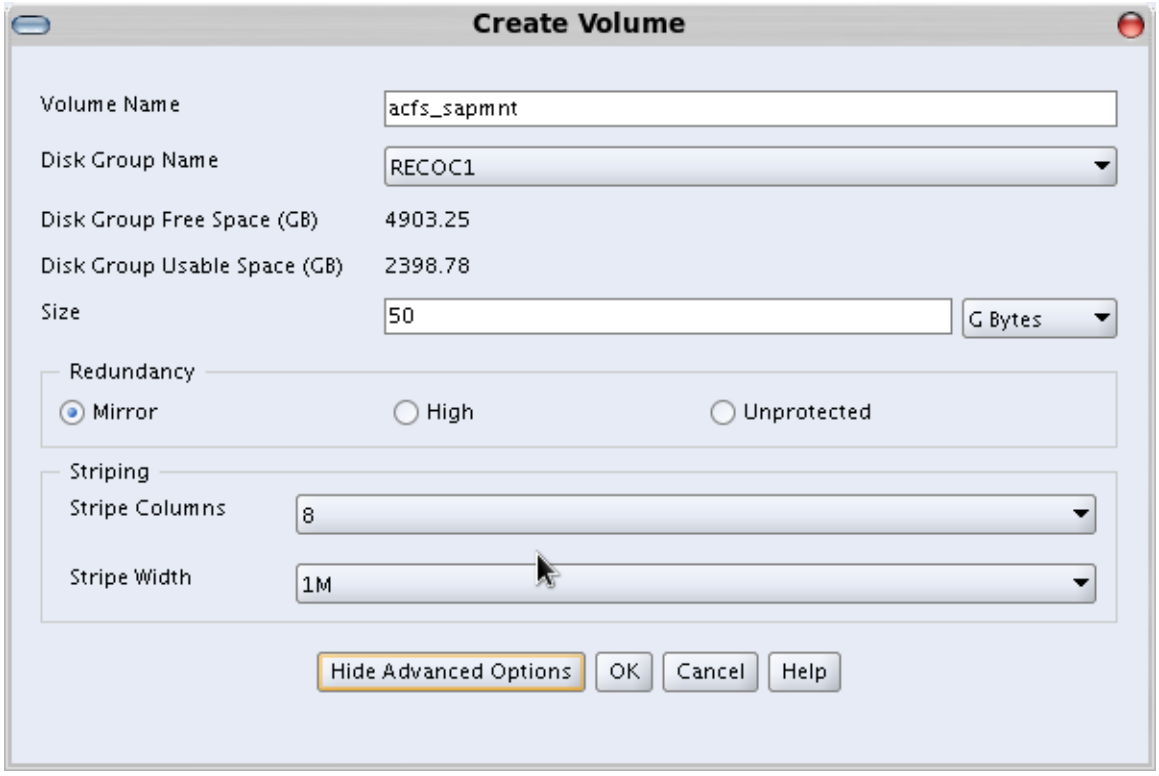
Oracle Exadata offers the Oracle Cloud File System (formerly known as ACFS). ACFS can be used for /sapmnt, /usr/sap/trans on all application servers, if it is NFS exported from the Oracle Exadata compute nodes. This file system has to be created before the deployment. You can add additional file systems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

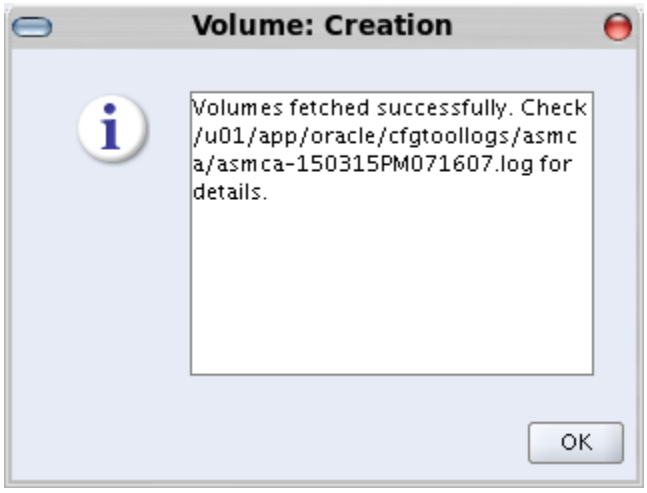
Note: Before making any changes to the Linux kernel versions for instance by applying a new QFSDP verify that a version of the ACFS file systems exist for the changed kernel versions. See MOS Note 1369107.1 for more details.

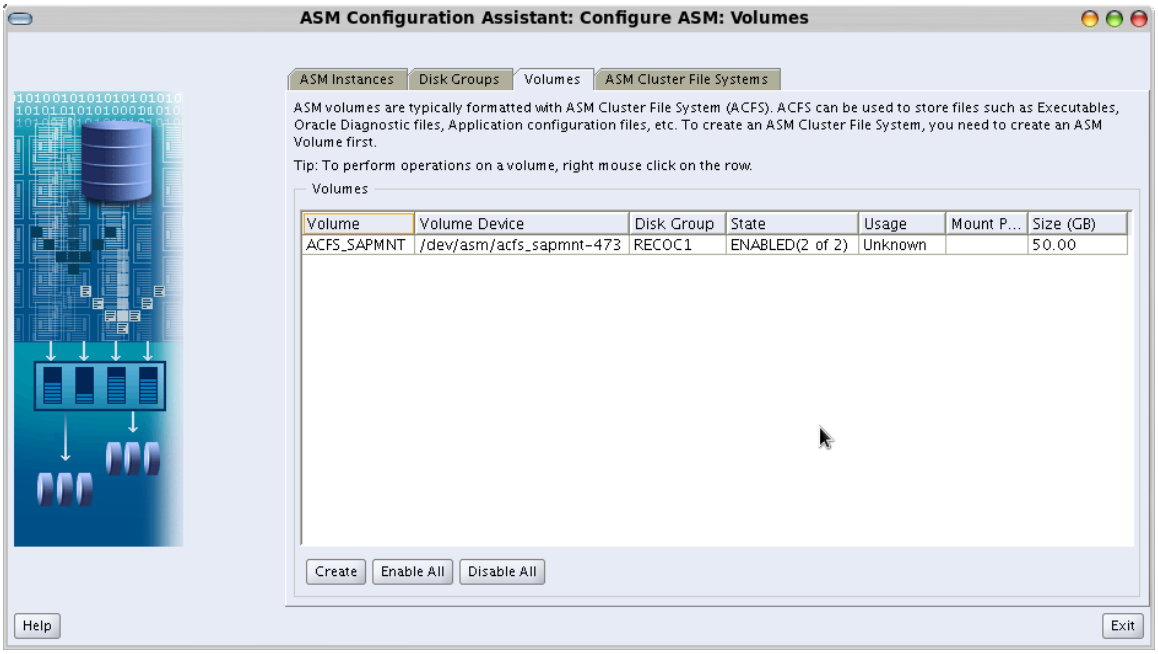
Here you can find an example how to create an ACFS file system with the size of 50GB from the ASM Disk Group RECOC1 and the mount point /sapmnt. Create a mount point for the ACFS file system and set the graphical environment to use the graphical ASM Configuration Assistant (asmca). Change to user oracle and set the GRID environment to run asmca.

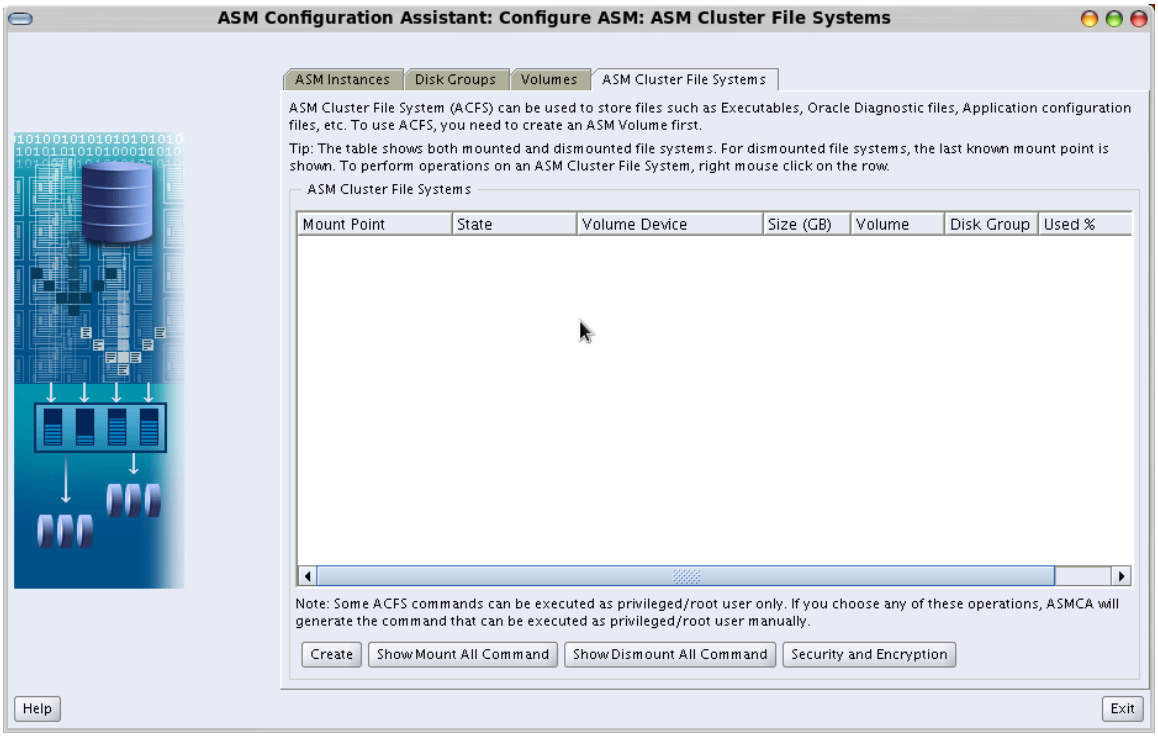

ASM Configuration Assistant: Configure ASM: Disk Groups
ASM Instances
Disk Groups
Volumes
ASM Cluster File Systems
You can choose to create a new disk group or add disks to an existing disk group. To create dynamic volumes, you need disk groups with 11.2 ASM compatibility or higher.
Tip: To perform operations on a disk group, right mouse click on the row.
Disk Groups
Disk Group Name | Size (GB) | Free (GB) | Usable (GB) | Redundancy | State
RECOC1 | 5073.00 | 4903.25 | 2398.78 | NORMAL | MOUNTED(2 of 2)
DATAC1 | 20304.00 | 17825.15 | 8701.08 | NORMAL | MOUNTED(2 of 2)
DBFS_DG | 1165.00 | 1155.11 | 562.99 | NORMAL | MOUNTED(2 of 2)
Create
Mount All
Dismount All
Help
Exit

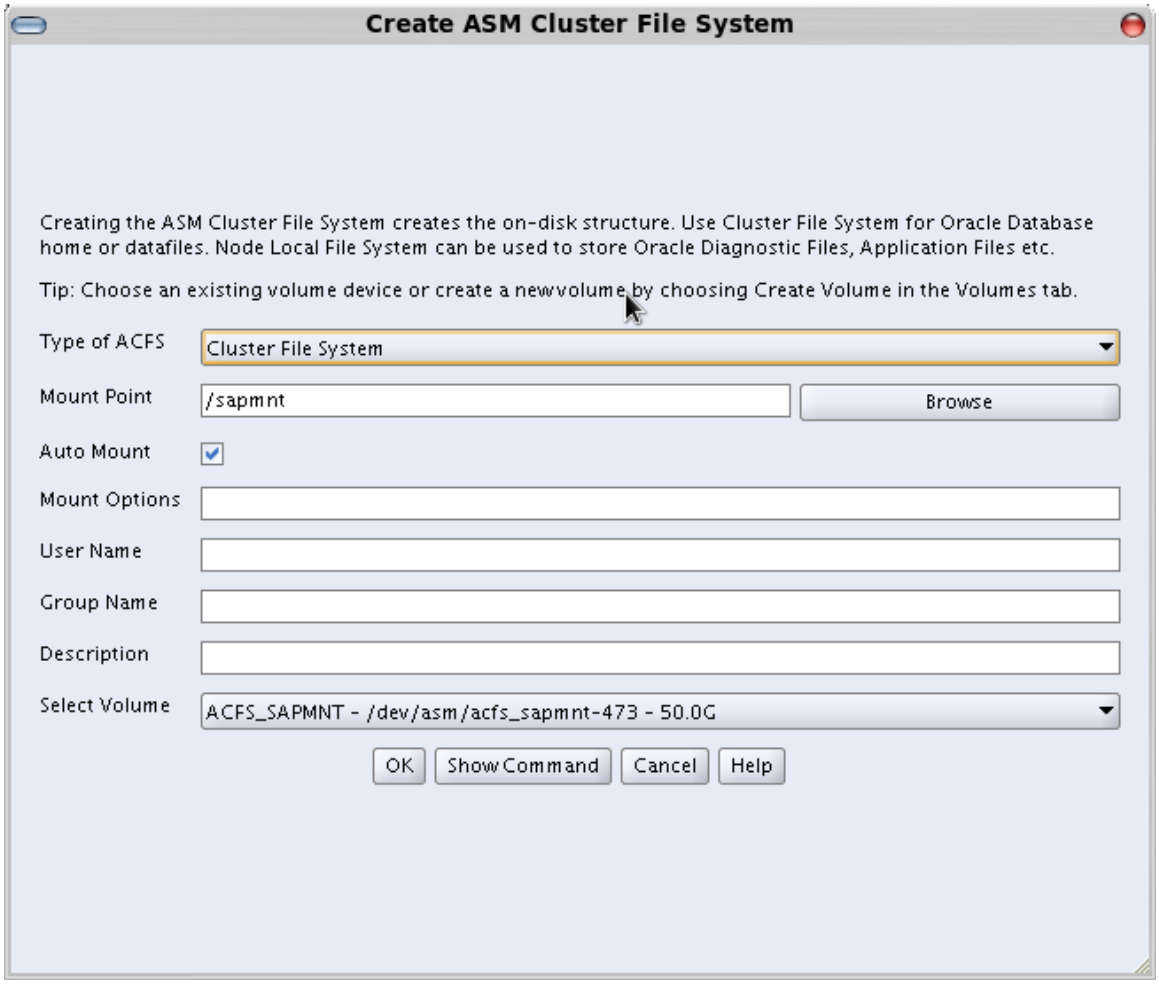

ASM Configuration Assistant: Configure ASM: Volumes
ASM Instances
Disk Groups
Volumes
ASM Cluster File Systems
ASM volumes are typically formatted with ASM Cluster File System (ACFS). ACFS can be used to store files such as Executables, Oracle Diagnostic files, Application configuration files, etc. To 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.
Volumes
Volume | Volume Device | Disk Group | State | Usage | Mount Point | Size (
Create
Enable All
Disable All
Help
Exit

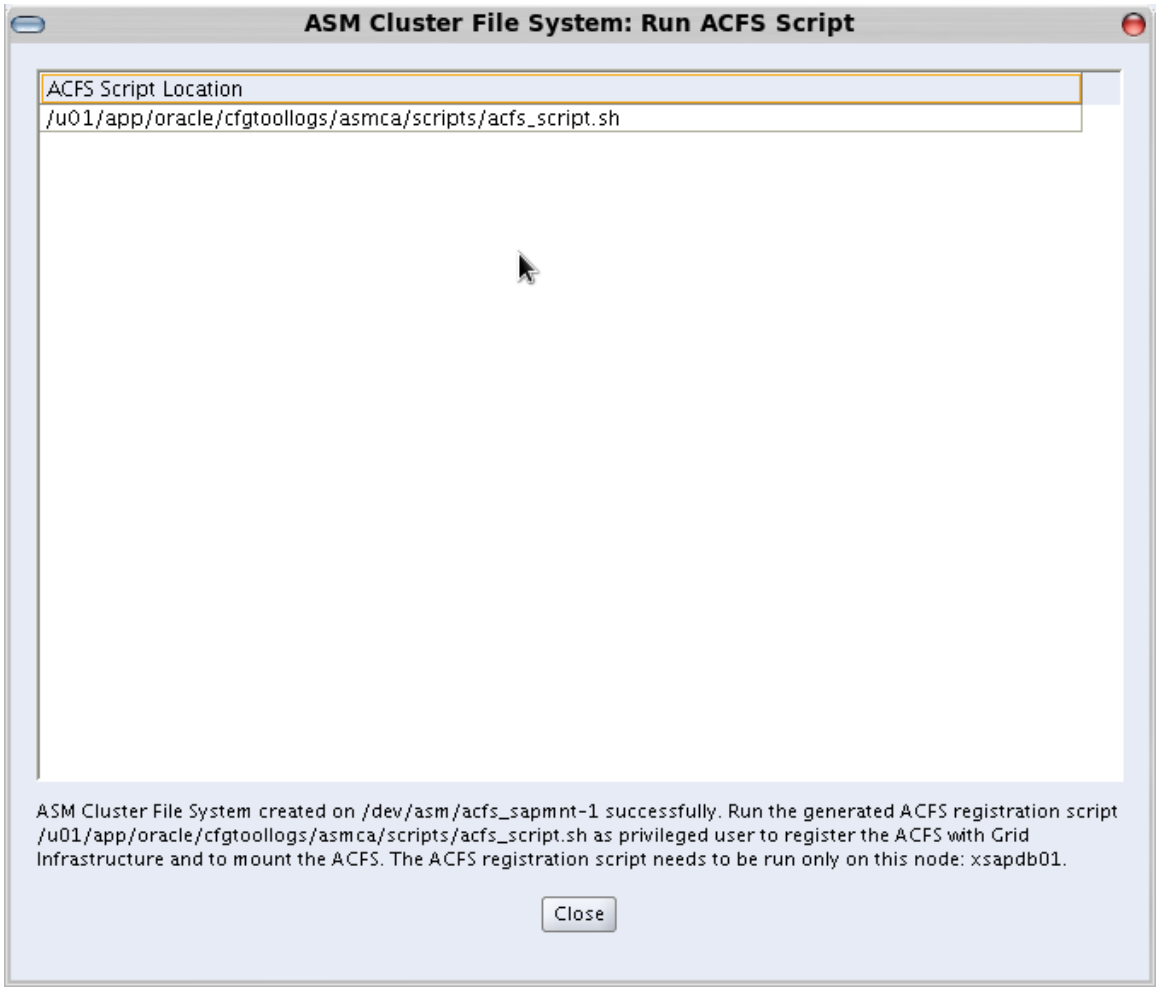

Create Volume
Volume Name
acfs_sapmnt
Disk Group Name
RECOC1
Disk Group Free Space (GB)
4903.25
Disk Group Usable Space (GB)
2398.78
Size
50
G Bytes
Redundancy
Mirror
High
Unprotected
Striping
Stripe Columns
8
Stripe Width
1M
Hide Advanced Options
OK
Cancel
Help


Volume: Creation
Volumes fetched successfully. Check /u01/app/oracle/cfgtoollogs/asmca/asmca-150315PM071607.log for details.
OK


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.
Volumes
Volume
Volume Device
Disk Group
State
Usage
Mount P...
Size (GB)
ACFS_SAPMNT
/dev/asm/acfs_sapmnt-473
RECOC1
ENABLED(2 of 2)
Unknown
50.00
Create
Enable All
Disable All
Help
Exit

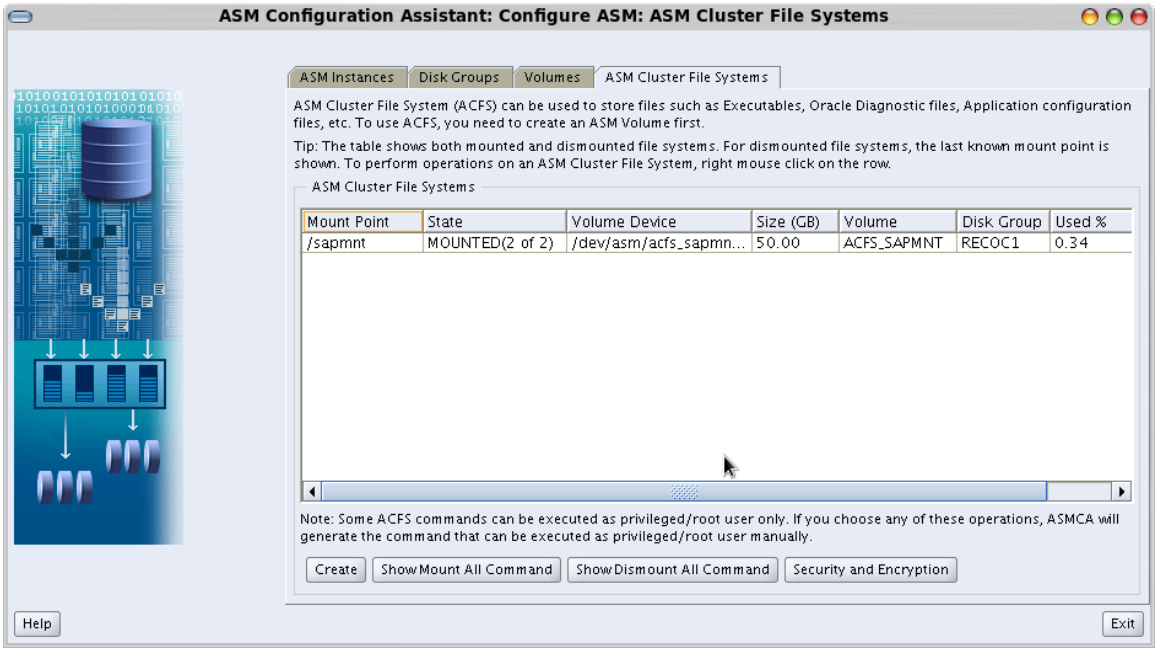

ASM Configuration Assistant: Configure ASM: ASM Cluster File Systems
ASM Instances
Disk Groups
Volumes
ASM Cluster File Systems
ASM Cluster File System (ACFS) can be used to store files such as Executables, Oracle Diagnostic files, Application configuration files, etc. To use ACFS, you need to create an ASM Volume first.
Tip: The table shows both mounted and dismounted file systems. For dismounted file systems, the last known mount point is shown. To perform operations on an ASM Cluster File System, right mouse click on the row.
ASM Cluster File Systems
Mount Point
State
Volume Device
Size (GB)
Volume
Disk Group
Used %
Note: Some ACFS commands can be executed as privileged/root user only. If you choose any of these operations, ASMCA will generate the command that can be executed as privileged/root user manually.
Create
Show Mount All Command
Show Dismount All Command
Security and Encryption
Help
Exit


Create ASM Cluster File System
Creating the ASM Cluster File System creates the on-disk structure. Use Cluster File System for Oracle Database home or datafiles. Node Local File System can be used to store Oracle Diagnostic Files, Application Files etc.
Tip: Choose an existing volume device or create a newvolume by choosing Create Volume in the Volumes tab.
Type of ACFS
Cluster File System
Mount Point
/sapmnt
Browse
Auto Mount
Mount Options
User Name
Group Name
Description
Select Volume
ACFS_SAPMNT - /dev/asm/acfs_sapmnt-473 - 50.0G
OK
Show Command
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\|rpcidmapd\|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
rpcidmapd       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

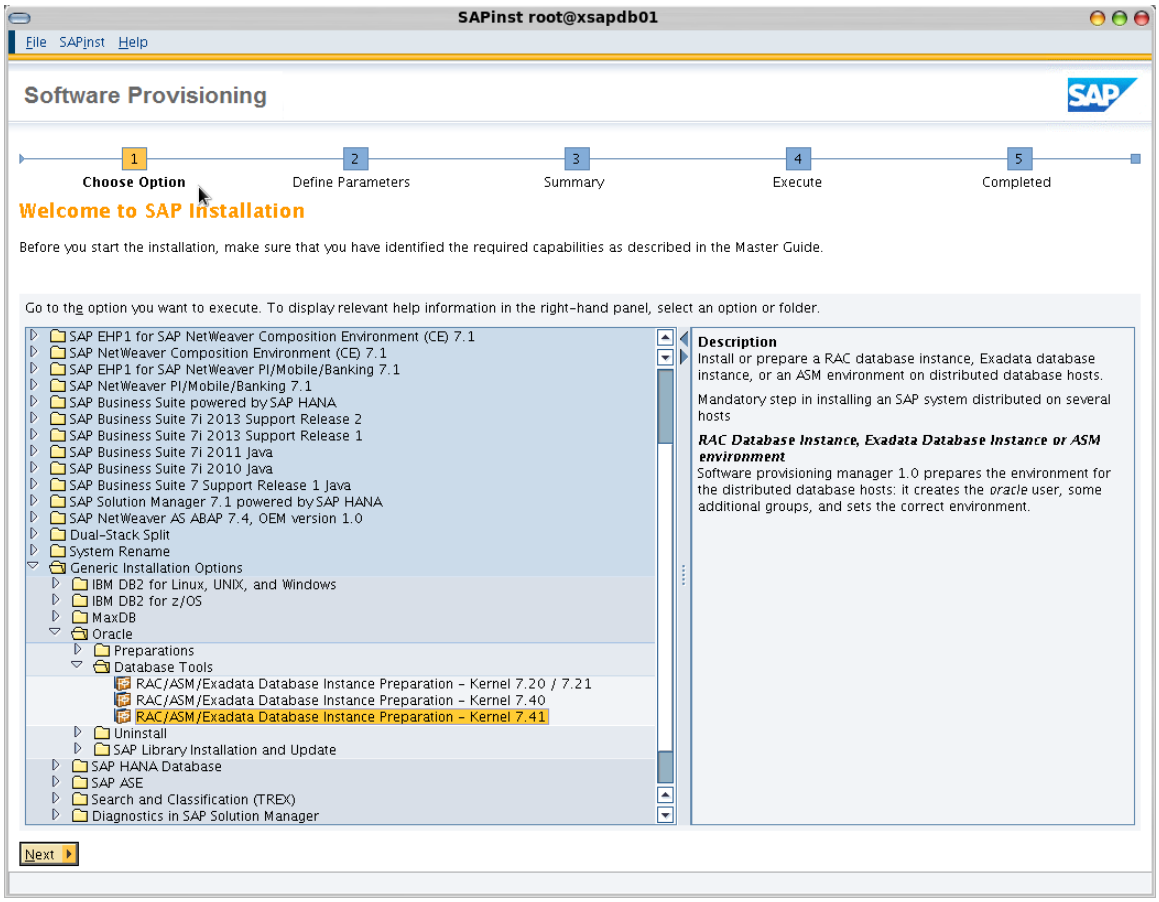
The SAP Software Provisioning Manager (SWPM) provides you with the step RAC/ASM/Exadata Database Instance Preparation to

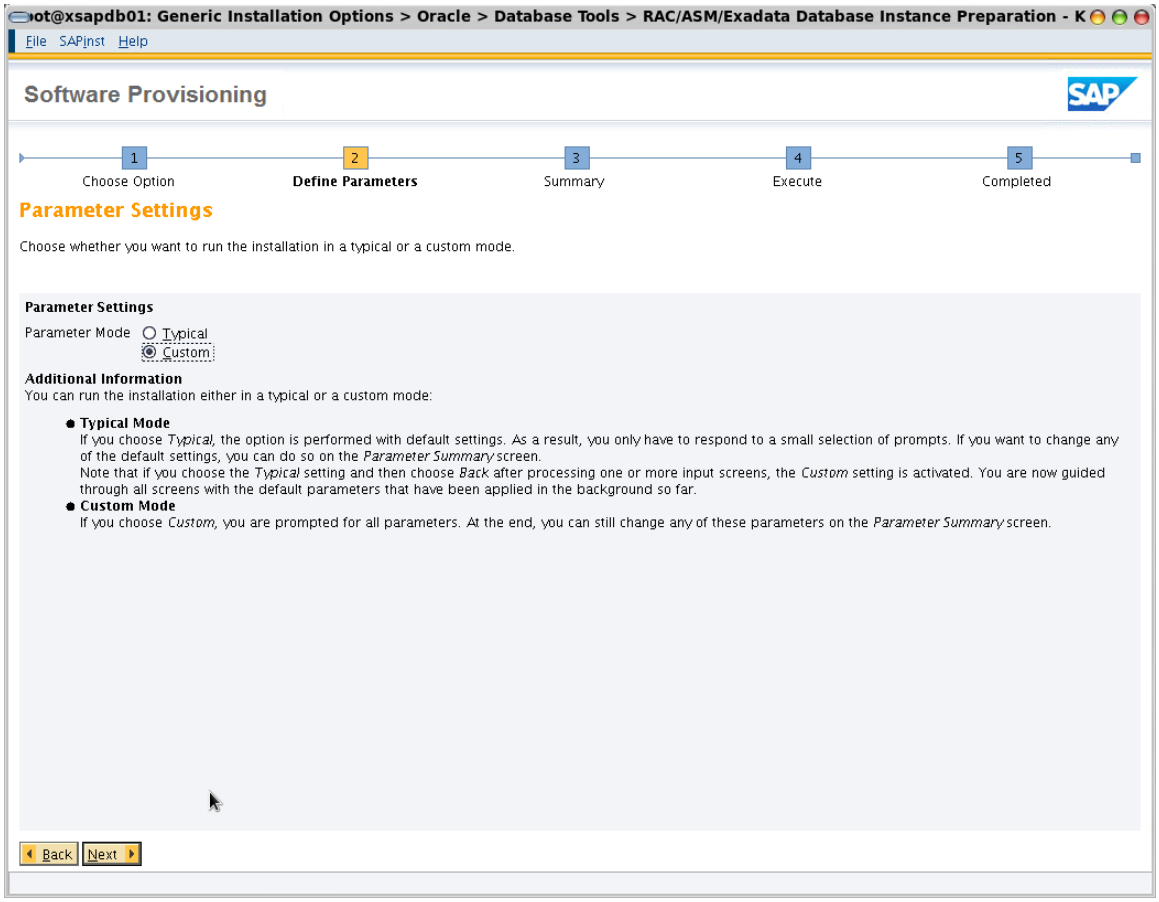
- install SAP Kernel independent and database dependent parts of the SAP Kernel

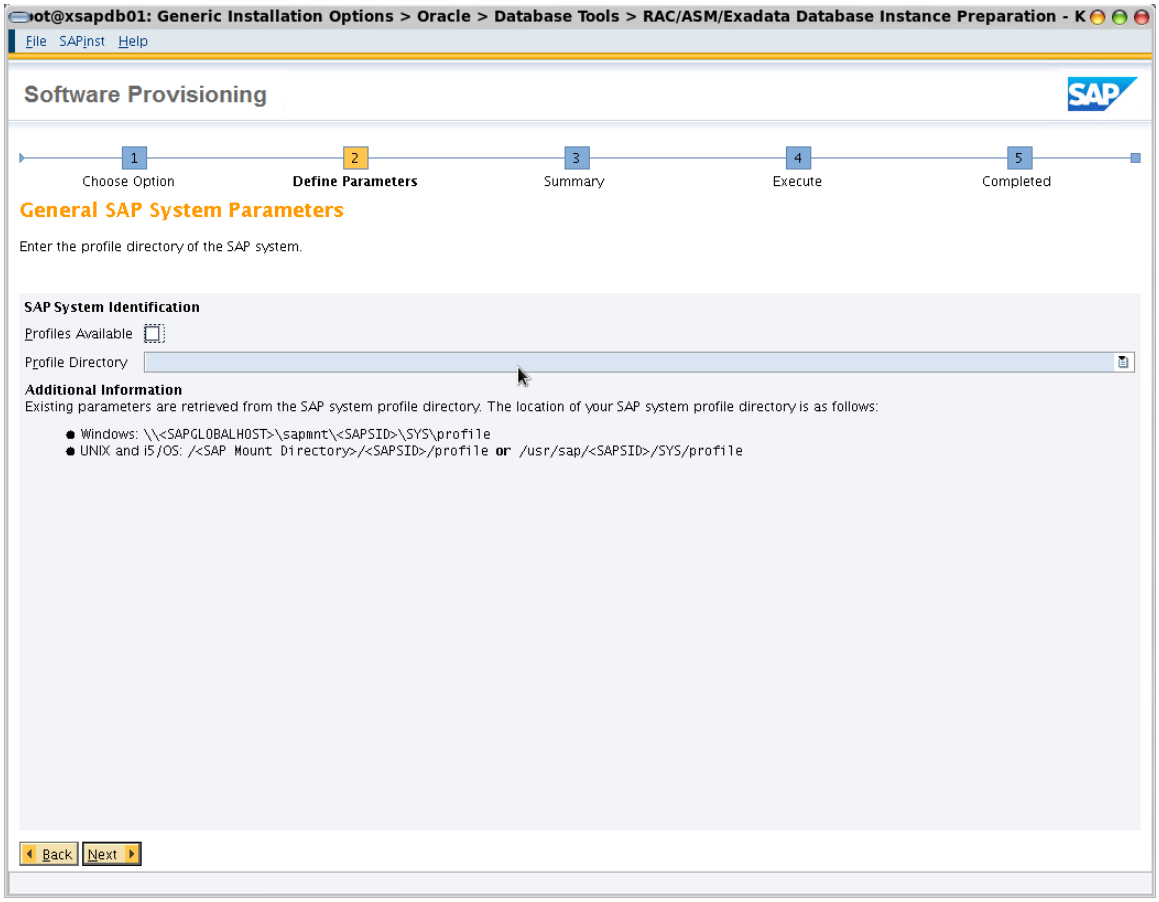
- install the BR*Tools as on portion of the database dependent part
- install the Oracle Instant Client
- install the SAP Host Agent
- create SAP users and groups
- prepare the environment for running the SAP database on ASM with RAC

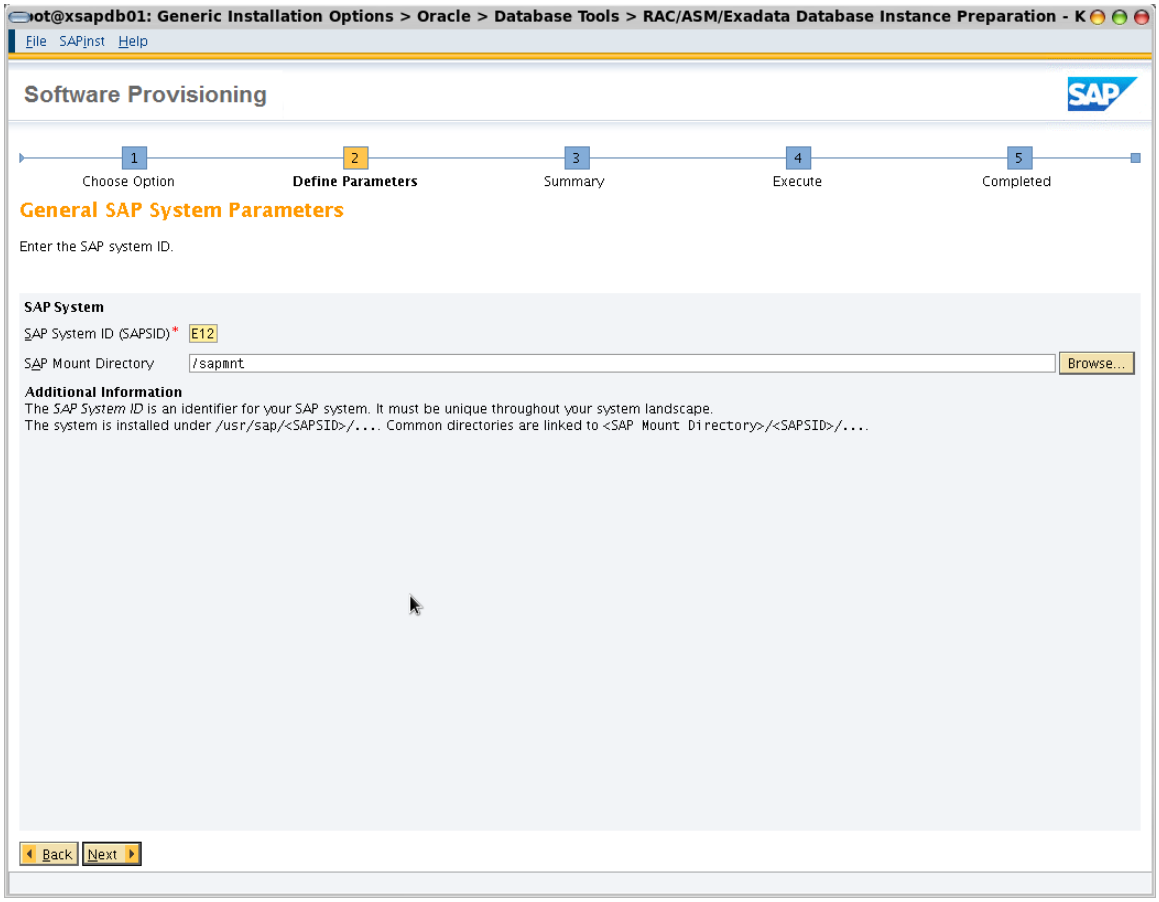
on the Oracle Exadata Database Machine compute nodes.

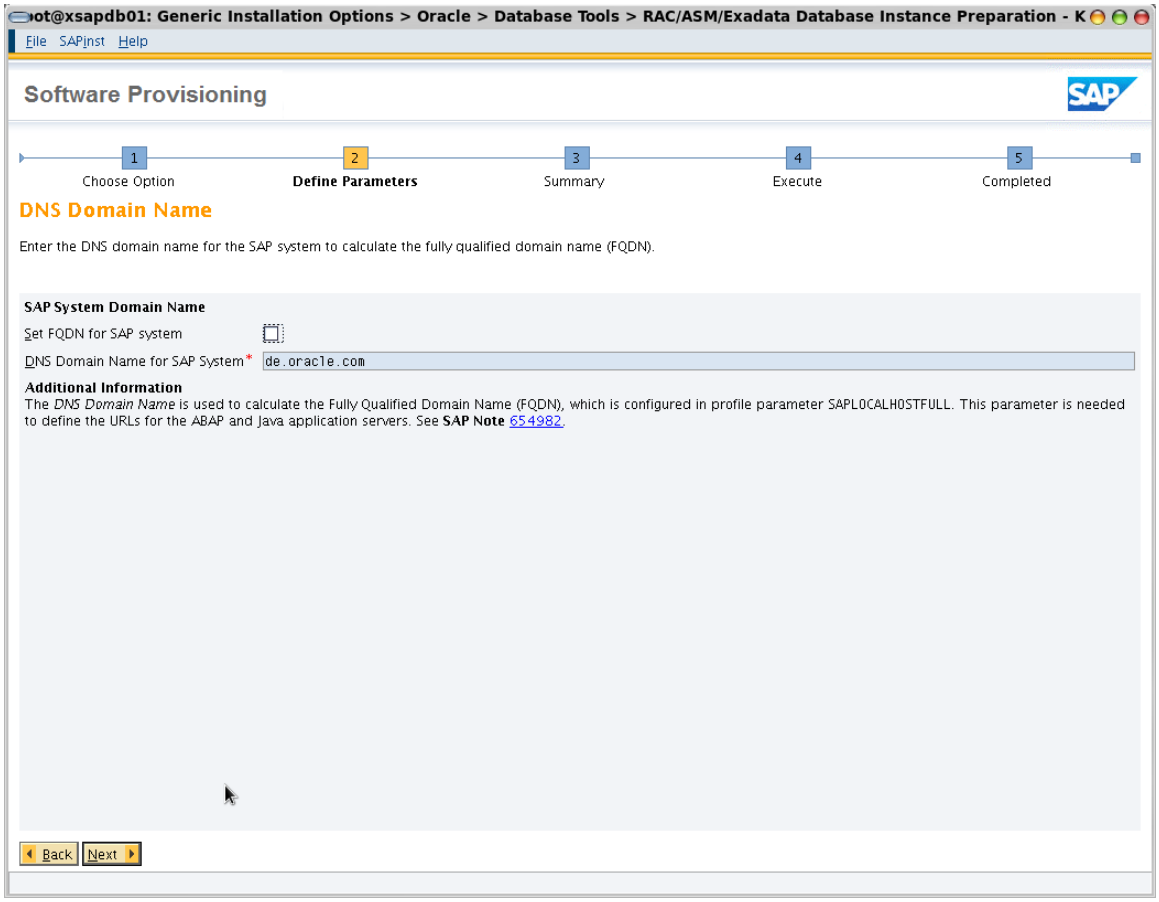
Important: Execute above steps on **ALL** compute nodes of the Oracle Exadata Database Machine.

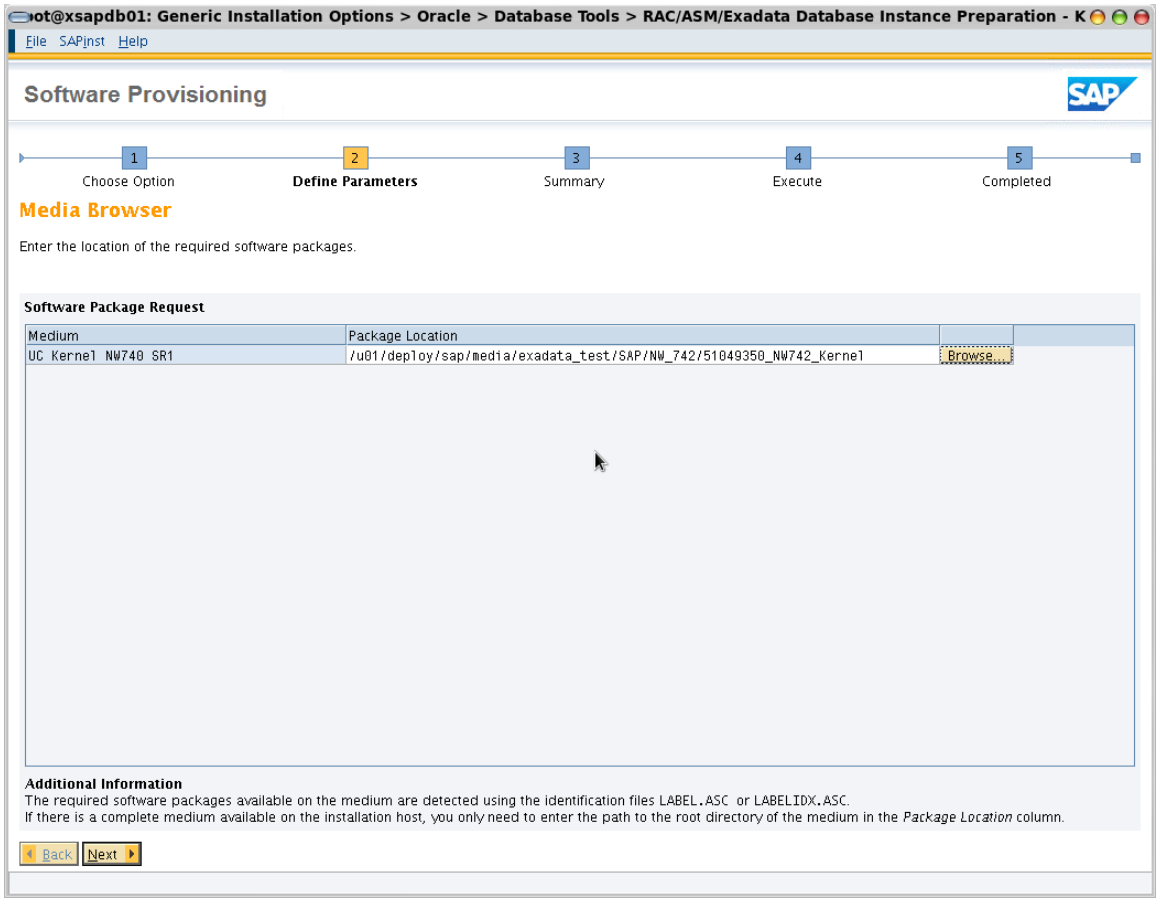


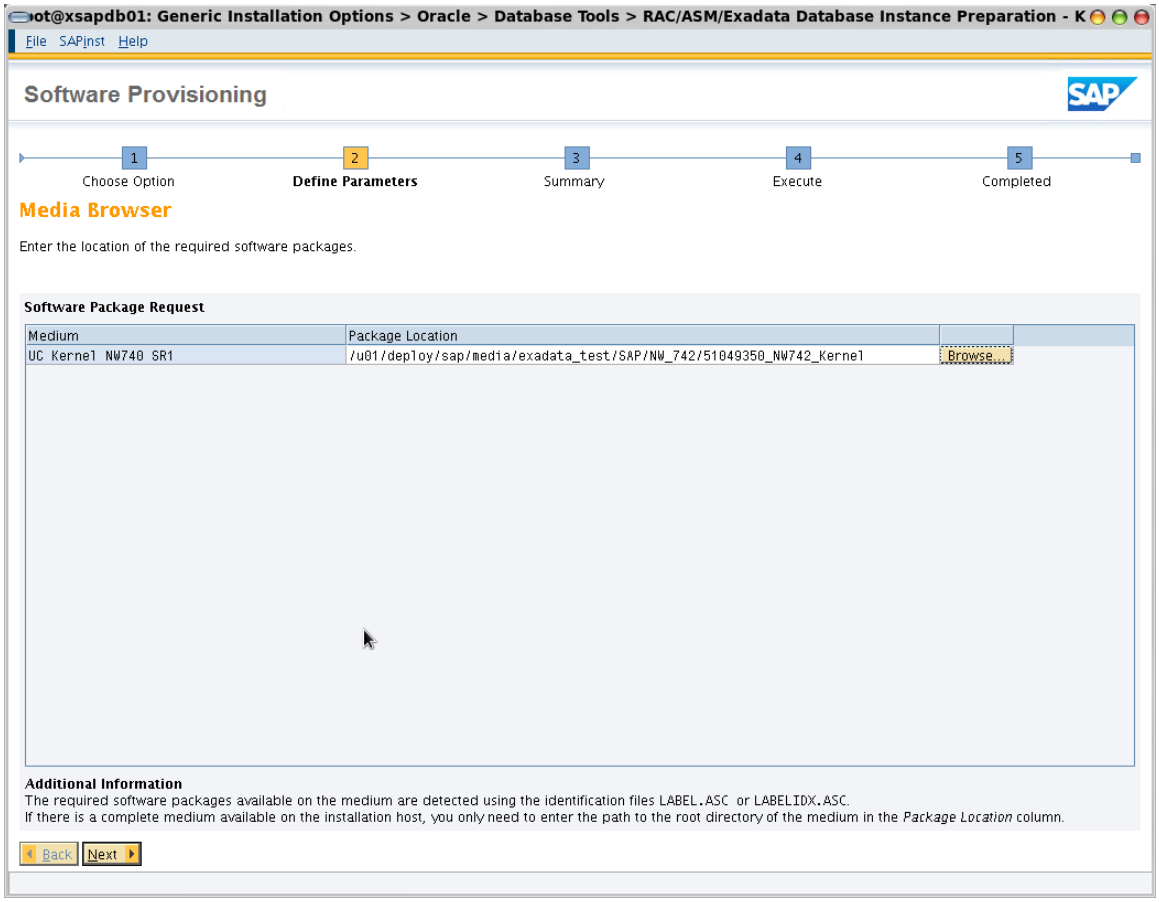

ot@xsapdb01: Generic Installation Options > Oracle > Database Tools > RAC/ASM/Exadata Database Instance Preparation - K
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Parameter Settings
Choose whether you want to run the installation in a typical or a custom mode.
Parameter Settings
Parameter Mode Typical Custom
Additional Information
You can run the installation either in a typical or a custom mode:
Typical Mode
If you choose Typical, the option is performed with default settings. As a result, you only have to respond to a small selection of prompts. If you want to change any of the default settings, you can do so on the Parameter Summary screen.
Note that if you choose the Typical setting and then choose Back after processing one or more input screens, the Custom setting is activated. You are now guided through all screens with the default parameters that have been applied in the background so far.
Custom Mode
If you choose Custom, you are prompted for all parameters. At the end, you can still change any of these parameters on the Parameter Summary screen.
Back
Next

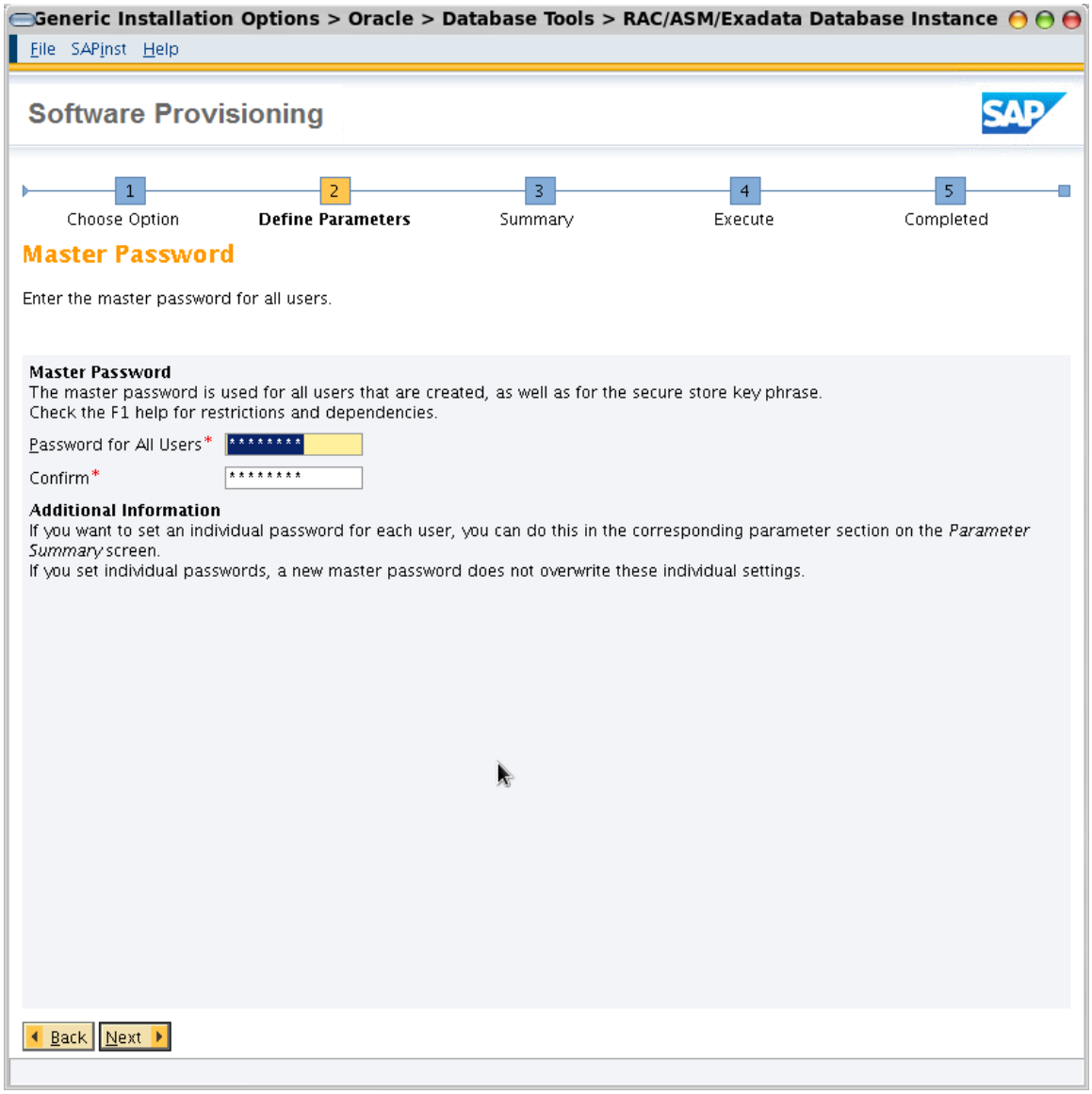

ot@xsapdb01: Generic Installation Options > Oracle > Database Tools > RAC/ASM/Exadata Database Instance Preparation - K
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
General SAP System Parameters
Enter the profile directory of the SAP system.
SAP System Identification
Profiles Available
Profile Directory
Additional Information
Existing parameters are retrieved from the SAP system profile directory. The location of your SAP system profile directory is as follows:
Windows: \\<SAPGLOBALHOST>\sapmnt\<SAPSID>\SYS\profile
UNIX and i5/OS: /<SAP Mount Directory>/<SAPSID>/profile or /usr/sap/<SAPSID>/SYS/profile
Back
Next

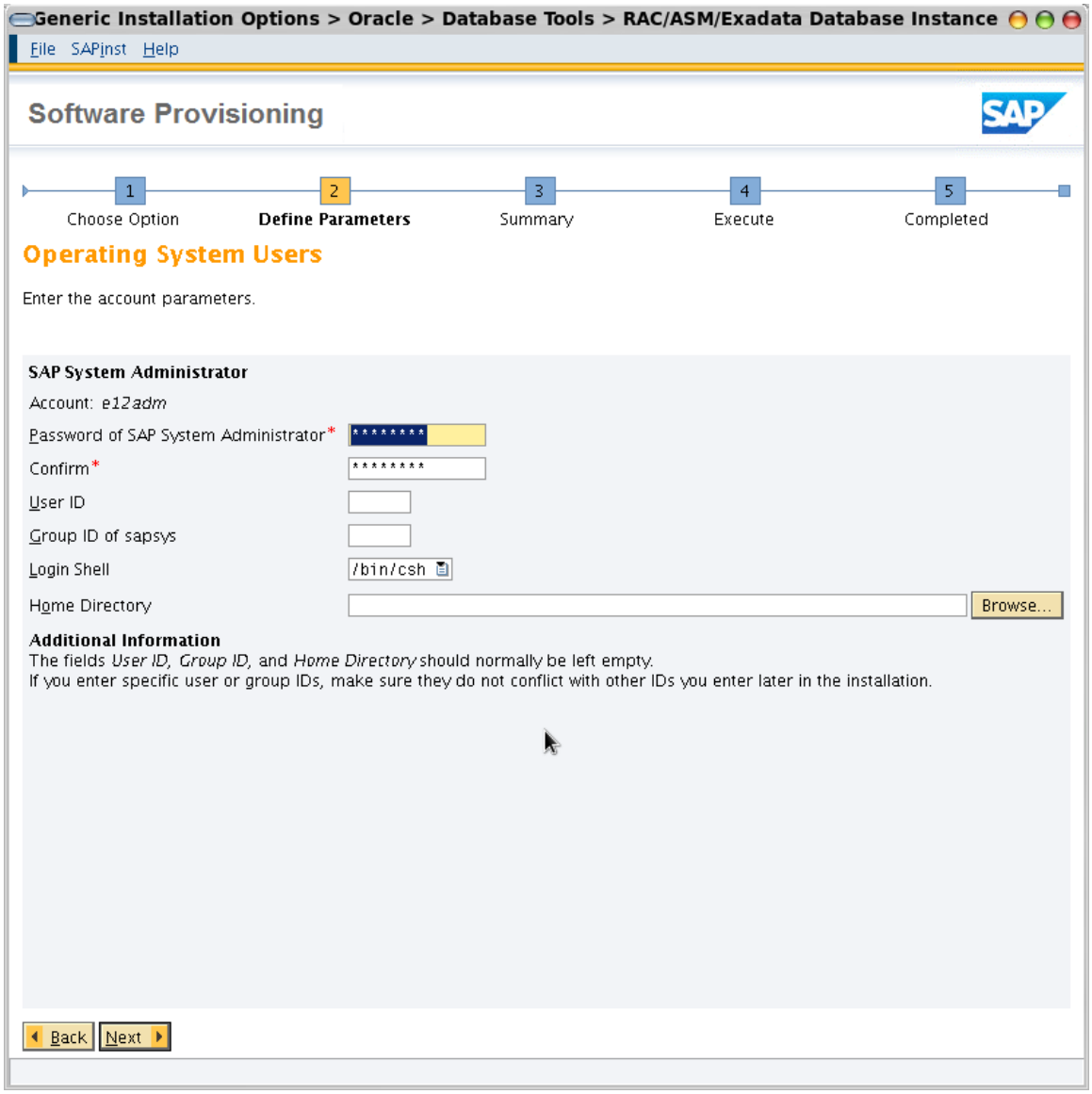

ot@xsapdb01: Generic Installation Options > Oracle > Database Tools > RAC/ASM/Exadata Database Instance Preparation - K
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
General SAP System Parameters
Enter the SAP system ID.
SAP System
SAP System ID (SAPSID)*
E12
SAP Mount Directory
/sapmnt
Browse...
Additional Information
The SAP System ID is an identifier for your SAP system. It must be unique throughout your system landscape.
The system is installed under /usr/sap/<SAPSID>/.... Common directories are linked to <SAP Mount Directory>/<SAPSID>/....
Back
Next

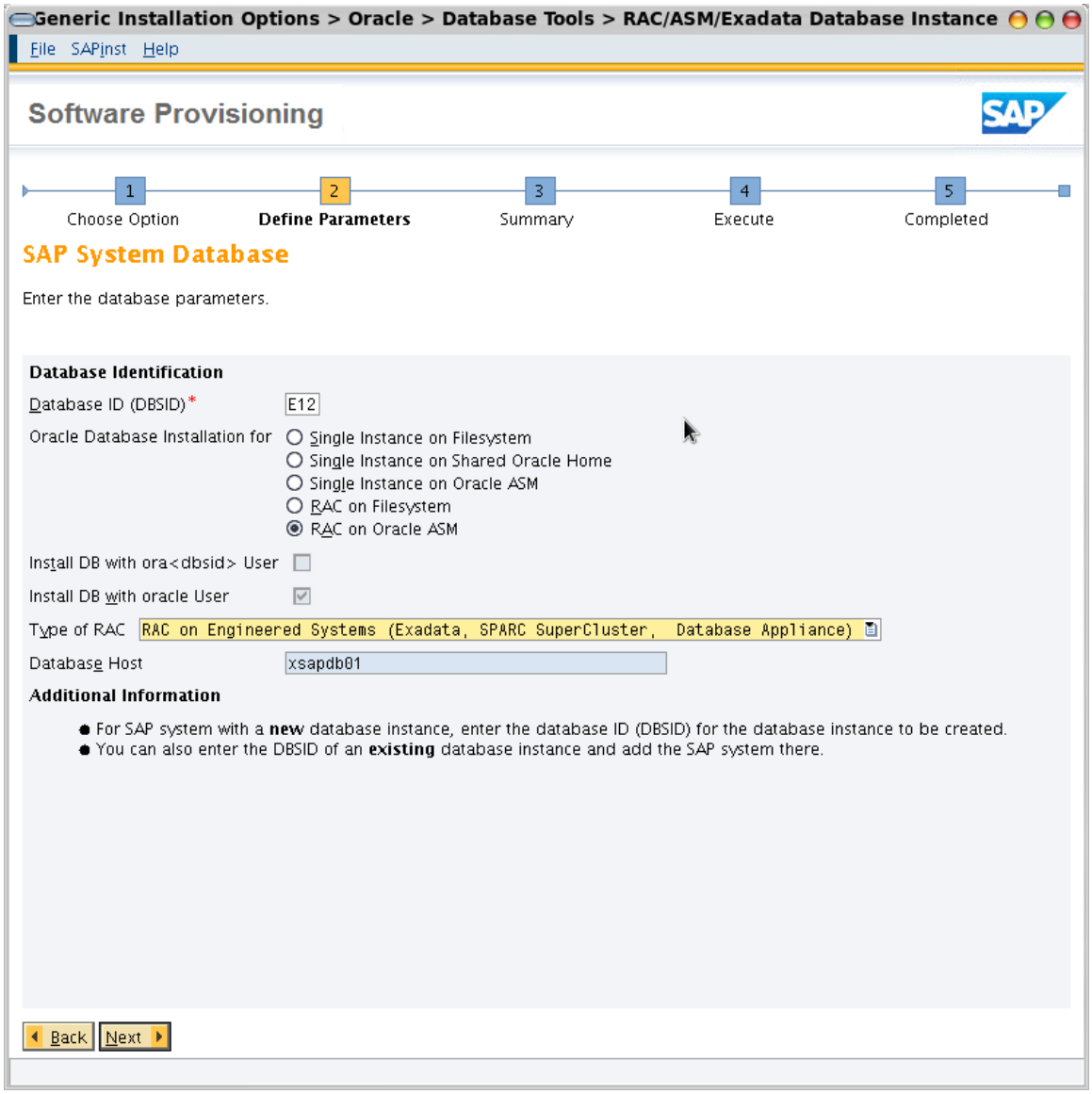

ot@xsapdb01: Generic Installation Options > Oracle > Database Tools > RAC/ASM/Exadata Database Instance Preparation - K
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
DNS Domain Name
Enter the DNS domain name for the SAP system to calculate the fully qualified domain name (FQDN).
SAP System Domain Name
Set FQDN for SAP system
DNS Domain Name for SAP System*
de.oracle.com
Additional Information
The DNS Domain Name is used to calculate the Fully Qualified Domain Name (FQDN), which is configured in profile parameter SAPLOCALHOSTFULL. This parameter is needed to define the URLs for the ABAP and Java application servers. See SAP Note 654982.
Back
Next

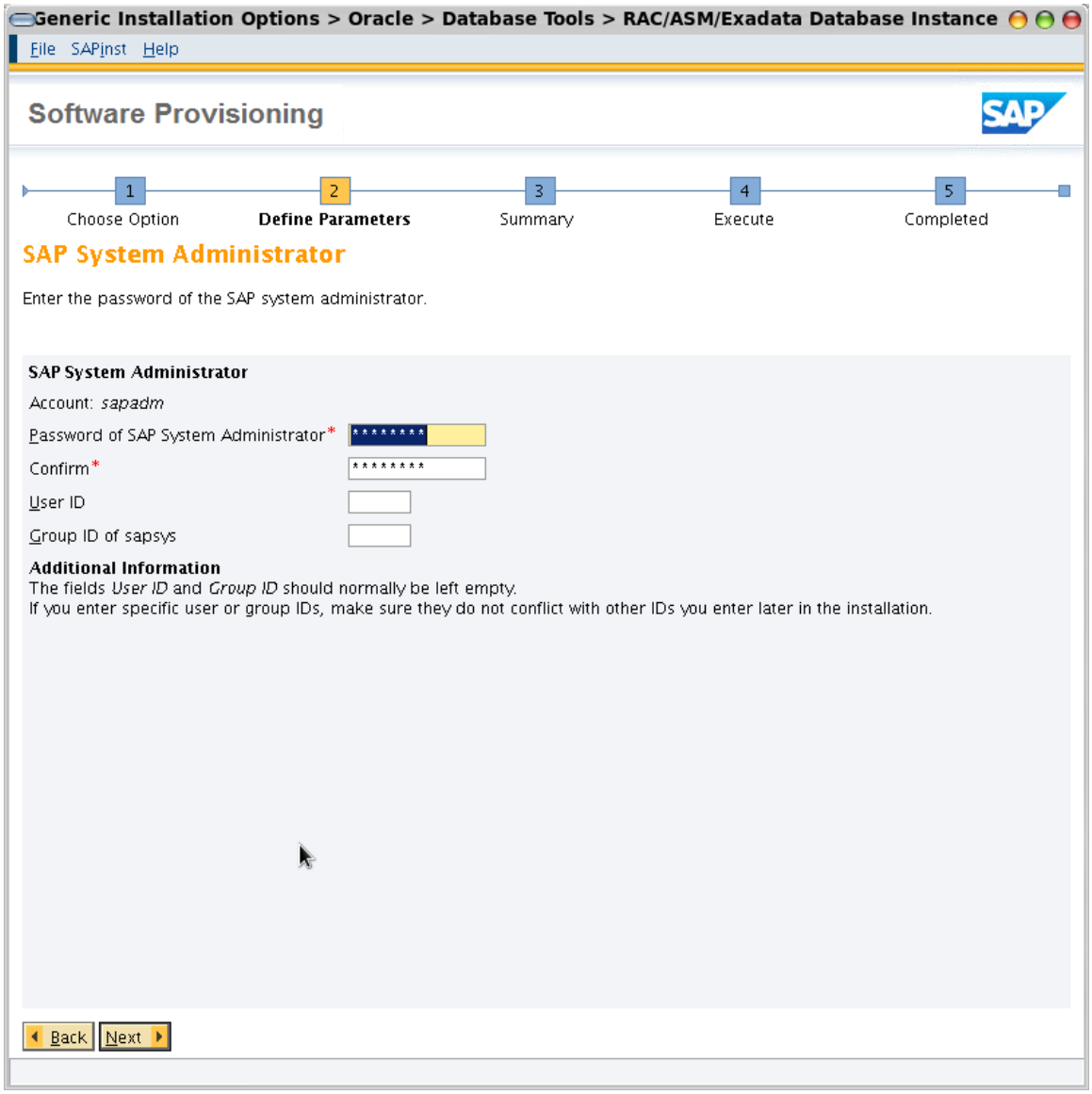

ot@xsapdb01: Generic Installation Options > Oracle > Database Tools > RAC/ASM/Exadata Database Instance Preparation - K
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Media Browser
Enter the location of the required software packages.
Software Package Request
Medium
Package Location
UC Kernel NW740 SR1
/u01/deploy/sap/media/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

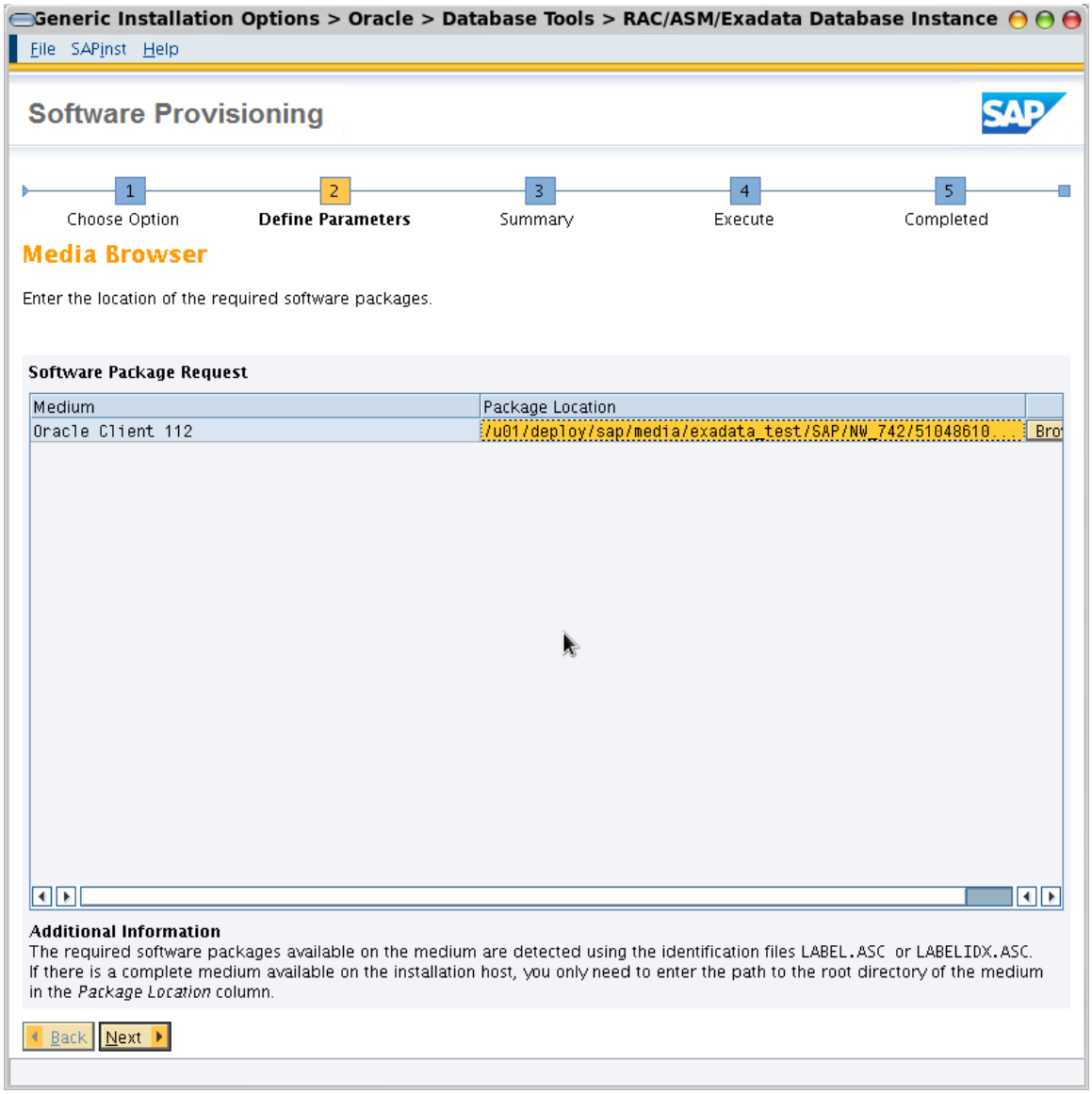

ot@xsapdb01: Generic Installation Options > Oracle > Database Tools > RAC/ASM/Exadata Database Instance Preparation - K
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Media Browser
Enter the location of the required software packages.
Software Package Request
Medium
Package Location
UC Kernel NW740 SR1
/u01/deploy/sap/media/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

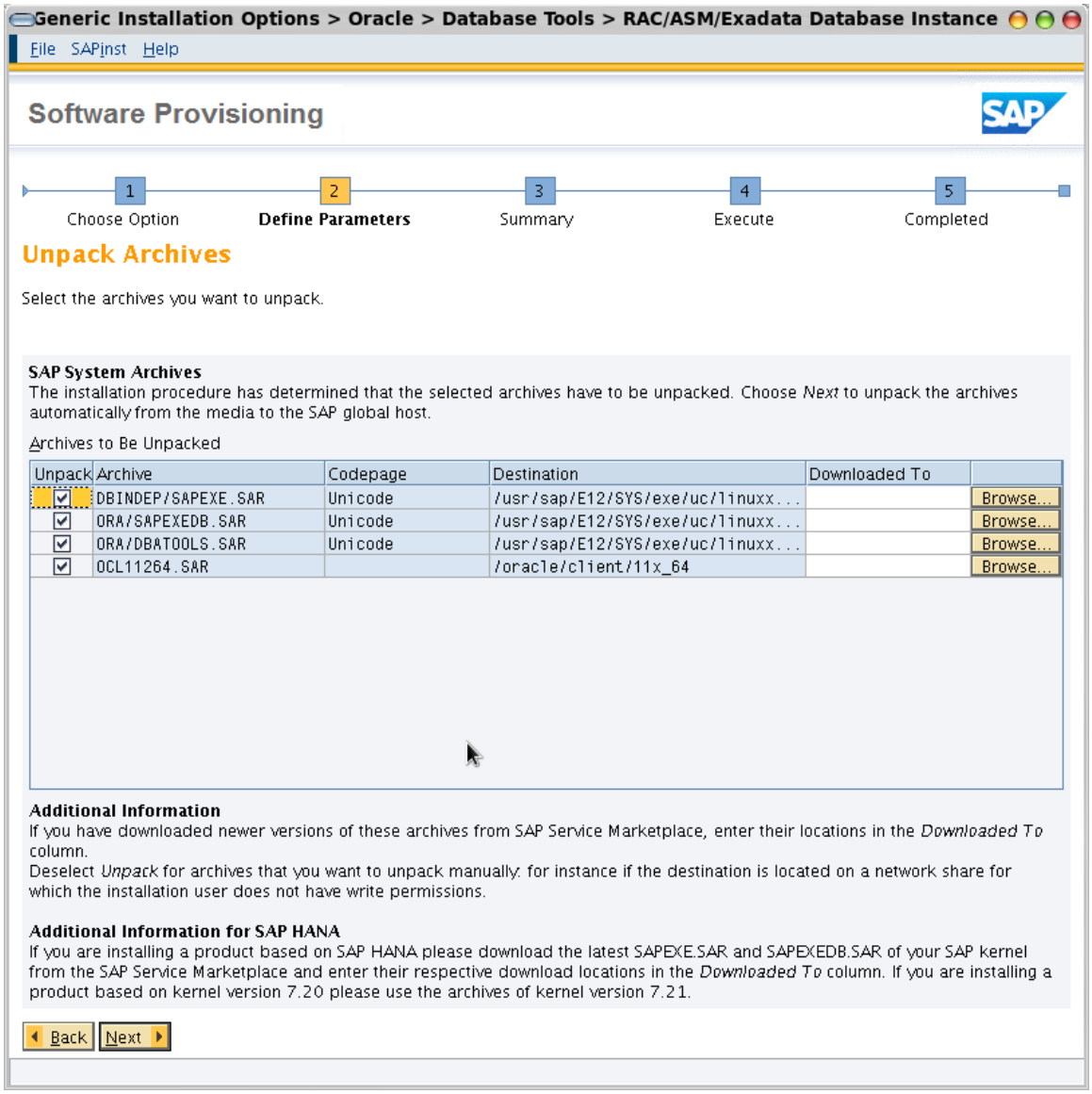

Generic Installation Options > Oracle > Database Tools > RAC/ASM/Exadata Database Instance
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Master Password
Enter the master password for all users.
Master Password
The master password is used 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

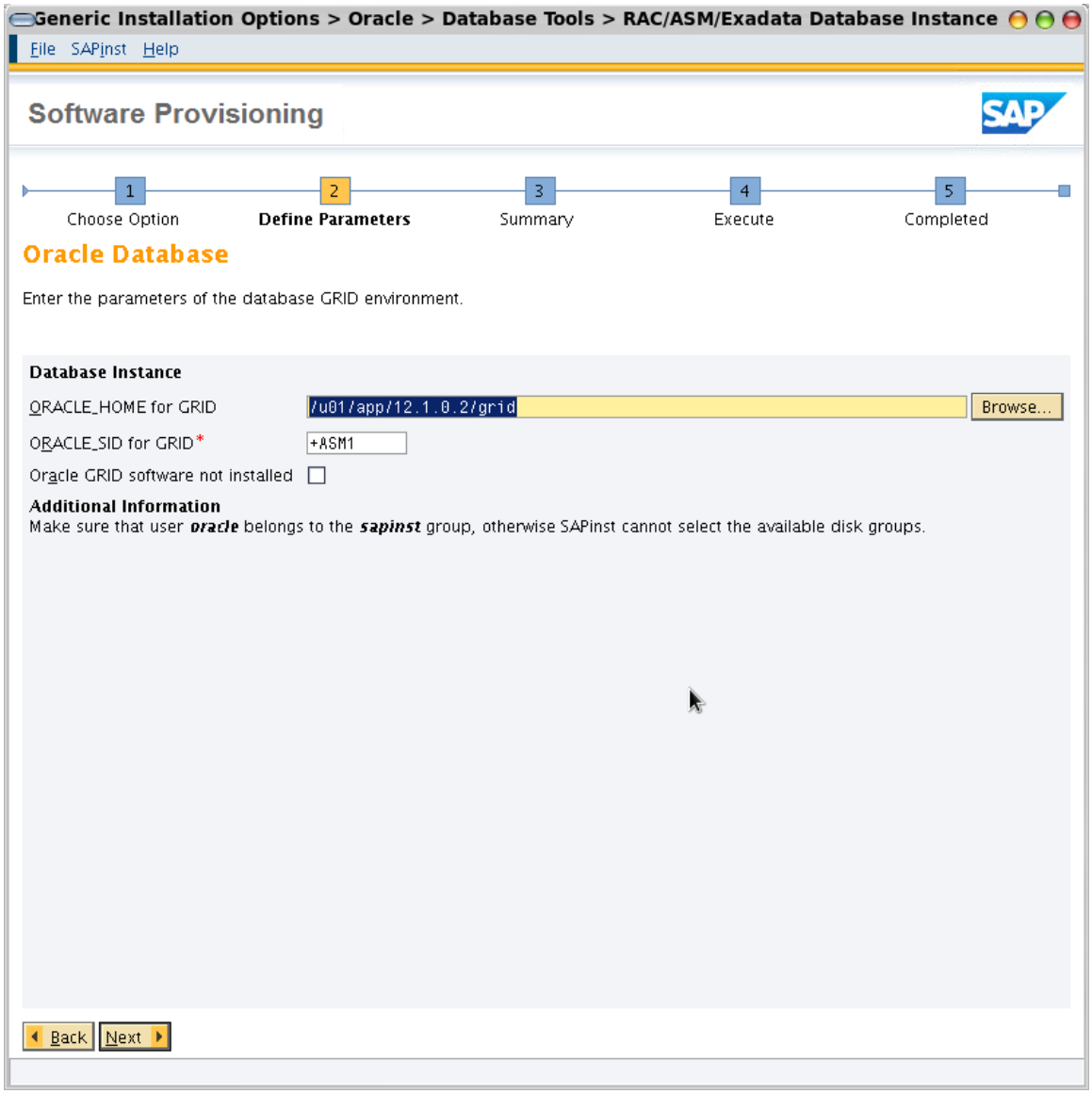

Generic Installation Options > Oracle > Database Tools > RAC/ASM/Exadata Database Instance
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Operating System Users
Enter the account parameters.
SAP System Administrator
Account: e12adm
Password of SAP System Administrator*
Confirm*
User ID
Group ID of sapsys
Login Shell
/bin/csh
Home Directory
Browse...
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
Next

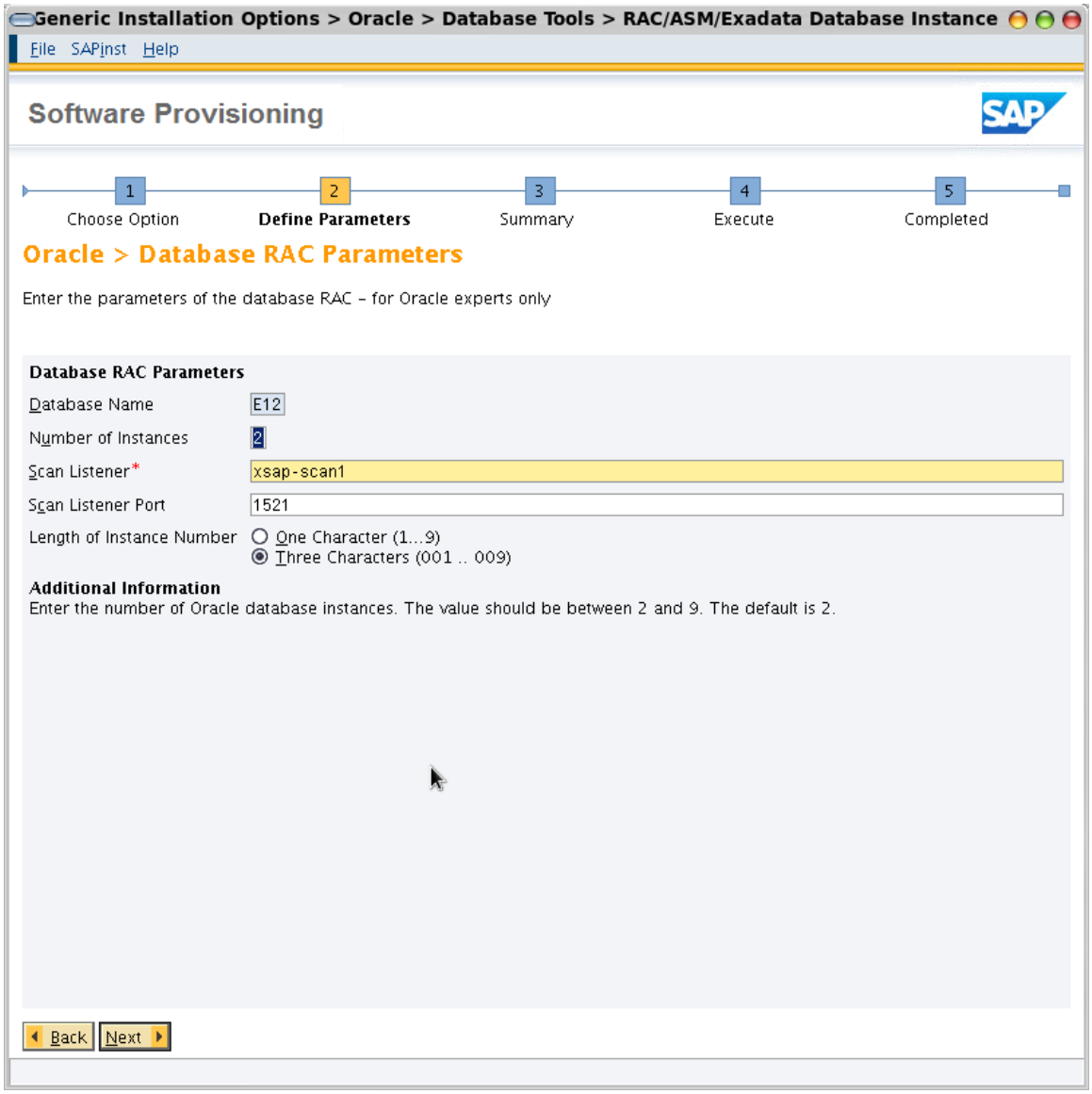

Generic Installation Options > Oracle > Database Tools > RAC/ASM/Exadata Database Instance
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
SAP System Database
Enter the database parameters.
Database Identification
Database ID (DBSID)*
E12
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
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

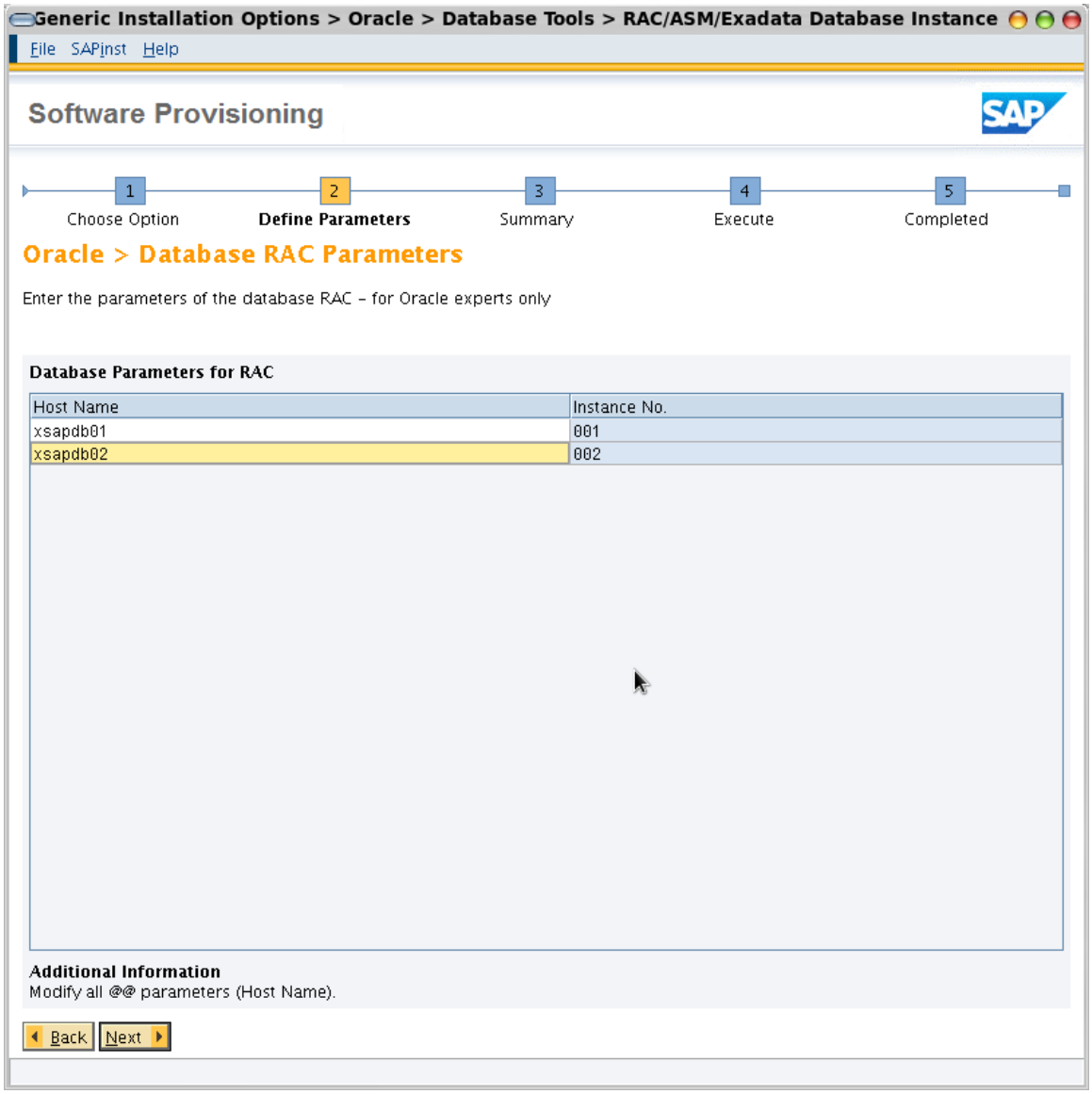

Generic Installation Options > Oracle > Database Tools > RAC/ASM/Exadata Database Instance
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
SAP System Administrator
Enter the password of the SAP system administrator.
SAP System Administrator
Account: sapadm
Password of SAP System Administrator*
Confirm*
User ID
Group ID of sapsys
Additional Information
The fields User ID and Group ID 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
Next

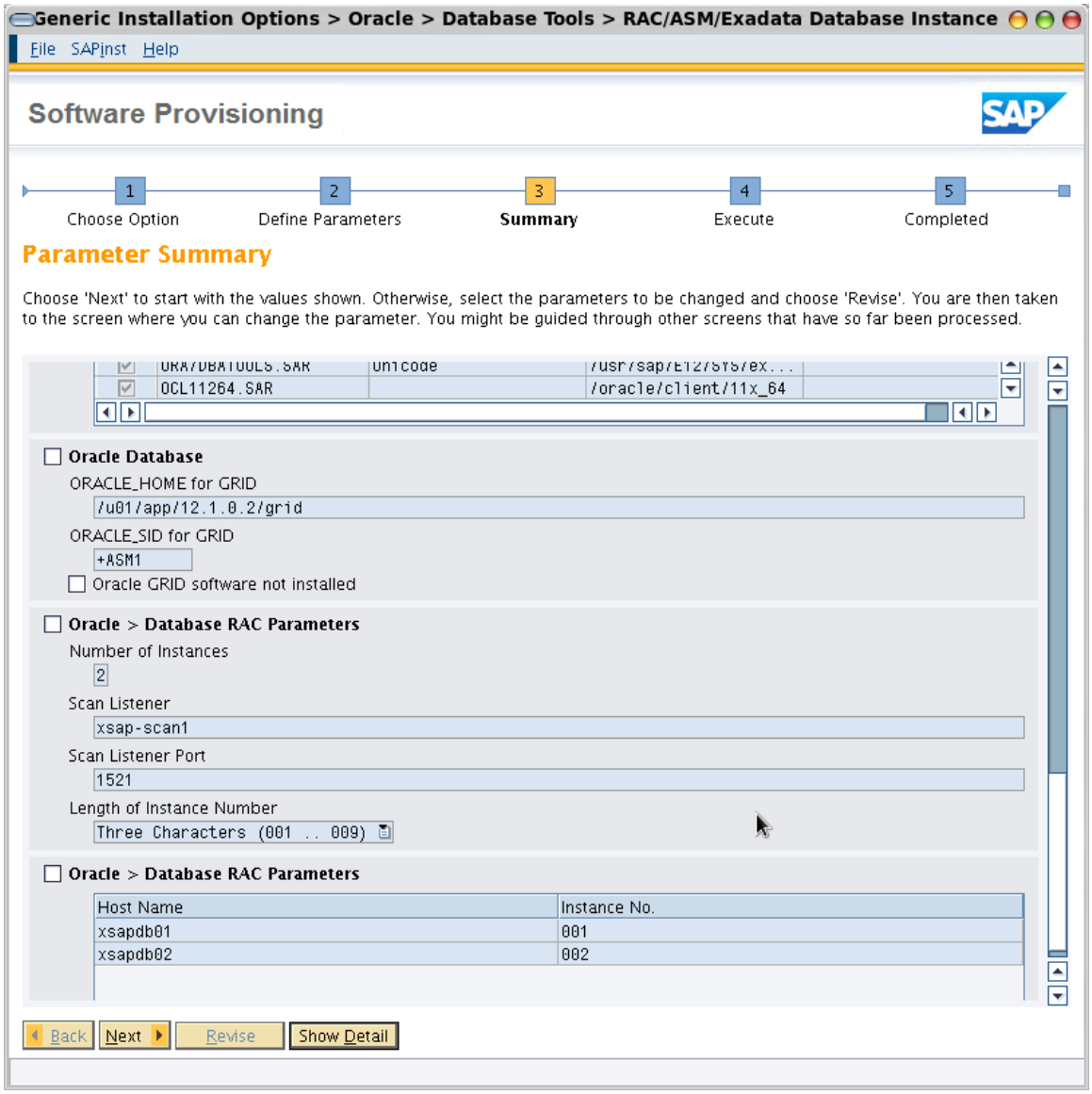

Generic Installation Options > Oracle > Database Tools > RAC/ASM/Exadata Database Instance
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Media Browser
Enter the location of the required software packages.
Software Package Request
Medium
Package Location
Oracle Client 112
/u01/deploy/sap/media/exadata_test/SAP/NW_742/51048610...
Bro
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


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
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
DBINDEP/SAPEXE.SAR Unicode /usr/sap/E12/SYS/exe/uc/linuxx... Browse...
ORA/SAPEXEDB.SAR Unicode /usr/sap/E12/SYS/exe/uc/linuxx... Browse...
ORA/DBATOOLS.SAR Unicode /usr/sap/E12/SYS/exe/uc/linuxx... Browse...
OCL11264.SAR /oracle/client/11x_64 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


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
Enter the parameters of the database GRID environment.
Database Instance
ORACLE_HOME for GRID
/u01/app/12.1.0.2/grid
Browse...
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.
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 One Character (1...9)
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

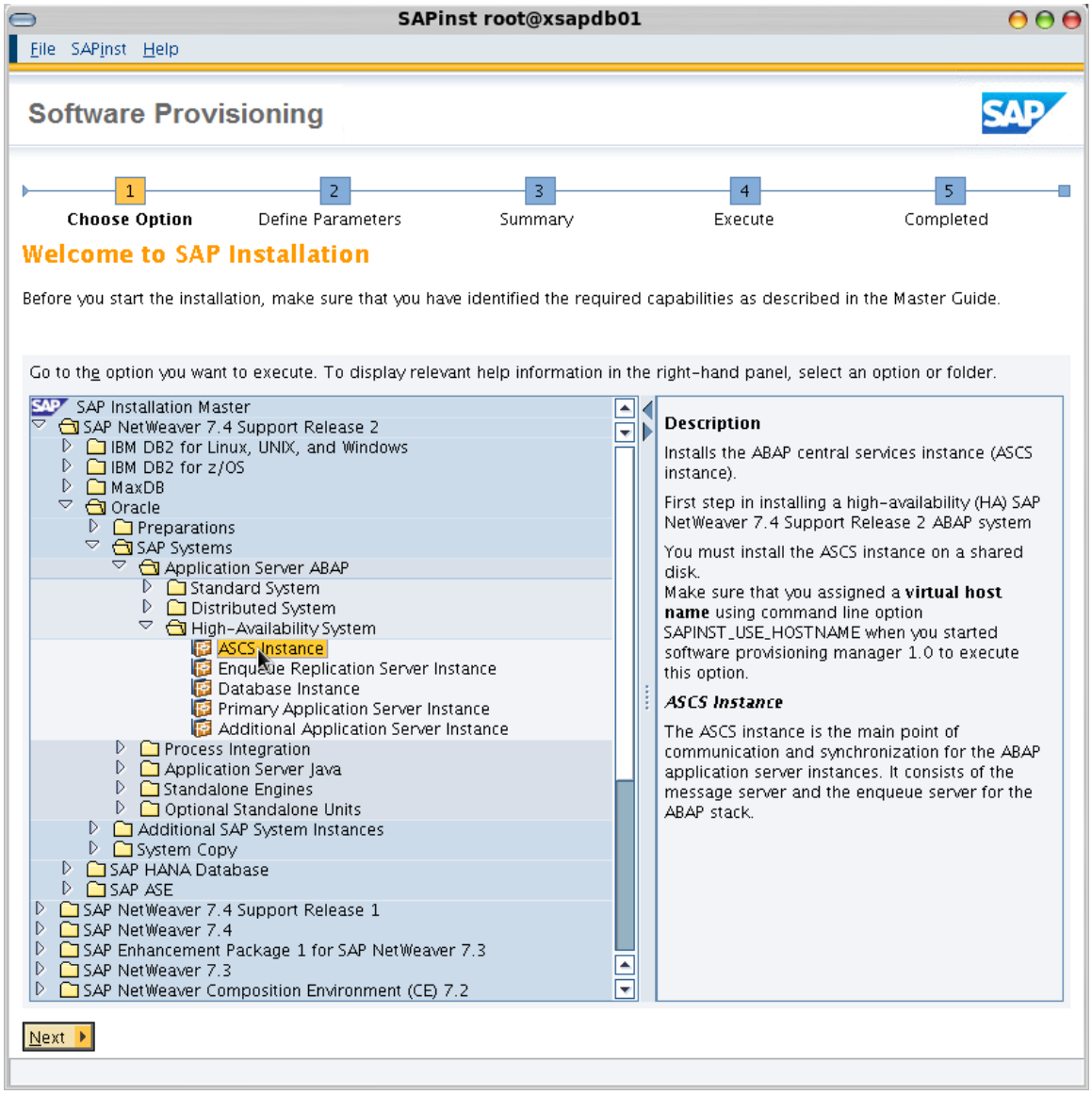

Generic Installation Options > Oracle > Database Tools > RAC/ASM/Exadata Database Instance
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Oracle > Database RAC Parameters
Enter the parameters of the database RAC – for Oracle experts only
Database Parameters for RAC
Host Name
Instance No.
xsapdb01
001
xsapdb02
002
Additional Information
Modify all @@ parameters (Host Name).
Back
Next

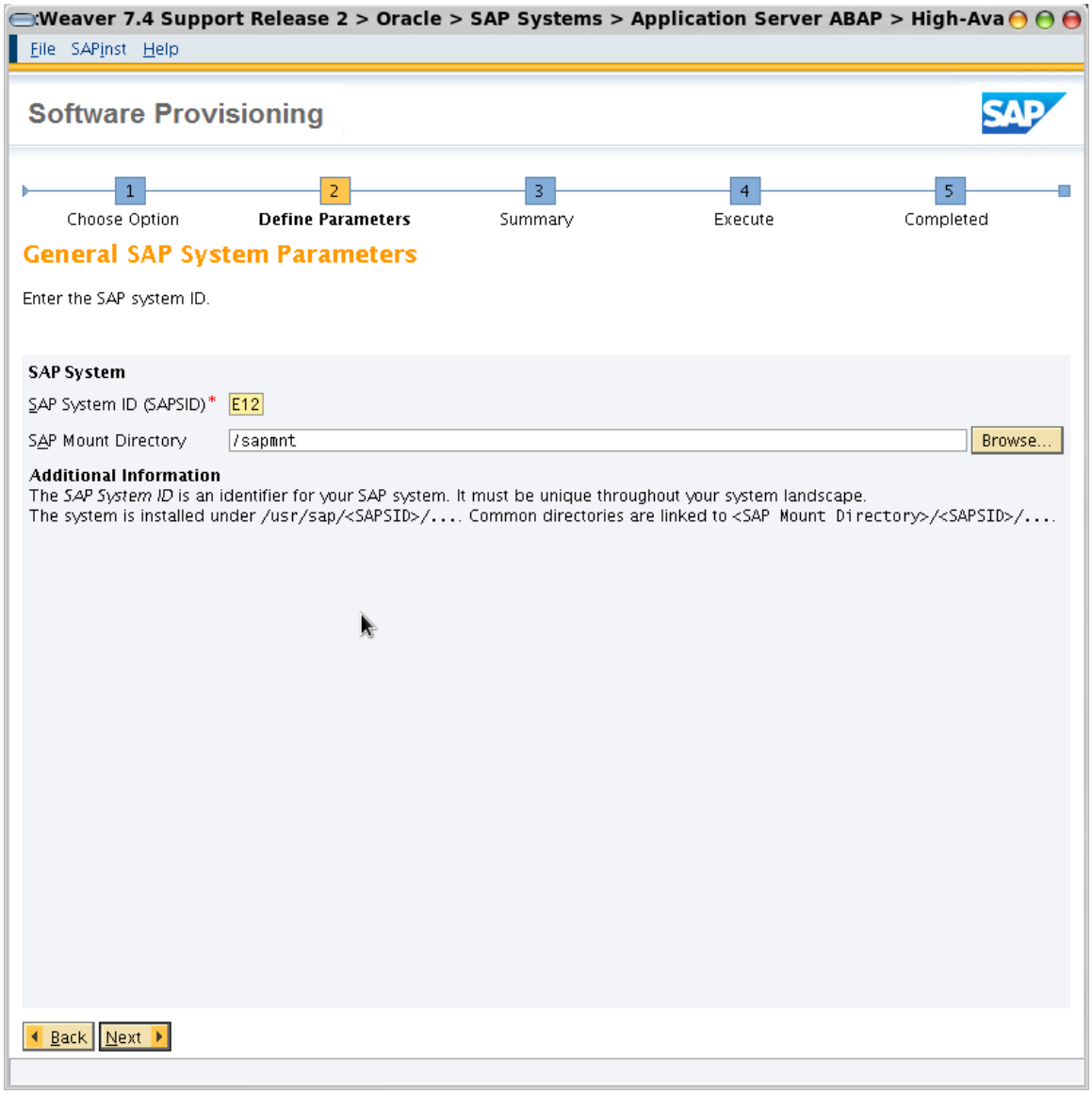


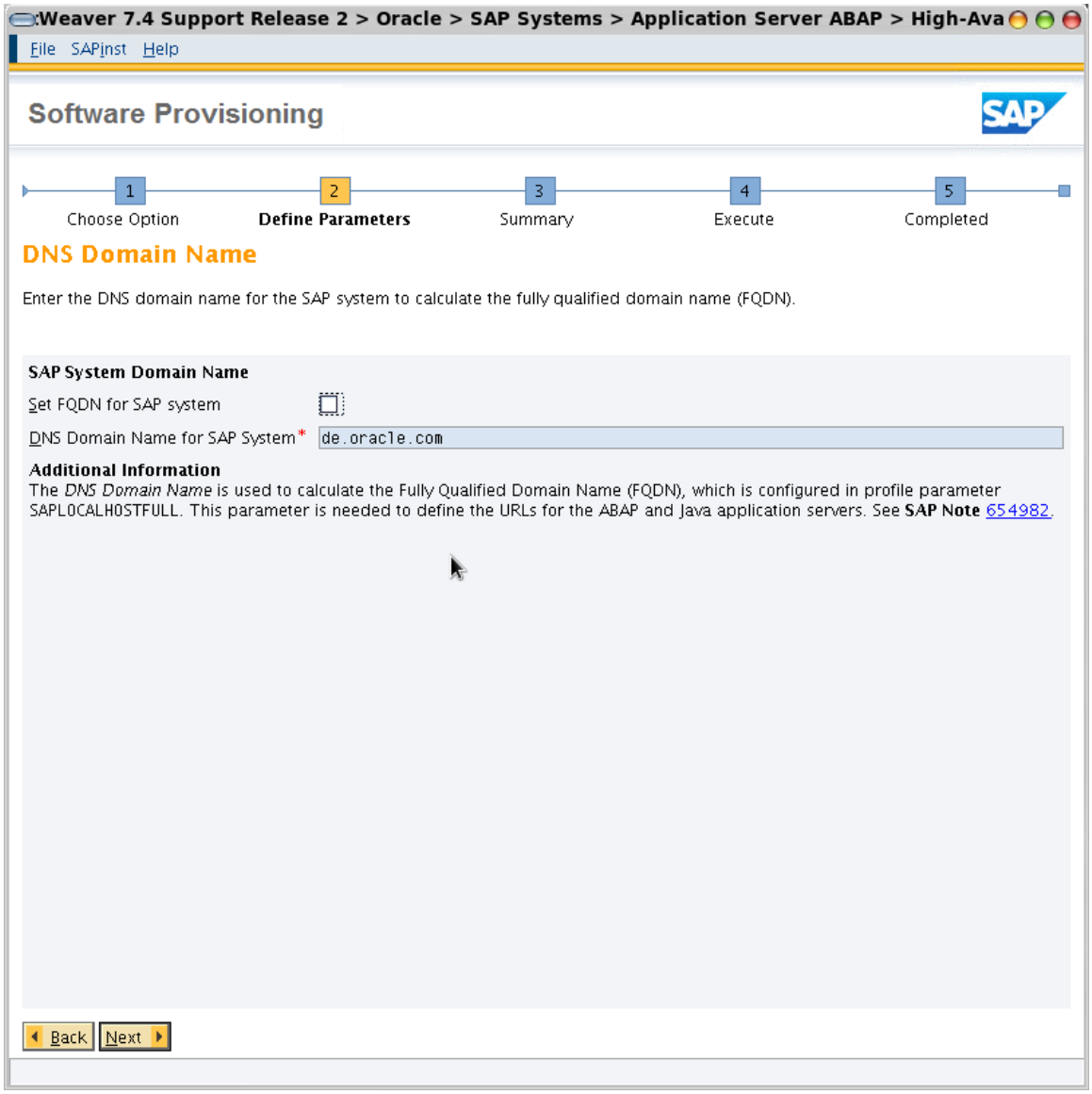
Note: It may be necessary to download a more current version of BR*Tools to be used for Oracle Database 12c and Oracle Exadata. As a minimum you need BR*Tools 7.40 Patch 14 for Oracle Database 12c. You should always use the most current version of BR*Tools. See SAP Note 12741 for more information.

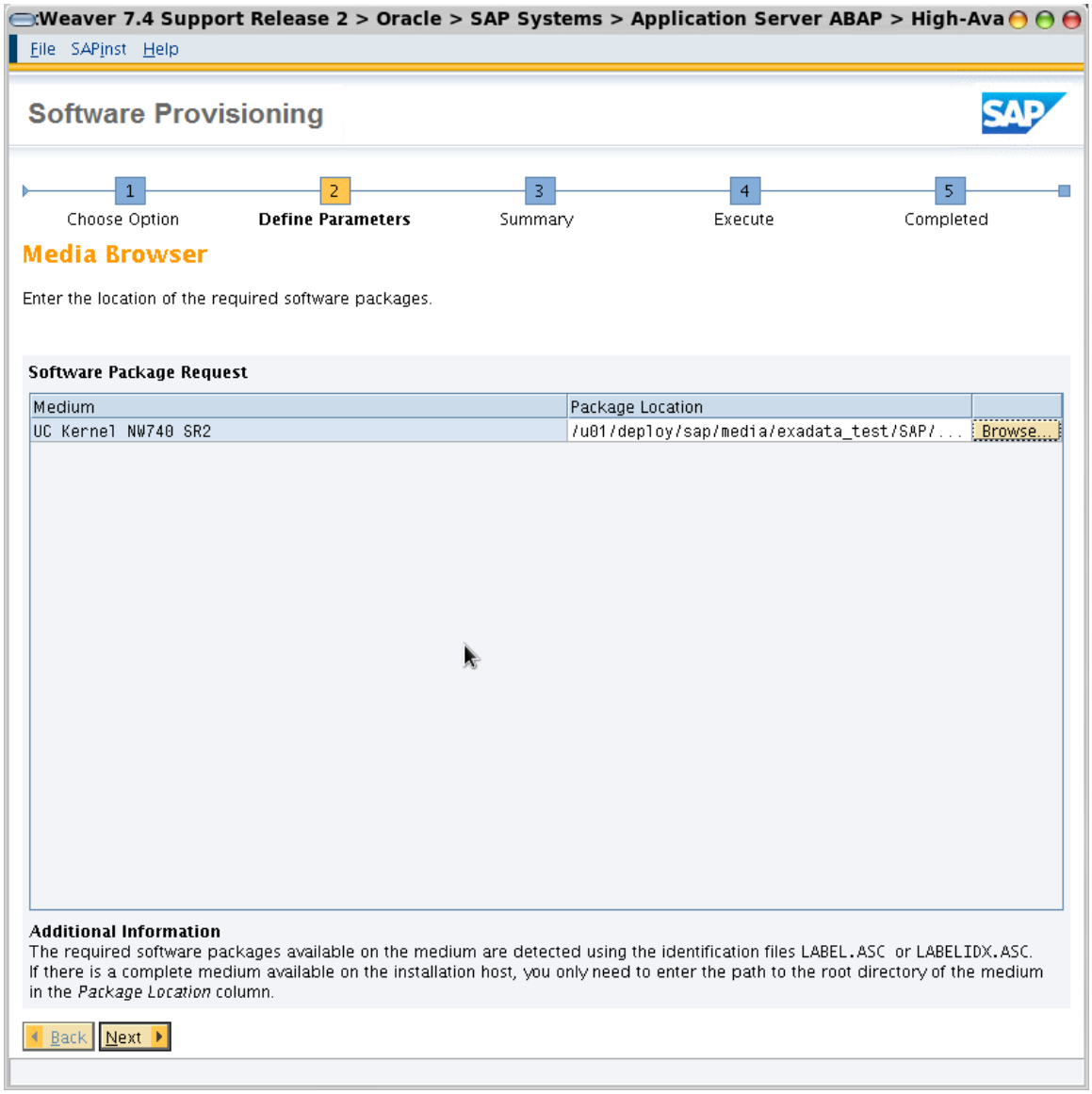
Installation of SAP Central Services with SAP SWPM

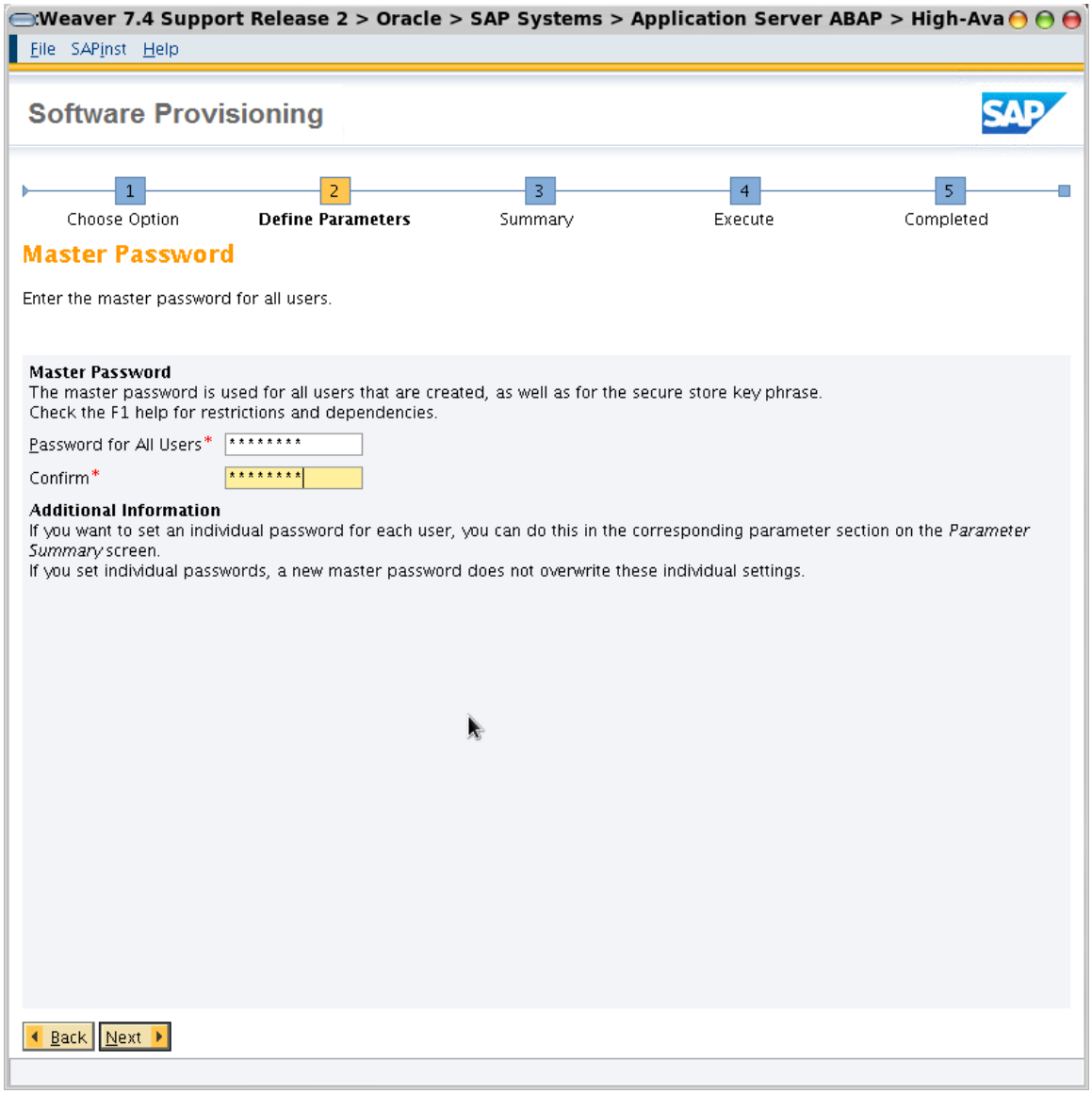
The following screens show an installation of the ABAP central services ASCS. Installation of JAVA central services SCS works the same.

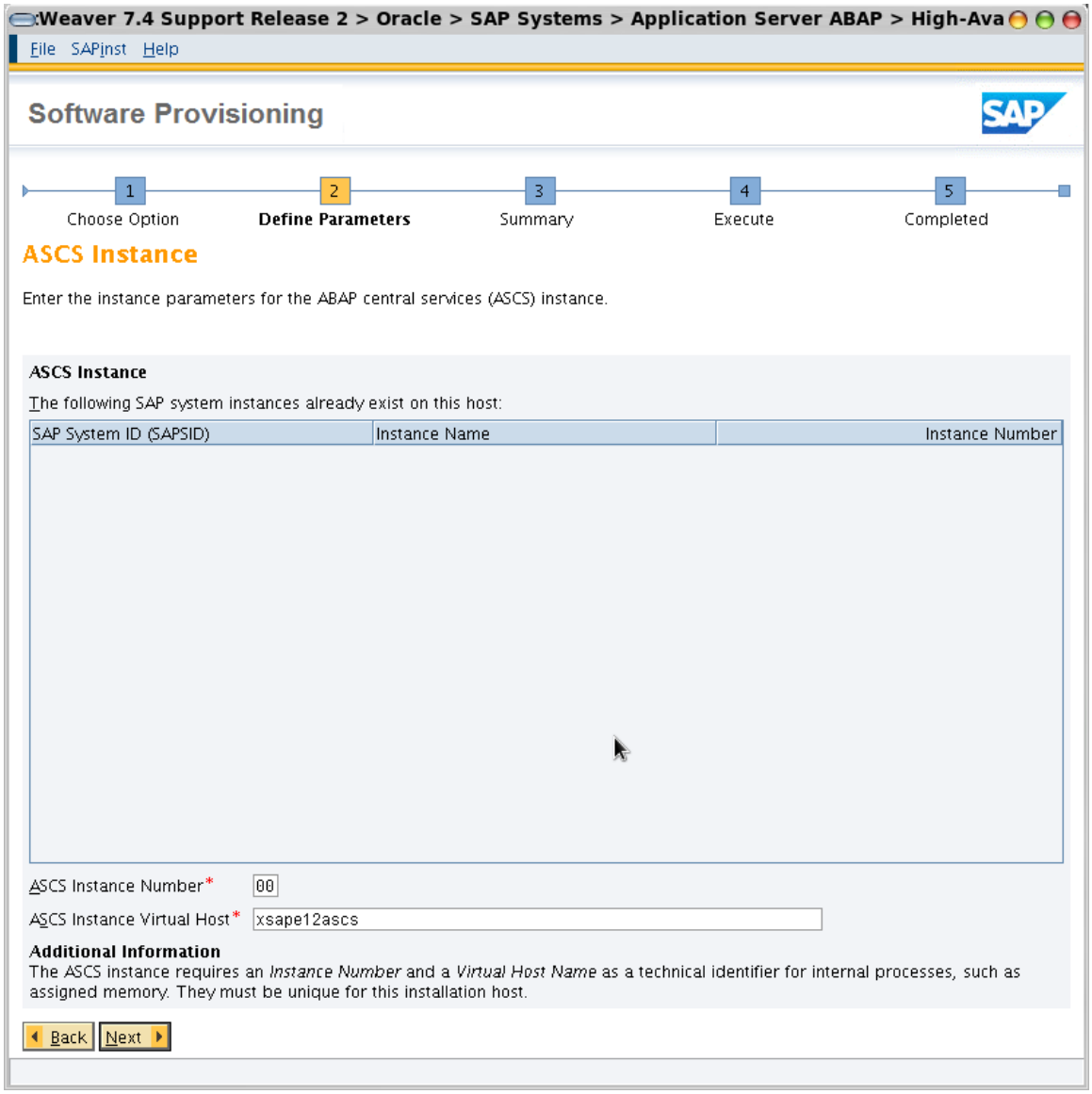


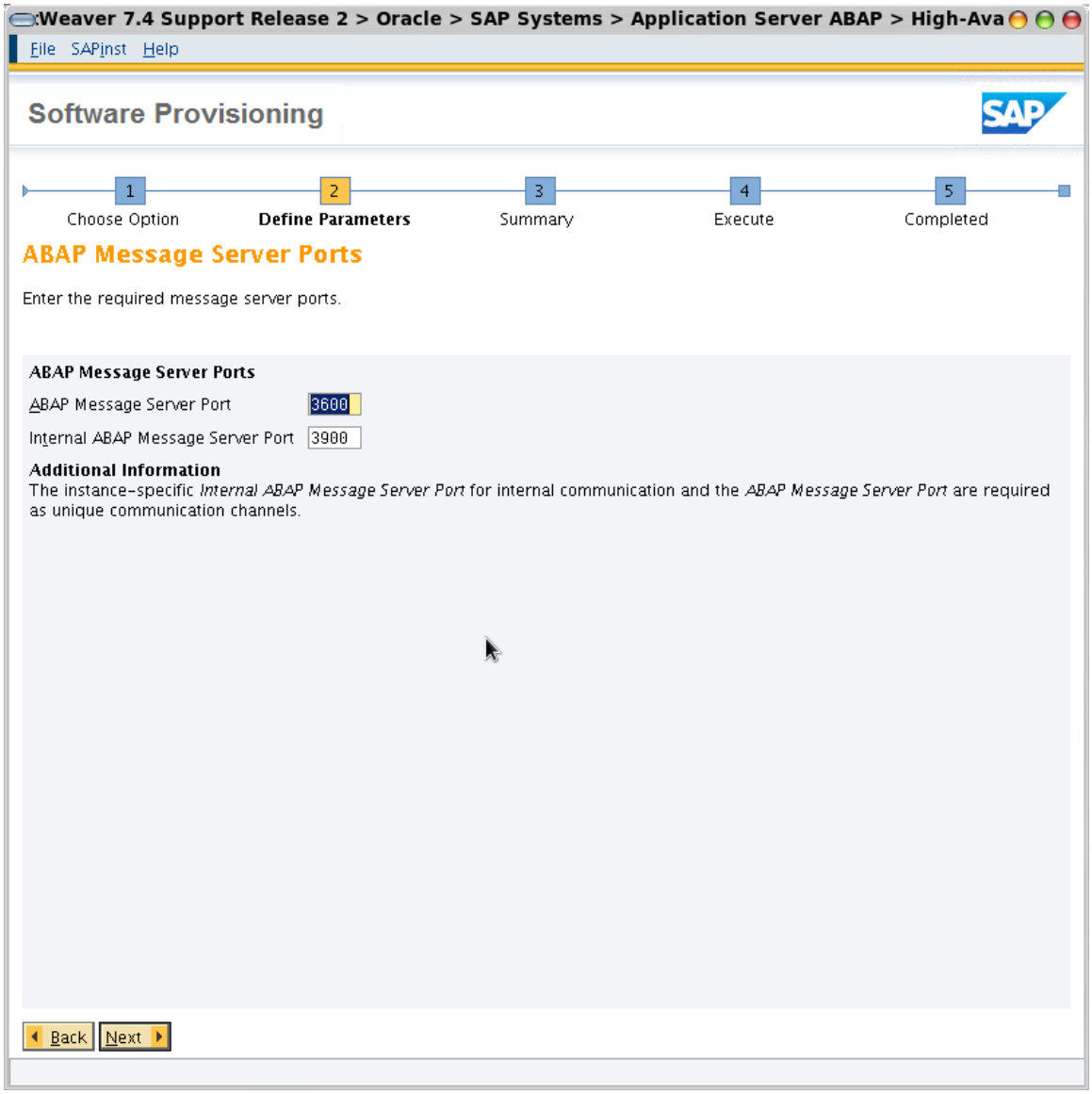

:Weaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > High-Ava
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
General SAP System Parameters
Enter the SAP system ID.
SAP System
SAP System ID (SAPSID) * E12
SAP Mount Directory /sapmnt Browse...
Additional Information
The SAP System ID is an identifier for your SAP system. It must be unique throughout your system landscape.
The system is installed under /usr/sap/<SAPSID>/.... Common directories are linked to <SAP Mount Directory>/<SAPSID>/....
Back Next

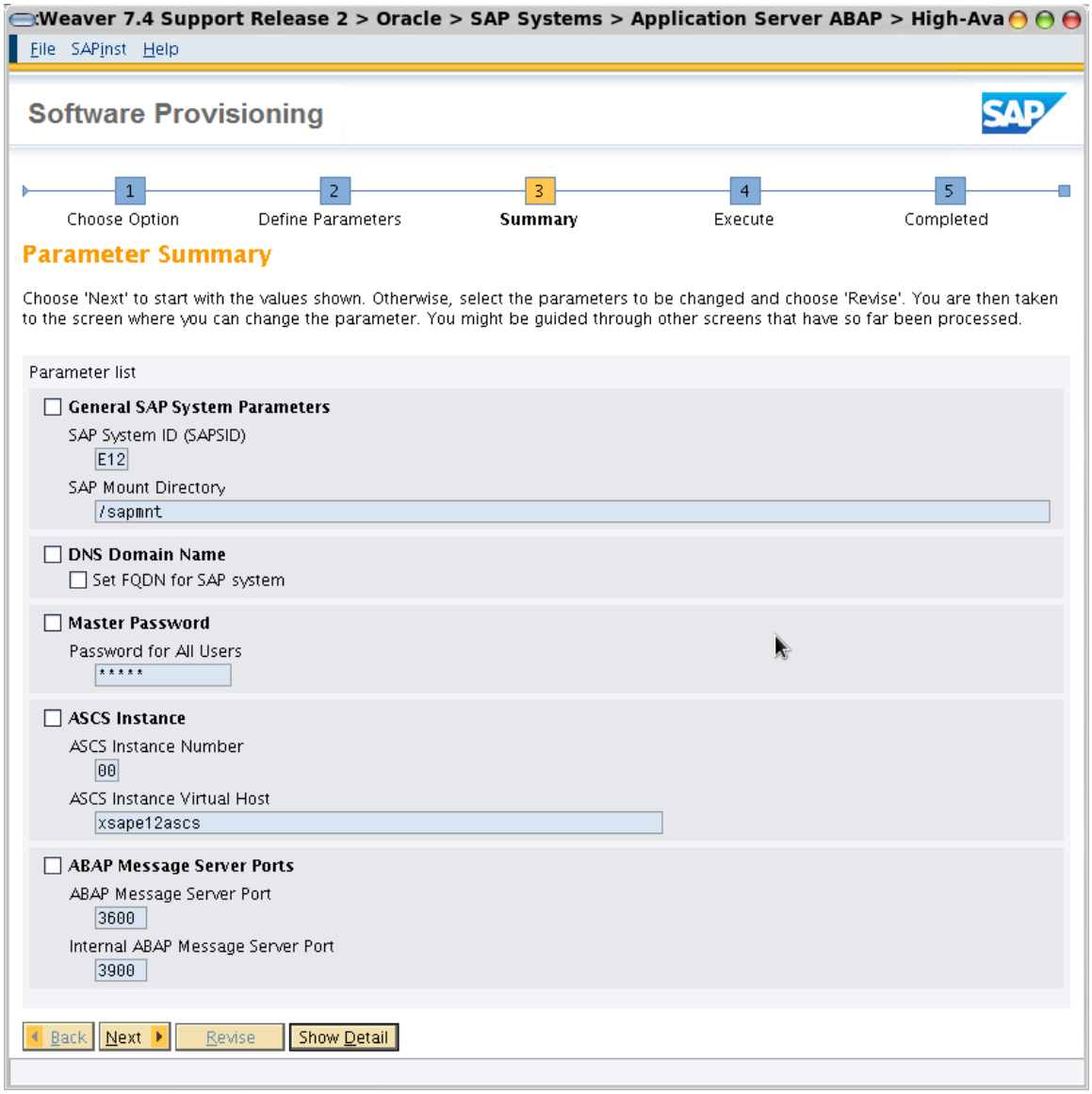

Weaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > High-Ava
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
DNS Domain Name
Enter the DNS domain name for the SAP system to calculate the fully qualified domain name (FQDN).
SAP System Domain Name
Set FQDN for SAP system
DNS Domain Name for SAP System*
de.oracle.com
Additional Information
The DNS Domain Name is used to calculate the Fully Qualified Domain Name (FQDN), which is configured in profile parameter SAPLOCALHOSTFULL. This parameter is needed to define the URLs for the ABAP and Java application servers. See SAP Note 654982.
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
Media Browser
Enter the location of the required software packages.
Software Package Request
Medium
Package Location
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

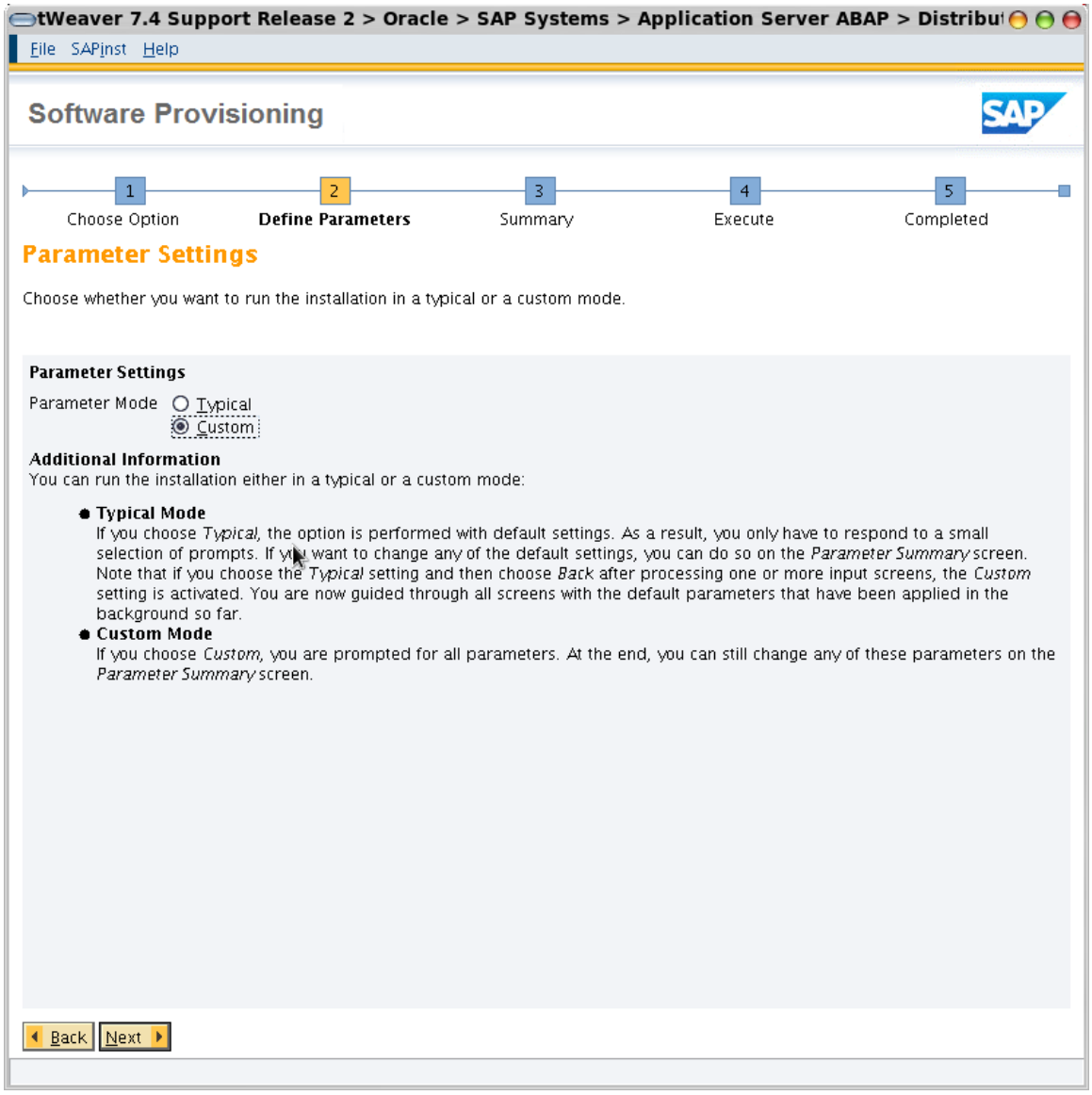

:Weaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > High-Ava
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
ASCS Instance
Enter the instance parameters for the ABAP central services (ASCS) instance.
ASCS Instance
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*
xsape12ascs
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

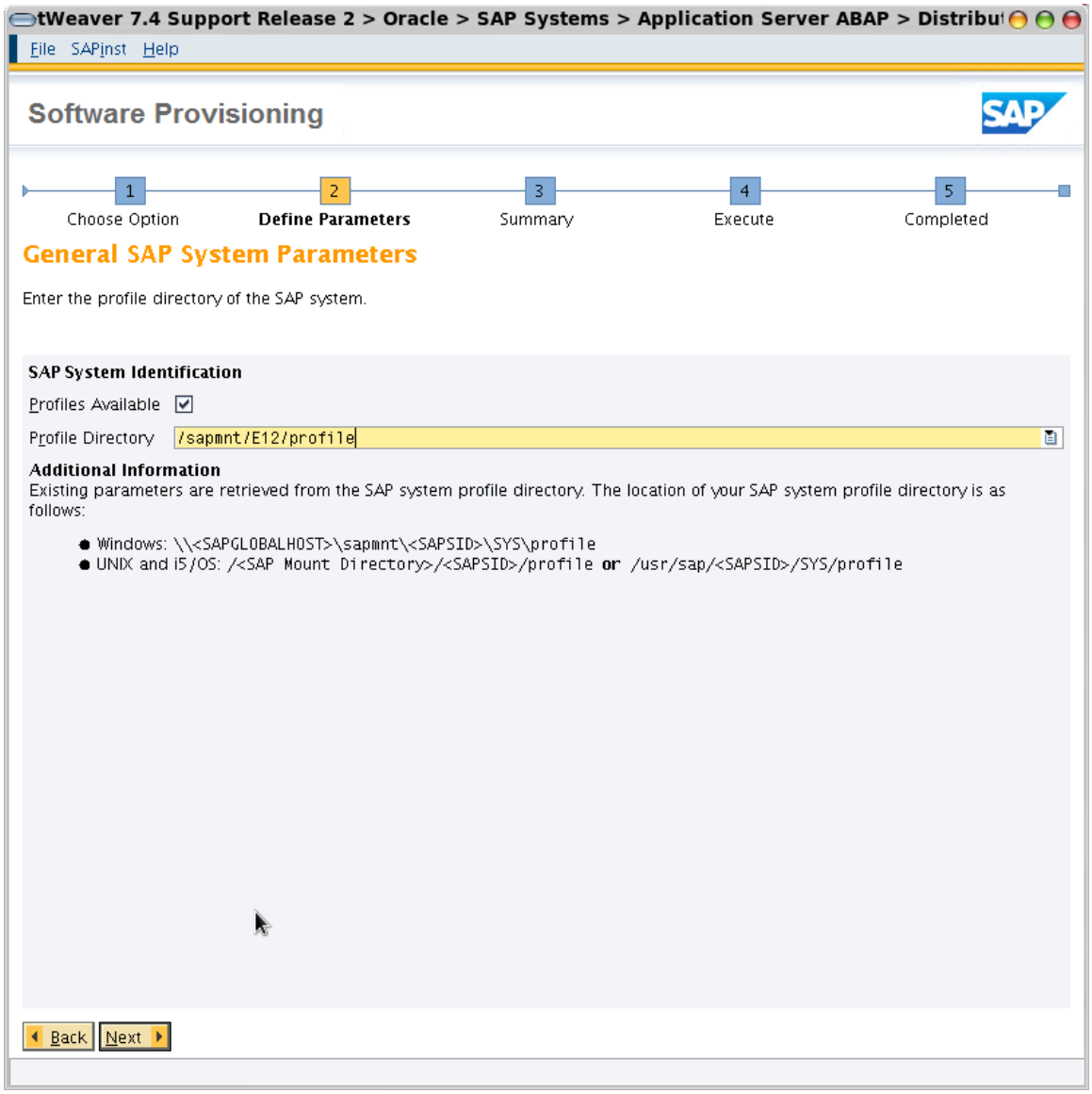

Weaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > High-Ava
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
ABAP Message Server Ports
Enter the required message server ports.
ABAP Message Server Ports
ABAP Message Server Port 3600
Internal ABAP Message Server Port 3900
Additional Information
The instance-specific Internal ABAP Message Server Port for internal communication and the ABAP Message Server Port are required as unique communication channels.
Back
Next

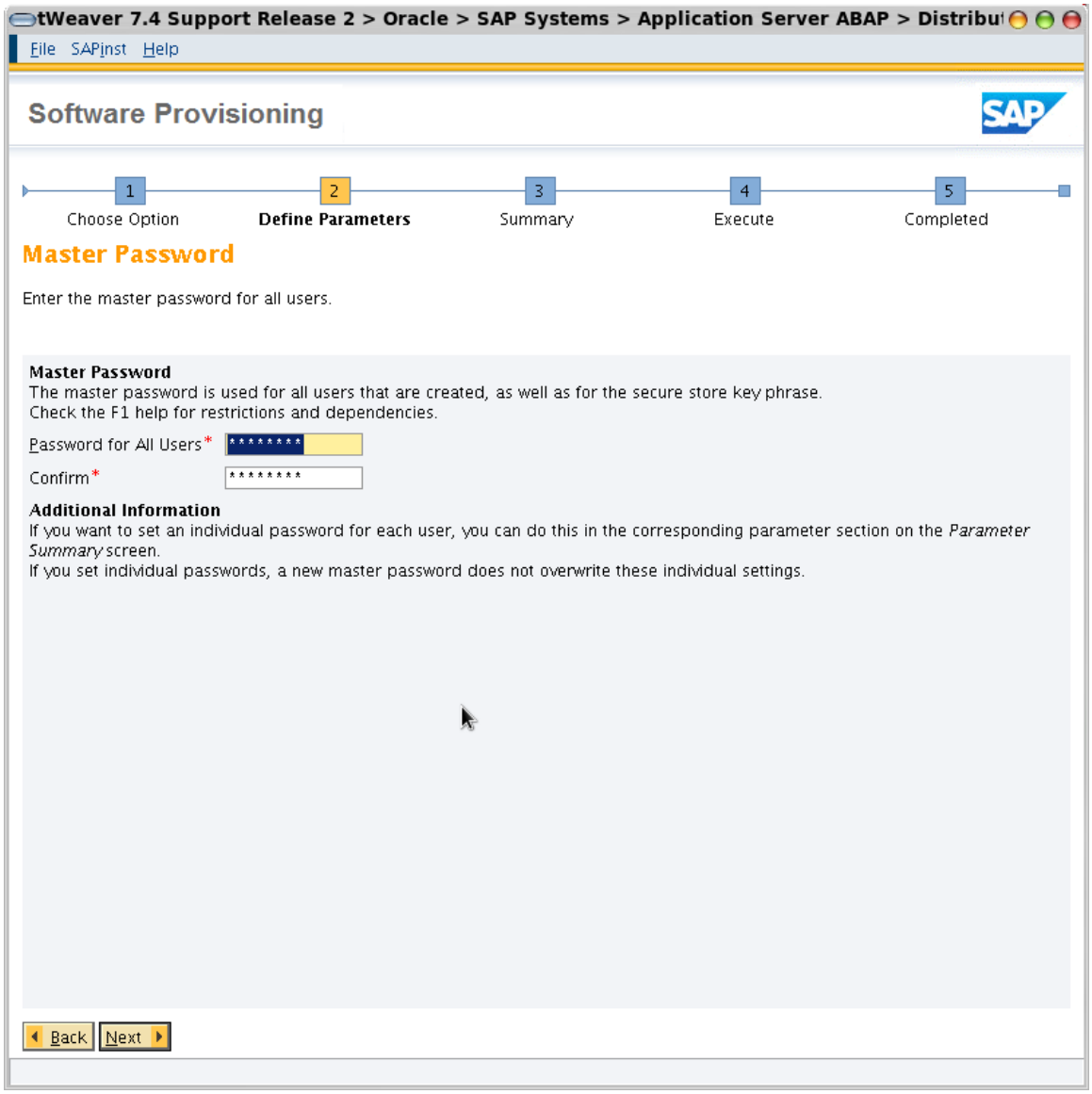

Weaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > High-Ava
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Parameter Summary
Choose 'Next' to start with the values shown. Otherwise, select the parameters to 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
xsape12ascs
ABAP Message Server Ports
ABAP Message Server Port
3600
Internal ABAP Message Server Port
3900
Back
Next
Revise
Show Detail

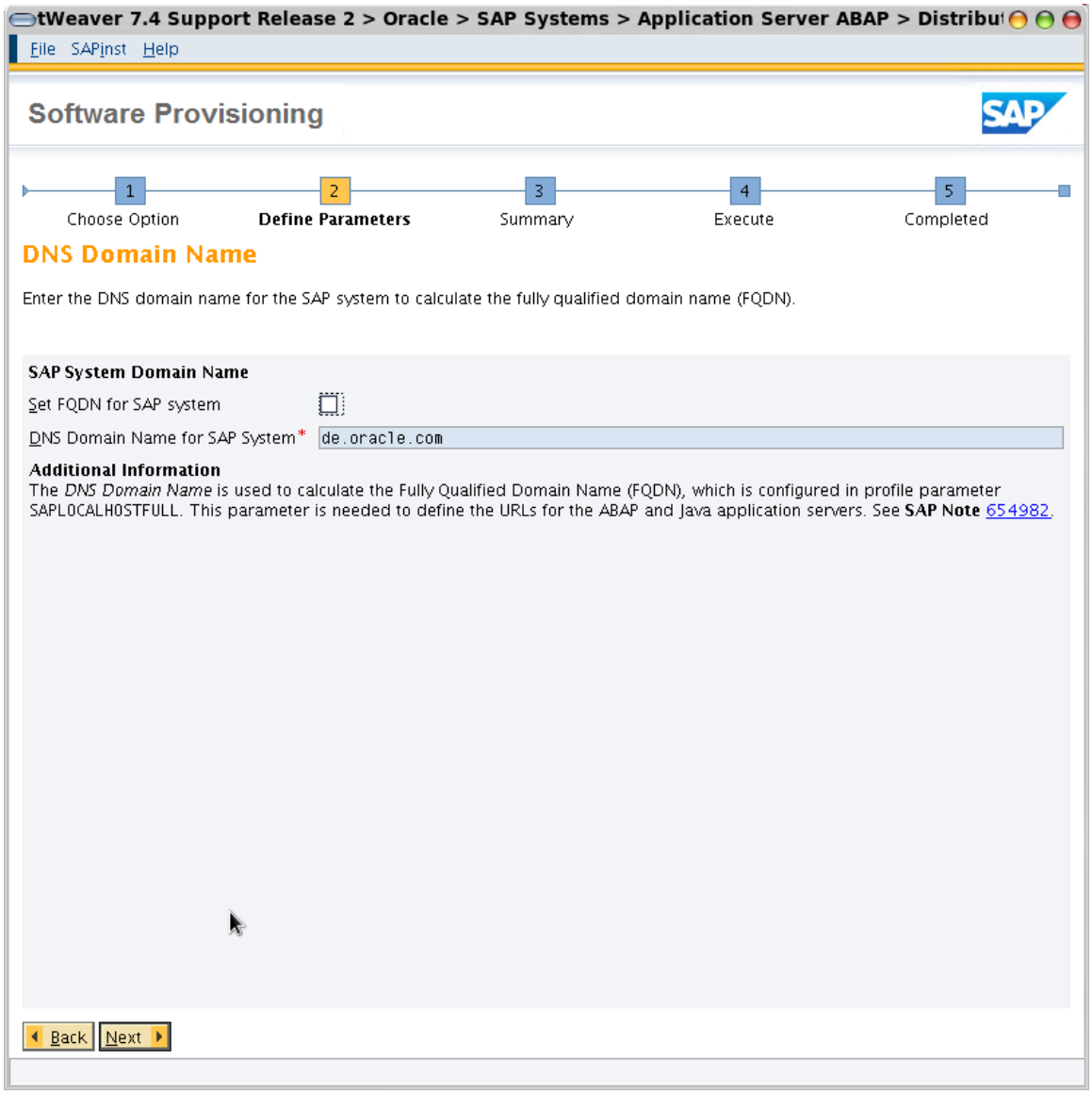
Installation of the Oracle Database for SAP with SAP SWPM

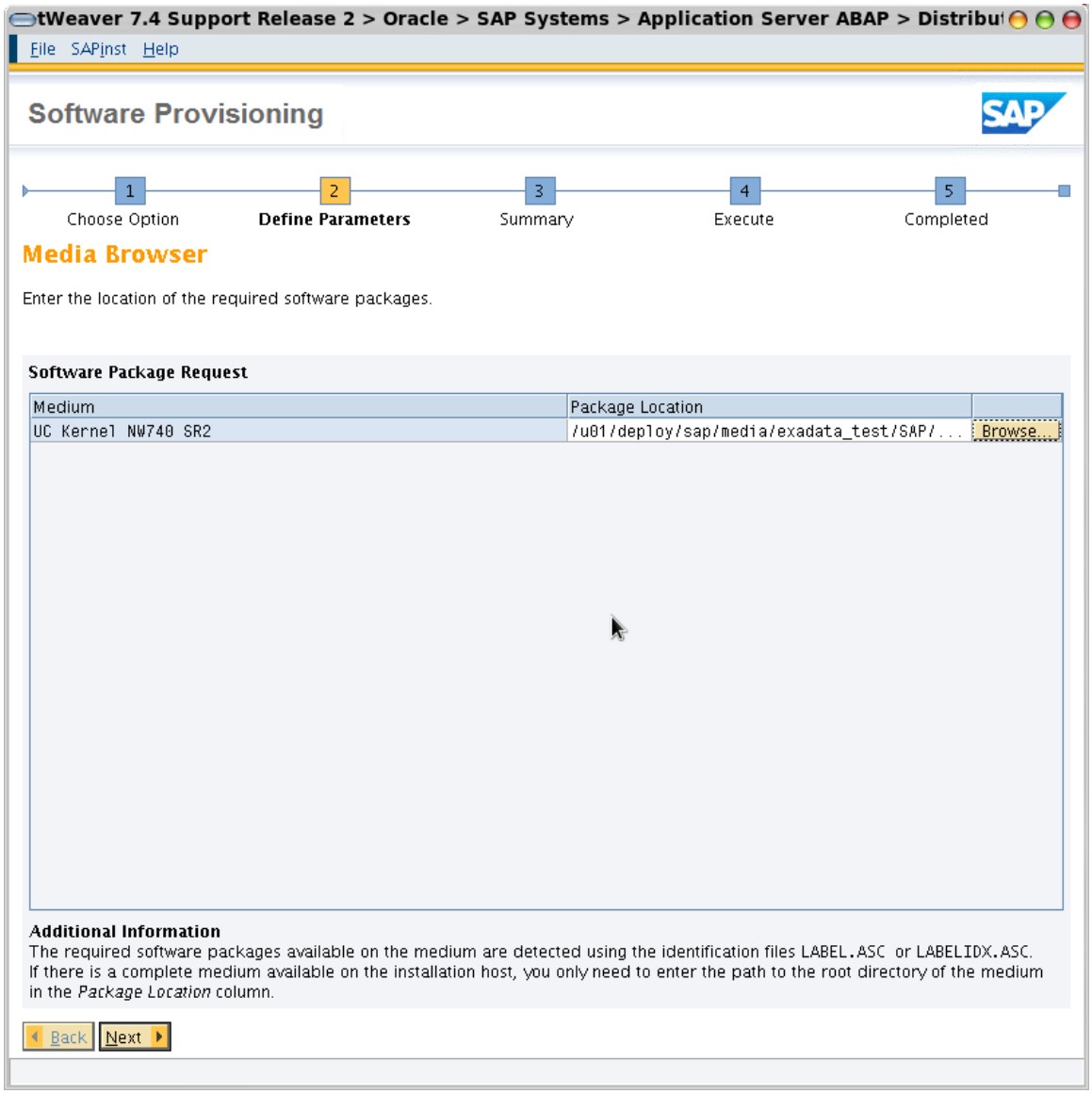
The following screens show the installation of an Oracle 12c database with SAP SWPM on the Oracle Exadata Database Machine.

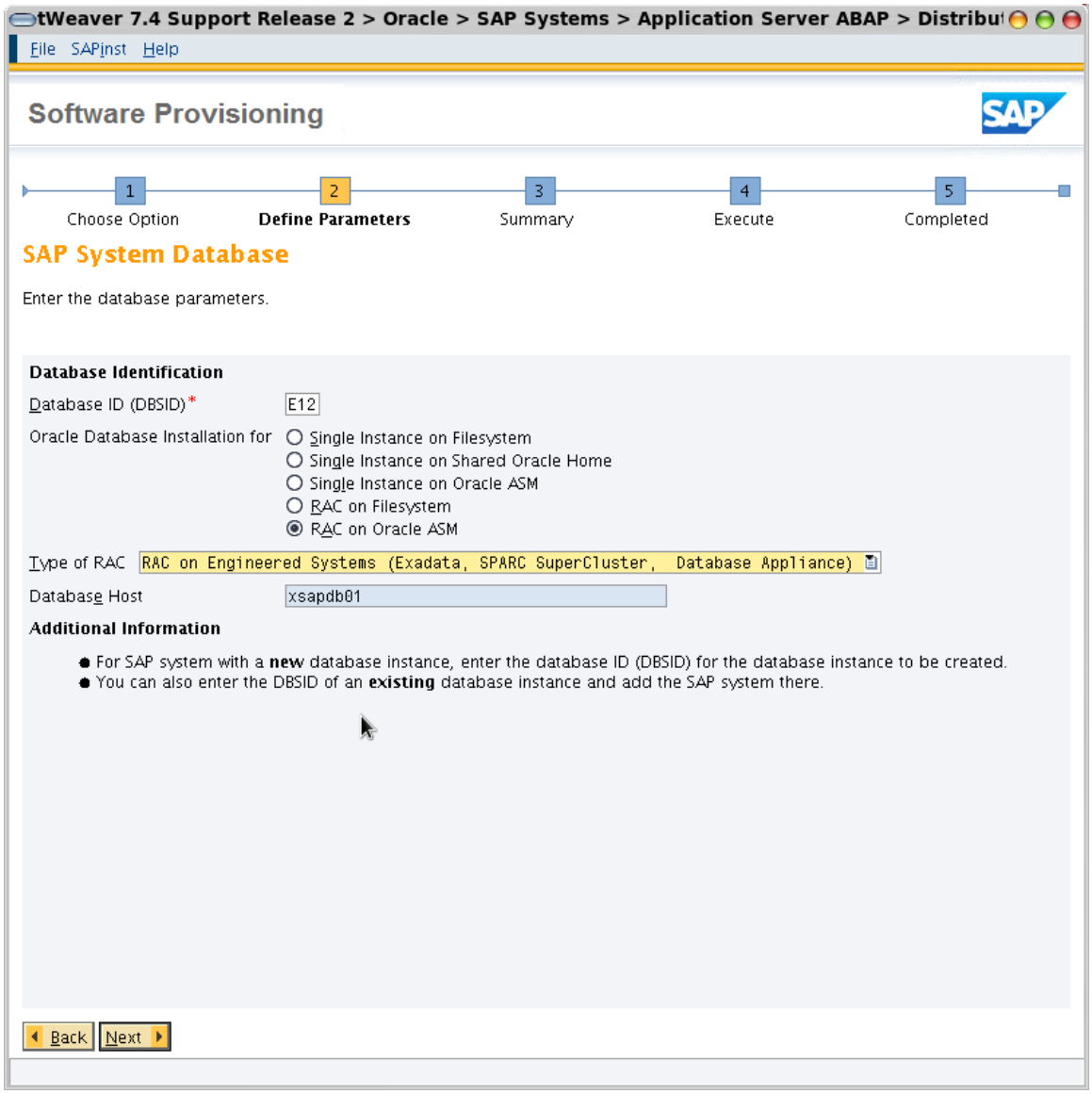


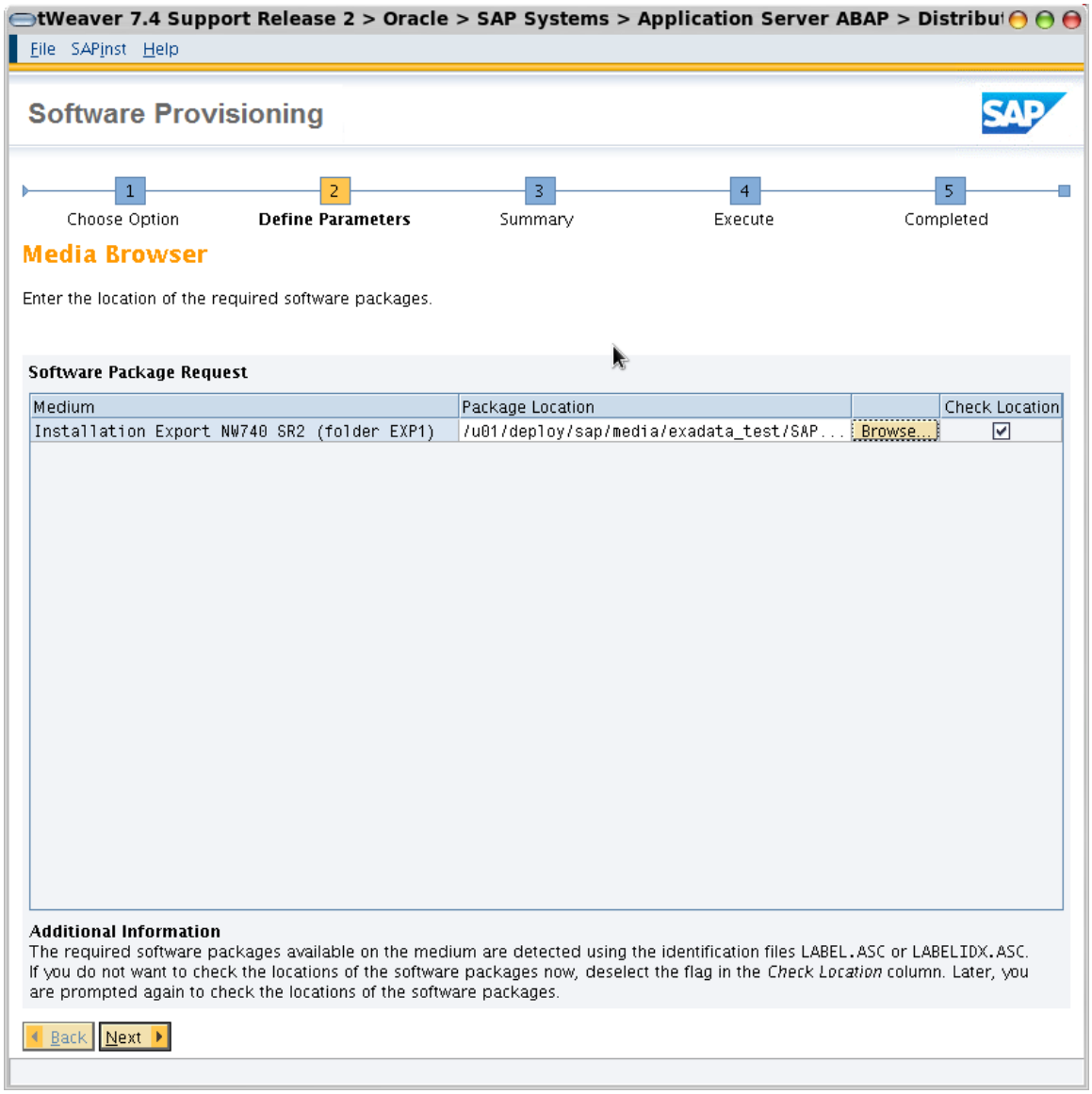

tWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distribu
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
General SAP System Parameters
Enter the profile directory of the SAP system.
SAP System Identification
Profiles Available
Profile Directory
/sapmnt/E12/profile
Additional Information
Existing parameters are retrieved from the SAP system profile directory. The location of your SAP system profile directory is as follows:
Windows: \\<SAPGLOBALHOST>\sapmnt\<SAPSID>\SYS\profile
UNIX and i5/OS: /<SAP Mount Directory>/<SAPSID>/profile or /usr/sap/<SAPSID>/SYS/profile
Back
Next

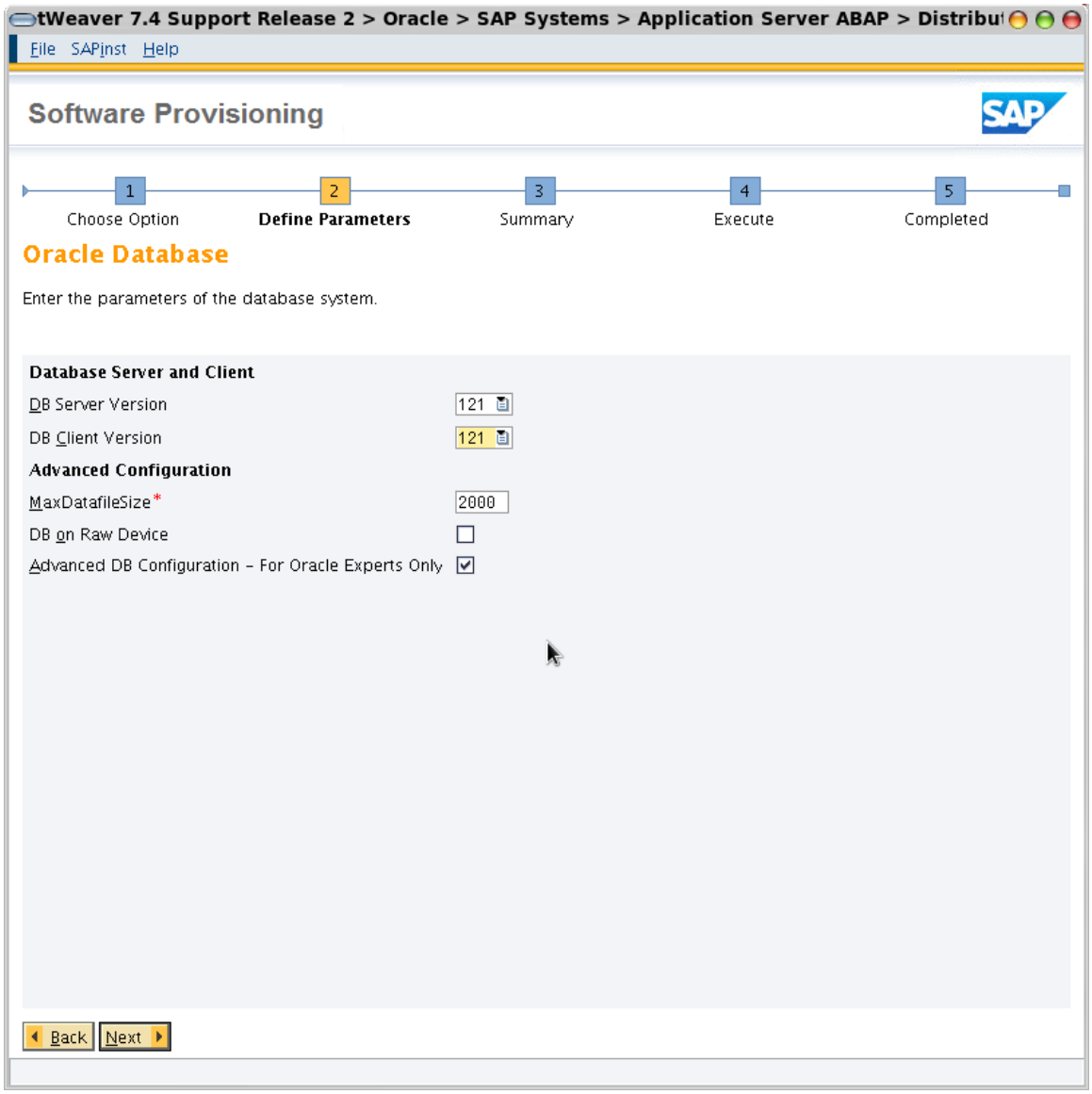

tWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distribu
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Master Password
Enter the master password for all users.
Master Password
The master password is used 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

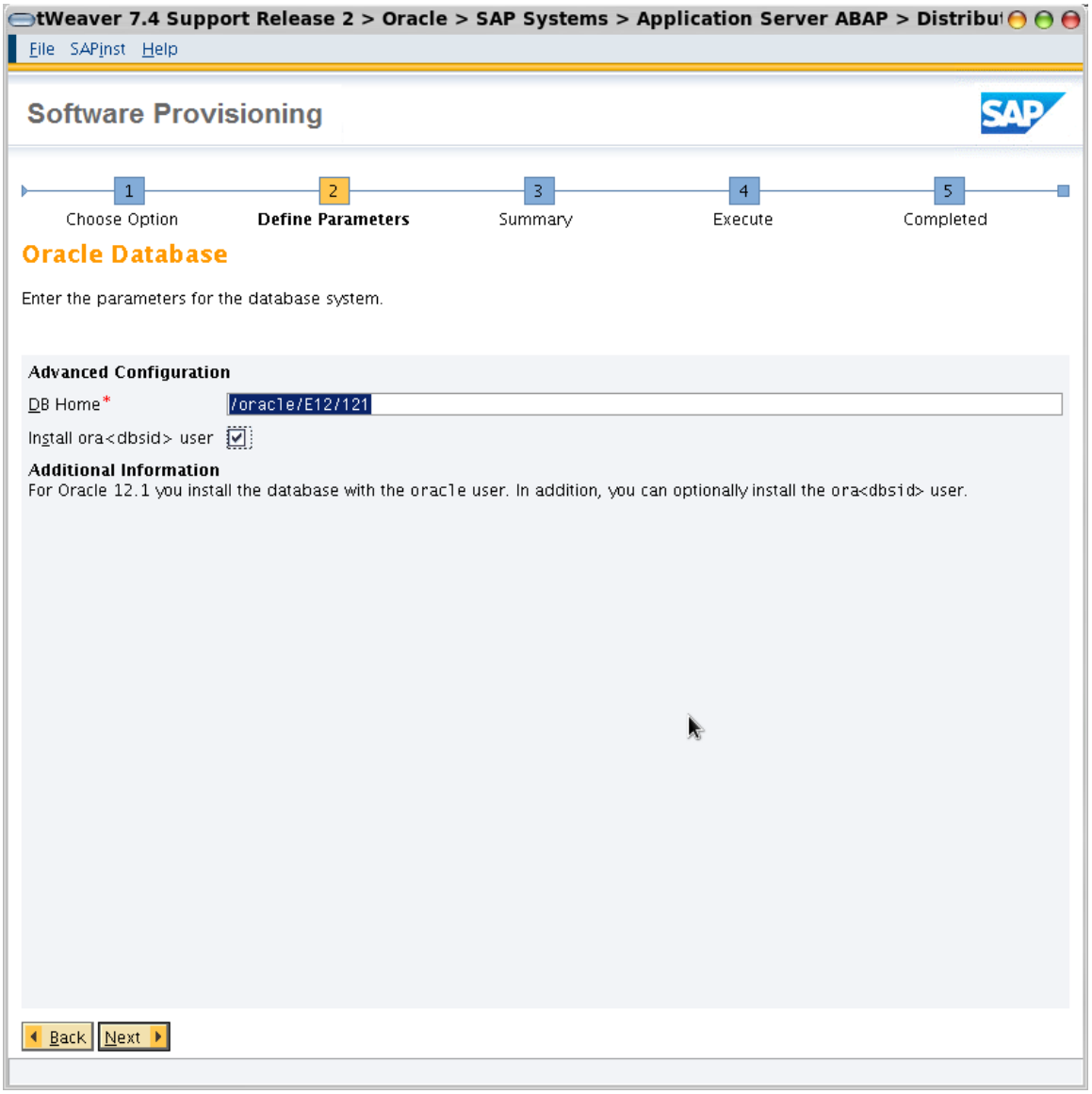

tWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distribu
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
DNS Domain Name
Enter the DNS domain name for the SAP system to calculate the fully qualified domain name (FQDN).
SAP System Domain Name
Set FQDN for SAP system
DNS Domain Name for SAP System*
de.oracle.com
Additional Information
The DNS Domain Name is used to calculate the Fully Qualified Domain Name (FQDN), which is configured in profile parameter SAPLOCALHOSTFULL. This parameter is needed to define the URLs for the ABAP and Java application servers. See SAP Note 654982.
Back
Next


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

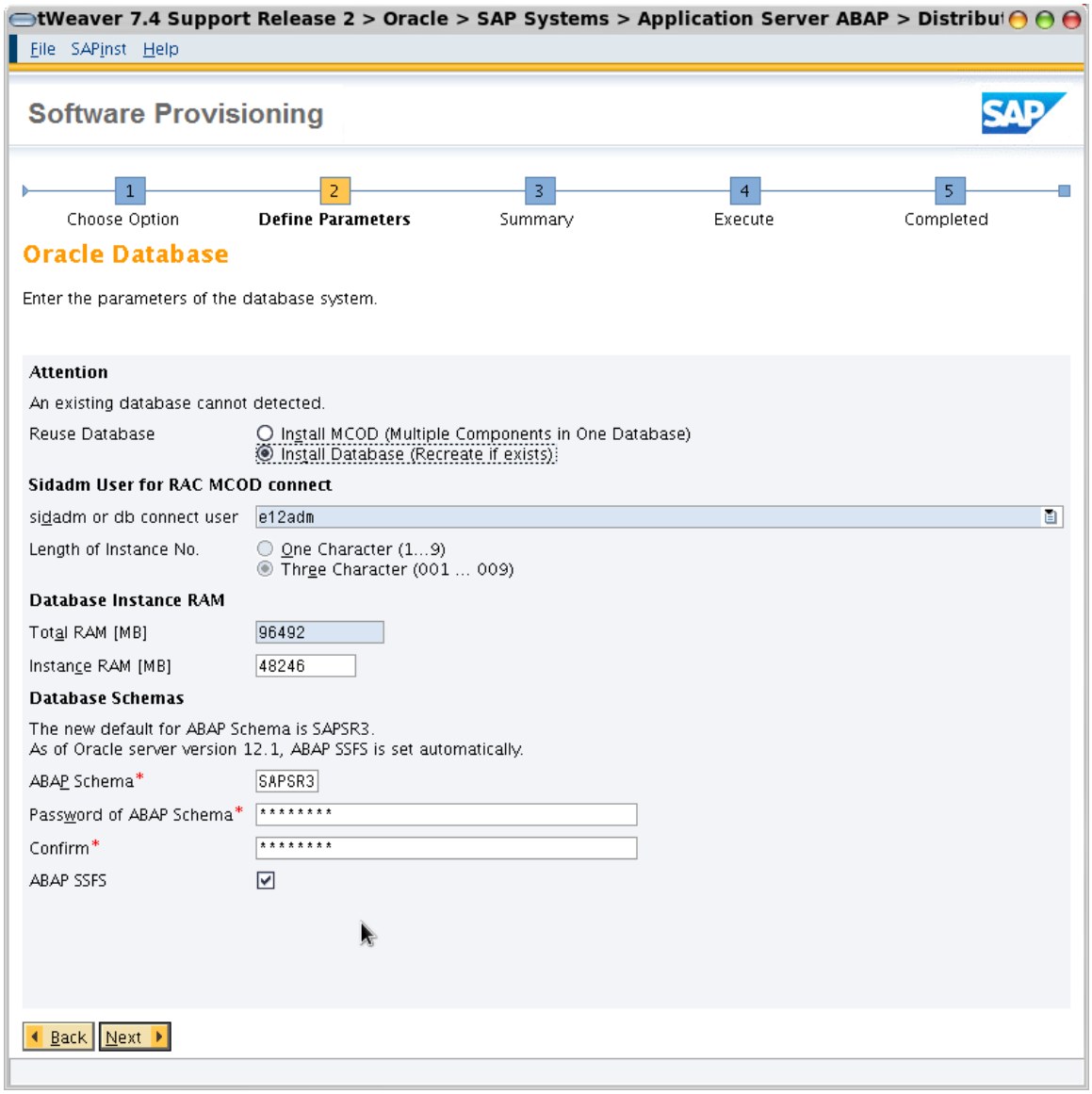

tWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distribu
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
SAP System Database
Enter the database parameters.
Database Identification
Database ID (DBSID)*
E12
Oracle Database Installation for
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
Next

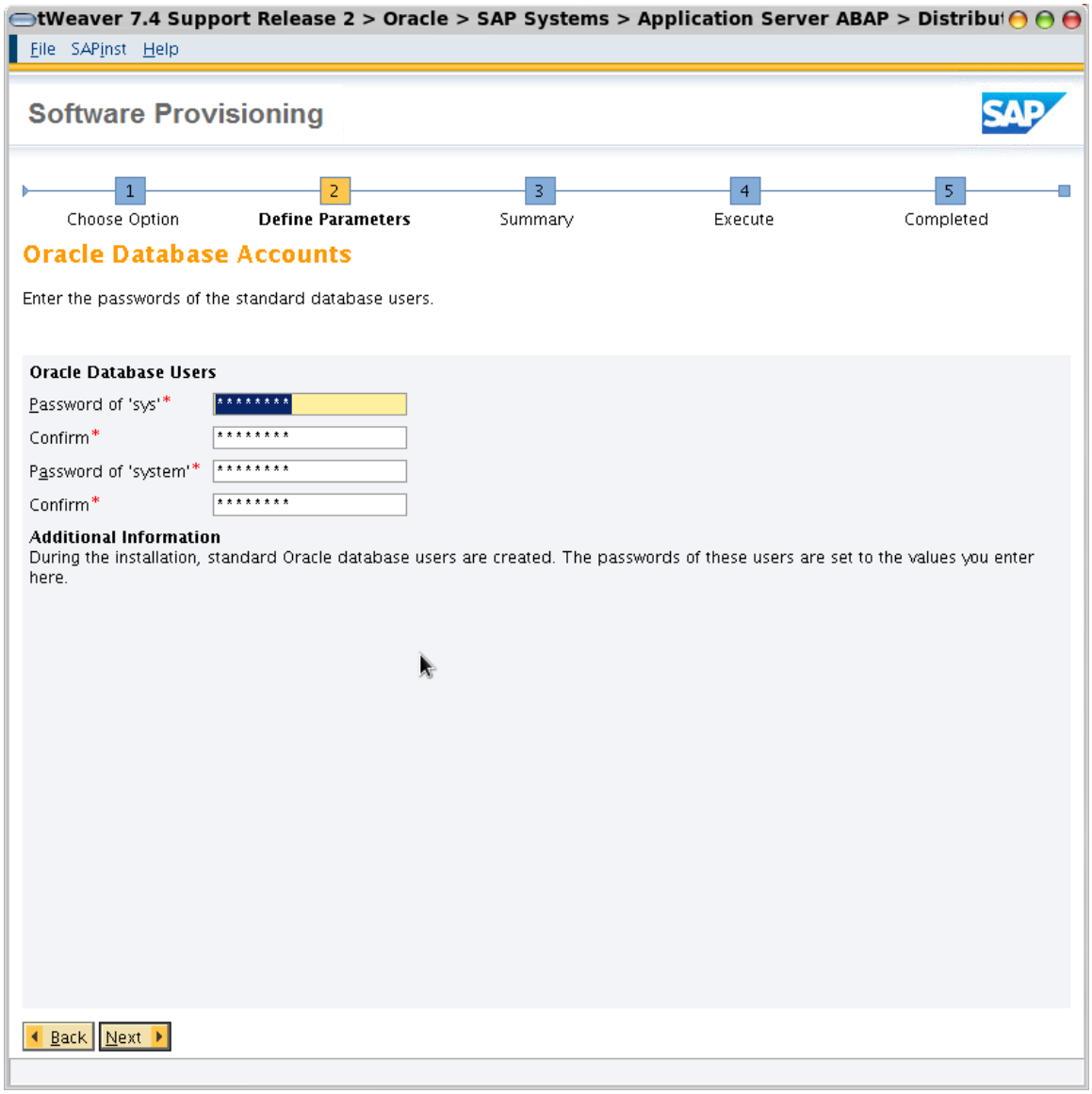

tWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distribu
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Media Browser
Enter the location of the required software packages.
Software Package Request
Medium
Package Location
Check Location
Installation Export NW740 SR2 (folder EXP1)
/u01/deploy/sap/media/exadata_test/SAP...
Browse...
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

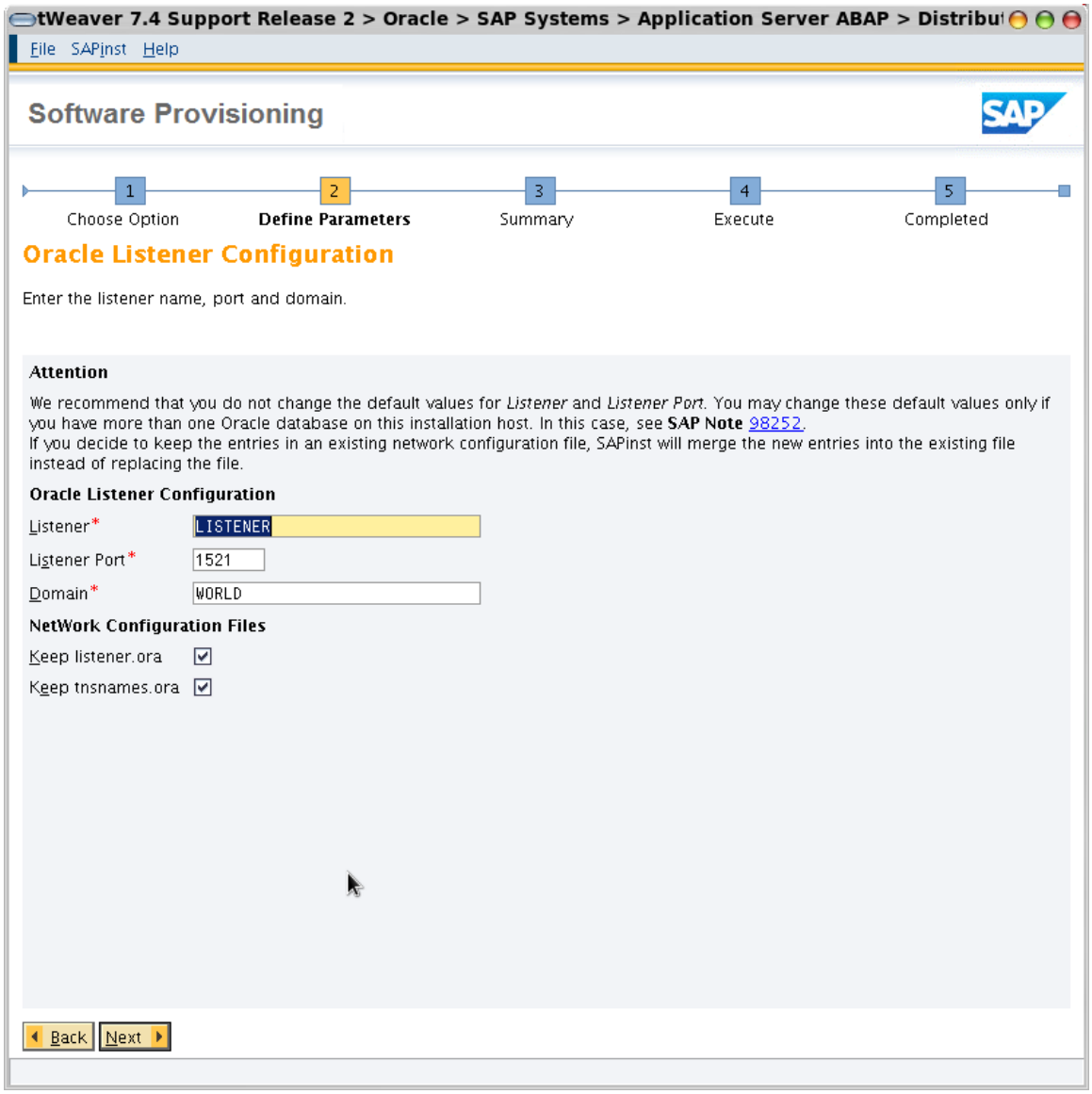

tWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distribu
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Oracle Database
Enter the parameters of the database system.
Database Server and Client
DB Server Version 121
DB Client Version 121
Advanced Configuration
MaxDatafileSize* 2000
DB on Raw Device
Advanced DB Configuration – For Oracle Experts Only
Back
Next

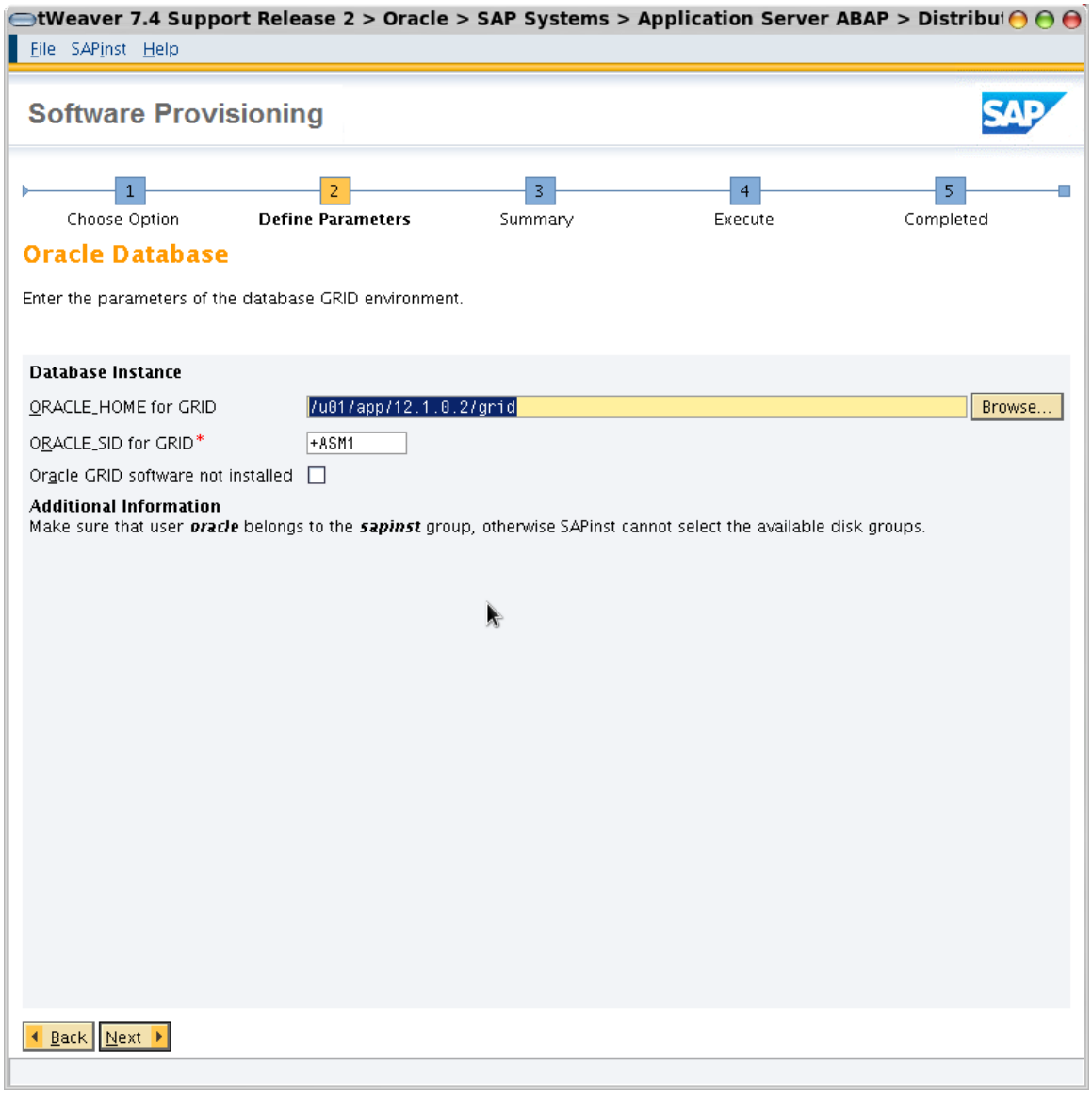


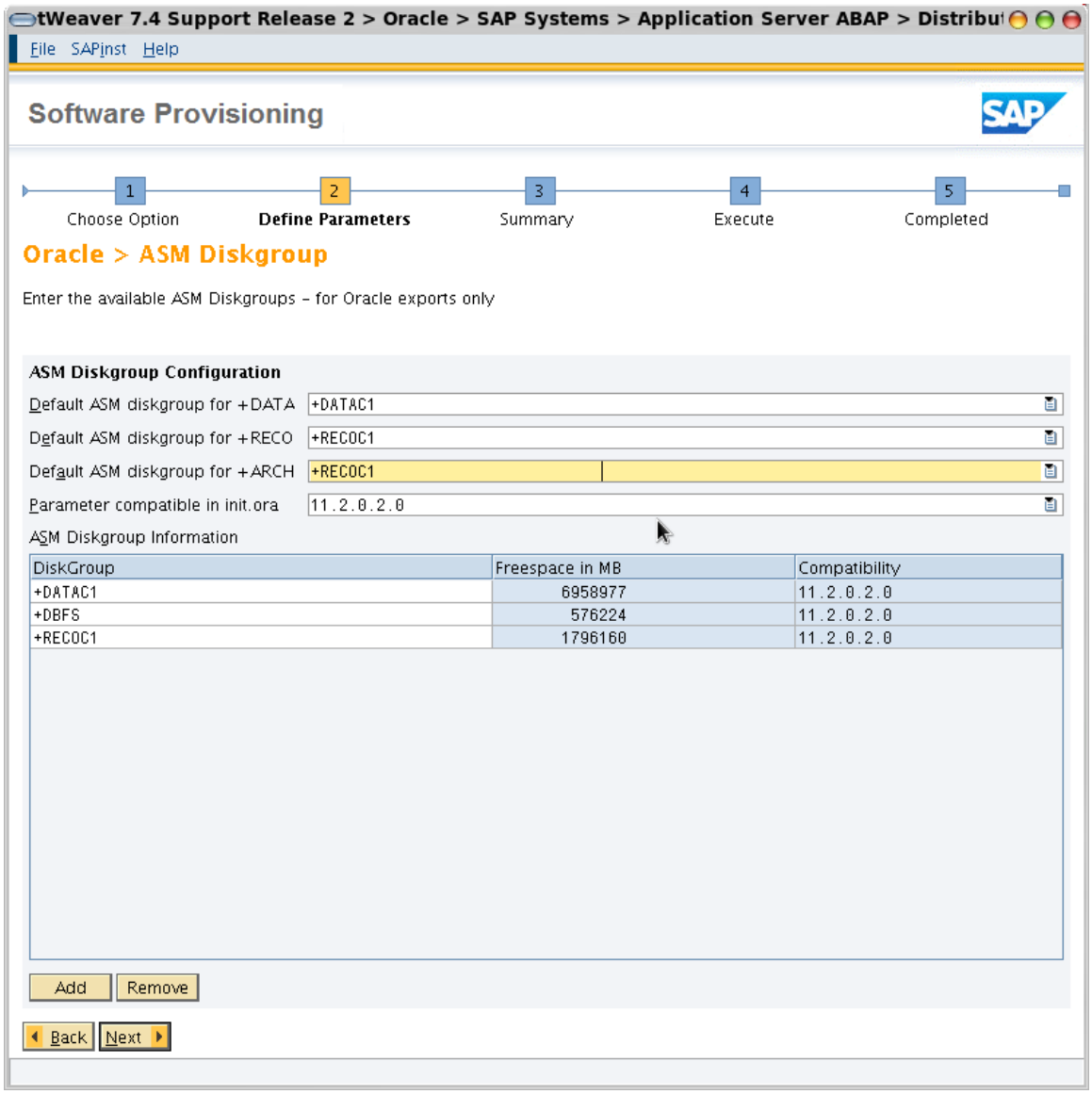
Note: Make sure that the ora<dbsid> user gets created. Therefore make a checkmark at “Install ora<dbsid> user” in above screen. Without the ora<dbsid> user certain SAP discovery functionality at OS and database level does not work correctly.


tWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distribu
File SAPinst Help
Software Provisioning
SAP
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 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
e12adm
Length of Instance No.
One Character (1...9)
Three Character (001 ... 009)
Database Instance RAM
Total RAM [MB]
96492
Instance RAM [MB]
48246
Database Schemas
The new default for ABAP Schema is SAPSR3.
As of Oracle server version 12.1, ABAP SSFS is set automatically.
ABAP Schema*
SAPSR3
Password of ABAP Schema*
****
Confirm*
****
ABAP SSFS
Back
Next

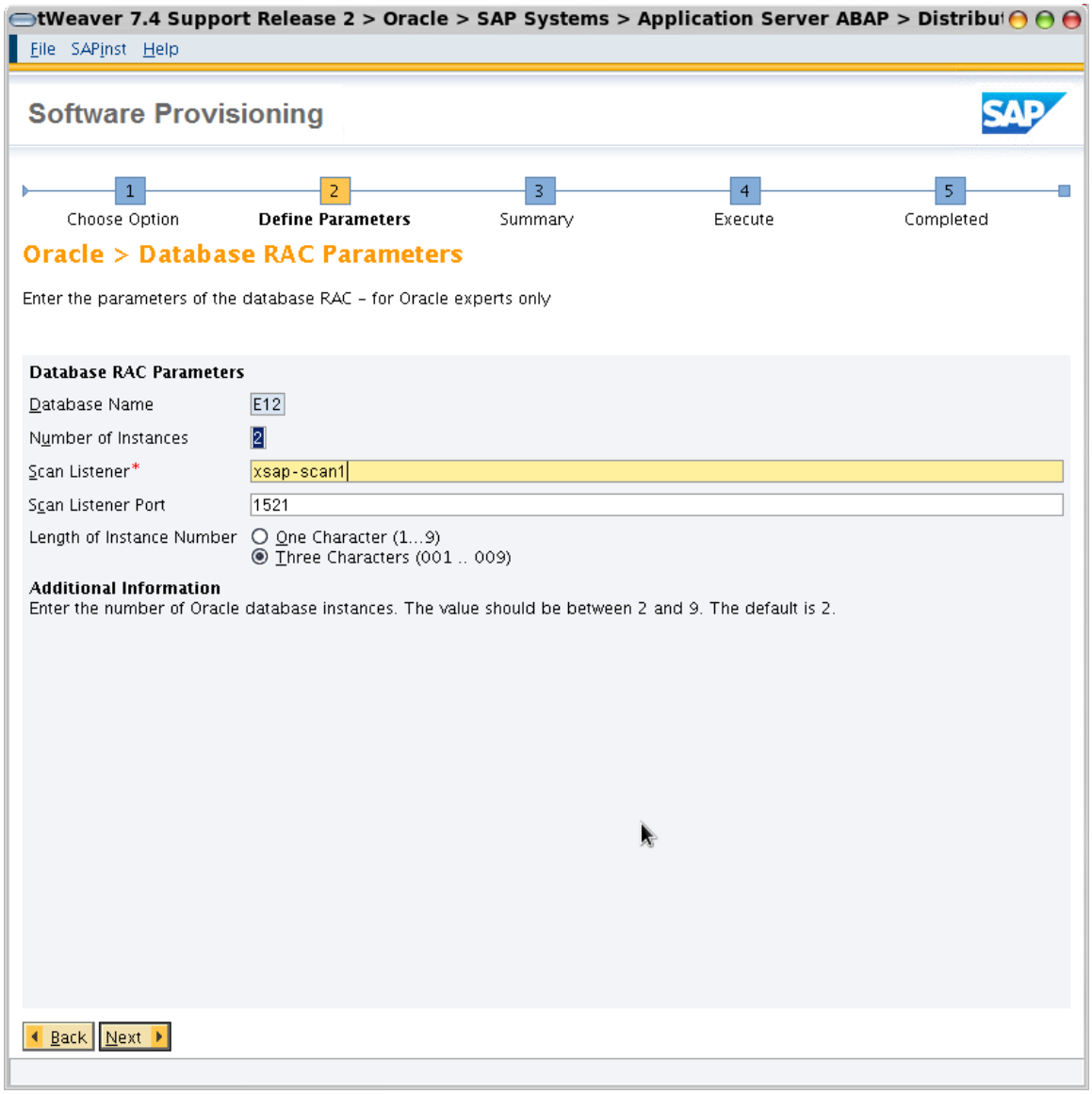

tWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distribu
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Oracle Database Accounts
Enter the passwords of the standard database users.
Oracle Database Users
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

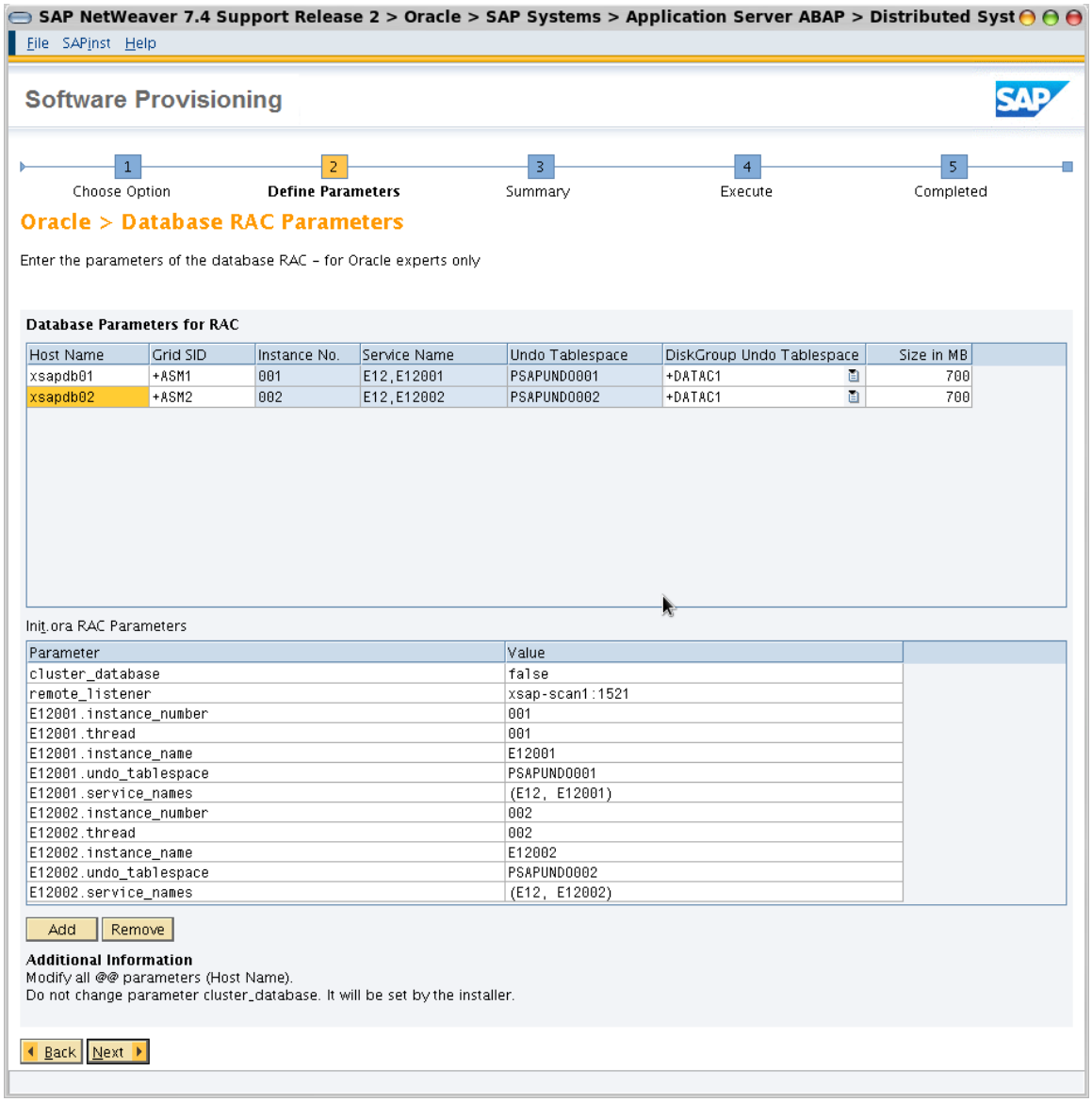

tWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distribu
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Oracle Listener Configuration
Enter the listener name, port and domain.
Attention
We recommend that you do not change the default values for Listener and Listener Port. You may change these default values only if you have more than one Oracle database on this installation host. In this case, see SAP Note 98252.
If you decide to keep the entries in an existing network configuration file, SAPinst will merge the new entries into the existing file instead of replacing the file.
Oracle Listener Configuration
Listener* LISTENER
Listener Port* 1521
Domain* WORLD
NetWork Configuration Files
Keep listener.ora
Keep tnsnames.ora
Back
Next

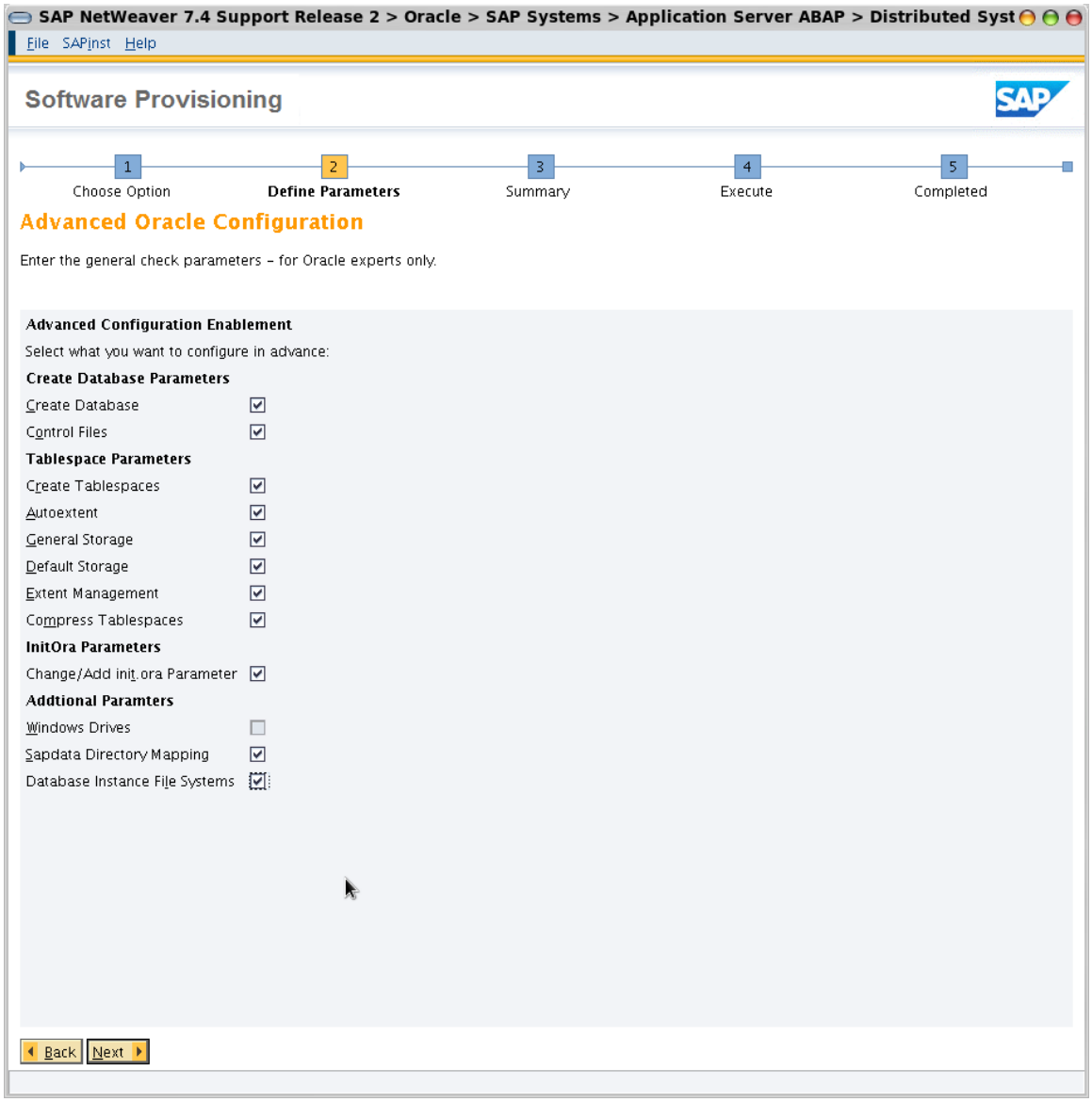

tWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distribu
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Oracle Database
Enter the parameters of the database GRID environment.
Database Instance
ORACLE_HOME for GRID
/u01/app/12.1.0.2/grid
Browse...
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.
Back
Next

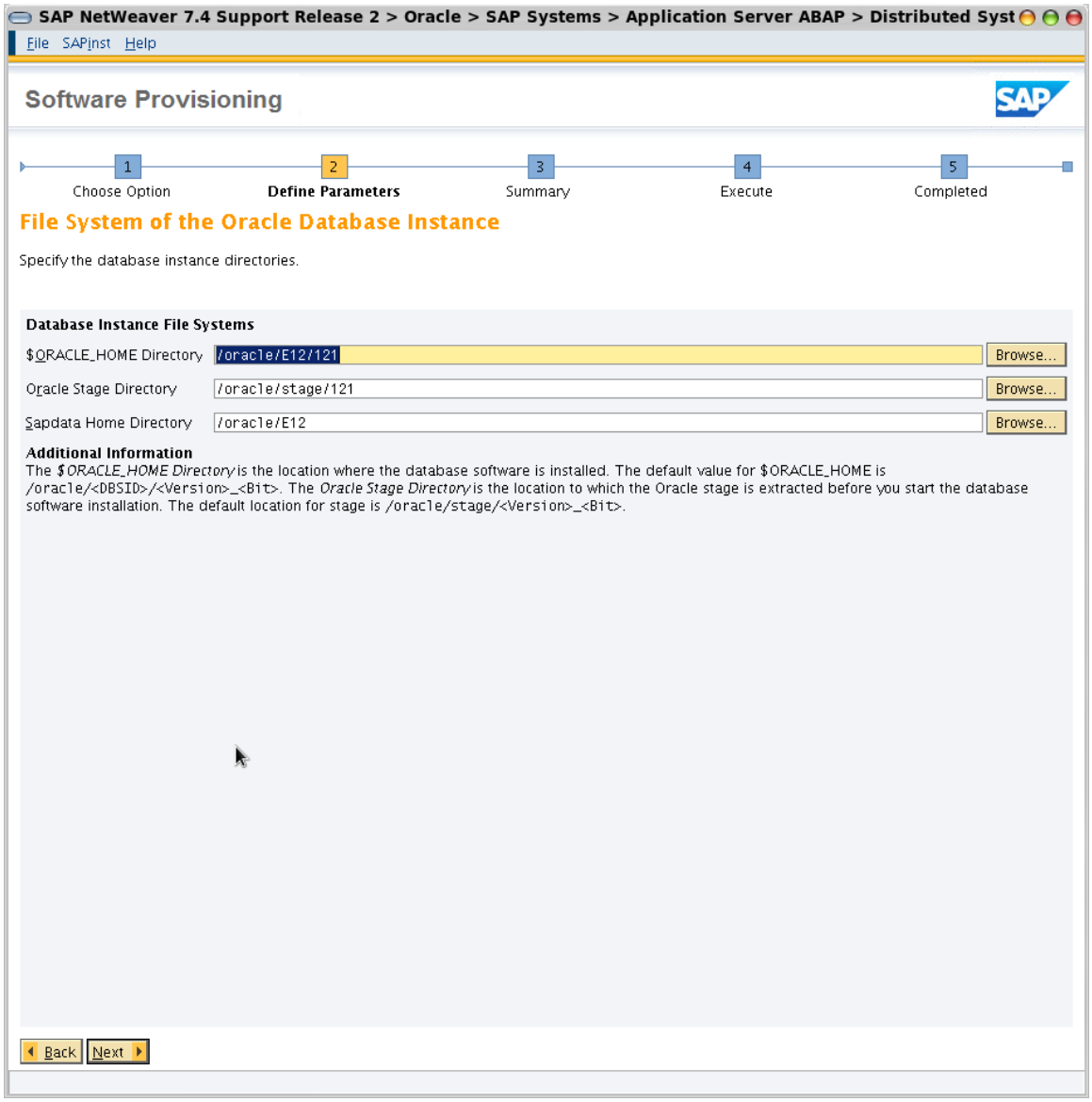


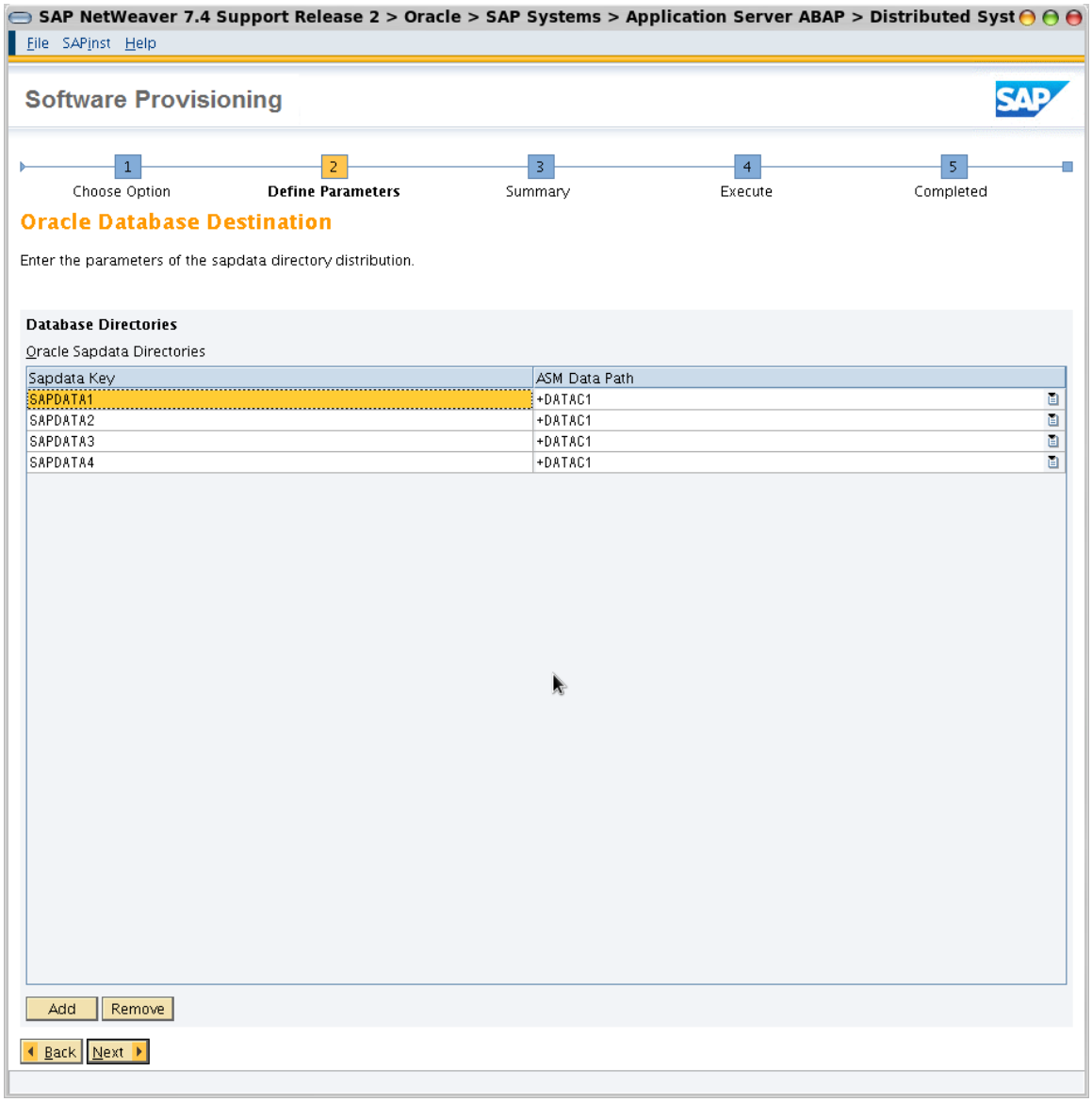
Note: There is no need to change the value of 11.2.0.2.0 in the line “Parameter compatible in init.ora”. This value describes the minimum version of the database which can be created on the existing ASM disk groups. Later on during the SWPM installation the compatible parameter in the init.ora of the 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).

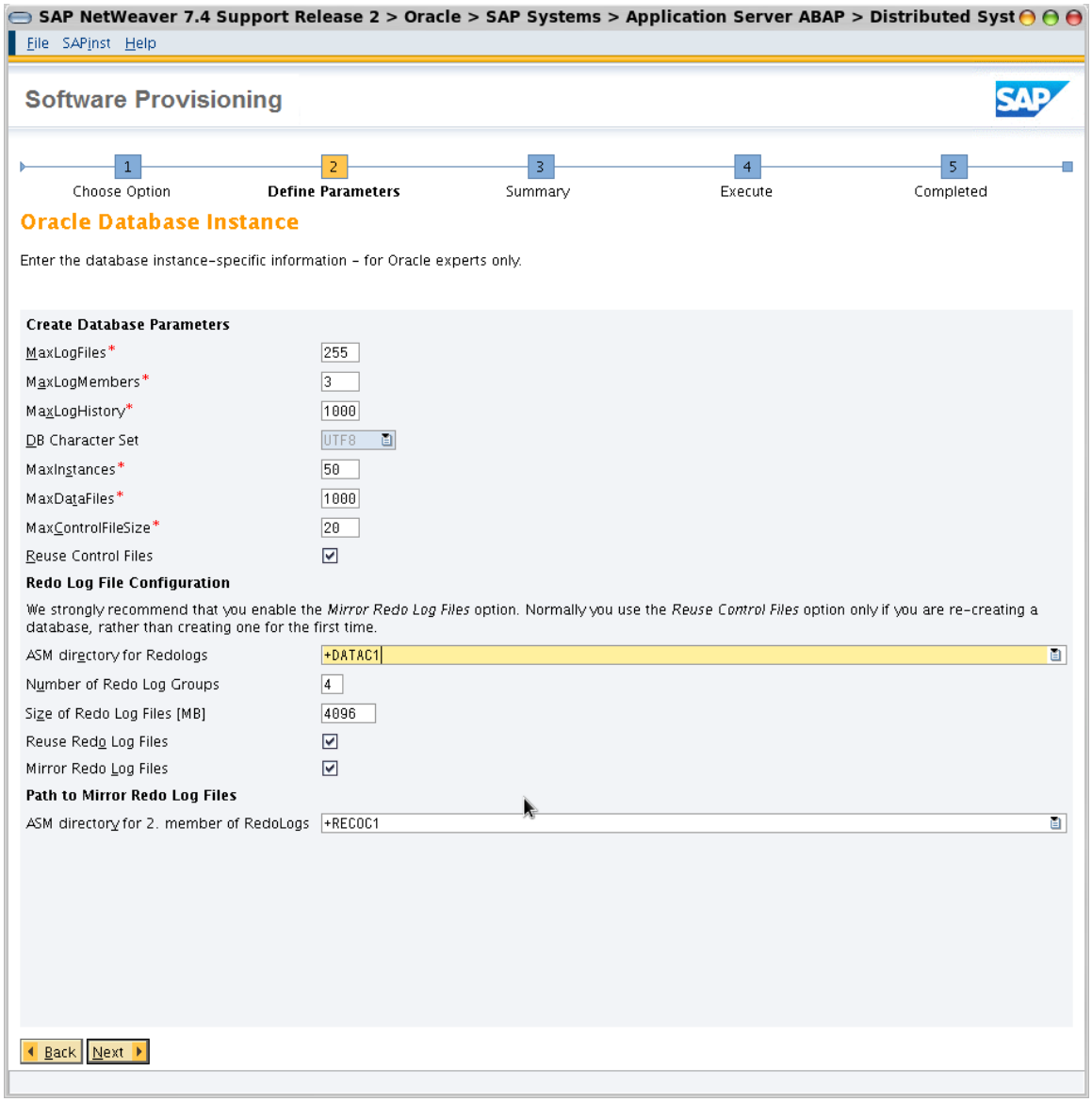

tWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distribu
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Oracle > Database RAC Parameters
Enter the parameters of the database RAC – for Oracle experts only
Database RAC Parameters
Database Name E12
Number of Instances 2
Scan Listener* xsap-scan1
Scan Listener Port 1521
Length of Instance Number One Character (1...9)
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

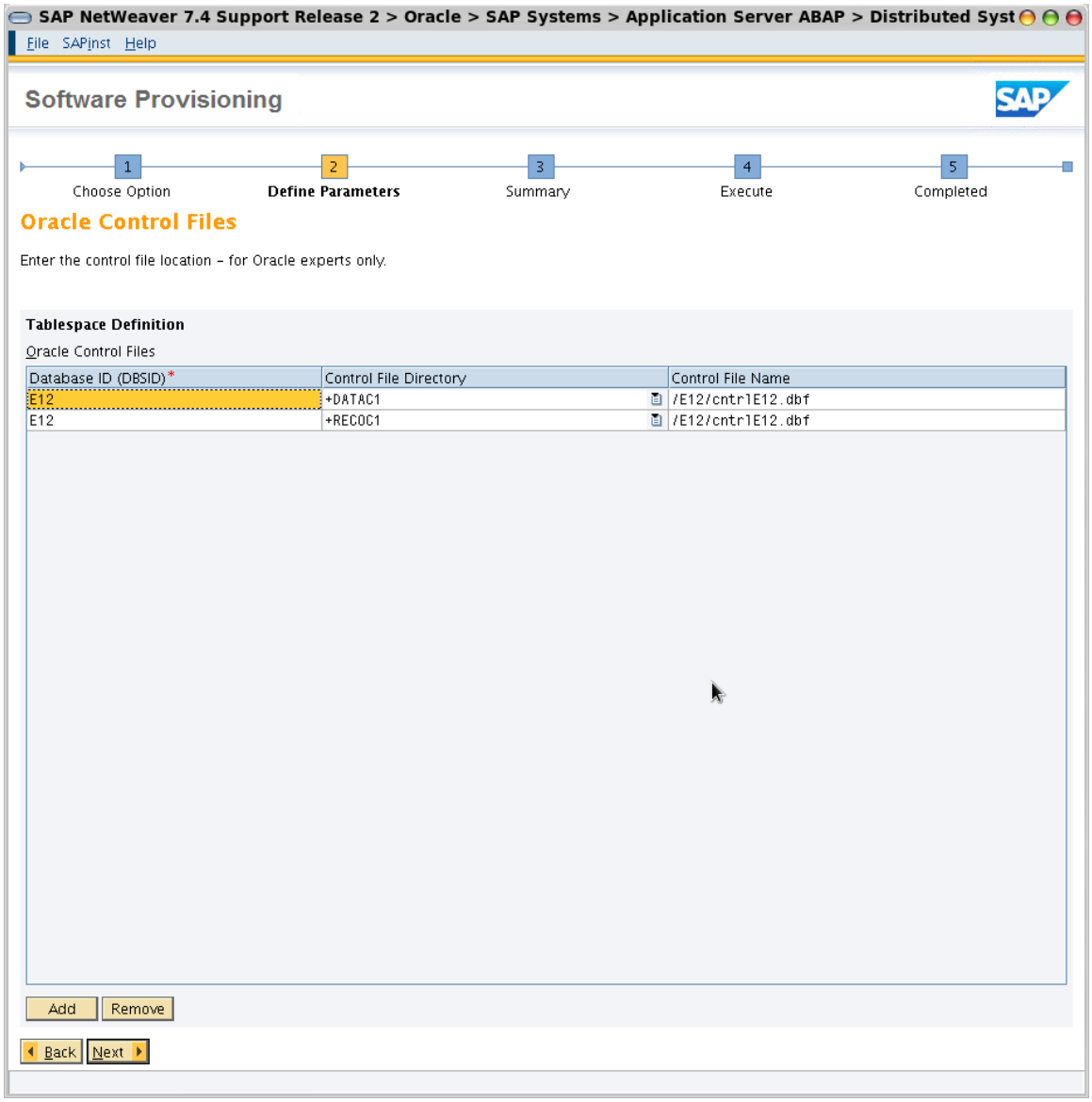

SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Syst
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Oracle > Database RAC Parameters
Enter the parameters of the database RAC – for Oracle 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 | PSAPUNDO001 | +DATAC1 | 700
xsapdb02 | +ASM2 | 002 | E12,E12002 | PSAPUNDO002 | +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 | PSAPUNDO001
E12001.service_names | (E12, E12001)
E12002.instance_number | 002
E12002.thread | 002
E12002.instance_name | E12002
E12002.undo_tablespace | PSAPUNDO002
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

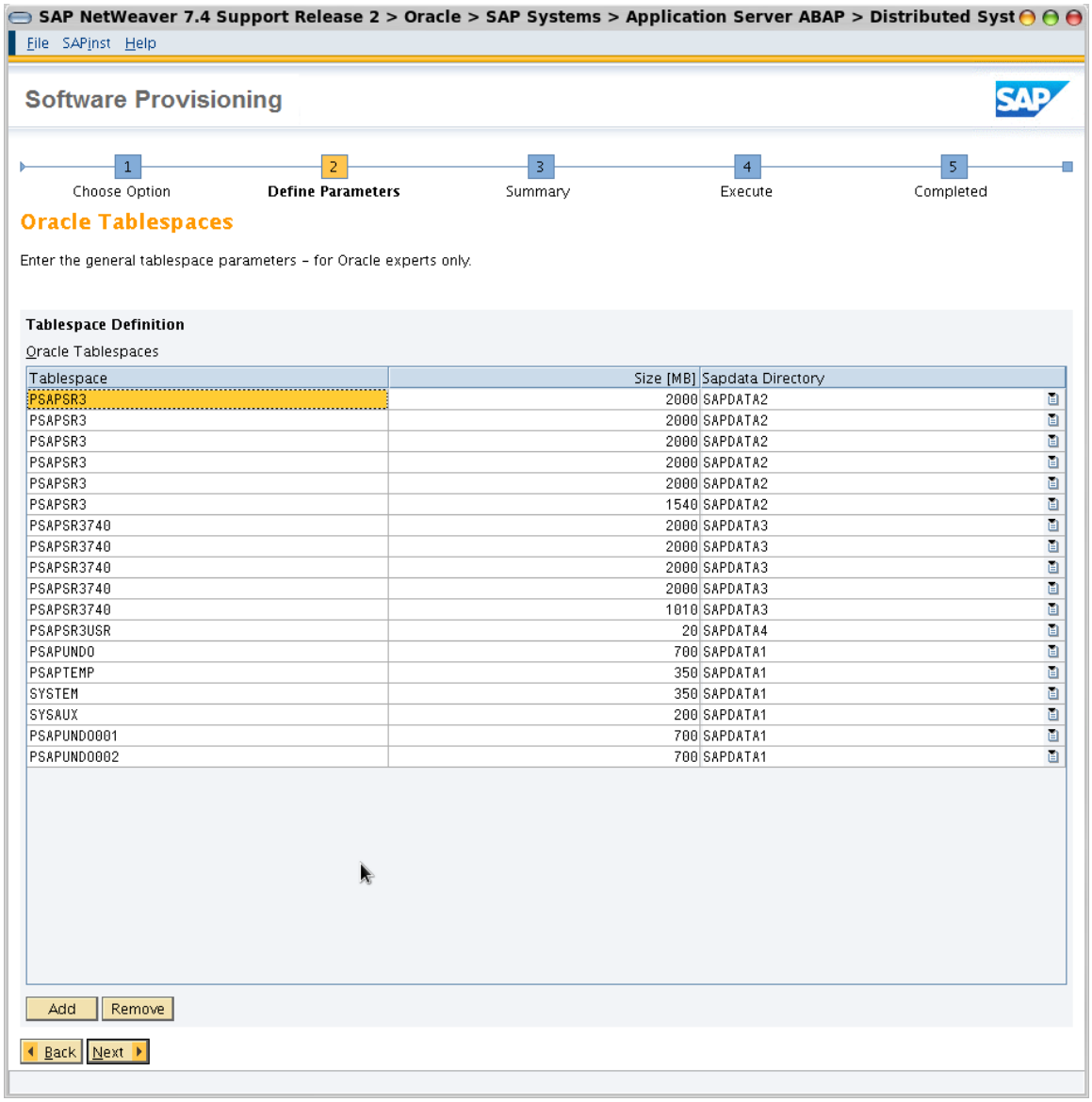

SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Syst
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Advanced Oracle Configuration
Enter the general check parameters – for Oracle experts only.
Advanced Configuration Enablement
Select what you want to configure in advance:
Create Database Parameters
Create Database
Control Files
Tablespace Parameters
Create Tablespaces
Autoextent
General Storage
Default Storage
Extent Management
Compress Tablespaces
InitOra Parameters
Change/Add init.ora Parameter
Addtional Paramters
Windows Drives
Sapdata Directory Mapping
Database Instance File Systems
Back
Next

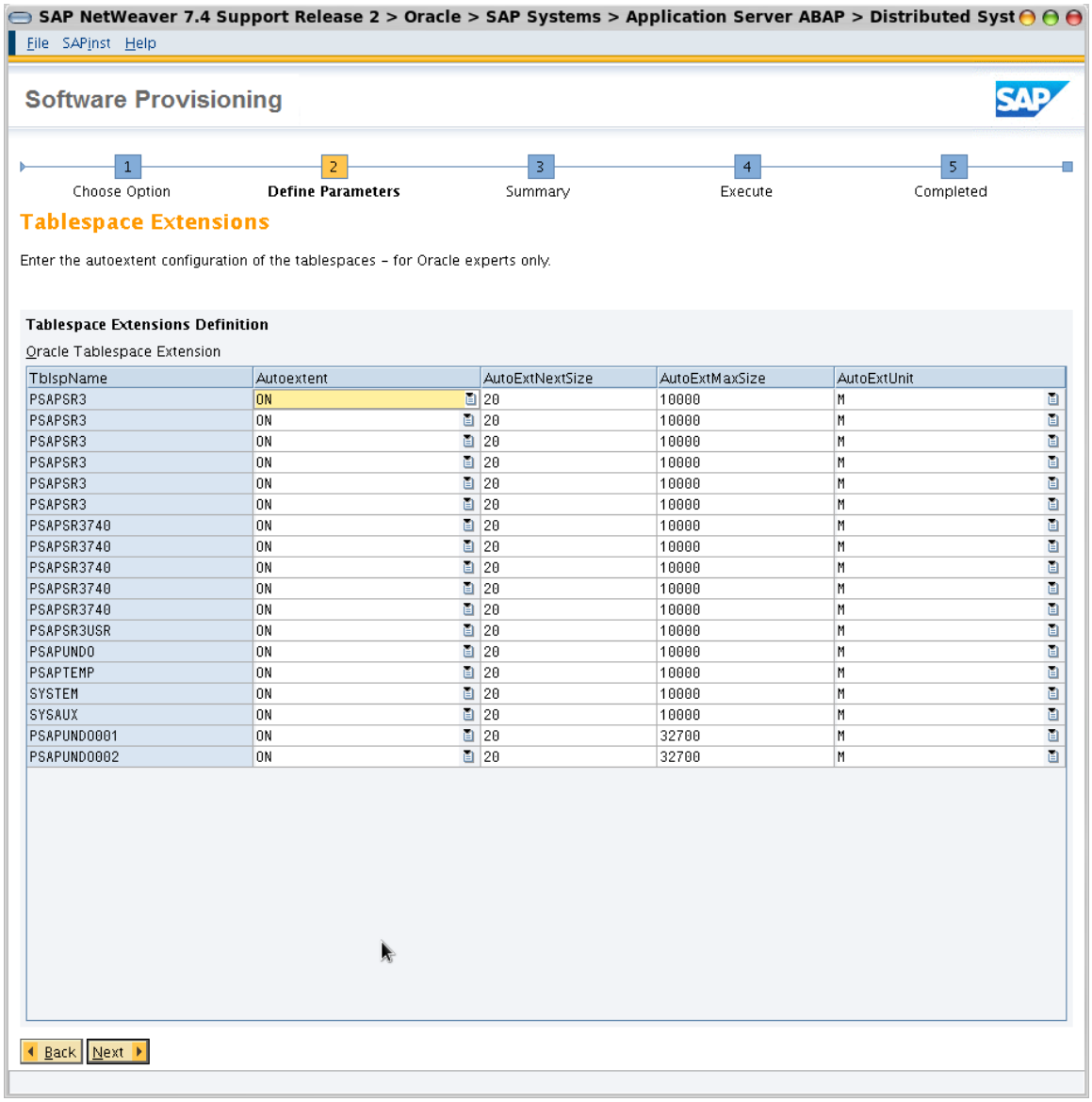

SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Syst
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
File System of the Oracle Database Instance
Specify the database instance directories.
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

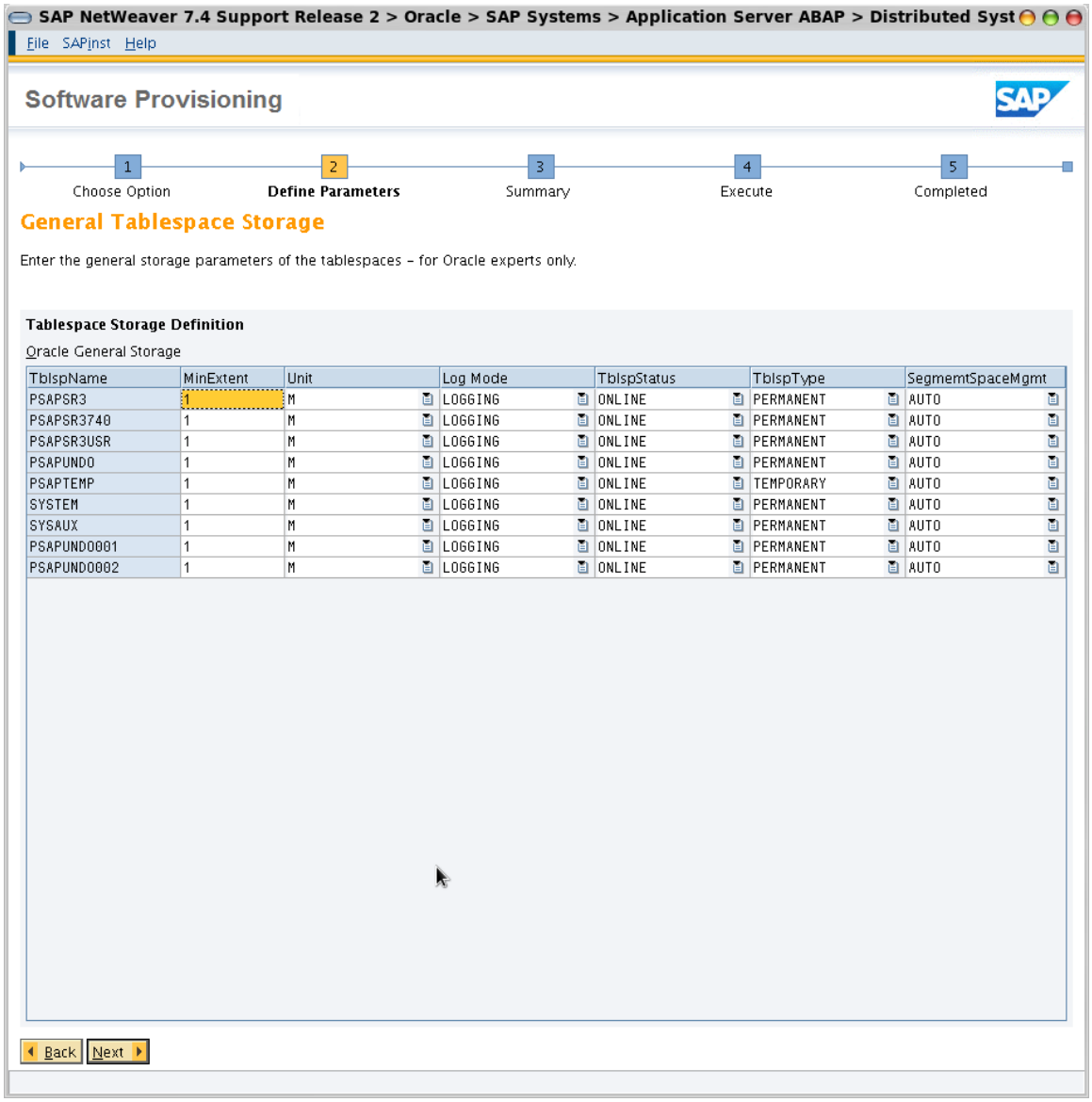

SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Syst
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Oracle Database Destination
Enter the parameters of the sapdata directory distribution.
Database Directories
Oracle Sapdata Directories
Sapdata Key
ASM Data Path
SAPDATA1 +DATAC1
SAPDATA2 +DATAC1
SAPDATA3 +DATAC1
SAPDATA4 +DATAC1
Add
Remove
Back
Next

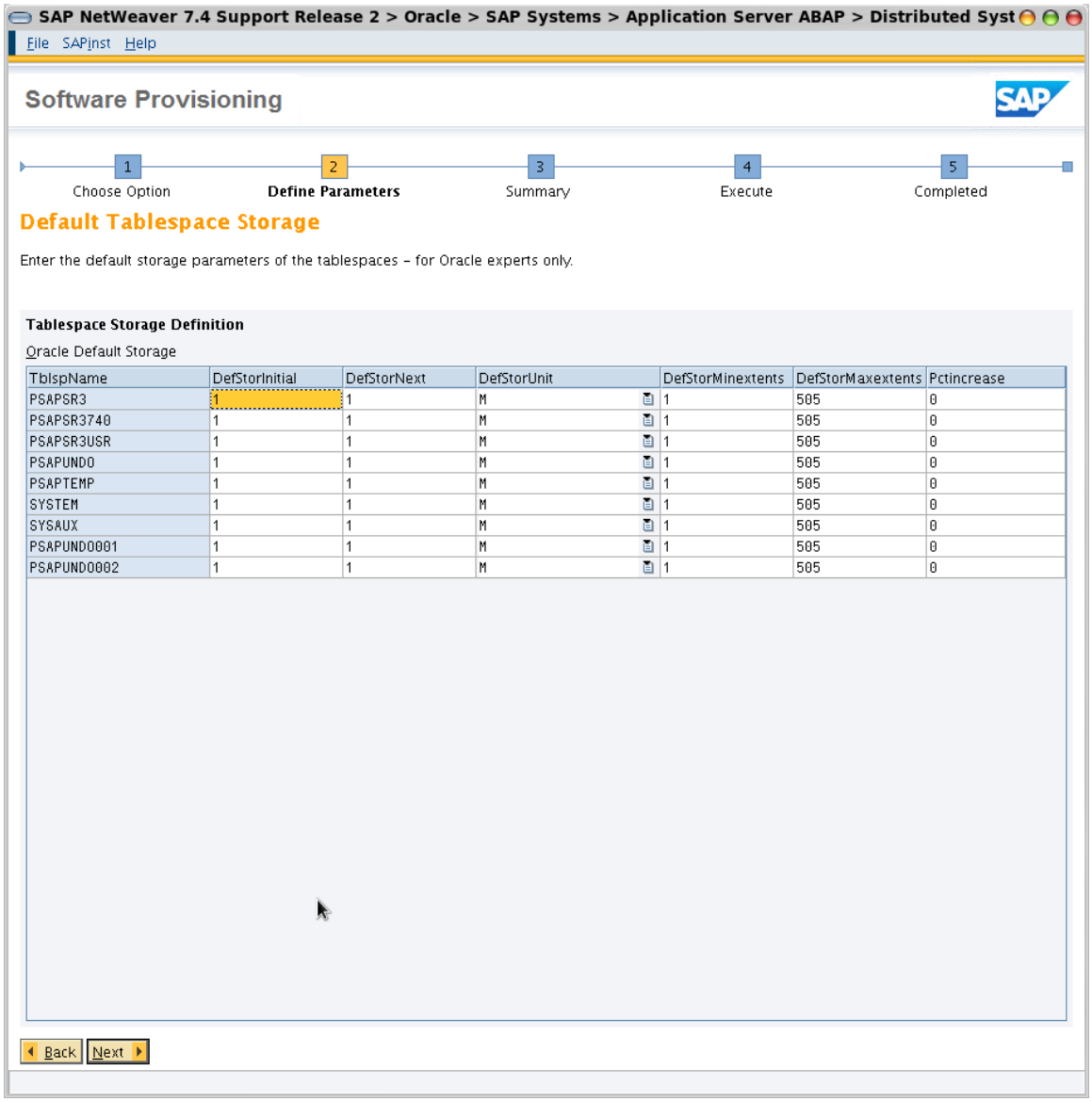

SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Syst
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Oracle Database Instance
Enter the database instance-specific information - for Oracle experts only.
Create Database Parameters
MaxLogFiles* 255
MaxLogMembers* 3
MaxLogHistory* 1000
DB Character Set UTF8
MaxInstances* 50
MaxDataFiles* 1000
MaxControlFileSize* 20
Reuse Control Files
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 +DATAC1
Number of Redo Log Groups 4
Size of Redo Log Files [MB] 4096
Reuse Redo Log Files
Mirror Redo Log Files
Path to Mirror Redo Log Files
ASM directory for 2. member of RedoLogs +RECOC1
Back
Next

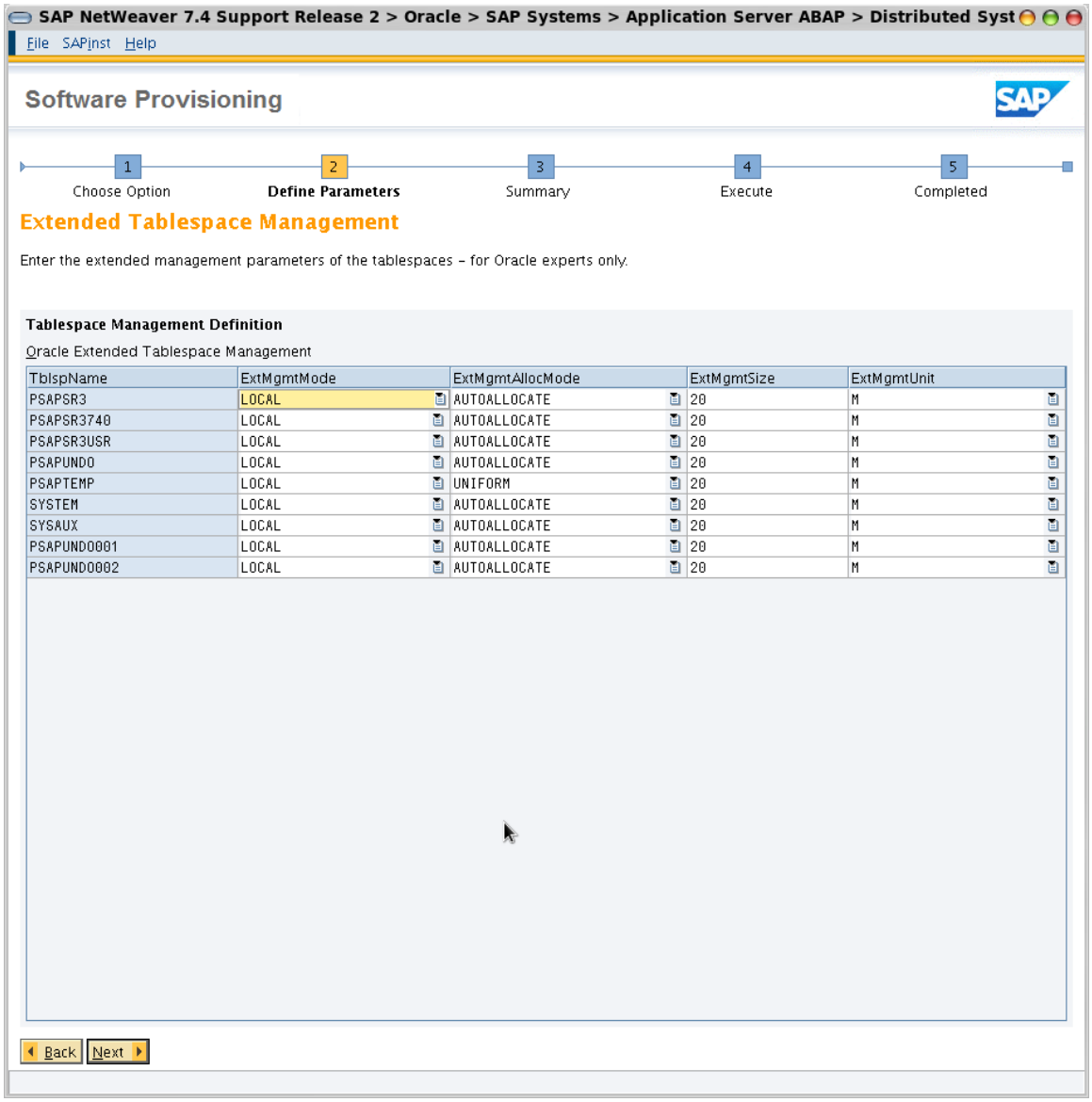

SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Syst
File SAPinst Help
Software Provisioning
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Oracle Control Files
Enter the control file location – for Oracle experts only.
Tablespace Definition
Oracle Control Files
Database ID (DBSID) *
Control File Directory
Control File Name
E12
+DATAC1
/E12/cntrlE12.dbf
E12
+RECOC1
/E12/cntrlE12.dbf
Add
Remove
Back
Next

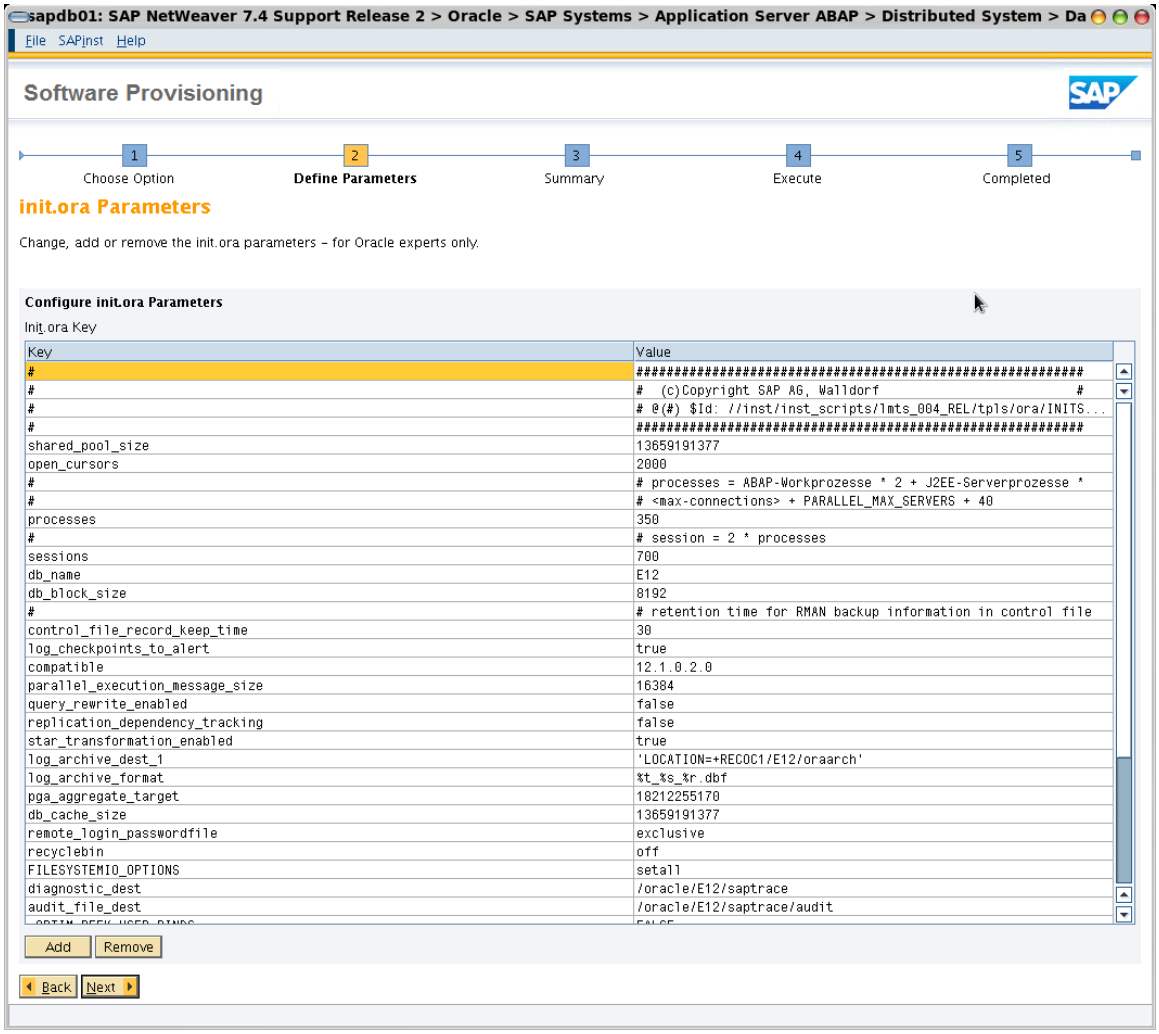

SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Syst
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Oracle Tablespaces
Enter the general tablespace parameters – for Oracle experts only.
Tablespace Definition
Oracle Tablespaces
Tablespace | Size [MB] | Sapdata Directory
PSAPSR3 | 2000 | SAPDATA2
PSAPSR3 | 2000 | SAPDATA2
PSAPSR3 | 2000 | SAPDATA2
PSAPSR3 | 2000 | SAPDATA2
PSAPSR3 | 2000 | SAPDATA2
PSAPSR3 | 1540 | SAPDATA2
PSAPSR3740 | 2000 | SAPDATA3
PSAPSR3740 | 2000 | SAPDATA3
PSAPSR3740 | 2000 | SAPDATA3
PSAPSR3740 | 2000 | SAPDATA3
PSAPSR3740 | 1010 | SAPDATA3
PSAPSR3USR | 20 | SAPDATA4
PSAPUNDO | 700 | SAPDATA1
PSAPTEMP | 350 | SAPDATA1
SYSTEM | 350 | SAPDATA1
SYSAUX | 200 | SAPDATA1
PSAPUNDO001 | 700 | SAPDATA1
PSAPUNDO002 | 700 | SAPDATA1
Add
Remove
Back
Next

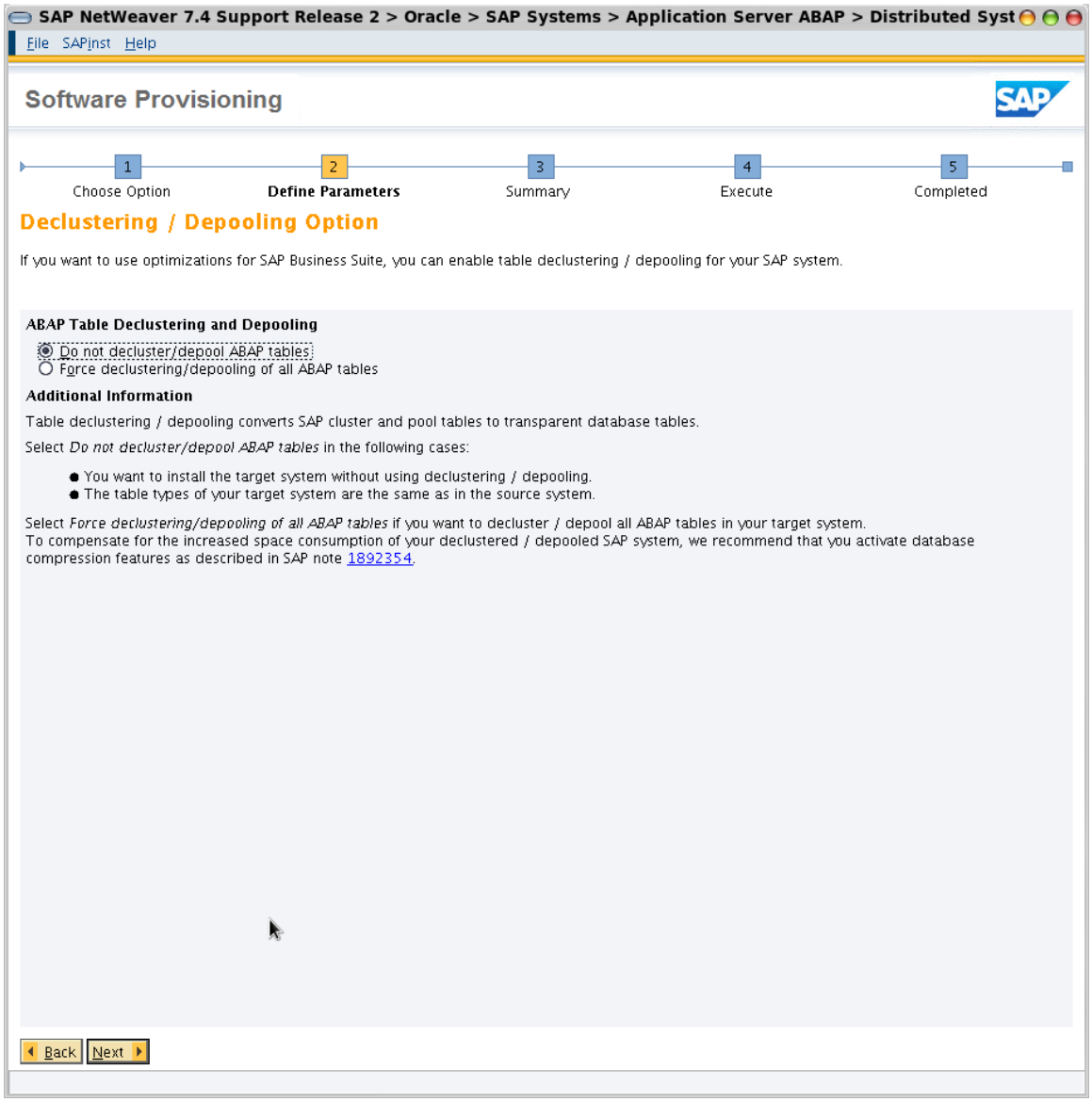

SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Syst
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Tablespace Extensions
Enter the autoextent configuration of the tablespaces – for Oracle 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
PSAPSR3USR | ON | 20 | 10000 | M
PSAPUNDO | ON | 20 | 10000 | M
PSAPTEMP | ON | 20 | 10000 | M
SYSTEM | ON | 20 | 10000 | M
SYSAUX | ON | 20 | 10000 | M
PSAPUNDO001 | ON | 20 | 32700 | M
PSAPUNDO002 | ON | 20 | 32700 | M
Back
Next

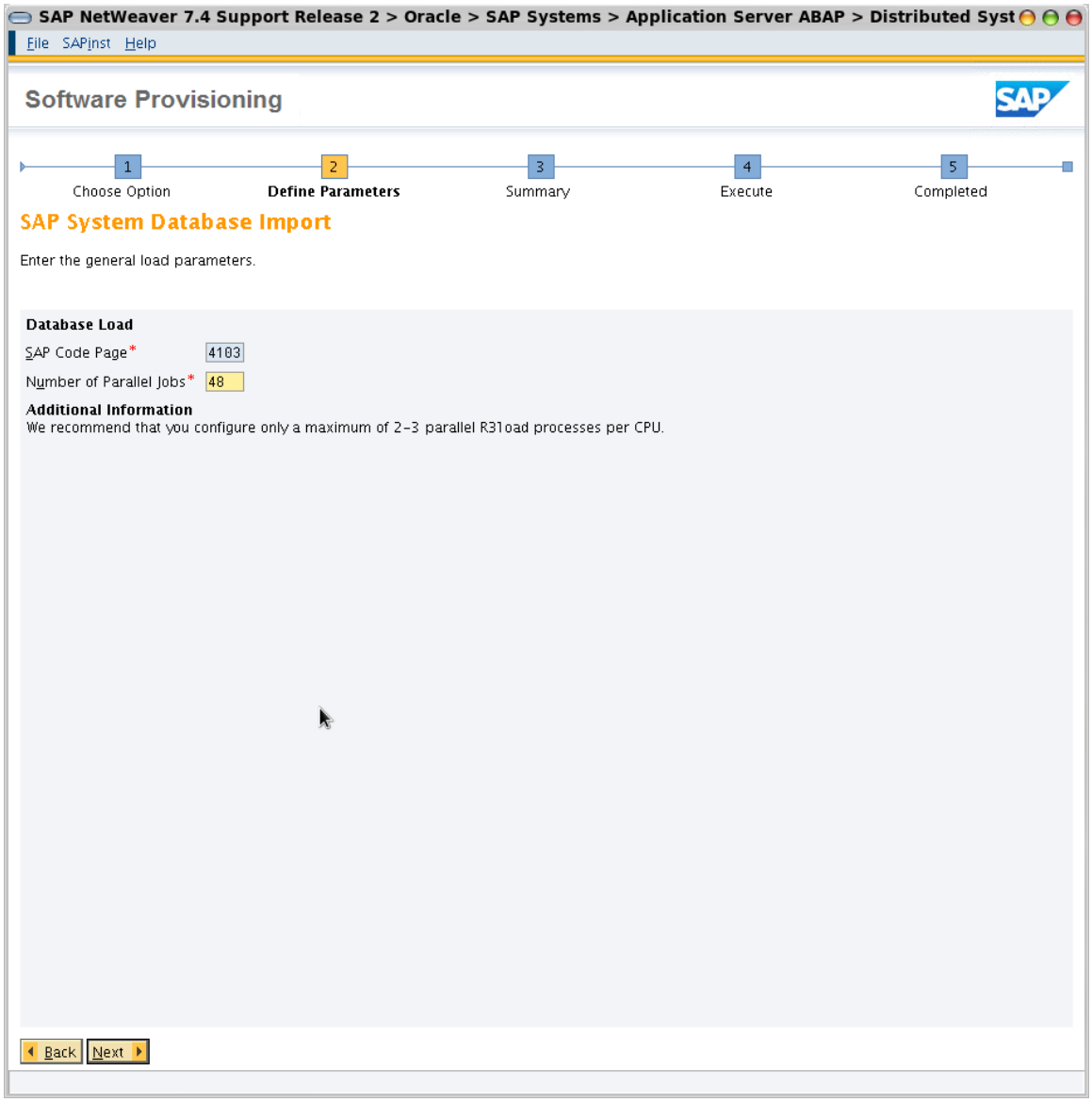

SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Syst
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
General Tablespace Storage
Enter the general storage parameters of the tablespaces – 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

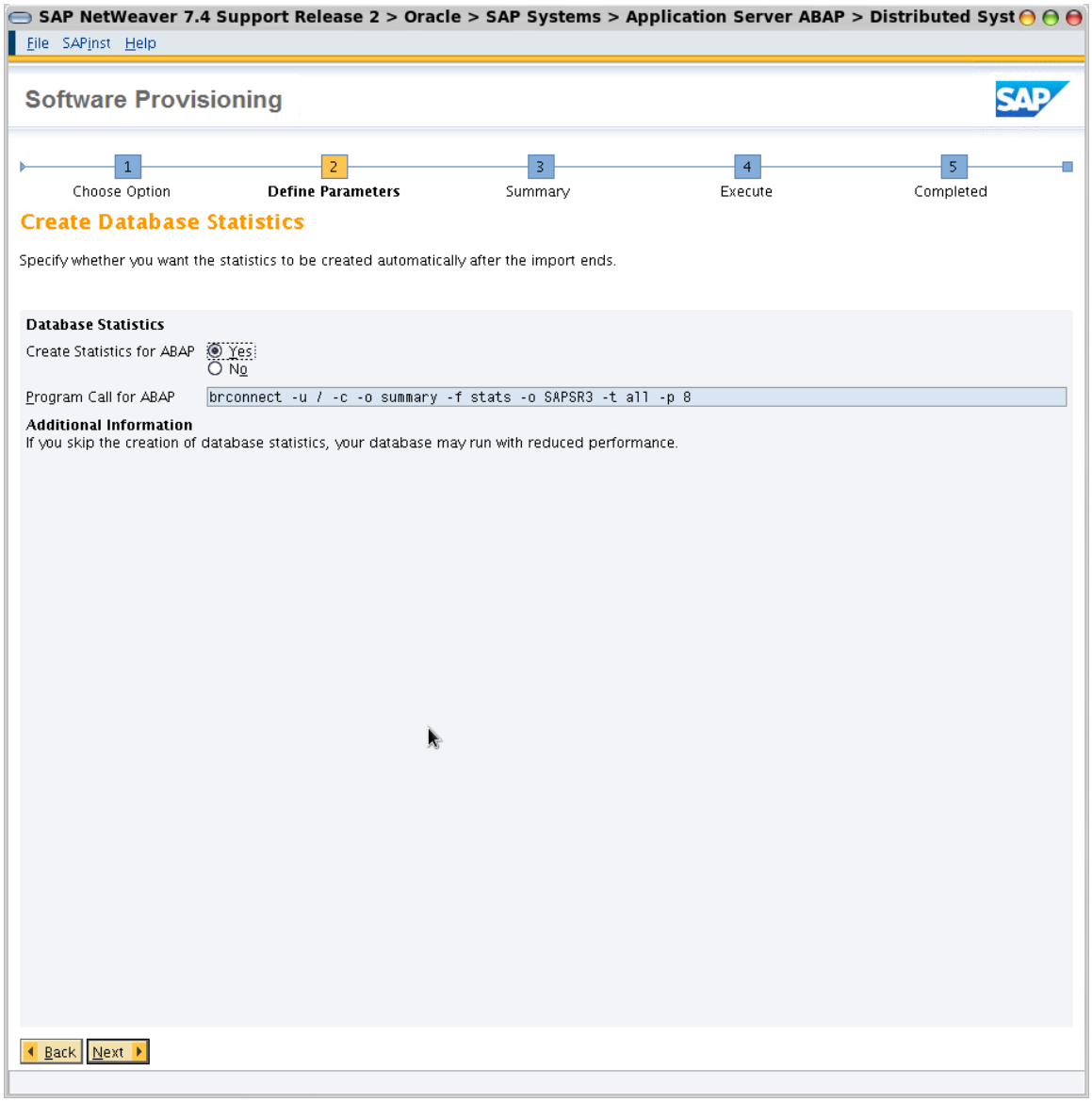

SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Syst
File SAPinst Help
Software Provisioning
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Default Tablespace Storage
Enter the default storage parameters of the tablespaces – for 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
PSAPUNDO 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
PSAPUNDO001 1 1 M 1 505 0
PSAPUNDO002 1 1 M 1 505 0
Back
Next

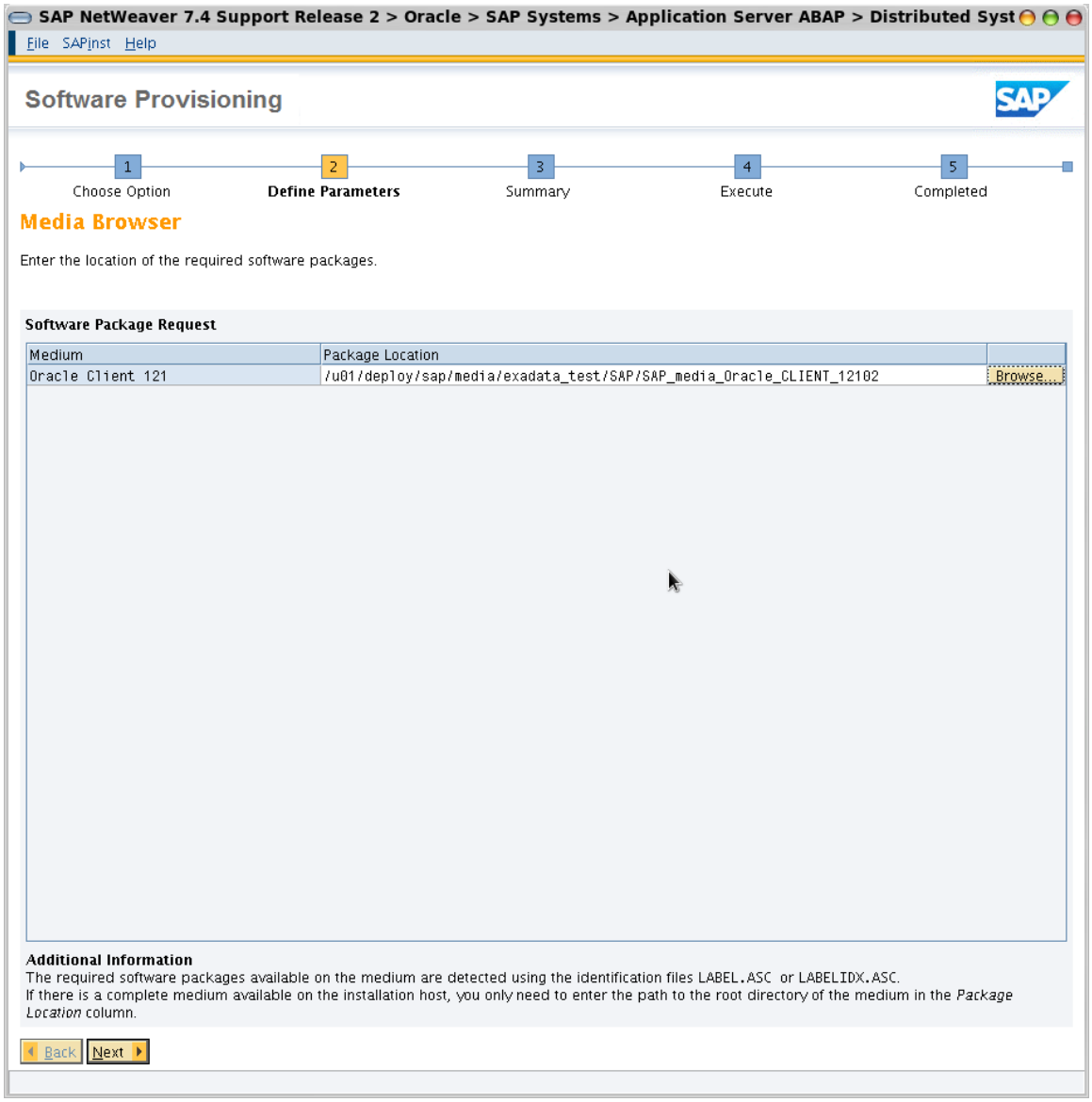

SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Syst
File SAPinst Help
Software Provisioning
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Extended Tablespace Management
Enter the extended management parameters of the tablespaces – 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

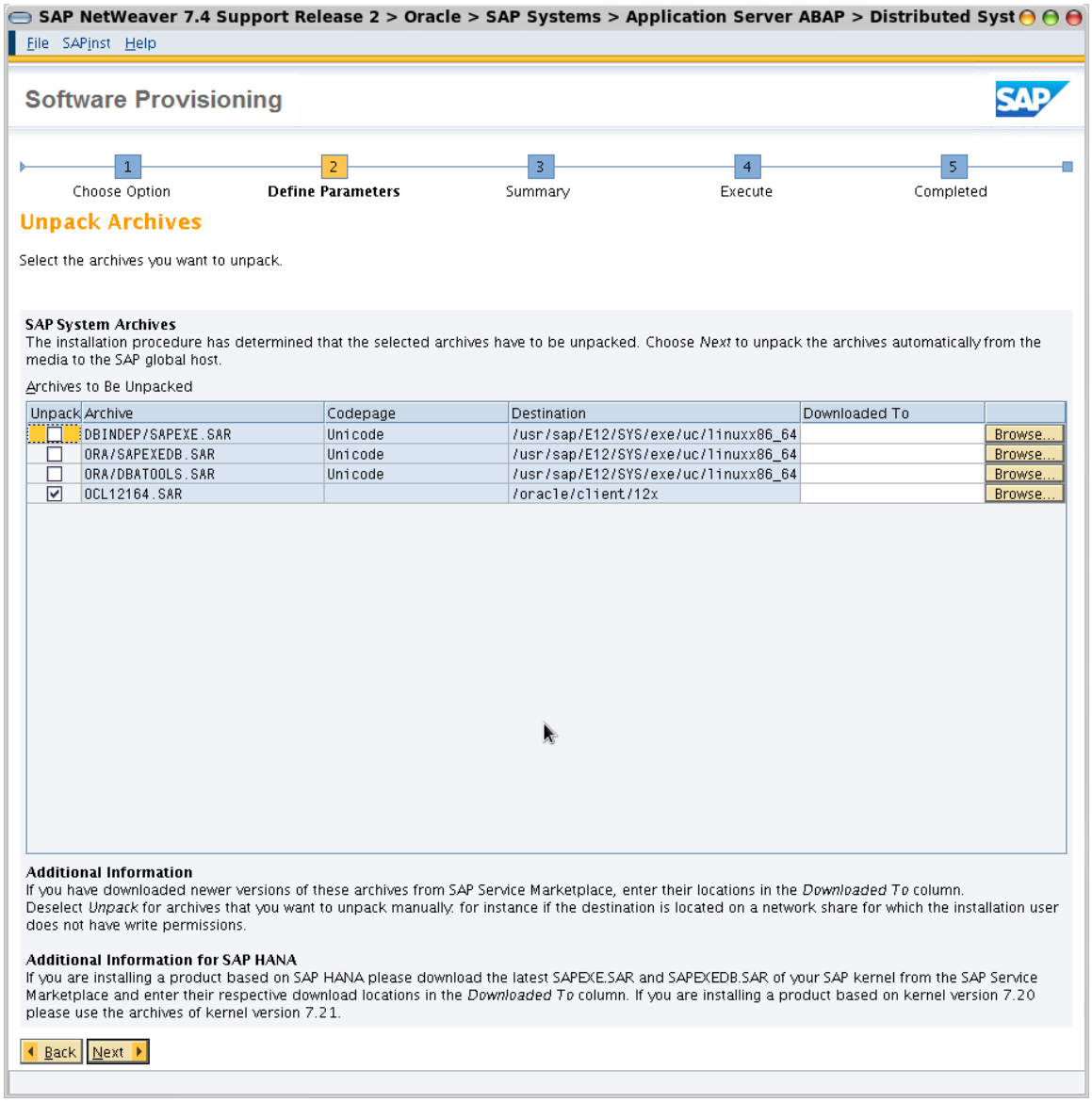

sapdb01: SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed System > Da
File SAPinst Help
Software Provisioning
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
init.ora Parameters
Change, add or remove the init.ora parameters – for Oracle experts only.
Configure init.ora Parameters
Init.ora Key
Key
Value
##
(c)Copyright SAP AG, Walldorf
@(#) $Id: //inst/inst_scripts/lmts_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=+RECOC1/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
Add
Remove
Back
Next

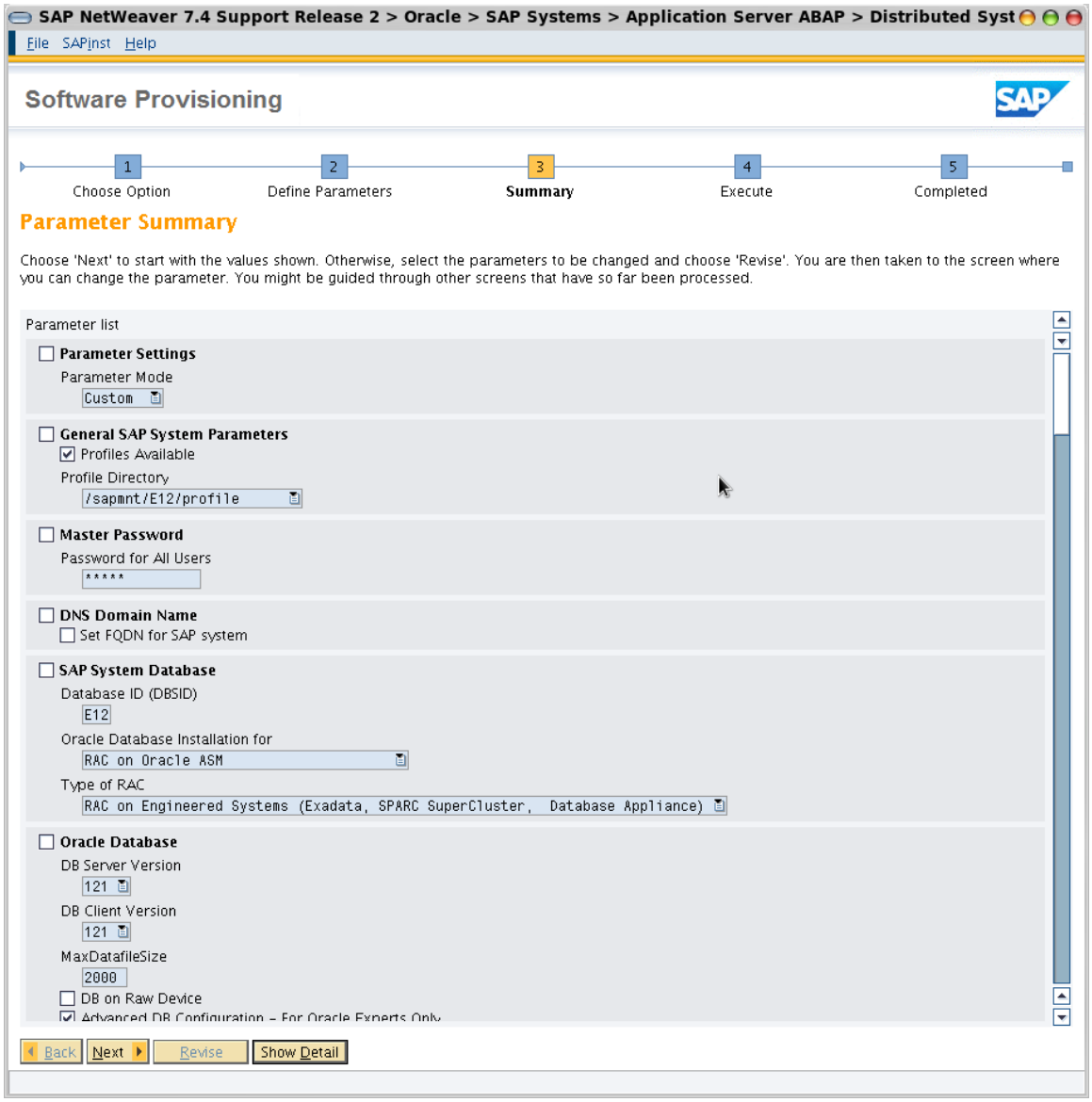

SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Syst
File SAPinst Help
Software Provisioning
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Declustering / Depooling Option
If you want to use optimizations for SAP Business Suite, 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

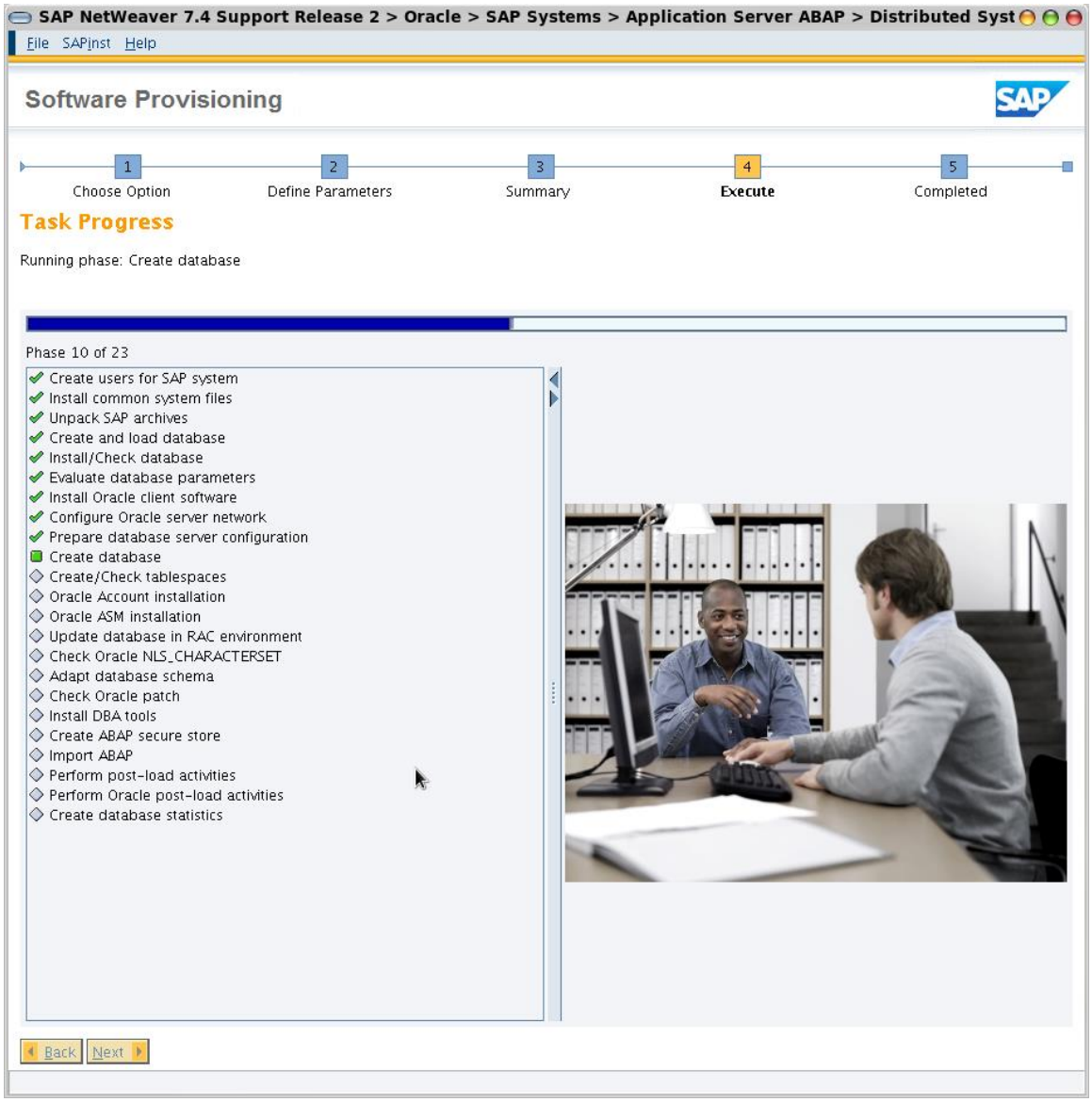

SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Syst
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
SAP System Database Import
Enter the general load parameters.
Database Load
SAP Code Page* 4103
Number of Parallel Jobs* 48
Additional Information
We recommend that you configure only a maximum of 2-3 parallel R3load processes per CPU.
Back
Next

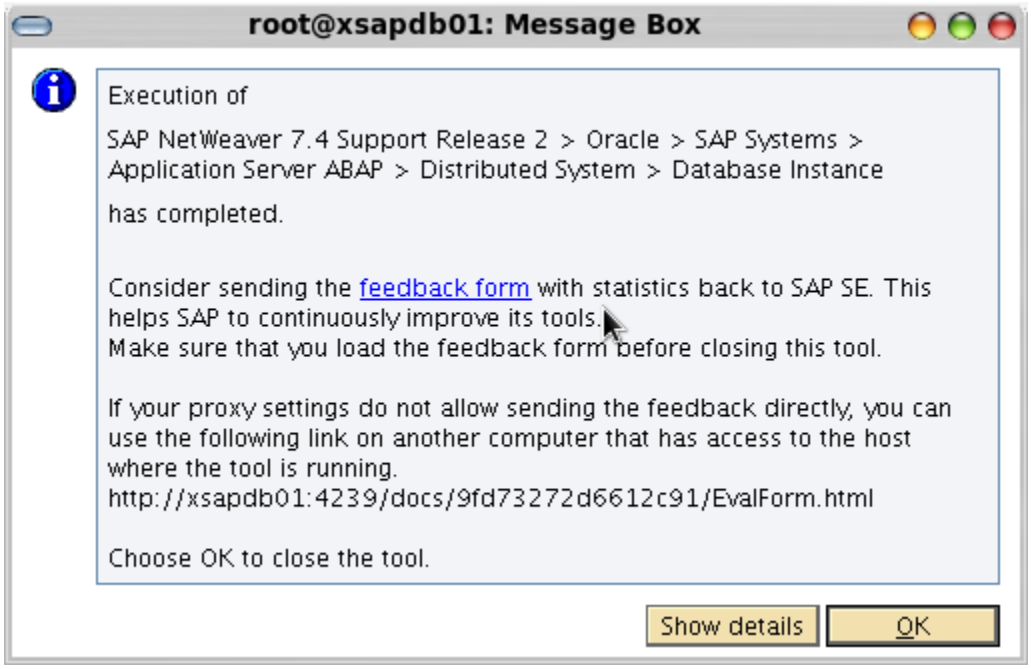

SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Syst
File SAPinst Help
Software Provisioning
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Create Database Statistics
Specify whether you want the statistics to be created automatically after the import ends.
Database Statistics
Create Statistics for ABAP
Yes
No
Program Call for ABAP
brconnect -u / -c -o summary -f stats -o SAPSR3 -t all -p 8
Additional Information
If you skip the creation of database statistics, your database may run with reduced performance.
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
Media Browser
Enter the location of the required software packages.
Software Package Request
Medium
Package Location
Oracle Client 121
/u01/deploy/sap/media/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 Syst
File SAPinst Help
Software Provisioning
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
DBINDEP/SAPEXE.SAR Unicode /usr/sap/E12/SYS/exe/uc/linuxx86_64 Browse...
ORA/SAPEXEDB.SAR Unicode /usr/sap/E12/SYS/exe/uc/linuxx86_64 Browse...
ORA/DBATOOLS.SAR Unicode /usr/sap/E12/SYS/exe/uc/linuxx86_64 Browse...
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 Syst
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
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
Back
Next
Revise
Show Detail


SAP NetWeaver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Syst
File SAPinst Help
Software Provisioning
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

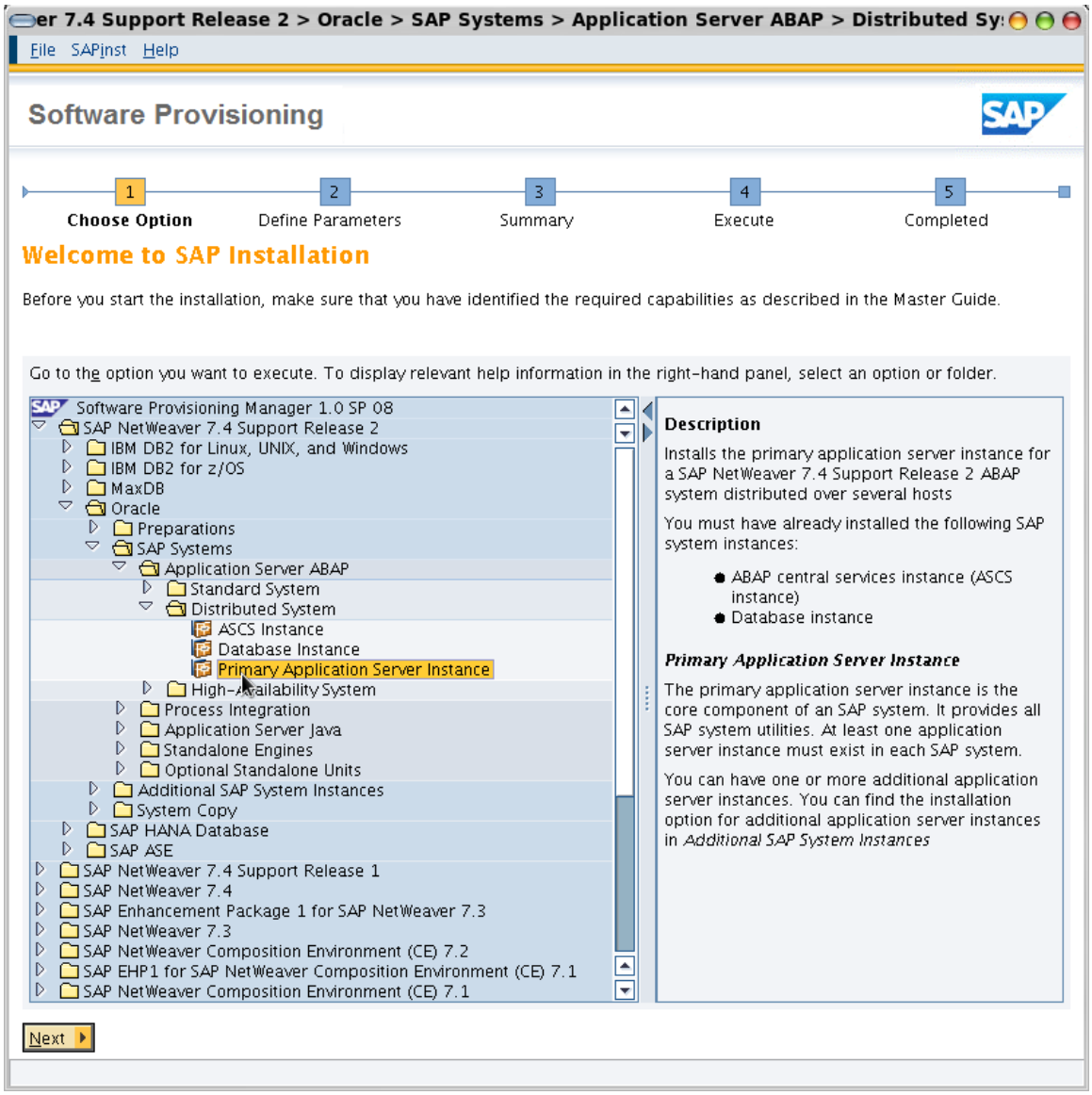


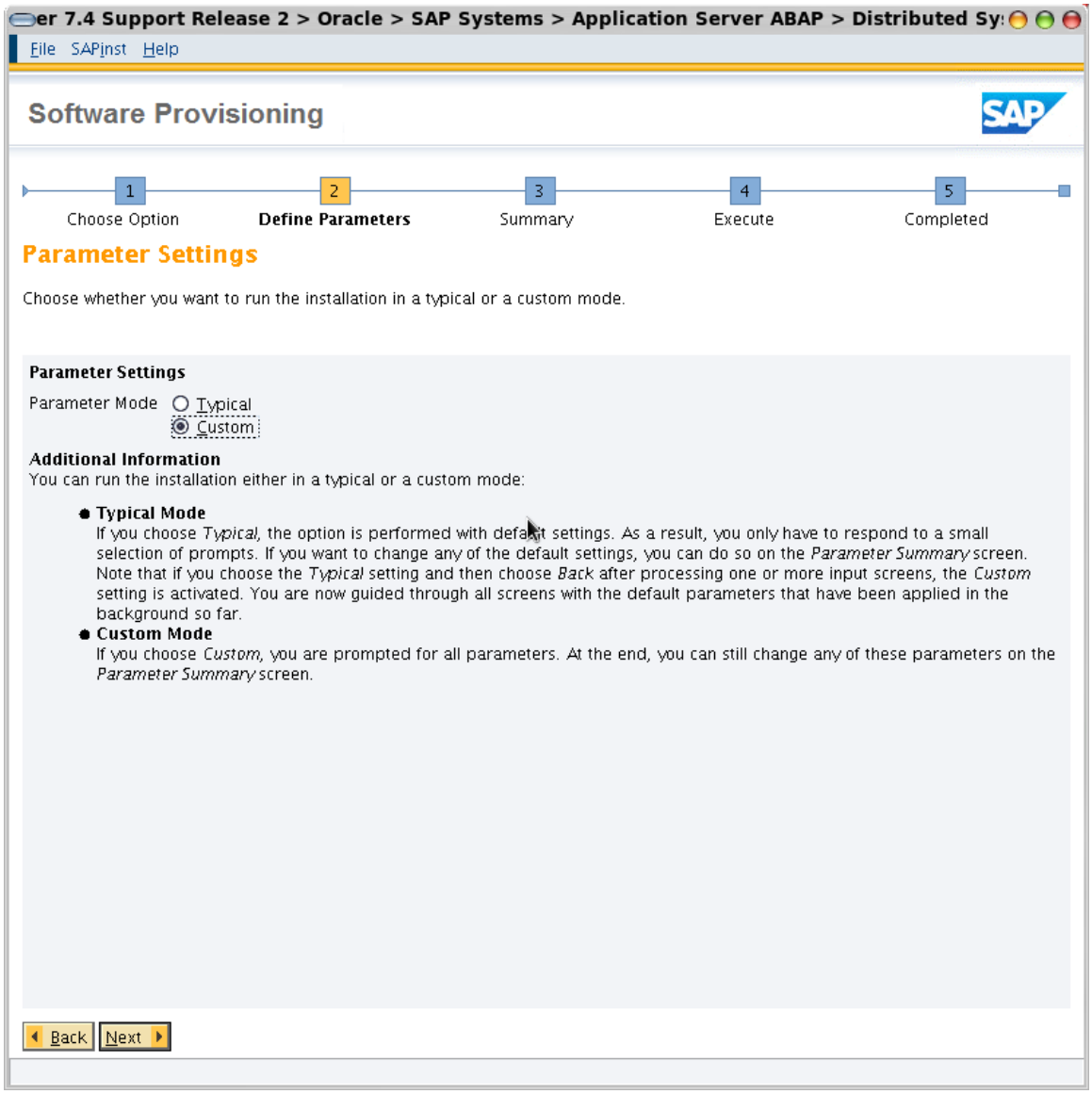
After that step you can see both Oracle database instances on the Exadata compute nodes controlled by the CRS:

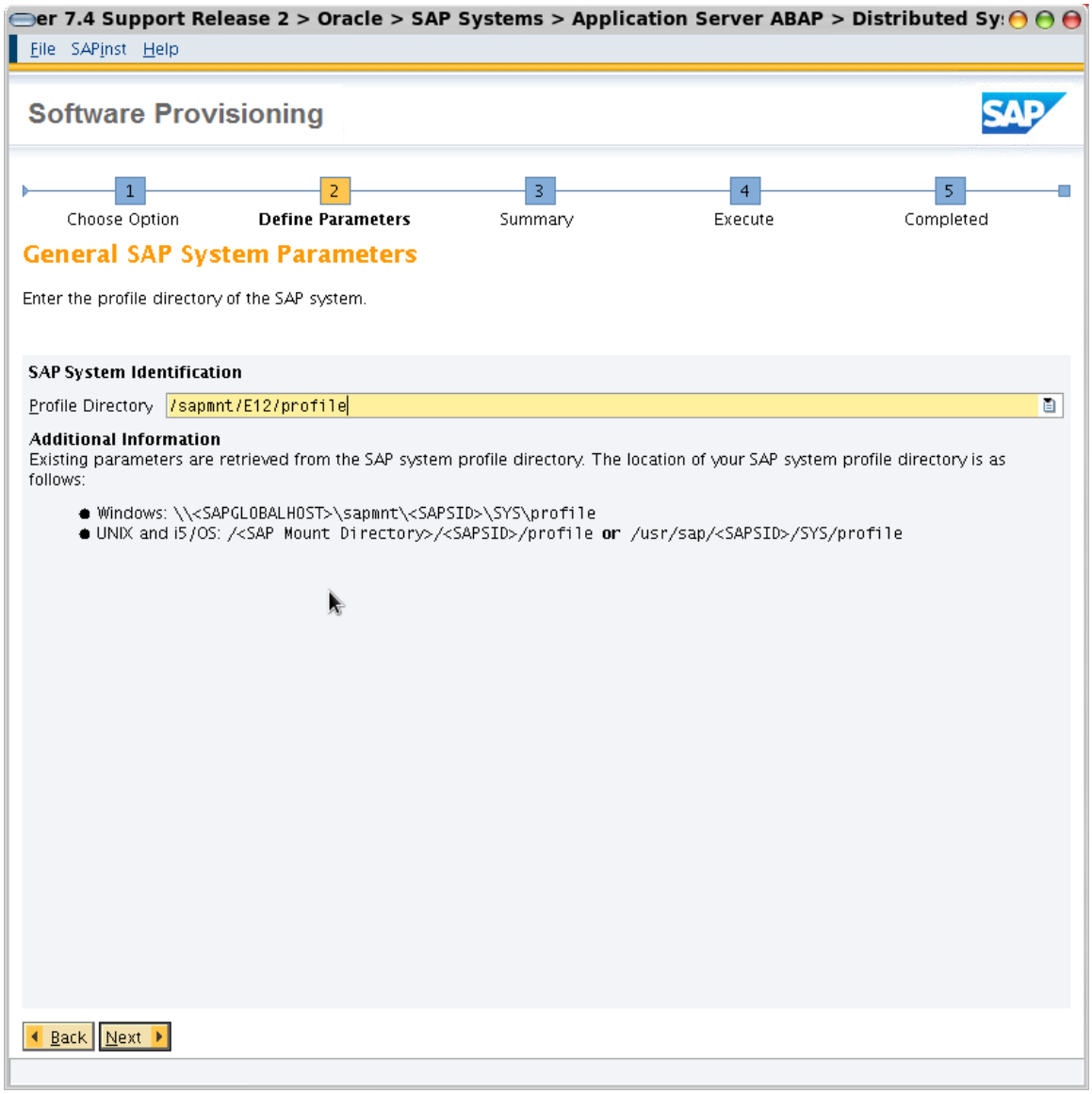
```
[oracle@xsapdb01 bin]$ ./crsctl stat res ora.e12.db -t
--------------------------------------------------------------------------------
Name           Target  State        Server                   State details
--------------------------------------------------------------------------------
Cluster Resources
--------------------------------------------------------------------------------
ora.e12.db
      1        ONLINE  ONLINE       xsapdb01                 Open,STABLE
      2        ONLINE  ONLINE       xsapdb02                 Open,STABLE
--------------------------------------------------------------------------------
[oracle@xsapdb01 bin]$
```

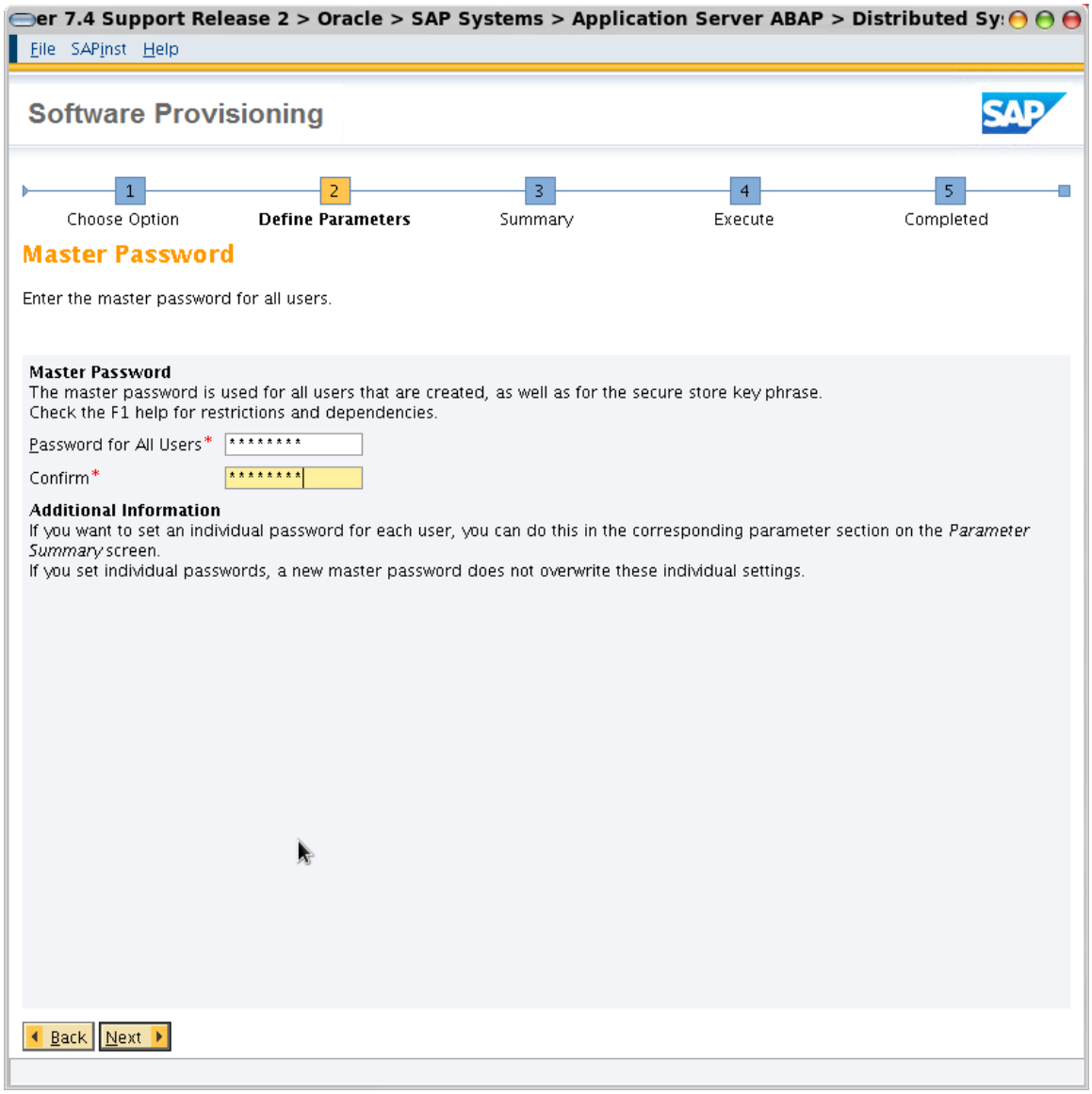
Installation of SAP Primary Application for SAP with SAP SWPM

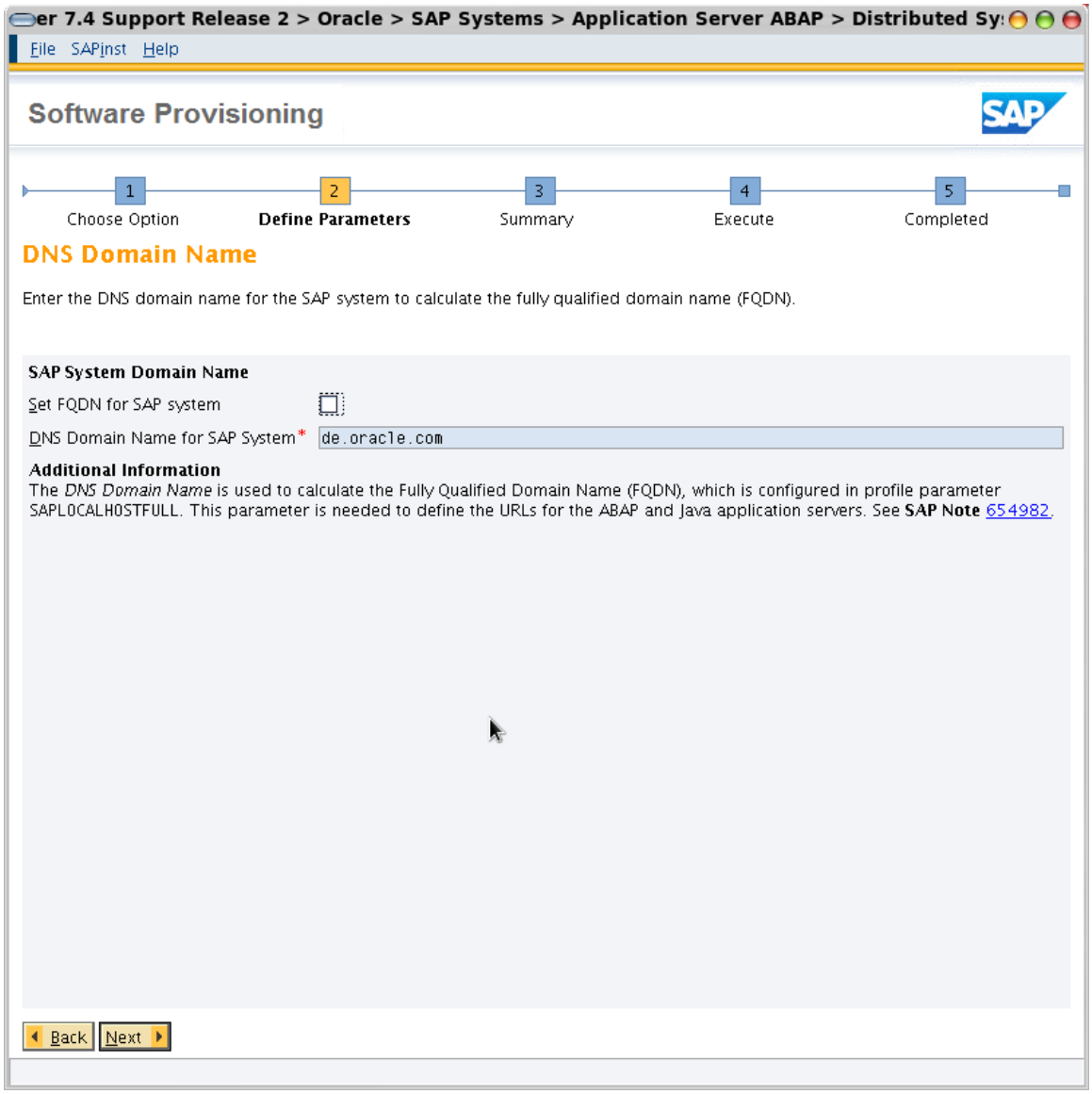
The following screens show the installation of a SAP Primary Application Server with SAP SWPM to use an Oracle 12c database running on an Oracle Exadata database machine.

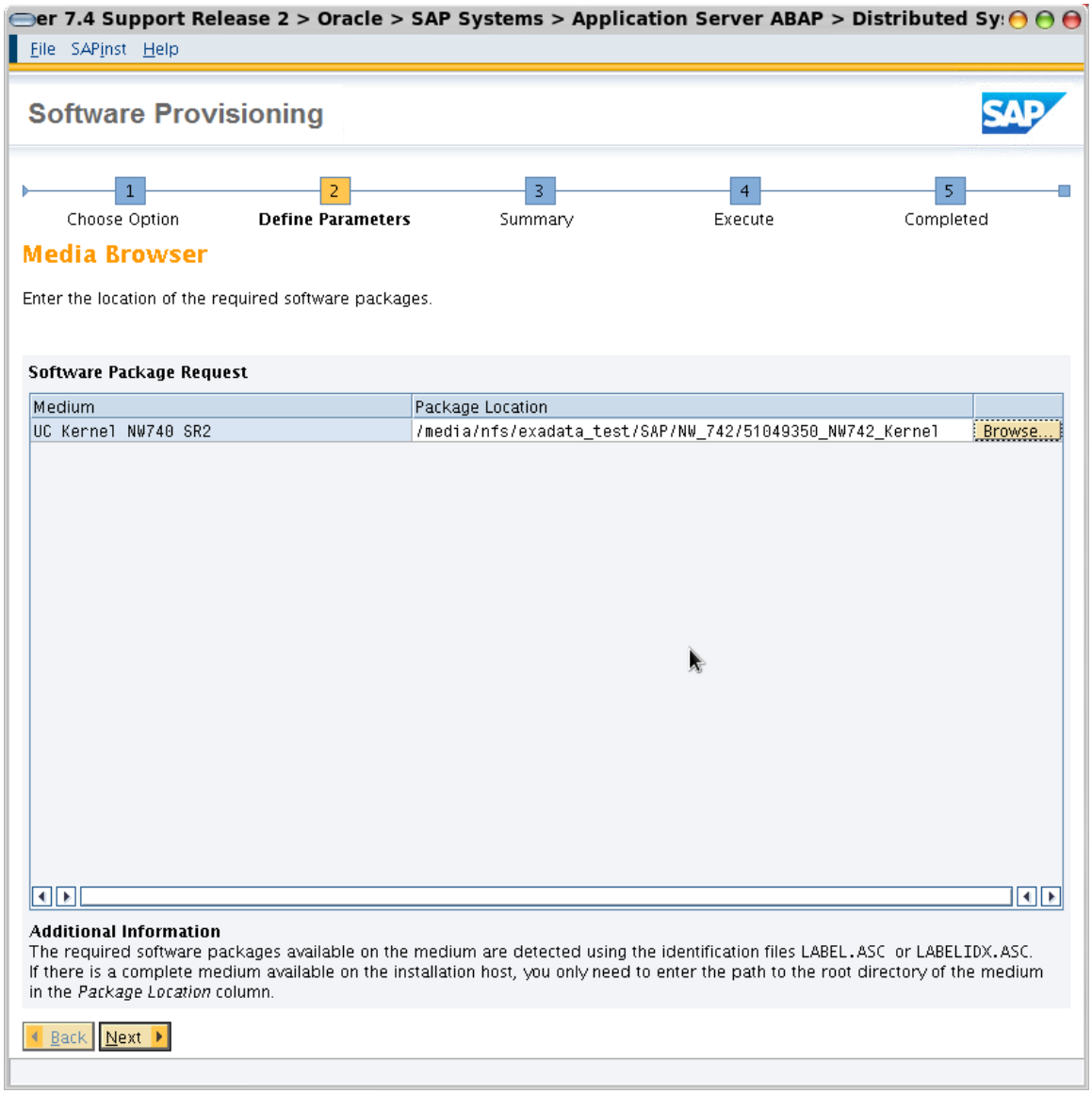


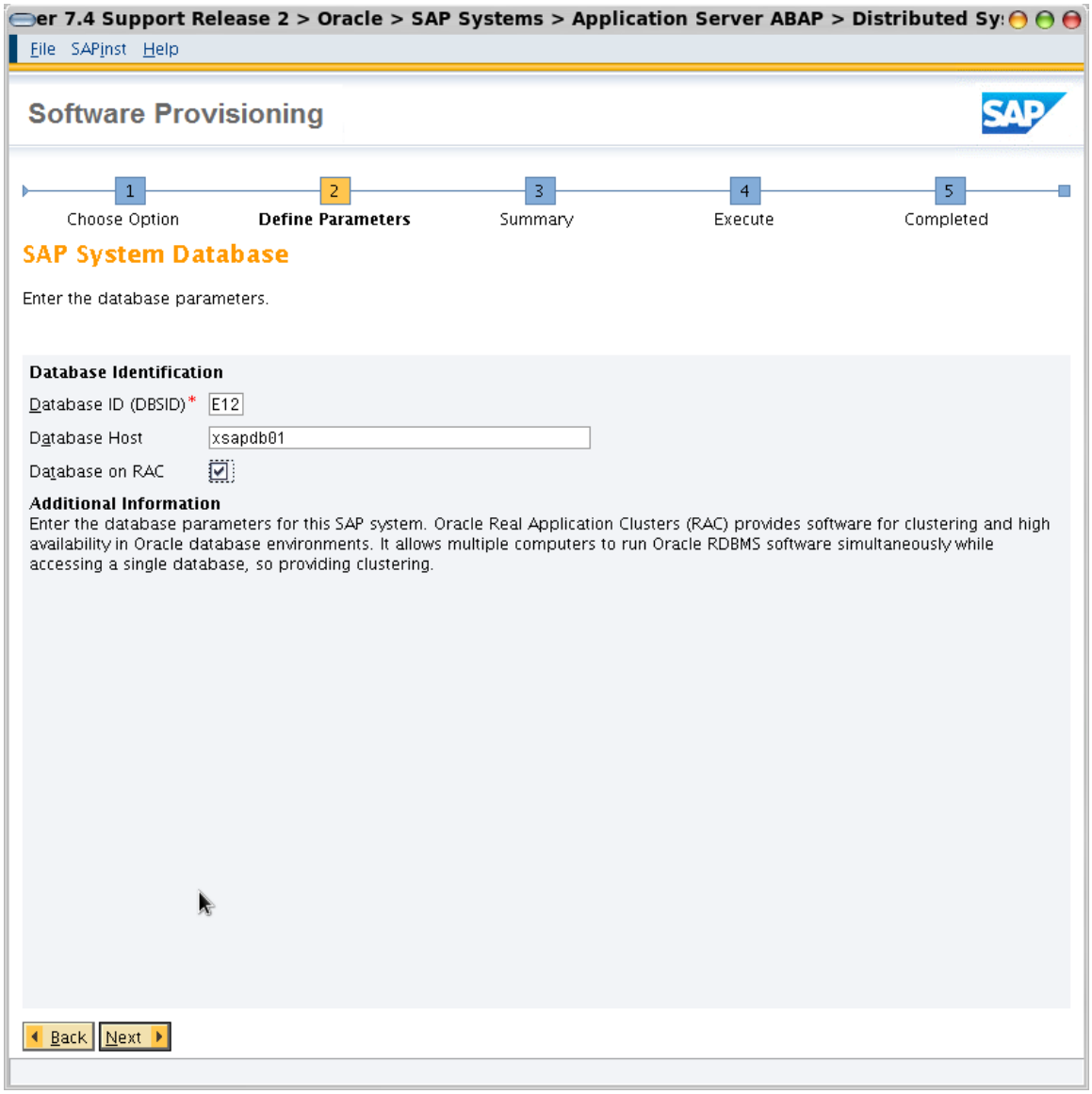

er 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sy
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Parameter Settings
Choose whether you want to run the installation in a typical or a custom mode.
Parameter Settings
Parameter Mode Typical Custom
Additional Information
You can run the installation either in a typical or a custom mode:
Typical Mode
If you choose Typical, the option is performed with default settings. As a result, you only have to respond to a small selection of prompts. If you want to change any of the default settings, you can do so on the Parameter Summary screen. Note that if you choose the Typical setting and then choose Back after processing one or more input screens, the Custom setting is activated. You are now guided through all screens with the default parameters that have been applied in the background so far.
Custom Mode
If you choose Custom, you are prompted for all parameters. At the end, you can still change any of these parameters on the Parameter Summary screen.
Back
Next

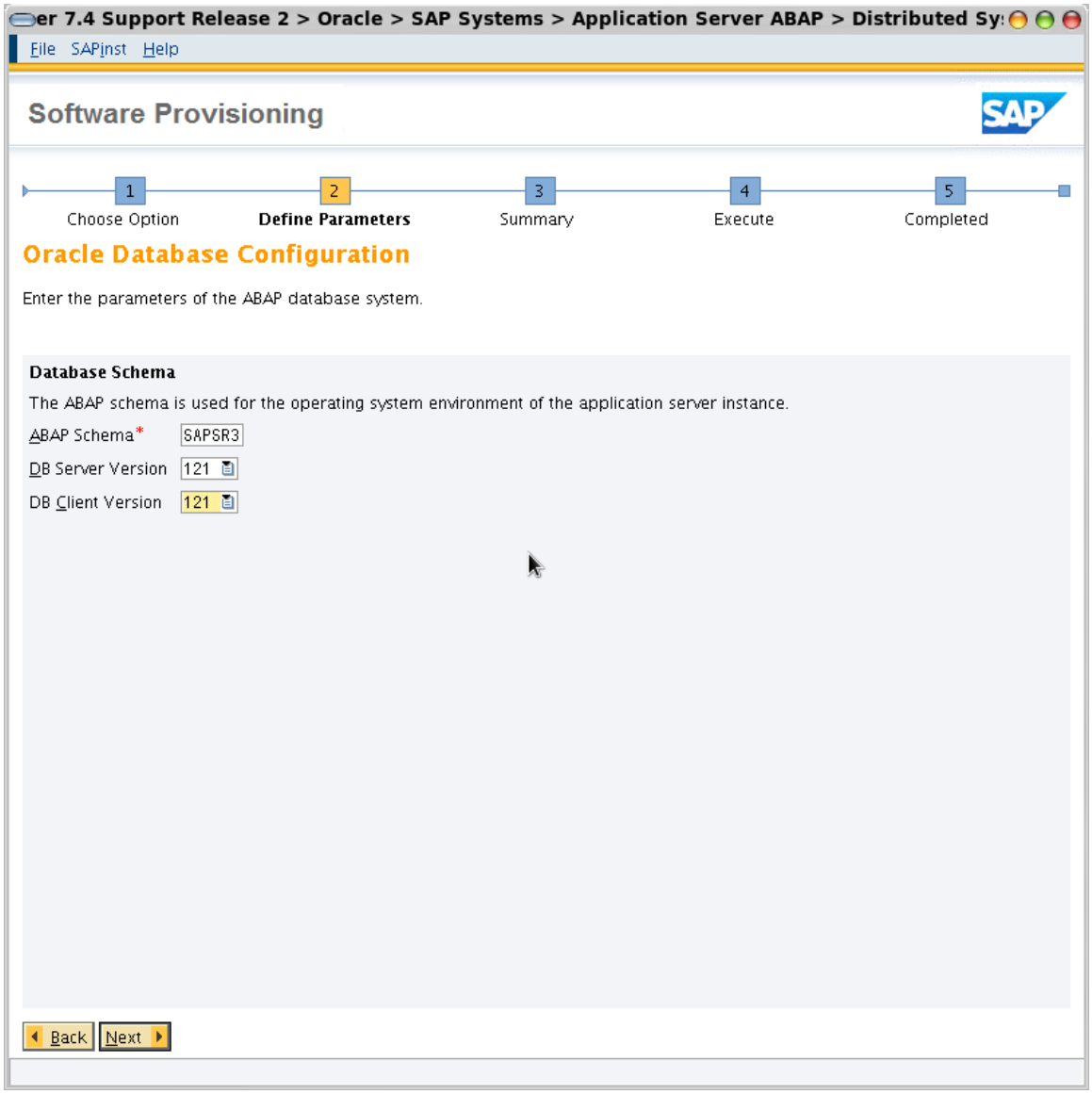

er 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sy
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
General SAP System Parameters
Enter the profile directory of the SAP system.
SAP System Identification
Profile Directory /sapmnt/E12/profile
Additional Information
Existing parameters are retrieved from the SAP system profile directory. The location of your SAP system profile directory is as follows:
Windows: \\<SAPGLOBALHOST>\sapmnt\<SAPSID>\SYS\profile
UNIX and i5/OS: /<SAP Mount Directory>/<SAPSID>/profile or /usr/sap/<SAPSID>/SYS/profile
Back
Next

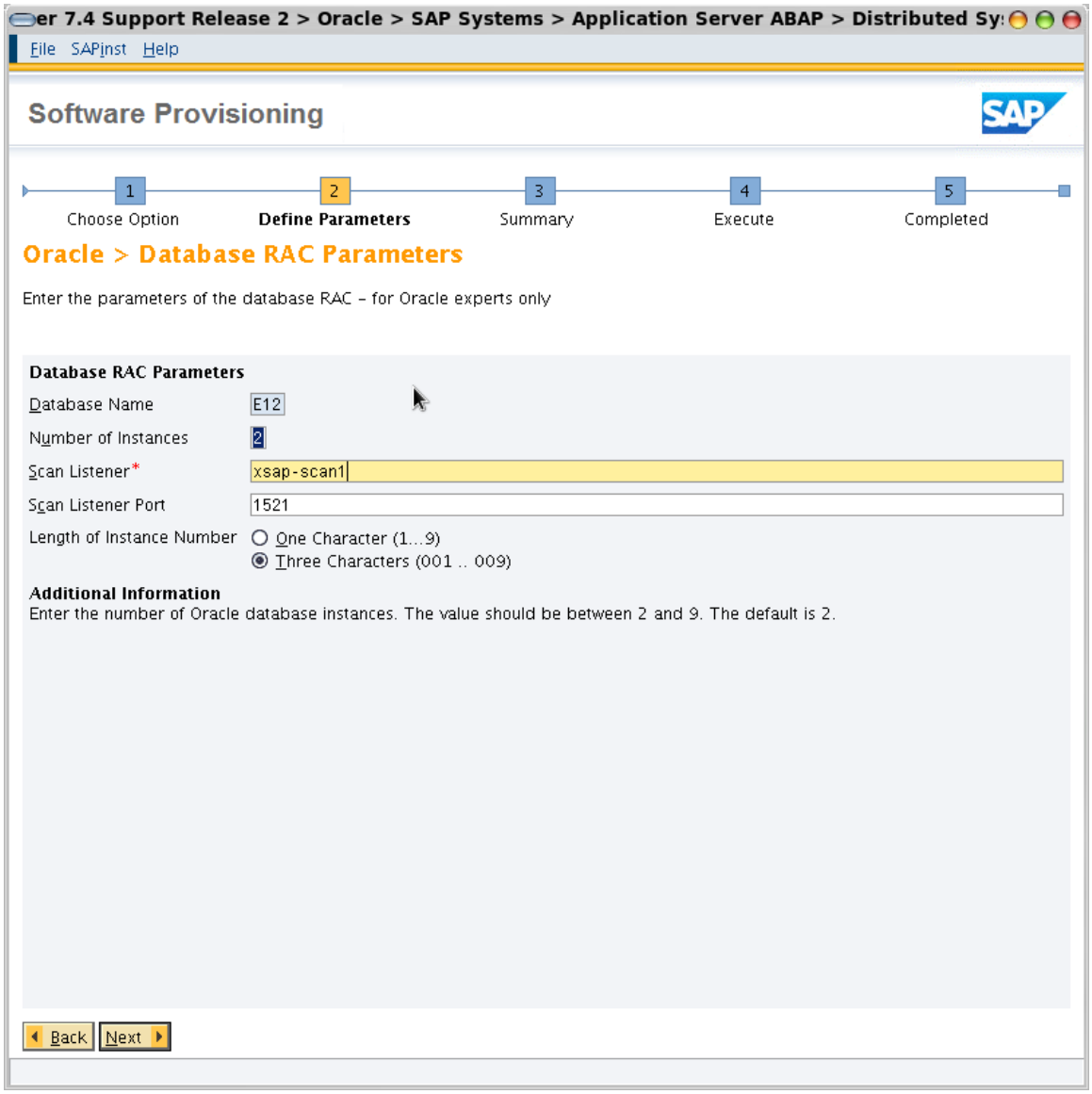

er 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sy
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Master Password
Enter the master password for all users.
Master Password
The master password is used 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

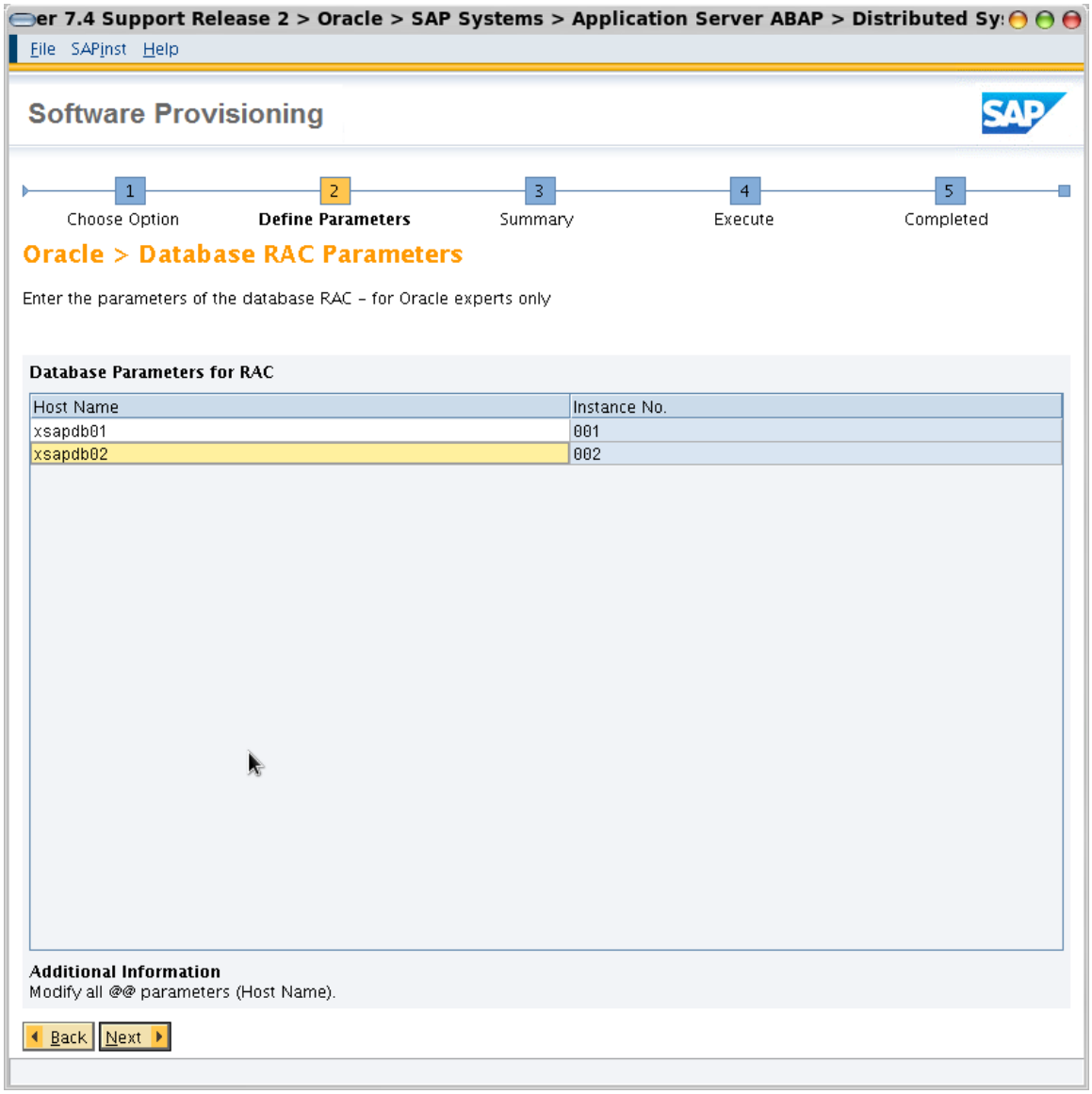

er 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sy
File SAPinst Help
Software Provisioning
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
DNS Domain Name
Enter the DNS domain name for the SAP system to calculate the fully qualified domain name (FQDN).
SAP System Domain Name
Set FQDN for SAP system
DNS Domain Name for SAP System*
de.oracle.com
Additional Information
The DNS Domain Name is used to calculate the Fully Qualified Domain Name (FQDN), which is configured in profile parameter SAPLOCALHOSTFULL. This parameter is needed to define the URLs for the ABAP and Java application servers. See SAP Note 654982.
Back
Next

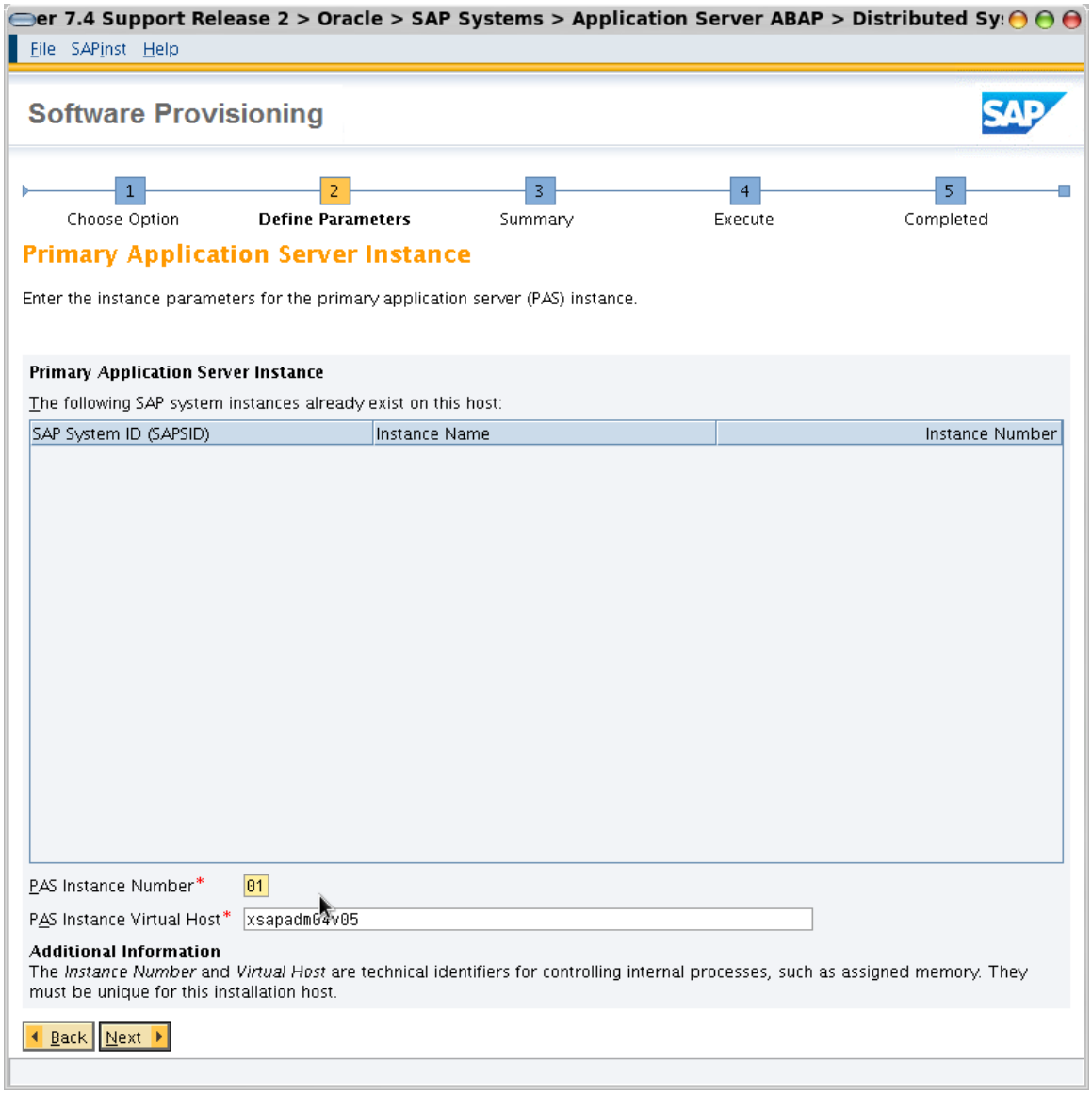

er 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sy
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Media Browser
Enter the location of the required software packages.
Software Package Request
Medium
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

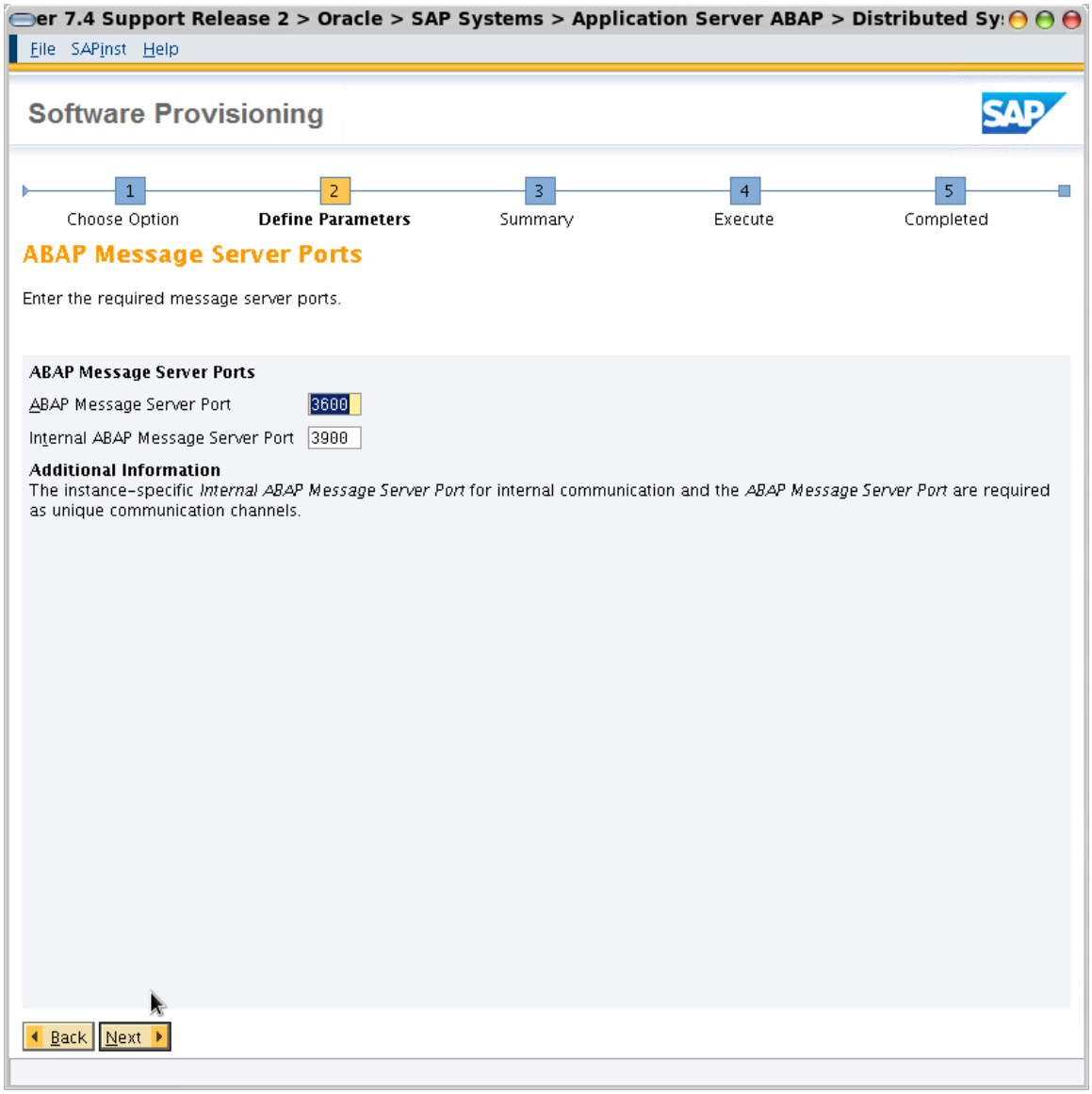

er 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sy
File SAPinst Help
Software Provisioning
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
SAP System Database
Enter the database parameters.
Database Identification
Database ID (DBSID)*
E12
Database 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

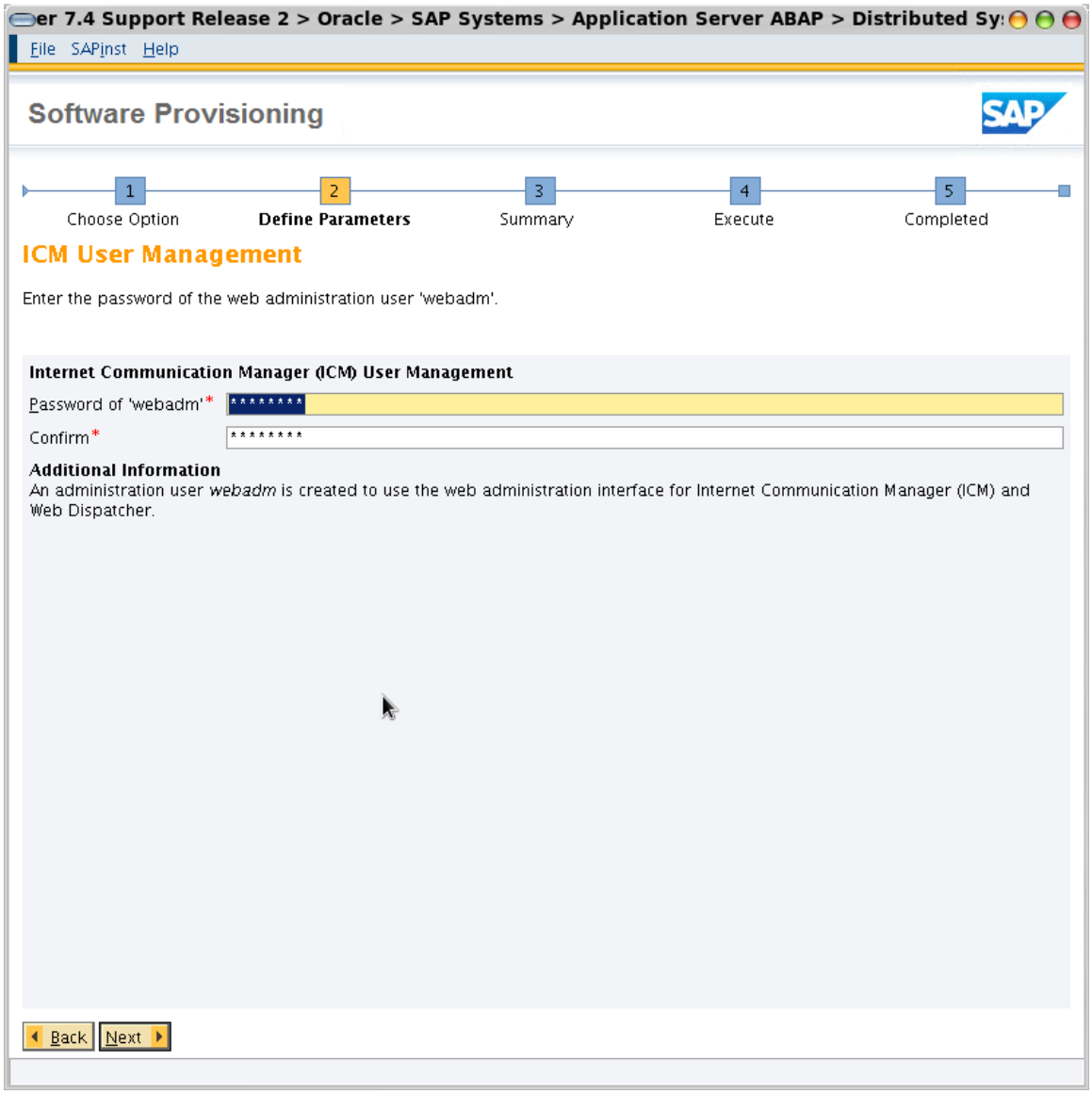

er 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sy
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Oracle Database Configuration
Enter the parameters of the ABAP database system.
Database Schema
The 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
Back
Next

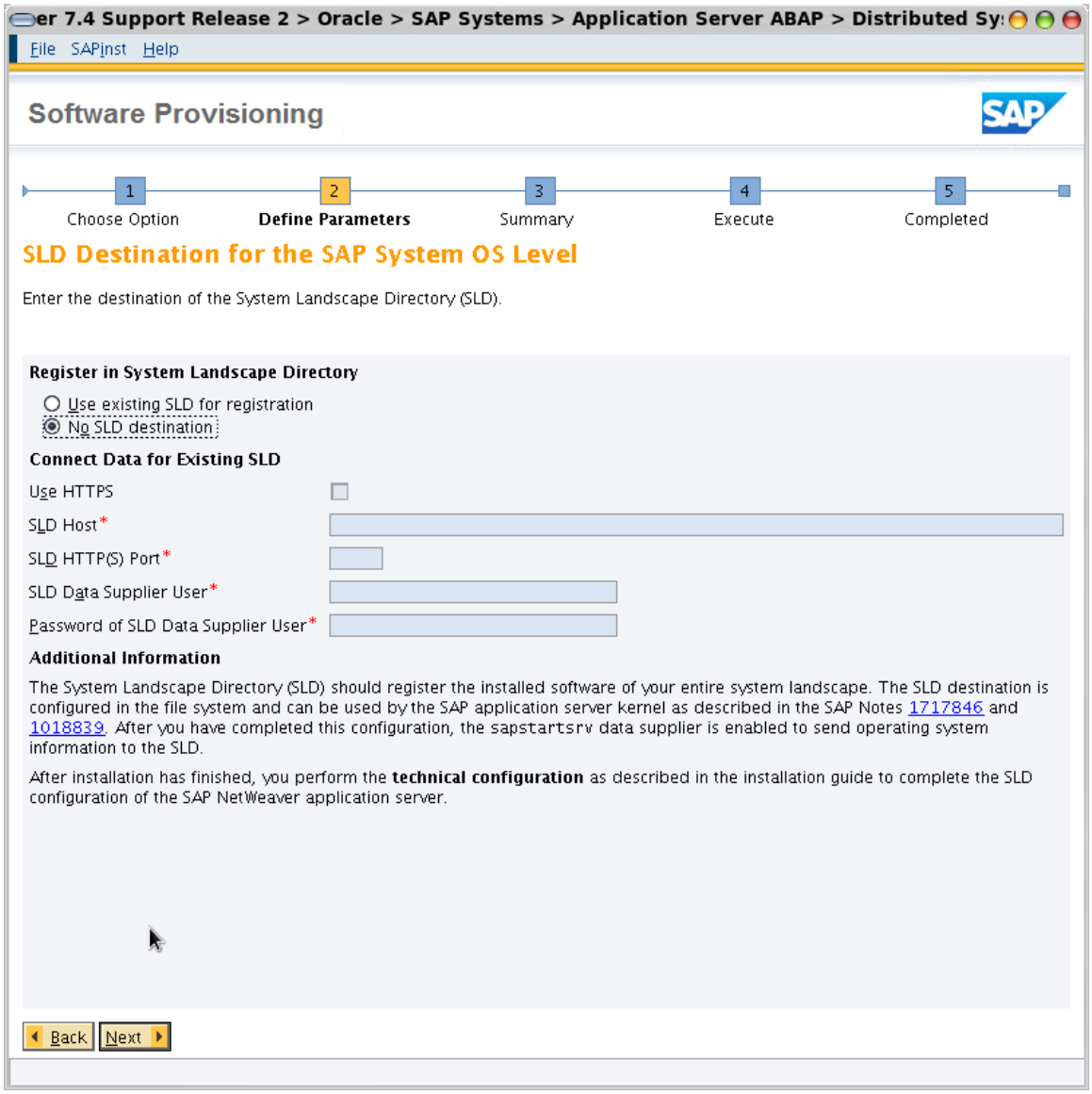

er 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sy
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Oracle > Database RAC Parameters
Enter the parameters of the database RAC – for Oracle experts only
Database RAC Parameters
Database Name E12
Number of Instances 2
Scan Listener* xsap-scan1
Scan Listener Port 1521
Length of Instance Number One Character (1...9)
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

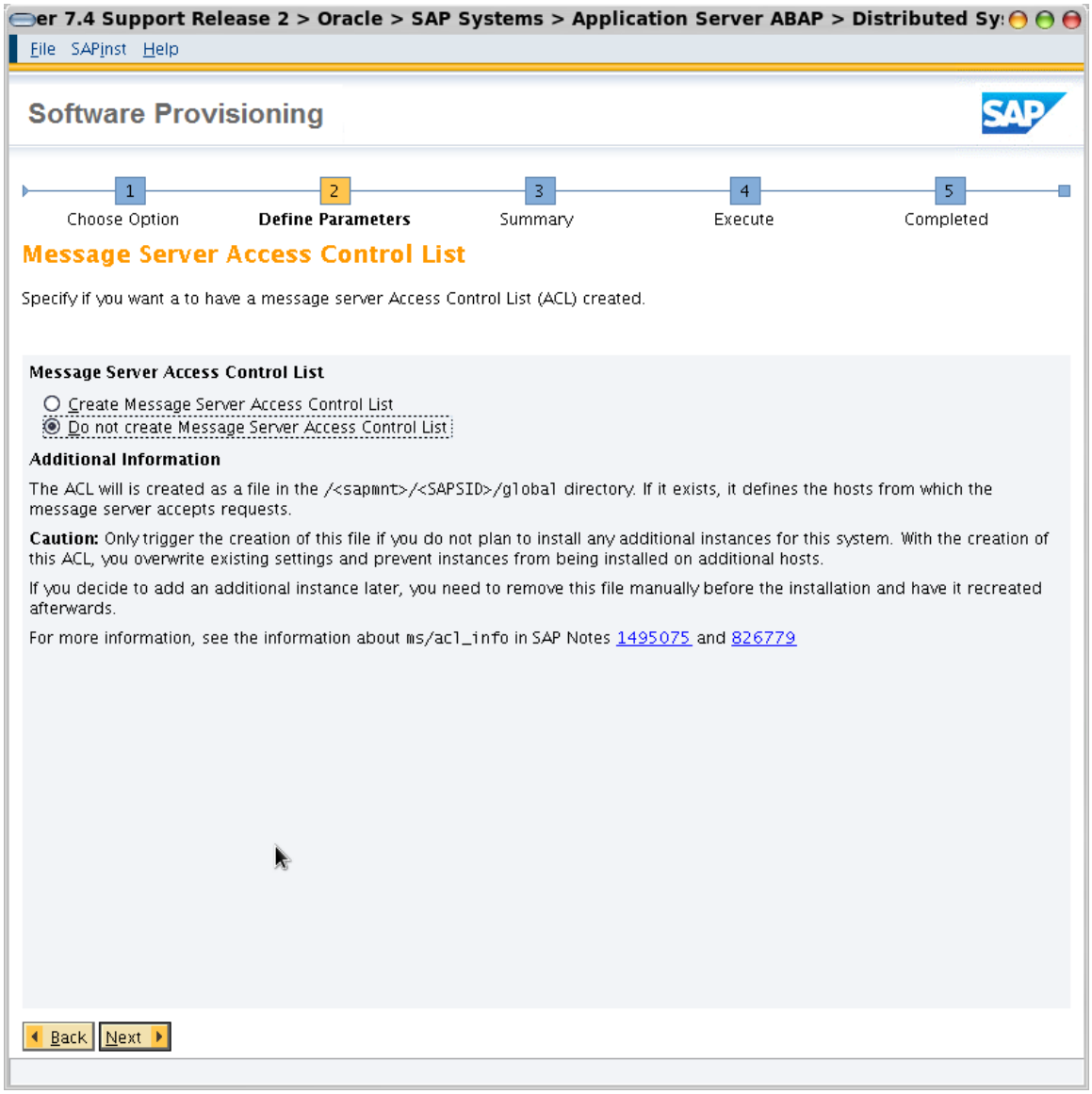

er 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sy
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Oracle > Database RAC Parameters
Enter the parameters of the database RAC – for Oracle experts only
Database Parameters for RAC
Host Name
Instance No.
xsapdb01
001
xsapdb02
002
Additional Information
Modify all @@ parameters (Host Name).
Back
Next

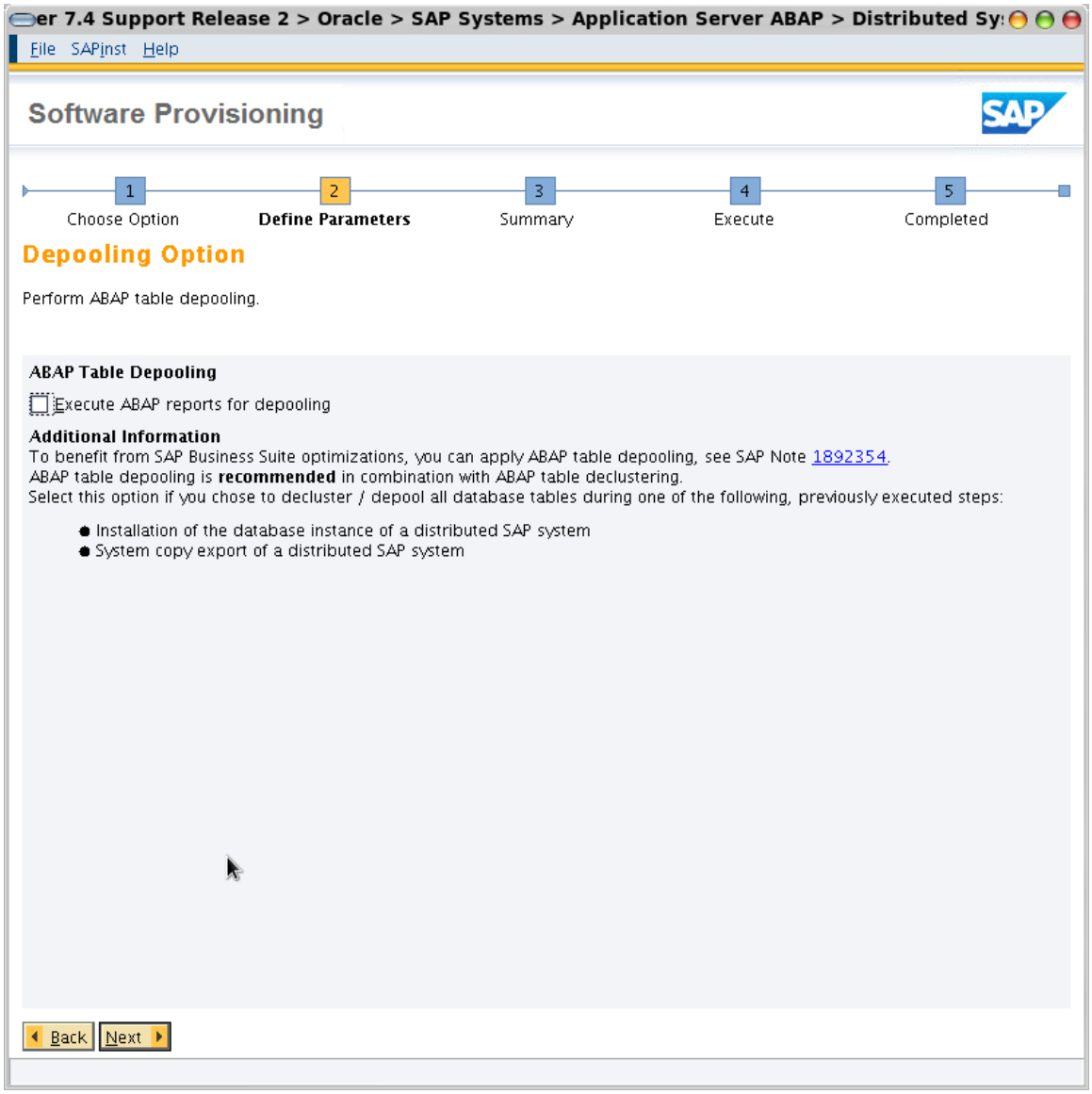

er 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sy
File SAPinst Help
Software Provisioning
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Primary Application Server Instance
Enter the instance parameters for the primary application server (PAS) 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*
01
PAS Instance Virtual Host*
xsapadm04v05
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.
Back
Next

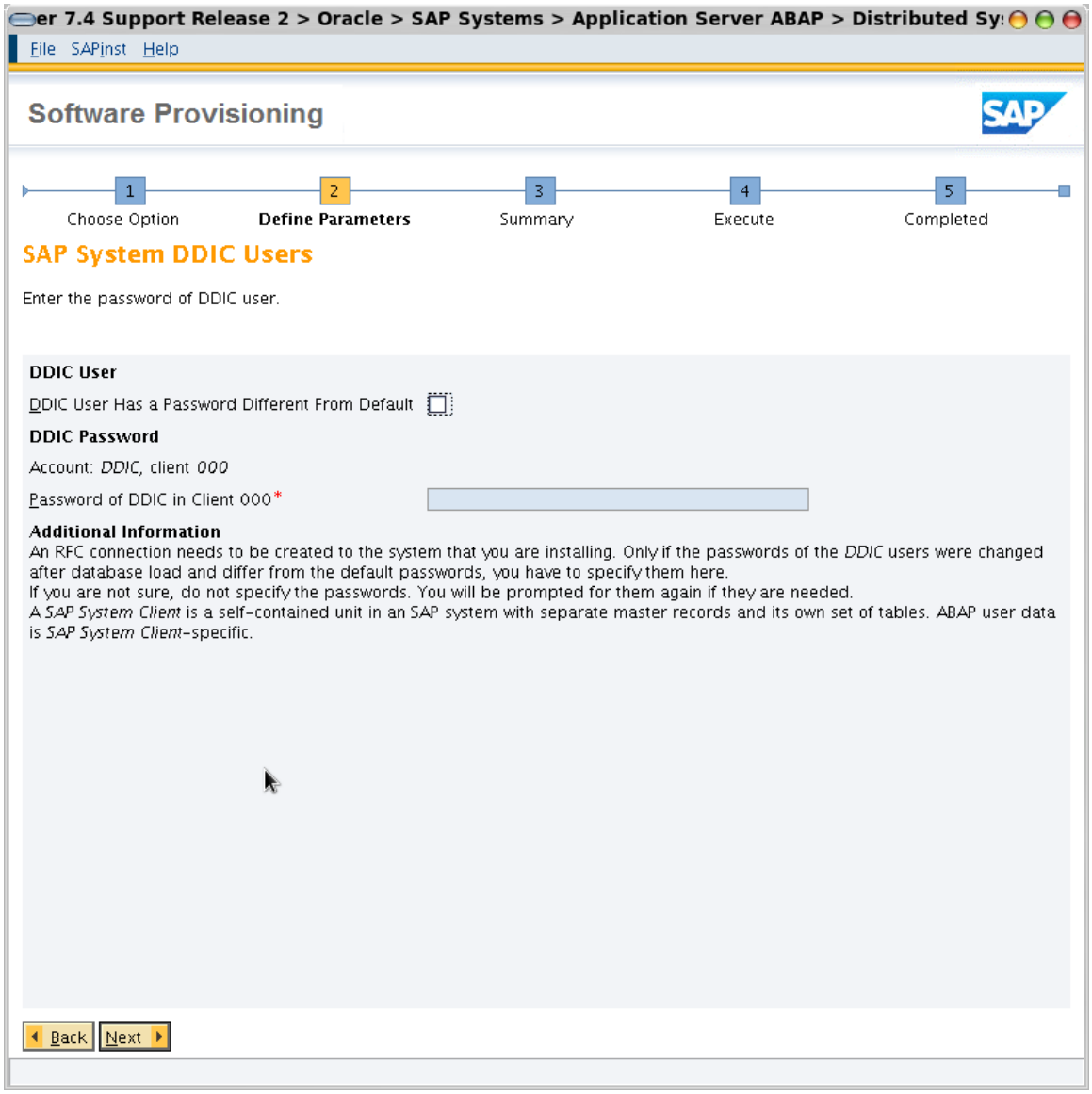

er 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sy
File SAPinst Help
Software Provisioning
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
ABAP Message Server Ports
Enter the required message server ports.
ABAP Message Server Ports
ABAP Message Server Port 3600
Internal ABAP Message Server Port 3900
Additional Information
The instance-specific Internal ABAP Message Server Port for internal communication and the ABAP Message Server Port are required as unique communication channels.
Back
Next

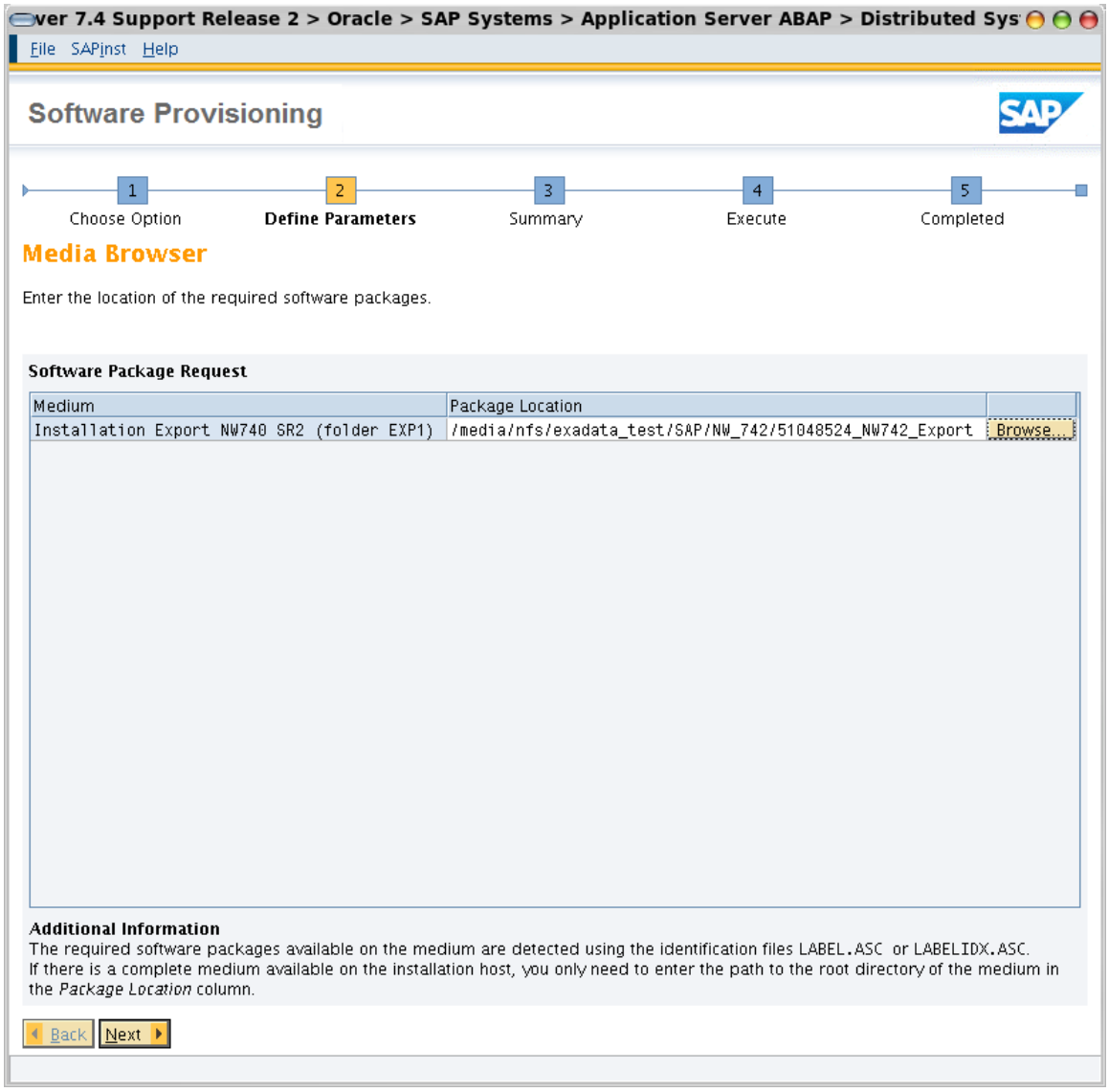

er 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sy
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
ICM User Management
Enter the password of the web administration user 'webadm'.
Internet Communication 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

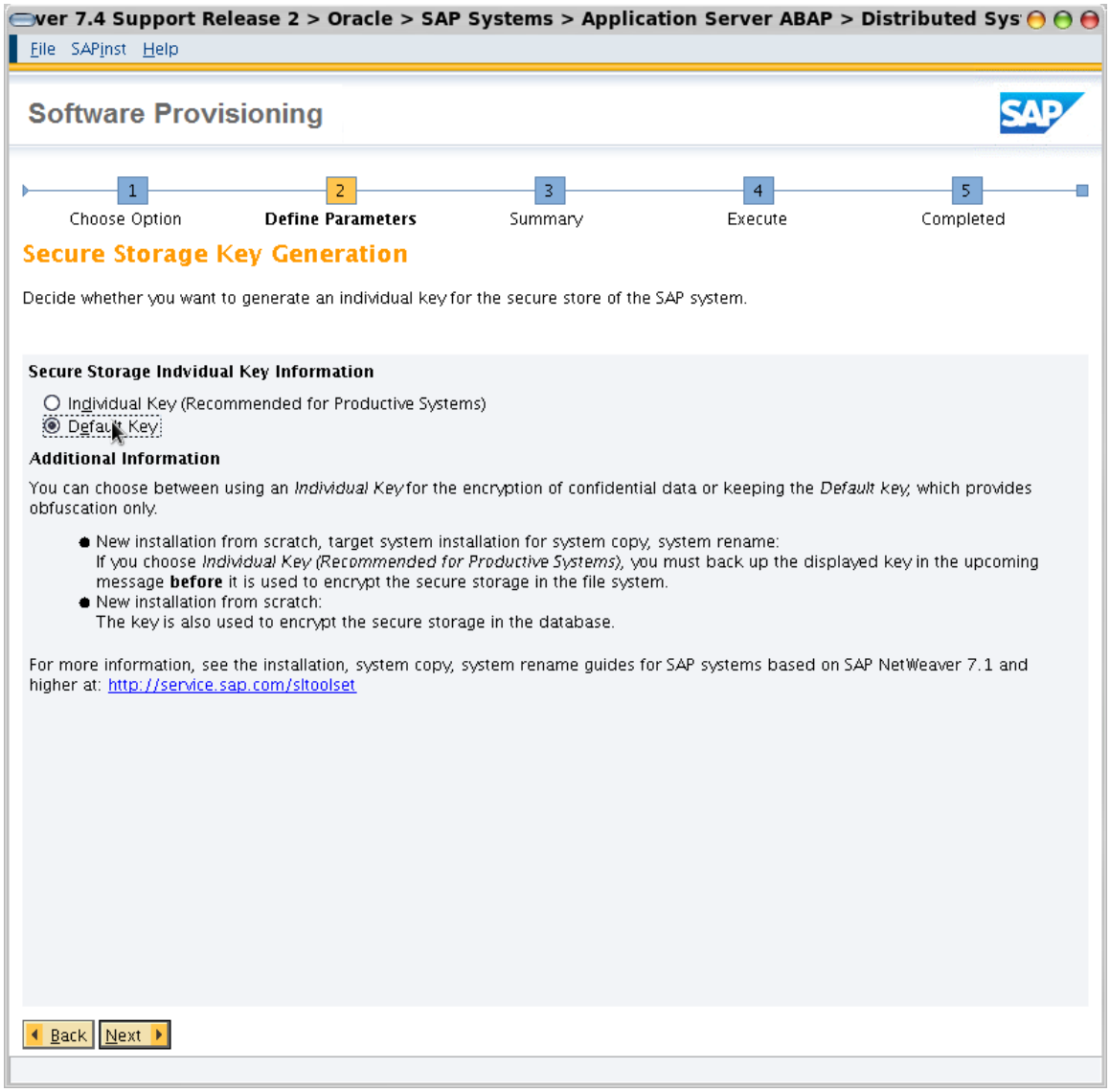

er 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sy
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
SLD Destination for the SAP System OS Level
Enter the destination of the System Landscape Directory (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

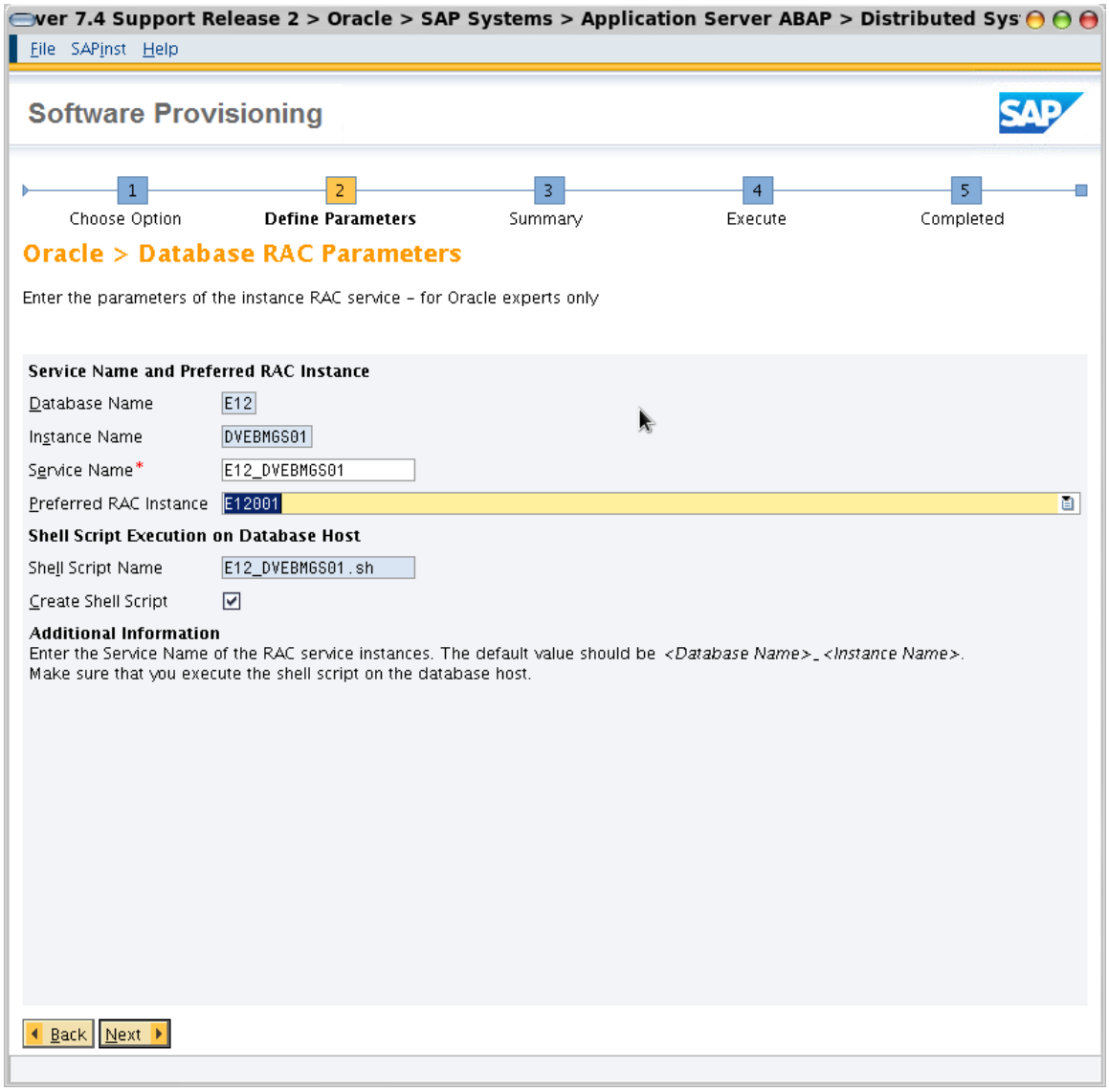

er 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sy
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Message Server Access Control List
Specify if you want a to have a message server Access Control List (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 is 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

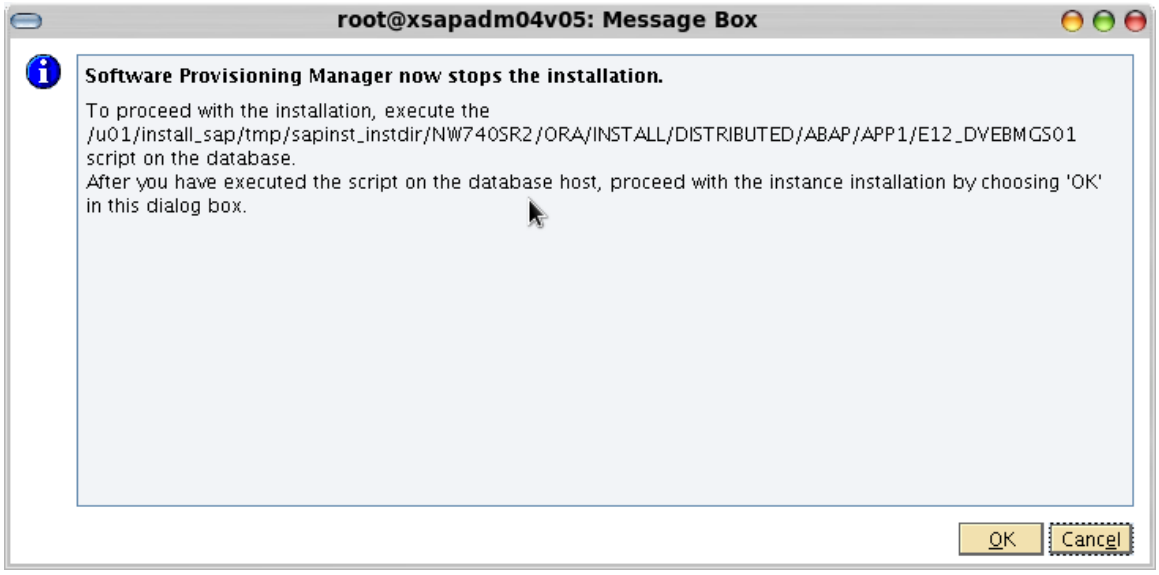

er 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sy
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Depooling Option
Perform ABAP table depooling.
ABAP Table Depooling
Execute ABAP reports for depooling
Additional Information
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:
Installation of the database instance of a distributed SAP system
System copy export of a distributed SAP system
Back
Next

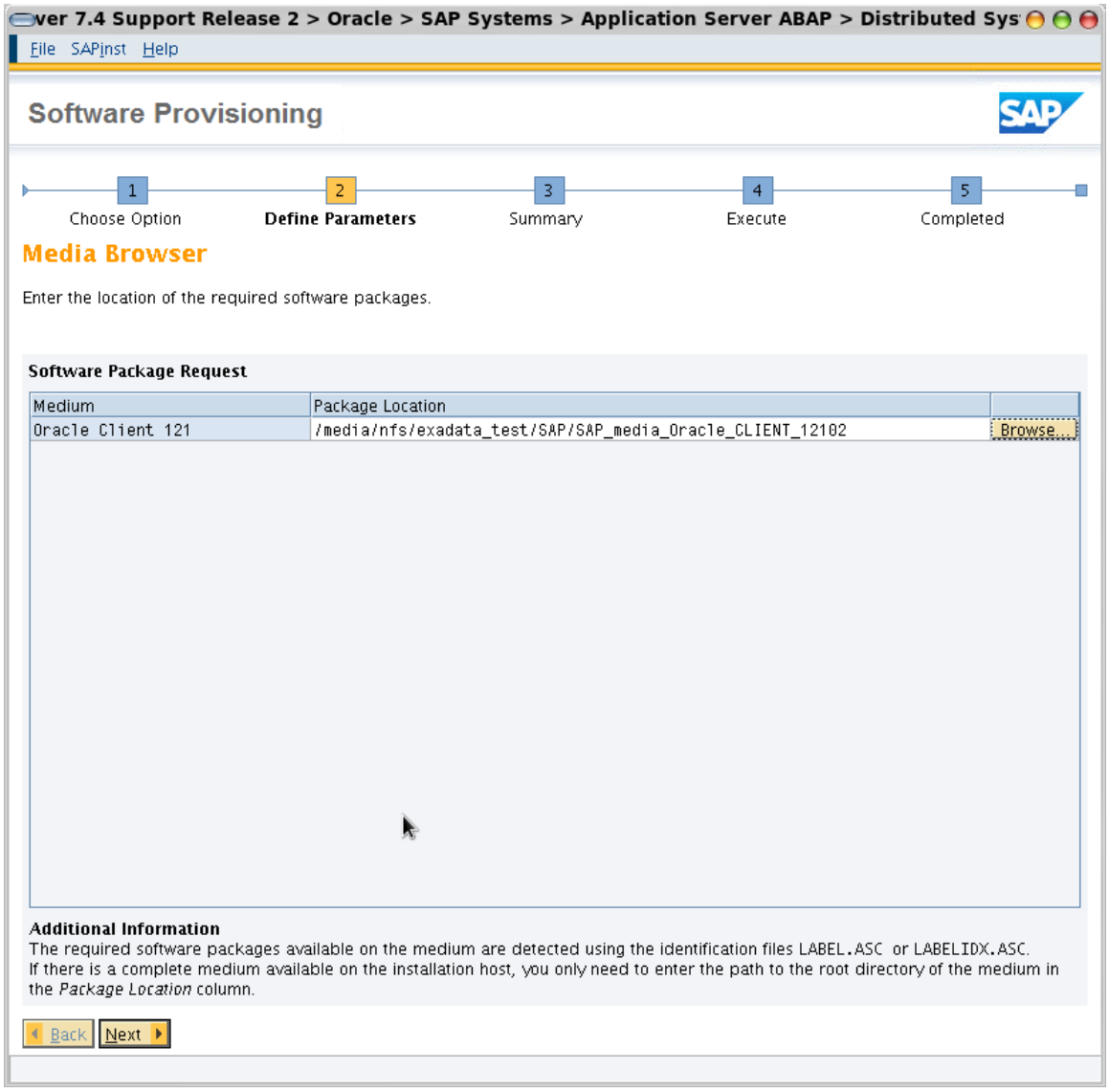

er 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sy
File SAPinst Help
Software Provisioning
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
SAP System DDIC Users
Enter the password of DDIC user.
DDIC User
DDIC User Has a Password Different From Default
DDIC Password
Account: DDIC, client 000
Password of DDIC in Client 000*
Additional Information
An RFC connection needs to be created to the system that you are installing. Only if the passwords of the DDIC users were changed after database load and differ from the default passwords, you have to specify them here.
If you are not sure, do not specify the passwords. You will be prompted for them again if they are needed.
A SAP System Client is a self-contained unit in an SAP system with separate master records and its own set of tables. ABAP user data is SAP System Client-specific.
Back
Next

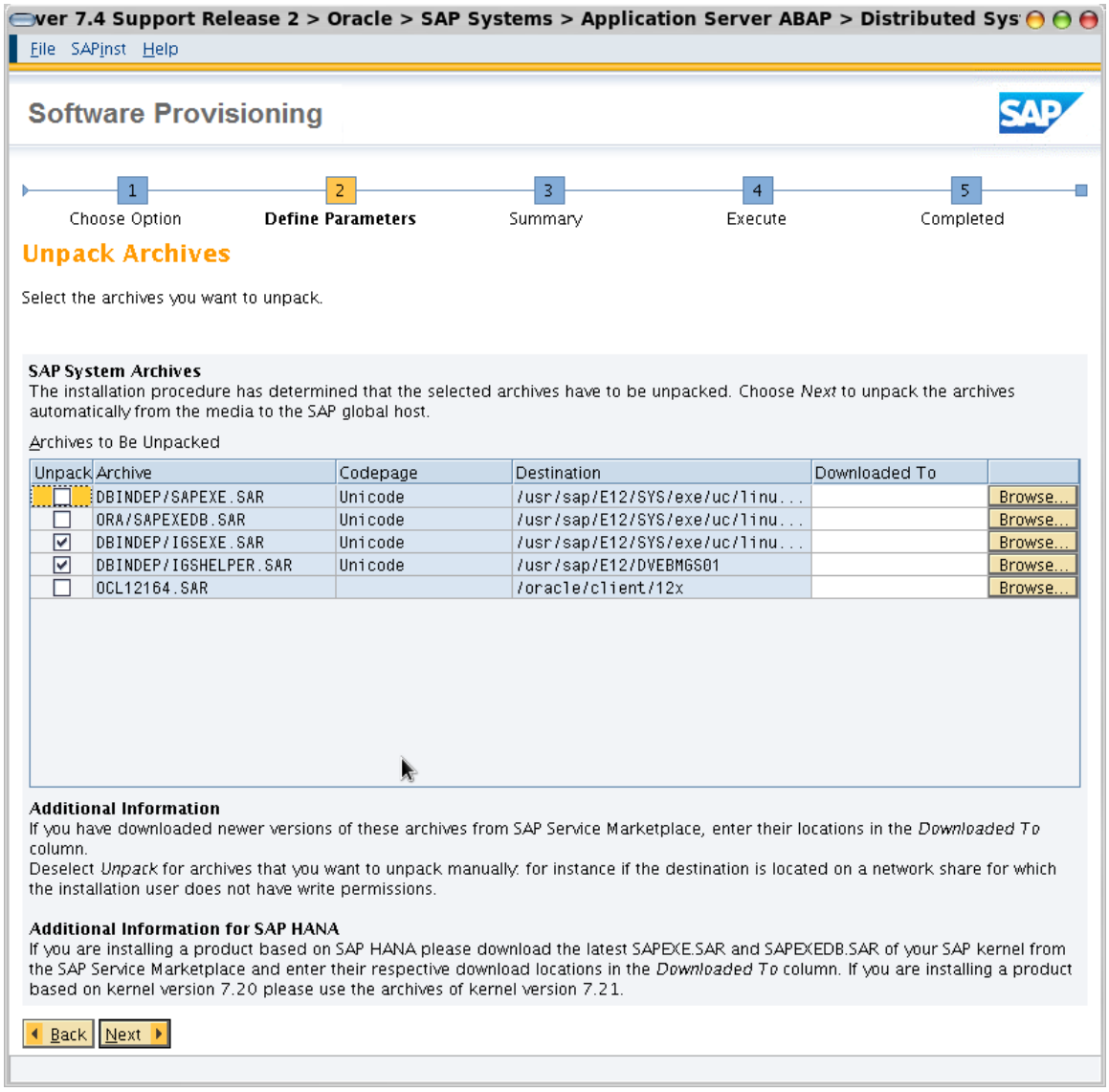

ver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sys
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Media Browser
Enter the location of the required software packages.
Software Package Request
Medium
Package Location
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

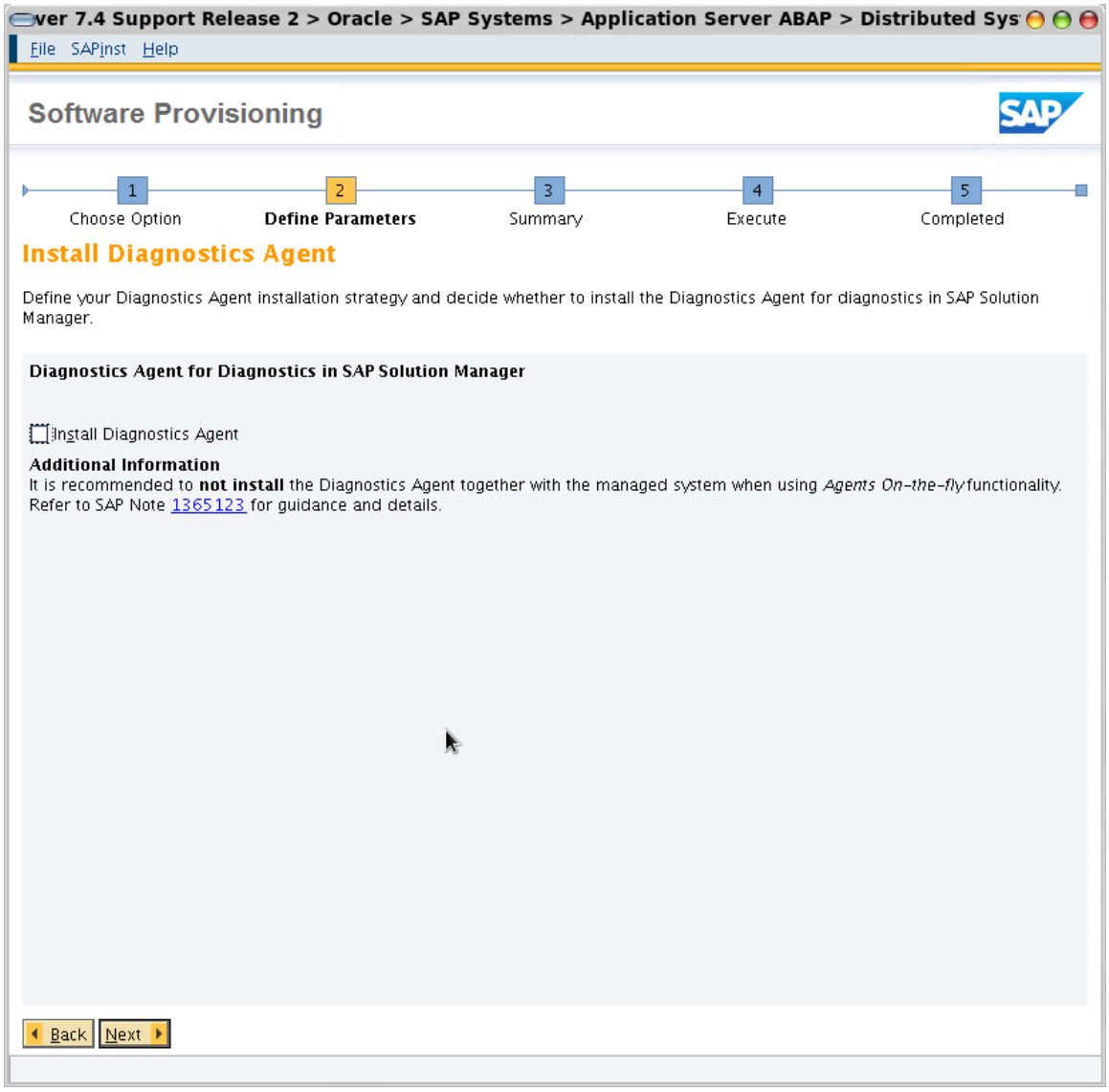

ver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sys
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Secure Storage Key Generation
Decide whether you want to generate an individual key for the secure store of the SAP system.
Secure Storage Indvidual 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/sltoolset
Back
Next

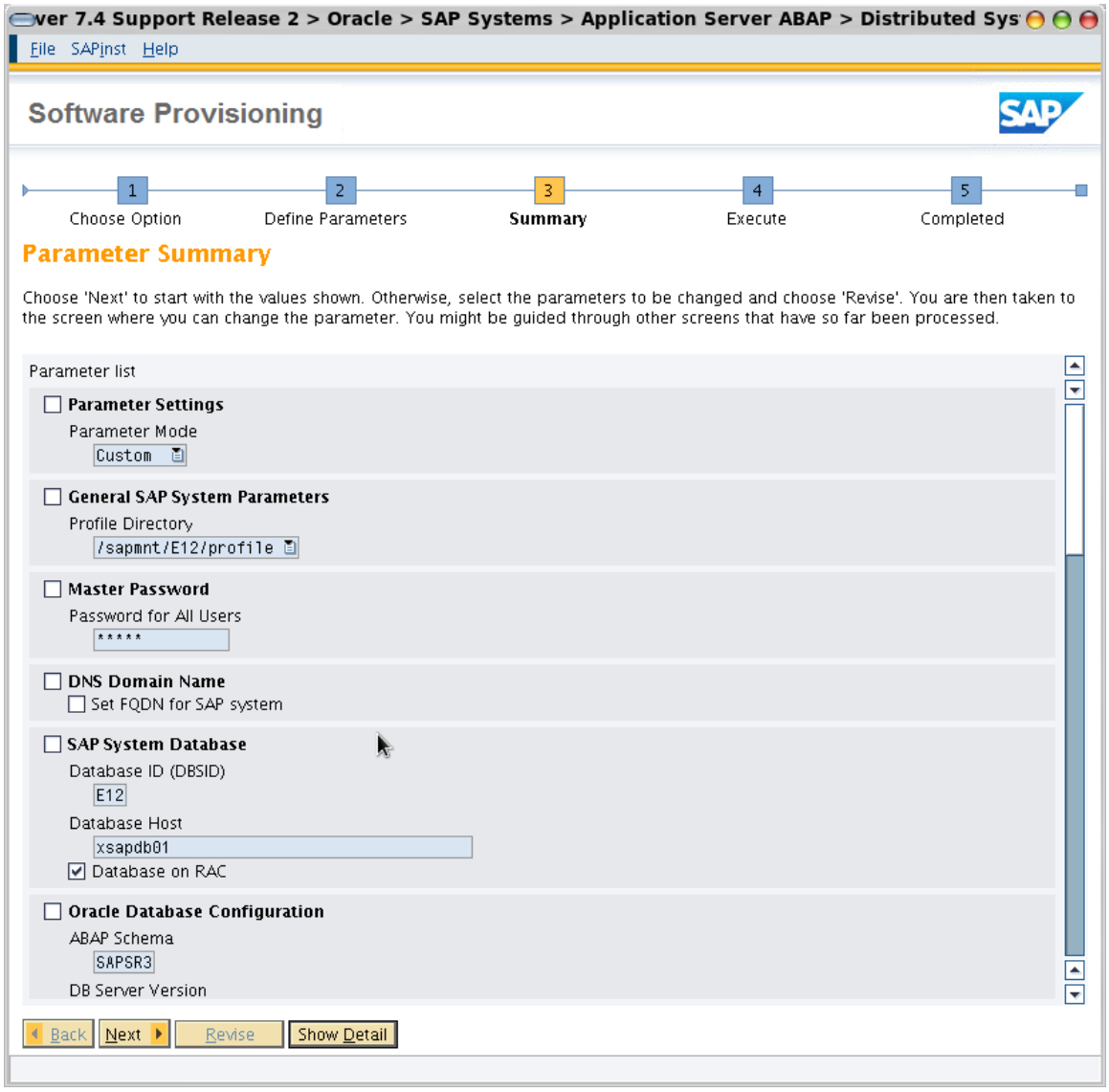

ver 7.4 Support Release 2 > Oracle > SAP Systems > Application Server ABAP > Distributed Sys
File SAPinst Help
Software Provisioning
SAP
1 Choose Option
2 Define Parameters
3 Summary
4 Execute
5 Completed
Oracle > Database RAC Parameters
Enter the parameters of the instance RAC service – for Oracle experts 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

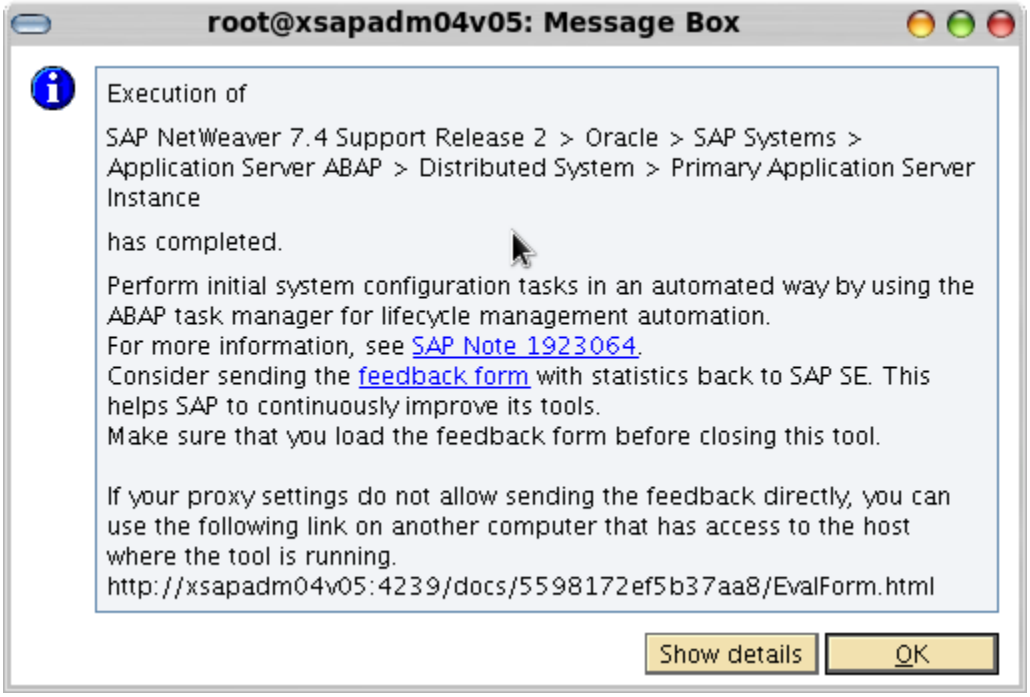

root@xsapadm04v05: Message Box
Software Provisioning Manager now stops the installation.
To proceed with the installation, execute the
/u01/install_sap/tmp/sapinst_instdir/NW740SR2/ORA/INSTALL/DISTRIBUTED/ABAP/APP1/E12_DVEBMGS01
script on the database.
After you have executed the script on the database host, proceed with the instance installation by choosing 'OK'
in this dialog box.
OK
Cancel


ver 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


ver 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
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
DBINDEP/SAPEXE.SAR Unicode /usr/sap/E12/SYS/exe/uc/linu... Browse...
ORA/SAPEXEDB.SAR Unicode /usr/sap/E12/SYS/exe/uc/linu... Browse...
DBINDEP/IGSEXE.SAR Unicode /usr/sap/E12/SYS/exe/uc/linu... Browse...
DBINDEP/IGSHELPER.SAR Unicode /usr/sap/E12/DVEBMGS01 Browse...
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


ver 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
Install Diagnostics Agent
Define your Diagnostics Agent installation strategy and decide whether to install the Diagnostics Agent for diagnostics in SAP Solution Manager.
Diagnostics Agent for Diagnostics in SAP Solution Manager
Install Diagnostics Agent
Additional Information
It is recommended to not install the Diagnostics Agent together with the managed system when using Agents On-the-fly functionality.
Refer to SAP Note 1365123 for guidance and details.
Back
Next


ver 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@xsapdb01 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       xsapdb01                 STABLE
--------------------------------------------------------------------------------
[oracle@xsapdb01 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 safe 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 where 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**
	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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Using SAP NetWeaver with Oracle Database 12c on Oracle Exadata
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