



PUBLIC

Update Strategy for the Kernel of the Application Server ABAP in On Premise Landscapes

MARCH 2021

THE BEST RUN



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ABSTRACT

The Application Server ABAP forms the basis of the most critical business applications with highest availability requirements in today's economic world. Thus, updating SAP software is a delicate and intricate process: selecting the right software version is essential for continuous operation, and failure to select the right version may result in increased downtime with significant financial impact.

In this article we point out **strategies for finding the correct kernel version** of the Application Server ABAP, thus minimizing the risk of unplanned and unexpected downtime.

The most important conclusion of this article is that usually there is no need to update the kernel. If there is a problem with your installation, you should update to the latest *SP Stack Kernel* provided that it contains the solution.

1. KERNEL CORRECTION STRATEGY

The **kernel** of the Application Server ABAP (AS ABAP) is the basis for all programs executed by AS ABAP. For this reason, it is crucial that the kernel runs reliably. In a worst case, an error in the kernel may lead to a system downtime and a production stop.

A **regression** is an undesired behavior of a software component caused by a later modification. Since there is always a risk of regressions as a side effect of a kernel correction, you should not update the kernel without a sound reason.

The kernel correction process is independent from the ABAP correction process. SAP is regularly publishing kernel corrections on the SAP ONE Support portal in form of kernel correction collections, also called **kernel patches**. Kernel patches can be subdivided into SP Stack Kernels and hotfixes.

An **SP Stack Kernel** is a complete kernel installation that is produced one to three times a year depending on the kernel release. It is the most stable and thoroughly tested version of a kernel patch. Should you have to update the kernel, check whether the latest SP Stack Kernel version for your release contains the required correction. If so, apply the latest SP Stack Kernel.

A **hotfix** is a regular kernel patch with typically weekly delivery schedule. In case your problem is not yet solved by the latest SP Stack Kernel, apply the latest available hotfix containing the required correction.

Although the kernel correction process is independent from the ABAP correction process, each SAP Support Package comes with its own SP Stack Kernel. We recommend following the [SAP Support Package Stack Strategy](#) when updating SAP software. This will automatically make sure that the most recent SP Stack Kernel is applied.

You may use the following set of “best practices” when applying kernel corrections. These are recommendations only, based on long time experience. Other approaches might be valid and make more sense, depending on the individual situation at hand.

Kernel Correction Strategy

1. Follow the [SAP Support Package Stack Strategy](#) for SAP software products. The most recent SP Stack Kernel will be applied to your system automatically.
2. Perform additional SAP kernel updates only if you need to solve a problem in the system. In this case:
 - a. Apply the **latest SP Stack Kernel** provided that it contains the required correction.
 - b. Apply a **hotfix only** if you are experiencing a serious error that is fixed by this hotfix but **not** by the latest SP Stack Kernel.

Following document sections offer detailed information on how to update the kernel of AS ABAP in accordance with this kernel correction strategy. Read on to learn the essentials of the kernel correction and delivery processes:

- What is the architecture of the kernel of the Application Server ABAP?
- Which kernel releases support specific SAP NetWeaver and SAP S/4HANA installations?
- What set of kernel patches is available on SAP ONE Support portal?
- How to identify the correct kernel patch for my problem?
- Where to find information on special features and known issues for this kernel patch?
- How to apply a kernel patch in my SAP system?

2. KERNEL ARCHITECTURE

The kernel of the Application Server ABAP is the interface between the ABAP-based SAP applications and the underlying operating system. Broadly speaking, the kernel is a **separate layer** that every SAP instance is based on, with the kernel **operating the system processes of the ABAP instance**. This way **all components of AS ABAP are based on a kernel core**.

2.1 Kernel as Core of the Application Server ABAP

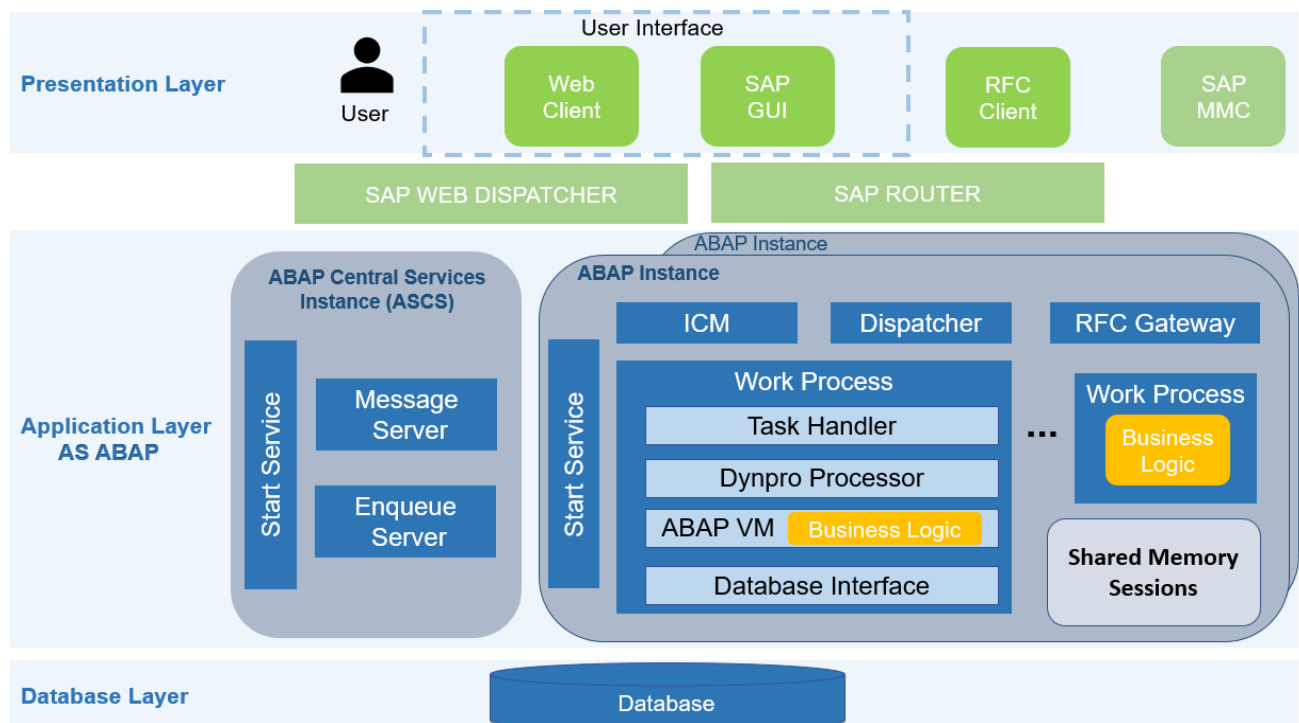
The AS ABAP is part of a three-tier architecture consisting of the database, application and presentation layers. The AS ABAP corresponds to the application layer upon which the entire business logic runs.

The AS ABAP consists of one ABAP central services instance and one or more application server instances. An instance is an administrative unit that contains various components of an SAP system, with each component executing certain processes in the system. The kernel **operates** the AS ABAP instances and is at **the core of each component** of AS ABAP. The kernel is primarily implemented in C/C++.

As a layer directly above the kernel, some core infrastructure is written in ABAP and thus runs in the ABAP Virtual Machine (ABAP VM). This infrastructure provides an interface between the kernel and all business applications written in ABAP (Business Logic).

Some of the kernel-based components are further configured as **software components** that can be **installed and patched separately** from the kernel. Examples: SAP Web Dispatcher, SAProuter, SAP Management Console (SAP MMC).

The following diagram shows the kernel-based components of AS ABAP within an SAP System. You can find detailed information on each component for your product version at <https://help.sap.com/viewer/index>.



2.2 Kernel Files

The kernel of the Application Server ABAP is implemented as a set of **executable files and shared libraries**.

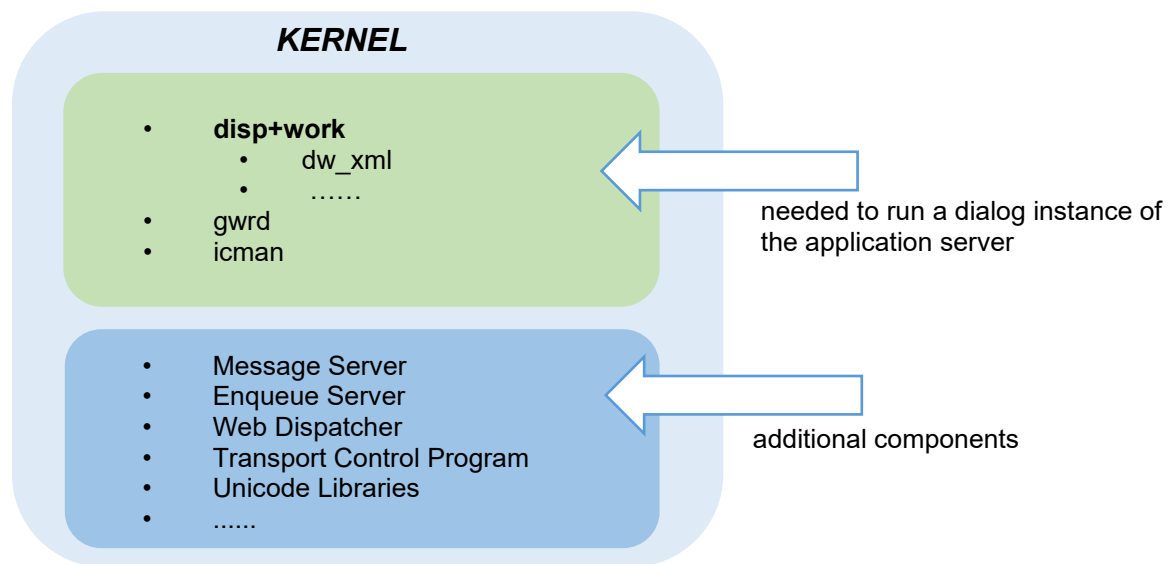
The smallest separately installable unit of the kernel consists of three executable files:

disp+work	a single executable file for both the dispatcher and the work processes
gwrđ	the gateway reader or RFC Gateway for short
icman	the Internet Communication Manager (ICM)

The RFC Gateway, the ICM, and the dispatcher are communication hubs providing input/output services for the work processes. They use shared memory for the interprocess communication. Therefore, they need to be updated as a whole. The three files are supplemented by a set of shared libraries such as dw_xml.so.

In addition, many executable files and OS level shared libraries are part of the kernel. Examples are the message server and the Enqueue Server, but also monitoring tools such as dpmon, gwmon and so on.

The following figure shows the main components of a kernel installation:



Lastly, the kernel contains database specific executables and shared libraries. For details see section 4.2.1 SP Stack Kernel.

3. KERNEL RELEASES

SAP offers a number of kernel releases supporting different SAP NetWeaver and SAP S/4HANA installations. This chapter discusses the current kernel releases for the on premise installations.

3.1 Overview of the Kernel Code Lines

Current kernel releases can be grouped into three kernel code lines: the 72x kernel, the 74x/75x kernel, and the 77x/78x kernel.

Note: To better differentiate between kernel releases and SAP NetWeaver releases, in kernel related documentation whole numbers (without '.' dot) are used for kernel releases, for example kernel 777 refers to SAP kernel 7.77.

72x kernel

The 72x code line supports SAP Business Suite 6.0 (EhP ≤ 6) with SAP NetWeaver releases 7.0 to 7.3 EhP1. It contains kernel 720, 721 and 722 and variations thereof: EXT and EX2 versions. The EXT and EX2 kernel versions support more recent OS and DB platforms, as well as newer compiler/runtime environments. For details see SAP Note [1744209](#)

- [SAP Kernel 720, 721 and 722: Versions and Kernel Patch Levels.](#)

74x and 75x kernel

The 74x and 75x code line supports SAP Business Suite 6.0 (EhP7 and EhP8) as well as SAP S/4HANA releases 1511, 1610 and 1709. This corresponds to SAP NetWeaver releases 7.4 and 7.5 and SAP NetWeaver Application Server for ABAP 7.51 and 7.52. The code line contains kernel 740 to currently 753. For details see SAP Note [1969546 - Release Roadmap for Kernel 74x and 75x.](#)

77x and 78x kernel

The 77x and 78x code line supports recent SAP S/4HANA releases from SAP S/4HANA 1809 on. It contains kernel 773 and following. For details see SAP Note [2907361](#)

- [Release Roadmap for Kernel 77x and 78x.](#)

Kernel 721 is the last kernel supporting 32-bit platforms. Note: Kernel 721 is of Maintenance since January 1st 2021.

Kernels from 72x and 74x/75x code lines are offered with both Unicode and non-Unicode versions, with SAP NetWeaver 7.4 being the last SAP NetWeaver release to support non-Unicode platforms. For details see SAP Note [2033243 - End of non-Unicode Support: Release Details.](#)

Kernel from 77x/78x code line only support Unicode platforms.

3.2 Downward Compatible Kernel

Within a kernel code line kernel releases can be **downward compatible**. In a given SAP NetWeaver/SAP S/4HANA installation you can upgrade the kernel to a newer downward compatible kernel (DCK).

Example: Kernel 777 supports not only its native SAP S/4HANA 1909 version, but you can also use it in SAP S/4HANA 1809 installations instead of kernel 773.

When a kernel release goes **out of maintenance**, it is usually replaced by a downward compatible version. The newer kernel offers new features and supports newer operating systems and databases. It is therefore **recommended to upgrade to a newer DCK kernel** as long as it supports the desired SAP NetWeaver/SAP S/4HANA release and operating system/database combination.

It is possible to keep using a kernel release after it went out of maintenance as long as it runs stable and no new features are desired. However, an out of maintenance kernel no longer receives corrections.

There is an **SAP Note for each downward compatible kernel** describing in detail the coverage and limitations/known issues when using a kernel as DCK.

Example: SAP Note [2556153 - Using kernel 7.53 instead of kernel 7.40, 7.41, 7.42, 7.45, or 7.49.](#)

The single DCK notes are listed within the roadmap notes for each kernel code line, see section 3.1.

3.3 Kernel Patch Level

Kernel patches are delivered to SAP ONE Support portal **independently for each kernel release** in form of SAP archives (kernel archives, packages). For an overview of available kernel archives see section 4.

After a kernel archive has been delivered to SAP ONE Support portal, a subsequent correction may be necessary. An updated version of this archive is then delivered. In order to differentiate between multiple versions/patches of the same kernel archive, they are labelled by distinct ascending numbers called **kernel patch levels (PL, #)**.

All kernel archives delivered at the same time (typically on the same day) receive the same patch level number.

Numeration rules:

Initially, a kernel is released internally with patch level 1. It is then deployed to internal SAP systems and patched if necessary. With each new patch the patch level **is increased by one**, e.g. PL 1, 2, 3 and so on.

A release to customer takes place a few months later **with SAPEXE and SAPEXEDB** executables at the running patch level, for example: SAPEXE_15 and SAPEXEDB_15.

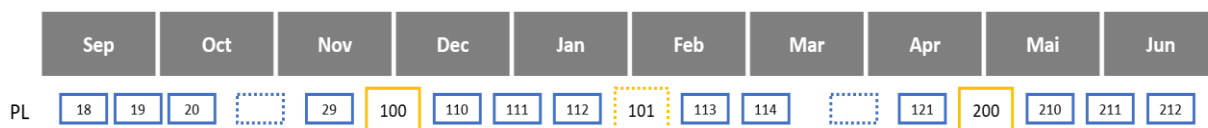
Afterwards, patch levels continue to increase by one until the first **SP Stack Kernel** is delivered. To make SP Stack Kernels easily recognizable, they are numbered by hundreds: 100, 200, 300 and so on.

Example: PL 42 can be the last regular patch level, followed by the first SP Stack Kernel release with PL 100.

Regular kernel patches resume with PL 110 (PL 210, 310 and so on). Again, with each new patch the patch level is increased by one: 110, 111, 112, 113 and so on, until the next SP Stack Kernel is delivered.

The patch numbers 101 to 109, 201 to 209, 301 to 309, and so on, are reserved for **emergency corrections of the SP Stack Kernel**. An emergency SP Stack Kernel PL 101 only contains a few select corrections on top of the SP Stack Kernel PL 100. It does not contain corrections delivered in the meantime with the regular kernel patch level 110, 111, 112 and so on. Most times there are no patches in this range.

Following figure shows a sample numeration within a kernel release:



4. KERNEL PATCHES ON SAP ONE SUPPORT PORTAL

A separate set of kernel patches is available for download on SAP ONE Support portal for each supported kernel release and platform.

4.1 From a Single Correction to a Kernel Patch

Individual corrections are implemented as changes in kernel files. **Multiple corrections** implemented over a certain **period of time** are collected into a new kernel patch. The patch delivery occurs typically once a week as long as there are new corrections available. If there are no new corrections for a certain kernel archive it is not being redelivered.

A new hotfix may contain a week's worth of corrections, whereas a new SP Stack Kernel includes several months to a year of new kernel corrections compared to the previous SP Stack Kernel.

Each kernel patch delivers **complete** and latest (updated) versions of respective kernel files. Applying a kernel patch means replacing the respective kernel files by their new versions. This has following implications:

- Kernel patches are **cumulative**. A correction contained in one kernel patch will be contained in any later kernel patch. The latest available patch delivers all available corrections for this archive.
 - Delivered **SP Stack Kernel** versions stay available to download on SAP ONE Support portal unless a version has been revoked because of a critical issue. This is by intention and in order to make sure that certain update tools and processes continue to work properly. Notice that upgrade and installation tools automatically select the latest available version.
 - For **hotfixes**, only the latest patch level is available on SAP ONE Support portal.
- Kernel patches are **reversible**. You may undo a kernel patch by simply **reverting** to the old files.

4.2 Overview of Kernel Archives

Kernel archives are delivered in the SAR format. There are three main categories of kernel archives. They differ in the impact, deployment effort and frequency of their distribution:

SAP Kernel Archive	Impact / Deployment effort	Frequency of distribution
SP Stack Kernel archives SAPEXE.SAR and SAPEXEDB.SAR	Complete replacement of the prior kernel, similar to a new kernel installation	One to three times a year depending on the kernel release
DW.SAR package	Incremental update of disp+work and related files	Regular: weekly to monthly depending on the kernel release
Patches for individual kernel files, like: R3TRANS, SAPFTP, Database library lib_dbsl	Incremental update of single files or groups of files belonging together	On demand: whenever there is a new correction available for the corresponding files

4.2.1 SP STACK Kernel

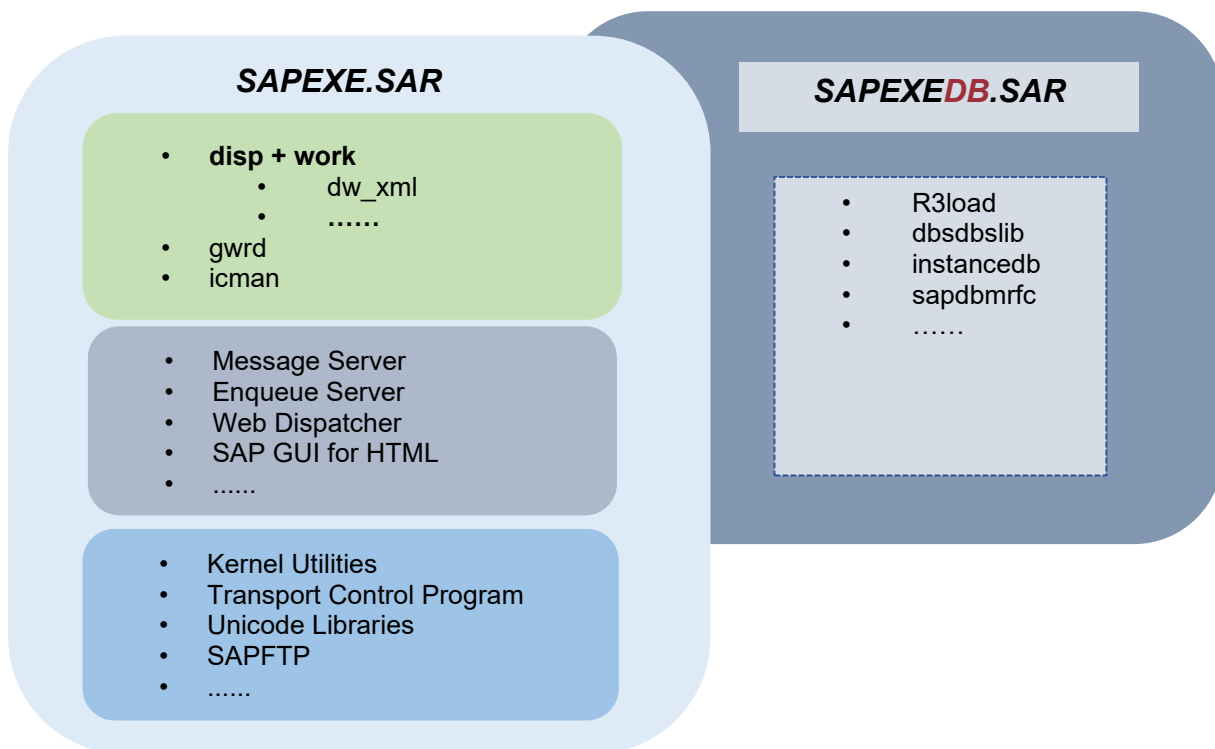
The combination of the two largest kernel correction archives **SAPEXE.SAR** and **SAPEXEDB.SAR** is called the **SP Stack Kernel**.

The SP Stack Kernel comprises the **complete set of executables and shared libraries of the kernel**:

- SAPEXE.SAR contains all files for a specific operating system that are independent of the type of the used central database
- SAPEXEDB.SAR contains all files required for a specific type of the central database

To update the SP Stack Kernel, customers need to download and install **both archives** by combining the SAPEXE.SAR with the SAPEXEDB.SAR for their platform.

The following figure shows an SP Stack Kernel installation:



4.2.2 DW.SAR Package

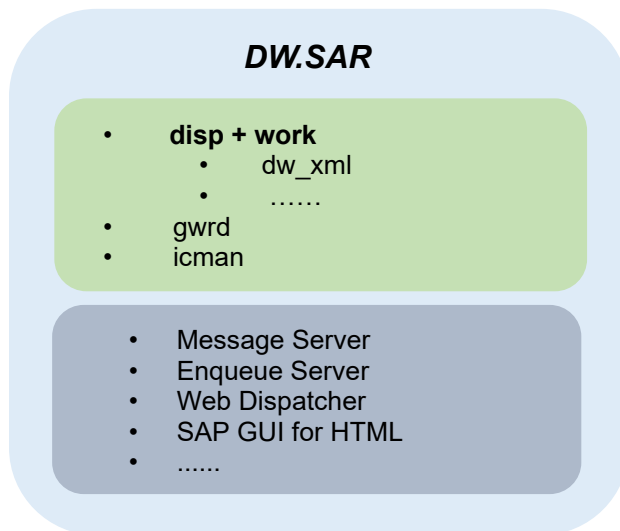
The DW.SAR package is the most important member of SAPEXE.SAR archive that is offered separately. It contains the smallest set of files that need to be replaced to update the program for the kernel runtime - the disp+work executable.

When applying a new DW.SAR package to the system, the package content must be replaced in full.

DW.SAR package includes:

- *gwr*d and *ic*m and corresponding monitoring tools *dpmon*, *gwmon*, and *icmon*
- executables for message server, Enqueue Server, Web dispatcher and so on
- many shared libraries linked to the executables at runtime that must be replaced at the same time
- for 72x and 74x/75x code lines: directories with the Java class libraries needed by the VM Container

The following figure shows the content of a DW.SAR package:



4.2.3 Patches for Individual Kernel Files

Selected files from the SAPEXE.SAR and SAPEXEDB.SAR archives (especially those not contained in the DW.SAR archive) are available for a separate update. These could be either single files or packages containing a few files that need to be replaced simultaneously.

Examples:

- Kernel utilities *dw_utils*
- Transport Control Program *tp*
- SAP GUI for HTML patch *sapwebgui*
- Unicode Libraries *UCLIB*
- Database Library *lib_dbsl*

SAP Note [2966761 - Overview of Standalone Kernel Archives](#) provides the list of individual kernel files and corresponding documentation.

SAP GUI for HTML patch *sapwebgui*:

An important kernel component that can be updated separately is SAP GUI for HTML. It is delivered with both: DW.SAR and as the standalone archive SAPWEBGUI.SAR. Both packages contain exactly the same version of SAP GUI for HTML at the same patch level.

In order to minimize the risk of side-effects in other kernel components when correcting an issue with SAP GUI for HTML, it is possible to install a *sapwebgui* patch alone, without having to install the rest of the kernel components. Please note that a *sapwebgui* patch must be installed on top of the compatible SP

Stack Kernel, for details see SAP Note [2412840 - Kernel Patch SAPWEBGUI.SAR](#).

4.2.4 Patches for Kernel-Related Software Components

Selected kernel-based components are also delivered as separate software components. Rather than using a functionality embedded in the kernel, you can install and use it as a standalone application. These software components are then patched separately from the kernel.

Examples:

- SAP Web Dispatcher
- SAProuter
- SAP Management Console
- CommonCryptoLib

Other software components like *SAP Internet Graphics Service (SAP IGS)* have dependencies to the kernel code, however they are delivered only separately from the kernel.

SAP Note [2966621 - Overview of Kernel-Related Software Components](#) provides the list of available kernel-related software components and the corresponding documentation.

4.3 Naming Convention for Kernel Patches

Given a specific patch level, the name of the corresponding kernel patch in the download section of the SAP ONE Support portal is built in accordance with the following pattern:

<Package-name>_<Patch-level>-<SAP-internal-GUID-No>.<archext>

where

- <Package-name> is the name of the corresponding kernel archive such as DW, SAPEXE, SAPEXEDB, R3trans
- <Patch-level> is the patch level
- <SAP-internal-GUID-No> is a unique ID, which is indicative of specific kernel release and platform/database combination
- <archext> is the package format, typically SAR

Example:

The disp+work package of kernel release 777 64-BIT Unicode on AIX 64BIT with PL 211 has the name:

dw_211-80004396.sar

5. HOW TO IDENTIFY THE CORRECT KERNEL PATCH?

You have a problem in the kernel that requires a kernel update. Choosing the correct kernel patch is essential in order to minimize the probability of unwanted side effects.

In order to identify the correct kernel patch, consider the following steps. Examples can be found in section 7.

5.1 Is my Kernel Release in Maintenance?

Kernel patches are only offered for kernel releases that are officially in maintenance. If a kernel release is out of maintenance, the patch will be instead provided for the DCK kernel, which makes a kernel upgrade necessary. For more details on kernel code lines and DCK kernels consult sections 3.1 and 3.2.

SAP Note [2083594 - SAP Kernel Versions and SAP Kernel Patch Levels](#) offers an overview of the supported kernel releases for current SAP NetWeaver/SAP S/4HANA versions.

5.2 What is the Patch Level of My Correction?

A separate **SAP Note** is created for each discovered issue requiring a kernel correction. The SAP Note details the kernel issue with symptom, prerequisites and solution, as well as a workaround if available.

The correction will be delivered for **all kernel releases** listed under “**Software Components**” section of the corresponding SAP Note.

As soon as the correction is delivered for the specific kernel release, the **exact patch level** can be found under “**Support Package Patches**” section. The correction is then included in this patch level and in all subsequent patch levels.

If the patch level is not yet listed for your kernel release, then the correction for this release has not yet been delivered. The entry will be added upon the delivery of the correction.

5.3 Is my Correction Part of an SP Stack Kernel?

Provided that the patch level of the correction is **less** than or **equal** to the patch level of the latest available SP Stack Kernel, this correction is also part of this SP Stack Kernel. Apply the **latest SP Stack Kernel** in this case. For more details on SP Stack Kernel see sections 4.2 and 4.2.1.

Motivation:

An SP Stack Kernel installation is the most stable and thoroughly tested kernel that bears a much lower risk of negative side-effects.

The SP Stack Kernel aims to be free of all known kernel regressions. Before an SP Stack Kernel delivery, the kernel undergoes several weeks long code freeze to better stabilize it, with only few selected corrections fixing regression errors and critical issues being implemented. Other corrections are postponed until after the SP Stack Kernel release.

During the code freeze the kernel is also used in SAP internal production systems so that issues that arise in production environments can be recognized and fixed prior to the delivery to customers.

At the end of the code freeze the new SP STACK Kernel is built and thoroughly validated in combination with the supported SAP NetWeaver/SAP S/4HANA versions to ensure its downward compatibility.

Emergency SP Stack Kernel:

Sometimes an emergency SP Stack Kernel is released on top of the original SP Stack Kernel. This happens if a severe error went undetected into the original SP Stack Kernel because, for example, it only occurs under very special conditions.

Emergency SP Stack Kernel versions can be recognized by their numbering: If an SP Stack Kernel has patch number 100, the emergency SP Stack Kernels have version numbers 101, 102, ... ,109.

The emergency SP Stack Kernel is considered the latest SP Stack Kernel. It replaces the original SP Stack Kernel as the “go-to-kernel”.

Since the emergency SP Stack Kernel only adds a few corrections for typically very special and rare situations, you should consult the release notes for the emergency SP Stack kernel to verify if your installation is affected at all.

Customers that have the original SP Stack Kernel installed:

- should update their installation to the emergency SP Stack Kernel only, if they are affected by the issue that caused the emergency correction.
- can (and should!) keep using the original SP Stack Kernel as the stable and thoroughly tested kernel if they are not affected by the error that led to the emergency SP Stack Kernel.

Consult the Information about SP Stack Kernel:

There is a dedicated **release note** for each SP Stack Kernel describing important changes since the previous SP Stack Kernel. It lists the new features, system parameter changes, and the known issues with the SP Stack Kernel. Please consult the release note prior to an update.

If upgrading from an earlier kernel release, also consult the **DCK note** for the new kernel release.

SAP Note [2083594 - SAP Kernel Versions and SAP Kernel Patch Levels](#) lists the latest SP Stack Kernels for the in maintenance kernel releases and provides links to the corresponding release notes and DCK notes.

In addition, new SP Stack Kernel releases get announced on the **News page**:

[**SAP Kernel: Important News**](#). Please subscribe to receive updates.

5.4 Is my Correction delivered as a Hotfix?

In case you are experiencing a serious error that is **not yet fixed** by the latest available SP Stack Kernel, **the latest hotfix must be applied**.

Before applying a hotfix consider if there is a viable **workaround** that does not require a kernel update. In such a case it might be advisable to wait for the next SP Stack Kernel containing the desired correction.

Motivation:

Hotfixes run through a thorough hierarchy of tests ranging from unit tests within SAP's development organization to automated regression tests in SAP's production unit.

Nevertheless, the test coverage of hotfixes is limited compared to an SP Stack Kernel by their weekly schedule and the imminent urgency of their publication.

Update Options:

Two kinds of hotfixes can be differentiated: DW.SAR package and patches for individual kernel files. For details see sections 4.2, 4.2.2 and 4.2.3.

Certain kernel-based components can be patched separately from the kernel by patching the corresponding kernel-related software component. For details see section 4.2.4.

In order to minimize the impact and the possible side-effects of a hotfix, it is advisable to update **as few files as possible**. Since the DW.SAR package consists of many different and crucial kernel files, consider if alternative update options are available:

- Patches for individual kernel files. For details see SAP Note [2966761 - Overview of Standalone Kernel Archives](#)
- Patches for kernel-related software components. For details see SAP Note [2966621 - Overview of Kernel-Related Software Components](#)

6. CONSULT THE INFORMATION ON KNOWN KERNEL ISSUES

Despite the extensive testing, it is not always possible to completely avoid issues with the kernel. SAP aims at **maximum transparency** towards the customers. The information on detected kernel issues is published as soon as possible in form of SAP Notes. **Please check all relevant SAP Notes before applying a kernel update:**

Note Type	Validity / Scope
Correction Note	A separate correction note is created for each new discovered kernel issue. For details see section 5.2.
Release Note	<p>A release note is published for each delivered SP Stack Kernel in each kernel release. It describes what is new in this SP Stack Kernel compared to the previous one.</p> <p>Search “SAP Support Package Stack Kernel 7.<XX>” for the list of all release notes in the respective kernel release, for example Kernel “7.53”.</p> <p>A release note gets updated in case there is a severe issue with the SP Stack Kernel.</p>
Regression Note	<p>A regression note is published for each delivered kernel patch level (SP Stack Kernels and hotfixes). It references single correction notes that each describe a known kernel regression occurring at this kernel patch level. Read the regression note thoroughly before the kernel patch installation. Check if those regressions apply to your system, and if so how to correct them.</p> <p>For more details on how to find regression notes for given patch level see SAP Note: 1802333 - Finding information about regressions in the SAP kernel</p> <p>Regression notes get updated as soon as new relevant regressions are detected.</p>
DCK Note	<p>A DCK note describes in detail the coverage and known issues if using a kernel release as DCK kernel. Check the DCK note before a kernel upgrade.</p> <p>Refer to Note 2083594 for links to specific DCK notes.</p> <p>DCK notes get updated as soon as new relevant DCK issues are known.</p>

It is a good idea to **subscribe to a specific SAP Note** to receive notifications whenever the SAP Note text is updated.

For a list of important SAP Notes see section 9.

In addition, please **subscribe to the “Important News page”** [SAP Kernel: Important News](#), where SAP announces:

- new SP Stack Kernel releases
- severe issues in kernel.

7. UPDATING KERNEL: EXAMPLES

Note: Examples refer to the patch levels available in October 2020.

Example 1: Kernel Upgrade with DCK Kernel

You have an SAP NetWeaver 7.5 installation with kernel 745. Kernel 745 is no longer in maintenance and you wish to upgrade to a newer kernel release.

SAP Note [2083594 - SAP Kernel Versions and SAP Kernel Patch Levels](#) lists the suitable DCK kernels that replace kernel 745: kernel 749 and kernel 753.

You decide to upgrade to kernel 753 in order to receive the latest features. In addition kernel 753 will be longer in maintenance according to SAP Note [1969546 - Release Roadmap for Kernel 74x and 75x](#).

SAP Note [2083594](#) also lists the latest SP Stack Kernel for release 753 that should be used for the upgrade: PL 700.

Before the upgrade: Check out the DCK note for kernel release 753, as well as the release note and the regression note for kernel 753 PL 700.

Example 2: Apply an SP Stack Kernel to correct a Kernel Regression

You have an SAP S/4HANA 1909 installation with kernel 777 PL 115. Unfortunately, work processes crash in warehouse transactions.

Searching for “KRNL777PL115” in “Knowledge Base” section at SAP ONE Support portal you find the regression note [2910194 - Known regressions in kernel 7.77 patch level 115](#).

SAP Note [2910194](#) references SAP Note [2932061 - webgui: fixed work process crash caused memory corruption in DPoD](#), which describes a regression matching the observed behavior.

The “Support Package Patches” section of SAP Note [2932061](#) lists the kernel patch levels correcting the regression.

Support Package Patches		
Software Component	Support Package	Patch Level
SAP KERNEL 7.73 64-BIT UNICODE	SP257	000257
SAP KERNEL 7.77 64-BIT UNICODE	SP123	000123

For the kernel release 777 (here: SAP KERNEL 7.77) the correction has been already delivered with patch level 123.

According to the SAP Note [2083594 - SAP Kernel Versions and SAP Kernel Patch Levels](#) the latest released SP Stack Kernel for kernel 777 is PL 200.

Since PL 123 is smaller than PL 200, the correction is also included in the latest **SP Stack Kernel**. The SP Stack Kernel 777 PL 200 should be applied to correct the regression.

Example 3: Applying a Standalone Kernel Archive (SAPWEBGUI.SAR)

You have an SAP S/4HANA 1909 installation with Kernel 777 PL 115 and want to apply the correction from the SAP Note [2923109 - SAP GUI for HTML: URL parameter are ignored or options/settings are not permanently stored](#).

According to “Support Package Patches” section of SAP Note [2923109](#) the correction has been delivered in kernel 777 with PL 210.

Support Package Patches		
Software Component	Support Package	Patch Level
SAP KERNEL 7.53 64-BIT	SP620	000620
SAP KERNEL 7.53 64-BIT UNICODE	SP620	000620
SAP KERNEL 7.73 64-BIT UNICODE	SP256	000256
SAP KERNEL 7.77 64-BIT UNICODE	SP210	000210

According to SAP Note [2083594 - SAP Kernel Versions and SAP Kernel Patch Levels](#) the latest released SP Stack Kernel for kernel 777 is PL 200.

Since PL 210 is greater than PL 200, the correction is not yet included in the latest SP Stack Kernel. **The latest hotfix** must be applied instead.

According to SAP Note [2966761 - Overview of Standalone Kernel Archives](#) SAP GUI for HTML patches are delivered either as part of DW.SAR package or as the standalone kernel archive SAPWEBGUI.SAR.

In order to minimize the risks, SAP recommends updating the SAPWEBGUI.SAR archive as it contains fewer changes compared to the DW.SAR package.

The sapwebgui patch must be applied on top of the preceding SP Stack Kernel because of its compatibility settings as stated in SAP Note [2966761](#). As result, you have to update to SP Stack Kernel 777 PL 200 first and then deploy the sapwebgui patch.

Currently sapwebgui package PL 220 is available for download at SAP ONE Support portal. Since patches are cumulative, sapwebgui package PL 220 also contains the correction initially delivered with PL 210. Hence, PL 220 should be deployed.

Don't forget to check the regression note for kernel 777 PL 220 and the release note for SP Stack Kernel 777 PL 200 before updating.

Tip: If you are unsure whether a standalone kernel archive contains the desired correction, check its “Content Info”. You can find it in the Download section under “Related Info” of the archive. The “Content Info” typically lists all correction notes that are included in the latest patch level for the respective kernel archive. If the correction is not listed contact SAP Support.

8. DEPLOYING KERNEL PATCHES IN THE SYSTEM

Once the kernel patch is downloaded from SAP ONE Support portal, it needs to be deployed to the system. For more details on **how to download and deploy kernel patches** refer to SAP Note [19466 - Downloading SAP kernel patches](#).

In the past, deploying kernel patches was a manual process, requiring shutting down the system, copying the new executable files to the executable directory and restarting the system. To minimize the system downtime, **Rolling Kernel Switch (RKS)** was introduced.

RKS is used to update the kernel by simultaneously running several application server instances with different kernel patch levels in one system. It allows to exchange the kernel of each application server instance in turn until all instances are updated, hence no system downtime is needed.

There is a manual RKS procedure for 7.2x releases. As of 7.4x/75x and 77x/78x releases, an automatic RKS procedure is provided, for details see SAP Note [953653 - Rolling Kernel Switch](#) and SAP documentation [Automated Rolling Kernel Switch \(RKS\)](#).

9. SUMMING UP & IMPORTANT LINKS

1. Follow the [SAP Support Package Stack Strategy](#) for SAP software products. Perform additional SAP kernel updates only if you need to solve a problem in the system.
2. Check if kernel is still in maintenance, else update to an available **DCK kernel**.
3. Apply the **latest SP Stack Kernel** provided that it contains the desired correction(s).
4. **Only** in case the issue is not fixed with the latest SP Stack Kernel, apply the **hotfix**.
 - Apply patches for the individual kernel files if available to minimize the impact.
5. **Before the kernel update check all relevant SAP Notes:**
 - Release note for the SP Stack Kernel
 - Regression note for the SP Stack Kernel and hotfixes
 - DCK note if upgrading to a new kernel release
 - Correction note for the specific kernel issue
6. Subscribe to [SAP Kernel: Important News](#)

IMPORTANT NOTES:

[2083594 - SAP Kernel Versions and SAP Kernel Patch Levels](#)

SAP Note 2083594 lists the latest available SP Stack Kernel in maintenance code lines with links to corresponding release and DCK notes.

[1802333 - Finding information about regressions in the SAP kernel](#)

Roadmaps for the kernel code lines:

[1744209 - SAP Kernel 720, 721 and 722: Versions and Kernel Patch Levels](#)

[1969546 - Release Roadmap for Kernel 74x and 75x](#)

[2907361 - Release Roadmap for Kernel 77x and 78x](#)

[19466 - Downloading SAP kernel patches](#)

[2966761 - Overview of Standalone Kernel Archives](#)

[2966621 - Overview of Kernel-Related Software Components](#)

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