# R/3 Installation on UNIX: Oracle Database

**Release 4.6B**

# Copyright

# Ordering Information

To order additional copies of this documentation, use the product number 51 008 169.

# Typographic Conventions

| Type Style | Represents |
|---|---|
| *Interface Text* | Words or characters that appear on the screen. This includes system messages, field names, screen titles, pushbuttons, menu names, and menu options. |
| *Document Title* | Cross-references to other documentation |
| `User Entry` | Exact user entry. These are words and characters that you enter exactly as they appear in the documentation. |
| `File Name` | File names, batch files, paths or directories, and screen messages |
| `<Variable User Entry>` | Variable user entry. Pointed brackets indicate that you replace these words and characters with appropriate entries. |
| NAME | Names of elements in the SAP System. These include report names, program names, transaction codes, table names, and ABAP language elements. |
| `KEY` | Keys on your keyboard. These include function keys (for example, `F2`) and the `ENTER` key. |

# Icons

| Icon | Meaning |
|---|---|
|  | Caution |
|  | Example |
|  | Note |
|  | Recommendation |

# Contents

# R/3 Installation on UNIX: Oracle Database

## Purpose

This documentation explains how to install the SAP System on a UNIX operating system when your database is Oracle.

> Throughout this documentation, the term *SAP System* is the same as *R/3 System*. Also, *SAP* stands for *R/3* in terms such as *SAP profile* or *SAP instance*.

You can install the following types of standard SAP Systems:

- **Central** system, in which the central instance and the database instance are on the **same** host machine

- **Standalone database** system, in which the central instance and the database instance are on **different** host machines

You also install dialog and gateway instances and additional components. The installation of frontends for the SAP System is described separately in the documentation *Installing SAP Frontend Software for PCs.*

> Read the installation Notes before beginning the installation. These Notes contain the most recent information regarding the installation, as well as corrections to the installation documentation.
> Make sure that you have the most recent version of each Note. You can find the SAP Notes by using SAPNet - R/3 Frontend.

**Table of Installation Notes for UNIX - Oracle**

| Note number | Title |
|---|---|
| 179136 | R/3 Installation on UNIX |
| 179141 | R/3 Installation on UNIX - OS Dependencies |
| 179139 | R/3 Installation on UNIX - Oracle Database |
| 15023 | Initializing table TCPDB |
| 45619 | R/3 with several languages or typefaces |

## Integration

The documentation *R/3 Installation on UNIX: Oracle Database* is delivered in the following formats:

**Formats of the Installation Documentation**

| Format | Media | Description / Usage |
|---|---|---|
| Printed | Paper | - |
| PDF (Acrobat) | Installation Guides CD-ROM, see the README file in the root directory for more information | • Online version of the printed guide<br>• Searchable<br>• Suitable for creating additional print-outs |
| PlainHTML | Installation Guides CD-ROM, see the README file in the HTML directory for more information | • Platform independent format<br>• Hyperlinks within the document |
| HTMLHelp | Installation Guides CD-ROM, see the README file in the HTML directory for more information | • Can only be executed on MS Windows<br>• Hyperlinks within the document<br>• Searchable |

Depending on your preference and the equipment you have, use the format that best suits your requirements. The information contained within the documentation is the same.

## Features

For a standard SAP System installation, SAP provides the R3SETUP tool. This has a graphical user interface (GUI) called INSTGUI that allows you to watch the progress of the installation and see all messages issued by R3SETUP. You can call online help from the INSTGUI while you perform the installation. You can start INSTGUI on a remote computer if you want, since it functions as a client to the R3SETUP server.

For more information, see The R3SETUP Tool [page 116].

## Variables

The following table shows variables used throughout this documentation.

**Variables use throughout this documentation**

| Placeholder | Meaning |
|---|---|
| <SAPSID> | SAP System name in uppercase letters |
| <sapsid> | SAP System name in lowercase letters |
| <DBSID> | Database name in uppercase letters |
| <dbsid> | Database name in lowercase letters |
| <INSTDIR> | Installation directory |
| <CD-DIR> | Directory on which a CD-ROM is mounted |
| <OS> | Operating system name within a path |

> Log on as user `<sapsid>adm` and change to the directory
> `/usr/sap/<SAPSID>`. If your SAPSID is C11, log on as user `c11adm` and
> change to the directory `/usr/sap/C11`.
> Change to the directory `<CD-DIR>/UNIX/<OS>`. If the CD-ROM is mounted on
> `/sapcd1` and your operating system is AIX, change to `/sapcd1/UNIX/AIX_32`.

## Constraints

Procedures that do not belong to the standard installation process are covered in other
documentation. They include:

- Copying an SAP System

- Installing standby SAP Systems for high availability purposes (see the SAP Online Help, *SAP
  Library → BC - Basis Components → Computing Center Management System → BC SAP
  High Availability*).

> The SAP installation tools must only be used in accordance with the instructions
> and for the purposes described in the SAP System installation documentation.
> Improper use of the SAP installation tools can damage files and systems already
> installed.

We recommend that SAP System installations only be done by SAP Technical Consultants who
are certified for your operating system, your database and the relevant SAP System.

This documentation **only** applies if you are installing an Oracle database with an UNIX operating
system.

If you do not have a suitable graphical display terminal (that is, X Windows on UNIX, Microsoft
Windows NT 4.0 or Windows 95 and 98), you cannot use the INSTGUI. Therefore, certain
limitations apply.

# Part I: Standard SAP System Installation

## Purpose

When you set up an SAP System, you need to install the main components that enable the system to operate. These are the:

- Central instance

- Database instance

- Dialog instances, if required

## Prerequisites

Before you can begin with the installation of the main SAP components, you have to plan the configuration of the system. This involves deciding which components you need and working out how these must be distributed to hosts. Normally an SAP hardware partner can assist you in this task. On the basis of information about the expected workload, set of applications that are to be deployed and number of users, the partner can recommend a feasible configuration.

As the system configuration fundamentally influences the installation procedure, it is important to have a clear configuration plan before you start the installation. There are two basic configuration types:

- **Central System**

  The Central Instance and Database Instance are installed on a single host.
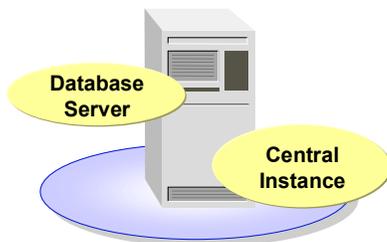


- **Standalone Database System**

  The Central Instance and Database Instance are installed on two different hosts.
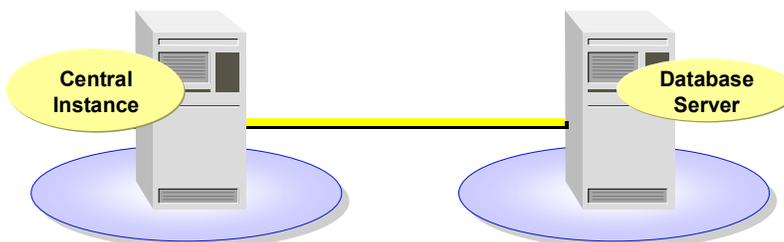


The configuration plan must specify whether a central or standalone database system is to be installed and how many dialog instances are required. Once the plan is complete and the required hardware available, you can start with the installation process as summarized in the

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following. Keep in mind that the process differs, depending on the hardware configuration you have decided to implement.

## Process Flow

The task of installing an SAP System can be subdivided into a number of phases:
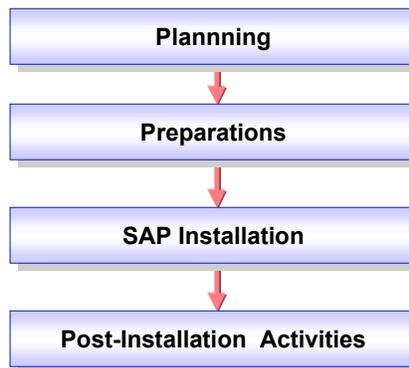


The following summarizes the actions that have to be performed in each of the phases.

1. In the **planning phase**, you have to:

   – Work out how the main system directories are to be distributed to disks in the system

     Before the installation, it is essential to get an overview of the directories involved and to decide how these can be best distributed to hard disks. An effective distribution takes into account aspects such as the expected workload, the size of individual components, performance of the system and security of the data.

   – Check the hardware and software requirements

     SAP specifies hardware and software requirements for different system configurations in check lists. On the basis of these lists you can determine whether your hardware meets the minimal requirements for your planned configuration and find out which software versions are necessary for the subsequent installation process.

   For more information, see Installation Planning [page 19].

2. In the **preparations phase**, before you run the installation utilities, it is necessary to perform a number of tasks that are a prerequisite for a successful installation:

   – Adapting UNIX Kernel Parameters and Swap Space

   – Choosing an SAP System Name

   – Setting up File Systems and Raw Devices

   – Setup of the Transport Directory

   – Setting up an Installation Directory

   For more information, see Installation Preparations [page 48].

3.  In the **SAP System installation phase**, you have to carry out the steps that are necessary to set up the core components of the SAP System.

> The installation procedure differs, depending on the planned system configuration. When you set up a **central system,** all the required steps are performed on the same host. When you set up a **standalone database system** some actions are carried out on the database host, others on the central instance host. The following summarizes the actions for both configuration types.

Actions for central system and standalone database system configuration types:

a.  Installation of the central and database instance

| **Central System** | **Standalone Database System** |
|---|---|
| a)  Actions on the central system host:<br><br>– Run R3SETUP to install the central instance.<br><br>– Run `orainst` to install the Oracle database software.<br><br>– Run R3SETUP for creating and loading of the database. | a)  Actions on the central instance host:<br><br>– Run R3SETUP to install the SAP instance.<br><br>b)  Actions on the database host:<br><br>– Run R3SETUP to install the DB instance.<br><br>– Run `orainst` to install the Oracle database software.<br><br>– Run R3SETUP for creating and loading of the database. |

b.  Installation of the dialog instances

When the central and database instance have been installed, you can optionally install one or more dialog instances on further hosts in the system. You have to run R3SETUP to install the dialog instance.

c.  Installation of a gateway instance or additional components

Once the central, database and dialog instances have been set up, you can install a gateway instance or additional components.

For more information, see The SAP System Installation [page 53].

4.  In a final **post-installation activities phase**, you have to perform a number of tasks to complete the installation. Some of these tasks are mandatory, others are optional and serve to activate optional features that may be useful.

–  Necessary Tasks

*   Starting and stopping the system

*   Logging on to the system

*   Installing and Using the SAP License

*   Checking SAP System Services

- Calling the System Administration Assistant transaction (SSAA)

- Installing the online documentation

- Configuring the SAProuter and SAPNet - R/3 Frontend

- Performing a full backup of the installation

– Optional Tasks

- Performing operating system adjustments

- Changing the permissions of the transport directory

- Performing application-specific actions

For more information, see .

# 1. Installation Planning

## Purpose

Before you begin with the practical installation tasks, it is essential to have a planning phase. in which you make a number of fundamental decisions that influence the subsequent installation procedure. Careful planning is a prerequisite for the successful installation of the system.

## Process Flow

When you plan the installation you have to:

- Decide on the optimal configuration for the system

- Work out how the software components must be distributed to disks

- Make sure that you can meet the hardware and software requirements specified by SAP

  SAP specifies minimal hardware and software requirements for different system configurations to make sure that a newly installed system performs well. These requirements are summarized in the hardware and software requirements check lists.

  In your planning stage, it is essential to consult the Hardware and Software Requirements Check [page 29] to find out the requirements and to make sure that they can be met.

> Read the installation Notes before beginning the installation. These Notes contain the most recent information regarding the installation, as well as corrections to the installation documentation. See the table of installation Notes [page 11].

# 1.1 System Configuration

The configuration of the system is generally planned well in advance of the installation together with the hardware vendor. Configuration planning involves deciding whether a central system or standalone database system is to be installed, and how many dialog instances are required.

The configuration is worked out with the hardware partner on the basis of sizing information that reflects the system workload. Details such as the set of applications that are to be deployed, how intensively these are to be used, and the number of users enable the hardware vendor to recommend a configuration that performs well.

An SAP System consists of a database server, (optional) additional application servers, and a number of frontend computers. The graphic below shows a typical distribution of the instances of an SAP System over several computers.

The database server is the computer on which the database is installed. It is named DBSERVER in the graphic. This server can also accommodate the central instance (the SAP instance that includes the message server and enqueue server processes). If the central instance is installed on a separate application server, the database server is called a standalone database server.

Additional dialog instances (SAP instances including only dialog, batch, spool, or update processes) are installed on application servers. These servers are named D1 and D2 in the graphic.

1.1 System Configuration

It is possible to install an SAP instance exclusively as a standalone gateway (not shown in the graphic). This type of instance does not contain normal work process types (dialog, background, update, enqueue or spool). Only the gateway process (gwrd) is started. If there is an SNA connection to an R/2 System, gateway work processes (gwwp) are also started.

You can think of an SAP instance (central or dialog instance, or standalone gateway) as a group of processes that are started and stopped at the same time. Every instance has a two-digit identifier between 00 and 96 that must be unique on a computer.
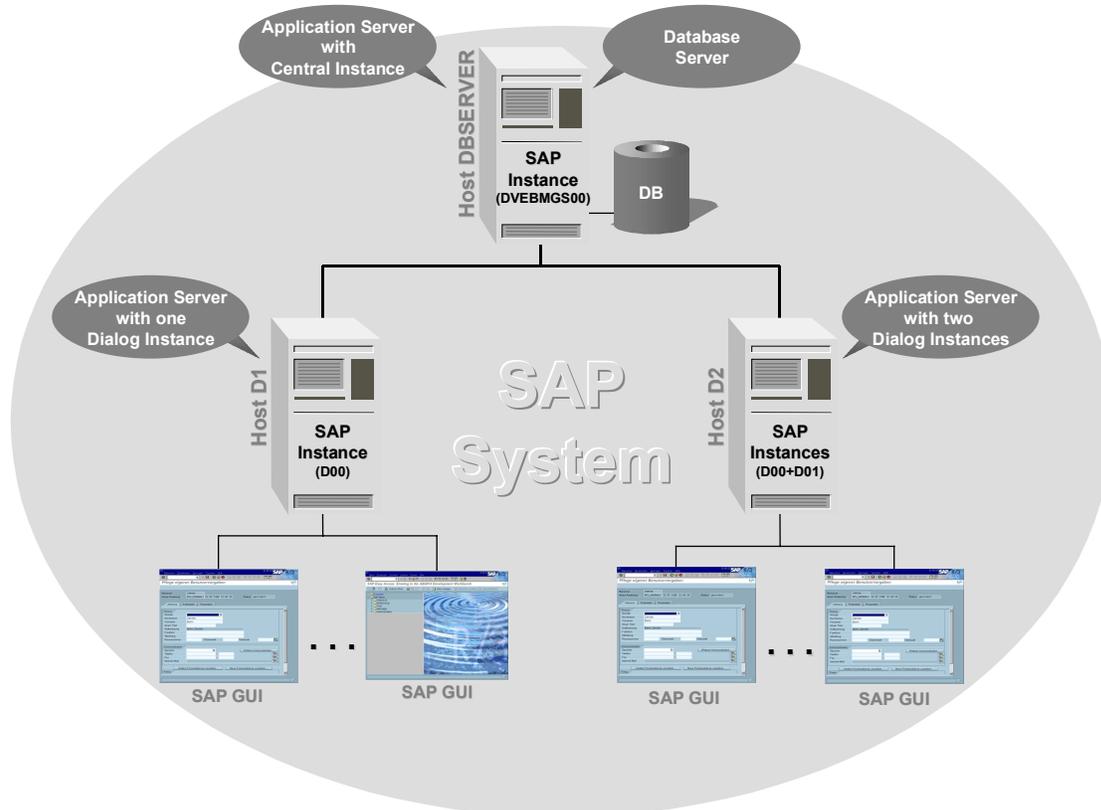


**Typical configuration of an SAP System**

When planning the configuration of your SAP System, consider the following recommendations:

- Install only one SAP System per computer. You can install several SAP Systems on the same computer, but, if you upgrade one of them, a new version of the operating system might be required. In this case, you cannot run SAP Systems having different releases on this computer.

- Install only one SAP instance per computer. You should only install more instances if the computer has enough RAM available.

- Use the same instance number for all instances of an SAP System unless they are installed on the same computer.

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If you plan to install instances of a single SAP System on different hardware platforms, see Heterogeneous SAP System Installations [page 220].

# 1.2 Distribution of Components to Disks

## Purpose

The way files are distributed to disk significantly affects system throughput and data security, and must therefore be carefully planned. The best distribution depends on your specific environment and must take into consideration factors such as the size of the components involved, security requirements and the expected workload. A good distribution of files to disks ensures that:

- Enough free space is available for system growth

- The data is secure

- Performance is good

When you work out the assignment of components to disks, you first need to get an overview of the main components and their corresponding directories. Then, on the basis of sample configurations and the recommendations provided in this documentation, you can decide which assignment is best for your particular system.

- **Customer Database Copy**
  If your own database export instead of the standard SAP database export from CD-ROM will be used for the database load, refer to the documentation *R/3 Homogeneous System Copy*.
- **Very Large Database (VLDB)**
  See Database Modifications for Very Large Databases [page 135] first if you expect one of the following:
  - A large amount of data (> 40 GB)
  - A large number of users ( > 300 users)
  - A large number of daily log files (> 1 GB)
  - A large number of transactions per hour (> 100,000)
  Contact a certified installation organization or a basis consultant if you expect to use a very large database.
- **Oracle Parallel Server (OPS)**
  If you are installing Oracle Parallel Server (OPS), refer to the documentation *R/3 Installation on UNIX - Oracle Parallel Server*.

## Process Flow

There is no single solution or any definite rules for the file distribution. To help you work out a good solution that suits your particular environment, the following topics cover important issues concerning Oracle file system configuration.

1.2 Distribution of Components to Disks

To find a suitable file distribution configuration, check the following topics:

- Oracle Redo Log Files

- Security Issues

- Performance Issues

- Different Oracle Systems

- Example Configurations

- List of required file systems

## Oracle Redo Log Files

There are four groups of Oracle transaction log files (redo log files). By default, each group contains one original and one mirrored redo log file. If you choose mirroring by UNIX, each group will consist of one original redo log file only.

- GROUP 101 (redo1)

  ```
  /oracle/<SAPSID>/origlogA/log_g101m1.dbf
  /oracle/<SAPSID>/mirrlogA/log_g101m2.dbf
  ```

- GROUP 102 (redo2)

  ```
  /oracle/<SAPSID>/origlogB/log_g102m1.dbf
  /oracle/<SAPSID>/mirrlogB/log_g102m2.dbf
  ```

- GROUP 103 (redo3)

  ```
  /oracle/<SAPSID>/origlogA/log_g103m1.dbf
  /oracle/<SAPSID>/mirrlogA/log_g103m2.dbf
  ```

- GROUP 104 (redo4)

  ```
  /oracle/<SAPSID>/origlogB/log_g104m1.dbf
  /oracle/<SAPSID>/mirrlogB/log_g104m2.dbf
  ```

The log files are periodically written from redo log `log_g101m?.dbf` to redo log `log_tg104m?.dbf` and are archived if the file reaches its maximum size (20 MB), provided the database is running in archive log mode.

If you consider the sets of Oracle transaction log files

- Set A

  ```
  /oracle/<SAPSID>/*logA/log*
  ```

- Set B

  ```
  /oracle/<SAPSID>/*logB/log*
  ```

the redo log that is archived and the redo log that is written always belong to different sets.

For better performance, the following file systems should be located on different disks:

```
/oracle/<SAPSID>/origlogA
/oracle/<SAPSID>/mirrlogA
/oracle/<SAPSID>/origlogB
/oracle/<SAPSID>/mirrlogB
```

## Security Issues

- For data security reasons, the redo logs should be mirrored on different disks. This can be achieved either by Oracle, by the hardware, or by the operating system.

- A production system **must** run in archive log mode.

- If a test system does not run in archive log mode, data written since the last complete backup will be lost after a system crash.

## Performance Issues

- Store database files and redo logs on different disks, and arrange the redo log files as described above. Since the redo logs are written synchronously, they cause more I/O activity than any other database files.

- It is possible to store the redo logs on the same disk as `/sapmnt` or `/oracle/stage`.

- Use the file systems `/oracle/<SAPSID>/sapdata<n>` exclusively for data files of the database.

- The block size of the file system must be less than or equal to the Oracle block size, which is 8 KB.

    AIX only allows a block size of 4 KB.

- Use a separate disk for the file system `/oracle/<SAPSID>/saparch`.

- For performance and security reasons, archive files and redo log files must reside on separate disks.

## Different Oracle Systems

For performance reasons, you generally should not install several database systems (for different SAP Systems) on one single host. If you decide to do so nevertheless, each database must be installed as described in this documentation.

    Make sure that the staging area (`/oracle/stage/stage_<version>`, Oracle
    8.1.5: `/oracle/stage/815_32` or `/oracle/stage/815_64`) corresponding
    to the Oracle version is used for every Oracle system.
    Use one staging area for Oracle systems with the same version.

## Examples

The following shows you some examples and gives recommendations that may be useful:

- For an overview of a basic distribution that provides adequate data security and performance in an average size production system, see the example Recommended Configuration [page 24].

- For a distribution that is suitable for a small test or demo system, see the example Minimal Configuration [page 24].

1.2 Distribution of Components to Disks

## List of required file systems

Refer to SAP File Systems [page 25] and Oracle File Systems [page 28] to get the minimum file system sizes required for the installation.

## 1.2.1 Recommended Configuration

The following diagram shows an optimal distribution of the database data on different disks.
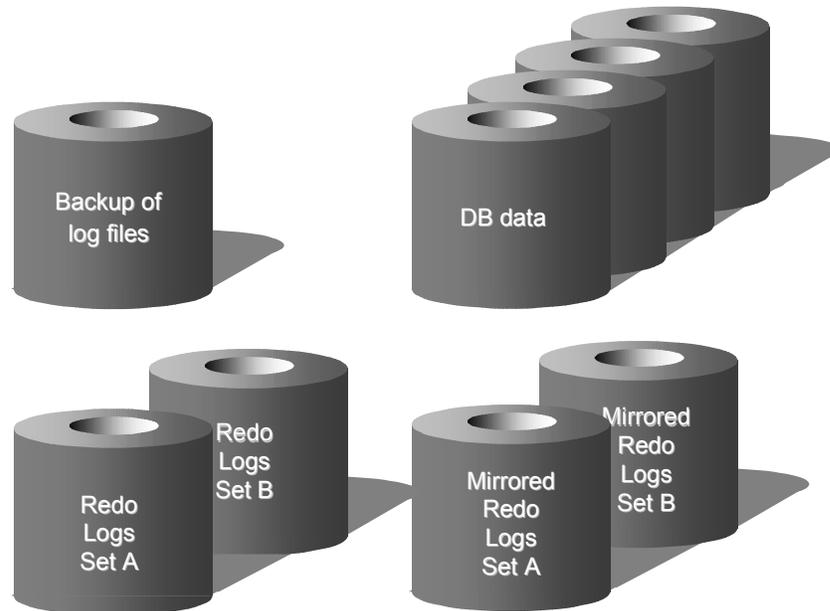


**Optimal Distribution**

## 1.2.2 Minimal Configuration

This configuration should only be used for test or demo systems.

Device 1: Backup of redo logs
Device 2: Redo logs and database data
Device 3: Mirrored redo logs and database data
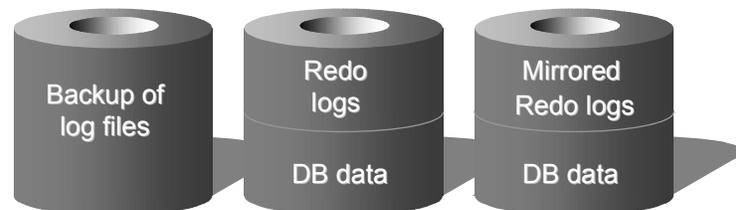


**Minimal Configuration**

Although this "minimal configuration" satisfies the SAP security requirements, it has the following disadvantages:

- Security

    – The minimal configuration does not ensure that both the database files and redo log files will not be lost if there is a single disk failure.

    – The minimal configuration makes sure that no data will be lost, but recovery will be complicated and time-consuming.

- Performance

    – The I/O-intensive redo logs are on the same disk volumes as the data files.

    – This configuration should only be used at small installations.

## 1.2.3 SAP File Systems

### Definition

You need to set up file systems for the SAP System before the installation. The file systems are global, that is, they are accessed by all hosts in the SAP System.

| File System Name | Description | Space Required |
|---|---|---|
| `<sapmnt>/<SAPSID>` | Software and data for one SAP System | Central instance and standalone gateway: 300 MB<br><br>Dialog instance (same platform as central instance): no file system necessary<br><br>Dialog instance (different platform): 240 MB |
| `/usr/sap/<SAPSID>` | Instance-specific data, symbolic links to the data for one system | Dialog instance with `sapcpe` in use: 380 MB<br><br>Other instances: 350 MB |
| `/usr/sap/trans` | Global transport directory for all SAP Systems | 100 MB for each SAP instance |
| `<db home>` | Database home directory | Database-specific |

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The listed file system sizes are SAP requirements. Depending on your operating system, you might have to add space for administrative purposes.

1.2 Distribution of Components to Disks

The following graphic shows the standard SAP directory structure:
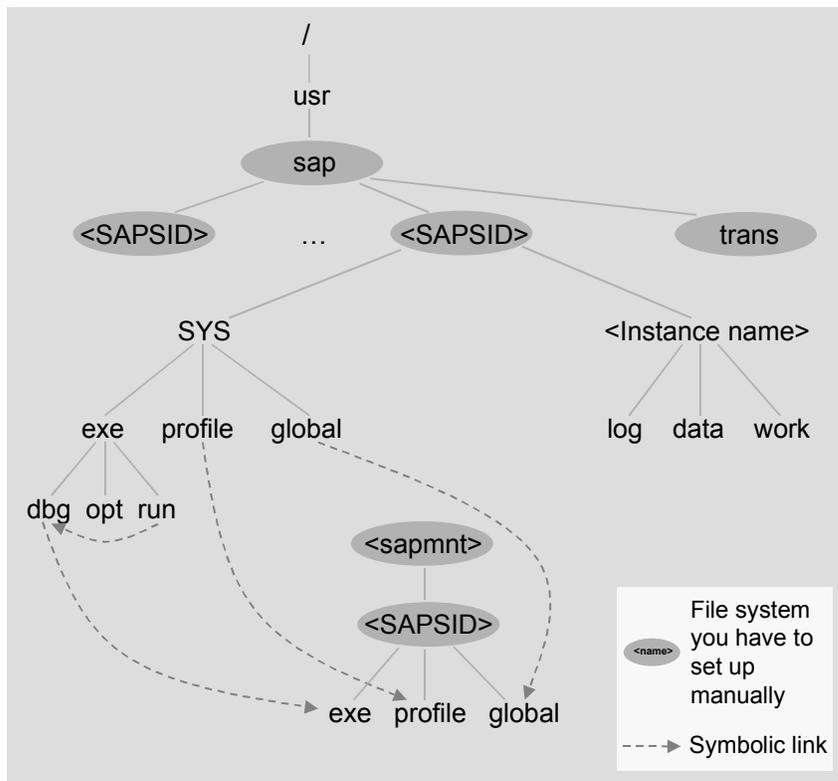


**Standard SAP Directory Structure**

## Use

### Directory /<sapmnt>/<SAPSID>

This directory is physically located on the central instance. In homogeneous systems, you need to mount it by Network File System (NFS) for all hosts belonging to the same SAP System. It contains the following sub-directories:

- `exe`, containing executable kernel programs

- `global`, containing log files

- `profile`, containing the start and operations profiles of all instances

### Directory /usr/sap/<SAPSID>

This directory contains files for the operation of a local instance. There is a sub-directory `<INSTANCE>` for each instance installed on the local instance host, whereas data used by several instances is located in the directory `SYS`. There are sub-directories of `/usr/sap/<SAPSID>/SYS` with symbolic links to sub-directories of `/sapmnt/<SAPSID>`.

R3SETUP sets up these directory structures during the installation.

> Since SAP traces for the instance are created in the directory
> `/usr/sap/<SAPSID>/<INSTANCE>`, sufficient space must be available in this
> directory. Changes in SAP System profiles can also affect the disk space.

## Directory /usr/sap/trans

In an SAP network there must be a global directory, called `/usr/sap/trans`, for the transport
of objects between SAP Systems. This directory is created on one SAP instance host in the SAP
network (the transport host). It must be accessible by every host on which an SAP instance is
installed and which belongs to this SAP network. The path on every host must be
`/usr/sap/trans`.

If you want to use the Change and Transport system, additional space is required in directory
`/usr/sap/trans`. Since the required storage size differs depending on the transport volume,
SAP cannot specify the required amount of free disk space. We recommend that you reserve 20
MB per user of the transport system, with a minimum of 200 MB.

The directory `/usr/sap/trans` can be a soft link pointing to the transport directory, or it can be
mounted using Network File System (NFS). It should be exported in read/write mode on the
transport host with NFS and mounted on all central and dialog instance hosts.

For more information, see .

1.2 Distribution of Components to Disks

## 1.2.4 Oracle File Systems

The following table gives an overview of the file systems required for the Oracle database. For a description of the file systems required for the SAP System see SAP File Systems [page 25].

**File systems required for the Oracle database**

| File System Name | Description | Space Required |
|---|---|---|
| Oracle 8.0.5, Oracle 8.0.6: `/oracle/<SAPSID>` <br><br> Oracle 8.1.5: `/oracle/<SAPSID>/815_32` or `/oracle/<SAPSID>/815_64` | Home directory for Oracle instance <SAPSID> `($ORACLE_HOME)` | Central instance with DB: 950 MB <br><br> Central or dialog instance: 140 MB <br><br> Standalone DB: 950 MB |
| `/oracle/805_32` or `/oracle/805_64` | Directory for Oracle client software. <br><br> The directory has to be called `805_<xy>` even if you are using Oracle 8.0.6 or Oracle 8.1.5. | Dialog instance: 20 MB |
| Oracle 8.0.5: `/oracle/stage/stage_805` <br><br> Oracle 8.0.6: `/oracle/stage/stage_806` <br><br> Oracle 8.1.5: `/oracle/stage/815_32` or `/oracle/stage/815_64` | Installation and upgrade directory for database software (staging area) | AIX: 600 MB <br><br> Compaq Tru64 UNIX: 680 MB <br><br> HP-UX, Linux: 500 MB <br><br><br> ReliantUNIX, Solaris: 650 MB |
| `/oracle/<SAPSID>/origlogA` | Original set A of redo logs | 55 MB |
| `/oracle/<SAPSID>/origlogB` | Original set B of redo logs | 45 MB |
| `/oracle/<SAPSID>/mirrlogA` | Mirrored set A of redo logs | 55 MB |
| `/oracle/<SAPSID>/mirrlogB` | Mirrored set B of redo logs | 45 MB |
| `/oracle/<SAPSID>/saparch` | Backup of redo logs | 350 MB |
| `/oracle/<SAPSID>/sapreorg` | Work directory for database administration | 1400 MB |
| `/oracle/<SAPSID>/sapdata1` | SAP data | Approximately 15 GB of space are required for all SAP data files. <br><br> See **SAP Note 179139** for exact space requirements of each sapdata file system. |
| `/oracle/<SAPSID>/sapdata2` | SAP data | |
| `/oracle/<SAPSID>/sapdata3` | SAP data | |
| `/oracle/<SAPSID>/sapdata4` | SAP data | |
| `/oracle/<SAPSID>/sapdata5` | SAP data | |
| `/oracle/<SAPSID>/sapdata6` | SAP data | |

The file system $ORACLE_HOME (`/oracle/<SAPSID>`, Oracle 8.1.5:
`/oracle/<SAPSID>/815_32` or `/oracle/<SAPSID>/815_64`) must reside
on a local disk. It **cannot** be a softlink.

The file system

- `/oracle/stage/stage_805` (Oracle 8.0.5)

- `/oracle/stage/stage_806` (Oracle 8.0.6)

- `/oracle/stage/815_32` (32-bit Oracle 8.1.5)

- `/oracle/stage/815_64` (64-bit Oracle 8.1.5)

is also used for Oracle upgrades and should **not** be deleted after the installation.

During system operation, the database writes temporary files to the `/oracle/<SAPSID>`
directory. SAP therefore reserves more space during installation than the Oracle software needs.

The archive directory `/oracle/<SAPSID>/saparch` should provide enough space for archives
between two backups. In a production system, between 300 MB and 1 GB data is archived daily.

The listed file system sizes are SAP requirements. Depending on your operating
system, you might have to add space for administrative purposes.

# 1.3 Hardware and Software Requirements Check

## Purpose

SAP specifies minimal hardware and software requirements for different system configurations to
ensure that a newly installed system performs well. These requirements are summarized in
hardware and software requirements checklists.

These checklists give the **minimum** requirements for small SAP system installations (database
server and application server). Depending on the amount of data involved, the requirements
might change. If you have any questions, contact the person in charge of installation or your
Competence Center.

The listed requirements are only valid for Release 4.6B.

1.3 Hardware and Software Requirements Check

## Prerequisites

To get remote support, the remote connection specified in the contract agreement must be available before installation. The Internet address setup at SAP and registration are dealt with during the installation.

## Process Flow

1. You check the requirements on each machine where you intend to install the SAP System:

    − For a central system, you see the check list for:

      • Central system to install the central instance and database

      • Central instance or dialog instance if you want to install additional dialog instances

    − For a standalone database system, you see the check list for:

      • Standalone database system to install the database

      • Central instance or dialog instance to install the central instance and if you want to install additional dialog instances

2. You check the network requirements. The requirements for the SAP System network configuration are described in the documentation *Integration of R/3 Servers in TCP/IP Networks* and *SAP Software in PC Networks*.

3. You check the operating system requirements:

    − AIX [page 34]

    − Compaq Tru64 UNIX [page 36]

    − HP-UX [page 38]

    − Linux [page 41]

    − Reliant (RM300/400/600) [page 42]

    − SEQUENT [page 44]

    − Solaris [page 45]

> ⚠️
>
> If you do not fully meet the relevant requirements, you might experience problems when working with the SAP System.

## 1.3.1 Checking Requirements for a Central System

### Use

For the installation of a central SAP System, be sure to meet the minimal requirements listed in this section.

### Prerequisites

You are installing a standard SAP System as a central system. That is, the central instance and the Oracle database are on the **same** host machine.

### Procedure

1. Check that the host machine meets the following requirements:

| Requirement Type | Requirement |
|---|---|
| Hardware Requirements | • CD drive<br><br>• SAP System: 18 GB disk space + 1.2 GB temporary disk space on separate disks<br><br>• For security reasons (system failure), the file systems must be distributed physically over at least 3 (recommended: 5) disks.<br><br>• SAP System: At least 256 MB RAM<br><br>• Disk space for swap: 3 * RAM + 500 MB<br><br>• Min. disk space for swap:<br><br>  - 32-bit SAP Kernel: 1.25 GB (for Digital UNIX: 1.5 GB)<br><br>  - 64-bit SAP Kernel: At least 20 GB is recommended for standard installations (for more information, see **SAP Note 153641**). If you want to install only a small system, contact your Hardware Partner for appropriate swap space values. |
| Software Requirements | • Operating system version: The supported operating system releases are listed in **SAP Note 85838**.<br><br>• Contact your operating system vendor for the latest OS patches.<br><br>• For the Oracle installation and importing Oracle patches, a C compiler and the `make` utility must be installed. *(Does not apply to Solaris.)*<br><br>• If application servers are installed decentralized, Network File System (NFS) is a requirement.<br><br>• Ensure that the necessary fonts/code pages and NLS are installed. |
| Other Requirements | • Ensure that no hostname is longer than 8 characters.<br><br>• Check your keyboard definitions.<br><br>• If you want to install a printer on the database server for the SAP system: Ensure that the printer can be accessed under UNIX. |

2. Check that the other requirements (network, dialog instance, operating system) are met.

1.3 Hardware and Software Requirements Check

# 1.3.2 Checking Requirements for a Standalone DB System

## Use

For the installation of a standalone database system, be sure to meet the minimal requirements listed in this section.

## Prerequisites

You are installing a standalone database system. That is, the central instance and the Oracle database are on the **different** host machines.

For the requirements of the central instance, see Checking Requirements for a Central or Dialog Instance [page 33].

## Procedure

1. Check that the database host machine meets the following requirements:

| Requirement Type | Requirement |
|---|---|
| Hardware Requirements | • CD drive <br><br> • 18 GB disk space + 1.2 GB temporary disk space on separate disks <br><br> • For security reasons (system failure), the file systems must be distributed physically over at least 3 (recommended: 5) disks. <br><br> • At least 256 MB RAM <br><br> • Disk space for swap: 3 * RAM + 500 MB <br><br> • Min. 1.25 GB disk space for swap (for Digital UNIX: 1.5 GB) |
| Software Requirements | • Operating system version: The supported operating system releases are listed in **SAP Note 85838**. <br><br> • Contact your operating system vendor for the latest OS patches. <br><br> • For the Oracle installation and importing Oracle patches, a C compiler and the `make` utility must be installed. *(Does not apply to Solaris.)* <br><br> • If application servers are installed decentralized, Network File System (NFS) is a requirement. <br><br> • Ensure that the necessary fonts/code pages and NLS are installed. |
| Other Requirements | • Ensure that no hostname is longer than 8 characters. <br><br> • Check your keyboard definitions. <br><br> • If you want to install a printer on the database server for the SAP system: Ensure that the printer can be accessed under UNIX. |

2. Check that the other requirements (network, dialog instance, operating system) are met.

## 1.3.3 Checking Requirements for a Central or Dialog Instance

### Use

For the installation of a dialog instance or a central instance without database, be sure to meet the minimal requirements listed in this section.

### Prerequisites

You are installing a dialog instance or a central instance without database for distributed SAP applications.

### Procedure

1.  Check that the host machine meets the following requirements:

| Requirement Type | Requirement |
|---|---|
| Hardware Requirements | • Disk space exclusively for the SAP System: <br><br> − Central Instance: At least 490 MB <br><br> − Dialog Instance (same platform as central instance): 520 MB <br><br> − Dialog Instance (different platform as central instance): 730 MB <br><br> • At least 256 MB RAM for the SAP System <br><br> • Disk space for swap: 3 * RAM + 500 MB <br><br> • Min. disk space for swap: <br><br> - 32-bit SAP Kernel: 1.25 GB (for Digital UNIX: 1.5 GB) <br><br> − 64-bit SAP Kernel: At least 20 GB is recommended for standard installations (for more information, see **SAP Note 153641**). If you want to install only a small system, contact your Hardware Partner for appropriate swap space values. |
| Software Requirements | • Operating system version: The supported operating system releases are listed in **SAP Note 85838**. <br><br> • Network File System (NFS) must be installed. |
| Other Requirements | • Ensure that no hostname is longer than 8 characters. <br><br> • Check your keyboard definitions. <br><br> • If you want to install a printer on the database server for the SAP system: Ensure that the printer can be accessed under UNIX. |

2.  Check that the other requirements (network, dialog instance, operating system) are met.

# 1.3.4 Checking Requirements for AIX

## Use

This description is intended to help you to perform the necessary checks. If in doubt, consult your system manuals and the documentation for your network software.

## Procedure

1. Check the host hardware requirements on AIX:

| Hardware Requirements | How to Check |
|---|---|
| Tape drive | EXAbyte 8mm drive with hardware compression is recommended. Capacity 5 GB. You can test the drive /dev/rmt0 as follows: **tar -cvf /dev/<tape_device> <test_file>** (The device name is always `rmt0` unless more than one tape drive exists) |
| CD drive | ISO 9660 compatible. Many CD drives can be configured, but not all can be mounted. Try to mount it. |
| Disks | For data security reasons, distribution over three disks is required (over five is recommended). Display available disks: **lspv** (disks marked `none` in the $3^{rd}$ column are unused) Display free space on a disk: **lspv -p <disk_name>** (areas marked `free` in the $2^{nd}$ column are unused) |
| RAM ( at least 256 MB) | Display RAM size (in KB): **lsattr -El sys0 -a realmem** |

2. Check the host software requirements on AIX:

| Software Requirements | How to Check |
|---|---|
| Operating system | Check the operating system version with the command: **lslpp -l bos.rte** Part of the output must be: bos.rte 4.3.2 (or a larger version number) |
| NFS | Check whether NFS is installed: **lslpp -l "bos.net.nfs.*"** Check whether NFS is running: **lssrc -g nfs** Then rpc.mountd and either biod or nfsd must have status activated. |

| NLS | Display which locales are available:<br>`locale -a`<br><br>The following files must be available: `de_DE.ISO8859-1`, `en_US.ISO8859-1`. |
|---|---|
| Additional Software | The following additional software components must be installed. To get an overview, use the following command as user `root`:<br>`lslpp -l | more` |
| | `bos.rte` (Base Operating System Runtime)<br><br>`bos.adt` (Base Application Development)<br><br>`bos.data` (Base Operating System Data)<br><br>`bos.sysmgt` (System Management)<br><br>`bos.diag.rte` (Hardware Diagnostics Database)<br><br>`bos.msg.en_US` (Base OS Runtime Messages - U.S. English)<br><br>`bos.net.nfs` (Network File System)<br><br>`bos.net.tcp` (TCP/IP)<br><br>`perfagent` (Performance Agent)<br><br>`bos.loc.iso.en_US` (Base System Locale Code Set - U.S. English)<br><br>`bos.loc.iso.de_DE` (Base System Locale Code Set - German)<br><br>`bos.iconv.de_DE` (Base Level Fileset (requ. for Local Code Set))<br><br>`bos.iconv.com` (Base Level Fileset (requ. for Local Code Set))<br><br>`devices.*` (Device Drivers for all installed Hardware)<br><br>`printers.rte` (Printer Backend (if Printer installed))<br><br>`X11.base` (AIXwindows Runtime)<br><br>`X11.apps` (AIXwindows Applications)<br><br>`X11.motif` (AIXwindows Motif)<br><br>`X11.fnt.iso1` (AIXwindows Latin 1 Fonts)<br><br>`X11.loc.en_US` (AIXwindows Locale - U.S. English)<br><br>`X11.msg.en_US` (AIXwindows Messages - U.S. English)<br><br>`X11.Dt` (AIXwindows Desktop)<br><br>`xlC.rte` (C Set ++ for AIX Application Runtime, Version 3.1.4.8 or higher)<br><br>A C linker is required (not a C compiler). A linker can be found in the `bos.rte.bind_cmds` fileset. A separate license is not required for the linker (beyond the AIX license). Use the following command to check the level and state of the linker:<br>`lslpp -L bos.rte.bind_cmds`<br><br>Additionally, check that all filesets are in a consistent state:<br>`lppchk -v` |

1.3 Hardware and Software Requirements Check

| Printer | Try to print a file:<br>`lp -d<printer_name> <test_file>`<br><br>Check the status of your spool and the printers:<br>`lpstat -t` |
|---------|-----------------------------------------------------------------|
| Keyboard | You can set the keyboard by typing the command<br>`smitty chkbd`<br><br>on the directly connected console.<br><br>You can select your keyboard under Motif by setting a language environment (`LANG`), for which an NLS component is installed. The settings will take effect after reboot. |
| Network | Test the network connection to the database server:<br>`/etc/ping  <db_server_name>  100  10` |

## 1.3.5 Checking Requirements for Compaq Tru64 UNIX

### Use

This description is intended to help you to perform the necessary checks. If in doubt, consult your system manuals and the documentation for your network software.

### Procedure

1.  Check the host hardware requirements on Compaq Tru64 UNIX:

| Hardware Requirements | How to Check |
|-----------------------|--------------|
| Tape drive | EXAbyte 8mm drive with hardware compression is recommended.<br><br>Capacity 5 GB.<br><br>You can test the drive /dev/rmt0 as follows:<br>**tar -cvf /dev/<dev_name> <test_file>**<br><br>(The device name is always `rmt0` unless more than one tape drive exists) |
| CD drive | ISO 9660 compatible. The CD drive must be connected locally to your central instance host. Many CD drives can be configured but not all can be mounted. Try to mount it. |
| Disks | For data security reasons distribution over three disks is required (over five is recommended). Display available disks:<br>`uerf -R -r 300 │ more`<br>(shows all devices recognized during startup)<br><br>or at boot prompt:<br>`>>>  SH DEV`  (information on type, size, port)<br><br>To display the partitioning use<br>`disklabel <dev_name>` (as shown by `uerf`, e.g. `rz6`) |

| RAM | Display RAM size (in MB):<br>`vmstat -P | head -2` |
|---|---|
| Processor | Only valid if your system has a Compaq Alpha Processor:<br><br>Processor version EV5/6 (with 400 MHz) or higher is recommended. See **SAP Note 165461**. |

2. Check the host software requirements on Compaq Tru64 UNIX:

| **Software Requirements** | **How to Check** |
|---|---|
| Operating system | Check the operating system version with the command:<br>`sizer -v` |
| C compiler | The output of<br><br>`setld -i │ grep OSFLIBA`<br>`setld -I │ grep OSFINCLUDE`<br><br>must contain, for example:<br><br>OSFLIBA440      installed…<br>OSFINCLUDE440   installed…<br><br>(The last three digits in the subset name are UNIX version dependant). |
| NLS | Enter the commands:<br>`setld -i │ grep OSFEURLOC4`<br><br>and check the output which should read, for example:<br>OSFEURLOC440  installed…<br><br>Display which locales are available：<br>`locale -a`<br><br>The following must be available: de_DE.ISO8859-1, en_US.ISO8859-1. |
| NFS | Check whether NFS is installed:<br>`setld -i │ grep NFS`<br><br>The output must contain<br>OSFNFS410  installed  NFS(tm)...<br><br>Check whether NFS is running:<br><br>`ps -ef │ grep nfsd`<br>`ps -ef │ grep portmap`<br>`ps -ef │ grep mountd`<br><br>Routing information:<br>`netstat -r`<br><br>You can use `/usr/sbin/nfssetup` to set up NFS. |

1.3 Hardware and Software Requirements Check

| Fonts | Check if the necessary X fonts are installed: `setld -i │ grep FONT` |
| | The output should contain, for example: |
| | `OSFFONT410 installed DECwindows 75dpi Fonts…` `OSFFONT15410 installed DECwindows 100dpi Fonts…` `OSFMITFONT410 installed X Fonts…` |
| Printer | Try to print a file: `lpr -P<printer_name> <test_file>` |
| | Check the status of your spool and the printers: `lpc stat` |
| Keyboard | Use the Session Manager to set the correct keyboard as follows: |
| | *Options* → *Keyboard* |
| | Choose the appropriate keyboard and confirm with *OK* or *Apply*. |
| | Save settings with |
| | *Options* → *Save Current Settings* |
| Network | Test the network connection to the database server: `ping  -c  10  <db_server_name>` |

## 1.3.6 Checking Requirements for HP-UX

### Use

This description is intended to help you to perform the necessary checks. If in doubt, consult your system manuals and the documentation for your network software.

### Procedure

1.  Check the host hardware requirements on HP-UX:

| Hardware Requirements | How to Check |
| --- | --- |
| Tape drive | EXAbyte 8mm drive with hardware compression is recommended. Capacity 5 GB |
| | You can test the drive /dev/rmt/0m as follows: `tar -cvf /dev/rmt/<tape_device> <test_file>` |
| CD drive | ISO 9660 compatible. The CD drive must be connected locally to your central instance host. Many CD drives can be configured but not all can be mounted. Try to mount it. |

| Disks | For data security reasons distribution over three disks is required (over five is recommended). |
|---|---|
| | Display available disks:<br>`ioscan -f -C disk`  (the CD-ROM is also displayed) |
| | To find out the size of the disks, use the command diskinfo:<br>`diskinfo /dev/rdsk/<dev_file>` |
| RAM | To display the RAM size, run SAM and choose: |
| | → *Performance Monitors → System Properties → Memory* |

2.  Check the host software requirements on HP-UX:

| Software Requirements | How to Check |
|---|---|
| Operating system | Check the operating system version with the following command:<br>`uname -r` |
| Fileset | *Oracle only*<br>Make sure that the fileset LANG-MIN is installed. Enter<br>`swlist -v │ grep -i lang-min` |
| | If nothing is displayed, the fileset is not installed yet. |
| NFS | The NFS driver must be in the kernel. You can check this using the current kernel configuration files:<br>`grep nfs /stand/system` |
| | Check whether NFS is running: |
| | `ps -ef │ grep nfsd`<br>`ps -ef │ grep portmap (HP-UX 10.xx)`<br>`ps -ef │ grep rpcbind (HP-UX 11.xx)` |
| | `grep NFS_C /etc/rc.config.d/nfsconf` |
| | `grep NFS_S /etc/rc.config.d/nfsconf` |
| | Either `NFS_CLIENT`, `NFS_SERVER` or both should be set to **1**. You can use SAM to start NFS or/and add the driver to the kernel. |
| NLS | Check whether National Language Support (NLS) is installed.<br>`swlist -v │ grep -i nls` |
| | The output should contain the string `NLS-AUX` ... |
| | Display which locales are available:<br>`locale -a` |
| | The following files must be available: `de_DE.iso88591`, `en_US.iso88591`. |

1.3 Hardware and Software Requirements Check

| C++ Runtime Environment | Check whether the C++ runtime environment is installed:<br>`swlist -l product │ grep PHSS`<br><br>This command should show that the following patches are installed:<br><br>HP-UX 10.xx:<br><br>    `PHSS_12609      HP aC++ core library components`<br>    `PHSS_10053      HP aC++ dld.sl performance fix`<br><br>HP-UX 11.xx:<br><br>    `PHSS_13390      HP aC++ runtime library components`<br>    `                        (A.03.05)`<br><br>A newer version of the patches listed here may exist. Contact your HP Response Center for information on the patches that are necessary for your machine. |
|---|---|
| Fonts | The directory `/lib/X11/fonts` contains the available fonts.<br><br>You can choose these fonts in your default profiles for X11 and VUE.<br><br>Example: `iso_8859.1` or `hp_roman8` |
| Printer | Try to print a file:<br>`lp -d<printer_name>  <test_file>`<br><br>Check the status of your spool and the printers:<br>`lpstat -t` |
| Keyboard | You can set the keyboard on an ASCII console as follows. A configuration menu bar is activated via the User/System key:<br><br>*config keys  →  terminal config*<br><br>Select *Default Values* or make your selection in the fields *Keyboard* and *Language* . |

## 1.3.7 Checking Requirements for Linux

### Use

This description is intended to help you to perform the necessary checks. If in doubt, consult your system manuals and the documentation for your network software.

### Procedure

1. Check the host hardware requirements on Linux:

| Hardware Requirements | How to Check |
|---|---|
| Tape drive | EXAbyte 8mm drive with hardware compression is recommended Capacity 5 GB<br>You can test the drive `<dev_name>` as follows:<br>`tar  -cvf  /dev/<dev_name>  <test_file>` |
| CD drive | ISO 9660 compatible. The CD drive must be connected locally to your central instance host.<br>Many CD drives can be configured but not all can be mounted. Try to mount it. |
| Disks | For data security reasons distribution over three disks is required (over five is recommended).<br>Display available disks:<br>`cat /proc/partitions` |
| RAM | Display RAM size (in KB):<br>`free` |

2. Check the host software requirements on Linux:

| Software Requirements | How to Check |
|---|---|
| Operating system | Check the operating system version with the command:<br>`cat /proc/versions` |
| C compiler | `C-Development Package` of RedHat 6.0 must be installed. |
| NLS | Display which locals are available：<br>`locale -a`<br><br>The following must be available: de_DE, en_US |
| NFS | Check wether NFS is running:<br>`/etc/rc.d/int.d/nfs status`<br>`/etc/rc.d/int.d/portmap status`<br><br>Routing information:<br>`netstat -r` |
| Network | Test the network connection to the database server:<br>`ping  -c  10  <db_server_name>` |

1.3 Hardware and Software Requirements Check

| Printer | Try to print a file:<br>`lpr -P<printer_name>  <test_file>`<br><br>Check the status of spooling queues and printers:<br>`lpc stat` |
|---------|------------------------------------------------------------------------------------------------------------------------------------|

## 1.3.8 Checking Requirements for Reliant (RM300/400/600)

### Use

This description is intended to help you to perform the necessary checks. If in doubt, consult your system manuals and the documentation for your network software.

### Procedure

1.  Check the host hardware requirements on Reliant:

| Hardware Requirements | How to Check |
|-----------------------|--------------|
| Tape drive | EXAbyte 8mm drive with hardware compression is recommended. Capacity 5 GB<br><br>You can test the drive as follows:<br>`tar -cvf  /dev/ios0/<tape_device>  <test_file>` |
| CD drive | ISO 9660 compatible. The CD drive must be connected locally to your central instance host. |
| Disks | For data security reasons distribution over three disks is required (over five is recommended). To display the available disks:<br>`/sbin/autoconf -l │ grep disk`<br><br>All disks and CD-ROM drives will be displayed.<br><br>To see the disk size:<br>`/sbin/dkpart -l /dev/ios0/rsdiskXXXsX`<br><br>or display the used areas with:<br>`/sbin/dkmap` |
| RAM | Display the RAM size (in MB):<br>`uname -M`<br><br>The command displays the number of CPUs and the RAM size, separated by a slash (/), for example `2/512`. |

2. Check the host software requirements on Reliant:

| Software Requirements | How to Check |
|---|---|
| Operating system | Check the operating system version and make sure that the latest EKS patches are installed.<br><br>For the OS version, enter:<br>`uname -rv` |
| Patches | Verify that the latest patches for your OS version are installed. Consult the technical support at SIEMENS(ITS). |
| NFS | Check whether your computer is configured for Network File System (NFS).<br><br>`pkginfo | grep -i nfs` (whether NFS is installed)<br>`ps -ef | grep nfsd` (whether NFS processes are running)<br>`ps -ef | grep mountd`<br>`ps -ef | grep inetd` |
| NLS | Display which locales are available:<br>`locale -a`<br><br>The following must be available: de_DE.88591, en_US.88591. |
| C++ Runtime System | Check whether the ReliantUNIX C++ Runtime System is installed:<br>`pkginfo -l CDS++RTS` |
| Fonts | To check the installed fonts:<br><br>`pkginfo -l siwinfs`<br>`pkginfo -l sifosrc` |
| Printer | Try to print a file:<br>`lp  -d<printer_name>  <test_file>`<br><br>Check the status of your spool and the printers:<br>`lpstat --t` |
| Network | Test the network connection to the database server:<br>`/usr/sbin/ping  <DB-SERVER>  100  10` |

## 1.3.9 Checking Requirements for SEQUENT

### Use

This description is intended to help you to perform the necessary checks. If in doubt, consult your system manuals and the documentation for your network software.

### Procedure

1.  Check the host hardware requirements on SEQUENT:

| Hardware Requirements | How to Check |
|---|---|
| Tape drive | EXAbyte 8mm or HP 4mm drives with hardware compression are recommended.<br><br>You can test the drive /dev/rmt/<dev> as follows:<br>`tar -cvf /dev/rmt/<tape_device> <test_file>`<br><br>where tape_device can be determined from:<br>`/etc/dumpconf -d \| grep "^t"` |
| CD drive | ISO 9660 compatible. The CD drive must be connected locally to your central instance host. Many CD drives can be configured, but not all can be mounted. Try to mount it. |
| RAM | To display the RAM size:<br>`/etc/showcfg` |
| Disks | Display available disks and sizes:<br>`/etc/diskid`<br><br>To find out the size of the disk partitions, use the command diskinfo:<br>`/etc/prtvtoc <disk>` |
| Printer | Try to print a file:<br>`lp -d<printer_name>  <test_file>`<br><br>Check the status of your spool and the printers:<br>`lpstat -t` |

2.  Check the host software requirements on SEQUENT:

| Software Requirements | How to Check |
|---|---|
| Operating system | Check the operating system version with the following command:<br>`uname -v` |
| Kernel Parameters | To check kernel parameters:<br>`/etc/sysdef \| more` |
| ANSI C compiler | To check the defaults and the version of compiler:<br>`cc -### foo.c` |

| NLS | Display which locales are available:<br>`locale -a`<br><br>The following file must be available: `en_US`. |
|---|---|
| Network | Test the network connection to the database server:<br>`/etc/ping <hostname or IP address>` |

## 1.3.10 Checking Requirements for Solaris

### Use

This description is intended to help you to perform the necessary checks. If in doubt, consult your system manuals and the documentation for your network software.

### Procedure

1. Check the host hardware requirements on Solaris:

| Hardware Requirements | How to Check |
|---|---|
| Tape drive | 14 GB EXAbyte 8mm drive with hardware compression is recommended. You can test the drives as follows:<br>`/usr/bin/mt -f /dev/rmt/[0,1,2,..][n]  status`<br><br>This tells you the type of drive and whether a tape is loaded.<br><br>Alternatively, you can use:<br>`/usr/bin/tar -cvf /dev/rmt/[0,1,2,..]  \`<br>`     [n] <testfile>` |
| CPU | Display the status and number of existing CPUs:<br>`/usr/sbin/psrinfo` |
| RAM | Display the available working memory:<br>`/usr/sbin/prtconf  |grep  Memory` |
| Disks | Device name:<br>`dev/[r]dsk/c[0-39]t[0-14]d[0-4]s[0-7]`<br>Parameters:<br><br>  `rdsk` use for raw devices<br>  `c[0-39]` number of the controller<br>  `t[0-14]` SCSI target<br>  `d[0-4]` position in tray<br>  `s[0-7]` number of the partition (`s2` is always the full disk)<br><br>Display the partitioning, for example:<br>`/usr/sbin/prtvtoc  <rawdevice>`<br><br>Change the partitioning:<br>`/usr/sbin/format` |

1.3 Hardware and Software Requirements Check

| Volume Manager | Mount a cdrom: `/bin/volcheck` |
| --- | --- |
| | Dismount and eject: `/usr/bin/eject` |
| | Test whether the volume manager is running: `/usr/ucb/ps -ef │grep vold` |
| | Start the volume manager: `/usr/sbin/vold &` |
| Printer | Status of the spool for all printers in use: `/bin/lpstat -t` |
| | To set up a printer: `/bin/admintool` |

2. Check the host software requirements on Solaris:

| **Software Requirements** | **How to Check** |
| --- | --- |
| Operating system | Check the operating system version with the command: `/bin/uname -r` |
| Patches | Check the installed patches: `/bin/showrev -p` |
| NLS | Display which locales are available： `locale -a` |
| | The following files must be available: iso_8859_1, en_US. |
| C++ Runtime Environment | The Shared Library Patch for C++ must be installed. |
| Networking | List of all active network devices:<br><br>`/usr/ucb/netstat -I`<br>`/usr/sbin/ifconfig -a`<br><br>Routing information:<br>`/usr/ucb/netstat -r`<br><br>Check whether ISDN is installed:<br>`/bin/pkginfo │grep SUNWisdn`<br><br>Status of the ISDN connection:<br>`/opt/SUNWconn/bin/isdnstat`<br><br>Check whether NFS is running:<br><br>    NFS client<br><br>      `/usr/ucb/ps -ef │grep nfs`<br><br>    The processes statd and lockd must run. Start them with: |

| | |
|---|---|
| | `/etc/init.d/nfs.client  start`<br><br>NFS server<br><br>`/usr/ucb/ps  -ef │grep  mountd`<br><br>Start it with:<br><br>`/etc/init.d/nfs.server  start`<br><br>Test the network connection to the database server:<br>`/usr/sbin/ping  <DB-SERVER>` |
| Solstice DiskSuite | Check whether Solstice DiskSuite is installed:<br>`/bin/pkginfo  │  /usr/bin/grep  SUNWmd`<br><br>For a detailed description, see the standard documentation. |
| Veritas Volume Manager | If you don't use Solstice DiskSuite, check whether Veritas Volume Manager is installed:<br>`/bin/pkginfo  │  /usr/bin/grep  SUNWvx`<br><br>For a detailed description, see the standard documentation. |

# 2. Installation Preparations

## Purpose

Before you start the installation, you must prepare the operating system and the SAP System. You perform preparations on hosts that are to be used with the SAP System.

> The installation preparations apply to all instance types (central, dialog, and database instance, and standalone gateway), unless indicated otherwise.

## Prerequisites

You have finished the planning phase.

> AIX only
> All operating system dependent steps for AIX can be done as follows:
> - Manually by entering AIX commands with the appropriate options
> - Using SMIT, a menu-driven system administration tool
>
> The text for AIX steps describes the use of the AIX tool SMIT. If problems arise with the function keys, you can also use ESC and the corresponding number to simulate the function key (for example, `F4 = ESC 4`).

## Process Flow

> Use `csh` or `sh` as login shell during the installation. The `ksh` (Korn shell) is no longer supported by SAP.

To prepare the installation, perform the tasks described below. Consult OS dependent information for each of these tasks.

1. You adapt UNIX kernel parameters and swap space [page 49].

2. You choose an SAP System name [page 49].

3. You set up file systems and raw devices [page 50]

4. You set up the transport directory [page 51].

5. You set up an installation directory [page 52].

# 2.1 Adapting UNIX Kernel Parameters and Swap Space

## Use

You need to check and, if necessary, modify the UNIX kernel of your host as described in Checking and Modifying the UNIX kernel [page 153] (AIX: Creating UNIX Groups and Users [page 211]).

The swap space size is listed in Hardware and Software Requirements Check [page 29].

You use the *memlimits* tool to check the following parameters:

• Maximum heap size (maximum data segment size per process)

• Maximum mapped file size

• Maximum protectable size

• Maximum address space per process

• Total available swap space

## Procedure

1. Unpack the file `memlimits`:

   ```
   /<KERNEL-CD>/UNIX/<OS>/CAR -xf \
        /<KERNEL-CD>/UNIX/<OS>/SAPEXE.CAR memlimits
   ```

2. Start `memlimits` by entering one of the following commands:

   – For a 32-bit SAP kernel, enter:  **./memlimits**

   - For a 64-bit SAP kernel, enter:  **./memlimits -l 20000**

3. If error messages occur, increase your swap space and rerun `memlimits` until there are no more errors.


# 2.2 Choosing an SAP System Name

## Use

You need to choose a name for your SAP System. This does **not** apply when you install a dialog instance.

## Procedure

Choose an SAP System name (SAPSID). The name for your SAP System must be unique throughout your organization and must consist of exactly three alphanumeric characters. Only uppercase letters are allowed. The first character must be a letter (not a digit).

Since the following names are reserved, you cannot assign them to your SAP System:

ADD ALL AND ANY ASC B20 B30 BCO BIN COM DBA END EPS FOR GID IBM INT KEY LOG MON NOT OFF OMS P30 RAW ROW SAP SET SGA SHG SID SQL SYS TMP UID VAR

2.3 Setting Up File Systems and Raw Devices

> ⚠️
>
> Choose your SAP System name carefully. Renaming is complicated and requires you to re-install the SAP system.

# 2.3 Setting Up File Systems and Raw Devices

## Use

You need to set up the file systems and/or raw devices for the SAP System and the database. For more information about the required file systems, see *Installation Planning*.

The creation and mounting of file systems and the creation of raw devices are described in File Systems, Raw Devices and Swap Space [page 168].

> ▪●≫
>
> The listed file system sizes are SAP requirements. Depending on your operating system, you might have to add space for administrative purposes.

## Prerequisites

The file system `<sapmnt>/<SAPSID>` is physically stored on the central instance host.

## Procedure

1. Export the file system `<sapmnt>/<SAPSID>` in read/write mode to all dialog instance hosts and in read-only mode to all UNIX frontends.

   > ▪●≫
   >
   > When installing a dialog instance on the same hardware platform as the central instance, you do not need to create the file system `<sapmnt>/<SAPSID>`. You can mount the directories that reside in this file system from the central instance host using Network File System (NFS).
   >
   > The file system `/usr/sap/<SAPSID>` must reside on a local disk. `/usr/sap` **cannot** be a softlink.

2. Set permissions for the directories `<sapmnt>` and `/usr/sap` to 775.

# 2.4 Setting Up the Transport Directory

## Use

In an SAP network there must be a global directory, called `/usr/sap/trans`, for the transport of objects between SAP Systems.

You must create this directory on one SAP instance host in the SAP network (the transport host). It must be accessible by every host belonging to this SAP network on which an SAP instance is installed. The path on every host must be `/usr/sap/trans`.

The directory `/usr/sap/trans` can be a softlink pointing to the transport directory, or it can be mounted using Network File System (NFS). It should be exported in read/write mode on the transport host using NFS and mounted on all central and dialog instance hosts.

## Procedure

To set up the transport directory, you perform the following steps.

### Creating the Transport Directory

If the transport directory does not yet exist in your SAP network, perform the following steps:

1. Log on to the central instance host as user `root`.

2. Create the file system.

3. Mount the file system at `/usr/sap/trans`.

### Exporting the Transport Directory

1. Log on to the central instance host on which `/usr/sap/trans` resides as user `root`.

2. Make sure that `/usr/sap/trans` belongs to the group `sapsys` and has the permissions `775`.

3. Export the directory using Network File System (NFS).

For more information, see OS-Dependent Installation Steps on UNIX [page 143].

> For security reasons, set the permissions of the directory `/usr/sap/trans` to `771` after the installation.

### Mounting the Transport Directory

1. Log on as user `root` to the central or dialog instance host on which `/usr/sap/trans` is to be mounted.

2. Create the mount point `/usr/sap/trans`.

3. Mount `/usr/sap/trans` using Network File System (NFS) from the exporting host.

4. Check that the user `root` has write permissions:
   ```
   touch  /usr/sap/trans/write_test
   rm  /usr/sap/trans/write_test
   ```

For more information, see Mounting Directories via NFS [page 202].

2.5 Setting Up an Installation Directory

# 2.5 Setting Up an Installation Directory

## Use

Create a **new** installation directory every time you start R3SETUP with another service (that is, with another command file identified by the ending `.R3S`). Otherwise, old log and command files could get lost.

> ⚠️
>
> SEQUENT (DYNIX/ptx), ReliantUNIX and SOLARIS
> Do **not** use `/tmp` and its subdirectories because they are removed when the system is rebooted. For more information, see Preparations [page 146], section "Installation Directory" or "Required Directories".

## Procedure

1. Set up an installation directory with 50 MB of free space available.

   You can choose any name for the installation directory. In this documentation, `<INSTDIR>` refers to the installation directory.

2. Set the permissions of the installation directory to `777`.

   > ⚠️
   >
   > Because R3SETUP performs various installation steps with different user IDs, the installation directory requires write permissions for **all** users.

# 3. The SAP System Installation

## Purpose

Once you have planned and prepared the installation, you can begin with the actual installation steps. In this core part of the installation process, you set up the main components that enable the operation of an SAP System. These are:

- The central instance

- The database instance

- If required, one or more dialog instances

- If required, a standalone gateway instance

A minimum SAP System consists of a central instance and a database. Optional dialog instances may be installed on different hosts once the installation of the central instance **and** the database has been completed.

A standalone gateway can be installed on its own. It does not require a central instance to be installed.

**Central or Standalone Database System Installation**

You can install the core part of the SAP System – that is, the central instance and database – in one of the following ways:

- As a **central** system

  In this type of configuration, you install central instance and database instance on a **single** host. This is the most commonly implemented configuration for an average-size system.

- As a **standalone database** system

  In this type of configuration, you install the central instance on **one** host, and the database instance on a **second** host. This is usually implemented for larger systems with a high throughput.

The best approach for your environment depends on various factors, such as the type of applications you intend to deploy, the size of the anticipated workload, and the number of expected concurrent users.

**Overview of the Installation Components**

The following components support the installation:

- R3SETUP: Tool that performs the actual installation.

- INSTGUI: Frontend for R3SETUP that enables you to:
    - Watch the installation progress
    - Continue the installation after manual installation steps
    - View log messages
    - Obtain help on installation steps

- Shell script: Copies R3SETUP, INSTGUI and the installation command file to your hard disk.

- Command file: Controls the installation process. For every installation step there is a corresponding section in the command file that holds all information required for this step.

For more information, see [The R3SETUP Tool [page 116]](#).

## Prerequisites

You have:

- Decided in a sizing phase, well in advance of the actual installation procedure, whether a central system or standalone database system best meets your business requirements.

- Adapted the UNIX kernel parameters and the swap space settings

- Created the required file systems and/or raw devices

- Mounted the file system `/usr/sap/trans` from the transport host (not necessary for a standalone gateway)

- Set up an installation directory `<INSTDIR>`

For more information, see *Installation Planning* and *Installation Preparation*.

## Process Flow

1. You install the central instance and database in one of the following ways:

   − On a single host as a central system

   − On two different hosts as a standalone database system

2. If required, you install one or more dialog instances on additional hosts in the system

3. You install the SAP frontends.

   Refer to the documentation *Installation of the SAP Frontend Software for PCs.* This is included in the installation package.

   No UNIX frontend available for 4.6B
   The development of UNIX frontends was stopped as of Release 4.5B. Instead, a platform-independent Java implementation is being developed that will also cover UNIX platforms. The SAP GUI for Java is not yet available for Release 4.6B. 32-bit Windows is supported as a frontend platform.
   For more information, see **SAP Note 26417** (and the related notes).

4. If required, you install a standalone gateway instance.

# 3.1 Central System Installation

## Purpose

When a small to medium-sized SAP System is set up, the core parts of the system, namely the central instance and database, are generally installed on a single machine.

## Process Flow

The following graphic illustrates the actions required to install the central and database instance on a single machine.
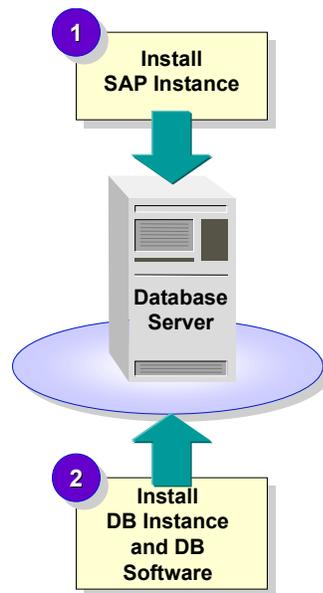
3.1 Central System Installation

# 3.1.1 SAP Instance Installation for a Central System

## Purpose

You want to install an SAP instance as part of the central system installation.

## Process Flow

1.  Mount the Kernel CD-ROM [page 57].

2.  Run the shell script INSTTOOL.SH [page 57].

3.  Customize the installation command file [page 57] if required.

4.  Configure tablespaces [page 58] if required.

5.  Start INSTGUI [page 58].

6.  Set the library path environment variable [page 59].

7.  Run R3SETUP [page 59].

8.  Set the password for user <sapsid>adm [page 60].

9.  AIX only: Check the settings for OS users [page 60].

Do not log on to the SAP System during the installation
The SAP System is not in a complete and consistent state before the installation
is completed. Do not log on until the installation is finished.

## Mounting the Kernel CD-ROM

1. Log on as user `root`.

2. Mount the `SAP Kernel` CD-ROM as described in <u>Mounting a CD-ROM [page 148]</u>.

> Mount the CD-ROM locally. It is not recommended to use NFS.

## Running the Shell Script INSTTOOL.SH

1. Log on as user `root`

2. Change to the installation directory: **cd &lt;INSTDIR&gt;**

3. Start the shell script from the CD by entering:
   **&lt;KERNEL CD&gt;/UNIX/INSTTOOL.SH**

## Customizing the Installation Command File

After you have run the shell script, you may modify the command file manually.

> You do not need to customize the installation command file in a standard installation.

Command files can be recognized by the file ending `.R3S`. If you want to edit the command file, see <u>R3SETUP Command Files [page 119]</u>.

> The section `[Z_ORACREATETSP]` is no longer located in the command file `<SERVICE>.R3S` as of R/3 Release 4.6A. See <u>Configuring Tablespaces [page 58]</u> if you want to change tablespace configuration.

You must save the modified command file before starting R3SETUP. If you change the command file after R3SETUP has been started, the changes have no effect.

> If you have several CD-ROM drives available, you can enter the CD mount points in the command file before starting R3SETUP. See <u>Required CD-ROMs for Database Installation [page 62]</u>.

# Configuring Tablespaces

## Use

This procedure tells you how to alter the configuration of tablespaces in your Oracle database. During installation, R3SETUP uses the file `DBSIZE.TPL` (on `EXPORT CD 1`) to create a profile to build the database. For more information, see the step `DBCREATETSP_IND_ORA` and the class `CoraCreateTsp` in the online documentation for R3SETUP.

To change the sizes of the tablespaces, you copy the `DBSIZE.TPL` file from the `EXPORT CD 1` to your installation directory and then edit it as required. R3SETUP always looks for the `DBSIZE.TPL` file in the installation directory first.

## Prerequisites

Be sure to complete this procedure **before** starting R3SETUP.

## Procedure

1.  Mount the `EXPORT CD 1`.

2.  Copy the `DBSIZE.TPL` file to the installation directory as follows:
    **`cp <EXPORT-CD 1>/DB/ORA/DBSIZE.TPL <INSTDIR>`**

3.  Edit the `DBSIZE.TPL` file in the installation directory as required.

    Do **not** change tablespace names. When you upgrade the database later on, the original tablespace names are required.

# Starting INSTGUI

If you want to use INSTGUI, the graphical user interface for R3SETUP, and it has not been started by the shell script, you need to start it **before** starting R3SETUP. To do this, enter the command:
**`cd <INSTDIR>; ./INSTGUI`**

You can start INSTGUI on a remote computer.

    If you are using INSTGUI, make sure that your `DISPLAY` environment variable is set correctly.

See for details and for information on using INSTGUI.

# Setting the Library Path Environment Variable

## Use

You need to set the library path environment variable of user `root` **before** starting R3SETUP.

## Procedure

Set the library path environment variable according to the following table, where `<SUFFIX>` is

- `32` for a 32-Bit SAP System Kernel

- `64` for a 64-Bit SAP System Kernel

**Name and Value of Library Path Environment Variable**

| Operating System | Variable Name | Variable Value |
|---|---|---|
| AIX 32-Bit | `LIBPATH` | `/sapmnt/<SAPSID>/exe: \` <br> `/oracle/805_32/lib` |
| AIX 64-Bit | `LIBPATH` | `/sapmnt/<SAPSID>/exe: \` <br> `/oracle/805_64/lib64` |
| HP-UX 10.20 | `SHLIB_PATH` | `/sapmnt/<SAPSID>/exe: \` <br> `/oracle/805/lib` |
| Other HP-UX versions | `SHLIB_PATH` | `/sapmnt/<SAPSID>/exe: \` <br> `/oracle/805_<SUFFIX>/lib` |
| All other UNIX operating systems | `LD_LIBRARY_PATH` | `/sapmnt/<SAPSID>/exe: \` <br> `/oracle/805_<SUFFIX>/lib` |

If you restart R3SETUP at a later time, make sure the variable is still set.

# Running R3SETUP for Central System Installation

## Use

If you install the central instance and the database on the same host, use the command file `CENTRDB.R3S` instead of `CENTRAL.R3S` to install the central instance. Controlled by this command file, R3SETUP will continue with the database installation once the central instance is installed.

It is **not** possible to install the central instance and the database on the same host using the command files `CENTRAL.R3S` and `DATABASE.R3S`.

## Procedure

1. Start R3SETUP as user `root`. Enter:
   **cd <INSTDIR>; ./R3SETUP -f CENTRDB.R3S**

2. When you are prompted for the version of the Oracle server software, make sure that you enter the correct version.

3.1 Central System Installation

3.  R3SETUP stops to let you install the database software. You can either stop R3SETUP, or perform the following steps and install the database software in a separate window and then continue R3SETUP.

The progress of the installation is displayed in INSTGUI if it was started.

Error messages, warnings and further information are written to the log file `CENTRDB.log`.

We recommend that you check the log file for warnings. You can navigate through the log messages shown in the log view of INSTGUI.

If problems with R3SETUP occur, consult the R3SETUP Troubleshooting [page 126] section.

### Result

Perform the following steps that are necessary for your operating system to complete the central system installation. After you have installed the database, continue/restart R3SETUP as described in the following sections to finish the installation.

## Setting the Password for User <sapsid>adm

R3SETUP has created the OS user `<sapsid>adm`. Before you can log on as `<sapsid>adm`, you must set a password for this user:

1.  Log on as user `root`

2.  Set the password with:
    **`passwd <sapsid>adm`**

## Checking Settings for OS Users (AIX only)

Check and, if necessary, modify the settings for the OS user `root` and users `<sapsid>adm` and `ora<sapsid>` that were created by R3SETUP. See Creating UNIX Groups and Users [page 211] for further information.

## 3.1.2 Oracle Database Instance Installation

### Purpose

You want to install the Oracle database instance as part of the Central System Installation.

### Prerequisites

1. You have created the required file systems and/or raw devices for the database.

2. You have set up an installation directory `<INSTDIR>`.

3. You have installed the central instance. R3SETUP may be still running.

### Process Flow

**Preparation**

You need some CD-ROMs for the database installation. During the installation process, R3SETUP requests you to insert these CD-ROMs and to enter the mount points. The required CD-ROMs are listed in **Required CD-ROMs for Database Installation [page 62]**.

If you have several CD-ROM drives available, you can enter the CD mount points in the command file before starting R3SETUP: Open the command file `CENTRDB.R3S` with an editor. Complete the lines that begin with `1_LOCATION`, `2_LOCATION`, and so on, of the section `CDSERVER_IND_ORA`. Mount the CDs at the mount points.

**Installation**

To install the Oracle database instance, perform the following tasks:

1. Mount the Kernel CD-ROM [page 62] if it has not been mounted yet.

2. Set the password for the user ora<sapsid> [page 62].

3. AIX only: Start the pre-installation script rootpre.sh [page 63].

4. Install the Oracle DB software:

   a. If you want to install Oracle DB software for Oracle DB version 8.0.x, see Installing the Oracle DB Software with orainst [page 64].

   b. If you want to install Oracle DB software for Oracle DB version 8.1.x, see Installing the Oracle DB Software with runInstaller [page 66].

5. Create and load the database with R3SETUP [page 69].

6. If required, update MNLS tables [page 69].

7. Run R3SETUP for RFC installation [page 70].

**Troubleshooting**

If you encounter any problems during the database software installation, consult the troubleshooting [page 125] section.

3.1 Central System Installation

# Required CD-ROMs for Database Installation

## Definition

The CD-ROMs are required for the installation.

**Required CD-ROMs**

| Key requested by R3SETUP | Mount point to be entered |
|---|---|
| 1_LOCATION | Path to KERNEL CD, for example /sapcd1 |
| 2_LOCATION | Path to RDBMS CD, for example /sapcd2 |
| 3_LOCATION | Path to EXPORT CD 1, for example /sapcd3 |
| 4_LOCATION | Path to EXPORT CD 2, for example /sapcd4 |
| 5_LOCATION | Path to EXPORT CD 3, for example /sapcd5 |

There is **no** Report Load CD needed and shipped for this release.

# Mounting the Kernel CD-ROM

1. Log on as user root.

2. Mount the SAP Kernel CD-ROM as described in Mounting a CD-ROM [page 148].

Mount the CD-ROM locally. It is not recommended to use NFS.

# Setting the Password for User ora&lt;sapsid&gt;

R3SETUP has created the user ora&lt;sapsid&gt;. Before you can log on as ora&lt;sapsid&gt;, you must set a password for this user:

1. Log on as user root

2. Set the password with:
   **passwd ora&lt;sapsid&gt;**

# Starting the Script rootpre.sh (AIX only)

## Use

The script `rootpre.sh` must be executed in order to install and activate AIX specific kernel extensions to activate asynchronous I/O.

## Prerequisites

This section only applies if your operating system is AIX.

## Procedure

1. Log on as user `root`

2. Change to the `orainst` installation directory:
   **cd /oracle/<SAPSID>/orainst**

3. Using a `cshell`, set the language environment variable:
   **setenv LANG En_US**

4. Run the pre-installation script
   **sh ./rootpre.sh**

> ■●⇒
>
> Check if the Asynchronous I/O is installed and activated. Enter
> **lsdev -C -l aio0**  which should put out
> aio0 Available Asynchronous I/O
> Otherwise install and activate the Asynchronous I/O using smit
> (*Devices → Asynchronous I/O*) and reboot your machine.

# Oracle DB Software Installation

If you want to install Oracle DB software for Oracle DB version 8.0.x, see Installing the Oracle DB Software with orainst [page 64].

If you want to install Oracle DB software for Oracle DB version 8.1.x, see Installing the Oracle DB Software with runInstaller [page 66].

# Installing the Oracle DB Software with orainst

## Use

The Oracle software for Oracle DB version 8.0.x is installed with the Oracle tool orainst.

If you want to install Oracle DB version 8.1.x, see <u>Installing the Oracle DB Software with runInstaller [page 66]</u>.

## Prerequisites

Compaq Tru64 UNIX and SEQUENT (DYNIX/ptx) only:
Make sure that there are at least 25 MB of free space on /tmp.

## Procedure

1. Log on as user ora<sapsid>.

2. Set the following environment variables according to the table "Recommended Terminal Types" below (use a cshell):

```
setenv TERM <Terminal type>
setenv ORACLE_TERM <Terminal type>
```

**Recommended Terminal Types**

| OS | Terminal with Graphical User Interface (GUI) | Alphanumeric Console | PC |
|---|---|---|---|
| AIX | vt100 | 3151 | vt100 |
| Compaq Tru64 UNIX | vt100 | vt100 | vt100 |
| HP-UX | hp / hpterm | hp | vt100 |
| Linux | xterm | vt100 | vt100 |
| ReliantUNIX | vt100 | 97801 | vt100 |
| Sequent | vt100 | vt100 | vt220 |
| Solaris | vt100 | vt100 | vt100 |

ReliantUNIX on Oracle 8.0.5 only:
Set the following environment variable before starting orainst:
Oracle 8.0.5: **setenv LD_LIBRARY_PATH /oracle/stage/stage_805/lib**

3. Start orainst in a terminal window of the size **24x80** characters or on the console with the following commands:

```
cd $ORACLE_HOME/orainst_sap
./orainst
```

4.  Confirm all screens with **ENTER** until the software is installed, then exit orainst.

> ■●≫
>
> Do not terminate orainst with **CTRL-C**.
> When entering data in orainst, use **CTRL-D** instead of **Backspace** to delete a
> character.
>
> ■●≫
>
> ReliantUNIX only:
> Create the following link by entering:
> **su root**
> **cd /usr/lib** (32 Bit Oracle Software)
> **cd /usr/lib64s** (64 Bit Oracle Software)
> **ln -s $ORACLE_HOME/lib/*so* .**
> See also **SAP Note 88884**.

5.  Before you continue, check that ora<sapsid> can connect to the database:

    **su - ora<sapsid> (if not already logged on as user ora<sapsid>)**
    **svrmgrl**
    SVRMGR> **connect internal**
    SVRMGR> **exit**

    If the connect succeeds without error messages, the database software installation was
    successful. Otherwise see <u>Database Installation Troubleshooting [page 127]</u>.

> ■●≫
>
> Compaq Tru64 UNIX only:
> After you have installed the database software with orainst and before you restart
> R3SETUP, enter the following commands as user ora<sapsid>:
> **cd $ORACLE_HOME/network/lib**
> **make -f ins_network.mk tnsping**
> **mv tnsping $ORACLE_HOME/bin**

6.  Continue with section *Creating and Loading the Database with R3SETUP.*

3.1 Central System Installation

# Installing the Oracle DB Software with runInstaller

## Use

The Oracle software for Oracle DB version 8.1.x is installed with the Oracle tool `runInstaller`.

If you want to install Oracle DB version 8.0.x, see Installing the Oracle DB Software with orainst [page 64].

## Procedure

1. Make sure the required memory space is available. The memory space required for the directory `/tmp` is specified in **SAP Note 181192**.

2. The user `ora<sapsid>` must have a write authorization for the directory `/oracle`. To check if this authorization exists, proceed as follows:

   a. Log on to your system with the user `ora<sapsid>`.

   b. Enter the following commands:

      **touch /oracle/write_test**
      **rm /oracle/write_test**

   If the user `ora<sapsid>` does not have a write authorization, log on to your system with the user `root` and enter the command:
   **chmod 775 /oracle**

3. Enter the following commands with the user ora<sapsid>:
   **umask**

   If `umask` does not return the value"022", set umask:
   **umask 022**

4. Set the `DISPLAY` environment variable to **<Computer name>:0**.

5. Set the library path environment variable according to the following table.

   | Operating system | Environment variable | Value |
   |---|---|---|
   | Linux | LD_LIBRARY_PATH | **$ORACLE_HOME/lib:/sapmnt/<SAPSID>/exe** |
   | Reliant UNIX | LD_LIBRARY_PATH | **$ORACLE_HOME/lib:/sapmnt/<SAPSID>/exe** or **$ORACLE_HOME/lib64:/sapmnt/<SAPSID>/exe** |
   | Other operating systems | Not required | Not required |

   If you restart R3SETUP at a later time, make sure the variable is still set.

6. Start the Oracle Universal Installer with the user ora<sapsid>:

   **cd /oracle/stage/815_32 bzw. 815_64**
   **./runInstaller**

When you start the Universal Installer, a series of windows appears:

a.   "*Welcome*"
     Continue by choosing *Next*.

b.   "*File Locations" -  "Destination...*"
     Check that the variable $ORACLE_HOME  is correctly set. The relevant directory must be empty! Continue by choosing *Next.*

c.   When you run the Universal Installer for the first time, the following menu appears:
     *"UNIX Group Name"*

     Enter **dba**  as the group name and confirm your entry by choosing *Next.*

     A dialog box appears.

     Execute the file **/tmp/OraInstall/orainstRoot.sh** with the user root, and confirm the dialog box by choosing *Retry*

d.   "*Available Products*"

     Select **Oracle 8i Enterprise Edition 8.1.5.0.0**  and confirm your selection choosing *Next.*

e.   "*Installation Types*"

     Select *Custom* as the installation type and continue by choosing *Next*.

f.   "*Available Product Components*"

     Select the products as follows: Deactivate **Oracle Product Options 8.1.5.0.0** and activate **all** options in **all** other categories. Confirm your selections by choosing *Next.*

g.   "*Component Locations*"

     Confirm this window by choosing *Next.*

h.   "*Upgrading or Migrating an Existing Database*"

        ▪●⟩

        If this step does not appear, continue with the next step.
     Upgrading or Migrating an Existing Database Database must **not** be activated.

     Continue by choosing *Next*.

i.   "*Create Database*"

     Select *No* and continue by choosing *Next*.

j.   "*Installing Legato Storage Manager*"

        ▪●⟩

        If this step does not appear, continue with the next step.
     Select *No* and confirm your selection by choosing *Next.*

k.   "*Oracle Protocol Support*"

     Select *TCP/IP* and continue by choosing *Next*.

3.1 Central System Installation

> l. "*Summary*"
>
>    Check the entries under *Summary*. If all entries are correct, choose *Install*.
>
> m. When the *Install* step has been completed, a dialog box appears.
>
>    Execute the file `$ORACLE_HOME/root.sh` with the user root, and confirm the dialog box by choosing *Ok*. Then continue by choosing *Next.*
>
> n. Cancel **all** other tools that the system automatically calls by choosing *Cancel* and then *Ok*.
>
> o. Exit the Oracle Universal Installer by choosing *Exit* and then *Yes.*

7. Log on at the operating system level with the user `ora<sapsid>`. Refer to **SAP Note 181195** for the number of the current patchset and the import instructions.

   ➠

   > If the Oracle RDBMS CD already contains the patchset, it can be found under `/oracle/stage/815_32/PATCH or /815_64/PATCH`. If it does not, copy it from `sapserv(x)` as described in **SAP Note 181195**.

8. Log on with the user `ora<sapsid>` and enter the command:
   **`$ORACLE_HOME/bin/lsnrctl start`**

9. Before you continue, check that `ora<sapsid>` can connect to the database:

   ```
   svrmgrl
   SVRMGR> connect internal
   SVRMGR> exit
   ```

   If the connect succeeds without error messages, the database software installation was successful. Otherwise see Database Installation Troubleshooting [page 127].

# Creating and Loading the Database with R3SETUP - Central Instance with DB

## Use

The database can now be created and loaded with the R3SETUP tool.

For more information about the installation tool, see .

## Prerequisite

You have successfully run R3SETUP before to install the SAP instance. If you stopped R3SETUP at that point (see ), restart R3SETUP. Otherwise (that is, if you installed the database software in a separate window), R3SETUP is still running and you can continue the installation.

## Procedure

> You can change the standard tablespace sizes and the assignment of tablespaces to `sapdata` directories in the section `[Z_ORACREATETSP]` of the file `DBSIZE.TPL` before restarting R3SETUP. Copy the file from the Export-CD 1 (directory `<Export-CD1>/DB/ORA`) to your installation directory to edit it. The section `[Z_ORACREATETSP]` is no longer located in the command file `CENTRDB.R3S` as of R/3 Release 4.6A.

To create and load the database, perform one of the following steps:

- If R3SETUP is still running, choose *NO* to continue the installation.

- If R3SETUP is not running:

    a. Log on as user `root`.

    b. Restart R3SETUP with:
       **cd <INSTDIR>; ./R3SETUP -f CENTRDB.R3S**

    > Creating and loading the database takes several hours to complete.

# Updating the MNLS Tables

After loading the database and updating the database statistics, R3SETUP **stops** to allow you to update the Multi National Language Support (MNLS) tables and (if the central instance is installed on a different host) to start up the SAP System.

If you choose to exit R3SETUP at this point, you can ignore the error message `ERROR: InstController: Step EXIT<xxx>_IND_ORA could not be performed` that is output by the installation step `EXIT<xxx>_IND_ORA`.

For more information, see **SAP Note 45619**.

3.1 Central System Installation

# Running R3SETUP for RFC Installation

> Compaq Tru64 UNIX only:
> Now restart the Oracle listener with umask 0. Log on as user `ora<sapsid>` and enter:
> **`lsnrctl stop`**
> **`umask 0`**
> **`lsnrctl start`**

1. Continue/restart R3SETUP:

   - If R3SETUP is still running, choose *NO* to continue the installation.

   - Otherwise restart R3SETUP.

2. When the installation is completed, the message *R3SETUP finished* is displayed.

The progress of the installation is displayed in INSTGUI if it was started.

We recommend that you check the log file for warnings. You can navigate through the log messages shown in the log view of INSTGUI.

If problems with R3SETUP occur, consult the section.

> After the installation, read **SAP Note 93256** on how to update the database statistics regularly.

# Result

You have finished this part of the installation. If you want to:

- Install a dialog instance on the same host, proceed with *Dialog Instance Installation* [page 89].

- Install a gateway instance on the same host, proceed with *Gateway Instance Installation* [page 97].

- Install a dialog or gateway instance on a different host, perform *Post-Installation Activities* [page 104] to complete this installation. After that, begin the new installation with *Installation Planning* [page 19] on the other host.

- Install additional components, proceed with *Additional Components Installation* [page 101].

Otherwise, perform *Post-Installation Activities* [page 104].

# 3.2 Standalone DB System Installation

## Purpose

When a large SAP System with a heavy workload and many concurrent users is set up, the central instance and database frequently need to be installed on two different hosts. This type of configuration is referred to as a standalone database system.

## Process Flow

The following graphic illustrates the actions required to install the central and database instance on two different hosts.
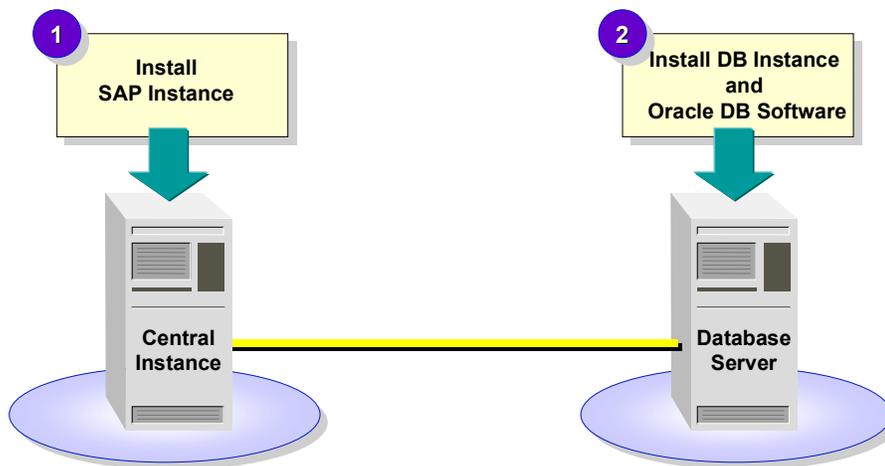
# 3.2.1 SAP Instance Installation for a Standalone DB

## Purpose

You want to install an SAP instance as part of the standalone database installation.

## Prerequisites

You have completed planning [page 19] and preparations [page 48]. Pay special attention to the following:

- You have adapted the UNIX kernel parameters and the swap space settings on the database host. Refer to Adapting UNIX Kernel Parameters and Swap Space [page 49].

- You have created the required file systems and/or raw devices for the database. Refer to Setting Up File Systems and Raw Devices [page 50].

- You have set up the transport directory [page 51].

- You have set up an installation directory [page 52] `<INSTDIR>`.

## Process Flow

To install an SAP instance, perform the following tasks on the central instance host:

1. You mount the kernel CD-ROM [page 73].

2. You run the shell script INSTTOOL.SH [page 73].

3. You customize the installation command file [page 73].

4. You start INSTGUI [page 74].

5. You set the library path environment variable [page 75].

6. You run R3SETUP [page 75].

7. You set the password for user <sapsid>adm [page 76].

8. AIX only: You check the settings for OS users [page 76].

> ⚠️
>
> Do not log on to the SAP System during the installation
> The SAP System is not in a complete and consistent state before the installation
> is completed. Do not log on until the installation is finished.

## Result

You have installed the SAP instance on the central instance host. Now you can install the database instance on the standalone database host.

## Mounting the Kernel CD-ROM

1. Log on as user `root`.

2. Mount the `SAP Kernel` CD-ROM as described in <u>Mounting a CD-ROM [page 148]</u>.

> Mount the CD-ROM locally. It is not recommended to use NFS.

## Running the Shell Script INSTTOOL.SH

1. Log on as user `root`

2. Change to the installation directory: **cd <INSTDIR>**

3. Start the shell script from the CD by entering:
   **<KERNEL CD>/UNIX/INSTTOOL.SH**

## Customizing the Installation Command File

After you have run the shell script, you may modify the command file manually.

> You do not need to customize the installation command file in a standard installation.

Command files can be recognized by the file ending `.R3S`. If you want to edit the command file, see <u>R3SETUP Command Files [page 119]</u>.

> The section `[Z_ORACREATETSP]` is no longer located in the command file `<SERVICE>.R3S` as of R/3 Release 4.6A. See <u>Configuring Tablespaces [page 74]</u> if you want to change tablespace configuration.

You must save the modified command file before starting R3SETUP. If you change the command file after R3SETUP has been started, the changes have no effect.

> If you have several CD-ROM drives available, you can enter the CD mount points in the command file before starting R3SETUP. See <u>Required CD-ROMs for Database Installation [page 78]</u>.

3.2 Standalone DB System Installation

# Configuring Tablespaces

## Use

This procedure tells you how to alter the configuration of tablespaces in your Oracle database. During installation, R3SETUP uses the file DBSIZE.TPL (on EXPORT CD 1) to create a profile to build the database. For more information, see the step DBCREATETSP_IND_ORA and the class CoraCreateTsp in the online documentation for R3SETUP.

To change the sizes of the tablespaces, you copy the DBSIZE.TPL file from the EXPORT CD 1 to your installation directory and then edit it as required. R3SETUP always looks for the DBSIZE.TPL file in the installation directory first.

## Prerequisites

Be sure to complete this procedure **before** starting R3SETUP.

## Procedure

1.  Mount the EXPORT CD 1.

2.  Copy the DBSIZE.TPL file to the installation directory as follows:
    **cp <EXPORT-CD 1>/DB/ORA/DBSIZE.TPL <INSTDIR>**

3.  Edit the DBSIZE.TPL file in the installation directory as required.

    Do **not** change tablespace names. When you upgrade the database later on, the original tablespace names are required.

# Starting INSTGUI

If you want to use INSTGUI, the graphical user interface for R3SETUP, and it has not been started by the shell script, you need to start it **before** starting R3SETUP. To do this, enter the command:
**cd <INSTDIR>; ./INSTGUI**

You can start INSTGUI on a remote computer.

    If you are using INSTGUI, make sure that your DISPLAY environment variable is set correctly.

See <u>The R3SETUP Tool [page 116]</u> for details and for information on using INSTGUI.

# Setting the Library Path Environment Variable

## Use

You need to set the library path environment variable of user `root` **before** starting R3SETUP.

## Procedure

Set the library path environment variable according to the following table, where `<SUFFIX>` is

- `32` for a 32-Bit SAP System Kernel

- `64` for a 64-Bit SAP System Kernel

**Name and Value of Library Path Environment Variable**

| Operating System | Variable Name | Variable Value |
|---|---|---|
| AIX 32-Bit | `LIBPATH` | `/sapmnt/<SAPSID>/exe:  \` `/oracle/805_32/lib` |
| AIX 64-Bit | `LIBPATH` | `/sapmnt/<SAPSID>/exe:  \` `/oracle/805_64/lib64` |
| HP-UX 10.20 | `SHLIB_PATH` | `/sapmnt/<SAPSID>/exe:  \` `/oracle/805/lib` |
| Other HP-UX versions | `SHLIB_PATH` | `/sapmnt/<SAPSID>/exe:  \` `/oracle/805_<SUFFIX>/lib` |
| All other UNIX operating systems | `LD_LIBRARY_PATH` | `/sapmnt/<SAPSID>/exe:  \` `/oracle/805_<SUFFIX>/lib` |

If you restart R3SETUP at a later time, make sure the variable is still set.

# Running R3SETUP for Central Instance Installation

1. Start R3SETUP as user `root`. Enter:
   **cd <INSTDIR>; ./R3SETUP -f CENTRAL.R3S**

2. When you are prompted for the version of the Oracle server software, make sure that you enter the correct version.

3. When the installation is completed, the message *R3SETUP finished* is displayed.

The progress of the installation is displayed in INSTGUI if it was started.

Error messages, warnings and further information are written to the log file `CENTRAL.log`.

We recommend that you check the log file for warnings. You can navigate through the log messages shown in the log view of INSTGUI.

If problems with R3SETUP occur, consult the section.

## Result

Perform the steps described in the following sections to complete the central instance installation. Then proceed with the database installation.

## Setting the Password for User <sapsid>adm

R3SETUP has created the OS user `<sapsid>adm`. Before you can log on as `<sapsid>adm`, you must set a password for this user:

1. Log on as user `root`

2. Set the password with:
   **`passwd <sapsid>adm`**

## Checking Settings for OS Users (AIX only)

Check and, if necessary, modify the settings for the OS user `root` and users `<sapsid>adm` and `ora<sapsid>` that were created by R3SETUP. See Creating UNIX Groups and Users [page 211] for further information.

## 3.2.2 Oracle Standalone Database Instance Installation

### Purpose

You want to install the Oracle database instance as part of the Standalone Database Installation.

### Prerequisites

- You have adapted the UNIX kernel parameters and the swap space settings on the database host.

- You have created the required file systems and/or raw devices for the database.

- You have mounted the file system `/usr/sap/trans` from the transport host.

- You have mounted the file systems `<sapmnt>/<SAPSID>/profile` and `<sapmnt>/<SAPSID>/global` from the central instance host.

- If you want to share the SAP executables via NFS, you have mounted the file system `<sapmnt>/<SAPSID>/exe` from the central instance host. This is only possible if the central instance and database hosts use the same operating system.

- You have set up an installation directory `<INSTDIR>`.

## Process Flow

**Preparation**

You need some CD-ROMs for the database installation. During the installation process, R3SETUP requests you to insert these CD-ROMs and to enter the mount points. The required CD-ROMs are listed in **Required CD-ROMs for Database Installation [page 78]**.

If you have several CD-ROM drives available, you can enter the CD mount points in the command file before starting R3SETUP: After the script has copied the command file `DATABASE.R3S`, open it with an editor. Complete the lines that begin with `1_LOCATION`, `2_LOCATION`, and so on, of the section `CDSERVER_IND_ORA`. Mount the CDs at the mount points.

**Installation**

To install the Oracle database instance, perform the following tasks on the database host:

1. Mount the Kernel CD-ROM [page 78] if it has not been mounted yet.

2. Run the shell script INSTTOOL.SH [page 78].

3. Start INSTGUI [page 79].

4. Set the library path environment variable. [page 79]

5. Run R3SETUP [page 80].

   R3SETUP first creates the users, groups and directories, and extracts software from the CD-ROM. It then allows you to install the Oracle database software. You can either stop R3SETUP, or install the database software in a separate window and then continue R3SETUP.

   If you choose to stop R3SETUP at this point, you can ignore the error message `ERROR: InstController: Step EXITORAINST_IND_ORA could not be performed` that is output by the installation step `EXITORAINST_IND_ORA`.

6. Set the password for the user <sapsid>adm [page 80].

7. Set the password for the user ora<sapsid> [page 80].

8. AIX only: Check the settings for OS users [page 81].

9. AIX only: Start the pre-installation script rootpre.sh [page 81].

10. Install the Oracle DB software:

    a. If you want to install Oracle DB software for Oracle DB version 8.0.x, see Installing the Oracle DB Software with orainst [page 82].

    b. If you want to install Oracle DB software for Oracle DB version 8.1.x, see Installing the Oracle DB Software with runInstaller [page 84].

11. Create and load the database with R3SETUP [page 86].

12. If required, update MNLS tables [page 87].

13. Run R3SETUP for RFC installation steps [page 87].

14. Enable remote monitoring [page 88].

3.2 Standalone DB System Installation

### Troubleshooting

If you encounter any problems during the database software installation, consult the troubleshooting [page 125] section.

## Required CD-ROMs for Database Installation

### Definition

The CD-ROMs are required for the installation.

**Required CD-ROMs**

| Key requested by R3SETUP | Mount point to be entered |
|---|---|
| `1_LOCATION` | Path to `KERNEL CD`, for example `/sapcd1` |
| `2_LOCATION` | Path to `RDBMS CD`, for example `/sapcd2` |
| `3_LOCATION` | Path to `EXPORT CD 1`, for example `/sapcd3` |
| `4_LOCATION` | Path to `EXPORT CD 2`, for example `/sapcd4` |
| `5_LOCATION` | Path to `EXPORT CD 3`, for example `/sapcd5` |

There is **no** `Report Load CD` needed and shipped for this release.

## Mounting the Kernel CD-ROM

1. Log on as user `root`.

2. Mount the `SAP Kernel` CD-ROM as described in Mounting a CD-ROM [page 148].

Mount the CD-ROM locally. It is not recommended to use NFS.

## Running the Shell Script INSTTOOL.SH

1. Log on as user `root`

2. Change to the installation directory: **cd <INSTDIR>**

3. Start the shell script from the CD by entering:
   **<KERNEL CD>/UNIX/INSTTOOL.SH**

# Starting INSTGUI

If you want to use INSTGUI, the graphical user interface for R3SETUP, and it has not been started by the shell script, you need to start it **before** starting R3SETUP. To do this, enter the command:

`cd <INSTDIR>; ./INSTGUI`

You can start INSTGUI on a remote computer.

> If you are using INSTGUI, make sure that your `DISPLAY` environment variable is set correctly.

See <u>The R3SETUP Tool [page 116]</u> for details and for information on using INSTGUI.

# Setting the Library Path Environment Variable

## Use

You need to set the library path environment variable of user `root` **before** starting R3SETUP.

## Procedure

Set the library path environment variable according to the following table, where `<SUFFIX>` is

- `32` for a 32-Bit SAP System Kernel

- `64` for a 64-Bit SAP System Kernel

**Name and Value of Library Path Environment Variable**

| Operating System | Variable Name | Variable Value |
|---|---|---|
| AIX 32-Bit | `LIBPATH` | `/sapmnt/<SAPSID>/exe:  \`<br>`    /oracle/805_32/lib` |
| AIX 64-Bit | `LIBPATH` | `/sapmnt/<SAPSID>/exe:  \`<br>`    /oracle/805_64/lib64` |
| HP-UX 10.20 | `SHLIB_PATH` | `/sapmnt/<SAPSID>/exe:  \`<br>`    /oracle/805/lib` |
| Other HP-UX versions | `SHLIB_PATH` | `/sapmnt/<SAPSID>/exe:  \`<br>`    /oracle/805_<SUFFIX>/lib` |
| All other UNIX operating systems | `LD_LIBRARY_PATH` | `/sapmnt/<SAPSID>/exe:  \`<br>`    /oracle/805_<SUFFIX>/lib` |

If you restart R3SETUP at a later time, make sure the variable is still set.

3.2 Standalone DB System Installation

# Running R3SETUP for Database Instance Installation

## Procedure

1. Start R3SETUP as user `root`. Enter:
   **`cd <INSTDIR>; ./R3SETUP -f DATABASE.R3S`**

2. When you are prompted for the version of the Oracle server software, make sure that you enter the correct version.

3. R3SETUP stops to let you install the database software. You can either stop R3SETUP, or perform the following steps and install the database software in a separate window and then continue R3SETUP.

The progress of the installation is displayed in INSTGUI if it was started.

Error messages, warnings and further information are written to the log file `DATABASE.LOG`.

We recommend that you check the log file for warnings. You can navigate through the log messages shown in the log view of INSTGUI.

If problems with R3SETUP occur, consult the <u>R3SETUP Troubleshooting [page 126]</u> section.

## Result

Perform the following steps that are necessary for your operating system to complete the database instance installation on the database host. After you have installed the database, continue/restart R3SETUP as described in the following sections to finish the installation.

# Setting the Password for User <sapsid>adm

R3SETUP has created the OS user `<sapsid>adm`. Before you can log on as `<sapsid>adm`, you must set a password for this user:

1. Log on as user `root`

2. Set the password with:
   **`passwd <sapsid>adm`**

# Setting the Password for User ora<sapsid>

R3SETUP has created the user ora`<sapsid>`. Before you can log on as ora`<sapsid>`, you must set a password for this user:

1. Log on as user `root`

2. Set the password with:
   **`passwd ora<sapsid>`**

# Checking Settings for OS Users (AIX only)

Check and, if necessary, modify the settings for the OS user `root` and users `<sapsid>adm` and `ora<sapsid>` that were created by R3SETUP. See [Creating UNIX Groups and Users [page 211]](#) for further information.

# Starting the Script rootpre.sh (AIX only)

## Use

The script `rootpre.sh` must be executed in order to install and activate AIX specific kernel extensions to activate asynchronous I/O.

## Prerequisites

This section only applies if your operating system is AIX.

## Procedure

1. Log on as user `root`

2. Change to the `orainst` installation directory:
   **cd /oracle/<SAPSID>/orainst**

3. Using a `cshell`, set the language environment variable:
   **setenv LANG En_US**

4. Run the pre-installation script
   **sh ./rootpre.sh**

> ▮●≫
>
> Check if the Asynchronous I/O is installed and activated. Enter
> **lsdev -C -l aio0**  which should put out
> aio0 Available Asynchronous I/O
> Otherwise install and activate the Asynchronous I/O using smit
> (*Devices → Asynchronous I/O*) and reboot your machine.

# Oracle DB Software Installation

If you want to install Oracle DB software for Oracle DB version 8.0.x, see [Installing the Oracle DB Software with orainst [page 82]](#).

If you want to install Oracle DB software for Oracle DB version 8.1.x, see [Installing the Oracle DB Software with runInstaller [page 84]](#).

3.2 Standalone DB System Installation

# Installing the Oracle DB Software with orainst

## Use

The Oracle software for Oracle DB version 8.0.x is installed with the Oracle tool orainst.

If you want to install Oracle DB version 8.1.x, see Installing the Oracle DB Software with runInstaller [page 84].

## Prerequisites

Compaq Tru64 UNIX and SEQUENT (DYNIX/ptx) only:
Make sure that there are at least 25 MB of free space on `/tmp`.

## Procedure

1. Log on as user `ora<sapsid>`.

2. Set the following environment variables according to the table "Recommended Terminal Types" below (use a `cshell`):

   ```
   setenv TERM <Terminal type>
   setenv ORACLE_TERM <Terminal type>
   ```

   **Recommended Terminal Types**

   | OS | Terminal with Graphical User Interface (GUI) | Alphanumeric Console | PC |
   |---|---|---|---|
   | AIX | vt100 | 3151 | vt100 |
   | Compaq Tru64 UNIX | vt100 | vt100 | vt100 |
   | HP-UX | hp / hpterm | hp | vt100 |
   | Linux | xterm | vt100 | vt100 |
   | ReliantUNIX | vt100 | 97801 | vt100 |
   | Sequent | vt100 | vt100 | vt220 |
   | Solaris | vt100 | vt100 | vt100 |

   ReliantUNIX on Oracle 8.0.5 only:
   Set the following environment variable before starting orainst:
   Oracle 8.0.5: `setenv LD_LIBRARY_PATH /oracle/stage/stage_805/lib`

3. Start orainst in a terminal window of the size **24x80** characters or on the console with the following commands:

   ```
   cd $ORACLE_HOME/orainst_sap
   ./orainst
   ```

4. Confirm all screens with **ENTER** until the software is installed, then exit orainst.

Do not terminate orainst with **CTRL-C**.
When entering data in orainst, use **CTRL-D** instead of **Backspace** to delete a character.

ReliantUNIX only:
Create the following link by entering:
**su root**
**cd /usr/lib** (32 Bit Oracle Software)
**cd /usr/lib64s** (64 Bit Oracle Software)
**ln -s $ORACLE_HOME/lib/*so* .**
See also **SAP Note 88884**.

5.  Before you continue, check that ora<sapsid> can connect to the database:

    **su - ora<sapsid> (if not already logged on as user ora<sapsid>)**
    **svrmgrl**
    SVRMGR> **connect internal**
    SVRMGR> **exit**

    If the connect succeeds without error messages, the database software installation was successful. Otherwise see .

    Compaq Tru64 UNIX only:
    After you have installed the database software with orainst and before you restart R3SETUP, enter the following commands as user ora<sapsid>:
    **cd $ORACLE_HOME/network/lib**
    **make -f ins_network.mk tnsping**
    **mv tnsping $ORACLE_HOME/bin**

6.  Continue with section *Creating and Loading the Database with R3SETUP*.

# Installing the Oracle DB Software with runInstaller

## Use

The Oracle software for Oracle DB version 8.1.x is installed with the Oracle tool `runInstaller`.

If you want to install Oracle DB version 8.0.x, see Installing the Oracle DB Software with orainst [page 82].

## Procedure

1.  Make sure the required memory space is available. The memory space required for the directory `/tmp` is specified in **SAP Note 181192**.

2.  The user `ora<sapsid>` must have a write authorization for the directory `/oracle`. To check if this authorization exists, proceed as follows:

    a.  Log on to your system with the user `ora<sapsid>`.

    b.  Enter the following commands:

    ```
    touch /oracle/write_test
    rm /oracle/write_test
    ```

    If the user `ora<sapsid>` does not have a write authorization, log on to your system with the user `root` and enter the command:
    ```
    chmod 775 /oracle
    ```

3.  Enter the following commands with the user ora<sapsid>:
    ```
    umask
    ```

    If `umask` does not return the value"022", set umask:
    ```
    umask 022
    ```

4.  Set the `DISPLAY` environment variable to **`<Computer name>:0`**.

5.  Set the library path environment variable according to the following table.

    | Operating system | Environment variable | Value |
    |---|---|---|
    | Linux | LD_LIBRARY_PATH | **`$ORACLE_HOME/lib:/sapmnt/<SAPSID>/exe`** |
    | Reliant UNIX | LD_LIBRARY_PATH | **`$ORACLE_HOME/lib:/sapmnt/<SAPSID>/exe`** or **`$ORACLE_HOME/lib64:/sapmnt/<SAPSID>/exe`** |
    | Other operating systems | Not required | Not required |

    If you restart R3SETUP at a later time, make sure the variable is still set.

6.  Start the Oracle Universal Installer with the user ora<sapsid>:

    ```
    cd /oracle/stage/815_32 bzw. 815_64
    ./runInstaller
    ```

    When you start the Universal Installer, a series of windows appears:

    a.  "*Welcome*"
        Continue by choosing *Next*.

b. "*File Locations" -  "Destination...*"
Check that the variable `$ORACLE_HOME` is correctly set. The relevant directory must be empty! Continue by choosing *Next.*

c. When you run the Universal Installer for the first time, the following menu appears: *"UNIX Group Name"*

Enter `dba` as the group name and confirm your entry by choosing *Next.*

A dialog box appears.

Execute the file `/tmp/OraInstall/orainstRoot.sh` with the user `root`, and confirm the dialog box by choosing *Retry*

d. "*Available Products*"

Select `Oracle 8i Enterprise Edition 8.1.5.0.0` and confirm your selection choosing *Next.*

e. "*Installation Types*"

Select *Custom* as the installation type and continue by choosing *Next*.

f. "*Available Product Components*"

Select the products as follows: Deactivate **Oracle Product Options 8.1.5.0.0** and activate **all** options in **all** other categories. Confirm your selections by choosing *Next.*

g. "*Component Locations*"

Confirm this window by choosing *Next.*

h. "*Upgrading or Migrating an Existing Database*"

◼●⟩

If this step does not appear, continue with the next step.

Upgrading or Migrating an Existing Database Database must **not** be activated.

Continue by choosing *Next*.

i. "*Create Database*"

Select *No* and continue by choosing *Next*.

j. "*Installing Legato Storage Manager*"

◼●⟩

If this step does not appear, continue with the next step.

Select *No* and confirm your selection by choosing *Next.*

k. "*Oracle Protocol Support*"

Select *TCP/IP* and continue by choosing *Next*.

l. "*Summary*"

Check the entries under *Summary*. If all entries are correct, choose *Install*.

m. When the *Install* step has been completed, a dialog box appears.

3.2 Standalone DB System Installation

Execute the file `$ORACLE_HOME/root.sh` with the user root, and confirm the dialog box by choosing *Ok*. Then continue by choosing *Next.*

n.  Cancel **all** other tools that the system automatically calls by choosing *Cancel* and then *Ok*.

o.  Exit the Oracle Universal Installer by choosing *Exit* and then *Yes.*

7.  Log on at the operating system level with the user `ora<sapsid>`. Refer to **SAP Note 181195** for the number of the current patchset and the import instructions.

> If the Oracle RDBMS CD already contains the patchset, it can be found under `/oracle/stage/815_32/PATCH or /815_64/PATCH.` If it does not, copy it from `sapserv(x)` as described in **SAP Note 181195**.

8.  Log on with the user `ora<sapsid>` and enter the command:
    **$ORACLE_HOME/bin/lsnrctl start**

9.  Before you continue, check that `ora<sapsid>` can connect to the database:

    **svrmgrl**
    SVRMGR> **connect internal**
    SVRMGR> **exit**

    If the connect succeeds without error messages, the database software installation was successful. Otherwise see Database Installation Troubleshooting [page 126].

# Creating and Loading the Database with R3SETUP - Standalone DB

## Use

The database on the database host can now be created and loaded with the R3SETUP tool.

For more information about the installation tool, see The R3SETUP Tool [page 116].

## Prerequisite

You have successfully run R3SETUP before to install the SAP instance. If you stopped R3SETUP at that point (see Running R3SETUP for Database Instance Installation [page 80]), restart R3SETUP. Otherwise (that is, if you installed the database software in a separate window), R3SETUP is still running and you can continue the installation.

## Procedure

> You can change the standard tablespace sizes and the assignment of tablespaces to `sapdata` directories in the section `[Z_ORACREATETSP]` of the file `DBSIZE.TPL` before restarting R3SETUP. Copy the file from the Export-CD 1 (directory `<Export-CD1>/DB/ORA`) to your installation directory to edit it. The section `[Z_ORACREATETSP]` is no longer located in the command file `DATABASE.R3S` as of R/3 Release 4.6A.

To create and load the database, perform one of the following steps:

- If R3SETUP is still running, choose *NO* to continue the installation.

- If R3SETUP is **not** running:

    a. Log on as user `root`.

    b. Restart R3SETUP with:
       **`cd <INSTDIR>; ./R3SETUP -f DATABASE.R3S`**

    > Creating and loading the database takes several hours to complete.

## Updating the MNLS Tables

After loading the database and updating the database statistics, R3SETUP **stops** to allow
you to update the Multi National Language Support (MNLS) tables and (if the central instance is
installed on a different host) to start up the SAP System.

If you choose to exit R3SETUP at this point, you can ignore the error message `ERROR:
InstController: Step EXIT<xxx>_IND_ORA could not be performed` that is output
by the installation step `EXIT<xxx>_IND_ORA`.

For more information, see **SAP Note 45619**.

## Running R3SETUP for RFC Installation

> Compaq Tru64 UNIX only:
> Now restart the Oracle listener with umask 0. Log on as user `ora<sapsid>` and
> enter:
> **`lsnrctl stop`**
> **`umask 0`**
> **`lsnrctl start`**

1. Continue/restart R3SETUP:

    − If R3SETUP is still running, choose *NO* to continue the installation.

    − Otherwise restart R3SETUP.

2. When the installation is completed, the message *R3SETUP finished* is displayed.

The progress of the installation is displayed in INSTGUI if it was started.

We recommend that you check the log file for warnings. You can navigate through the log
messages shown in the log view of INSTGUI.

If problems with R3SETUP occur, consult the <u>R3SETUP Troubleshooting [page 126]</u> section.

3.2 Standalone DB System Installation

After the installation, read **SAP Note 93256** on how to update the database statistics regularly.

## Enabling Remote Monitoring

To enable remote monitoring of the DB server from the SAP System, include the host name of each application server in the `.rhosts` file of user `<sapsid>adm` on the database host. If you use network domains, use `nslookup` on your database host to determine the 'long name' of a host.

Database server: host `host1`, central instance host: `host2`. The network domain is `subdomain1.my_company.com`.
The file `~<sapsid>adm/.rhosts` on host `host1` must contain at least the line:
`host2.subdomain1.my_company.com`

Check the connectivity from the central instance host to the database server. Try to open a remote shell without being asked for a password.

## Result

You have finished this part of the installation. If you want to:

• Install a dialog instance on the same host, proceed with *Dialog Instance Installation* [page 89].

• Install a gateway instance on the same host, proceed with *Gateway Instance Installation* [page 97].

• Install a dialog or gateway instance on a different host, perform *Post-Installation Activities* [page 104] to complete this installation. After that, begin the new installation with *Installation Planning* [page 19] on the other host.

• Install additional components, proceed with *Additional Components Installation* [page 101].

Otherwise, perform *Post-Installation Activities* [page 104].

# 3.3 Dialog Instance Installation

## Purpose

Optionally, you can install one or more dialog instances on hosts in your SAP System.

## Prerequisites

Before you can start the installation, the following actions must be complete:

- You have checked whether your dialog instance host meets the Hardware and Software Requirements [page 29].

- You have completed all preparations for the host.

- You have verified that the installation of the central instance of your SAP System has been completed successfully before starting the installation of your dialog instance.

- You have completed the Installation Preparations [page 48].

## Process Flow

To install a dialog instance, perform the following tasks on the dialog instance host:

1. Mount Directories from the Central Instance [page 90].

2. Check the File System for the Client Software [page 91].

3. Mount the Kernel CD-ROM [page 91].

4. Run the shell script INSTTOOL.SH [page 91].

5. Customize the installation command file [page 91].

6. Start INSTGUI [page 92].

7. Set the library path environment variable [page 92].

8. Run R3SETUP [page 93].

9. Set the password for user <sapsid>adm [page 93].

10. AIX only: Check the settings for OS users [page 93].

11. Check the Default Profile [page 93].

12. Dialog Instance on CI Host only: startsap/stopsap Aliases [page 94].

13. If you install a dialog instance which uses the same operating system as the central instance, activate sapcpe [page 94].

## Result

The dialog instance is installed. Further dialog instances can be installed.

# 3.3.1 Mounting Directories from the Central Instance

## Use

Before installing a dialog instance, you must mount the **exe**, **profile** and **global** directories via NFS from the central instance host.

## Procedure

If you want to install the executables locally instead of sharing them, do not mount the exe directory via NFS. Create `<sapmnt>/<SAPSID>/exe` as a local directory (not a link) with a minimum of 240 MB free space.

If you are installing a heterogeneous SAP System (the instances are installed on different platforms), do not mount the `exe` directory. See Heterogeneous SAP System Installations [page 220].

To mount directories from the central instance:

1. Log on to the central instance host as user `root` and export the following directories with `root` access to the dialog instance host:

   **`<sapmnt>/<SAPSID>/exe`**
   **`<sapmnt>/<SAPSID>/profile`**
   **`<sapmnt>/<SAPSID>/global`**

2. Make sure that the user `root` of the dialog instance host can access the exported directories.

3. Log on to the dialog instance host as user `root`

   − Create the mount points with permissions 777

      **`<sapmnt>/<SAPSID>/exe`**
      **`<sapmnt>/<SAPSID>/profile`**
      **`<sapmnt>/<SAPSID>/global`**

   − Mount these directories from the central instance host

   − Check whether the dialog instance host has write access to the directories exe, profile and global:

      **`touch <sapmnt>/<SAPSID>/exe/nfs_test`**
      **`rm <sapmnt>/<SAPSID>/exe/nfs_test`**

For more information, see Mounting Directories via NFS [page 202].

## 3.3.2 Checking the File System for the Client Software

If you are installing a dialog instance for an SAP System on Oracle, you have created among other file systems a file system for the Oracle client software as described in the Installation Preparations [page 48]. The default name of this file system is `/oracle/<SAPSID>` (Oracle 8.1.5: `/oracle/<SAPSID>/815_32` or `/oracle/<SAPSID>/815_64`).

Ensure that this file system has **140 MB** of free space and permissions `777`.

## 3.3.3 Mounting the Kernel CD-ROM

1. Log on as user `root`.

2. Mount the `SAP Kernel` CD-ROM as described in Mounting a CD-ROM [page 148].

> Mount the CD-ROM locally. It is not recommended to use NFS.

## 3.3.4 Running the Shell Script INSTTOOL.SH

1. Log on as user `root`

2. Change to the installation directory: **cd <INSTDIR>**

3. Start the shell script from the CD by entering:
   **<KERNEL CD>/UNIX/INSTTOOL.SH**

## 3.3.5 Customizing the Installation Command File

After you have run the shell script, you can modify the command file again manually.

> You do not need to customize the command file this in a standard installation.

Command files can be recognized by the file ending `.R3S`. If you want to edit the command file, see R3SETUP Command Files [page 119].

You must save the modified command file before starting R3SETUP. If you change the command file after R3SETUP has been started, the changes have no effect.

3.3 Dialog Instance Installation

# 3.3.6 Starting INSTGUI

If you want to use INSTGUI, the graphical user interface for R3SETUP, and it has not been started by the shell script, you need to start it **before** starting R3SETUP. To do this, enter the command:

`cd <INSTDIR>; ./INSTGUI`

You can start INSTGUI on a remote computer.

> ➡
>
> If you are using INSTGUI, make sure that your `DISPLAY` environment variable is set correctly.

See <u>The R3SETUP Tool [page 116]</u> for details and for information on using INSTGUI.

# 3.3.7 Setting the Library Path Environment Variable

## Use

You need to set the library path environment variable of user `root` **before** starting R3SETUP.

## Procedure

Set the library path environment variable according to the following table, where `<SUFFIX>` is

- `32` for a 32-Bit SAP System Kernel

- `64` for a 64-Bit SAP System Kernel

**Name and Value of Library Path Environment Variable**

| Operating System | Variable Name | Variable Value |
|---|---|---|
| AIX 32-Bit | LIBPATH | /sapmnt/<SAPSID>/exe: \ /oracle/805_32/lib |
| AIX 64-Bit | LIBPATH | /sapmnt/<SAPSID>/exe: \ /oracle/805_64/lib64 |
| HP-UX 10.20 | SHLIB_PATH | /sapmnt/<SAPSID>/exe: \ /oracle/805/lib |
| Other HP-UX versions | SHLIB_PATH | /sapmnt/<SAPSID>/exe: \ /oracle/805_<SUFFIX>/lib |
| All other UNIX operating systems | LD_LIBRARY_PATH | /sapmnt/<SAPSID>/exe: \ /oracle/805_<SUFFIX>/lib |

If you restart R3SETUP at a later time, make sure the variable is still set.

### 3.3.8 Running R3SETUP for Dialog Instance Installation

1. Start R3SETUP as user `root`. Enter:
   **`cd <INSTDIR>; ./R3SETUP -f DIALOG.R3S`**

2. R3SETUP requests information about the installation. Pay special attention to the following issues:

   – When R3SETUP requests information about the instance you are installing, pay special attention to the different instance numbers (SAP system numbers): First the SAP system number of the dialog instance is requested. Later, the SAP system number of the central instance is requested. These two numbers may be the same unless the instances are installed on the same host.

   – Before extracting software, R3SETUP asks if the software should be extracted or if it already exists on the host.

   – When you are prompted for the version of the Oracle server software, make sure that you enter the correct version.

3. When the installation is completed, the message *R3SETUP finished* is displayed.

The progress of the installation is displayed in INSTGUI if it was started.

Error messages, warnings and further information are written to the log file `DIALOG.log`.

We recommend that you check the log file for warnings. You can navigate through the log messages shown in the log view of INSTGUI.

If problems with R3SETUP occur, consult the R3SETUP Troubleshooting [page 126] section.

### 3.3.9 Setting the Password for User <sapsid>adm

R3SETUP has created the OS user `<sapsid>adm`. Before you can log on as `<sapsid>adm`, you must set a password for this user:

1. Log on as user `root`

2. Set the password with:
   **`passwd <sapsid>adm`**

### 3.3.10 Checking Settings for OS Users (AIX only)

Check and, if necessary, modify the settings for the OS user `root` and users `<sapsid>adm` and `ora<sapsid>` that were created by R3SETUP. See Creating UNIX Groups and Users [page 211] for further information.

### 3.3.11 Checking the Default Profile

During the installation of an dialog instance, R3SETUP replaces the default profile of the central instance (`<sapmnt>/<SAPSID>/profile/DEFAULT.PFL`) with the standard profile from the

3.3 Dialog Instance Installation

installation CD to make sure that the profile parameter `rdisp/bufrefmode` is set to `sendon,exeauto`. R3SETUP saves a copy of your original profile as `DEFAULT.PFL.<version>`.

If you have modified your default profile since installing the central instance, copy the modifications from the copy to the new `DEFAULT.PFL`.

## 3.3.12 Using startsap/stopsap Aliases

If you are installing a dialog instance on the same host on which the central instance is installed, the `startsap` and `stopsap` aliases cannot be used to start up an instance.

Use the scripts in the home directory of the `<sapsid>adm` user instead of the aliases:

**`startsap_<hostname>_<instanceID>`** instead of the `startsap` alias,
**`stopsap_<hostname>_<instanceID>`** instead of the `stopsap` alias.

## 3.3.13 Activating sapcpe

### Use

This section only applies when you install a dialog instance that uses the same operating system as the central instance.

After a standard installation of multiple instances of a homogeneous SAP System, the executables are stored in a file system on the central instance host. Distributed SAP instances use the central executables via NFS as displayed in the following graphic:
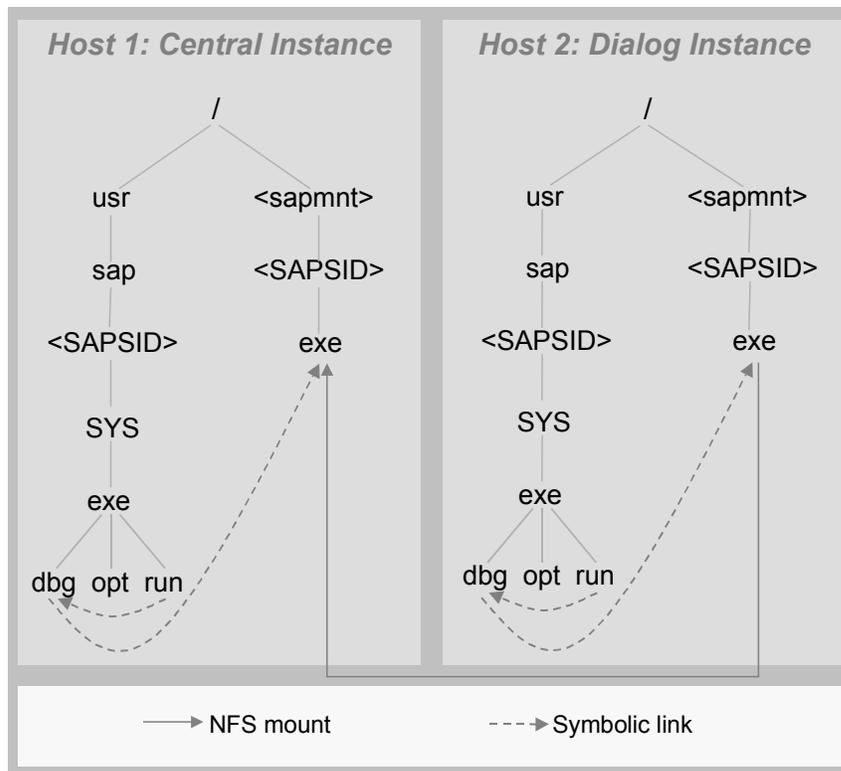
**File system after standard installation of multiple instances**

The `sapcpe` tool supports the local storage of SAP executables to reduce network traffic.

If `sapcpe` is activated, `sapcpe` checks during the startup of an dialog instance whether important local executables are current (compared with those under `/<sapmnt>/<SAPSID>/exe` on the central instance host) and copies the files to the dialog instance host if required (that is, if the local executables are missing or obsolete).

Additionally, `sapcpe` creates links to files not stored locally. For more information, see the following graphic and refer to the *SAP Online Help*.
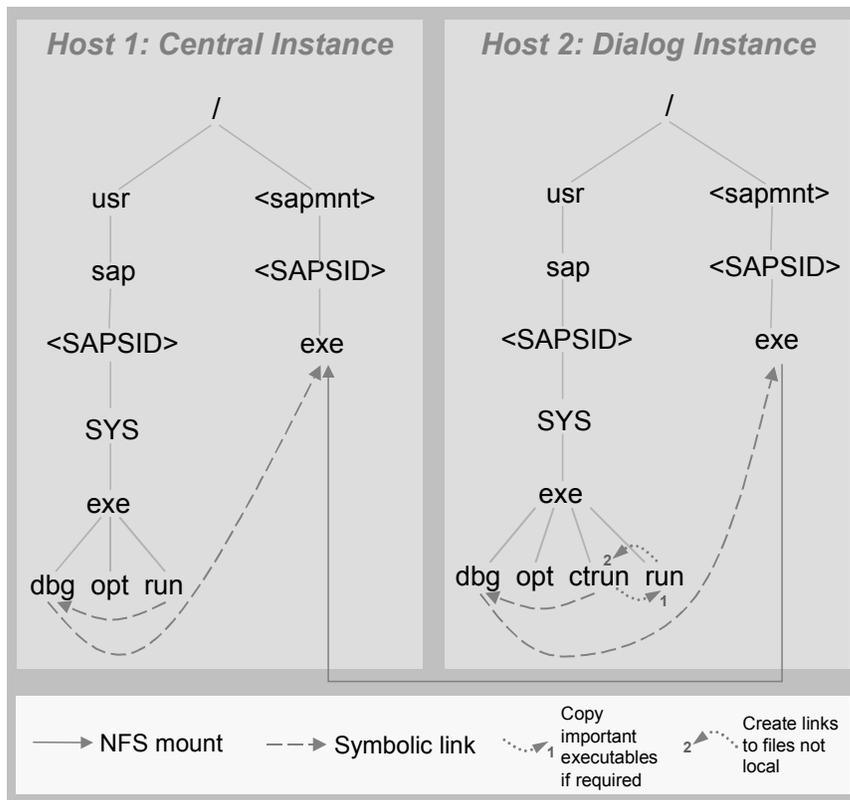


**File system with sapcpe in use**

## Procedure

1. Log on to the dialog instance host as user `<sapsid>adm`

2. Enter:

   ```
   mv /usr/sap/<SAPSID>/SYS/exe/run /usr/sap/<SAPSID>/SYS/exe/ctrun
   mkdir /usr/sap/<SAPSID>/SYS/exe/run
   ```

Provide at least 30 MB of additional disk space for the directory `/usr/sap/<SAPSID>/SYS/exe/run`.

Before the first startup of the dialog instance (and only before the first time):

1. Log on to the dialog instance host as user `<sapsid>adm`

3.3 Dialog Instance Installation

2.  Execute one of the following commands:

    a.  When using a `csh`:
        **`setenv DIR_LIBRARY /usr/... ctrun`**

    b.  When using a `sh`:
        **`DIR_LIBRARY=/usr/... ctrun`**
        **`export DIR_LIBRARY`**

3.  Start the dialog instance with the command **`startsap`**.

4.  Log off from the dialog instance.

5.  Log on again for the old environment to become active.

# Result

You have finished this part of the installation. If you want to:

*   Install another dialog instance on the same host, proceed with *Dialog Instance Installation* [page 89].

*   Install a gateway instance on the same host, proceed with *Gateway Instance Installation* [page 97].

*   Install a dialog or gateway instance on a different host, perform *Post-Installation Activities* [page 104] to complete this installation. After that, begin the new installation with *Installation Planning* [page 19] on the other host.

*   Install additional components, proceed with *Additional Components Installation* [page 101].

Otherwise, perform *Post-Installation Activities* [page 104].

# 3.4 Gateway Instance Installation

## Purpose

There are various reasons why you might want to install a standalone gateway instance. For example, in a system where the database instance and central instance are on different hosts, a gateway instance on the database server host enables remote function calls. Another reason to install a gateway, is to enable communication between SNA (systems network architecture) and SAP Systems.

This gateway instance can be installed on a separate host or on a host where a database server is already installed.

## Process Flow

1. Mount the Presentation CD-ROM [page 97].

2. Run the shell script INSTTOOL.SH [page 97].

3. Customize the installation command file [page 98].

4. Start INSTGUI [page 98].

5. Set the library path environment variable [page 98].

6. Run R3SETUP [page 99].

7. Set the password for user <sapsid>adm [page 99].

8. AIX only: Check the settings for OS users [page 99].

9. Configuring the SNA Communication Software [page 100].

## 3.4.1 Mounting the Presentation CD-ROM

1. Log on as user `root`.

2. Mount the `SAP Presentation` CD-ROM as described in Mounting a CD-ROM [page 148].

   ▪●⟩

   Mount the CD-ROM locally. It is not recommended to use NFS.

## 3.4.2 Running the Shell Script for a GW Installation

1. As user `root`, change to the installation directory: `cd <INSTDIR>`

2. Start the shell script from the CD by entering:
   `<PRESENTATION CD>/GATEWAY/UNIX/INSTTOOL.SH`

3.4 Gateway Instance Installation

### 3.4.3 Customizing the Installation Command File

After you have run the shell script, you can modify the command file again manually.

> You do not need to customize the command file this in a standard installation.

Command files can be recognized by the file ending `.R3S`. If you want to edit the command file, see R3SETUP Command Files [page 119].

You must save the modified command file before starting R3SETUP. If you change the command file after R3SETUP has been started, the changes have no effect.

### 3.4.4 Starting INSTGUI

If you want to use INSTGUI, the graphical user interface for R3SETUP, and it has not been started by the shell script, you need to start it **before** starting R3SETUP. To do this, enter the command:
```
cd <INSTDIR>; ./INSTGUI
```

You can start INSTGUI on a remote computer.

> If you are using INSTGUI, make sure that your `DISPLAY` environment variable is set correctly.

See The R3SETUP Tool [page 116] for details and for information on using INSTGUI.

### 3.4.5 Setting the Library Path Environment Variable

#### Use

You need to set the library path environment variable of user `root` **before** starting R3SETUP.

#### Procedure

Set the library path environment variable according to the following table, where `<SUFFIX>` is

- `32` for a 32-Bit SAP System Kernel
- `64` for a 64-Bit SAP System Kernel

**Name and Value of Library Path Environment Variable**

| Operating System | Variable Name | Variable Value |
|---|---|---|
| AIX 32-Bit | `LIBPATH` | `/sapmnt/<SAPSID>/exe: \`<br>`      /oracle/805_32/lib` |
| AIX 64-Bit | `LIBPATH` | `/sapmnt/<SAPSID>/exe: \`<br>`      /oracle/805_64/lib64` |
| HP-UX 10.20 | `SHLIB_PATH` | `/sapmnt/<SAPSID>/exe: \`<br>`      /oracle/805/lib` |
| Other HP-UX versions | `SHLIB_PATH` | `/sapmnt/<SAPSID>/exe: \`<br>`      /oracle/805_<SUFFIX>/lib` |
| All other UNIX operating systems | `LD_LIBRARY_PATH` | `/sapmnt/<SAPSID>/exe: \`<br>`      /oracle/805_<SUFFIX>/lib` |

If you restart R3SETUP at a later time, make sure the variable is still set.

## 3.4.6 Running R3SETUP for Gateway Instance Installation

1. Start R3SETUP as user `root`. Enter:
   **cd <INSTDIR>; ./R3SETUP -f GATEWAY.R3S**

2. When the installation is completed, the message *R3SETUP finished* is displayed.

The progress of the installation is displayed in INSTGUI if it was started.

Error messages, warnings and further information are written to the log file `GATEWAY.log`.

We recommend that you check the log file for warnings. You can navigate through the log messages shown in the log view of INSTGUI.

If problems with R3SETUP occur, consult the R3SETUP Troubleshooting [page 126] section.

## 3.4.7 Setting the Password for User <sapsid>adm

R3SETUP has created the OS user `<sapsid>adm`. Before you can log on as `<sapsid>adm`, you must set a password for this user:

1. Log on as user `root`

2. Set the password with:
   **passwd <sapsid>adm**

## 3.4.8 Checking Settings for OS Users (AIX only)

Check and, if necessary, modify the settings for the OS user `root` and users `<sapsid>adm` and `ora<sapsid>` that were created by R3SETUP. See Creating UNIX Groups and Users [page 211] for further information.

## 3.4.9 Configuring the SNA Communication Software

### Use

See the *SAP Online Documentation* for information on how to configure the SNA Software.

### Procedure

In the SAP Online Documentation, choose *SAP Library → BC-Basis Components → Basis Services/Communication Interfaces → BC-SAP Communication Configuration → Communication Subsystems for SNA*.

# Result

You have finished this part of the installation. If you want to:

- Install a dialog instance on the same host, proceed with *Dialog Instance Installation* [page 89].

- Install a dialog instance on a different host, perform *Post-Installation Activities* [page 104] to complete this installation. After that, begin the new installation with *Installation Planning* [page 19] on the other host.

- Install additional components, proceed with *Additional Components Installation* [page 101].

Otherwise, perform *Post-Installation Activities* [page 104].

# 3.5 Additional Component Installation

## Use

In this step, you can install one or more of the SAP software development kits.

The optional components can only be installed on the central instance host. (The directory `<sapmnt>/<SAPSID>` must be located on a local file system.)

## Prerequisites

Before you install additional components, the central instance and the database must be installed.

## Procedure

## Installing the SAP Software Development Kits

To install one or more of these components, follow the procedure in this section:

1. Mount the Presentation CD-ROM [page 101] on the central instance host.

2. Run the shell script INSTTOOL.SH [page 101] on the central instance host.

3. Start INSTGUI [page 102]  on the central instance host.

4. Run R3SETUP [page 102]  on the central instance host.

5. Install Lotus Script Extension for SAP Systems [page 102] if needed.

## 3.5.1 Mounting the Presentation CD-ROM

1. Log on as user `root`.

2. Mount the `SAP Presentation` CD-ROM as described in Mounting a CD-ROM [page 148].

   ■●≫

   Mount the CD-ROM locally. It is not recommended to use NFS.

## 3.5.2 Running the Shell Script for Additional Components

1. As user `root`, change to the installation directory: **cd <INSTDIR>**

2. Start the shell script from the CD by entering:
   **<PRESENTATION CD>/SDK/UNIX/INSTTOOL.SH**

3.5 Additional Component Installation

## 3.5.3 Starting INSTGUI

If you want to use INSTGUI, the graphical user interface for R3SETUP, and it has not been started by the shell script, you need to start it **before** starting R3SETUP. To do this, enter the command:
**cd <INSTDIR>; ./INSTGUI**

You can start INSTGUI on a remote computer.

> If you are using INSTGUI, make sure that your DISPLAY environment variable is set correctly.

See The R3SETUP Tool [page 116] for details and for information on using INSTGUI.

## 3.5.4 Running R3SETUP for Additional Component Installation

1.  Start R3SETUP as user root. Enter:
    **cd <INSTDIR>; ./R3SETUP -f ADDPACK.R3S**

2.  R3SETUP prompts you to enter information on the components SAP software development kits (CPIC, CAD, RFC).

    − To install a component, enter **YES**.

    − To skip the installation of a component, enter **NO**.

3.  When the installation is completed, the message *R3SETUP finished* is displayed.

The progress of the installation is displayed in INSTGUI if it was started.

Error messages, warnings and further information are written to the log file ADDPACK.log.

We recommend that you check the log file for warnings. You can navigate through the log messages shown in the log view of INSTGUI.

If problems with R3SETUP occur, consult the R3SETUP Troubleshooting [page 126] section.

## 3.5.5 Installing Lotus Script Extension for SAP Systems

### Use

If you want to install the Lotus Script Extension for SAP Systems, you will find versions that support AIX, HP-UX and Solaris on the Presentation  CD. This software allows users of Lotus Script to make RFC calls from within their Lotus Script code. Lotus Notes for AIX, HP-UX and Solaris supports this function.

It is **not** possible to install the Lotus Script Extension with R3SETUP.

### Procedure

1. Log on as user `<sapsid>adm`.

2. Copy the version for your platform to the home directory of user `<sapsid>adm`. The following examples assume you use a cshell.

   

   ```
   AIX:
   cp <CDDIR>/GUI/UNIX/AIX/LSXAIX.CAR ~<sapsid>adm/.
   ```

3. Unpack this file.

   

   ```
   AIX:
   cd ~<sapsid>adm
   <CDDIR>/GUI/UNIX/AIX/CAR -x -f LSXAIX.CAR
   ```

The last operation created a directory called `lsxaix`. Change to this directory and follow the instructions in the `readme.dmo` file to complete the installation.

# Result

You have finished this part of the installation. If you want to:

- Install a dialog instance on the same host, proceed with *Dialog Instance Installation* [page 89].

- Install a dialog or gateway instance on a different host, perform *Post-Installation Activities* [page 104] to complete this installation. After that, begin the new installation with *Installation Planning* [page 19] on the other host.

Otherwise, perform *Post-Installation Activities* [page 104].

# 4. Post-Installation Activities

## Purpose

This section describes how you complete and check the installation of an SAP System.

◼●≫

> Many of the steps in this process are documented in detail in the System Administration Assistant (transaction code *SSAA*). You can use the Assistant to execute the step and call up the documentation.

## Prerequisites

You have completed the SAP System installation on all the hosts of your SAP System, including setting up at least one frontend (for example, on the central instance host). You install the frontend software on at least one host machine in your system environment. To simplify administration of your SAP System, we recommend that you do this on the central instance host.

For more information on installing the frontend software, see the separate documentation:

- *Installing SAP Frontend Software for PCs* (English version)
- *SAP-Frontend-Software für PCs installieren* (German version)

## Process Flow

1. You check that you can start and stop the SAP System [page 105].

2. You check that you can log on to the SAP System [page 106] with the SAP frontend.

3. You check that the SAP System services are present [page 107] on the correct instances.

4. You install the SAP license [page 108]. Without a permanent license, you cannot use the SAP System after the temporary license expires (that is, after the first four weeks).

5. You perform operating system adjustments [page 109].

6. You perform file and directory adjustments [page 110].

7. You install the online documentation [page 110] and check that you can access it.

8. You configure SAProuter and SAPNet - R/3 Frontend [page 110].

9. You complete and check the Oracle database installation [page 111].

10. You configure the domain controller in the Transport Management System (TMS) by using transaction code STMS.

11. You perform the steps specified in *Installation follow-up Work* in the System Administration Assistant (transaction code *SSAA*). You can use the Assistant to execute the step and call up the documentation.

12. Configure the instance profiles after the installation, as SAP is only able to deliver default instance profiles. They have to be adapted to the purpose and the peculiarities of the installed SAP System.

13. You perform a full installation backup [page 113]. Make sure that you have finished all client maintenance (for example, copying clients) **before** the backup.

14. If needed, you perform application-specific actions [page 114].

15. If needed, <u>install the SAP Internet Solution [page 115]</u>.

## Result

You have completed and checked the SAP System installation.

You now need to prepare the SAP System for using business applications. This process includes customizing the Basis system and the various business components. The procedure for implementing the business processes and organizational structure of your SAP System is **not** described in this documentation.

# 4.1 Starting and Stopping the SAP System

## Use

This procedure describes how to check that you can start and stop the SAP System after the installation.

## Prerequisites

You have signed on to SAP System hosts as user `<sapsid>adm`.

## Procedure

**Starting the SAP System**

1. To start the central instance and database instance:

   - If you have a central system (that is, central instance and database instance on the **same** host), enter the following on the central system host:
     `startsap`

     This checks if the database is already running. If not, it starts the database before starting the SAP instance.

     ◖➤

     > You can start the database and SAP System separately by entering the command `startsap DB` and then `startsap R3`. Make sure you always start the database first because otherwise the SAP instance cannot be started.

   - If you have a standalone database (that is, central instance and database instance on **different** hosts), do the following:

     i. On the database host, enter:
        `startdb`

     ii. On the central instance host, enter:
        `startsap R3`

2. Enter the following to start dialog instances (if there are any):
   `startsap`

For more information on how to start database-specific tools, see the database-specific information in this documentation and the documentation from the database manufacturer.

4.2 Logging on to the SAP System

**Stopping the SAP System**

1.  Enter the following to stop dialog instances:
    **stopsap**

2.  To stop the central instance and database instance:

    – If you have a central system (that is, central instance and database instance on the **same** host), enter the following on the central system host:
      **stopsap**

      This stops the SAP instance and then the database.

      You can stop SAP System and the database separately by entering the command **stopsap R3** and then **stopsap**. Make sure you always stop the SAP System first because otherwise the database cannot be stopped.

    – If you have a standalone database (that is, central instance and database instance on **different** hosts), do the following:

      i.  On the central instance host, enter:
          **stopsap R3**

      ii. On the database host, enter:
          **stopdb**

          Make sure that no SAP instance is running before you enter stopdb on a standalone database server. No automatic check is made.

For more information on how to stop database-specific tools, see the database-specific information in this documentation and the documentation from the database manufacturer.

# 4.2 Logging on to the SAP System

## Use

This section tells you how to log on to the SAP System after the installation. To start with, you log on using the frontend of the host where the central instance is running.

## Prerequisites

You have already started the SAP System and installed a frontend.

There are two standard users in the SAP System after the installation:

| User | Initial password | Clients in which user exists |
|------|------------------|------------------------------|
| SAP* | 06071992 | 000, 001, 066 |
| DDIC | 19920706 | 000, 001 |

## Procedure

1. Make sure that you are logged on to the operating system as `<sapsid>adm`.

2. On the machine, where you have installed the frontend, choose *Start → Programs →  SAP Frontend<Release> → SAPlogon*

   The *SAP Logon* dialog box opens.

3. Create a logon entry for the newly installed system:

   a. Choose *New.*

   b. Enter the following data:

   | *Field* | *Explanation* |
   |---------|---------------|
   | *Description of system* | Give a meaningful description, for example, the host name of the central instance or the SAP System name. |
   | *Application Server* | Specify the name of the central instance host |
   | *System number* | Specify the number you entered for the central instance during the installation. |

   When you choose *OK*, the *SAP Logon* dialog box reappears and now includes an entry for the new system.

4. Double-click the new system entry.
   The logon screen for the SAP System appears.

5. Log on as user `SAP*` and choose a new password.

6. Repeat the logon as user `DDIC` and choose a new password.


# 4.3 Checking SAP System Services

## Use

This section describes how to check that the SAP System services are correctly installed.

■●⮞

> Make sure you perform this procedure after you log on to the SAP System for the first time after installation.

## Prerequisites

You have logged onto the SAP System [page 106] using a frontend on the central instance.

4.4 Installing and Using the SAP License

## Procedure

1. Call transaction `SM50`.

   The services available for this instance are displayed, that is, dialog, update, enqueue, batch and spool.

   If the display is empty, check whether the message server is running. The process name is `ms.sap<SAPSID>_DVEBMGS<nr>`. If the process is not running, one of the following files contains more detailed information:

   − `/usr/sap/<SAPSID>/DVEBMGS<nr>/WORK/dev_ms`

   − `/usr/sap/<SAPSID>/DVEBMGS<nr>/work/dev_ms`

2. Call transaction `SM21` to check the system log.


# 4.4 Installing and Using the SAP License

## Use

To work with the SAP System, you need an SAP license. After the installation of the central instance, a temporary license is active for **four weeks only**. During this period, you must install a permanent license.

You can install several licenses, one for each host running the message server. If relevant, you must do this for a Microsoft Cluster Server (MSCS) installation. You must perform this procedure on each host running the message server. The SAP System then searches for the current license.

## Prerequisites

You need to install a new permanent license if you are:

- Performing a new SAP System installation

- Renaming your SAP System ID (that is, `<SAPSID>` )

- Changing the message server host (that is, the central instance)

- Changing an existing hardware configuration

To see online help text for the license installation, enter the following command:
**saplicense -help**

See SAP Online Help for more information about the SAP license (*SAP Library* → *BC - Basis Components* → *Kernel Components* → *BC - SAP License*).

## Procedure

1. To find the hardware key (that is, the customer key) needed for the license request, enter the following command on the host where the message server is running:
   **saplicense -get**

   The system displays an 11-character hardware key, for example, `D1903055560`.

2.  Using the fax form in the installation package, send a fax with the following information to SAP:

    −   Hardware key from previous step

    −   Name of the installed SAP System (that is, the value of `<SAPSID>` )

    −   The date when you installed the database

3.  After you have received your license key from SAP, install it as follows, being sure to enter the license key **exactly** as shown in the SAP reply to your fax:
    ```
    saplicense -install
    ```

    −   If the license installation is successful, you see the following message:
        ```
        license successfully installed
        ```

        You now have a permanent license for your SAP System.

    −   If the license installation is **not** successful, you see the following message:
        ```
        check failed, no license installed
        ```

4.  For more information, see the following in SAP Online Help:

    *BC Basis → Kernel Components → BC SAP License*

# 4.5 Performing Operating System Adjustments

## Use

These adjustments are required if your operating system is AIX or HP-UX on HP/HPPA.

## Procedure

1.  If your operating system is AIX, check that `perfagent` is installed as follows:
    ```
    lslpp -l perfagent.server
    ```

    If the software is installed, the version is displayed on the screen. For more information, see **SAP Note 40605**.

    > The AIX software `perfagent` must be installed for `saposcol` on AIX.

2.  If your operating system is HP-UX on HP/HPPA or AIX on IBM/RS6000, you can improve performance by reducing the number of shared memories. To do this, group shared memories together as shared memory pools. For more information, see **SAP Note 37537**.

# 4.6 Performing File and Directory Adjustments

1. If you have copied installation CDs to your hard disk to enable an unattached installation, you can delete these files after the installation is finished successfully.

2. For security reasons, set the permissions of the transport directory `/usr/sap/trans` to `771` by performing the following steps:

   a. Log on as user **root** on the host that exports the transport directory.

   b. Enter:
      **chmod 771 /usr/sap/trans**

# 4.7 Installing the Online Documentation

## Use

SAP currently provides an HTML-based solution for the SAP online documentation. The Application Help, Glossary, Implementation Guide (IMG) and Release Notes are delivered in HTML format. You can display the documentation with a Java-compatible web browser on all frontend platforms supported by SAP.

## Procedure

1. Install the online documentation. For more information, see *Installing the Online Documentation*, delivered as part of the installation package.

2. Log on to your SAP System [page 106].

3. Choose *Help → SAP library*.

   You can also directly access the help files on the `Online Documentation` CD without starting your SAP System. You need a PC running Windows NT 4.0 or Windows 95 to install the HTMLHelp Viewer for the `Online Documentation` CD.

**See also:**

Using R3SETUP Online Help [page 121]

# 4.8 Configuring SAProuter and SAPNet - R/3 Frontend

## Use

SAProuter increases network security and simplifies network configuration. SAProuter allows you to make indirect network connections. The SAProuter software is included in the standard SAP System. No additional installation is required. The network administrator normally configures SAProuter.

If you are using any of the following, you require SAProuter:

• SAPNet – R/3 Frontend

SAPNet – R/3 Frontend is the SAP-based service system and provides the technical link between SAP customers and SAP. SAPNet – R/3 Frontend was formerly known as the Online Service System (OSS).

For more information on setting up and using SAPNet – R/3 Frontend, see the alias *sapnet-guide* in SAPNet – Web Frontend, and the SAP online documentation.

- EarlyWatch

  For more information, use the alias *earlywatch* in SAPNet – Web Frontend.

- Remote Consulting

  For more information, use the alias *remoteconsulting* in SAPNet – Web Frontend.

## Procedure

To get a complete list of SAProuter parameters, enter the following at the command line prompt:

**`saprouter`**

For more information see the SAP online documentation. For information on installing SAProuter as a Windows NT service, see **SAP Note 41054**.

# 4.9 Completing and Checking the Oracle Installation

## Use

An Oracle SAP database has to be run in archive log mode. Only this mode guarantees recovery after system failure. The database archive logs are written to the directory `/oracle/<SAPSID>/saparch`. If the file system containing the archive directory is full, all database transactions are stopped (`archiver stuck`). Use the tool **`brarchive`** to save the archives on tape. For more information, see the guide *SAP Database Administration: Oracle* which is part of the Online Documentation.

The following tasks need to be executed to ensure the availability of important database tools and to complete the Oracle database installation.

## Procedure

**Database Utilities brbackup and brarchive**

Execute the following steps in order to check whether the database utilities `brbackup` and `brarchive` are installed correctly:

1. Log on as UNIX user `ora<sapsid>`.

2. Verify that the database is running.

3. Load a scratch/new tape in the tape station.

4.9 Completing and Checking the Oracle Installation

4.  Initialize all tapes defined in the `volume_backup` and `volume_archive`
    `init<SAPSID>.sap` profile parameters, if enough scratch tapes are available (default 60):

    **`brbackup -i force`**
    **`brarchive -i force`**

    If only one scratch tape is available, enter:

    **`brbackup -i force -n 1`**
    **`brarchive -i force -n 1`**

5.  Enter the command **`sapdba`**. The SAPDBA main menu appears.

6.  Select *Backup*. The Backup menu appears.

7.  Select *Enter backup type* to change the type to `online`.

8.  To save a sample tablespace select *Enter Tablespace(s)* and enter **`psapuser1i`**

9.  Select *Start BRBACKUP*.

10. If the message `BRBACKUP terminated successfully` appears,
    select *Return* to get back to the SAPDBA main menu.

11. Select *Archive*. The Archive menu appears.

12. Select *Query only, no processing*.

13. Select *Start BRARCHIVE*.

14. Select *Return* to return to the SAPDBA main menu, if one of these messages appears:

    –   `BRARCHIVE terminated successfully`

    –   `BR013W No archive logs found to be processed`
        `BR004I BRARCHIVE terminated with warnings`

15. Select *Quit* to exit `sapdba`.

If brarchive or brbackup did not terminate successfully, refer to the guide
*SAP Database Administration: Oracle* (supplied on the *Online Documentation CD*) to analyze
error messages and to obtain information on how to solve the problems.


**Changing Passwords of the Database Users**

For security reasons, you should change the passwords of the database users **`SYS`** and **`SYSTEM`**
after the installation by using the program `sapdba`.

> Do not use the tool chdbpass to change passwords.

To change the passwords, perform the following steps:

1.  Log on as user `ora<sapsid>`.

2.  Start sapdba by entering
    **`sapdba`**

3.  Select *User and Security* in the main menu.

4.  Select *Change password*.

5.  Select *User*.

6.  Enter `SYSTEM`.

7.  Select *Change password* and change the password for this user.

8.  Repeat steps 4 to 7 for user `SYS`.

# 4.10 Performing a Full Backup of the Installation

## Use

You must perform a full off-line backup at the end of the installation. This procedure also describes how to use the backed up data for a restore.

You need to back up the following directories and files:

* All database-specific directories

* All SAP-specific directories:

    – `/usr/sap/<SAPSID>`

    – `/usr/sap/trans`

    – `<sapmnt>/<SAPSID>`

    – home directory of the user `<sapsid>adm`

* The root file system

    This saves the structure of the system and all configuration files (for example, file system size, logical volume manager configuration, database configuration data).

> This list is only valid for a standard installation.

This procedure works on all hardware platforms. See your *System Administration Guide* for details and for operating system-specific backup procedures.

## Prerequisites

* You have completed client maintenance (for example, client copy).

* You have logged on as user `<sapsid>adm` and stopped the following:

    – The SAP System

    – The database

4.11 Application-Specific Actions

## Procedure

**Backing Up the Installation**

1. Log on as user `root`.

2. Manually create a compressed tar archive containing all installed files:

   a. Create the archive:

      ```
      tar -cf <ARCHIVNAME> <filesystem / filename>
      tar -uf <ARCHIVNAME> <filesystem / filename> ....
      ```

   b. Compress the archive:
      ```
      compress <ARCHIVNAME>
      ```

   c. Store the archive on tape:
      ```
      tar -cf <tape_device> <ARCHIVNAME>.Z
      ```

**Restoring Your Backup**

Check for modifications in the existing parameter files before you overwrite them with the backup.

1. Log on as user `root`.

2. Restore the data that you previously backed up:

   a. Restore the data from tape:
      ```
      tar -xf <tape_device> <ARCHIVNAME>.Z
      ```

   b. Uncompress the data
      ```
      uncompress <ARCHIVNAME>.Z
      ```

   c. Restore the data to the file system
      ```
      tar -xf <ARCHIVNAME>
      ```

# 4.11 Application-Specific Actions

## SAP Retail

If you use SAP Retail, follow the instructions in **SAP Note 138360**.

# 4.12 SAP Internet Solution Installation

## Purpose

The SAP Internet Transaction Server (ITS) links the SAP System to the Internet. The ITS enables Internet and intranet users to communicate directly with SAP Systems and run SAP Internet Application Components (IACs), which are Internet-enabled SAP System transactions.

## Prerequisites

To use the SAP Internet Solution, you must install the SAP Internet Transaction Server (ITS). If you want to modify the standard Internet application components, also install SAP@Web Studio, the ITS development environment.

The requirements for hard- and software are described in the installation guide *SAP@Web Installation*. Install the most current versions of ITS and SAP@Web Studio. **SAP Note 85129** contains information on when the latest versions are available.

## Process Flow

Installation of the SAP Internet Solution consists of the following installation procedures:

- ITS Installation

- SAP@Web Studio Installation, if required

For more information on installation of ITS and SAP@Web Studio, see the installation guide *SAP@Web Installation*.

# 5. The R3SETUP Tool

## Use

R3SETUP is the SAP tool to automate installation of the SAP System. It installs the different components of an SAP System.

## Integration

You can use INSTGUI, the graphical user interface for R3SETUP, to monitor the progress of the installation.

## Prerequisites

R3SETUP does **not** support the following steps, which you must do **before** installation:

- UNIX

    - Setup of file systems and raw devices

    - Configuration of UNIX kernel parameters and swap space

- AS/400

    - Configuration of AS/400 system values

    - Addition of user auxiliary storage pools (ASPs)

    - Configuration of TCP/IP

    - Checking and adjusting memory pools

- NT

    - Installation of the Microsoft Management Console (MMC)

    - Adjustment of virtual memory and file cache

## Features

The R3SETUP tool supports the installation of:

- The central instance

- The database

- An dialog instance

- The SAP software development kits (UNIX)

- A standalone gateway

R3SETUP does this by:

- Creating operating system users and groups (UNIX and NT)

- Creating user profiles (AS/400)

- Defining services at operating system level

- Creating and modifying files and directories

- Unpacking (restoring) and copying software

- Creating the database and loading it with data

- Configuring essential database and operating system objects for the SAP System

> ⚠️
>
> Create a new installation directory every time you start R3SETUP with another service (that is, with another command file identified by the ending .R3S). Otherwise, old log and command files are overwritten.

When you start R3SETUP, the following options are available:

| Option | Meaning |
|---|---|
| `-f <command file>` | Specify the service you want to install (required) |
| `-l <log file>` | Specify log file, default: `<service>.log` |
| `-t trace` | Include detailed trace messages in log file |
| `-g <gui_host>:<gui_port>` | Specify host and port for INSTGUI |
| `-m` | Create file with messages for INSTGUI |
| `-h` | List R3SETUP options |

After it is started, R3SETUP shows the following properties:

- It performs all installation steps that are defined in the command file

- It writes error messages, warnings and other information to the log file

- Important messages are also written to the console.

- When the last installation step is completed, R3SETUP finishes with the message "`R3SETUP finished.`"

- If R3SETUP encounters a problem that it cannot handle, it stops with an error message.

## Activities

You can:

- Run R3SETUP unattended

  You determine how R3SETUP performs the installation by making entries in a command file during the input phase. This allows you to provide all the necessary information before the actual installation starts. R3SETUP then goes into the processing phase to automatically perform the installation in unattended mode, without prompting you for any further information.

  If necessary you can re-use the command file to perform another identical installation or to restart the installation in the event of failure.

- Restart R3SETUP

  The installation consists of a number of independent installation steps. If a step fails, R3SETUP stops. When the problem has been solved, you can restart R3SETUP. Since R3SETUP records the installation progress in the command file, it can continue the installation from the failed step, without repeating previous steps.

# 5.1 INSTGUI

## Use

You use INSTGUI, the graphical user interface (GUI) for R3SETUP, during the:

- Input phase to enter information for later use by R3SETUP

- Processing phase to:

    – Monitor progress of the installation steps

    – View log messages

You can also use INSTGUI to get online help on R3SETUP.

## Integration

Depending on your operating system platform, you start INSTGUI:

- Independently of R3SETUP as a separate process, on non-Windows platforms

- Simultaneously with R3SETUP, on Windows platforms

For a remote installation on Windows platforms, you also have to start INSTGUI as a separate process on the host from which you supervise the installation.

If you use INSTGUI, it is closely integrated with R3SETUP to exchange information about the progress of the installation.

## Prerequisites

INSTGUI is available for X Windows (on UNIX operating systems) and for Windows NT 4.0 and Windows 95 or 98.

## Features

You can start INSTGUI with these options:

| Options | Meaning |
|---|---|
| `-port <number>` | Port for communication with R3SETUP, default: 61312 |
| `-docupath <path>` | Path to the R3SETUP online help files, default: `./doc` |
| `-fontsize <size>` | Font size for INSTGUI (8 to 14), default: 8 |
| `-loadmsg <file>` | Replace internal messages with those listed in the file |
| `-updatemsg <file>` | Update internal messages with those listed in the file |
| `-spoolmsg  <file>` | Spool internal messages to the file |
| `-help` | List INSTGUI options |

### Activities

When using INSTGUI, you can switch between the following views:

- Step View

  When you start R3SETUP, it goes into step view. You can:

  - See which installation step is currently being performed and what it does

  - Get online help on the installation step that is currently being performed

  - Switch to the log view

- Log View

  This shows all R3SETUP messages as they are recorded in the log file. You can:

  - Display the next or previous information, warning, or error message

  - Get online help on the installation step that created a message

  - Switch back to the step view

> The warning "`No message-id for step …`" can be ignored. It means that no description for this step is available to be displayed by INSTGUI.

## 5.2 R3SETUP Command Files

### Definition

The R3SETUP command files determine how R3SETUP performs the installation of the SAP System. The names of the command files are `<SERVICE>.R3S`.

> The name of the command file for the installation of a central instance is `CENTRAL.R3S`.

### Use

During the input phase of the installation, you enter information into the R3SETUP command file, which is then used by the R3SETUP tool during the processing phase of the installation. R3SETUP performs all installation steps that are defined in the command file.

An installation step can run in one of two different modes, `SKIP` or `DO`. The default mode before the installation is `DO`. After the step has run successfully, the default mode is `SKIP`. This means the step is skipped if you restart R3SETUP.

You can force a step to run even if installation results already exist by adding the key `ACTION=FORCEDDO` to the step's section in the command file. If you want to skip a step although it has not yet run, add the key `ACTION=SKIP`.

5.3 R3SETUP Messages

If you modify the command file, you must save your changes **before** you start R3SETUP. Otherwise, your changes have no effect.

### Structure

The command file consists of several sections. The beginning of a section is always indicated by the section name in brackets. Each section contains a set of keys and their values. There are the following types of section:

* The `[EXE]` section

  This is the installation roadmap. Steps are listed in numerical order of execution, as shown in the following example:

  ```
  [EXE]
  10=GATEWAYINSTANCE_IND_IND
  20=R3GATEWAYPORT_IND_IND
  30=R3GATEWAYSECURITYPORT_IND_IND
  40=OSGROUPSAPLOCAL_NT_IND
  50=OSUSERSIDADM_NT_ORA
  60=R3DIRECTORIES_NT_IND
  ```

* Step sections

  These describe in detail a step named in the `[EXE]` section. After execution, step sections are updated with the status `OK` or `ERROR`.

* List section

  These contain additional information for the installation, such as a list of directories to be created. The names of list sections start with `[Z…]`.

Keys enclosed in `@` characters, for example `@SAPSYSNR@`, are variables that are replaced by suitable values during the installation.

## 5.3 R3SETUP Messages

### Definition

R3SETUP records all information about the installation process in the relevant log file:

* UNIX: `<INSTDIR>/<COMMAND_FILE_NAME>.log` (or `<COMMAND_FILE_NAME>.log<NR>` if R3SETUP was started several times)

* NT: `<INSTDIR>\<COMMAND_FILE_NAME>.LOG` (or `<COMMAND_FILE_NAME>.LOG<NR>` if R3SETUP was started several times)

## Use

Since the log file can contain up to several hundred messages, we recommend you use the R3SETUP frontend to navigate through the messages. See Using R3SETUP Online Help [page 121].

## Structure

Every message in the log file contains:

- Message type (`INFO`, `WARNING`, or `ERROR`)

- Date and time

- Installation step (that is, the name of the section in the command file)

- Message and text



```
INFO 1997-12-09 13:52:20 R3LINKS_IND_IND ColdKeyCheck:0
Phase successful
```

# 5.4 Using R3SETUP Online Help

## Use

You can display R3SETUP online help for information on the R3SETUP installation steps.

## Prerequisites

You need an HTML browser to view the online help for the R3SETUP installation steps:

- UNIX

  Netscape Navigator 3.0 or higher

  The HTML help files are stored in a CAR archive on the `SAP Kernel` CD. They are unpacked and stored in the directory `<INSTDIR>/doc` by the shell script when INSTGUI is copied from the CD to the hard disk.

- Windows

  Windows NT 4.0 and Windows 95

  Netscape Navigator 3.0 or higher (32-bit version), and Microsoft Internet Explorer 3.0 or higher (32-bit version). Internet Explorer is shipped with the SAP System on the `Online Documentation` CD. See the `README.TXT` file on this CD.

  The HTML help files are stored in a CAR archive on the `SAP Kernel` CD. They are unpacked and stored in the directory `<instguidir>/doc` on your PC.

- AS/400

  Netscape Navigator 3.0 or higher (32-bit version), and Microsoft Internet Explorer 3.0 or higher (32-bit version). Internet Explorer is shipped with the SAP System on the `Online Documentation` CD. See the `README.TXT` file on this CD.

5.5 Continuing an Interrupted Installation

The HTML help files are stored in a CAR archive on the `SAP Kernel` CD. You can do one of the following:

– Unpack the HTML files and store them in the directory `<instguidir>/doc` on your PC.

– Configure your AS/400 as an HTTP server and unpack and store the HTML files on your AS/400.

## Procedure

You can access the R3SETUP online help in the following ways:

- You can display context-sensitive help on installation steps and log messages by choosing *Help* in INSTGUI.

- You can browse the help by opening the file `<INSTDIR>/doc/_START.HTM` (AS/400: `<instguidir>/doc/START.HTM`) on your PC with your web browser.

- AS/400: If you configured your AS/400 as an HTTP server, you can also start INSTGUI with the option `instgui -docupath http://<your_AS400>/r3setup/`

**See also:**

Installing the Online Documentation [page 110]

# 5.5 Continuing an Interrupted Installation

## Use

You can continue an installation that has failed from the point of failure, without repeating steps that have already successfully completed.

## Prerequisites

If an installation step fails, R3SETUP stops with an error message.

## Procedure

1. Look at the log file [page 120] to find out exactly what happened.

2. If necessary, see the R3SETUP online help [page 121].

3. When you have solved the problem, restart R3SETUP.

   Since R3SETUP records installation progress in the command file, it can continue the installation from the point of failure.

   ◀●⟫

   Windows NT only:
   You can use the R3SEDIT utility to restart the installation at a particular step.

# 5.6 Monitoring a Remote Installation

## Use

You can run R3SETUP and INSTGUI on different computers that are connected via a TCP/IP network. This allows you to install a remote SAP System while monitoring the installation with INSTGUI on your local computer.

## Procedure

To monitor a remote installation:

1. Create an installation directory on the local computer that can be accessed by any user.

2. Copy INSTGUI from the `SAP Kernel` or the Presentation CD to this installation directory. Make sure you copy the appropriate INSTGUI for your local hardware platform.

3. Unpack the R3SETUP Online Help on the local computer. Make sure you use the appropriate `CAR` for your local hardware platform:

   a. Enter:
      **`cd <INSTDIR>`**

   b. Depending on the operating system of the computer, on which you want to run the R3SETUP Online Help and use the CD, enter one of the following commands:

      • On UNIX using the `Kernel CD`, enter:
        **`<CD-DIR>/UNIX/<OS>/CAR -xvf <CD-DIR>/DOCU/R3S_DOC.CAR`**

      • On UNIX using the `Presentation CD`,. enter:
        **`<CD-DIR>/GUI/UNIX/<OS>/CAR -xvf <CD-DIR>/DOCU/R3S_DOC.CAR`**

      • On Windows NT 4.0 or Windows 95 using the `Kernel CD`, enter:
        **`<CD-DRIVE>:\NT\<Platform>\CAR -xvf     \`**
        **`    <CD-DRIVE>:\DOCU\R3S_DOC.CAR`**

      • On Windows NT 4.0 or Windows 95 using the `Presentation CD`, enter:
        **`<CD-DRIVE>:\GATEWAY\NT\<Platform>\CAR -xvf     \`**
        **`    <CD-DRIVE>:\DOCU\R3S_DOC.CAR`**

   This creates a subdirectory `doc` that contains the help files.

4. Start INSTGUI on the local computer:

   – On UNIX, enter:
     **`<INSTDIR>/INSTGUI`**

   – On Windows NT 4.0 or Windows 95, enter:
     **`<INSTDIR>\INSTGUI`**

        ▬●➤

        If you have stored the R3SETUP online help files in a directory different from
        `<INSTDIR>/doc`, start INSTGUI with the option **`-docupath <path>`**.

5. Start R3SETUP on the remote computer (on which the SAP System is to be installed) by entering:
   **`<INSTDIR>/R3SETUP -f <command file> -g <INSTGUI_hostname>`**

5.6 Monitoring a Remote Installation

6. If INSTGUI reports that the default communication port 61312 is already occupied:

   a. Exit INSTGUI.

   b. Start INSTGUI on the local computer with a different port by entering
      `<INSTDIR>/INSTGUI -port <port>`

   c. Start R3SETUP on the remote computer (on which the SAP System is to be installed) by entering
      `<INSTDIR>/R3SETUP -f <command file> -g <INSTGUI_hostname:port>`
      Use the same port you used with INSTGUI.

# 6. Additional Information

Consult this section for additional information:

- For troubleshooting information during the installation process, see Installation Troubleshooting [page 125].

- For information on how to delete an SAP System installation, see Deleting an SAP System Installation [page 129].

- For information on how to delete an Oracle database installation, see Deleting an Oracle Database Installation [page 133].

- For information on database modifications for Very Large Databases (VLDB), see Database Modifications for Very Large Databases [page 135].

# 6.1 Installation Troubleshooting

## Purpose

This troubleshooting section contains solutions to possible problems and errors that could occur during the installation procedure. Consult this section when encountering problems during the installation process.

## Process Flow

If you encounter problems during the installation procedure:

1. Check the installation documentation again to see whether certain steps or aspects were disregarded. Pay special attention to note and caution boxes that refer to your operating system.

2. Consult one or more of the following troubleshooting sections:

   a. See Common Installation Troubleshooting [page 126] for common troubleshooting and considerations for the installation process.

   b. If an error occurs during execution of R3SETUP, see also R3SETUP Troubleshooting [page 126].

   c. If an error occurs during the database installation, see also Database Installation Troubleshooting [page 127].

   d. If you suspect that hardware problems are the reason for errors in your installation, see also Operating System Dependent Troubleshooting [page 218].

3. Consult the table of installation notes [page 11].

4. Search for other SAP Notes by using SAPNet - R/3 Frontend containing possible solutions.

5. Contact your Local Support via SAP Support Line.

## Result

After solving the problem, proceed with the installation procedure.

6.1 Installation Troubleshooting

## 6.1.1 Common Installation Troubleshooting

- Make sure you did not log on to the SAP System during the installation The SAP System is not in a complete and consistent state before the installation is completed. Do not log on until the installation is finished.

- If you log on as user DDIC, do not change the standard password. The installation steps beginning with "RFC..." need a connection to the SAP System and therefore require DDIC to have the standard password. If you log on as DDIC during the installation and change the password, these steps will fail. In this case, reset the password of DDIC to 19920706 and restart R3SETUP.

## 6.1.2 R3SETUP Troubleshooting

### Common R3SETUP Aspects

You can obtain online help on a message by clicking it in the log view and choosing *Help*.

Important error, warning and info messages are also written to your terminal.

For information on using R3SETUP and INSTGUI and on accessing the R3SETUP Online Help, see Using R3SETUP Online Help [page 121].

### When R3SETUP Stops

If R3SETUP exits with an error message, see the log file for error details and possible solutions. Eliminate the cause of the error and restart R3SETUP. The installation continues from the last step that did not finish successfully.

### R3SETUP Permission Error

If R3SETUP stops with an error message that the permission of a file or directory on a NFS-mounted file system is not correct, you can either:

- Add the key `CHANGE_ON_NFS=YES` to the command file (search for the path name of the file) to instruct R3SETUP to change the permission of this file

  or

- Add the key `BREAK_ON_NFS_PERMISSION_ERROR=NO` to the section of the step that failed to let R3SETUP ignore the wrong permissions.

### See also:

Installation Troubleshooting, Operating System Dependent Troubleshooting [page 218].

## 6.1.3 Database Installation Troubleshooting

### Orainst Error Situations

- Wrong User Input

  - All user input is checked. If entries are incorrect, an error message appears. Enter the correct value and continue after confirming the message.

- Oracle Installation Errors

  - Refer to the Oracle documentation.

  - The screen *Available Products* (product list for installation) of `orainst` is displayed after error recovery. Select the products to be installed and proceed with the installation.

  - The warning "insufficient disk space" can be ignored.

- Relinking Errors

  - With relinking errors, see Oracle error Notes. Check that the C compiler is available and has the correct version.

- SVRMGR Errors

  - `Connect internal fails`: restart `orainst`

  - `svrmgrl not found`: enter **rehash**

- Other Errors

  - If other errors occur, you can exit `orainst` by choosing *CANCEL* or by selecting *QUIT* from the menu. After you have eliminated the error, restart `orainst.`

### Restarting Orainst

If `orainst` has to be restarted:

- Remove the file `unix.rgs`

  **rm $ORACLE_HOME/orainst/unix.rgs**
  **rm $ORACLE_HOME/orainst_sap/unix.rgs**

- Clean up the incomplete installation:

  **cd $ORACLE_HOME**
  **rm -rf bin dbup ddbo guicommon lib network tcppa  \**
  **plsql rdbms tcp tk2 xa core3 guicommon2    \**
  **names netman oacore slax sqllib sqlplus svrmgr**

  (Some of the directories may not have been created yet.)

- Restart `orainst`

## R3SETUP Error Situations during the Database Installation

- ORA-01658 Error During the Database Load/ Tablespaces created are too small

  This error occurs if a tablespace is too small. Add a new data file to the tablespace. You can do this with SAPDBA or R3SETUP.

  When you use R3SETUP, you must perform the following steps:

  − Delete the line `STATUS=OK` from the section `DBCREATETSP_IND_ORA` of the command file.

  − Copy the file `DBSIZE.TPL` from the Export-CD 1 (directory `<Export-CD1>/DB/ORA`) to your installation directory. In the section `[Z_ORACREATETSP]` of the file `DBSIZE.TPL`, find the line corresponding to the tablespace that is too small.

     The section `[Z_ORACREATETSP]` is no longer located in the command files as of Release 4.6A.

  − Append `!@Z_SAPDATAPATH=SAPDATA<x>@;<size>` to this line (see example).

     To add a new data file with a size of 100 MB that resides in the `sapdata1` file system to the tablespace `PSAPDDICD`, find the line
     `PSAPDDICD=@Z_SAPDATAPATH=SAPDATA4@;238`
     in the section `[Z_ORACREATETSP]` of the file `DBSIZE.TPL` and add this:
     **`!@Z_SAPDATAPATH=SAPDATA1@;100`**
     Now the file `DBSIZE.TPL` contains this line:
     `PSAPDDICD=@Z_SAPDATAPATH=SAPDATA4@;238!@Z_SAPDATAPATH=SAPDATA1@;100`

     If you have created data files with `sapdba` or `svrmgrl` that are not listed in the file `DBSIZE.TPL`, you must delete these data files manually. Enter:
     **`rm -rf /oracle/<SAPSID>/sapdata*/*`**

  − Now restart R3SETUP. A new data file is added to the tablespace, and the database load is continued.

- Rollback Segment too Small During the Database Load

  If R3SETUP stops with the error message `ERROR: Child exited with error: rc=1` while executing the step `DBR3LOADEXEC_IND_IND`, check if the R3load log file contains the message `ORA-01555: snapshot too old: rollback segment number <no> with name "<name>" too small`.

  If this is the case, restart R3SETUP. The database load is continued.

- ReliantUNIX: "ldd: cannot find lib ..." when Starting up the SAP System

  If starting up the SAP System fails because libraries are missing, check if all required libraries are available at `/usr/lib` via links. See also **SAP Note 88884**.

- Digital UNIX: Starting up the SAP System or the Database Fails

  If starting up the SAP System or the database fails, check if the database connect is possible for the users `<sapsid>adm` and `ora<sapsid>`:
  **`R3trans -d`**

  If the connect fails for one of these users, perform the following steps:

  − Log on as user `ora<sapsid>`.

  − Enter **`lsnrctl stop`**

  − Enter **`umask 0; lsnrctl start`**

  − Start up the SAP System again.

## See also:

Installation Troubleshooting [page 125], Operating System Dependent Troubleshooting [page 218].

# 6.2 Deletion of an SAP System Installation

## Purpose

This section describes how to delete an SAP System that you have installed.

> ⚠
>
> This description assumes that the installation of your SAP System has been performed using SAP standard tools according to the installation documentation.

## Process Flow

To delete an SAP System installation completely, you:

1. Delete all the dialog instances (if there are any)

2. Delete the central instance

3. Adapt the configuration description file, if necessary

4. Delete the database instance

   > ⚠
   >
   > If you delete network-wide users, groups or service entries in an NIS environment, other SAP installations might also be affected. Make sure that the users, groups, and service entries to be deleted are no longer required.

## 6.2.1 Deleting a Dialog Instance

### Use

This section describes how to delete a dialog instance. This is part of deletion of an SAP System installation.

### Prerequisites

There are no files or directories located on the dialog instance host that are exported as Network File System (NFS) mounts.

> If you are deleting a single SAP instance without deleting the entire SAP System, make sure that you do not delete files or directories used by other SAP instances by means of NFS mounts.

### Procedure

1. Stop the SAP instance to be deleted:

    a. Log on as user `<sapsid>adm`.

    b. Execute this command:
       **`stopsap_<hostname>_<ID>  R3`**

       **`stopsap_saphost_00  R3`**

2. If the instance to be deleted is the only SAP instance running on this host, stop the following process:
    **`saposcol -k`**

3. If all dialog instances with the same instance ID `<ID>` belonging to the SAP System should be deleted, remove profiles as follows:

    **`rm /usr/sap/<SAPSID>/SYS/profile/START_D<ID>_<hostname>`**
    **`rm /usr/sap/<SAPSID>/SYS/profile/<SAPSID>_D<ID>_<hostname>`**

       **`rm /usr/sap/C11/SYS/profile/START_D00_h0001`**
       **`rm /usr/sap/C11/SYS/profile/C11_D00_h0001`**

4. Log on as UNIX user root and delete the local instance directory:
    **`rm -rf  /usr/sap/<SAPSID>/D_<ID>`**

    > Perform the remaining steps **only** if there are no other instances belonging to this SAPSID running on this host. Otherwise, you have completed the deletion.

5. If the file system for the executables `<sapmnt>/<SAPSID>/exe` is located on the dialog instance host, delete it:
    **`rm -rf  <sapmnt>/<SAPSID>/exe`**

6. Remove the softlinks:

   ```
   rm /usr/sap/<SAPSID>/SYS/exe/dbg
   rm /usr/sap/<SAPSID>/SYS/profile
   rm /usr/sap/<SAPSID>/SYS/global
   ```

7. Delete user `<sapsid>adm` along with its home directory and all subdirectories of this directory:

   a. Delete the UNIX user `<sapsid>adm` using the steps appropriate for your operating system.

   b. If the home directory of the user was not deleted automatically in the previous step, delete this directory:
   ```
   rm -rf  <sapsid_adm_home>
   ```

   

   ```
   rm -rf /home/c11adm
   ```

8. Delete the user `<sapsid>adm` from the groups `sapsys`, `oper` and `dba`, if this was not done automatically in the previous step. If one of these groups is now empty, delete the complete group using the steps appropriate for your operating system.

9. Check whether you need to delete entries from the file `/etc/services`:

   a. Search for entries starting with `sap`.

   b. Check whether these entries are still required by other instances with the same or a different SAPSID on any server.

   c. If not, start by generating a backup copy of the file `services`. You can do this as follows:
   ```
   cp /etc/services /etc/services.sap
   ```

   d. Delete superfluous entries from `/etc/services`.

   If you use NIS for the services file, see the documentation on your operating system for information on how to delete entries from network-wide service entries.

10. If there are no other SAP instances running on this host and the `/etc/sapconf` file exists, delete this file.


## 6.2.2 Deleting a Central Instance

### Use

This section describes how to delete a central instance.

### Prerequisites

- You have deleted all dialog instances belonging to the SAP System. Refer to Deleting a Dialog Instance [page 129].

- The file systems `/usr/sap/<SAPSID>` and `<sapmnt>/<SAPSID>` are physically located on the central instance host.

6.2 Deletion of an SAP System Installation

## Procedure

1. Stop the central instance by entering the following as user `<sapsid>adm`:
   **`stopsap_<hostname>_<ID>  R3`**

   

   **`stopsap_saphost_00    R3`**

2. If the instance to be deleted is the only SAP instance running on this host, stop the `saposcol` process:
   **`saposcol -k`**

3. Delete the following directories:

   **`rm -rf /usr/sap/<SAPSID>`**
   **`rm -rf /<sapmnt>/<SAPSID>`**
   **`rm -rf <INSTDIR>`**

4. Log on as user `root`.

5. Delete user `<sapsid>adm`, its home directory, and all sub-directories of this directory:

   a.  Delete `<sapsid>adm` using the steps appropriate for your operating system.

   b.  If the user's home directory was not deleted automatically as part of the previous step, delete it as follows:
       **`rm -rf  <sapsid_adm_home>`**

6. Check whether you need to delete entries from the file `/etc/services`:

   a.  Search for entries starting with `sap`.

   b.  Check whether these entries are still required by other instances with the same or a different SAPSID on any server.

   c.  If not, start by generating a backup copy of the file `services`. You can do this with:
       **cp /etc/services /etc/services.sap**

   d.  Delete superfluous entries from `/etc/services`.

   If you use NIS for the services file, We recommend that you refer to your operating system documentation for information on how to delete entries from network-wide service entries.

7. Delete the user `<sapsid>adm` from the groups `sapsys`, `oper` and `dba`, provided this was not done automatically in the previous step. If one of these groups is now empty, delete the complete group using the steps appropriate for your operating system.

8. If there are no other SAP instances running on this host and the `/etc/sapconf` file exists, delete this file.

9. If there are no other SAP Systems running network-wide, delete the directory `/usr/sap/trans` with all its sub-directories.

   Otherwise, adapt the SAP System configuration description.

## 6.2.3 Adapting the Configuration Description File

### Use

If an SAP System is deleted completely and there are other SAP Systems that were originally installed as R/3 Release 3.1 or earlier in the network, you need to adapt the configuration description file.

### Procedure

1. Log on as user `root` to any SAP instance host.

2. Start R3INST (Release 3.0 or 3.1):

   **cd /tmp**
   **<sapmnt>/<SAPSID>/exe/R3INST**

3. Select *System → Delete System*.

4. Select the SAPSID for the deleted system and confirm.

   >>

   It is not possible to delete single instances from the configuration description file.

# 6.3 Deleting an Oracle Database Installation

### Use

This section describes how to delete an Oracle Database that you have installed.

### Prerequisites

⚠️

Before deleting the database, stop all SAP instances belonging to this database. We recommend you delete the SAP instances before deleting the database instance.

### Procedure

1. Log on as user **ora<sapsid>**

2. Start the server manager and shutdown the database. Enter:

   **svrmgrl**
   SVRMGR> **connect internal**
   SVRMGR> **shutdown immediate**
   SVRMGR> **exit**

6.3 Deleting an Oracle Database Installation

3.  Kill the `orasrv` process if it is running:

    ```
    ps -ef │ grep orasrv (note the process ID <PID>)
    kill -9 <PID>
    ```

4.  Stop the listener process:
    `lsnrctl stop`

5.  Log on as user `root`.

6.  Delete user `ora<sapsid>` from group `dba`

7.  Remove the directory `/oracle/<SAPSID>` and sub-directories
    `rm -rf /oracle/<SAPSID>`

8.  If there are no other database instances with the same Oracle release installed on this host, remove the staging area directory (`<xyz>` is the release of the Oracle database to be deleted):

    -   Oracle 8.0.z: `rm -rf /oracle/stage/stage_<xyz>`

    -   32-bit Oracle 8.1.5: `rm -rf /oracle/stage/<xyz>_32`

    -   64-bit Oracle 8.1.5: `rm -rf /oracle/stage/<xyz>_64`

9.  Depending on the Oracle SQL *NET Version, perform the following tasks:

    −   **Oracle SQL *NET Version 1:**

        Delete the SAP entries from the file `/etc/oratab` by editing the file `/etc/oratab`
        Delete the line starting with `<SAPSID>`.
        If the entry starting with `<SAPSID>` is the only entry in `/etc/oratab`, remove the file by entering the following command:
        `rm /etc/oratab`

    −   **Oracle SQL *NET Version 2:**

        i.   If the database you remove has the only entry in the file `/etc/listener.ora`, you can remove the file `/etc/listener.ora` on the database host.
             If the database is the only database in the domain you can remove the files `/usr/sap/trans/sqlnet.ora` and `/usr/sap/trans/tnsnames.ora`, and the link `/usr/sap/trans/listener.ora`. A domain is a group of database hosts that share the same `/usr/sap/trans` directory.

        ii.  If there are other systems listed in the file `/etc/listener.ora`, run the tool `netv2` on all hosts in the domain. Enter all systems that are not to be deleted. To enter a system, press **a**. After you have entered all systems, press **s** to save your input. The tool `netv2` can be found on a Kernel CD of SAP R/3 Release 3.0 or 3.1 under the path `<CD-DIR>/UNIX/<OS>/INSTALL`.

# 6.4 Database Modifications for Very Large Databases

## Use

This chapter describes modifications to the database implementation for very large Oracle databases.

## Integration

Please refer to the Oracle documentation for more detailed information.

## Prerequisites

An Oracle database within an SAP System is considered to be large if one of the following conditions are met:

- Large amount of data (> 40 Gbyte)

- Large number of users (> 300 users)

- Large amount of log file data (> 1 Gbyte per day)

- Large number of transactions (> 100,000 transactions per hour)

## Activities

> Modifying an existing database should be done by an experienced database consultant.

Below, activities are listed according to when they should be performed:

- Activities during the installation procedure:

  - Tuning the redo log I/O [page 136]
    The redo logs produce most of the I/O activity of the database. You should think about the VLDB distribution of the redo logs, if you expect more than 100,000 transactions per hour or more than 1 Gbyte of daily log files.

- Activities that should be done as soon as possible after the technical standard installation:

  - Table striping [page 137]
    Big tables (> 1GByte) should be divided into separate tablespaces.

- Activities that should be done after completing the technical standard installation:

  - Enlarging the redo logs / Moving the redo logs to other disks [page 139]
    You should enlarge the redo logs if the database writes a lot of log files (more than 1 Gbyte per day), independent from the transaction rate.

- Activities that can be done at any time after the technical standard installation:

  - Installation of additional rollback segments [page 141]
    Additional rollback segments should be installed if more than 300 users are expected to work on the system simultaneously.

  - Enlarging rollback segments [page 141]
    A small number of big rollback segments should be used if big batch jobs will be run.

6.4 Database Modifications for Very Large Databases

# 6.4.1 Configurations for Redo Log I/O

## Recommended Configuration

The following configuration shows the distribution of the database file system on different disks. It satisfies the performance and reliability requirements for almost all SAP Systems:

**Distribution of Database File System for Standard Installations**

| Disk | File System | Contents |
|------|-------------|----------|
| DISKSAP1<br>...<br>DISKSAP\<n> | \<ORACLE_HOME>/sapdata1<br>...<br>\<ORACLE_HOME>/sapdata\<n> | DB data files |
| DISKARCH | \<ORACLE_HOME>/saparch | Backup of log files |
| DISKLOG1 | \<ORACLE_HOME>/origlogA<br>\<ORACLE_HOME>/origlogB | Original log files set A and set B |
| DISKLOG2 | \<ORACLE_HOME>/mirrlogA<br>\<ORACLE_HOME>/mirrlogB | Mirrored log files set A and set B<br>(only if mirroring by Oracle) |

If the log writer writes to the redo log $n$ and the log file is full, a log switch is performed. Then the following I/O operations are performed:

DISKLOG1:          log writer writes to redo log $n+1$

                           archiver reads from redo log $n$

DISKARCH:          archiver writes to \<ORACLE_HOME>/saparch

## VLDB (Very Large Database) Configuration

The following configuration shows the distribution of the database file systems on different disks. It satisfies the performance and security requirements for SAP Systems with a transaction rate of more than 100,000 per hour and/or a large amount of redo log files (> 1 Gbyte per day):

**Distribution of Database File System for VLDB Installations**

| Disk | File System | Contents |
|------|-------------|----------|
| DISKSAP1<br>...<br>DISKSAP\<n> | \<ORACLE_HOME>/sapdata1<br>...<br>\<ORACLE_HOME>/sapdata\<n> | DB data files |
| DISKARCH | \<ORACLE_HOME>/saparch | Backup of log files |
| DISKLOG1 | \<ORACLE_HOME>/origlogA | Original log files set A |
| DISKLOG2 | \<ORACLE_HOME>/origlogB | Original log files set B |

| DISKLOG3 | `<ORACLE_HOME>/mirrlogA` | Mirrored log files set A (only if mirroring by Oracle) |
| DISKLOG4 | `<ORACLE_HOME>/mirrlogB` | Mirrored log files set B (only if mirroring by Oracle) |

If the log writer writes to the redo log `n` of set A and the log file is full, a log switch is performed. Then the following I/O operations are performed:

DISKLOG4:                    log writer writes to redo log `n+1` of set B

DISKLOG3:                    archiver reads from redo log `n` of set A

DISKARCH:                    archiver writes to `<ORACLE_HOME>/saparch`

In this configuration all I/O operations act on different disks. There is always only one single I/O operation on any of the disks `DISKARCH`, `DISKLOG1`, `DISKLOG2`, `DISKLOG3`, and `DISKLOG4`.

> ■●≫
>
> If RAID systems are in use, it is recommended to use RAID only for the DB data files. The redo log files and the archive should reside on separate disks as shown above.

# 6.4.2 Separating Big Tables (Table Striping)

## Use

Very large tables should be separated into single tablespaces for the following reasons:

- Administration and I/O tuning of the database
- Maximal UNIX file size (2 GB) limits the size of the data files

The following example shows how to strip the table RFBLG and its indices to different data files of a new tablespace.

## Prerequisites

> ■●≫
>
> Since table stripping is easier for tables containing less data, it is recommended to separate tables as soon as possible after the technical installation.
> The sizes of the database tables should be monitored regularly with the CCMS tools.

For separating tables and creating new tablespaces the SAP tool `sapdba` is used. For more information, see the guide *BC SAP Database Administration: Oracle*.

6.4 Database Modifications for Very Large Databases

## Procedure

⚠

Your operating system needs up to 10% of additional disk space.
Oracle needs some blocks of each data file for internal administration data.

🔲●⪢

A similar procedure could be done for every table with a very big final size.

The following procedure is an example for separating big tables into new tablespaces. In the example, we use a sample file size of 2,000 MB (to equals 1.9 GB) and a sample extent size of 1,998 MB:

1. Perform a full backup of your database.

2. Create the first data file of the tablespace (max. size 2 GB on most platforms). Refer to the SAP naming convention as described in the guide *BC SAP Database Administration: Oracle*

    − In `sapdba`, select *Tablespace administration* → *Create new tablespace*.

    − Enter the tablespace name (for example, PSAPRFBLGD).

    − Select *a*.

    − Enter file size in KB: (e.g.  2000000KB).

    − Adapt the suggested path, if necessary.

    You can also use `svrmgrl` in order to create the tablespace:

    ```
    CREATE TABLESPACE PSAPRFBLGD DATAFILE
    '/oracle/SID/sapdata10/rfblgd_1/rfblgd.data1'
    SIZE 2000M DEFAULT STORAGE(INITIAL 1M NEXT 1M
    MAXEXTENTS 999 PCTINCREASE 0);
    ```

3. Create the corresponding index tablespace (`PSAPRFBLGI`) with `sapdba` on another `sapdata<n>` location.

    The SQL statement for creating it manually is:

    ```
    CREATE TABLESPACE PSAPRFBLGI DATAFILE
    '/oracle/SID/sapdata15/rfblgi_1/rfblgi.data1'
    SIZE 2000M DEFAULT STORAGE(INITIAL 1M NEXT 1M
    MAXEXTENTS 999 PCTINCREASE 0);
    ```

4. Expand the data and index tablespace (with `sapdba`).
    All data files should have the same size to make table and index stripping possible.

    Use `sapdba` *Tablespace administration* → *Add datafile* or perform the step manually:

    ```
    ALTER TABLESPACE PSAPRFBLGD ADD DATAFILE
    '/oracle/SID/sapdata11/rfblgd_2/rfblgd.data2' SIZE 2000M DEFAULT
    STORAGE(INITIAL 1M NEXT 1M MAXEXTENTS 999
    PCTINCREASE 0);
    ```

```
ALTER TABLESPACE PSAPRFBLGD ADD DATAFILE
'/oracle/SID/sapdata12/rfblgd_3/rfblgd.data3' SIZE 2000M DEFAULT
STORAGE(INITIAL 1M NEXT 1M MAXEXTENTS 999
PCTINCREASE 0);

...

ALTER TABLESPACE PSAPRFBLGI ADD DATAFILE
'/oracle/SID/sapdata16/rfblgd_2/rfblgd.data2' SIZE 2000M DEFAULT
STORAGE(INITIAL 1M NEXT 1M MAXEXTENTS 999
PCTINCREASE 0);

...
```

5. Use `sapdba` to reorganize the table and its indices. If the table is reorganized into the new tablespace, the indices will be shifted to the corresponding index tablespace automatically. Select appropriate values for the INITIAL and NEXT parameters and choose the new tablespace as target tablespace for the reorganization.

# 6.4.3 Enlarging/Moving the Redo Logs

## Use

During a standard installation, four redo log members are installed with a size of 20 MB each.

The size of the redo log files directly affects database performance and security. Therefore, the size of the redo log files and their file location should be adapted to the database needs.

> Large redo log files give better performance, but there are three disadvantages:
> 1. If the redo log file currently in use is lost, the amount of lost data is big.
> 2. If an instance recovery is necessary, it takes longer.
> 3. Slow database startup. For example, a startup of a database with 80 MB redo logs could take 20 minutes.

## Procedure

1. Force four log switches

   As user ora<sapsid> force `4` switches:

   ```
   svrmgrl
   SVRMGR> connect internal
   SVRMGR> startup restricted
   SVRMGR> alter system switch logfile; (4 times)
   ```

   Make sure that all the redo logs are archived.

2. Backup the whole database. (This step is necessary to have a restart point if any of the following actions should fail.)

3. Change the database mode to NOARCHIVELOG

6.4 Database Modifications for Very Large Databases

4.  Startup the database in exclusive mode.

    **svrmgrl**
    SVRMGR> **connect internal**
    SVRMGR> **startup restricted**

5.  Drop the redo logs:

    SVRMGR> **alter database drop logfile group <group_number>;**

    

    **alter database drop logfile group 101;**

    Remove the corresponding UNIX file(s).

6.  Create new log members with the new size (or at a new file location).

    

    −   Without Oracle mirroring:
        **alter database add logfile group 101**
        **'/oracle/<SID>/origlogA/log_g101_m1' SIZE 80M;**
    −   With Oracle mirroring:
        **alter database add logfile group 101**
        **('/oracle/<SID>/origlogA/log_g101_m1',**
        **'/oracle/<SID>/mirrlogA/log_g101_m2')**
        **SIZE 80M;**

    **Naming convention:**
    log_g<group_number>_m<member_number>
    where the group_numbers are  101, 102, 103 and  104.

7.  Repeat step 5 and 6 for the log groups 102, 103  and 104.

    If you try to drop the logfile currently written, you get an Oracle message:
    cannot drop log at this time; log in use

    In this case, force a log switch:
    **alter system switch logfile;**

8.  Change the database mode to ARCHIVELOG

9.  Backup the whole database. (Since any change of the redo log files results in a change of the structural database description in the control files, this backup will be used as a restart point for any future database recoveries.)

## 6.4.4 Installing Additional Rollback Segments

### Use

During a standard installation, 15 rollback segments are created. Each rollback segment is able to store the rollback data of about 3 SAP work processes (Oracle shadow processes).

If the final system has more than 45 SAP work processes, you should create additional rollback segments.

### Procedure

1. Create additional rollback segments `PRS_11`, `PRS_12`, ...

```
create rollback segment PRS_11 tablespace PSAPROLL
storage (initial 1M next 1M minextents 2 maxextents 121
   optimal 8M );
```

2. The new rollback segments must be added to the `init<dbsid>.ora` parameter `rollback_segments`.

3. Shutdown and restart the database.

4. Each additional rollback segment needs a minimum of 8 MB additional space in the tablespace PSAPROLL. You should add a new data file to PSAPROLL with **sapdba**.

> It is recommended to spread the additional data files of PSAPROLL across different disks.

## 6.4.5 Enlarging Rollback Segments

### Use

In case of a standard installation, a single rollback segment has a maximum size of 300 MB. If a single rollback segment is exceeded, you can change the storage parameters and enlarge rollback segments.

### Procedure

If a single rollback segment is exceeded, change the storage parameters and enlarge the tablespace PSAPROLL.

```
alter rollback segment PRS_1 storage (initial 8M
   next 8M minextents 2 maxextents 300 optimal 8M );
```

> All rollback segments should have the same storage parameters.

# Part II: OS-Dependent Installation Steps on UNIX

## Purpose

During an installation, some of the tasks that have to be performed are operating system dependent. Therefore, special information for each operating system is required to perform these tasks. This information is covered in the OS Dependencies documentation.

This documentation has been written with the support of Competence Centers. It is not intended to replace the documentation for the different operating systems covered within this text.

## Integration

If operating system dependent tasks are described in the installation documentation, consult the corresponding section suitable for your operating system in the OS Dependencies documentation for further information.

## Features

You can find operating system dependent information for the following topics:

- Network Information Service Environment [page 144]

- Preparations [page 146] for an Installation

- Mounting a CD-ROM [page 148]

- Checking and Modifying the UNIX Kernel [page 153]

- File Systems, Raw Devices and Swap Space [page 168]

- Mounting Directories via Network File System [page 202]

- Creating UNIX Groups and Users [page 211]

- Operating System Dependent Troubleshooting [page 218]

- Heterogeneous SAP System Installation [page 220]

## Constraints

If there is no section for your operating system in one of the topics, there are no special considerations for performing this installation step on your operating system.

# 7. Network Information Service Environment

## General Notes on NIS

In environments where Network Information Service (NIS) is used, the person in charge of the installation is responsible for distributing users over the network.

All users must have identical TZ environment settings.

If you change the environment delivered by SAP, such as variables, paths, and so on, SAP will not assume responsibility.

The SAP installation tool R3SETUP checks all required users, groups, and services on the local machine.

If you manage users, groups and/or services network-wide in your company, you should consider the following:

- R3SETUP uses NIS commands to check the users, groups and services. However, R3SETUP does not change NIS configurations.

- R3SETUP creates the necessary users, groups and services locally. Use these entries to adjust your NIS Server. Examine the R3SETUP messages carefully.

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　　　　　It is also possible to generate the network-wide entries prior to the R3SETUP run. See the section for your operating system.

## Users and Groups

The following tables give an overview of the users and their primary groups:

**Users and their Primary Groups**

| Database System | User | Primary Group |
|---|---|---|
| SAP DB | `<sapsid>adm` | `sapsys` |
| | `sqd<sapsid>` | `sapsys` |
| DB2 UDB for UNIX, Windows | `<sapsid>adm` | `sapsys, db<sapsid>ctl` |
| | `sapr3` | `sapsys` |
| | `Db2as` | `Db2asgrp` |
| | `db2<sapsid>` | `Db<sapsid>adm` |
| DB2 UDB for OS/390 | `<sapsid>adm` | `sapsys` |
| Informix | `<sapsid>adm` | `sapsys` |
| | `sapr3` | `sapsys` |
| | `informix` | `informix` |
| Oracle | `<sapsid>adm` | `sapsys, oper, dba` |
| | `ora<sapsid>` | `dba, oper` |

**Groups and Members**

| Database System | Group | Members |
|---|---|---|
| SAP DB | `sapsys` | `sqd<sapsid>, <sapsid>adm` |
| DB2 UDB for UNIX, Windows | `sapsys` | `<sapsid>adm, sapr3` |
| | `Db<sapsid>ctl` | `<sapsid>adm` |
| | `Db2asgrp` | `Db2as` |
| | `Db2<sapsid>adm` | `db2<sapsid>` |
| DB2 UDB for OS/390 | `sapsys` | `<sapsid>adm` |
| | `sapctrl` | `<sapsid>adm` |
| Informix | `sapsys` | `sapr3, <sapsid>adm` |
| | `informix` | `informix` |
| | `super_archive` | `informix, <sapsid>adm` |
| Oracle | `sapsys` | `<sapsid>adm` |
| | `oper` | `<sapsid>adm, ora<sapsid>` |
| | `dba` | `<sapsid>adm, ora<sapsid>` |

**Compaq Tru64 UNIX:**
The user `<sapsid>adm` must be a member of the group `mem`.

The user ID (UID) and group ID (GID) of SAP users and groups must be identical for all servers belonging to any SAP System.
This does **not** mean that all users and groups have to be installed on all SAP servers.
There are no other requirements concerning certain numbers for UIDs or GIDs.

R3SETUP checks if the users and groups already exist and creates them if necessary.
R3SETUP choose free user and group IDs unless you are installing a dialog instance. In this case the IDs must be the same as on the central instance host.

## Services

R3SETUP checks if the required services are available on the host and creates them if necessary.

See the log messages about the service entries and adapt the network-wide (NIS) entries accordingly.

# 8. Preparations

## Purpose

Before you begin with the practical installation tasks, some operating systems require special tasks or considerations. These are listed in the following sections.

## Process Flow

If there is an instruction in the documentation *R/3 Installation on UNIX* to carry out the operating system dependent preparations for the installation, perform the following steps:

1. See the corresponding section for your operating system and perform the necessary actions listed there:

   - AIX [page 146]
   - ReliantUNIX [page 146]
   - SEQUENT [page 147]
   - Solaris [page 147]

   If there is no section for your operating system, you can proceed with the next step.

2. When you have finished, continue with the next step in the installation documentation.

# 8.1 AIX: Preparing the Installation

## Portable Stream Environment (PSE)

SAP requires the Portable Stream Environment. The command **strload** enables you to load PSE, PSE drivers and PSE modules. This command must run at boot time from the inittab.



> PSE is not needed in a **DB2 for OS/390** installation.

To enable the PSE, enter the command:
**mkitab strload:2:once:/usr/sbin/strload**

To check the PSE, as user **root,** enter the command:
**lsitab strload**

This has to return the inittab entry specified above with the **mkitab** command.

# 8.2 ReliantUNIX: Preparing the Installation

## Installation Directory

In a standard ReliantUNIX installation, the contents of the /tmp directory is removed while rebooting the system. We recommend that you create another directory like /temp for the installation.

# 8.3 SEQUENT: Preparing the Installation

The following table lists the directories that are required on the system before the installation can start.

**Directories that Need to be Created Before the Installation**

| Directory | Description |
|---|---|
| `/usr/sap/trans` | Directory where the configuration file `.sapconf` will reside, but it is not needed as the NFS mount point of a file system. |
| `/usr/sap/exe` | Directory that is used to store the local database binaries for the SAP instance. |
| `/oracle/stage` | Directory used by Oracle for a permanent staging area. |
| `/temp/install` | Installation directory referred to as `<INSTDIR>`. <br><br> Do **not** use the `/tmp` directory since it is cleaned out upon rebooting of the system. |

These directories need to be created by user `root` before the installation tool is started. The first three directories should have the file access modes of `0775`, while `/temp/install` should have the modes of `0777`.

In addition, any file systems that are to be mounted for the SAP instance and Oracle tablespaces need to be created, initialized and mounted before the installation tool is started.

# 8.4 Solaris: Preparing the Installation

## C++ Runtime Environment

Make sure that the Shared Library Patch for C++ is installed.

## Installation Directory

In a standard Solaris installation `/tmp` is a tmpfs file system.

tmpfs is a memory-based file system that uses kernel resources relating to the VM system and page cache as a file system.

Once mounted, a tmpfs file system provides standard file operations and semantics. tmpfs is so named because all files and directories are lost after reboot or unmounts. For this reason, we recommend that you create a directory `/temp` on an ufs file system.

# 9. Mounting a CD-ROM

## Purpose

To be able to access CD-ROMs, some operating systems require tasks to mount these CD-ROMs. The required tasks are listed in the following sections.

## Process Flow

If there is an instruction in the documentation *R/3 Installation on UNIX* to mount a CD-ROM, perform the following steps:

1. See the corresponding section for your operating system and perform the necessary actions listed there:

    – AIX [page 148]

    – Compaq [page 149]

    – HP-UX [page 150]

    – Linux [page 151]

    – ReliantUNIX [page 151]

    – SEQUENT [page 152]

    – Solaris [page 152]

2. When you have finished, continue with the next step in the installation documentation.

# 9.1 AIX: Mounting a CD-ROM

1. Log on as user **root**.

2. Add a CD-ROM file system.

    a. Enter the command **smitty**.

    b. Select:

    *Physical & Logical Storage → File Systems →*
    *Add / Change / Show / Delete File Systems →*
    *CDROM File Systems → Add a CDROM File System*

    c. Press F4 to get a list of device names.

    Select a device name.

    d. Enter the mount point **<CD-mountdir>**.

    (For example, <CD-mountdir> is /sapcd)

    e. Press F10 to exit smitty.

3.  Mount the CD-ROM.

    a.  Enter the command **smitty**.

    b.  Select:

        *Physical* & *Logical Storage* →
        *File Systems* → *Mount a File System*

    c.  Place the cursor on *File System Name* and press F4.

    d.  Select /sapcd.

    e.  Place the cursor on field *Type of File System*. Press F4.

    f.  Select cdrfs.

    g.  Change *Mount as Read Only system* to YES.

    h.  Press ENTER.

    i.  Press F10 to exit smitty.

# 9.2 Compaq: Mounting a CD-ROM

1.  Log on as user **root**.

2.  Create a mount point for the CD-ROM with the command:
    **mkdir <CD-mountdir>**   (for example, **<CD-mountdir>** is **/sapcd**)

3.  Mount the CD-ROM with the command:
    **mount -dr -t cdfs /dev/rz<n>c <CD-mountdir>**

    <n> is the hardware or SCSI address of the CD-ROM  (0-6).

    If the command fails with the message Invalid argument, the kernel is not configured for
    the use of CD-ROMs. In this case, proceed as follows:

    a.  Edit the file /usr/sys/conf/<HOST>
        Insert the following line in the appropriate section:
        **options CDFS**

    b.  Generate a new kernel with
        **/usr/sbin/doconfig -c <HOST>**
        <HOST> is the hostname of the computer in uppercase letters.

    c.  Copy the new kernel to the **root** directory
        **cp  /usr/sys/<HOST>/vmunix  /.**

    d.  Reboot the system.

# 9.3 HP-UX: Mounting a CD-ROM

## Mounting a CD-ROM Manually

1. Log on as user `root`.

2. Create a mount point for CD-ROM with the command:
   **`mkdir <CD-mountdir>`**

   (usually `<CD-mountdir>` is `/sapcd`).

3. Make sure that the driver is part of the kernel (skip this step if the CD drive is already working):
   **`grep cdfs /stand/system`**

   If the driver is not configured, you have to add the string
   `cdfs`

   to the file
   `/stand/system`

   and rebuild the kernel. The procedure to build a new kernel is described in Checking and Modifying the UNIX Kernel [page 155] (section Manual Configuration of the Kernel). Reboot the system after rebuilding the kernel.

4. Mount the CD-ROM with the command:
   **`mount -r -F cdfs  /dev/dsk/<diskdevice>  <CD-mountdir>`**

   

   `<diskdevice>` is `c0t4d0`, a CD drive with hardware address 4.

## Mounting a CD-ROM Using SAM

1. Enter the command
   **`/usr/sbin/sam`**

2. Select:

   *Disks and Filesystems* → *Disk Devices* → *Actions* → *Mount*

3. Enter the mount directory
   **`<CD-mountdir>`**

   (for example, `<CD-mountdir>` is `/sapcd`).

4. Perform task.

5. Exit SAM.

## 9.4 Linux: Mounting a CD-ROM

1. Log on as user **root**.

2. Create a mount point for the CD-ROM with the command:
   **mkdir <CD-mountdir>**   (for example, <CD-mountdir> is /sapcd)

3. Mount the first CD-ROM device with the command:
   **mount -t iso9660 -r <device> <CD-mountdir>**

   where **<device>** is **/dev/cdrom** for non-SCSI CD-ROM devices and **/dev/scd<n>** for SCSI drives with the device number **<n>**.

   If the file names on the mounted CD-ROM are written in lowercase letters, remount the CD-ROM with the following commands:
   **umount <device>**
   **mount -t iso9660 -r -omap=off <device> <CD-mountdir>**

## 9.5 ReliantUNIX: Mounting a CD-ROM

1. Log on as user **root**.

2. Create a mount point for the CD-ROM with:
   **mkdir <mountpoint>**

3. Determine the device name of the CD-ROM with:
   **autoconf -l | grep CD**

   which produces output like
   ios0/sdisk00?  OS02  (CD-ROM)

4. Mount the CD-ROM with:
   **mount -F hs /dev/<device_name>s0  <mountpoint>**

5. Set the x-bits for the executables:
   **/usr/sbin/cdmntsuppl -F 0555 <mountpoint>**

```
mkdir /sapcd
mount -F hs /dev/ios0/sdisk005s0  /sapcd
cdmntsuppl -F 0555 /sapcd
```

# 9.6 SEQUENT: Mounting a CD-ROM

1.  Log on as user `root`.

2.  Insert the CD into the CD-ROM drive.

3.  Create the mount point for the CD-ROM:
    **`mkdir /sapcd`**

4.  Mount the CD-ROM:
    **`/etc/mount -r -f cdfs -o showdot, toupper /dev/dsk/cd1  /sapcd`**

5.  Before exchanging the CD-ROM, the CD file system must be unmounted first, using the command:
    **`/etc/umount /sapcd`**

# 9.7 Solaris: Mounting a CD-ROM

## Use

In the Solaris operating system, a layer of software manages CD-ROM and other media.  This is the volume manager, which automates the interaction between you and your CD-ROMs. Do **not** use this volume manager to mount CD-ROMs needed for the installation, as the manager does not use the *nomaplcase* option. Without this option, some files on CDs can not be found. Mount CD-ROMs for the installation manually as described in the following procedure.

For more information on configuring the volume management, see the *SunOS Routine System Administration Guide*.

## Procedure

1.  Log on as user **`root`**.

2.  Check if `vold` (volume daemon) is running:
    **`ps -ef | grep vold`**

3.  Kill `vold` if it is running.

4.  Insert the CD-ROM into your disk drive.

5.  Create a mountpoint:
    **`mkdir /sapcd`**

6.  Mount the CD-ROM:
    **`mount -F hsfs -o nomaplcase,ro /dev/dsk/c0t6d0s2 /sapcd`**

After the installation, you can start `vold` with the command `/usr/sbin/vold`.

# 10. Checking and Modifying the UNIX Kernel

## Purpose

Before you begin with the actual installation tasks, some operating systems require special tasks or considerations concerning the UNIX kernel. These tasks are listed in the following sections.

## Process Flow

If there is an instruction in the documentation *R/3 Installation on UNIX* to check and possibly modify the UNIX Kernel settings, perform the following steps:

1. See the corresponding section for your operating system and perform the necessary actions listed there:

   – Compaq [page 153]

   – HP-UX [page 155]

   – Linux [page 159]

   – Reliant [page 160]

   – SEQUENT [page 164]

   – Solaris [page 166]

   If there is no section for your operating system, you can proceed with the next step.

2. When you have finished, continue with the next step in the installation documentation.


# 10.1 Compaq: Checking and Modifying the UNIX Kernel

## Use

To run an SAP System, you must check and, if necessary, modify the Compaq Tru64 UNIX operating system kernel.

## Procedure

**Checking the UNIX Kernel**

You can check the UNIX kernel with the following UNIX commands:

```
sysconfig -q ipc
sysconfig -q proc
sysconfig -q vm
```

Compare the output of these commands with the values in the list below.

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Corrections of the kernel parameters are published in the installation Notes. These Notes contain the most recent information regarding the installation.

10.1 Compaq: Checking and Modifying the UNIX Kernel

We recommend that all Compaq Tru64 UNIX kernel modifications be performed by your system administrator.

**Changing the UNIX Kernel**

To change the system configuration defined in `/etc/sysconfigtab`:

1. Create a file named `sapr3.stanza` in any directory `<path>` (for example, `/etc/sapr3.stanza`). It must contain the following lines for the subsystem entries `ipc` and `proc`:

```
ipc:
        sem-mni                 =             512
        sem-msl                 =             512
        sem-opm                 =             512
        sem-ume                 =             512
        shm-max                 =      2139095040
        shm-mni                 =             512
        shm-seg                 =             512

proc:
        maxusers                =             512
        max-per-proc-address-space =   8589934592
        max-per-proc-data-size     =   8589934592
        max-per-proc-stack-size    =    268435456
        max-proc-per-user       =             512
        per-proc-address-space  =      8589934592
        per-proc-data-size      =      8589934592
        per-proc-stack-size     =       268435456
```

2. Insert the following lines for the subsystem entry `vm` into the file `sapr3.stanza`.

   − For a 32-bit SAP Kernel, enter the following lines:

```
vm:
        ubc-minpercent          =               5
        vm-ubcseqstartpercent   =               5
        ubc-borrowpercent       =               6
        ubc-maxpercent          =              10
        vm-maxvas               =     17179869184
        vm-vpagemax             =          524288
```

   − For a 64-bit SAP Kernel, enter the following lines:

```
vm:
        ubc-minpercent          =               3
        vm-ubcseqstartpercent   =               3
        ubc-borrowpercent       =               3
        ubc-maxpercent          =               7
        vm-maxvas               =     17179869184
        vm-vpagemax             =         1048576
```

3. Use the following commands to newly add the three subsystem entries to
   `/etc/sysconfigtab`:

   **`sysconfigdb -a -f <path>/sapr3.stanza ipc`**
   **`sysconfigdb -a -f <path>/sapr3.stanza proc`**
   **`sysconfigdb -a -f <path>/sapr3.stanza vm`**

   or if the subsystem entries are already present in `/etc/sysconfigtab` use:
   **`sysconfigdb -u -f <path>/sapr3.stanza`**

   to update the complete subsystem entries with your new settings in `sapr3.stanza`.

4. Reboot the system after changing the kernel parameters. Check the kernel parameter
   settings after rebooting the system.

# 10.2 HP-UX: Checking and Modifying the UNIX Kernel

## Use

To run an SAP System, you must check and, if necessary, modify the UNIX operating system
kernel.

> We recommend that all UNIX kernel modifications be performed by your UNIX
> system administrator.

There are two ways to perform the necessary changes to the UNIX operating system:

- Manually
- Using SAM

> Reboot the system after changing the kernel parameters.

## Procedure

1. Check the following table for the recommended kernel parameters for HP-UX.

> Corrections of the kernel parameters are published in the installation Notes.
> These Notes contain the most recent information regarding the installation.

> Only HP-UX 11.x
> If a default kernel value is greater than the ones suggested under SAP
> Requirements, do not change the value.

10.2 HP-UX: Checking and Modifying the UNIX Kernel

**Recommended Kernel Parameters for HP-UX**

| Parameter Group | Parameter | Description | 32-bit SAP Kernel Requirements | 64-bit SAP Kernel Requirements |
|---|---|---|---|---|
| Memory Paging | maxswapchunks | Maximal number of swap space chunks | ≥ 1200 | ≥ 2048 |
| Message Parameters | msgseg | Message segments | 32767 | 32767 |
| | msgssz | Message segment size | 32 | 32 |
| | msgmnb | Max. sum of messages in a queue | 65535 | 65535 |
| | msgtql | Max. number of message headers | 2046 | 2046 |
| | msgmap | msgtql + 2 | 2048 | 2048 |
| Semaphores | semaem | 'adjust on exit' -Max. value | 16384 | 16384 |
| | semmnu | No.of sema-phores UNDO | ≥ 256 | ≥ 256 |
| | semmns | No.of sema-phores | 1024 | 1024 |
| | semmni | Semaphores keys | 520 | 520 |
| | semume | UNDO keys | 100 | 100 |
| | semvmx | Max.value semaphore | 32767 | 32767 |
| Shared Memory | shmmax | Max Shared memory | 1.073.741.824 | ≥ 17.179.869.184 |
| | shmmni | Max. Shared Memory keys | ≥ 256 | ≥ 256 |
| | shmseg | Shared Memory segments | ≥ 100 | 200 |

| File System | `maxfiles` | soft-limit opened files | 512 | 1024 |
|---|---|---|---|---|
| | `maxfiles_lim` | hard-limit opened Files | 1024 | 2048 |
| | `nflocks` | No. of file locks | 200 | 800 |
| | `nfile` | No. of files | 8192 | 8192 |
| | `ninode` | No. of open inodes | 8192 | 8192 |
| Process Management | `maxuprc` | No. of processes per user | 100 | 400 |
| | `maxdsiz` | Max. data segment size | 990.056.448 | 990.056.448 |
| | `maxdsiz_64bit` | Max. data segment size 64-bit | N/A | 4.294.967.296 |
| | `nproc` | No. of processes system-wide | | `10 * maxusers` |
| Miscellaneous Parameters | `maxusers` | Max. "USER" (system resource allocation) | 128 | 128 |
| | `dbc_min_pct` | Min. percentage of memory to be used by dynamic buffer cache | 5 | 5 |
| | `dbc_max_pct` | Max. percentage of memory to be used by dynamic buffer cache | 8 | 8 |

10.2 HP-UX: Checking and Modifying the UNIX Kernel

> The values listed in the table above are required by the SAP System.
> If the currently configured kernel parameters have already been set by another
> application to approximately the values recommended by SAP, the values shown
> in the table may not be high enough. The increase could be insufficient. As a
> result, the start-up of the SAP System or of other applications may fail.

2.   Adapt the UNIX kernel values manually or using SAM if necessary.

## Manual Configuration of the Kernel

1.   Change the kernel parameters according to the table *Recommended Kernel Parameters for HP-UX* in the file
     `/stand/system`

2.   Generate a new kernel after making the changes using the following command:
     `mk_kernel -o /stand/vmunix -s /stand/system`

3.   Reboot your system.

## Configuration of the Kernel Using SAM

1.   Enter the command
     `/usr/sbin/sam`

2.   Select:

     *Kernel Configuration → Configurable Parameters*

     Choose the parameter you want to modify and select:

     *Actions → Modify Configurable Parameter*

3.   Modify all kernel parameters according to the table *Recommended Kernel Parameters for HP-UX*.

4.   Select *Process New Kernel* from the *Actions* menu.

5.   Exit SAM.

6.   Reboot your system.

# 10.3 Linux: Checking and Modifying the Linux Kernel

## Use

Normally, checking and modifying the Linux Kernel is not necessary, as the kernel has been adjusted by SAP. Nevertheless, it is recommended to run a special test tool that analyzes several system parameters.

## Prerequisites

Make sure that the SAP Kernel was booted. The following command should report a Linux kernel version adapted by SAP:
```
uname -a
```

## Procedure

1. Install the test tool `saposcheck` provided on the kernel CD with the following command:
   ```
   rpm -i saposcheck.i386.rpm
   ```

   > Check sapserv<x> for the newest version of `saposcheck`.

   If other RPM packages are missing on your system for `saposcheck`, you will be asked to install them. The according installation procedure is similiar to that of `saposcheck`. These supplementary RPMs can be found either on the kernel CD or on Linux Operating System CDs.

2. After the installation of saposcheck:

   a. As user **root**, enter the command:
      ```
      saposcheck
      ```

   b. Check the output for errors.

      > The `saposcheck` package contains a README file that contains information on both the activities of `saposcheck` and the possibilities of setting some system parameters manually.

# 10.4 ReliantUNIX: Checking and Modifying the UNIX Kernel

## Use

To run an SAP System, you must check and, if necessary, modify the UNIX operating system kernel.

## Procedure

> The recommended values of the kernel parameters may change. Refer to SAP Note *R/3 Installation on UNIX - OS Dependencies*.

> Kernel parameters should not be decreased when adapting the following requirements.

1. Check the following table for the recommended kernel parameters for ReliantUNIX.

**Recommended Kernel Parameters for ReliantUNIX**

| Parameter Group | Parameter | Description | 32-bit SAP Kernel Requirements | 64-bit SAP Kernel Requirements |
|---|---|---|---|---|
| Semaphores | SEMMAP | Semaphores map | 512 (=SEMMNS/2) | 512 (=SEMMNS/2) |
| | SEMMNI | Semaphores keys | 1024 | 1024 |
| | SEMMNS | No.of semaphores | 1024 | 1024 |
| | SEMMNU | No.of semaphores UNDO | 700 | 700 |
| | SEMUME | UNDO keys | 40 | 40 |
| | SEMVMX | Max. value semaphores | 32767 | 32767 |
| | SEMMSL | Max. number of sem./ key | 250 (if more than one SAP System) | 250 (if more than one SAP System) |

| File System | NBUF | Buffer header file system code | 512 | 512 |
|---|---|---|---|---|
| | HFNOLIM | Hard limit opened files | 2048 | 2048 |
| | SFNOLIM | Soft limit opened files | 2048 | 2048 |
| | HFSZLIM | Max. file size (hard limit) | 0x7FFFFFFF | 0x7FFFFFFFFF |
| | SFSZLIM | Max. file size (soft limit) | 0x7FFFFFFF | 0x7FFFFFFFFF |
| | HCORLIM | Max. core size (hard limit) | 0x7FFFFFFF | 0x7FFFFFFF |
| | SCORLIM | Max. core size (soft limit) | 0x7FFFFFFF | 0x7FFFFFFF |
| Process | HDATLIM | Max. bytes proc. data segm. | 0x7FFFFFFF | 0x7FFFFFFFFF |
| | SDATLIM | Softlimit bytes proc. data segm. | 0x7FFFFFFF | 0x7FFFFFFFFF |
| | HVMMLIM | Max. bytes proc. address space | 0x7FFFFFFF | 0x7FFFFFFFFF |
| | SVMMLIM | Softlimit bytes proc. adress space | 0x7FFFFFFF | 0x7FFFFFFFFF |
| | SSTKLIM | Softlimit max. proc. stack size | 0x7FFFFFFF | 0x7FFFFFFF |
| | HSTKLIM | max. proc. stack size | 0x7FFFFFFF | 0x7FFFFFFF |
| | MAXUP | No. of proc. per user | 500 | 500 |
| | GPGSLO | Page daemon start value | 600 | 600 |
| | SM_SIZE | Perc. of phys. mem. for buffer cache | 10 (if RAM ≥ 512:5) | 10 (if RAM ≥ 512:5) |
| Shared Memory | SHMMAX | Max. shared memory | 1073741824 | 4294967296 |
| | SHMMNI | Max. shared memory keys | 256 | 256 |
| | SHMSEG | Max. shared memory segments | 100 | 100 |

10.4 ReliantUNIX: Checking and Modifying the UNIX Kernel

| Other | AIO_HIWAT | No. reserved async. I/O structures (only for raw device installations) | 4096 | 4096 |
|---|---|---|---|---|
| | AIO_MAX | Max. No. of async I/O structures (only for raw device installations) | 6144 | 6144 |
| | MAXUSERS | Max. "USER" (system resource allocation) | 512 | 512 |
| | HRTIME | No. of timer | NPROC/4 (minimum 1000) | NPROC/4 (minimum 1000) |
| | HRVTIME | No. of timer (SW) | NPROC/4 (minimum 1000) | NPROC/4 (minimum 1000) |
| | IDLE_MIGRATE | Migration to an idle CPU (RM600 only) | 1 | 1 |
| | IPPORT_USER_START | Start of area for dynamical allocation of ports | 60000 | 60000 |
| | IPPORT_USER_END | End of area for dynamical allocation of ports | 65535 | 65535 |
| | KV_SIZE | Kernel virtual segment size | 0x6000000 (if RAM ≥ 1.5GB: 0xC000000) | 0x6000000 (if RAM ≥ 1.5GB: 0xC000000) |

After creation of a new kernel, the machine must be rebooted.

2.  Adapt the UNIX kernel parameters using the shell command `idtune`. To do this:

a.  Check the actual setting of the parameters using the command:
    **`strings /unix|grep <Parameter>`**

    The default kernel settings are defined in the file `/etc/conf/cf.d/mtune`.

b.  Adapt all parameters listed in the table *Recommended Kernel Parameters for ReliantUNIX* separately.

    Parameters are changed in the file `/etc/conf/cf.d/stune` by setting the value to the requirements as described below.

It is not recommended to change any parameter settings in the file
`/etc/conf/cf.d/mtune`.

It is not possible to define a parameter in `/etc/conf/cf.d/stune` with a
higher value than the defined maximum in `/etc/conf/cf.d/mtune`.

Adjust the parameters with the command:
**/etc/conf/bin/idtune  &lt;parameter&gt;  &lt;parametervalue&gt;**

```
idtune   SEMMNS   1024
```

The command idtune checks the minimum/maximum values listed in
`/etc/conf/cf.d/mtune`

and writes the changes to the file
`/etc/conf/cf.d/stune`.

If a range error occurs, the minimum/maximum value can be modified  (through editing
`mtune`), if reasonable.

If a value for the 64-bit kernel requirements is higher than the maximum setting
defined in `/etc/conf/cf.d/mtune`, set the parameter to this maximum value
and ask your Technical Service to check whether it is possible to increase the
maximum value in `/etc/conf/cf.d/mtune`.

c.  Create a new kernel.

- First check if you are on a multi or on a single processor machine. Enter the
  command:
  **uname -M**

  This shows the number of CPUs and the RAM size:

  `1/256` : single processor system and 256 MB RAM

  `2/*`    : multi processor system

- Create the kernel with the commands

  **/etc/conf/bin/idbuild  -M** (multi-processor system)

  **/etc/conf/bin/idbuild  -S** (single processor system)

d.  To activate the new operating system kernel, the system must be rebooted with:
    **shutdown -y -g&lt;grace period&gt; -i6**

# 10.5 SEQUENT: Checking System and Kernel Parameters

To assure that the system and kernel parameters are set correctly, perform the following steps:

1.  Check and modify the kernel.

    The following table shows the recommended kernel parameters for high performance SAP System installation on SEQUENT DYNIX/ptx using the Oracle RDBMS.

**Recommended Kernel Parameters for SEQUENT DYNIX/ptx**

| ptx/Admin Adjustment | Parameter | Installation Requirement |
|---|---|---|
| set | BUFPCT | 2 |
| set | FDIV_BUG | 0 |
| set | NTLI | 8192 |
| set | NTRW | 4160 |
| set | MAXAIO | 4096 |
| set | NABUF | 8192 |
| set | NPROC | 2048 |
| set | MAXUP | 2048 |
| set | SHMMAX | 2147483647 |
| set | SHMGAP | 2097152 |
| set | SEMMNS | 3100 |
| set | SEMMNU | 3100 |
| set | SEMMSL | 350 |
| set | SEMUME | 50 |
| set | NFIFO | 3000 |
| set | NFILE | 24000 |
| set | NINODE | 2048 |
| set | NOFILETAB | 12000 |
| set | N_UDP_PCB_FR | 2048 |
| set | TCP_SENDSPAC | 32 |
| set | MAXUSERS | 1024 |
| set | SHM_LOCK_UID | -1 |
| set | SHM_LOCK_OK | 1 |
| set | TCP_DELAYACK | 20 |
| set | NABUF_DYN_DI | 1 |
| set | NABUF_DYN_MU | 2 |

| set | N_TCP_PCB_FR | 2048 |
|-----|------|------|
| set | N_TCP_PCB_HD | 64 |
| set | MSGMAX | 16384 |
| set | MSGMNB | 65535 |
| set | MSGSEG | 4096 |
| set | MSGSSZ | 64 |
| set | NTICLTS | 2048 |
| set | MSGTQL | 90 |
| set | SHMMNI | 1000 |
| set | SHM_LOCKDF_O | 1 |
| set | SHM_LOCKDF_U | -1 |

If a kernel parameter is not set within the current kernel or the current value of a kernel parameter is too low, the system configuration file needs to be updated and a new kernel built. Use the ptx/Admin tool **menu** to change the kernel parameters, to build a new kernel and to schedule the installation of the new kernel upon reboot of the system. For more information on how to use ptx/Admin, see the SEQUENT documentation *DYNIX/ptx System Administration Guide Volume 1*, chapter 3.

2. Setting up VMTUNE parameters

   To better utilize the virtual memory system, the adjustments of the VMTUNE environment listed in the following table should be made.

   **Recommended Virtual Memory Parameters for SEQUENT DYNIX/ptx**

| Parameter | SEQUENT DYNIX/ptx Default | Installation Requirement |
|-----------|---------------------------|--------------------------|
| maxdirty | 400 | 10240 |
| dirtyhigh | 200 | 9216 |
| dirtylow | 100 | 8192 |

   This can be done by creating a file /etc/rc2.d/S99vmtune that contains:
   **/etc/vmtune -f -maxdirty 10240 -dirtyhigh 9216 -dirtylow 8192**.

   For more information, see the SEQUENT documentation *DYNIX/ptx System Configuration and Performance Guide.*

3. Rebooting the system

   If a new kernel has been built, the system has to be booted.

   If kernel parameters were manually inserted into the system configuration file of the previous kernel, these parameters have to be reinserted into the system configuration file of the new kernel, and the kernel build has to be restarted.

   The new kernel is booted by entering:
   **init 6**

# 10.6 Solaris: Checking and Modifying the UNIX Kernel

## Use

Before installing an SAP System, you must check and, if necessary, modify the UNIX operating system kernel.

## Procedure

> The Solaris kernel modules are automatically loaded when needed. This makes rebuilding of the kernel unnecessary.

1. Edit the file `/etc/system`. It must contain the following lines:

    − For 32-bit SAP Kernel:

```
Shared memory parameters set for SAP
*
set shmsys:shminfo_shmmin=100
set shmsys:shminfo_shmmax=<physical memory, min. 536870912,
                                          max. 2147483648>
set shmsys:shminfo_shmmni=256
set shmsys:shminfo_shmseg=100
*
* End of shared memory parameters
*
* Semaphores parameters set for SAP
*
set semsys:seminfo_semmap=256
set semsys:seminfo_semmni=4096
set semsys:seminfo_semmns=4096
set semsys:seminfo_semmnu=4096
set semsys:seminfo_semume=64
set semsys:seminfo_semmsl=75
set semsys:seminfo_semopm=50
*
* End of semaphores parameters
*
* IPC Message queues Parameters set for SAP
*
* End of message queues parameters
*
* Other parameters for SAP:
*
* End of other parameters
```

− For 64-bit SAP Kernel:

```
* Shared memory parameters set for SAP
*
set shmsys:shminfo_shmmin=100
set shmsys:shminfo_shmmax=1073741824
set shmsys:shminfo_shmmni=256
set shmsys:shminfo_shmseg=200
*
* End of shared memory parameters
*
* Semaphores parameters set for SAP
*
set semsys:seminfo_semmap=256
set semsys:seminfo_semmni=4096
set semsys:seminfo_semmns=4096
set semsys:seminfo_semmnu=4096
set semsys:seminfo_semume=64
set semsys:seminfo_semmsl=75
set semsys:seminfo_semopm=50
*
* End of semaphores parameters
*
* IPC Message queues Parameters set for SAP
*
* End of message queues parameters
*
* Other parameters for SAP:
*
* End of other parameters
```

2. Reboot the system with the command:
   **shutdown -i6 -y -g0**

# 11. File Systems, Raw Devices and Swap Space

## Purpose

Before you begin with the practical installation tasks, some operating systems require special tasks or considerations concerning volume groups, file systems, raw devices or swap space. These tasks are listed in the following sections.

## Process Flow

If there is an instruction in the documentation *R/3 Installation on UNIX* to check volume groups, file systems, raw devices or swap space, perform the following steps:

1.  See the corresponding section for your operating system and perform the necessary actions listed there:

    – AIX [page 168]

    – Compaq [page 172]

    – HP-UX [page 180]

    – Linux [page 186]

    – ReliantUNIX [page 188]

    – SEQUENT [page 193]

    – Solaris [page 195]

    If there is no section for your operating system, you can proceed with the next step in the installation documentation.

2.  When you have finished, continue with the next step in the installation documentation.

# 11.1 AIX: Volume Groups, File Systems, Raw Devices, Swap Space

The following describes how to create the volume groups, file systems, raw devices and swap space for your installation.

The structure of the SAP system depends on the disk configuration of the customer system. For this reason, there are no general procedures for setting up the file systems.

> Consider the following when you specify the sizes of file systems (not applicable for **DB2 for OS/390**):
> Your operating system needs up to 10% of disk space for administration.

AIX does not allow block 0 to block 15 on the disk to be part of the raw device used by the database system. When you reboot the machine, the operating system writes system information to these blocks. Data from the database will be overwritten and a restore of the database becomes necessary.

## 11.1.1 AIX: Size of a Logical Partition

In the Logical Volume Manager, the size of a logical partition is equal to the size of the physical partition of the volume group to which the partition belongs.

At the time a volume group is created, the size can be chosen from the range 1, 2, ...256 MB. For example, when a volume group is created with the parameter `Physical Partition SIZE` of 128 MB, each logical partition will be 128 MB.

## 11.1.2 AIX: Setting up Swap Space

### Use

You can set up swap space now if you have a suitable volume group. You also can perform this step at the end of the OS preparation.

### Prerequisites

You can find the minimum swap space requirement in the installation documentation in Hardware and Software Requirements Check [page 29]. If possible, you should use an entire physical disk as a swap space partition.

### Procedure

1. Determine the size of the installed RAM using the command:
   **`lscfg │ grep mem`**

2. Determine the allocated swap space:

   a. Enter the command **`smitty`**.

   b. Select:

      *Physical & Logical Storage → Logical Volume Mgr → Paging*
      *Space → List All Paging Spaces*

   or enter the command
   **`lsps -a`**

3. Add another paging space if necessary using `smitty`:

11.1 AIX: Volume Groups, File Systems, Raw Devices, Swap Space

a. Select:

*Physical & Logical Storage → Logical Volume Mgr →*
*Paging Space → Add Another Paging Space*

A list of volume group names is displayed.

b. Select a volume group.

c. Enter the size of paging space in logical partitions.

d. Set *Start using this paging space NOW* ? to `YES`.

e. Set *Use this paging space each time the system is RESTARTED* to `YES`.

f. Press `F10` to exit `smitty`.

g. To check the results, follow the procedure described in step 2.

## 11.1.3 AIX: Creating Volume Groups

### Prerequisites

Before you start to set up the necessary file systems for SAP, carefully plan their distribution to available disks. Decide whether one or more volume groups (VGs) should be used.

### Procedure

1. Enter the command **`smitty`**.

2. Select:

*Physical & Logical Storage → Logical Volume Manager →*
*Volume Groups → Add a Volume Group*

3. Enter a volume group name, for example, **`sapr3vg`**.

Press `F4` to get a list of disks, which have not yet been assigned to a volume group.

4. With `F7`, mark the disks you want to be included in the volume group and press `ENTER`.

5. Press `F10` to exit.

Repeat these steps for each volume group that has to be created.

## 11.1.4 AIX: Setting up File Systems

1. Create one logical volume for each file system listed in the appropriate SAP profile.

a. Select:

*Physical & Logical Storage → Logical Volume Manager →*
*Logical Volumes  → Add a Logical Volume*

b. Enter a volume group name, for example, **`sapr3vg`**.

   c.    Enter a logical volume name, for example, `lvsap01`.

   d.    Enter the number of logical partitions (see section *Size of a Logical Partition*).

   e.    Press `F3` until the *Physical & Logical Storage* menu appears.

2.   Create the file systems.

   a.    Select:

      *Physical & Logical Storage → File Systems →*
      *Add/Change/Show/Delete File Systems → Journaled File Systems →*
      *Add a Journaled File System on a previously defined Logical Volume*

   b.    Press `F4` to get a list of logical volumes.

   c.    Select one logical volume.

      ⚠️

      Select the logical volume with the desired size.

      Enter mount point as given in the file system list files.

      ▶

      DB2 UDB for UNIX, Windows: **/db2/<SAPSDID>**
      Informix: **/informix/<SAPSID>**
      Oracle: /**oracle/<SAPSID>/sapdata1**
      SAP DB: **/sapdb/<SAPSID>/sapdata**

      Set *mount automatically* to `yes`.

   d.    Press `F10` to exit `smitty`.

# 11.1.5 AIX: Setting up Raw Devices

1.   Create volume group.

      See the section *Creating Volume Groups*.

2.   Create logical volume:

   a.    Enter the command `smitty`.

   b.    Select:

      *Physical & Logical Storage → Logical Volume Manager →*
      *Logical Volumes → Add a Logical Volume*

   c.    Enter volume group name.

   d.    Enter logical volume name (for example: `lvsap02`).

   e.    Enter the number of logical partitions.

   f.    Set the logical volume TYPE to `r3data` and press `ENTER`.

   g.    Press `F10` to exit SMIT.

11.2 Compaq: File Systems, Raw Devices and Swap Space

The logical volume can be accessed through `/dev/r<name of raw log.vol>`.

Name of logical volume: `lvsap02` leads to the corresponding device name `/dev/rlvsap02`.

3. Accessing raw devices

   For each logical volume, create a link to access the volume.

DB2 UDB for UNIX, Windows: Not necessary
Informix: `ln -s /dev/rlvsap01                    \`
          `/informix/<SAPSID>/sapdata/physdev1/data1`
Oracle: Not necessary
SAP DB: Not necessary (R3SETUP creates the links)

# 11.2 Compaq: File Systems, Raw Devices and Swap Space

The following describes how to create the volume groups, file systems, raw devices and swap space for your installation.

The structure of the SAP system depends on the disk configuration of the customer system. For this reason, there are no general procedures for setting up the file systems.

The installation documentation (section ) lists the space requirements for the swap space.

Consider the following when you specify the sizes of file systems:
- Your operating system needs up to 10% of disk space for administration.
- 1 MB is 1024 KB
See the installation documentation for additional planning information.

For new installations, you are recommended to use the standard file system or the Advanced File System (ADVFS, license required).

In both cases, you can also use LSM (logical storage manager) volumes (license required). To do this, replace `<diskname>` by the name of the created logical volumes in the following sections.

## 11.2.1 Compaq: Preparing Hard Disks

### disklabel Command

The command `disklabel` displays the start/stop cylinder, the size of the partition, the label and the disk type of a disk device.

As user `root`, enter the command:
`disklabel -r /dev/<rawdisk device>`

`disklabel -r /dev/rrz3c`

Compaq Tru64 UNIX does not allow block 0 to block 15 on the disk to be part of the raw device used by the database system. When the machine is rebooted, the operating system writes a label here. Consequently, data from the database is overwritten and a restore of the database becomes necessary.
If you use a RAID System or Advanced File System (advfs) then the device driver will take care of this restriction.
Otherwise, when you initially setup a raw device, the standard 'c' partition (`/dev/rrz?c`) may **not** be used since it normally includes track zero on the disk.
A disk that is intended for use as a raw device, must be reformatted appropriately to ensure that the raw device begins at track two.
Check your disk configuration as soon as possible to make sure that your raw devices meet the above requirements. To do this:
a. Log on as user `root` and change to the directory
   `/<db-system>/<SAPSID>/sapdata`
b. List the links to the raw devices with the command:
   `ls -lR`
c. Display all partitions on the disks with the command:
   `disklabel -r /dev/<raw_device>`

Assume `ls -lR` produces the output
`lrwxrwxrwx  1  root   18 Nov 29  data3  ->  /dev/rrz3h`
then the partition `h` of this disk is used as a raw device.

Always use partition `c` of the raw device in the `disklabel` command to display the content of the entire disk.

11.2 Compaq: File Systems, Raw Devices and Swap Space

The output of `disklabel -r /dev/rrz3c` looks similar to:

```
# /dev/rrz3c:
type: SCSI
disk: rz26
label:
flags:
bytes/sector: 512
sectors/track: 57
tracks/cylinder: 14
sectors/cylinder: 798
cylinders: 2570
sectors/unit: 2050860
rpm: 3600
interleave: 1
trackskew: 0
cylinderskew: 0
headswitch: 0                    # milliseconds
track-to-track seek: 0  # milliseconds
drivedata: 0

8 partitions:
#      size   offset    fstype  [fsize bsize    cpg]
 a:  131072        0    unused    1024  8192    # (Cyl.    0 - 164*)
 b:  262144   131072    unused    1024  8192    # (Cyl.  164*- 492*)
 c: 2050860        0    unused    1024  8192    # (Cyl.    0 - 2569)
 d:  552548   393216    unused    1024  8192    # (Cyl.  492*-1185*)
 e:  552548   945764    unused    1024  8192    # (Cyl. 1185*-1877*)
 f:  552548  1498312    unused    1024  8192    # (Cyl. 1877*-2569*)
 g: 1657644   393216    4.2BSD    1024  8192 16 # (Cyl.  492*-2569*)
 h:  838444  1212416    unused    1024  8192    # (Cyl. 1519*-2569*)
```

➡

> Since partition a contains track zero, it is necessary to choose an other partition
> as raw device. To edit and change this output for (re-)partitioning the disk, it
> should be directed in a file using the command:
> **disklabel  -r  /dev/rrz3c  >  <tmp_file>**

## Partitioning Disks

1. Edit the output file `<tmp_file>` you generated in the previous step and change the boldface lines accordingly:

```
# /dev/rrz3c:
type: SCSI
disk: rz26
label:
flags:
bytes/sector: 512
sectors/track: 57
tracks/cylinder: 14
sectors/cylinder: 798
cylinders: 2570
sectors/unit: 2050860
rpm: 3600
interleave: 1
trackskew: 0
cylinderskew: 0
headswitch: 0                    # milliseconds
track-to-track seek: 0 # milliseconds
drivedata: 0

8 partitions:
#     size  offset  fstype [fsize bsize      cpg]
a:  ....16       0  unused   1024  8192  16     # (Cyl.    0 - 164*)
b:  262144  131072  unused   1024  8192         # (Cyl.  164*- 492*)
c: 2050860       0  unused   1024  8192         # (Cyl.    0 - 2569)
d:  552548  393216  unused   1024  8192         # (Cyl.  492*- 1185*)
e:  552548  945764  unused   1024  8192         # (Cyl. 1185*- 1877*)
f:  552548 1498312  unused   1024  8192         # (Cyl. 1877*- 2569*)
g: 1657644  393216  4.2BSD   1024  8192  16     # (Cyl.  492*- 2569*)
h:  131056      16  unused   1024  8192  16     # (Cyl. 1519*- 2569*)
```

> - Only partitions a and h were modified !
> - Never change partition c because it always represents the entire disk.
> - Partition a should always span block 0 and block 1.
> - Partitions a and c are the only ones containing track zero.
> - After activating this partition all partitions but a and c can be used as raw devices.

2. Activate the disk using the command:
   **disklabel -R -r <raw_device> <tmp_file> <disktype>**

   where `<disktype>` is the value of `disk:` in the above `<tmp_file>`.

   **disklabel  -R  -r  /dev/rrz3c  <tmp_file>  rz26**

   Always use partition `c` of the raw device in the above command.

11.2 Compaq: File Systems, Raw Devices and Swap Space

## 11.2.2 Compaq: Setting up Swap Space

1.  Determine the size of the installed RAM with the command:
    **vmstat -P | head -2**

2.  Determine the allocated swap space with the command:
    **/usr/sbin/swapon -s**

3.  Determine the required size of the swap space.

    You can find the minimum swap space requirement in the installation documentation in section <u>Hardware and Software Requirements Check [page 29]</u>.

    If possible, you should use an entire physical disk as swap space partition.

4.  Increase the swap space if necessary.

    To define additional swap partitions, insert the entry:
    /dev/<disk partition> swap<n> ufs sw 0 2 in the file /etc/fstab.

    

    Insert entry   /dev/rz1b swap1 ufs sw 0 2

5.  To activate new swap partitions, use the command:
    **/usr/sbin/swapon  -a**

6.  Check the results by using the command:
    **/usr/sbin/swapon  -s**

7.  Execute memlimits, to verify paging space size and kernel settings.

    

    Do not execute this step if you are installing a standalone DB server.

    *   Make sure that the UNIX kernel, paging space and user limits are already configured for the SAP System as described in the installation documentation in section <u>Hardware and Software Requirements Check [page 29]</u> and in section <u>Compaq: Checking and Modifying the UNIX Kernel [page 153]</u>.

    *   Unpack the file memlimits:

        **cd <INSTDIR>**
        **/<CD-DIR>/UNIX/<OS>/CAR -xf /<CD-DIR>/UNIX/<OS>/SAPEXE.CAR \**
        **memlimits**

    *   Start memlimits:

        –   For a 32-bit SAP kernel, enter:  **./memlimits**

        –   For a 64-bit SAP kernel, enter:  **./memlimits -l 20000**

    If error messages occur, increase your paging space and rerun memlimits until it is error free.

## 11.2.3 Compaq: Setting up Standard File Systems

The following table shows the variables and their corresponding values.

**Variables in Standard File Systems**

| Variable | Description |
|---|---|
| `<diskname>` | Full path of a disk, for example, `/dev/rz11c` |
| `<rawdiskname>` | Full path of a raw disk, for example, `/dev/rrz11c` |
| `<disktype>` | Disk type, for example, `rz28` |
| `<mountpointname>` | Full path of a mount point, for example, SAP DB: `/sapdb/<SAPSID>/sapdata1` Informix: Not applicable  Oracle: `/oracle/<SAPSID>/sapdata1` |

To set up a standard file system:

1. Ask the customer which disks are available and make sure that they do **not** belong to one of the categories listed in the following table:

   **Avoidable Disk Categories**

   | Disk Category | How to Check |
   |---|---|
   | Mounted disks | `grep <diskname> /etc/fstab` |
   | Swapdevices | `swapon -s | grep <diskname>` |
   | Advanced FS | `cd /etc/fdmns; showfdmn * | grep <diskname>` |
   | Volumes within LSM (Logical Storage manager) | `volprint -Ath | grep <diskname>` |

2. Create disk label, if necessary:
   **disklabel -w -r <rawdiskname> <disktype>**

3. Create empty file system:
   **newfs -m 0 <rawdiskname>**

4. Create mount point:
   **mkdir <mountpointname>**

5. Add line to `/etc/fstab`:
   **<diskname> <mountpointname> ufs rw 1 0**

6. Mount file system:
   **mount <mountpointname>**

# 11.2.4 Compaq: Setting up Advanced File Systems

The following table shows the variables and their values.

**Variables in Advanced File Systems**

| Variable | Description |
|---|---|
| `<diskname>` | Full path of a disk, for example, `/dev/rz11c` |
| `<disktype>` | Disk type, for example, `rz28` |
| `<mountpointname>` | Full path of a mount point, for example, SAP DB: `/sapdb/<SAPSID>/sapdata1` Informix: Not applicable Oracle: `/oracle/<SAPSID>/sapdata1` |
| `<domainname>` | ame of a domain, for example, `sapdomain1` |
| `<filestename>` | Name of a file set, for example, `sapfileset1` |

To set up an advanced file system:

1.  Ask the customer which disks are available and make sure that they do **not** belong to one of the categories listed in the following table:

    **Avoidable Disk Categories**

    | Disk Category | How to Check |
    |---|---|
    | Mounted disks | `grep <diskname> /etc/fstab` |
    | Swapdevices | `swapon -s | grep <diskname>` |
    | Advanced FS | `cd /etc/fdmns; showfdmn * | grep <diskname>` |
    | Volumes within LSM (Logical Storage manager) | `volprint -Ath | grep <diskname>` |

2.  Check required licenses:
    **lmf list | grep ADVFS-UTILITIES**

3.  Create file domain:
    **mkfdmn -t <disktype>  <diskname>  <domainname>**

4.  To add more disks to the domain, specify:
    **addvol -t <disktype>  <diskname>  <domainname>**

5.  Install one or more file sets in the domain:
    **mkfset <domainname>  <filesetname>**

6.  Create mount point:
    **mkdir <mountpointname>**

7. Add line to `/etc/fstab`:
   **`<domainname>#<filesetname> <mountpointname> advfs rw 1 0`**

8. Mount file system:
   **`mount <mountpointname>`**


# 11.2.5 Compaq: Setting up Raw Devices

## Use

Some DBMSs prefer raw devices. Therefore, you have to maintain your disks for raw device access. Keep the following points in mind:

- The installation tool can handle disk partitions up to 2 GB

- The first few disk blocks should not be contained in an active raw device partition

- You are recommended **not** to use a disk with a raw device partition for anything other than raw devices (that is, if one partition of a disk is used as raw device, no other partition of this disk should be used for file system, swap space, or anything else except raw devices.)

- You should use a disk for raw device **only** when you are absolutely sure that this disk is not used in any other way.

## Procedure

1. Ask the customer which disks are available and make sure that they do **not** belong to one of the categories listed in the following table:

   **Avoidable Disk Categories**

   | Disk Category | How to Check |
   |---|---|
   | Mounted disks | `grep <diskname> /etc/fstab` |
   | Swap devices | `swapon -s | grep <diskname>` |
   | Advanced FS | `cd /etc/fdmns; showfdmn * | grep <diskname>` |
   | Volumes within LSM (Logical Storage manager) | `volprint -Ath | grep <diskname>` |

2. Create disk label, if necessary:
   **`disklabel -w -r <rawdiskname> <disktype>`**

3. Modify the partition table of a particular raw device `<rawdiskname>`.

   `prompt>` **`disklabel -r -e <rawdiskname>`**

11.3 HP-UX: File Systems, Raw Devices and Swap Space

If you perform the above command with an existing device name, you will be put into an editor and you can edit the partition lines as required. For example, if you want to use partition b to hold the whole disk except the first 16 blocks as your raw partition, your partition table should look as follows:

```
#      size    offset    fstype    [fsize bsize   cpg]
a:   131072       0       ADVfs                        # (Cyl.     0 - 8
b:  4110464      16      unused    1024   8192         # (Cyl.    82*- 3
c:  4110480       0      unused    1024   8192         # (Cyl.     0 - 2
d:   442343  131072      unused    1024   8192         # (Cyl.    82*- 3
e:   442343  131072      unused    1024   8192         # (Cyl.    82*- 3
f:   442343  131072      unused    1024   8192         # (Cyl.    82*- 3
g:  3537065  573415       ADVfs                        # (Cyl.   362*- 2
h:   442343  131072      unused    1024   8192         # (Cyl.    82*- 3
```

➡

Do not use partitions a and c because they contain the first 16 blocks of the disk.

# 11.3 HP-UX: File Systems, Raw Devices and Swap Space

The following describes how to create the volume groups, file systems, raw devices and swap space for your installation.

The structure of the SAP system depends on the disk configuration of the customer system. For this reason, there are no general procedures for setting up the file systems.

➡

Consider the following when you specify the sizes of file systems:
- Your operating system needs up to 10% of disk space for administration.
- 1 MB is 1024 KB.

## 11.3.1 HP-UX: Setting up Swap Space

1. Find the minimum swap space requirements in the installation documentation in section Hardware and Software Requirements Check [page 29].

2. Find out whether you have to increase the swap space:

   a. Determine the size of the installed RAM: Run SAM and choose:

      *Performance Monitors → System Properties → Memory*

   b. Find out how much swap is currently configured on your system:
      **/usr/sbin/swapinfo**

3. Increase the swap space if necessary. You have two options:

   - Manually

   - Using SAM

4. Verify the paging size and the kernel settings if you are not installing a standalone DB server.

## Setting up Swap Space Manually

1.  Create a logical volume:
    **`lvcreate -n <LVName> /dev/<VGName>`**

2.  Define size and allocate the logical volume to a disk:

    **`lvextend -L <size in MB> /dev/<VGName>/<LVName>  \`**
    **`/dev/dsk/<diskdevice>`**

3.  Add the following entry to the file `/etc/fstab`:
    `/dev/<VGName>/<LVName>      /swap swap  defaults 0 0`

4.  Activate the swap space with the command:
    **`/usr/sbin/swapon -a`**

5.  Check activation with the command:
    **`/usr/sbin/swapinfo -tm`**

## Setting up Swap Space Using SAM

1.  Enter the command
    **`/usr/sbin/sam`**

2.  Select

    *Disks and Filesystems* → *Swap* → *Actions* →
    → *Add Device Swap* → *Using the LVM*

3.  Choose a partition for swap and choose *OK*.

4.  Exit SAM.

## Verify paging space size and kernel settings

■●≫

Do not execute this step if you are installing a standalone DB server.

1.  Make sure that the UNIX kernel, paging space and user limits are already configured for the SAP System as described in the installation documentation in section Hardware and Software Requirements Check [page 29] and the above text.

2.  Execute `memlimits`, to verify paging space size and kernel settings.

    a.  Unpack the file `memlimits`:

        **`cd <INSTDIR>`**

        **`/<CD-DIR>/UNIX/<OS>/CAR -xf /<CD-DIR>/UNIX/<OS>/SAPEXE.CAR \`**
        **`    memlimits`**

    b.  Start `memlimits`.

        –   For a 32-bit SAP kernel, enter:  **`./memlimits`**

        –   For a 64-bit SAP kernel, enter:  **`./memlimits -l 20000`**

11.3 HP-UX: File Systems, Raw Devices and Swap Space

3. If error messages occur, increase your paging space and rerun `memlimits` until it is error free.

# 11.3.2 HP-UX: Setting up File Systems using LVM

## Use

Using a logical volume manager allows you to distribute partitions (logical volumes) across several disks (physical volumes). The individual logical volumes are grouped together into volume groups.

File systems can be larger than physical disks, but not larger than the volume group.

## Procedure

1. Examine device configuration

   Enter the command:
   **`ioscan -f -C disk`**

   This command provides the logical unit (LU) number and the hardware addresses of all available devices, using the device class disk.

   The following command scans all disks for logical volumes:
   **`vgscan  -pv`**

   Make sure you use option **`-p`** (preview), otherwise `/etc/lvmtab` will be updated. LVM can coexist in a system that uses fixed partitions.

2. Prepare disks

   To assign an unused disk to a physical volume, enter:
   **`pvcreate /dev/rdsk/<diskdevice>`**

3. Create volume group directory `<VG Name>` and group device file (for example `SAPR3`). For each volume group in the system, there must be a volume group directory that has a character device file named group in it:

   **`mkdir   /dev/<VG Name>`**
   **`mknod   /dev/<VG Name>/group c 64  0x<nn>0000`**

4. Create the volume group

   To create a volume group, you specify which physical volumes (disks) belong to the group:
   **`vgcreate  /dev/<VG Name>  /dev/dsk/<diskdevice>`**

   To add another disk to an existing volume group, enter:
   **`vgextend  /dev/<VG Name>  /dev/dsk/<diskdevice>`**

5. Examine the size of volume group

   To see how many physical disks you have in a volume group, enter:
   **`vgdisplay  /dev/<VG Name>`**

6. Calculate the free space in the volume group:
   **`FREE_Space = Free physical extents (PEs) * PE_Size`**

7. Create one logical volume for each file system listed in SAPFS.PAR:
   ```
   lvcreate  /dev/<VG Name>
   ```

   Allocate the logical volume to a disk with the command:

   ```
   lvextend -L <size in MB> /dev/<VGName>/<LVName>  \
   /dev/dsk/<diskdevice>
   ```

   SAPFS.PAR lists the required size for each file system. The size <in MB> should be a multiple of PE_Size, or the size will be rounded up.

   You can find out the size of the logical volume with either of these commands:

   ```
   vgdisplay  -v  /dev/<VG Name>
   lvdisplay  /dev/<VG Name>/<LV Name>
   ```

   > Write down the device names of the logical volumes (for example, `lv12`).
   > You will need the device names when creating and mounting the file systems.

   > The following steps are only needed for file systems, not for raw devices. If you set up raw devices, see section *Accessing Raw Devices* for more information.

8. Determine the disk type with the command:
   ```
   diskinfo /dev/rdsk/<diskdevice>
   ```

9. Create the file systems required by SAP.

   For `sapdata1` to `sapdata<n>` enter:

   − **HFS:**
     ```
     newfs -L -i 20000 -F hfs -b 8192 -f 8192 -m 1  \
     /dev/<VG Name>/r<LV Name>
     ```

   − **JFS:**
     ```
     newfs -F vxfs -b 8192   /dev/<VG Name>/r<LV Name>
     ```

   For all others, enter:

   − **HFS:**
     ```
     newfs -L -F hfs /dev/<VG Name>/r<LV Name>
     ```

   − **JFS:**
     ```
     newfs -F vxfs /dev/<VG Name>/r<LV Name>
     ```

   The logical volume is identified by the device file that you defined when you created the logical volume.

10. Create mount directories.

11. Add the new file system to the `/etc/fstab`.

11.3 HP-UX: File Systems, Raw Devices and Swap Space

HFS:
`/dev/<VG Name>/<LV Name> /<mountdir> hfs defaults 0 2`

JFS:
`/dev/<VG Name>/<LV Name> /<mountdir> vxfs delaylog, \`
 `nodatainlog 0 2`

12. Mount the file systems using the command:
    `mount -a`

The mount sequence is determined via the file `/etc/fstab`.


# 11.3.3 HP-UX: Setting up File Systems using SAM

## Use

SAM is not able to build file systems with 8 K fragment size.


## Procedure

1.  Enter the command
    `/usr/sbin/sam`

2.  Select

    *Disks and Filesystems* → *File Systems* → *Actions*
     → *Add Local File System* → *Using the LVM*

3.  Add all disks.

4.  Select

    *Disks and Filesystems* → *Volume Groups* → *Actions* → *Create*

5.  Create all volume groups.

6.  Select

    *Disks and Filesystems* → *Logical Volumes* → *Actions* → *Create*

7.  Create all logical volumes.

8.  Exit SAM.

SAM already creates filesystems with the `newfs` command, but the filesystems for `sapdata1` to `sapdata<n>` have to be rebuild with special options.

9.  Perform the steps 9 to 12 of :

   − Create the file system required by SAP

   − Create mount Directories

   − Add the new file system to the `/etc/fstab`

   − Mount the file system using the command


## 11.3.4 HP-UX: Accessing Raw Devices

File systems and raw devices differ in the way that data is written to and read from disk:

- **Buffering:** Reads and writes to a file system are buffered in a UNIX system. To be absolutely sure that all data is physically present on a disk, the buffers and files must be synched.

  Writes to a raw device are unbuffered: the system writes directly to the disk. These writes are faster and more secure.

- **File access:** Accessing files on a UNIX file system is transparent. Accessing data on a raw device is only possible with a special application.

Some databases prefer raw devices. To access these raw devices you can create symbolic links. The following examples show symbolic link commands:

SAP DB:     not necessary, because R3SETUP creates the links

Informix:
```
ln -s /dev/rdsk/<diskdevice>                    \
      /informix/<SAPSID>/sapdata/physdev1/data1
ln -s /dev/rdsk/<diskdevice>                        \
      /informix/<SAPSID>/sapdata/physdev<m>/data<n>
```

Oracle:     not necessary

# 11.4 Linux: File Systems and Swap Space

The following describes how to create the volume groups, file systems and swap space for your installation.

The structure of the SAP system depends on the disk configuration of the customer system. For this reason, there are no general procedures for setting up the file systems.

The installation documentation (section Hardware and Software Requirements Check [page 29]) lists the space requirements for the swap space.

Consider the following when you specify the sizes of file systems:
- Your operating system needs up to 10% of disk space for administration.
- 1 MB is 1024 KB

See the installation documentation for additional planning information.

## 11.4.1 Linux: Preparing Hard Disks

### Use

The commands `fdisk` or `cfdisk` display the start/stop cylinder, the size of the partition, the label and the disk type of a disk device.

### Procedure

Execute one of the following commands as user `root`:
`fdisk /dev/<device>` or `cfdisk /dev/<device>`

## 11.4.2 Linux: Setting up Swap Space

### Prerequisites

Make sure that the UNIX kernel, paging space and user limits are already configured as described in the installation documentation (section Hardware and Software Requirements Check [page 29]) and in section Checking and Modifying the Linux Kernel [page 159].

### Procedure

1. Determine the allocated swap space by using the command:
   `cat /proc/swaps`

2. Determine the required size of the swap space.

   You can find the minimum swap space requirement in the installation documentation (section Hardware and Software Requirements Check [page 29]).

   If possible, you should use an entire physical disk as swap space partition.

3.  To configure swap space, use the following command:
    **linuxconf**

    ◄●➤

    >   Maximum size for swap partitions is 2GB. If more swap space than 2 GB is
    >   required, use multiple partitions.

4.  Unpack the file memlimits:
    **cd <INSTDIR>**

    **/<CD-DIR>/UNIX/<OS>/CAR -xf /<CD-DIR>/UNIX/<OS>/SAPEXE.CAR \
       memlimits**

5.  Start memlimits:
    **./memlimits -a yes_w -s mf**

6.  If error messages occur, increase your paging space and rerun memlimits until it is error
    free.

For more information, see **SAP Note 165892**.


## 11.4.3 Linux: Setting up Standard File Systems

### Prerequisites

The following table shows the variables and their corresponding values.

**Variables in Standard File Systems**

| Variable | Description |
|---|---|
| <diskname> | Full path of a disk, for example, /dev/sda |
| <mountpointname> | Full path of a mount point, for example, <br> SAP DB: /sapdb/<SAPSID>/sapdata1 <br> Informix: /informix/<SAPSID>/sapdata <br> Oracle: /oracle/<SAPSID>/sapdata1 <br> DB2 UDB: /db2/<SAPSID>/sapdata1 |

### Procedure

1.  Create empty file system:
    **mke2fs -b 4096 /dev/<device>**

2.  Create mount point:
    **mkdir <mountpointname>**

3.  Add line to /etc/fstab:
    **/dev/<device> <mountpointname> ext2 defaults 1 0**

4.  Mount file system:
    **mount <mountpointname>**

# 11.5 ReliantUNIX: File Systems, Raw Devices, Swap Space

The following describes how to create the volume groups, file systems, raw devices and swap space for your installation.

The structure of the SAP system depends on the disk configuration of the customer system. For this reason, there are no general procedures for setting up the file systems.

> Consider the following when you specify the sizes of file systems:
> − Your operating system needs up to 10% of disk space for administration.
> − 1 MB is 1024 KB.

## 11.5.1 ReliantUNIX: Setting up Swap Space

1. Find the minimum swap space requirements in the installation documentation in section .

2. Determine the size of the installed RAM.

   Use the following command to display the number of CPUs and megabytes of memory:
   **uname -M**

   The following **sample** output describes two CPUs and 512 MB of main memory:
   `2/512`

3. Determine the allocated swap space and define added swap space if necessary.

   The following command displays size and location of currently defined swap space:
   **swap -l**

   **Sample** output:

   ```
   path                     dev  swaplo  blocks  free
   /dev/ios0/sdisk000s1     4,1  0       261960  234352
   ```

   Additionally, the swap space can be looked up in the file `/etc/vfstab`, where disk slices used for swap space are marked with `'swap'`. Slices reserved for swap space cannot be used for a file system.

   Additional swap space can be defined using the command:
   **swap -a <diskdevice> <start block> <number of blocks>**

   The **<number of blocks>** defines the number of 512-byte blocks to be added.

   **swap -a /dev/ios0/sdisk001s3 0 50000**

The command above creates a new swap area on disk 1, slice 3 starting at block 0. The size of the area is 50000 blocks (25 MB).

Edit the file /etc/vfstab and add the new swap are.

```
/dev/ios0/sdisk001s3   /dev/ios0/rsdisk001s3 -  swap  - -  rw
```

4. Verify the paging space size and the kernel settings.

> Do not execute this step, if you are installing a standalone DB server.

− Make sure that the UNIX kernel paging space and user limits are already configured for the SAP System as described in the installation documentation in section Hardware and Software Requirements Check [page 29] and the information above.

− Execute memlimits to verify paging space size and kernel settings.

− Unpack the file memlimits:

**cd <INSTDIR>**

**/<CD-DIR>/UNIX/<OS>/CAR -xf /<CD-DIR>/UNIX/<OS>/SAPEXE.CAR \
 memlimits**

− Start memlimits:

- For a 32-bit SAP kernel, enter: **./memlimits**

- For a 64-bit SAP kernel, enter: **./memlimits -l 20000**

− If error messages occur, increase your paging space and rerun memlimits until it runs without errors.

## 11.5.2 ReliantUNIX: File System

### Use

The configuration of virtual disks and the creation of file systems can be done manually using shell commands or using of **sysadm**.

### Procedure

**Creating File Systems on Hard Disk Partitions**

1. Create new file systems using **newfs**. (File system type: ufs)

The file system partition is created with the command:

Oracle: **newfs -i <15000 per GB> -o t -m 0 -b 8192    \
        -f 8192 <device name>**

The option '**-m <number>**' describes the minimum free space threshold as a percentage.

11.5 ReliantUNIX: File Systems, Raw Devices, Swap Space

Better performance can be achieved using the Veritas File System (vxfs):

```
mkfs -F vxfs <device name> -
```
resp.
```
mkfs -F vxfs -o ninode=<15000 per GB>,bsize=8192 <device name> -
```

2. Create directories and mount the file systems.

The directories to hold the file systems must be created using **mkdir**. The newly created file systems can then be defined in `/etc/vfstab` and mounted into the directories.

**Configuring of Virtual Disks Manually**

Make sure you follow the recommendations in the installation guide in section *Installation Planning* concerning the distribution of file systems on distinct physical disks when configuring virtual disks.

To configure virtual disks manually, perform the following steps:

1. Define the structure of the virtual disks to be used so that they contain the file systems by editing the file `/etc/dktab`.

The file `/etc/dktab` describes the configuration of all virtual disks. It defines the disk partitions used to create a virtual disk. To establish a virtual disk, this file has to be edited.

There are two types of lines in `dktab` used to configure virtual disks:

a. Virtual disk declaration lines

b. Physical disk declaration lines

The new virtual disk has to be defined with one virtual disk declaration line followed by a number (equal to the number of slices) of physical disk declaration lines:

− Syntax of virtual disk declaration line:
  `<virtual disk name> <type> <number of slices> <cluster size>`

− Syntax of physical disk declaration line:
  `<slice name> [<start block> <number of blocks>]`

Explanation of parameters:

− The `<virtual disk name>` has to follow the pattern '`/dev/vd/vdisk<number>`'.

− The value of `<type>` is one of

  `'concat'` to combine partitions of different sizes

  `'stripe'` to combine partitions of the same size, situated on different disks

     (allowing for an even workload distribution)

  `'simple'` to make a certain number of blocks available as a partition

− `<number of slices>` counts the number of pieces needed to form the virtual disk. Virtual disks of type `'simple'` do not need this parameter.

− `<cluster size>` is only needed for virtual disks of type `'striped'` and should be defined as '`128`'

- `<slice name>` is the device name of the piece to be used.

- `[<start block> <number of blocks>]` have to be defined if you are using only parts of slices.

A concatenated virtual partition
```
/dev/vd/vdisk0  concat     4
/dev/ios0/sdisk001s4
/dev/ios0/sdisk001s5
/dev/ios0/sdisk002s4
/dev/ios0/sdisk002s5
```
A striped virtual partition with a cluster size of 128 blocks
```
/dev/vd/vdisk1  stripe     2     128
/dev/ios0/sdisk001s4
/dev/ios0/sdisk002s4
```
A tiny 2400 block simple virtual partition
```
/dev/vd/vdisk2 simple
/dev/ios0/sdisk010s7       0     2400
```

2. Configure the virtual disks with the **dkconfig** utility.

   After being defined by editing `/etc/dktab`, the new virtual disk systems have to be configured.

   Use the following command to configure separate entries:
   **dkconfig -c <virtual disk name>**

   or the following command to configure all virtual disks described in `/etc/dktab`:
   **dkconfig -vac**

3. Create new file systems using newfs.

   After defining the virtual disks in `/etc/dktab` and executing `dkconfig`, file systems can be generated on them (similar to using a raw device).

   The file system partition is created with the command:

   Oracle:   **newfs -i <15000 per GB> -m 1 -o s -b 8192 -f 8192  \
           <virtual disk name>**

   The option '**-m <number>**' describes the minimum free space threshold as a percentage.

   Better performance can be achieved using the Veritas File System (vxfs):

   **mkfs -F vxfs <device name> -**
   resp.
   **mkfs -F vxfs -o ninode=<15000 per GB>,bsize=8192 <device name> -**

4. Create directories and mount the file systems.

   The directories to hold the file systems must be created using **mkdir**.

   The newly created file systems may then be defined in `/etc/vfstab` and mounted into the directories.

11.5 ReliantUNIX: File Systems, Raw Devices, Swap Space

**Preparing Virtual Disks With sysadm**

1. Create the virtual disk nodes using `mknod` if they are not already defined.

2. Define the structure of the virtual disks to be used to contain the file systems.

   Configure the virtual disks:

   − Enter the command `sysadm`.

   − For each file system listed in the appropriate SAP template or documentation guide:

   − Select *file_systems → vdisk → <type of disk to be configured>*

   Fill in the type dependent form and press *Save* to trigger update of /etc/dktab and execution of `dkconfig`.

3. Create new file systems.

   Create directories and mount the file systems:

   − Enter the command `sysadm`.

   − For each file system listed in the appropriate SAP template or documentation guide:

   − Select *file_systems → make*

   Fill in the form and save your changes.

# 11.5.3 ReliantUNIX: Accessing Raw Devices

File systems and raw devices differ in the way data is written to and read from disk:

- **Buffering:** Reads and writes to a file system are buffered in a UNIX system. To be absolutely sure that all data is physically present on a disk, the buffers and files must be synched.

  Writes to a raw device are **unbuffered**: the system writes directly to the disk. These writes are faster and more secure.

- **File access:** Accessing files on a UNIX file system is transparent. Accessing data on a raw device is only possible with a special application.

Some databases prefer raw devices. To access these raw devices you can create symbolic links. The following examples show symbolic link commands:

SAP DB: Not necessary because R3SETUP creates the links

Informix:
```
ln -s /dev/ios0/<diskdevice>                 \
/informix/<SAPSID>/sapdata/physdev1/data1
    .
    .
ln -s /dev/ios0/<diskdevice>                 \
/informix/<SAPSID>/sapdata/physdev<m>/data<n>
```

Oracle: Not necessary

> It is important to also list the used raw devices in `/etc/vfstab`. Otherwise,
> system tools like `dkmap` do not recognize that the disks are already in use.

> Entry in `/etc/vfstab`:
> `/dev/ios0/<diskdevice> /dev/ios0/r<diskdevice> - raw 0 no rw`

# 11.6 SEQUENT: File Systems, Raw Devices, Swap Space

The following describes how to create the volume groups, file systems, raw devices and swap space for your installation.

The structure of the SAP system depends on the disk configuration of the customer system. For this reason, there are no general procedures for setting up the file systems.

> Consider the following when you specify the sizes of file systems:
> - Your operating system needs up to 10% of disk space for administration.
> - See *Installation Planning* in your installation guide for additional disk planning information.

For new installations, you are recommended to use the standard file system partitions or file systems generated by the SEQUENT Volume Manager (ptx/SVM, license required).

## 11.6.1 SEQUENT: Preparing Hard Disks

### Use

Additional file systems are required for the database.

These file systems are created using either command line utilities or ptx/Admin (`menu`) as user `root.`

### Procedure

1. Plan your total disk configuration

2. Use ptx/Admin to create custom Volume Table of Contents (VTOC) on each of the physical disks using the tool **menu**. Choose *System Administration → Disk Drive Management → Create a Custom VTOC File*

3. Format the partitions using the tool **menu**. Choose *System Administration → File System Management → Make a New Filesystem*

4. Add these file systems to the file system table `/etc/vfstab` using the tool **menu**. Choose *System Administration → File System  Management → Add Filesystem Table Entry*

11.6 SEQUENT: File Systems, Raw Devices, Swap Space

5. Label the partitions using the tool `menu`. Choose *System Administration → File System Management → Create-Change Disk Labels*

6. Mount these file systems using the tool `menu`. Choose *System Administration → File System Operations → Mount a Filesystem*

7. Check the free space available of the new files system using the tool `menu`. Choose *System Administration → File System Operations → Report Free Disk Space*.

   Interpret the available free space by taking the value in the *Avail* column, which is reported in 512byte blocks, and divide by 2048 to determine the available free space in megabytes.

8. Check the mode of the mount points, which must be `0775`.


## 11.6.2 SEQUENT: Setting up Swap Space

1. Determine the size of the installed RAM by using the command:
   `/etc/showcfg │ grep MEM`

   Sum up the memory entries `size=xxx.0mb (xxx.0mb)` of each MEM line to get the total memory of the system.

2. Determine the allocated swap space by using the command:
   `/etc/swap -l`

3. Determine the required size of the swap space.

   The minimum swap space requirement depending on installed RAM is displayed in the following table.

   **Swap Space Requirements**

   | Installed RAM | Required Swap Space |
   |---|---|
   | ≤ 192 MB | 1 GB |
   | > 192 MB and ≤ 512 MB | 1 GB + 2 * RAM |
   | > 512 MB | 3 * RAM |

   If possible, you should use an entire physical disk as swap space partition.

   ▪●➣

   > For a 64-bit SAP kernel, at least 20 gigabyte of swap space is recommended. For more information, see **SAP Note 153641**.


4. Increase the swap space if necessary.

   To define additional swap partitions, use the following command:
   `/etc/swap -a <partition> <length>`

   where `<partition>` is a device that is not being used by a file system.

```
/etc/swap -a /dev/vx/dsk/rootdg/sd1s2 0
```

5.  To activate new swap partitions, reboot the system using the command:
    **init 6**

6.  Upon reboot of the system, check the results by using the command:
    **/etc/swap -l**


# 11.7 Solaris: File Systems, Raw Devices, Swap Space

The following describes how to create the volume groups, file systems, raw devices and swap space for your installation.

The structure of the SAP system depends on the disk configuration of the customer system. For this reason, there are no general procedures for setting up the file systems.

Consider the following when you specify the sizes of file systems:
- Your operating system needs up to 10% of disk space for administration.
- 1 MB is 1024 KB.

Solaris with Veritas File System:
If you are installing Oracle 8 on Solaris with Veritas file system, make sure you have Veritas Version 3.2.6 or higher.


## 11.7.1 Solaris: Preparing Hard Disks

### prtvtoc Utility

**prtvtoc** prints the content of the VTOC (volume table of contents). It displays the start/stop cylinder, the size of the partition and the mounted directory.  Execute **prtvtoc** as follows:

1.  Log on as user **root**.

2.  Enter:
    **/usr/sbin/prtvtoc -s <rawdevice>**

11.7 Solaris: File Systems, Raw Devices, Swap Space

Solaris does not allow track zero on the disk to be part of the raw device used by the database system. When the machine is rebooted, the operating system writes a label here. Consequently, data from the database is overwritten and a restore of the database becomes necessary.

If you use a RAID System or a Volume Management Software from Sun (Solstice DiskSuite or Veritas Volume Manager) then the device driver will take care of this restriction.

Otherwise, when you initially setup a raw device, the standard second partition (`/dev/rdsk/c?t?d?s2`) may **not** be used since it normally includes track zero on the disk. A disk that is intended for use as a raw device, must be reformatted appropriately to ensure that the raw device begins at track one.

Check your disk configuration as soon as possible to make sure that your raw devices meet the above requirements. To do this:

1. Log on as root and change to the directory
   `/<db-system>/<SAPSID>/sapdata`
2. List the links to the raw devices by entering the command:
   **`ls -lR`**
3. Display all partitions on a disk (substitute "?"):
   **`/usr/sbin/prtvtoc <rawdevice>`**

Assume **`ls -lR`** produces the output

`lrwxrwxrwx  1  root 18 Nov 29 data3 -> /dev/rdsk/c0t3d0s6`

then the partition 6 of this disk is used as a raw device.

Assume **`/usr/sbin/prtvtoc /dev/rdsk/c0t3d0s6`** produces the output:

```
                  First    Sector    Last
Part. Tag Flags  Sector    Count     Sector   Mount Directory
0     0    00     0        7050      7049
2     5    01     0        3929670   3929669
6     4    00     7050     3922620   3929669
```

Then the first sector of partition 6 is **not** equal zero.

If the partition you want to use begins with sector zero (as shown for partition 2 in the above example) it cannot be used as a raw device partition.

## Partitioning Disks

1. Look for a mounted partition with the format utility:

   **`format`**
   `format>` **`partition`**
   `partition>` **`print`**

2.  Define partition size:

    ```
    partition> label
    partition> quit
    format> disk
    ```

3.  Chose next disk:

    ```
    format> quit
    ```

For more information, see the Solaris documentation.


## 11.7.2 Solaris: Setting up Swap Space

1.  Determine the size of the installed RAM with the command:
    **prtconf │ grep "Memory"**

2.  Determine the allocated swap space:
    **swap -s**

3.  Increase the swap space if necessary. You can find the minimum swap space requirement in the installation documentation in section Hardware and Software Requirements Check [page 29].

    To increase swap space, you have the following options:

    −   Create a swap file

    −   Use an entire disk or partition.

4.  Verify paging space size and kernel settings.


### Creating a Swap File

To create additional swap space without reformatting a disk, first create a swap file using the **mkfile** command. mkfile creates a file that is suitable for use either as an NFS mounted or local area. You can specify the size in bytes (default), kilobytes, blocks or megabytes using the **k**, **b** or **m** suffixes.

1.  Make sure that you have enough free space on your system for the additional swap:
    **df -k**

2.  Create the swap file:
    **mkfile <size>[ k │ b │ m ] <filename>**

    

    **mkfile 500m /sap/newswap**

3.  Once the swap file is created you make it accessible using the swap command:
    **swap -a <filename>**

    

    **swap -a /sap/newswap**

11.7 Solaris: File Systems, Raw Devices, Swap Space

4. To make the swap file available automatically each time the system boots, add an entry to the `/etc/vfstab` file.



```
/sap/newswap - - swap - no -
```

Since the file system must be mounted before the swap file, make sure that the entry that mounts the file system comes before the swap entry.

## Using an Entire Disk or Partition



Understanding disk device names:
The disk naming convention is based on logical (not physical) device names. To specify a slice (partition) on a disk with a bus controller (SCSI), use a device name with these conventions:

       **c<w>t<x>d<y>s<z>**

Key:

| | |
|---|---|
| **<w>** | logical controller number |
| **<x>** | physical bus target number (for example, SCSI-ID) |
| **<y>** | drive number |
| **<z>** | slice (partition) 0-7 |

To use an entire disk or partition:

1. Look for an unused partition or disk. Verify that the partition is unused by looking at `/etc/vfstab, /etc/opt/SUNWmd/md.tab` or using the **vxprint** utility.

2. Make your swap accessible.
   **swap -a <blockdevice>**

3. To make the swap partition available automatically each time the system boots, add an entry to the `/etc/vfstab` file.
   `<blockdevice> - - swap - no -`

## Setting up Metadevices

For advanced disk management, use the **Solstice DiskSuite** package or the **Veritas Volume Management Software.** They provide performance (striping), high availability (mirroring, RAID 5) and maintenance (hotspares, growing file systems) using **logical metadevices**.

- Solstice DiskSuite

  – All information about the logical devices is kept in several replicas of a metadatabase. To access a stripe, for example, use its nickname.

  – A `<metadevice>` is defined in the `/etc/opt/SUNWmd/md.tab`. The format is: `/dev/md/dsk/d[0..n]`.

− To access, for example, the raw partition of the metadevice `d10`, use:
`/dev/md/rdsk/d10.`

⚠

For striping and mirroring with **Solstice DiskSuite** equal physical partitions are
required.

− To set up metadevices:

1. Check the metadatabase:
**/usr/opt/SUNWmd/sbin/metadb**

2. Define the metadevices:
**vi /etc/opt/SUNWmd/md.tab.**

3. Initialize the metadevices with:
**/usr/opt/SUNWmd/sbin/metainit -a**

4. Check metadevices with:
**/usr/opt/SUNWmd/sbin/metastat**

5. Use raw metadevices:

Instead of `/dev/rdsk/<diskdevice>` you should use `/dev/md/rdsk/d[0..n]`.

For more information, see the **Solstice DiskSuite** documentation.

• Veritas Volume Management Software

For more information, see the **Veritas Volume Management Software** documentation.

## Verify Paging Space Size and Kernel Settings

■●≫

Do not execute this step if you are installing a standalone DB server.

• Make sure that the UNIX kernel, paging space and user limits are already configured for the
SAP System as described in the installation guide in section Hardware and Software
Requirements and in the previous section.

• Execute `memlimits`, to verify paging space size and kernel settings:

a. Unpack the file `memlimits`:

**cd <INSTDIR>**

**/<CD-DIR>/UNIX/<OS>/CAR -xf /<CD-DIR>/UNIX/<OS>/SAPEXE.CAR \
 memlimits**

b. Start `memlimits`.

- For a 32-bit SAP Kernel, enter: **./memlimits**

- For a 64-bit SAP Kernel, enter: **./memlimits -l 20000**

c. If error messages occur, increase your paging space and rerun `memlimits` until it is
error free.

11.7 Solaris: File Systems, Raw Devices, Swap Space

## 11.7.3 Solaris: Creating File Systems

### Creating File Systems on Hard Disk Partitions

1. Look for already configured and mounted file systems using the command:
   `df -k`

2. Look for the physical available disks and partitions using the `format` or
   `/usr/sbin/prtvtoc <rawdevice>` utility.

3. Verify that the partition is unused.

4. Create new file systems using the command `newfs`:

   Oracle (sapdata file systems):
   : `newfs -i  20000  -m  1  -b 8192  -f  8192  <rawdevice>`

   Standard SAP file systems:
   : `newfs <rawdevice>`

   

   ```
   newfs /dev/rdsk/<diskdevice>
   ```
   The disk naming convention is based on logical (not physical) device names. To
   specify a slice (partition) on a disk with a bus controller (SCSI), use a device
   name `<diskdevice>` with these conventions:
   **c<w>t<x>d<y>s<z>**

   Key:
   **<w>**　　　　logical controller number
   **<x>**　　　　physical bus target number (for example, SCSI-ID)
   **<y>**　　　　drive number
   **<z>**　　　　slice (partition) 0-7

### Mounting File Systems

Create directories (`mkdir`) and mount the file systems using the command:
`mount <blockdevice> <mountdir>`

To make the file systems available automatically each time the system boots, add an entry to the
`/etc/vfstab` file:

- If you do **not** use `Solstice DiskSuite`, add the following entry:

  ```
  /dev/dsk/<diskdevice> /dev/rdsk/<diskdevice> \
      <mountdir> ufs <fsck pass#> yes -
  ```

  where `<fsck pass#>` is a number greater than 6.

- If you use `Solstice DiskSuite`, add the following entry:

  ```
  /dev/md/dsk/<metadevice> /dev/md/rdsk/<metadevice> \
      <mountdir> ufs - no -
  ```

## 11.7.4 Solaris: Accessing Raw Devices

File systems and raw devices differ in the way that data is written to and read from disk:

- **Buffering:** Reads and writes to a file system are buffered in a UNIX system. To be absolutely sure that all data is physically present on a disk, the buffers and files must be synchronized.

  Writes to a raw device are **unbuffered**: the system writes directly to the disk. These writes are faster and more secure.

- **File access:** Accessing files on a UNIX file system is transparent. Accessing data on a raw device is only possible with a special application.

Some databases prefer raw devices. To access these raw devices, you can create symbolic links. The following examples show symbolic link commands:

```
SAP DB: ln -s  <rawdevice>  /sapdb/<SAPSID>/sapdata/DISK01
Informix: ln -s  <rawdevice>   \
          /informix/<SAPSID>/sapdata/physdev1/data1
Oracle: Not necessary
```

**With Solstice DiskSuite :**
```
SAP DB: Not necessary because R3SETUP creates the links
Informix: ln -s /dev/md/rdsk/<metadevice>           \
              /informix/<SAPSID>/sapdata/physdev1/data1
Oracle: Not necessary
```

**With Veritas Volume Manager:**
```
SAP DB: Not necessary because R3SETUP creates the links
Informix: ln -s /dev/vx/rdsk/<volumegroup>/<volumename>   \
              /informix/<SAPSID>/sapdata/physdev1/data1
Oracle: Not necessary
```

# 12. Mounting Directories via NFS

## Purpose

To be able to access directories via Network File System (NFS), some operating systems require tasks to mount these directories. These tasks are listed in the following sections.

## Process Flow

If there is an instruction in the documentation *R/3 Installation on UNIX* to mount a directory via NFS:

1. See the corresponding section for your operating system and perform the necessary actions listed there, perform the following steps:

   − AIX [page 203]

   − Compaq [page 205]

   − HP-UX [page 206]

   − Linux [page 208]

   − ReliantUNIX [page 208]

   − Solaris [page 210]

   If there is no section for your operating system, you can proceed with the next step in the installation documentation.

2. When you have finished, continue with the next step in the installation documentation.

# 12.1 AIX: Mounting Directories via NFS

## Use

There are two ways of mounting directories via NFS:

- Manually

- Using SMIT

## Procedure

**Mounting Directories via NFS using SMIT**

To mount directories via NFS from the host on which the central instance runs:

1. Log on as user `root`.

2. Use SMIT to start NFS services at the host on which the central instance runs:

    a. Enter the command `smitty`.

    b. Select:

    *Communications Applications and Services → NFS →*
    *Network File System (NFS) → Configure NFS on this System → Start NFS*

    c. In the line *Start NFS now*, *on system restart or both*, enter:
    `both`.

    d. Press ENTER.

3. Export the directory (for example `/sapmnt/<SAPSID>/exe`) with read or read-write access for the host on which the additional instance runs:

    a. Enter the command `smitty`.

    b. Select:

    *Communications Applications and Services → NFS →*
    *Network File System (NFS) → Add a Directory to Exports List*

    c. Enter the path of the directory which you want to export (for example,
    `/sapmnt/<SAPSID>/exe`).

    d. Choose export mode (use read-write or read-only as required by SAP).

    In the line *HOSTS allowed root access,* enter the name of the host on which the additional instance runs. For security reasons, this root access should be disabled after the installation.

    e. In the line *Export directory now, system restart or both*, enter:

    `both`

    f. Press ENTER.

4. Create the mount point at the host on which the additional instance runs:
    `/usr/bin/mkdir /sapmnt/<SAPSID>/exe`

5. Mount the directory on the host on which the additional instance runs

12.1 AIX: Mounting Directories via NFS

      a.   Enter the command `smitty`.

      b.   Select:

          *Communications Applications and Services* → *NFS* →
          *Network File System (NFS)* → *Add a File System for Mounting*

      c.   Enter the path name of the mount point.

      d.   Enter the path name of the remote directory (the directory of the central instance).

      e.   Enter the host where the remote directory resides.

      f.   Set *Mount now, add entry to /etc/filesystems or both* to `both`.

      g.   Set */etc/filesystems entry will mount the directory on system RESTART* to `yes`.

      h.   Change *Mount file system soft or hard* to `soft` and press ENTER.

6.   If you exported the directory with read-write access, check whether the host on which the future additional instance will run has write access to the directory `/sapmnt/<SAPSID>/exe`:

```
cd /sapmnt/<SAPSID>/exe
touch test (create a file called test)
ls -l test (check if file test is created)
rm test (remove the file test)
```

## Mounting Directories via NFS manually

To mount directories via NFS from the host on which the central instance runs:

1.   Log on as user `root`.

2.   Enter the directories you wish to export into the file `/etc/exports`.

3.   Enter:
```
exportfs -a
```

# 12.2 Compaq: Mounting Directories via NFS

1. Log on as user **root** to the NFS server and proceed as follows (The following assumes that the central instance host is the NFS server):

   a. Make sure that your host is configured as NFS server.  You can set up your host as NFS server with the command:
   **/usr/sbin/nfssetup**

   b. For each directory (being in a local file system) you want to export add a line to the local file /etc/exports.

   ```
   #export /sapcd to host osfsap2
   /sapcd  -ro  osfsap2
   #export this directory read and write to all hosts
   /usr/sap/trans -root=     <nfs_cli_host_1> : ... :
   <nfs_cli_host_n>,
      access=       <nfs_cli_host_1> : ... : <nfs_cli_host_n>
   ```
   (nfs_cli_host_n: hostname of the NFS client where you want to install the SAP instance).
   ```
   #export the directories (set remote root uid = 0)
   /sapmnt/<SAPSID>/profile  -root= <nfs_cli_host_1>: ...
   /sapmnt/<SAPSID>/global   -root= <nfs_cli_host_1>: ...
   ```

   For security reasons, the option
   ```
   -root= <nfs_cli__hostname_1>: ... :<nfs_cli_host_n>
   ```
   should be used during installation only.

2. Log on as user **root** to the host where the file system should be imported:

   a. For each remote file system, add a line to /etc/fstab

   ```
   <nfs_server>:/usr/sap/trans   /usr/sap/trans  nfs rw 1 0
   ```

   b. Mount the file systems with:
   **mount    <nfs_server>:<file_system>    <mount_point>**

   **mount    <nfs_server>:/usr/sap/trans    /usr/sap/trans**

# 12.3 HP-UX: Mounting Directories via NFS

## Use

There are two ways of mounting directories via NFS:

- Manually

- Using SAM

## Procedure

## Mounting Directories via NFS using SAM

**On the host on which the main instance runs, proceed as follows:**

1. Enter the command
   `/usr/sbin/sam`

2. Select

   *Networking and Communications → Networked File Systems →
   → Exported Local File Systems → Actions → Add*

3. Enter the *Local Directory Name*: for example,
   `/sapmnt/CUS`

   Select *Specify UID for unknown user*  and enter at *User ID* the value 0.

   Select *Specify Root User Access* and add the *Remote System Names*.

4. Type OK

5. Exit SAM

**On the host on which the additional instance runs:**

1. Enter the command
   `/usr/sbin/sam`

2. Select

   *Networking and Communications → Networked File Systems →
   Mounted Remote File Systems → Actions → Add Remote File Systems →
   Using NFS*

3. Enter:

   – The *Local Directory Name*

   – The *Remote Server Name* of the host exporting the file system

   – The *Remote Directory Name*

4. Enable the mount *Now* and *On boot.*

5. Specify *Read-Write Access.*

6. Type OK

7. Exit SAM

## Mounting Directories via NFS manually

**On the host on which the main instance runs, proceed as follows:**

1. Add the file system you want to export to the file
   ```
   /etc/exports
   ```

   using the option

   ```
   -root=   <nfs_cli_hostname_1>:...:< nfs_cli_hostname_n>,>
   access=  <nfs_cli_hostname_1>:...:< nfs_cli_hostname_n>
   ```

   

   ```
   /sapmnt/C11/exe    -root=hw5111:hw5115, access=hw5111:hw5115
   ```

   When you encounter problems with your input similar to the example above, try something like:
   ```
   /sapmnt/C11/exe    -anon=y, access=hw5111:hw5115
   ```

   

   > For security reason the option
   > `-root= <nfs_cli__hostname_1>: ... :<nfs_cli_hostname_n>`
   > should be used during installation only.

2. Make the file system available to NFS clients:
   **/usr/sbin/exportfs -a**

**On the host on which the additional instance runs:**

1. Add the remote file system to
   ```
   /etc/fstab
   ```
   e.g. `hwi173:/sapmnt/CUS  /sapmnt/CUS nfs defaults 0 0`

2. Mount the file system, for example, with:
   **mount hwi173:/sapmnt/CUS**

# 12.4 Linux: Exporting Directories via NFS

To export directories via NFS, perform the following steps (the following assumes that the central instance host is the NFS server):

1.  Log on as user **root** to the NFS server.

2.  Make sure that your host is configured as NFS server by making sure that the output of the command
    **chkconfig --list nfs**

    looks like:
    ```
    nfs   0:off   1:off   2:off   3:on   4:on   5:on   6:off
    ```

    You can set up your host as NFS server using the command:
    **/etc/rc.d/init.d/nfs start**

3.  To export a directory from a local file system, use the tool **linuxconf**.

4.  Log on as user **root** to the host where the file system should be imported.

5.  Mount the file systems with:
    **mount    <nfs_server>:<file_system>    <mount_point>**

    

    ```
    mount    <nfs_server>:/usr/sap/trans    /usr/sap/trans
    ```

# 12.5 ReliantUNIX: Mounting Directories via NFS

## Use

If directories are to be accessed from several machines in parallel, mount directories via NFS.

## Procedure

To mount directories via NFS, perform the following steps on the server side and on the client side.

## Server Side

The machine that actually contains the directories is the server. Local NFS resources to be made available for mounting by remote systems must be known to the server. Perform the following steps on the server side:

1.  Enter the following command to display the local resources already accessible to be mounted remotely:
    **/usr/sbin/share**

2.  A local directory can be shared by entering the command:

    ```
    /usr/sbin/share -F nfs -o root=<application server>,      \
       rw=<client side> -d <description> <file system>
    ```

where `<client side>` is the host name of the machine the directory is to be mounted via NFS, `<description>` is a user-defined text to describe the directory and `<file system>` is the name of the directory to be shared.

3. If the directories are to be shared permanently, the share commands can be placed in the description file `/etc/dfs/dfstab` using the syntax described above.  The share commands are executed automatically when the system is entering init state 3.

## Client Side

The machine where the remote resources are mounted via NFS is the client. Perform the following steps on the client side:

1. Enter the following command to make sure the respective directory is shared by the server side:
   `/usr/sbin/showmount -e <server side>`

   All directories already shared by host `<server side>` are displayed.

2. Mount the directory from the server side via NFS:
   `/sbin/mount -F nfs <server side>:<pathname>  <newpathname>`

   where `<server side>` is the host name of the machine that actually contains the resource, `<pathname>` is the path name of the resource on the server side, and `<newpathname>` is the path name of the mount on the client side.

3. If the directories are to be mounted permanently, the mount descriptions can be placed in the file `/etc/vfstab` in the following form:
   ```
   <server side>:<pathname> - <newpathname> nfs - yes -
   ```



> The directory `/usr/sap/trans` residing on host `host1` is to be mounted on `host2` via NFS
> .
> *Server Side (host1):*
> > Command:
> > `/usr/sbin/share -F nfs -o root=host2,rw=host2 -d"info"  \`
> > `    /usr/sap/trans`
> > and the same command line in `/etc/dfs/dfstab`.
>
> *Client Side (host2):*
> > Command:
> > `/usr/sbin/mount -F nfs host1:/usr/sap/trans  \`
> > `    /usr/sap/trans`
> >
> > and add the line:
> > `host1:/usr/sap/trans - /usr/sap/trans nfs - yes -`
> > into `/etc/vfstab`.

12.6 Solaris: Mounting Directories via NFS

# 12.6 Solaris: Mounting Directories via NFS

## Procedure

To mount directories via NFS from the host on which the central instance runs, log on as user **root** and proceed as follows:

**On the host on which the main instance runs:**

1. Enter the command:
   **/usr/sbin/share**

2. Edit the file /etc/dfs/dfstab to add file systems shared via NFS:
   **vi /etc/dfs/dfstab**

   Add the following line for each file system, for example:

   **share -F nfs -o root=<nfsclient1>:<nfsclient2>    \\**
   **   -d "description" /usr/sap/trans**

   > ⚠
   >
   > After your SAP System has been installed successfully, in the above line you have to change -o root to -o rw (or remove anon=0, respectively) for all exported directories, for example:
   > share -F nfs -o rw=<nfsclient1>:<nfsclient2>    \\
   >    -d "description" /usr/sap/trans

3. If the /etc/dfs/dfstab was empty, the NFS server is not active.

   Start the NFS server with the command:
   **/etc/init.d/nfs.server start**

4. To see if the NFS server is active and which partitions are mountable, enter the command:
   **showmount -e <NFS-server>**


**On the host on which the additional instance runs:**

1. If you are mounting NFS disks for the first time, the NFS client software is not active.

   Start the NFS client software with the command:
   **/etc/init.d/nfs.client start**

2. Edit the file /etc/vfstab to mount the directory:
   **vi /etc/vfstab**

   Add the following line for each file system, for example:
   **db_server:/usr/sap/trans - /usr/sap/trans nfs - yes -**

   If the mount point exists, mount /usr/sap/trans, for example, with the command:
   **mount /usr/sap/trans**

# 13. Creating UNIX Groups and Users

## Purpose

For the installation and the operating, certain UNIX groups and users have to exist. The necessary tasks to create these groups and users are listed in the following sections.

## Process Flow

If there is an instruction in the documentation *R/3 Installation on UNIX* to create UNIX groups or users, perform the following steps:

1.  See the corresponding section for your operating system and perform the necessary actions listed there.

    –   AIX [page 211]

    –   Compaq [page 213]

    –   HP-UX [page 214]

    –   Linux [page 214]

    –   ReliantUNIX [page 215]

    –   SEQUENT [page 216]

    –   Solaris [page 216]

    If there is no section for your operating system, you can proceed with the next step in the installation documentation.

2.  When you have finished, continue with the next step in the installation documentation.

# 13.1 AIX: Creating UNIX Groups and Users

## Prerequisites

⚠

Informix :
Due to operating system functions, it is possible that the group `super_archive` is not inserted correctly in the `/etc/group` file. Check whether the group name was truncated to `super_` here and change it to `super_archive`.

## Procedure

For the users and groups created by R3SETUP, see the appropriate section.

13.1 AIX: Creating UNIX Groups and Users

**Creating UNIX Groups and Users**

Use SMIT to create UNIX groups and users:

1. Create groups:

    a. Enter the command `smitty`.

    b. Select:

    *Security & Users → Groups → Add a Group*

    c. Enter a group name, for example, `sapsys`.

    Set *administration group* to `true`.

    d. Press `F3` until the *Security & Users* menu appears.

2. Create users:

    a. Select *Security & Users → Users → Add a User*

    b. Enter a user name, for example `<sapsid>adm`.

    c. Enter all necessary values.

3. Set the initial password using the following command:
    `passwd <user>`



For example, `passwd <sapsid>adm`

**Checking Created Users**

Check, as `root`, all existing users. To do this:

1. Enter the command `smitty`.

2. Select:

    *Security & Users → Users → Change/Show Characteristics of a User*

3. Press F4 to get a list of users.

4. For user `root` and each created user `<user>`:

    a. Select `<user>`.

    b. Change field *Soft CPU time* to `-1`.

    c. Change field *Soft CORE file size* to `100000`.

    d. Change field *Soft FILE size* to `4194302`.

    e. Change field *Soft DATA segment* to `262144` (32-bit SAP Kernel) or `4194302` (64-bit SAP Kernel).

    f. Change field *Soft STACK size* to `512000`.

g.  Change field *Hard CPU time* to `-1`.

h.  Change field *Hard CORE file size* to `100000`.

i.  Change field *Hard FILE size* to `4194302`.

j.  Change field *Hard DATA segment* to `524288`.

k.  Change field *Hard STACK size* to `512000`.

■●≫

AIX on RS6000 SP only
For user `root`, change fields *Soft DATA segment* and *Hard DATA segment*
to `-1`.

**Checking the Operating System**

1.  Enter the command `smitty`.

2.  Select:

    *System Environments* → *Change/Show Characteristics of Operating System*

3.  Change *Maximum number of PROCESSES allowed per user* to `500`.

4.  Press `F10` to exit SMIT.

# 13.2 Compaq: Creating UNIX Groups and Users

The following table contains commands for creating and administering UNIX groups and users.

**Commands for Creating and Administering UNIX Groups and Users**

| Action | Command |
|---|---|
| Creating UNIX groups | addgroup |
| Creating UNIX users | adduser |
| Modifying UNIX users | vipw |
| Deleting UNIX users | userdel |

▶▌

If home directory `/usr/sap/C11` is chosen, **`adduser`** creates the home
directory `/usr/sap/C11/c11adm`
You cannot force adduser to use `/usr/sap/C11` as the home directory for the
user **`c11adm`**. You must edit `/etc/passwd` and correct the entry of the home
directory to `/usr/sap/C11`. See the man pages of `passwd` to find out the
structure of `passwd`-entries.

# 13.3 HP-UX: Creating UNIX Groups and Users

■●➢

> For the users and groups created by R3SETUP, see Network Information Service Environment [page 144].

Use SAM to create UNIX groups and users:

1.  Enter the command
    `/usr/sbin/sam`

2.  Select:

    *Accounts for Users and Groups → Local Users → Actions → Add*

3.  Enter the required users.

4.  Select:

    *Accounts for Users and Groups → Groups → Actions → Add*

5.  Enter the required groups.

6.  Exit SAM.

7.  Verify that TZ settings in the following are consistent:

    ```
    /etc/TIMEZONE
    /etc/profile
    /etc/csh.login
    ```

# 13.4 Linux: Creating Linux Groups and Users

For the users and groups created by R3SETUP see Network Information Service Environment [page 144].

You can administer UNIX users with the graphical tool `userconf` or with the following commands:

*   Create UNIX groups with `groupadd`.

*   Create UNIX users with `useradd`.

*   Modify UNIX users with `usermod`.

*   Delete UNIX users with `userdel`.

# 13.5 ReliantUNIX: Creating UNIX Groups and Users

## Use

Groups and users can either be created manually using the shell commands `useradd` and `groupadd` or using the tool `sysadm`.

## Procedure

■●⇒

For the users and groups created by R3SETUP see <u>Network Information Service Environment [page 144]</u>.

■●⇒

Informix only:
Due to operating system functions, it is possible that the group `super_archive` is not inserted correctly in the `/etc/group` file.
Please check whether the group name was truncated to `super_` here and change it to `super_archive`.

⚠️

Add the user **root** to group `dba` manually (entry in `/etc/group`).

**Manual Creation of UNIX Groups and Users**

Use the following commands to create groups and users:

```
groupadd  <new_group>

useradd -g <login_group> -d <home_directory> \
        -s <login_shell>  <new_user>
```

To delete a user, enter the command:
```
userdel -r <user>
```

**Creation of UNIX Groups and Users using sysadm**

1. Enter the command `sysadm`.

2. Select *users → add user/group*.

3. Fill in the form and save your changes*.

# 13.6 SEQUENT: Creating UNIX Groups and Users

Groups and users can be created manually using the ptx/Admin tool **menu**.

■●≫

> For the users and groups created by R3SETUP see Network Information Service Environment [page 144].

# 13.7 Solaris: Creating UNIX Groups and Users

## Use

Groups and users can be created manually using the shell commands **useradd** and **groupadd**. If you run a graphical user interface, you can use the **admintool**.

## Procedure

■●≫

> For the users and groups created by R3SETUP, see Network Information Service Environment [page 144].

■●≫

> Informix only:
> Due to operating system functions, it is possible that the group super_archive is not inserted correctly in the /etc/group file.
> Check whether the group name was truncated to super_ here and change it to super_archive after creation of all the SAP System users.

⚠

> User **root** cannot be added to group dba using **groupadd**. You have to use the **admintool** for this entry.

1. Use groupadd and useradd according to the following syntax:

   ```
   groupadd <new group>

   useradd -g <login group> -d <homedirectory> \
      -s <login shell>  <new user>
   ```

2.  Check the following values for the users:

   − In `csh` call **`limit`**

     Output:

     ```
     cputime                      unlimited
     filesize                     unlimited
     datasize                     2097148 kbytes     (<-- important)
     stacksize                    8192 kbytes
     coredumpsize                 unlimited
     descriptors                  1024
     memorysize                   unlimited          (<-- important)
     ```

   − In `sh` or `ksh` call **`ulimit -a`**

     Output:

     ```
     time(seconds)                unlimited
     file(blocks)                 unlimited
     data(kbytes)                 2097148            (<-- important)
     stack(kbytes)                8192
     coredump(blocks)             unlimited
     nofiles(descriptors)         1024
     memory(KBytes)               unlimited          (<-- important)
     ```

3.  If your parameter settings differ from the settings above, change these values accordingly.

   

   > If you have to change the value for `descriptors` to `1024`, proceed as follows:
   > 1.  Add the following line to the `.cshrc` file after the line containing `case Sun*`:
   >     **`limit descriptors 1024`**
   > 2.  Add the following line to the `.profile` file after the line containing `Sun*)` :
   >     **`ulimit -n 1024`**

# 14. Operating System Dependent Troubleshooting

## Purpose

The following sections contain operating system dependent information for troubleshooting.

## Process Flow

If there is an instruction in the documentation *R/3 Installation on UNIX* to consult the operating system dependent troubleshooting section, perform the following steps:

1.  See the corresponding section for your operating system and perform the necessary actions listed there.

    If there is no section for your operating system, you can proceed with the next step in the installation documentation.

2.  When you have finished, continue with the next step in the installation documentation.

## 14.1 AIX: Troubleshooting

If you suspect that hardware problems are the reason for errors in your installation, analyze the system log. To do this, enter the command:
```
errpt -a │ more
```

## 14.2 Compaq: Troubleshooting

If you suspect that hardware problems are the reason for errors in your installation, analyze the system log. To do this, enter the command:
```
/usr/sbin/uerf  -R  │  more
```

# 14.3 HP-UX: Troubleshooting

If you suspect that hardware problems are the reason for errors in your installation, analyze the system log and perform the following steps:

1. Check your console system messages are printed here.

2. Check the output of the command
   **/usr/sbin/dmesg**

   The output is listed in /var/adm/messages.

# 14.4 ReliantUNIX: Troubleshooting

If you suspect that hardware problems are the reason for errors in your installation, analyze the system.

To do this, enter the command:
**more  /var/adm/log/messages**

# 14.5 SEQUENT: Troubleshooting

If you suspect that hardware problems are the reason for errors in your installation, analyze the system log and perform the following steps:

1. Check your console. System messages are printed here.

2. Check the last lines of the system messages file:
   **tail /usr/adm/messages**

# 14.6 Solaris: Troubleshooting

If you suspect that hardware problems are the reason for errors in your installation, analyze the system. To do this, use the following commands:

**dmesg    |    more**
**more  /usr/adm/messages**

# 15. Heterogeneous SAP System Installation

## Use

This documentation describes how to install SAP instances in a heterogeneous UNIX environment, that is, instances running on different UNIX platforms.

> ■●⇒
>
> This section does **not** apply to installations of SAP instances in a mixed UNIX / Windows NT environment. See the documentation *R/3 Installation on Windows NT* for more information.

## Procedure

### General Procedure

To install an additional dialog instance within a heterogeneous environment:

1.  Install the central instance and the database as described in the documentation *R/3 Installation on UNIX*.

2.  Export the directories `<sapmnt>/<SAPSID>/global` and `<sapmnt>/<SAPSID>/profile` via NFS on the central instance host and mount them on each dialog instance host.

3.  On the dialog instance host, the executables appropriate for the hardware must be available in the directory `<sapmnt>/<SAPSID>/exe`.

There are two ways to install the executables:

*   Shared software installation:

    The executables are installed in a differently named directory on the server and mounted via NFS.

    **Advantages:**

    – Central software management

    – Easier upgrading and maintenance of SAP software

    **Disadvantages:**

    – Greater load on the network

    – Local software installation

    – The executables are located on a local disk on the application servers

*   Local Software Installation

    **Advantage:**

    – Less network load (WAN networks)

    **Disadvantage:**

    – More work to upgrade the SAP software in a consistent manner

## Shared Software Installation

As part of the standard installation procedure, the correct executables for the central instance are installed automatically in `<sapmnt>/exe` on the central instance.

The executables of dialog instance hosts on different platforms to the central instance hosts are installed in different hardware-dependent directories:
`<sapmnt>/<platform>/exe`

Possible values for `<platform>` are:

```
HP
DG
DEC
IBM
SNI
SUN
```

The directories `<sapmnt>/<platform>/exe` are exported on the central instance host and mounted on the corresponding dialog instance host as `<sapmnt>/exe`.

The graphic below shows an example with an HP machine as a central instance and with HP or IBM machines as dialog instance hosts.

1. Log on as **`<sapsid>adm`** on the central system.

2. Create the directory `<sapmnt>/<platform>/exe` and NFS export the directory read-write.

3. Log on as **`root`** on the heterogeneous dialog instance host.

4. Create `<sapmnt>/exe` as a NFS mount to the above created directory.

5. Create `<sapmnt>/profile` and `<sapmnt>/global` as a NFS mount described earlier.

6. Mount the CD drive (via NFS) and insert the CD with the SAP executables.

7. Install the dialog instance.

   – During the installation of the first dialog instance of this platform, R3SETUP must be forced to copy the correct executables from CD-ROM to the directory `<sapmnt>/exe` (which is `<sapmnt>/<platform>/exe` on the central instance host).

   – In the command file for R3SETUP, specify the key `EXTRACT_ON_NFS=YES` in the steps that extract `SAPEXE.CAR` and `SAPEXEDB.CAR`. (When installing additional dialog instances of this platform, do not specify this key.)
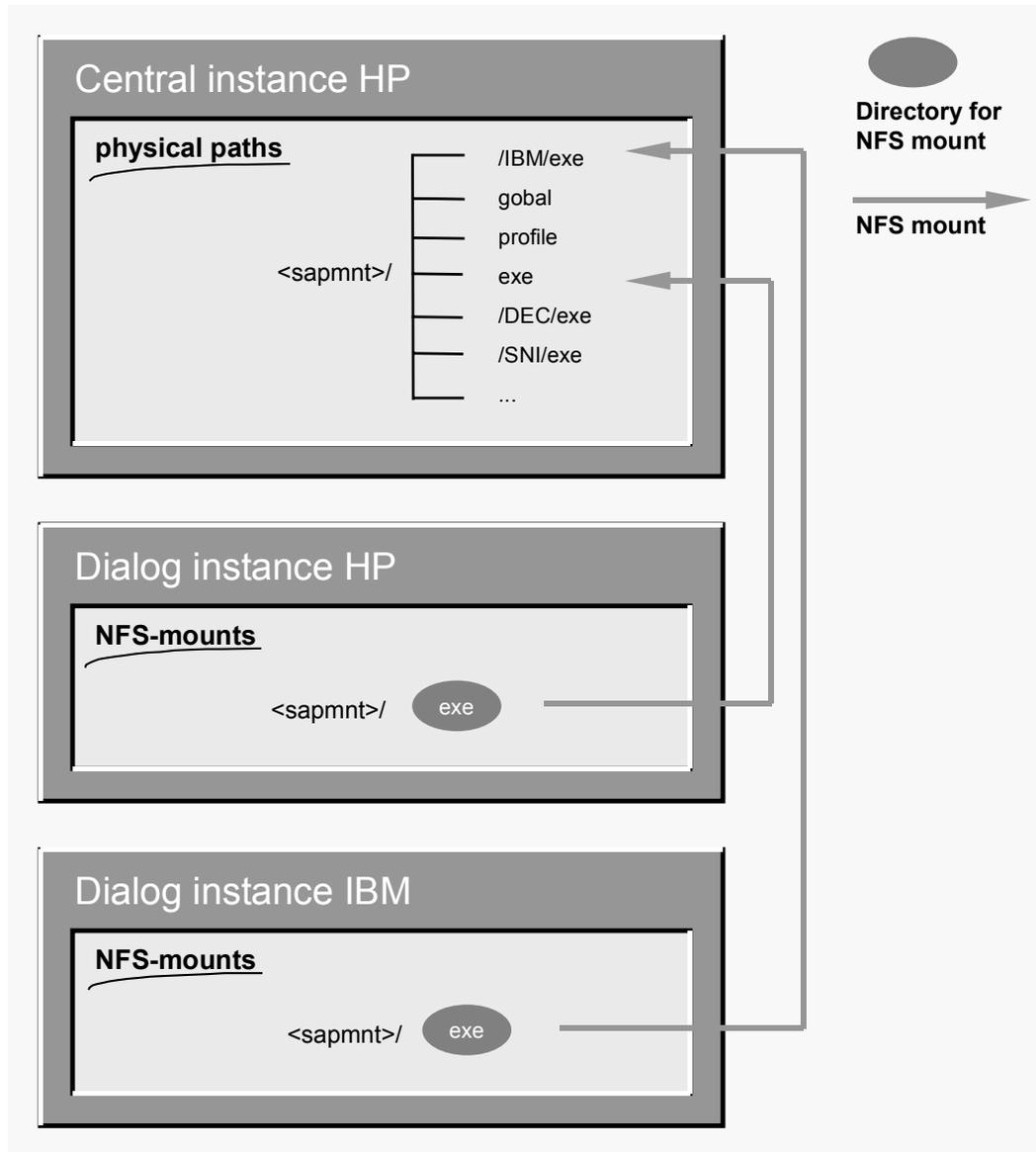
**SAP Software in Heterogeneous Networks**

## Local Software Installation

If you decide to store the SAP executables locally, proceed as follows:

1. Log on as user **root** on the dialog instance.

2. Create `<sapmnt>/exe` as a local directory.

3. Create `<sapmnt>/profile` and `<sapmnt>/global` as a NFS mount as described in section *Mounting directories via NFS*.

4. Mount the CD drive (via NFS) and insert the CD with the SAP executables.

5. Install the dialog instance.