

# SAP Upgrade Guide

**Simplifying Your Upgrade**



**SAP Labs, Inc.**

Palo Alto, California

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## Overview

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### Note

The term 'mySAP Technology' encompasses SAP Basis and other technologies.

Customers sometimes approach an upgrade with fear or apprehension. Usually, they do not know what the SAP upgrade is and what it entails. But an upgrade is not something to fear.

The goal of this document is to demystify the upgrade process. This document also points out the various resources available to you concerning your upgrade.

For this document to be database-, operating-system-, and release-independent, we do not repeat instructions from the various referenced documents and manuals. Think of this document as a compilation of various tips, tricks, and explanations to help make your upgrade easier.

## You Can Perform the Upgrade Yourself

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SAP intends that you (the customer) be able to perform an upgrade by yourself.

While upgrading SAP components is not as simple as entering `upgrade.exe` and having the rest of the process run automatically, it is not a complex problem. However, upgrading SAP components can be an involved project.

If you have an adequate number of experienced mySAP Technology and functional/business process team members, you should be able to perform the upgrade with little or no external help. **Be realistic.** If you do not have the proper staff to do an upgrade yourself, get the assistance of your consulting partner. In any case, you should have your consulting partner on-call if any problems arise.

## Key Success Factors

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A few key success factors to performing an upgrade successfully are:

- Discipline
- Planning
- Teamwork

## Discipline

You must have the discipline to plan the upgrade and follow the plan.

Your solutions can still be creative, but you must be methodical about what you do and how you do it. If you deviate from the plan to fix a problem without documenting it, you may not be able to duplicate that deviation on other upgrades. Conversely, if you deviate from the plan, you may create a problem. The upgrade could even fail because you did not perform the procedures correctly.

Unfortunately, a number of people do upgrades (and other tasks) without the required discipline. As a result, problems occur that otherwise should not.

## Planning

Do not expect to open the upgrade kit and immediately begin the upgrade without proper planning.

A plan is a road map. It tells you where you are going and how to get there.

You must be able to reliably duplicate the upgrade for each of your systems. The only way to duplicate an upgrade is to follow a plan. If you do not have a plan documented, your ability to reliably repeat the process for each system decreases. If you cannot repeat the upgrade identically on each system, the end result may be a failed upgrade.

Thus, discipline and planning are interrelated.

## Teamwork

An upgrade is not just a mySAP Technology task. The next section, “The Upgrade Team,” shows that the upgrade requires many different groups to succeed. Each group must do their part in the upgrade for it to be successful.

## The Upgrade Team

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An upgrade is more than just an SAP Basis or mySAP Technology task. In fact, in many cases, that portion of the upgrade is smaller than the other portions. The upgrade team is made up of many different groups, all of them important.

The upgrade team includes:

- mySAP Technology staff (formerly know as SAP Basis staff)
- Functional / business process staff
- User owners / key users

- Training staff
- IT (network, servers, desktop, and so on)
- Your network of contacts and peers
- Partners or consultants
- SAP
  - Your sales contact:
  - SAP Sales for direct customers
  - CBS provider for VAR customers
  - SAP local support

The groupings that we describe are logical groups by task or function. In a small organization, the same person may perform several roles that fall into many of the described groups. In a large organization, just the opposite may happen, where many individuals or departments may fall into a single group. We have a group for partners or consultants. In fact, they could be providing you with staff for many of the other groups such as mySAP Technology team, Basis, functional/business process team, and IT.

## mySAP Technology Staff

**Who They Are.** Your mySAP Technology staff consists of the technical team members familiar with the SAP systems' technical operation and maintenance.

**What They Do.** The mySAP Technology staff performs the technical upgrade of the system. They also assist the functional / business process team to resolve object conflicts caused by modifications that have been made by customers.

### Note

As of SAP Basis release 4.6C, the term Basis has been superseded by and is a subset of mySAP Technology.

The mySAP Technology staff assist the functional / business process team and cannot make the decisions about modification adjustments. Technical staff usually do not have the functional area knowledge to properly determine the modification adjustment. Even if your technical team has the functional knowledge, the functional team member should make the decision.

### Example

We do not expect the technical team member to understand pricing procedures in the Sales and Distribution (SD) component or cost allocations in the Controlling (CO) component.

## Functional / Business Process Team

**Who They Are.** The functional / business process team consists of team members who are responsible and familiar with the various SAP components, such as FI-Finance, and SD-Sales and Distribution. The team members are normally from the various functional departments (for example, accounting and shipping). Members of the mySAP Technology team specializing in various functional areas (such as an FI programmer) supplement the members of the functional team.

**What They Do.** The functional / business process team provides functional area knowledge to properly test the upgrade and make business process changes where required.

The functional / business process team performs the following tasks:

- Regression testing to ensure that the business processes still work properly after the upgrade.
- Modification adjustment. Resolve changes made to SAP objects (such as programs and tables) that conflict with new updates as a part of the upgrade.
- Business process reengineering. If the upgrade has affected the business process, the business process may have to be changed to accommodate the change. A functional team member works with the various user departments to make these changes.
- Assist the training staff in updating the training and documentation for the new release.

## User Owners / Key Users

**Who They Are.** The user owners are the representatives of the various user organizations or departments, such as accounting, sales and order processing, and shipping.

**What They Do.** They are responsible for verifying that the system works as it should for the end user. They perform quality assurance testing and validation.

## Training Staff

### Example

In SAP R/3 4.6, many transactions differ significantly from prior releases, such that users may need additional training. For example, in Release 4.6, many transactions use a tab-based scheme instead of the sequence of screens used in prior releases. Therefore, the screens look and behave differently.

**Who They Are.** The training staff trains the end users and maintains the specific user documentation.

**What They Do.** If processes and screens have changed in the target SAP release, training documents and training programs will require revision. Such changes probably also require the retraining of users.

The revising of the training documents and procedures should be done **jointly** with the functional / business process team members.

## Your IT Organization

**Who They Are.** The IT organization is known by various names, such as IT, MIS, DP, computer operations, network, and telecommunications.

**What They Do.** The IT organization supports the hardware, operating system, network, and the users' desktops and mobile computers.

The IT organization runs the necessary backups, upgrades the non-SAP software on the servers (such as the operating system and database), and upgrades the frontend or GUI on the users computer. If hardware needs to be upgraded, the IT organization also performs the hardware upgrade.

## Your Network of Contacts

**Who They Are.** Your network of contacts includes other SAP customers and consultants that you have met (in classes, customer functions, and during SAP functions) with whom you have built a professional relationship.

Your best resource is a customer who has done exactly what you will be doing on the same operating system, database, and SAP component release.

**What They Do.** Your contacts can provide guidance and advice about the upgrade, problems to watch out for, and possible solutions. They could also use their own network of contacts to provide you with access to even more assistance.

Your own network can provide you with good information at less cost than a consultant. If a contact has just performed an upgrade, the information is still fresh in their minds and they can provide valuable advice.

## Partners or Consultants

**Who They Are.** The partners or consultants are your implementation partners. You may also rely on outside consultants if you have released your implementation partner.

Depending on your arrangement, SAP may be your consulting partner.

**What They Do.** Partners or consultants provide the project planning guidance on performing an upgrade. They also provide the detailed technical and functional knowledge required to perform an upgrade.

If you have the staff to perform the upgrade, the partners can provide the training, guidance, and advice for a smooth upgrade.

If you do not have the technical or functional staff to perform the upgrade, the partners can provide consulting personnel to perform the required functions.

A good partner assists you in planning the upgrade and helps you through any problems faster than if you were to do it yourself.

Have them teach and assist you with the first upgrade (see “Learning Upgrade” on page 19) and then be on-call to assist you during the upgrade of the remaining systems.

Furthermore, partners and consultants know where problems are likely to occur and have benefitted from the experience of upgrading other customers.

With a partner, you are buying expertise. The partner should add value to the upgrade and not merely be another body on the upgrade team.



Have your partner teach you to perform the upgrade, so you can do most of it yourself. Learning from partners or consultants saves a significant amount of money and increases your knowledge of the system.

## SAP

**What They Do.** As part of SAP’s support to the customer, we ask that you advise us as to when you are performing an upgrade of your production system. Problems related to the upgrade can be treated with greater urgency.

SAP customer support provides various upgrade services, some included as part of your annual maintenance fees, whereas others are billable.

### Note

See SAP Note *30068* to register the upgrade of your production system with the support group.

## CBS Provider for VAR customers

**Who They Are.** For US customers with revenue under \$500 million, the sales and initial service contacts occurs through a VAR, a Certified Business Solution (CBS) provider.

**What They Do.** For CBS customers, trouble calls and messages are routed to and handled by the CBS providers. They are your first line of contact for any problems.

## SAP Support

### Note

SAP Support is not a consulting organization. If your problem is viewed to be a consulting question, rather than an SAP problem or error, you will be referred to your consulting partner.

**Who They Are.** SAP Support is the same organization formerly known as the SAP hotline.

**What They Do.** SAP Support provides assistance to customers for SAP-related problems or bugs.

If, during your upgrade, you run into an SAP problem you cannot solve, SAP Support is available to provide assistance. If you notified them that you are performing an upgrade of your production system, your problem messages will have increased priority.

## Key Planning Documents

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During planning for an upgrade, you must gather and prepare all materials, including the:

- ASAP Upgrade Roadmap
- Upgrade manuals
- Upgrade script

The following graphic illustrates how these three items relate to each other.



## ASAP for Upgrade Roadmap

### Note

With all SAP customers, the various materials from SAP are delivered to a specific person. In many cases, the person receiving the materials is not the mySAP technology manager or the SAP project manager. Sometimes, packages are lost or are opened and material lost.

If the *ASAP for Upgrade Roadmap* is not in the upgrade package, either:

- Contact your SAP account representative
- Contact your VAR or CBS provider
- Order the *ASAP for Upgrade Roadmap* from SAPShop

We also recommend that your internal personnel be instructed on what to do when SAP material is received, and to whom the different material should be routed.

**What Is It.** The *ASAP for Upgrade Roadmap* is a generic project plan, developed by SAP for performing upgrades. Like the rest of ASAP, this roadmap is a general tool and must be tailored for your environment.

**When.** The *ASAP for Upgrade Roadmap* should be obtained as soon as possible so that you can begin the planning process.

Good planning takes much more time than most people realize. Planning should be done at a high level using the *ASAP for Upgrade Roadmap*.

**Where is it.** The *ASAP for Upgrade Roadmap* is included in the upgrade kit, up to SAP R/3 4.6C. For example, in the 4.6C upgrade, the CD labeled *R/3 Upgrade 4.6C*, contains the *ASAP for Upgrade*. The CD can also be ordered separately from SAP Shop (at <http://www.sap.com/shop>). In SAP Shop, do a search on the word **upgrade** to find the CDs.

The upgrade kit and the ValueSAP CD should be ordered as soon as possible so you can have the CDs and begin the planning process.

**Why.** If you have not previously performed an SAP upgrade (and even if you have), the tasks in the *ASAP for Upgrade Roadmap* should be reviewed. There may be tasks of which you are unaware or have forgotten.

**How to Use ASAP for Upgrade Roadmap .** The *ASAP for Upgrade Roadmap* is a general tool that must be tailored for your environment. Using the *ASAP Upgrade Roadmap* as a template, you then make your own upgrade plan.

Evaluate the various tasks and determine if they apply to your environment. There may be tasks that do not apply and can be deleted. There may be tasks that need to be expanded or added.

When you finish, you will have an upgrade plan tailored for your installation.

### Note

As of this printing, the latest version of the ASAP for Upgrade Methodology can be found on the Value SAP Edition 2 CD, material number 500-40-910. This CD is available online in the SAPShop also.

## Upgrade Manual

**What It Is.** The upgrade manual contains details for the specific tasks to be performed.



If something in the manual does not apply, such as a section for a different database, cross the section out to avoid confusion. For example, if you are running on DB2, cross out the sections for the other databases.

**Locating the Upgrade Manual .** On older releases, the upgrade manual was a printed manual included in the upgrade package. On current SAP R/3 releases, the upgrade manual is on the *R/3 Upgrade <release>* CD (for example, *R/3 Upgrade 4.6C*).

The current upgrade manuals are also available for download from SAP Service Marketplace at the following URL:

<http://service.sap.com/instguides>

**How to Use the Manual.** The upgrade manual should be used in conjunction with the *ASAP for Upgrade Roadmap* and your own upgrade plan to organize the upgrade and to write the upgrade script (described in the next section). An important thing to look for in the upgrade manual is various prerequisites. For example, the database must be SQL Server 7 with Service Pack 1.



Caution

#### Note

Beginning with SAP Basis 6.10, the upgrade manual will contain a chronological checklist with links to all documentation necessary for the specific task.

The upgrade manual is organized by subject, not chronologically. Therefore, some tasks discussed later in the manual must be performed earlier than tasks appearing earlier in the manual. Furthermore, because of this organization, you cannot simply open the manual and begin the upgrade. You need an upgrade script.

A printed manual can only be organized one way. Each way of organizing has its advantages and disadvantages. If organized chronologically, for example, tasks for a specific subject or person could be scattered throughout the manual.

## Upgrade Script

**What It Is .** Unlike the upgrade manual, the **upgrade script** is a chronological task list that tailors the processes and tasks in the *ASAP for Upgrade Roadmap* and upgrade manuals to your specific installation.

The upgrade script contains detailed tasks for each person.

**Why It Is Needed.** You create and maintain an upgrade script to:

- Organize everything to be done
- Document every task and role so that no steps are omitted and no roles forgotten

Having an upgrade script reduces the danger of making a mistake caused by late-night exhaustion. When upgrading the system at 2 AM, if you can follow a script to complete the process, you can rely less on your memory.

Even if it is not 2 AM when you upgrade the production system (PRD), you still might face difficulties remembering whether you performed a step on PRD or on one of the prior servers (test server, DEV, QAS, sandbox, or training server). Using an upgrade script as a checklist allows you follow and record when you complete each step of the process.

- Repeat the upgrade process identically on each system.



If you do not have an upgrade script, you may forget an important step. Consequently, the upgrade process could be damaged, which would require that the database be restored from backup .

By the time you perform the upgrade on the production system, everything must have been performed at least once in practice. Rehearsing the upgrade can only be accomplished using detailed scripts that can be followed and duplicated. The key word is *duplicated*. **Everything** to be done must be written in the detailed script in the proper order.

For information on how to construct a sample script, see “Bibliography” on page 40. The upgrade checklist in the upgrade manual will help you to list the tasks in their chronological order.

**How to Use an Upgrade Script.** You need to create an upgrade script with detailed tasks for each person.

Unlike the upgrade manual, the upgrade script is a chronological task list that tailors the processes and tasks in the manual that are specific to your installation. Some examples of processes requiring customer-specific tailoring include:

- Databases
- User IDs
- Passwords
- Drive letters
- Directories
- Files

Assign tasks in the script. You need to identify decision points (including who makes the key decisions) and actions for *go/no-go*.

Each task should have a completion indicator, so you can mark that the task is complete. A date and time when the task is started and completed could also be helpful.

Everything done during the upgrade should be on the upgrade script. Conversely nothing should be done that is not on the script. This ensures that the upgrade is duplicated reliably on each system.

## Relevant SAP Notes from SAPNet



SAP Notes can be critical.  
Your upgrade may fail if a  
critical note is not applied.

Before you complete your upgrade script, gather all relevant SAP Notes from SAP Service Marketplace at <http://service.sap.com/notes> or from SAPNet-R/3 through transaction OSS1. The SAP Notes advise you of problems and issues. In most cases, the notes can provide solutions to those problems. The longer the target release has been out, the more problems have likely been found and solved.



SAP Notes can reference other SAP Notes, so you may have to follow a trail of notes. After locating all relevant notes, you must evaluate how all the notes interact and relate.



Some SAP Notes are continuously updated. You must download the latest notes on a regular basis, before an upgrade is performed.

You should look for several different kinds of notes:

Note Type	Description
Upgrade-specific notes	Upgrade-specific SAP Notes can contain corrections or updates to the upgrade manual. These notes are specific to the target upgrade release and are therefore critical. The main notes are listed in the upgrade manual.
R/3-related notes	R/3-related notes address general problems. The upgrade manual or the upgrade note usually references these notes.
Database notes	Database notes tell the minimum release and patch level on which the upgrade can be performed. These notes also set database parameters for the upgrade.
Operating system notes	Operating system notes also tell the minimum release and patch level on which the upgrade can be performed.

The upgrade manual lists all necessary notes to conduct your upgrade. The General Upgrade note is the most important for your upgrade as it complements the upgrade manual and is continuously updated. It also contains links to other critical notes that you might have to consider during the upgrade.

## Maintaining Documentation

After reading relevant SAP Notes, you should review the following documents:

- ASAP for Upgrade Roadmap (your upgrade plan)
- Upgrade manual (Make corrections if changes from the notes affect your upgrade plan and the upgrade manual.)
- Your upgrade script

Keep the upgrade script updated with changes from the various SAP Notes. Update the script based on what you learn from performing practice upgrades.

## Planning Your Upgrade

We do not intend to duplicate tasks specified in the *ASAP for Upgrade roadmap*. However, certain items and tasks require more discussion, including:

- System downtime
- Long lead-time items

- SAP security changes
- Resolving SAP object conflicts
- Contingency planning

## System Downtime

System downtime is the time that the SAP system is not available to users. The reason for the downtime does not matter—to the users, it is still downtime.

The SAP upgrade itself is only a part of the total downtime required for upgrading your SAP system to a new release.

### When to Perform the Upgrade

An upgrade requires the SAP system to be down and not available to users for a period of time. You need to plan for this downtime according to your business operations. Upgrades should be scheduled on three- or four-day weekends when possible.

For seven-days-a-week operations or others where a 3 or 4-day weekend is not available, downtime is especially difficult to plan for. See the section “Performance Improvement Items” on page 29 for options and ideas to reduce the system downtime.

### Items that Affect the Length of System Downtime

Your total system downtime is not just limited to the time to perform the technical upgrade of the SAP system. Several other related items extend the downtime, sometimes significantly, such as:

- Backups
- Problem resolution
- Testing

**Backups.** Taking your offline backups before and after the upgrade can significantly add to downtime.

#### Example

If it takes three hours to take an offline backup of the system, the system is down for three hours, even before starting the upgrade. The same applies to the post-upgrade backup. Thus, an additional six hours of downtime for taking backups, three hours before and three hours after, must be factored into the plan.

Certain drive systems on the market can be used to significantly reduce backup downtime.

#### Example

If you have a **three-way mirror**, you can break the three-way mirror to take a snapshot and thus have a backup downtime of your R/3 System in minutes rather than hours.

#### Note

These drive systems are not inexpensive solutions.

We discuss different options to reduce backup time in the section “Options to Reduce Backup Time” on page 34.

**Problem Resolution.** Problem resolution often involves the resolving conflicts with SAP objects (see “Modification Adjustment” on page 23). During the learning upgrade, problem resolution takes a significant amount of time. However, with the transports generated as a result of the learning upgrade, this step on subsequent upgrades will be relatively insignificant.

**Testing.** The post-upgrade testing (both regression testing and acceptance testing) also requires the system be unavailable for general usage.

Using Computer-Aided Test Tools (CATTs) or other automated testing aids can significantly reduce the amount of time required for testing. The other advantage in using a CATT is repeatability. The same test can be run on each system. Human error and inconsistency is virtually eliminated.

#### Note

In the SAP R/3 4.6C Online Documentation, information on CATTs can be found by following the menu path: *SAP Library* → *Basis components* → *Computer Aided Test Tools (BC-CAT)*



Caution

CATTs are sensitive to changes in the transaction screen. If the transaction has been changed in the upgrade, the CATT will fail and must be fixed.

This has the fortunate benefit of telling you that the transaction has changed and needs to be reviewed to determine what effect the change has.

## Long Lead-Time Items

Early in the planning of the upgrade, several long lead-time tasks need to be addressed. These include:

- Personnel availability
- Hardware upgrade
- Database upgrade
- Operating system upgrade

## Personnel

**Availability of Personnel.** An obvious but often forgotten item is personnel availability. All key personnel who are involved in the upgrade must confirm that they will be available during key phases of the upgrade process and when the upgrades are planned. It is normally understood that the SAP team personnel will be available, but what is often missed are the various key personnel from the functional organizations.

All key personnel involved in the upgrade must be informed of the upgrade schedule well in advance of the upgrade. If a three or four day weekend is in the upgrade plan, be aware that employees may have already planned vacation during the same period, and quite possibly well in advance of the upgrade plan. The company must either plan for the person not being available, or make compensating arrangements for the employee to change their vacation.

**Avoiding single point failure with personnel .** During the early phase of the upgrade process, a process should be put in place to find, train and have at least two people in each area or task, sufficiently trained and knowledgeable so either can do each other's job. This reduces the risk that the upgrade process will stop if someone is unavailable due to illness, job change, leaving the company, and so on.

## Hardware Upgrades

**What.** When you upgrade your SAP System, your hardware may also need to be upgraded to a configuration with greater resources; number and speed of processors, amount of memory, and amount of disk space.

**Why.** When you upgrade SAP, keep in mind that additional functionality and increased transaction volume may be more than the system was built to handle. You may require additional resources. Check for SAP Notes that describe resource requirements.

A problem with hardware upgrade is that not all the equipment may be available off-the-shelf. If it must be special ordered or if it is in short supply, procurement could take a significant amount of time. In addition, the hardware has to be shipped and installed, which could take several months.

**When.** Since hardware procurement and installation can take a significant amount of time, this must be planned into your upgrade schedule.

If the hardware upgrade will be done on the live system, it needs to be planned and scheduled, as it will result in system down time.

**How.** To simplify the upgrade project management, we recommend that the hardware upgrade should be treated as a separate project, and must be completed before the SAP system can be upgraded.



With the falling cost of high-performance computer equipment, replacing old equipment may be more cost-effective, rather than upgrading older equipment.

For example, an older server with two Pentium® 166MHz processors, 512MB RAM and 4GB hard drives can only house two more 166MHz processors—if you can find the processor expansion kits. You are still processor-speed limited at 166MHz, whereas current servers have 800+MHz quad processors. You may not be able to add any more memory, and thus may be memory bound, whereas newer servers can contain over 2GB of RAM. You can replace the 4GB hard drives with larger drives for a larger database, but you are still limited by the speed of the processors.

In this way the SAP upgrade project manager does not have to also manage the hardware upgrade. The hardware upgrade becomes a task in the SAP upgrade plan. The IT organization would manage the hardware upgrade.

## Database and Operating System Upgrades and Patches

### Note

The ability to make the database and/or operating system upgrade a separate project depends on the specific details. There may be situations where the database and/or operating system upgrade must be done at the same time as the SAP upgrade. This will be specified in the Upgrade Manual or SAP Notes for the specific target SAP release.

**What and Why.** Interdependencies exist between the SAP component, databases, and operating system release levels. For example, SAP R/3 could require the database and operating system to be at a minimum release and patch level. Also, the database upgrade could require that the operating system be upgraded to a minimum release and patch level before it can be upgraded.

**When and How.** If the database and/or the operating system are required to be upgraded, the upgrade should be treated as a separate project that must be completed before the SAP systems can be upgraded.

In this way, the SAP upgrade project manager does not also have to manage the database and operating system upgrade. They simply become tasks in the SAP upgrade plan. The IT organization would manage the database and operating system upgrade.

## SAP Security Changes



The expedient solution of granting the security profiles *SAP\_ALL* and *SAP\_NEW* to all users will circumvent your existing security. At that point there is **NO** security in the system.

A common problem that is overlooked or left to the end of the upgrade process is the changes to SAP security in the target release.

Resolving security changes in the new release, or rebuilding the security with the new tools (such as implementing the *Profile Generator*) takes a significant amount of time. If the security model has changed significantly from what you know, there will also be a steep learning curve.

User security involves **all** functional groups, requiring many people to investigate and resolve any upgrade issues.

## Modification Adjustments of SAP Objects

A potentially major problem is adjusting your modifications to the newly delivered SAP objects. These are changes that you have made to standard SAP objects that are being updated in the upgrade. See “Modification Adjustment” on page 23.

Until you get a listing of modification to be adjusted, estimating the amount of time that it will take to adjust the objects may be difficult or impossible. You would know how many objects have to be adjusted only when you get the listing. Once this list becomes available, in the PREPARE phase, you will be able to evaluate the effort and make adjustments to the upgrade plan and schedule.

If proper documentation standards (see the Appendix on page 40) have not been maintained during development, the amount of time to resolve object conflicts can be enormous. Unfortunately, in many cases, it is when an upgrade is performed that it is discovered how poorly documentation standards were followed, if at all.

## Contingency



Murphy's Law applies to upgrades. *Anything that can go wrong, will go wrong.*

This is especially true on the upgrade of the production system.

Contingency is defined in this case as *what if something goes wrong, what do I do?* Your upgrade should happen without problems, but it is always a good idea to plan for any problems that might occur.

For the upgrade, this contingency is taken care of by *go/no-go* decision points. You should put into place various decision points in your upgrade plan and upgrade script where *go/no-go* decisions should be made. These critical decision points can occur in all phases of the upgrade. The decision point is at a critical place where a failed task puts the upgrade at risk, or the resulting system is not usable.

### Example

Some examples of contingency points are:

- Was the pre-upgrade backup of the system successful?
  - A failure here would mean you have no safety net if the upgrade fails and you have to restore the system.
- Did the technical upgrade complete without fatal errors?
  - A failure here could require a restore of the database.
- Have all acceptance tests completed successfully?
  - A failure here means that the users will not accept the system as delivered. They cannot do their jobs with the system in an unacceptable condition.



The *no-go* process must also be planned for. If it is not, and a *no-go* decision is made, you will not have a plan of action in place. The *no-go* process can be even more critical than the *go* process.

A contingency does not always have to be at a *go/no-go* decision point. Any task could fail, for any number of reasons. The question then becomes what you do when that task fails. The decision could be to abort the upgrade. Or the failure could be so minor that you could safely continue the upgrade. However, in all cases, the failure must be addressed.

Where *go/no-go* decisions exist, steps need to be defined and matched with an owner who is responsible for making the *go/no-go* decision.

Items to resolve when a *no-go* decision terminates the upgrade include:

- Who needs to be consulted prior to aborting the upgrade?
- Who is the person with the authority to make the decision to abort the upgrade?
- Who needs to be informed of the abort?  
You must have an *abort list* of people to call if the upgrade is aborted.
- What needs to be done to get the system back to a pre-upgrade state?



A very common mistake is to make a plan assuming everything works properly. But when something fails, there is no plan to accommodate the failure.

- How long do you have to recover the system?

## Other Components and Products to Consider

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### Other SAP Components in Sync with the SAP Release

Other SAP components need to be in sync with the SAP release. These components must be compatible with the target SAP release, or a new release of the component must be compatible with the target SAP release. If the component is not available for the target release, this situation may prevent your upgrade. Thus you need to plan for upgrading these components as well.

#### Example

If *IS Software* is not available for SAP R/3 4.6C, you cannot upgrade to SAP R/3 4.6C until the *IS Software* component upgrade is available for SAP R/3 4.6C.

Some of these components have dependencies that will require a specific order that they must be upgraded in.

#### Example

For the ITS, the ITS release must be equal to or greater than the backend SAP R/3 release. If you have ITS 4.6B, and you will be upgrading to SAP R/3 4.6C, you must **first** upgrade the ITS to release 4.6C or higher **before** upgrading the SAP R/3 system.

The components that you need to ensure compatibility and availability with include:

- Industry solutions
- Plug-ins
- Extractors
- Internet Transaction Sever

### Third-Party Products Affected by Upgrade

Any third-party products that interface to SAP systems need to be checked. These products must be compatible with the target SAP release, or you must obtain a new version of the product that is compatible with the target SAP release.

If a third-party product is not available for the target release, this situation may prevent your upgrade. You must establish alternate plans if you cannot use the third party products.

**Example**

Your third-party printer output manager does not work with SAP R/3 4.6C. In order to upgrade to SAP R/3 4.6C, you must also upgrade the external printer output manager to an SAP R/3 4.6C-compatible version, or consider an alternate solution.

In some cases the third party products have not been upgraded for the release of the database or operating system that the target SAP release runs on.

**Example**

Your external tax calculation program only runs on Microsoft SQL Server 6.5, it does not work on Microsoft SQL Server 7. Your target SAP R/3 4.6C requires Microsoft SQL Server 7. You cannot upgrade SAP R/3 until your external tax calculation program has been upgraded to run on MS SQL Server 7.

Some third party products are:

- Sales tax programs
- Credit card authorization programs
- Print management systems
- Background job schedulers
- System monitoring programs

## The Upgrade

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We discuss the upgrade in two major phases:

- The practice upgrades, to learn and refine the upgrade process.
- The pipeline upgrades, when you upgrade your development support and production systems.

These phases and upgrades will differ from those described in the *ASAP for Upgrade Roadmap*. This is because for this guide, we use meaningful labels that describe what the various upgrades are and their purpose.

## Practice Upgrades

We recommend that you plan to go through at least three practice upgrades. The three practice upgrades that we recommend are:

- Learning upgrade
- Validation upgrade
- Timing upgrade

These upgrades are named by function, but may be known by different names. They each have a specific purpose in the upgrade process, and will be described in greater detail in their respective sections.

We will go into more detail about the learning upgrade and then refer to the details of the learning upgrade in the later upgrades.

### Learning Upgrade

Your first practice upgrade is the learning upgrade.

The learning upgrade fulfills the following purposes:

- Familiarity with the upgrade process
- Learning what the upgrade does
- Determining what problems you will run into, and to solve these problems
- Adjusting modifications to SAP objects, and generating the transports that will be used in subsequent upgrades

You should expect this learning upgrade to take the longest time of all the upgrades, and to have the most problems.

The process in brief is as follows:

- Copy your production system into a test server.  
You must use a good copy of the production system (such as database, operating system files and so on) to duplicate as close as possible everything that could occur on the production system. This process of copying the production system is the same process that you would use to perform a disaster recovery.
- Go through the upgrade to learn what to expect, and what you need to do for each step.



If you have a LARGE production system (for example, over 200GB)

you might want to take a copy of your development system (which is presumably much smaller) to use for learning. The upgrade on the smaller database will run faster.

Do a copy of the production system later in the timing upgrade, to learn the effects of the size of a system with representative data (the size of objects and potential areas of problems with the production system.)

You can do this only if your DEV system is in sync with your PRD system.



Until you can go through the learning upgrade without problems, you are not ready to move to the next upgrade.

- Validate the accuracy of your plan and script.  
Fix your plan where it is not accurate.
- Gather preliminary timing for each step.  
For accurate timing, the test system should duplicate as closely as possible the configuration of the production system.
- Repeat the upgrade as many times as necessary to understand and learn what needs to be done.

The functional/business process staff needs to evaluate the modification adjustments. Whenever possible, go back to SAP standard. Make the modifications to reapply object changes, creating transports that you can apply to subsequent upgrades. For more information, see “Modification Adjustment” on page 23.

The functional/business process team and users must perform a functional test of the upgrade and sign off on the upgrade. This is to validate that the business processes will be able to function.

**Tasks to Do Prior to the Upgrade .** There are various phases of the upgrade process that need to be done before running the upgrade itself. They are:

- Tasks to do prior to the PREPARE phase
- Executing the PREPARE phase
- Tasks to do after the PREPARE phase, but before the UPGRADE

**Tasks to Do Before the PREPARE phase.**

**R/3 System.**

SAP System Prerequisites for the source release:

- The upgrade may require that the source SAP release (the release that you will be upgrading from) be at a certain minimum level before the upgrade can begin.
- Support packages installed to a defined minimum level.

Update the following to the current level:

- Kernel
- tp
- R3trans
- SPAM

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**Note**

If you will be installing the support packages as part of the upgrade, you must have the support package files available during the PREPARE phase.

**Support Packages for the target release.** Consider installing the support packages for the target release as part of the upgrade, instead of separately after the upgrade. As of SAP R/3 4.6, support packages can be installed as part of the upgrade process, saving time after the upgrade. The upgrade time

increases because of the additional time spent installing support packages, but the overall time decreases because the support packages are installed faster in the upgrade than when done separately after the upgrade.

**Profile Parameters.** Be sure to set SAP profile parameters as specified for the upgrade.

### **Database and Operating System.**

**Version and Patch Level.** Before running PREPARE, upgrade the version or patch level of the database and operating system if needed.

**Parameters.** Be sure to set database parameters as specified for the upgrade.

**Upgrade.** The DB/OS upgrade should be run in a separate maintenance period other than the one for the SAP upgrade. SAP offers a downward compatible kernel for the start release, which is already linked with the appropriate releases of OS and DB libraries.

Upgrading the version or patch level should be done as a project in itself. While upgrading the database (DB) or operating system (OS) may be required by the SAP upgrade, the DB/OS upgrade is a major project and should be managed as such, not as part of the SAP upgrade.

**The PREPARE Phase.** The PREPARE program runs checks on your system to determine if the prerequisites for the upgrade have been met. In the later releases, PREPARE:

- Checks space in the database
- Performs RFC and batch checks
- Checks for open repairs
- Identifies objects to be adjusted
- Identifies modification adjustments

The earlier you run the PREPARE program, the more time you have to act on the results.

**Tasks After PREPARE and Before the Upgrade.** Tasks to be run after PREPARE but before the upgrade include:

- Communications
  - Keep users informed of:
    - The upgrade schedule (start, end and down-time)
    - How the successful upgrade will be communicated
    - Problems
    - Available options if the upgrade is aborted
- For SAP

- Set the SAP profile parameters as specified for the upgrade.
- Install the Upgrade Assistant.
- For your **database**
  - Set database parameters as specified for the upgrade.
- For your operating system
  - Set operating system parameters as specified for the upgrade.

Download upgrade notes to see if any late changes or updates have been made to the notes. Always review the notes just prior to the upgrade to see if any new changes have appeared since you last reviewed the notes.

**The Upgrade Assistant.** The Upgrade Assistant is a frontend for running and monitoring the upgrade. The Upgrade Assistant has two modes:

- Administrator, to actively run the upgrade
- Observer, to monitor the progress

The Upgrade Assistant can also be used remotely.

After installing the Upgrade Assistant and checking it out on the local network, make sure that you can get through your remote connection firewall.

#### Note

While the upgrade team is running the upgrade in the office, the technical manager can monitor progress from his office or home in observer mode.

If there is a problem, others can access the Upgrade Assistant in observer mode to review the problem. In this way the person running the upgrade and the resource helping him can view the upgrade using the Upgrade Assistant at the same time.



TechTalk

If you cannot connect to the SAP server from your remote connection, get the help of your network security group to open the port the Upgrade Assistant uses.

The Upgrade Assistant uses port 4239 (or port 4241, if the native UA is used for remote connection via SAProuter, see Upgrade Assistant Online Help and SAP Note *133402*).



Your backup procedure must be a reliable, tested and verified procedure. If the upgrade fails and you must restore the system, this is your only way of restoring the system. There is no option to fail, the backup procedure **MUST** finish successfully.

**The SAP Upgrade Phase.** The technical upgrade is performed during the SAP upgrade phase. As mentioned previously, we will not duplicate the detailed procedures from the upgrade manual and other documents, but will provide additional hints and tips where problems normally occur.

**Backup.** Before the upgrade begins, you should perform a full backup of the SAP component, the database, and operating system files. If you have the time, making two backups is not an unreasonable task, given the critical nature of the task.

**Problems.** During the practice upgrades (see “Practice Upgrades” on page 19), you might run into problems that need to be researched on SAP Service Marketplace or SAPNet-R/3. The solutions must be added to your upgrade script. Some may be as simple as *repeat the phase* or *ignore the error message*, whereas others may require the application of an SAP Note.

**Organization.** Plan for the production and *dress rehearsal* upgrades to go nonstop to minimize downtime.

- Organize your staff in shifts to monitor the upgrade. If the staff is on-site, consider having a break room with cots, food and drink. Rent a nearby hotel room for the off-shift staff so they do not lose time driving home.
- Maintain a status board for the upgrade, so people will not bother the upgrade staff with questions about how the upgrade is going.

**Notification of Delays.** An alert mechanism can be used to generate a page if the system waits too long for a user response. This alert mechanism must be configured and tested in advance.

**Post-upgrade Tasks. Backups.** After the SAP upgrade, you should first back up the SAP component, the database, and the operating system.

**Modification Adjustment.** After backing up SAP, you will need to resolve conflicts to SAP objects. These are the modifications that you have made to various SAP objects (such as programs and tables) that are affected by the upgrade. As a part of the upgrade process, the conflicts are identified for you to resolve.

The functional team must determine:

- If the changes are **in** the upgrade, and thus **do not** need to be reapplied.
- If the changes are **not** in the upgrade, and thus **need** to be reapplied.
  - In making the changes, transports will be created. These transports will be imported into subsequent upgrades, so the changes do not have to be manually reapplied.

Whenever a change is made to SAP programs and other objects, your change documentation should reflect the SAP Note number that brought about the change. Reading the note may indicate that the problem in the note was fixed in a particular SAP release. If this release is equal to or less than the release you are upgrading to, you could let the program return to SAP standard.



Adjusting the modifications made to SAP objects is probably the most difficult and time-consuming part of the upgrade, and requires extensive advanced planning.

#### Note

The mySAP Technology team could have Basis-related or mySAP Technology changes that need to be reapplied.

If the changes made to the system were not properly documented, it will be very difficult and time-consuming to determine why the changes were made.



If many undocumented changes are found, this could easily add weeks of time to your schedule.

#### Example

The modification adjustment step identifies a change to an SAP program. But nowhere in the program is there any documentation of why the change was made, who made the change, are there any related programs or objects affected by the change. Trying to determine this could take a week for just one object.

Once all the corrections have been made, the resulting transport files can be saved and imported into subsequent upgrades, thus saving the manual repetition for each upgrade, in which mistakes could be made.

The recommended process is as follows:

On the first upgrade:

- Reset the object to SAP standard.
- Reapply the required changes. This will generate a transport.
- Save the transport files.

On the subsequent upgrades, import the transports saved in the third step. This transport applies the changes made in the previous step.



Tips & Tricks

Record the transport numbers for the conflict fixes. Save the associated transport files (these are in the directory *usr/sap/trans/data* and *usr/sap/trans/cofile* directories) to import into the other systems.

On subsequent systems that are upgraded, import the transports created above, in the order that they were released, after the upgrade is completed. This process then applies all the fixes made in the first system to all subsequent systems. It eliminates human error of fixes done manually and saves a significant amount of time.

**Testing.** Two kinds of testing need to be done:

- Regression testing determines if business processes, such as order entry, still work the same after the upgrade.
- Acceptance testing is performed as a QA check to determine that the system, as upgraded and fixed meets the user's requirements.

**Regression Testing.** Regression testing has two purposes:

- Determine if business processes still function as in the prior release.
- Identify changes in the new release that will require additional work
  - Business processes that will require changing to work with the upgraded system
  - Documentation and training for changes

- Changes that may be required of the system if the business processes cannot accommodate the changes from the upgrade

Regression testing checks if business processes such as the following can be performed correctly:

- Can you enter an order?
- Can you enter a journal entry?
- Can you ship a product?
- Does the order flow through into the billing?
- Can you look up information, such as orders or journal entries?
- Are the prices calculating correctly?
- Are the financial statements and reports correct?
- Do third-party programs function properly?

Regression testing also involves various technical groups. Check to see if the various in-bound and out-bound interfaces with other systems still work, such as:

- EDI interface
- Payroll
- Connections to various legacy systems

Also check for the following:

- Do system management processes developed for the prior release still work in the new release?
- Does the disaster recovery plan have to be changed because of changes in the new release?

After regression testing has uncovered changes that need to be made to the business process or the SAP system, the functional team and any other required group (training, users, and so on) will perform the required changes to the business process or the SAP system.

As discussed in “Modification Adjustment” on page 23, some of the changes made to the SAP R/3 system can be captured in transports. These transports can be saved, then applied to subsequent upgrades, saving time and effort.

**Acceptance Testing.** The representatives of the user organization do acceptance testing.

After the system is upgraded and all required fixes are made, the user owners will perform a final QA test, similar to the regression test, to determine if the upgrade had succeeded and the users will be able to perform their tasks. The regression test looks for problems. The acceptance test should have **no** problems found. If there are no problems found, the users sign off. The sign-off is the acceptance by the users of the system as delivered.

## Validation Upgrade

In the validation upgrade, repeat everything you did in the learning upgrades. This time, you verify that everything you need to do is documented properly and that you now know what to expect. Essentially, your upgrade script gets validated in this step, with one difference. Rather than investigating and making fixes, everything should be documented. There should be nothing new. The modification adjustments is done by importing the transport requests generated in the learning upgrade. Thus from the validation upgrade and later, the time to fix the system is dramatically reduced.

If there are problems in the validation upgrade, fix the problem as in the learning upgrade. Then repeat the validation upgrade.

The final validation upgrade should complete without any problems.

## Timing Upgrade

The timing upgrade serves as a dress rehearsal. You would do everything as if it were the production system. The primary purpose for this test is to determine how long the various steps of the upgrade will take. This will assist in the planning of the timing of the production upgrade.

You perform this procedure to rehearse and time the upgrade of the production system.

- Copy your production system to a test server.
- Use a good copy of the production system to duplicate as close as possible everything that could occur on the production system.
- For accurate timing, the test system should duplicate the configuration of the production system.
- Do not do anything different than the validation upgrade, or you could invalidate your planning.
- To time this rehearsal as if it were the production system:
  - Start on same day and time (for example, Friday afternoon).
  - Schedule and run on a 24-hour, nonstop schedule.
- Time each step to finalize the preliminary timing.



If you have a large production system (for example, over 200GB) for your learning upgrades, you might want to take a copy of your development system (which is presumably much smaller).

The *timing upgrade* would use a copy of the larger production system to learn the effects of the size of the production system on the upgrade.

The functional/business process team and users must perform a functional test of the upgrade, and must sign off on the upgrade.

#### Note

The results of the timing upgrade may, or may not apply to the other systems, depending on if they are configured the same as the production system.

For example, if the DEV system has two 500MHz CPUs and 1GB of RAM vs. the PRD system with eight 800MHz CPUs and 4GB of RAM, the DEV performance would be less than the PRD system. But the DEV system generally has very little data compared to the PRD system.

If the timing upgrade goes beyond the target time, then the timing upgrade phase becomes a second learning upgrade. This time, the purpose is to reduce the time to perform the upgrade. You must then repeat the QA and validation that are part of the learning upgrade. Any changes to the upgrade process could invalidate any QA and acceptance work that has been done in prior phases.

#### Example

##### Constraint:

The upgrade must be completed so users can begin work at 8AM Monday morning. The timing upgrade begins at 11 PM Friday evening and runs to 6 PM Monday evening. The timing upgrade has taken ten hours longer than the allotted time. The task now is to determine what can be done so that the upgrade process completes by the 8AM target time.

##### Comments:

Some of the options are:

- The start time for the upgrade could be negotiated with the users to begin at 7 PM Friday evening, four hours earlier.
- Run the upgrade on a three-day weekend, thus gaining an additional 24 hours.

##### Techniques:

- Look for the task that took the longest amount of time to complete. This is where the potential for saving time is greatest. Then from there work to the shorter tasks. For example, saving 25% of a two-hour task saves 30 minutes, saving 25% on a ten-minute task saves 2 ½ minutes.
- Look for wait time. This is time lost waiting for action or a decision.

## Other Non-Pipeline Systems to Upgrade

You may have other systems in your system landscape besides the pipeline systems (see the next section for definition of *pipeline systems*). The upgrade of these systems is not critical but may influence the entire upgrade strategy.

- **Sandbox** – This is generally the system that you were practicing your upgrades on, so as not to break the pipeline during the initial phases of the upgrade.
- **Training** – To prepare your users for the upgrade, the training system should be upgraded before the development system. This approach allows the users to practice on the new release while you are upgrading the pipeline.
  - If the new release is significantly different than the old release, we **strongly** recommend having a training system available to train the users on before the pipeline is upgraded.

## The Pipeline Upgrade (DEV, QAS & PRD)



A major planning issue is that, once the development system has been upgraded, you no longer have a production support pipeline. The DEV system is on the new release and the PRD system is on the old. You now need to complete the upgrade of the pipeline as fast as possible.

### Note

In many companies, where the upgrade of the pipeline may take many months, there are other options. These all involve additional systems for a temporary production support pipeline, which is used to provide production support during the upgrade of the pipeline. Note that this increases the number of systems from three to as many as five! For more information, see “Upgrade Landscape with Temporary Production Support Pipeline” on page 29.

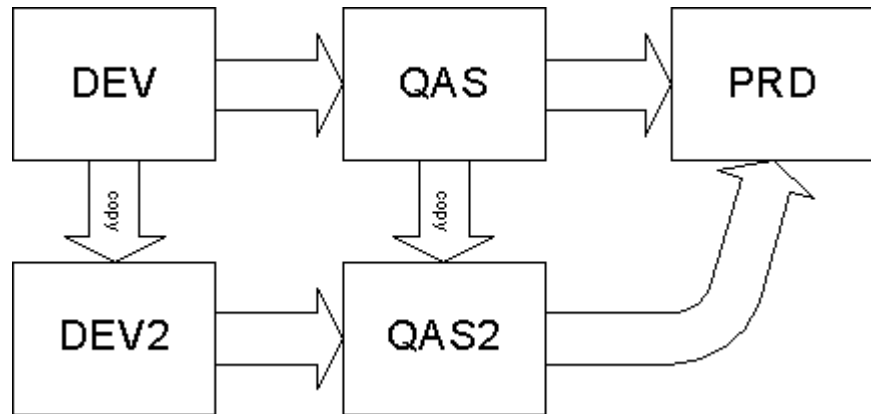
**Overview.** After a clean validation and timing upgrades, you are ready to upgrade the pipeline. The pipeline is the path made up of the standard three systems—development (DEV), QA (QAS) and production (PRD). Normally, the pipeline describes how fixes are brought into the production system, developed in the development system, tested in the QA system, and then finally moved into the production system.

**Phases.** The phases of the pipeline upgrade correspond to the systems in the pipeline.

- Development (DEV)
- Quality Assurance (QAS)
- Production (PRD)
  - Do nothing different than what you practiced. If you do something different, you could invalidate all of your practices.
  - Arrange for on-call consulting assistance with your partner.
  - Notify SAP of the upgrade, using SAP Note 30068. You can obtain special assistance if needed during the upgrade.

**Acceptance Testing.** Acceptance testing is done by the Functional Owners, representatives of the user organization. If there are no problems found, the users sign off. The sign off is the acceptance by the users of the system as delivered. The most important sign off is the sign off on the production system.

## Upgrade Landscape with Temporary Production Support Pipeline



**What .** The upgrade with a temporary production support pipeline is a dual path landscape. The production support pipeline remains in place (DEV and QAS). In addition, an upgrade pipeline is created (DEV2 and QAS2).

**Why.** The temporary production support pipeline alternative is for installations where the upgrade of the pipeline may take many months, or where you absolutely must have a production support pipeline during the upgrade. This allows production support changes to be made, tested and moved into production during the pipeline upgrade.

**How.** Briefly, the development (DEV) and QA (QAS) systems are copied to another pair of systems to be used for the upgrade (DEV2 and QAS2). Whenever a change is made to the production support pipeline, the same change must be evaluated and then made to the upgrade pipeline systems.

Note that there are many variations of this process. In one variation, it is the production support that is moved to the copied systems. In another variation, only one copied system is used for production support.

In all cases, the planning and coordination in this landscape is critical. To minimize the problems, only critical changes should be implemented.

## Performance Improvement Items

There is no quick fix to improve performance. Many items affect performance, some more than others, and not always in a consistent manner between different installations.

With this in mind, we discuss several items that could improve the performance of your upgrade. Depending on your situation, configuration, and production system considerations, some of the following may apply to your situation. You must evaluate their applicability to your installation.

The performance improving items we discuss are:

- Sizing
- CPU
- Memory
- Disk I/O
- Copy upgrade CDs to disk
- Archiving
- Support Packages and Service Releases
- Replacement Server
- Options to reduce backup time
- Customer Based Upgrade (CBU)

## Sizing

Sizing refers to the capacity of the hardware that the system is installed on, and if the hardware has sufficient resources for adequate performance. Sizing is important for both the upgrade itself as well as the running of the system after it has been upgraded.

- Is the server undersized for the target SAP release and your business?
- Is the server undersized as you project for one to two years?

If the server is determined to be undersized, consider upgrading or replacing the hardware in advance of or as a part of the upgrade. Replacing hardware could make your upgrade go faster.

If you decide to upgrade the server as part of the SAP upgrade, you have the following two options:

- Migrate to the new server before performing the upgrade.
- Migrate to the new server as part of the upgrade. For more information, see “Replacement Server” on page 33.

Note that sizing a server also covers some of the other items in this section, such as CPU, memory, and disk I/O.

## CPU

The Central Processing Unit (CPU) or Processor is the *brains* of the server.

The CPU is a component of the sizing exercise above.

The speed and number of processors in the server has an effect on the upgrade run time. Having additional CPUs in the server allows more parallel processing to occur, speeding up the upgrade process.

## Memory

Memory refers to the volatile memory known as Random Access Memory (RAM). It does not refer to the amount of storage space on the disks.

Memory is a component of the sizing exercise above.

The SAP system and the upgrade make use of buffers to speed processing. These buffers typically run in RAM. When enough memory is not available to hold the buffers, the buffers are stored on disk. When the system needs to read data from disk instead of memory, the accessing of that data on disk is much slower than memory.

In addition to SAP, the database and operating system make use of memory for buffers and swap files. If there is not enough memory for these, they will be swapped to disk, again decreasing performance.

## Disk I/O

Disk Input/Output (Disk I/O) is the physical writing to or reading from the disk. Disk I/O, being physical rather than electronic, is the slowest thing that can happen on the server.

Disk I/O is a component of the sizing exercise above.

Because of the large number of writes to the database, any bottleneck in disk I/O will slow down the upgrade. RAID5 (stripe plus parity) is typically slower than RAID1 (mirror) or RAID 0+1 (mirrored stripe). To reduce head contention, the more spindles (disks) the data is spread over, the faster the write.

The mistake that is often made is maximum utilization of disk space. This is translated as *use all available disk space, don't waste space*. However, there may be cases where a single file has so much disk access, that it may justify being on a drive by itself, because the accessing anything else on that drive will impact the accessing of that file.

### Note

Head contention is not a new problem. This problem existed from the early days of disk drives on computers. The only difference now is the drives are **bigger**.

### Example

The system writes to the database log file before the database is updated. Every write to the database requires a write to the log file. For applications with constant order processing, such as large volume of sales, the log file is active constantly. The writing and reading of additional files to the drive containing the log file will slow down the updating of the database, impacting performance.

## Copy Upgrade CDs to Disk

Copy the upgrade CDs to disk. This involves copying all of the upgrade CDs to disk on the server to be upgraded.

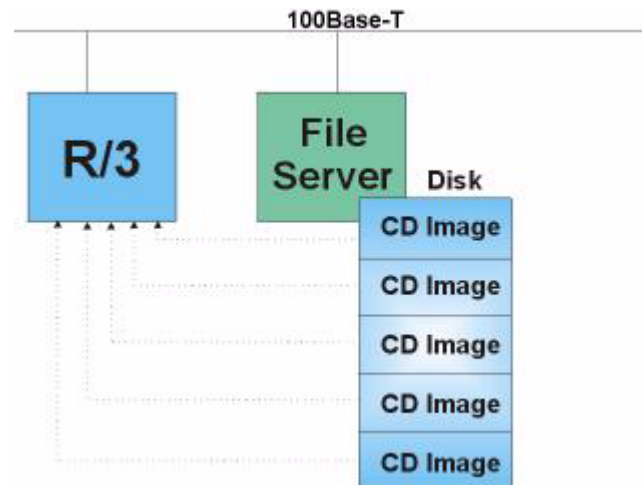
The upgrade will be faster for the following reasons:

- Reading from disk is much faster than reading from CD.
- You may not have the required number of CD drives on the R/3 server. Therefore, additional CD drives must be mounted on the network. You would then have network traffic to contend with, in addition to slower reading from CD.
- You do not lose time manually changing the CDs.

Requirement for copying the upgrade CDs:

- You need sufficient free space on the server for the disk images.

Alternatively, you can copy the CDs to disk on a file server that has a fast network connection to the SAP server being upgraded. Map or mount the copies of the CD so you can access them from the SAP server to be upgraded. The file server should be connected to the SAP servers to be upgraded by 100baseT (or faster) network.



## Archiving

Archiving is the removal of old data from the live database to an archival system.

Archiving old data can decrease the upgrade processing time. If there is less data in the system to upgrade, the upgrade process will run faster. This is especially true when major structural changes have been made. In this case, the upgrade process converts the data in the old structure to the new structure. Having less data to upgrade pays off, allowing the conversion to run much faster.

A problem to consider is that the decision to archive before upgrading depends upon what SAP release you are upgrading from. The archiving tools have improved in later releases. There may be a business case for archiving **after** upgrading rather than before upgrading.

## Support Packages and Service Release

**Support Packages for the Target Release.** There are two phases to installing Support Packages during an upgrade.

First, install the Support Packages for the target release as part of the upgrade, rather than as a separate process after the upgrade. As of SAP R/3 4.6, Support Packages can be installed as part of the upgrade process, saving time after the upgrade. The upgrade time increases because of the additional time

to install the Support Packages, but the overall time decreases because the Support Packages are installed faster during the upgrade than when done separately after the upgrade.

If you will be installing the Support Packages as part of the upgrade, you must have the Support Package files available during the PREPARE phase.

Second, towards the end of the learning upgrade, consider installing the latest Support Package that have been released since the start of the learning upgrade. Installing the latest Support Packages is especially beneficial if a long period of time has passed since the start of the learning upgrade and many more Support Packages have been released.

Then, perform a combined QA test of the learning upgrade and the Support Packages.

In the validation upgrade and later upgrades, install up to the last Support Package installed as a part of the upgrade.

**Service Release.** There is a free performance improvement that all customers should use, that upgrades to the latest Service Release of the target release. For example, when upgrading to SAP R/3 4.6C, upgrade to 4.6C-Service Release 2 (4.6C-SR2), rather than the base SAP R/3 4.6C.

The Service Releases have the Support Packages integrated into the upgrade, which saves on the additional time required to import and activate the support packages separately. For example, this step could take as much as eight hours versus 4.6C-SR2, which contains Support Packages up through 15. This amount of time will only increase as the number and size of the Support Packages increase.

## Replacement Server

If you will be replacing your production server with new hardware, you have another alternative.

Perform a system copy of the old production server to the new production server, and perform the upgrade on the new production server. The process is basically as follows:

- Restore the production server onto the new server.
- Take the old server offline.
- Upgrade the new server to the target release.
- Put the new server online.

This gives you the following advantages:

- The old production server and database is still intact.
  - The pre-upgrade backup time is no longer critical.
  - If you have to abort the upgrade, the old server with the pre-upgrade system is immediately available. You do not have to restore the system.
- The upgrade can begin faster
  - As you have the old production system intact, the length of time it takes to run the pre-upgrade backup is no longer critical. It is done independent of the upgrade.
- You do not have to migrate to the new server as a separate task before the upgrade.
- You can practice the upgrade on the actual production server, to get accurate timings.

## Options to Reduce Backup Time

A critical part of the upgrade process is backing up the system before starting the upgrade and after the upgrade is completed. The time it takes to perform the backup increases the overall time to complete the upgrade.

There are several options to reduce backup time, including backing up:

- To a second server, and from that server backup on tape

The backup of the data on the second server does not affect the upgrade on the SAP server. You will need a fast network connection to backup the database to the other server.
- To multiple fast tape drives in parallel
- The database to disk on the R/3 server

If possible, back up the database in parallel.

- From a broken mirror

As part of various high-availability configurations, such as triple mirror, the backup is almost instant to the SAP system. The actual backup is made off the broken mirror by another system, and thus does not affect the SAP system. However, as the method and technique is very specific to the vendor and product, we do not discuss the details in this document. If you have a high availability environment, check with your vendor for a way to reduce the SAP downtime during database backup.

The cost of backing up from a broken mirror is when you reattach the broken mirror to the mirrored set. There will be a significant performance impact as the broken mirror is synchronized to the current data.

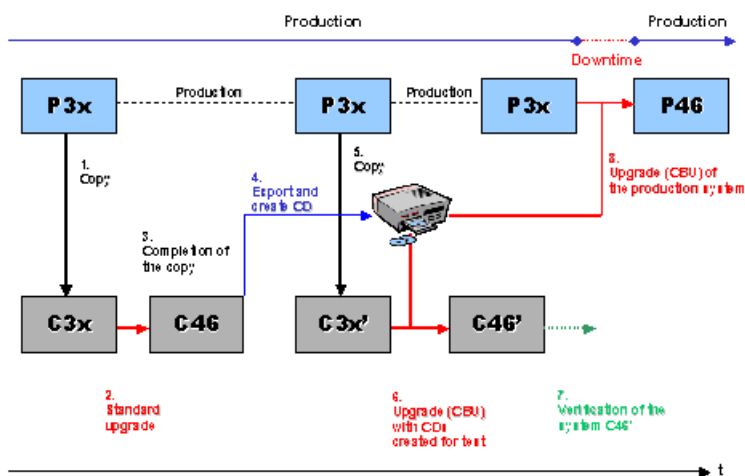
## Customer-Based Upgrade (CBU)

There is another option, which has the potential of significant reduction in the upgrade run time. This is the *Customer-Based Upgrade (CBU)*.

However, the CBU is a very different process and requires SAP Basis consultants who have been trained in performing a CBU. The CBU upgrade landscape is also very different from a traditional upgrade landscape.

A CBU is a special upgrade procedure that aims to significantly reduce downtime when upgrading a production system. The downtime reduction is achieved by creating an export at the customer site, which replaces the substitution set imported in the EU-IMPORT<x> phases. This export already contains all customer-specific adjustments to the repository, which are normally made during the upgrade. The customer-specific export removes the need for performing several tasks on the production system when you use a CBU.

As can be seen in the diagram, the CBU is a different process than the standard upgrade.



### Prerequisites

You must meet the following requirements before you can perform a CBU:

- Must be able to make a quick copy of the production system
- After the first copy of the production system is made, the repository of the production system must be frozen. Any transports and corrections that are made in the production system after the copy is made will be lost, and need to be repeated after the upgrade.
- The hardware you use to upgrade the second copy must be the same as the hardware of the production system. This is the only way you can reliably estimate the downtime needed for the (platform-specific) load generation.

For more information on CBUs, go to <http://service.sap.com/upgrade> and then select *Customer-Based Upgrade*.

For more information, contact SAP consulting.

## New Technology and Methods

SAP is constantly working on techniques and methods to decrease the time that it takes to upgrade an SAP system. Check the SAP upgrade web page at <http://service.sap.com/upgrade> for new methods that were released after this guide was written.

## SAP Upgrade Services

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SAP has several services that are available to assist customers in doing an upgrade. These are:

- *Upgrade Angel Program*
- *GoingLive Functional Upgrade Check*
- *Remote Upgrade*

As an SAP customer, you should take advantage of these services, especially the *Upgrade Angel program* and the *GoingLive Functional Upgrade check*, available free of cost. Please check with your SAP account manager for specifics of your contract.

Please also check with your SAP technical account manager for any other upgrade services that are available from SAP.

## Upgrade Angel Program

This service is included as part of your annual maintenance fee. It facilitates problem resolution and escalation for customers for the upgrade of the production system. It is offered by SAP America Customer Support.

A Customer Support angel will be assigned to your account to do the following:

- Monitor critical SAP customer messages daily
- Provide you with weekly status updates for each issue
- Communicate escalation issues

This gives you a single point contact for support and service issues.

See SAP Notes *161919* and *30068*.

- Note *161919*; description of GoingLive/Upgrade Angel Support Program
- Note *30068*; registration form for the GoingLive/Upgrade Angel program

## GoingLive Functional Upgrade Check

This service is included as part of your annual maintenance fee.

The underlying concept of the SAP GoingLive Functional Upgrade Check is to ensure smooth operation of your mySAP.com solution by taking action proactively, before severe technical problems occur.

The *GoingLive Functional Upgrade Check* is made up of three sessions (Planning, Analysis and Verification) — two sessions (Planning and Analysis) before the upgrade and the other (Verification) after the upgrade.

**Planning Session:** This session should be performed as much in advance as possible when the upgrade is first being considered.

Analyses compatibility for the target release with regards to connected systems in the Solution Landscape, OS version, DB version, installed Add-Ons, Plug-ins, Country Versions, and so on.

**Analysis Session:** It is generally performed two months before the production upgrade (consider lead time for hardware procurement).

- The focus is on resource planning and system configuration.
- There is a high-level hardware plausibility check (this is not a hardware sizing exercise).
- Potential resource bottlenecks are identified.
- Necessary changes will be recommended to prepare the system for the productive use of the new release.

**Verification Session:** Generally performed four to six weeks after the production upgrade, and the recommendation from the analysis session implemented.

- Comparison of performance with results prior to upgrade
- Recommendations on configuration and optimization

**More information and ordering .** For more information, see the *GoingLive Functional Upgrade Check* web page at:

<http://service.sap.com/goinglive-fu>

To order a *GoingLive Functional Upgrade Check*, contact SAP Customer Care Center at least eight weeks prior to the planned upgrade of your production system.

For customers of value-added resellers (VARs) such as CBS customers in the US, special conditions apply. Contact your VAR.

## Remote Upgrade Service

Remote Upgrade Service is a technical upgrade that is performed by SAP remote consultants. Pricing is based on the complexity of the customer's environment.

SAP performs the technical upgrade of your system, allowing you to focus on the functional and training side of the upgrade. You are still responsible for resolving object conflicts.

See SAP Notes *106447* and *84044*.

The Remote Upgrade Service is an attractive option for CBS sized customers with small or non-existent mySAP Technology group.

For more information see the *Remote Upgrade Service* web page at:

<http://service.sap.com/remotepupgrade>

## Resources

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The following list shows some of the resources you can use as you prepare for your upgrade of SAP. These resources include:

- Your installation partner
- Customers and others you have networked with at customer functions and conferences such as:
  - ASUG

- TechEd
- SAP training classes
- SAP Service Marketplace, at <http://service.sap.com>
- Other web sites, news groups, and lists
  - <http://www.sapassist.com>
  - <http://www.sapclub.com>
  - <http://www.sapfans.com>
  - <http://www.SAPpro.com>
- Other consultants
- The *ASAP for Upgrade*
  - ASAP for Upgrade Roadmap
  - ASAP for Upgrade Project Plan
  - Installation manuals
- Tools CD from the U.S. Upgrade Competency Center.  
These are made available to your SAP America technology consultants.
- Installation manuals
  - Printed from the CD or
  - Downloaded from SAP Service Marketplace at <http://service.sap.com/instguides>

- SAP Customer Service
  - Upgrade Angel Program (SAP America)
  - Upgrade Going Live Functional Upgrade check
  - Remote Upgrade Service
- Relevant SAP web page aliases  
Entered as *http://service.sap.com/<alias>*, for example  
*http://service.sap.com/upgrade*

<i>upgrade</i>	Upgrading SAP systems
<i>goinglive-fu</i>	Going Live Functional Upgrade Check
<i>instguides</i>	Installation and upgrade guides
<i>notes</i>	SAP Notes
<i>noteassistant</i>	Note Assistant
<i>ocs</i>	Online Correction Support
<i>ocs-download</i>	Online Correction Support, downloads
<i>releasestrategy</i>	Contains matrix of R/3 release from/to upgrade paths
<i>remoteupgrade</i>	Remote upgrade service
<i>sizing</i>	Sizing information and QuickSizer tool
<i>supportservices</i>	

## Bibliography

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The Essential Guide to SAP R/3 Upgrades, SAP Professional Journal,  
*http://www.SAPpro.com*

## Appendix

### Excerpts from an Upgrade Script

The following excerpt shows you some of the items you might find in an upgrade script. Note that this example is just a sample to show you what a script looks like and how parts of the script can be constructed. A full script is very long.

Task	Person Responsible	Time Completed
<b>Preparation</b>		
Environment		
Apply NT service pack XX	Gary	
Apply SQL server, service pack XX	Gary	
Check and clear required drive space	Gary	
Create directory <i>lusrlsap\put</i>	Gary	
<i>sappad.exe</i> should be in the executables directory	Gary	
<b>Identify customer changes</b>		
Code: Collect and identify changes	Sheryl	
Code: Identify which code might/will be required to be reapplied	Sheryl	
<b>Configuration</b>		
Upgrade GUI	Claudia	
Upgrade team		
Server		
Test users		
All users		
<b>Upgrade workstations</b>		
Test access to Upgrade Assistant: from desktop		
Test access to Upgrade Assistant: From phone dial-up through firewall		
<b>R/3 Preparation</b>		

Task	Person Responsible	Time Completed
Update the kernel	Gary	
<ul style="list-style-type: none"> <li>■ Download and unpack kernel from SAPSERV</li> </ul>		
<ul style="list-style-type: none"> <li>■ Back up existing kernel</li> </ul>		
<ul style="list-style-type: none"> <li>■ Stop R/3 services</li> </ul>		
<ul style="list-style-type: none"> <li>■ Existing file xxxxx must be renamed before the copy</li> </ul>		
<ul style="list-style-type: none"> <li>■ Copy new kernel to the kernel directory</li> </ul>		
<ul style="list-style-type: none"> <li>■ Restart R/3 services</li> </ul>		
Update SPAM	Gary	
Update <i>tp.exe</i>	Gary	
Install sw for Upgrade Assistant		
<b>PREPARE phase</b>		
Run PREPARE program		
Document and resolve problems pointed out by the PREPARE program		
<b>Upgrade phase</b>		
Preparation for upgrade		
Security		
Lock out all users not on the upgrade team	Gary	
Remove "everyone" permission from directories:		
Sapr3e (documentation)		
SAP share (for outbound extract files)		
Tax (tax program)		
Back up the system		
Database (2 hrs)		
Operating system files (30 min)		
<b>CONTINGENCY:</b> Backups must be successful		
Shut down		

Task	Person Responsible	Time Completed
Shutdown, cancel, or reschedule all background jobs scheduled during the upgrade period	Sheryl	
Execute upgrade		
Monitor upgrade process	Gary, Sheryl	
<b>CONTINGENCY:</b> If there is a hardware failure during the upgrade, initiate recovery process		
After upgrade program completed		
Back up the system		
Database (2 hrs)		
Operating System files (30 min)		
Import upgrade transports generated from earlier upgrade		
Apply support packs		
Back up the system		
Database (2 hrs)		
Operating System files (30 min)		
<b>Post-upgrade</b>		
Unlock user access for regression testers	Gary	
Regression/Acceptance test		
Regression test is performed on the test systems, the acceptance test is performed on the dress rehearsal upgrade and the production system upgrade.		
Functional team execute scripted tests		
Review of tests and sign-off by functional owners	Claudia, Mark, Andrew, Todd	
<b>CONTINGENCY:</b> If acceptance test fails, initiate recovery process		
<ul style="list-style-type: none"> <li>■ Recovery will take 5 hours from the point of decision to initiate recovery.</li> </ul>		

Task	Person Responsible	Time Completed
<ul style="list-style-type: none"> <li>■ <i>Inserted note</i> on the production system, depending on when the acceptance test is done and the size of the database, this recovery may extend into the expected workday.</li> </ul>		
Post-acceptance test		
Reschedule background jobs that were cancelled or rescheduled before the upgrade.		
Create system message announcing the upgrade.		
Send e-mails to people on the notification list for a successful upgrade.		
Unlock user access for all users		
<b>Contingency</b>		
Prepare		
Gather all material required to perform a recovery		
Evaluate		
Present reason for potential upgrade failure		
Team members evaluate		
Team members decide if a failure decision is to be made		
If required contact appropriate functional manager(s)		
Obtain management concurrence to restore	Walt	
Notify		
Contact all functional owners and managers on abort notification list		
If the recovery is as a result of a nonacceptance from the regression test, the recovery may extend into the expected workday. The appropriate people need to be notified why the system is not up.		

Task	Person Responsible	Time Completed
Send e-mail to people on the upgrade-aborted distribution list.		
Recover		
Expected time to restore database and operating system files to prior release is 5 hrs.		
Execute system recovery process including OS files.		
A recovery script is referenced		

## Change Documentation

**What.** When making a change to standard SAP programs, we recommend that you document the changes in the ABAP code itself. In addition you should have the following:

- Change document; describing the change, what it is, why it was made, any other programs and/or objects which were changed as a part of the change. This document should allow you to recreate the change in its entirety.
- QA document, especially important for controlled environments such as aerospace industries, defense contractors, pharmaceuticals, and so on.

**Why.** The reason for making this documentation in the code is that paper can get lost. If this information is entered into the code, along with the changes, it will not get lost. If you have the code, then you also have the documentation.

- The documentation provides –when you upgrade and the PREPARE program identifies an object conflict – the ability to identify why the change exists in the system. From this you can determine if the change either:
  - Is a part of the upgrade, and the object can revert to SAP standard.
  - Is not a part of the upgrade, and needs to be reapplied, and a transport generated.
- As a general rule under time pressure, documentation gets the last priority. In many cases, the management tells the programmers to fix the problem and document it later. However, later never comes, as there is always something more important to do.
- Memory is not perfect. In a few months, the programmer may not be able to remember the details of the change. This situation can become worse if the programmer was a consultant and has now left your engagement, or was an employee that has left your company. You may have a difficult time finding that programmer again.



If the information is not available, you could easily spend a man-week (or more) investigating a single undocumented change. The following questions arise:

- What is the change?
- Why is the change there?
- Is there an SAP Note that was the source of the change?
- What other program(s) were affected?
- Is the change implemented in the upgrade?

If there are many such undocumented changes, the amount of time these investigations could take would require the upgrade be rescheduled, and the cost of your upgrade would be increased by the effort of the investigation and the delays.

**How.** When making a change to standard SAP programs, we recommend that you document the following in the ABAP code itself:

- Date the change was made
- Who made the change
- The SAP Note number that specified the change
- Your internal change document number, see below
- Your internal QA document number that you use to document changes made to your system
- If the change is being made for reasons other than an SAP Note, then create
- the design documents and the reason that the change is being made.
- A new alternative is the *Note Assistant* that eliminates manually applying a note. See the *Note Assistant* section below.

**When.** The documentation in the code should be the first thing that is done to the code.

### **New Information**

#### Note Assistant

- The Note Assistant is a new tool for implementing and handling SAP Notes. It is available for SAP R/3 Releases 4.5B, 4.6B, 4.6C. The Note Assistant eliminates manually entering a note, and the error that can occur.
- The Note Assistant determines the appropriate correction instruction for that version of your SAP solution and issues a go-ahead for you to proceed with implementing the correction.
- One of the most important capabilities of the Note Assistant is its ability to recognize dependencies on Support Packages, upgrades, and SAP Notes that have already been implemented.
- The Note Assistant is closely integrated with the Modification Assistant. After you implement a Support Package, for example, any corrections indicated in SAP Notes are displayed separately from your own modifications, which makes the adjustment much more efficient.
- For more information and to download the Note Assistant, see <http://service.sap.com/noteassistant>