

Developer Guide | PUBLIC
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SAP GUI Scripting Security Guide

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1 Introduction

The SAP GUI Scripting API is an automation interface that enhances the capabilities of SAP GUI for Windows. Using this interface, end users may automate repetitive tasks by recording and running macro-like scripts. Administrators and developers on the other hand may build tools for server-side application testing or client-side application integration.

From the SAP server's point of view there is no difference between SAP GUI communication generated by a script and SAP GUI communication generated by a user. For this reason a script has the same rights to run SAP transactions and enter data as the user starting it. In addition, the same data verification rules are applied to data entered by a user and data entered by a script.

However, just as a person might make mistakes that cannot be detected by a verification rule, an error in a script may cause bad data to be entered into the system without being detected immediately. A script runs significantly faster than manual interaction with a system, though, and it may also run unattended. It is therefore likely that a bad script can generate more bad data than a user before the mistake is detected.

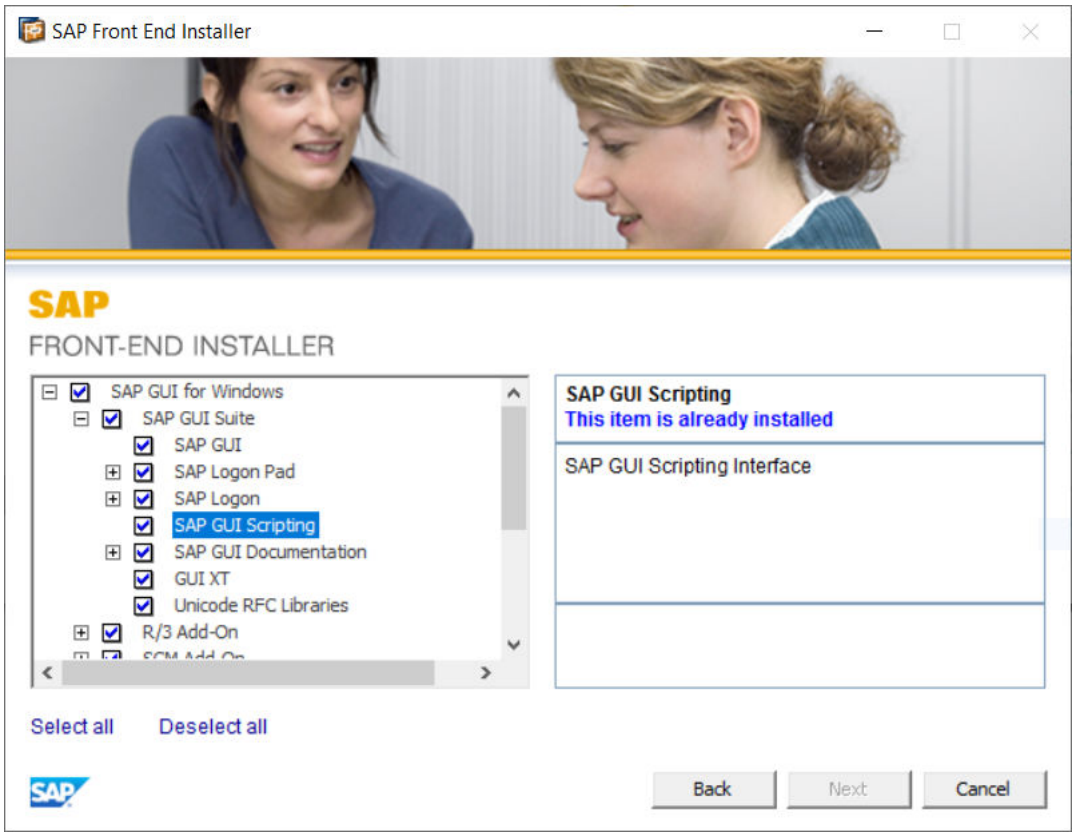
The main focus of the SAP GUI Scripting security considerations is to prevent scripts from being run accidentally or unbeknownst to the user. This also prevents user interaction from being recorded without the user's consent.

In the following chapters, we will describe the available security measures that are implemented on different levels of the system architecture.

2 Installation

On any client PC, SAP GUI Scripting is only available if it has been installed. The SAP GUI Scripting support is included in the SAP GUI installation per default. However, an administrator can prevent SAP GUI Scripting from being installed. Using `NWSAPSetupAdmin.exe`, the administrator can create an installation package without Scripting and then prevent users from selecting components manually. Installation packages can be assigned to single users or to a group of users so that an administrator can easily define who will be able to use SAP GUI Scripting and who will not.

If a user has the right to select components, he or she can exclude SAP GUI Scripting by not selecting the entry in the list of components.



Local administrator privileges are required to run the SAP GUI installation, unless a central installation server is used. A non-admin user can therefore not enable SAP GUI Scripting even if he or she has access to a SAP GUI installation medium.

It is possible for the administrator to disable SAP GUI Scripting on certain client machines even after it has been installed. All that needs to be done is to set the REG_DWORD registry value

`HKEY_LOCAL_MACHINE\SOFTWARE\SAP\SAPGUI Front\SAP Frontend Server\Security\UserScripting`

to **`0`**. This will disable SAP GUI Scripting and cannot be overridden by users who do not have access to the HKEY_LOCAL_MACHINE branch of the Windows registry.

Please note, that on 64bit operating systems when running a 32bit version of SAP GUI for Windows the value mentioned above needs to be created under

`HKEY_LOCAL_MACHINE\software\Wow6432Node\sap\SAPGUI Front\SAP Frontend Server\Scripting`.

SAP GUI Scripting makes use of an ActiveX object called `sapfewse.ocx`. Even though SAP applies strict security policies ActiveX objects may be vulnerable to attacks. Therefore, SAP has decided to set the so-called "killbit" for the SAP GUI Scripting ActiveX object (see SAP Note 1261706 for more information). Setting the killbit does not have any effect on SAP GUI Scripting at all except for scenarios where `sapfewse.ocx` is called directly from a web page.Such scenarios are not required for running SAP GUI Scripting with SAP GUI for Windows and are not supported by SAP.

3 Protecting Critical SAP Systems

By default SAP GUI Scripting is disabled on any given SAP system. The administrator has to enable the support by setting the profile parameter `sapgui/user_scripting` to **TRUE** on the application server. That way an administrator can enable scripting either for all users of a given system by setting the parameter on all application servers or for a certain group of users by setting the parameter only on certain servers, which may have special access restrictions. See also section Modes for Server Side Protection [page 8].

On the other hand, it is possible to completely prevent scripts from being run against a specific SAP system. This might be desirable to protect mission critical data from being corrupted or downloaded.

The profile parameter requires the following kernel patch levels and SAP support packages:

- 6.20 and following: Standard
- 6.10: Kernel 6.10 patch level 360, support package SAPKB61012
- 4.6D: Kernel 4.6D patch level 948, support package SAPKB46D17
- 4.6C: Kernel 4.6D patch level 948, support package SAPKB46C29
- 4.6B: Kernel 4.6D patch level 948, support package SAPKB46B37
- 4.5B: Kernel 4.5B patch level 753, support package SAPKH45B49
- 4.0B: Kernel 4.0B patch level 903, support package SAPKH40B71.
- 3.1I: Kernel 3.1I patch level 650, support package SAPKH31I96.

The currently installed kernel patch level can be checked on the status dialog of you SAP system. Select the dialog from the system menu and open the kernel information window by clicking on the *Other kernel info* button on the toolbar. The patch level is displayed in the *Sup. Pkg. Lvl.* or *Patchlevel* field.

To check the support package level of an SAP system, go to transaction **SPAM** and press the *Package level* button. For SAP system releases 4.5B and below check the line *SAP_APPL*, for higher versions the *SAP_BASIS* line is relevant.

For the following systems the parameter can be set dynamically using transaction *rz11* instead of changing the profile file and re-starting the application server:

- 6.20 and following
- 6.10: Kernel 6.10 patch level 391
- 4.6D: Kernel 4.6D patch level 972
- 4.6C: Kernel 4.6D patch level 972
- 4.6B: Kernel 4.6D patch level 972

To set the parameter run transaction **`rz11`**, enter the parameter name `sapgui/user_scripting` and press the *Display* button. If the parameter is not found then the support package level of the system does not suffice. On the following screen, the *Current value* entry should be **TRUE**. If it is displayed as **FALSE**, press the *Change value* button on the toolbar, set the value to **TRUE** and save it.

> **Note**
>
> The value must be entered in uppercase; otherwise it will be interpreted as **FALSE**.

If the SAP system has several application servers and uses load balancing you may want to set the *Switch on all servers* check box. Otherwise, the parameter is only set when you log into the current application server.

After saving the value, the *Current value* should change to **TRUE**. If the value does not change, then make sure that the appropriate kernel patch has been installed.

The scripting support will then be enabled the next time you log into the server.

See SAP Note 480149 for additional information.

4 Modes for Server Side Protection

The profile parameter described in the previous chapter controls the availability of SAP GUI Scripting in an all-or-nothing kind of way. Some users have asked for a more fine grained approach. This would allow them to enable only those features of SAP GUI Scripting that are required for their specific application.

In response to these requests, we have added additional profile parameters that modify the behavior of the `sapgui/user_scripting` profile parameter.

sapgui/user_scripting_disable_recording

This parameter disables all SAP GUI Scripting events for the system on which it is set. It is still possible to run previously recorded or written scripts. However, it is not possible to record new scripts or log any other type of information in response to SAP GUI Scripting events.

sapgui/user_scripting_set_readonly

In SAP GUI Scripting's read only mode only a subset of the API can be used from a script. This comprises read access to properties and calling read only functions. This mode is typically used when SAP GUI runs together with a Screenreader Software or for the side panels in SAP Business Client.

Please note that the read-only restriction applies to the state of the SAP GUI session on the server. This implies that you may not execute any call which changes the data stream sent to the server, even if no actual database update is attempted.

The installation requirements for `sapgui/user_scripting_set_readonly` and `sapgui/user_scripting_disable_recording` are as follows:

SAP Kernel:

- 46D: The support is introduced in patch 1698.
  Correct RZ11 support requires patch 2098.
- 620: The support is introduced in patch 1223.
  Correct RZ11 support requires a 640 kernel.
- 640 and following: Supported
  Correct RZ11 support available.

SAP_Basis:

- 46C: Support package required (SAPKB46C47)
- 620: Support package required (SAPKB62037)
- 640: Supported.
- 700: Support package required (SAPKB70011)
- 710 and following: Supported.

For further requirement information, see also SAP Note 692245.

sapgui/user_scripting_per_user

In some cases, it is not desired to enable SAP GUI Scripting for all users and no dedicated application server for serving users which are allowed to run SAP GUI Scripting is available. This implies that users who are allowed

to use SAP GUI Scripting work on the same server as others. For supporting such a scenario, an even more fine-grained approach is required.

The problem can be solved by setting the rights to run SAP GUI Scripting per user. The new profile parameter `sapgui/user_scripting_per_user` allows the administrator then to enable SAP GUI Scripting support for specific users. Unless the administrator explicitly changes the value, this parameter is set to **FALSE**. If the profile parameter is set to **TRUE** the following happens:

- On the login screen SAP GUI Scripting is available for every user.
- After login, SAP GUI Scripting only remains available for those users that have the authorization for the Execute(16) action of the authorization object *S_SCR* in class *BC_A*.

The following software versions are required to use this new functionality:

- 6.40: Kernel 6.40 patch level 159, support package SAPKB64020
- 7.00: Kernel 7.00 patch level 87, support package SAPKB70011
- 7.10 and following
  For more information on the requirements, see SAP Note 983990.

> **Note**
>
> These parameters will only take effect after SAP GUI Scripting has been enabled using the parameter `sapgui/user_scripting`.

sapgui/nwbc_scripting

Use this profile parameter, if you do not want to give full scripting authorizations, but still want the users to be able to use side panels in SAP Business Client. This has the same effect as using `sapgui/user_scripting` together with `sapgui/user_scripting_set_readonly`.

This parameter is part of the SAP NetWeaver Kernel as of release 7.21.

See also: Mode Combination for Server Side Protection [page 10]

5 Mode Combination for Server Side Protection

The usage of SAP GUI Scripting can be restricted by the means of the profile parameters mentioned in section Modes for Server Side Protection [page 8]. Two of these parameters are:

- `sapgui/user_scripting_per_user` (decide whether SAP GUI Scripting is permitted based on an authorization object *S_SCR* assigned to users)
- `sapgui/user_scripting_set_readonly` (activate a read only version of SAP GUI Scripting for all users)

Up to patchlevel 16 of SAP GUI for Windows 7.40 and patchlevel 3 of SAP GUI for Windows 7.50 these parameters could not be combined. When the parameter `sapgui/user_scripting_set_readonly` was activated, values for parameters `sapgui/user_scripting_per_user` were ignored and all users held only read only version SAP GUI Scripting authorizations. Therefore, it was impossible to assign some users full SAP GUI Scripting authorizations and all others read-only SAP GUI Scripting authorizations.

However, there are scenarios in which it may be desired to use a combination of full SAP GUI Scripting support for some users and read-only Scripting support for others (for example when SAP Enable Now is used for all others and full SAP GUI Scripting is required by some other users). Until now, such a scenario could only be realized by assigning the respective user groups to different application servers via dedicated logon groups.

In order to protect customers who are already using the two parameters we have implemented a switch that allows combining the two parameters. The default behavior remains unchanged. You can switch to the new behavior when setting the following registry value (REG_DWORD) to "1":

64bit operating system when running a 32bit version of SAP GUI for Windows:

```
HKEY_LOCAL_MACHINE\SOFTWARE\WOW6432Node\SAP\SAPGUI Front\SAP Frontend
Server\Security\ScriptingPerUserAccountExecute
```

32bit operating system or 64bit operating system when running a 64bit version of SAP GUI for Windows:

```
HKEY_LOCAL_MACHINE\SOFTWARE\SAP\SAPGUI Front\SAP Frontend
Server\Security\ScriptingPerUserAccountExecute
```

The behavior is as follows:

- If only `sapgui/user_scripting_per_user` is set, all users with the authorization object have full SAP GUI Scripting authorizations, all other users have no SAP GUI Scripting authorizations
- If only `sapgui/user_scripting_set_readonly` is set, all users have read only SAP GUI Scripting authorizations
- If both parameters are combined (=new behavior), those users which have the authorization object have full SAP GUI Scripting authorizations, all other users have read only SAP GUI Scripting authorizations

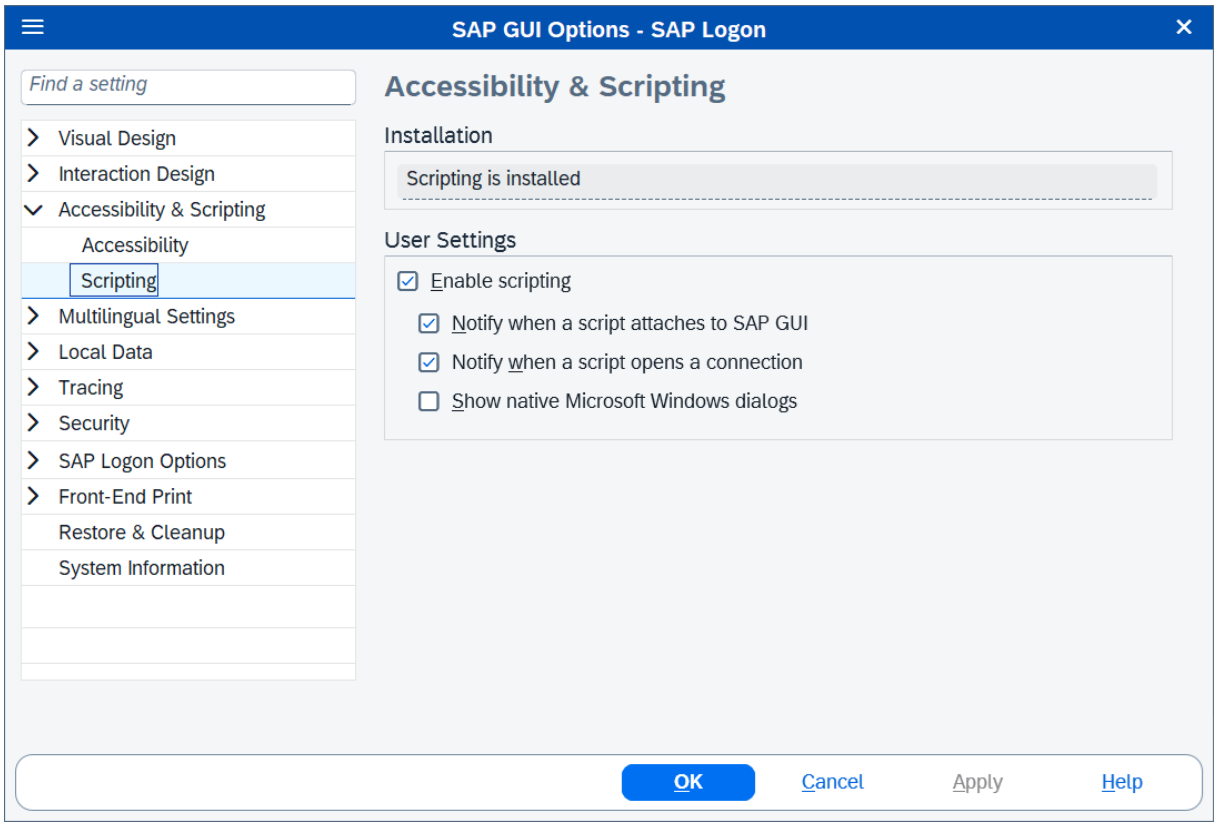
You find more information in SAP Note 2565390. Attached to this note, you find a flow chart that compares the former and new behavior.

6 Protection on the Client Level

If the administrator has enabled scripting for end users, a given user can still disable it by setting the registry value `UserScripting` in the `HKEY_CURRENT_USER\SOFTWARE\SAP\SAPGUI Front\SAP Frontend Server\Security` key to `0`. To enable scripting, the user can set the key back to the default value of `1`.

In addition, a user may want to be notified whenever a script attempts to access the running SAP GUI or whenever a script attempts to open a connection to an SAP system. This can be done by setting the registry values `WarnOnAttach` and/or `WarnOnConnection` in `HKEY_CURRENT_USER\SOFTWARE\SAP\SAPGUI Front\SAP Frontend Server\Security` or `HKEY_LOCAL_MACHINE\SOFTWARE\SAP\SAPGUI Front\SAP Frontend Server\Security` to the default value of `1`. Setting these values to `0` will prevent the message popup. Settings under `HKEY_CURRENT_USER` have priority over settings under `HKEY_LOCAL_MACHINE`.

These registry settings can also be set through the *SAP GUI Options* dialog that can be called from the Control Panel, SAP Logon (Pad) or a running SAP GUI session.



If the administrator or the user has chosen **not** to install Scripting, then the User Settings are not available.

Since in Accessibility scenarios SAP GUI Scripting is used, it is recommended that users disable the notification regarding attaching scripts to SAP GUI before starting SAP GUI.

> **Note**
>
> The notifications serve to protect the user from running scripts unintentionally and potentially undiscovered. You should only deactivate these notifications, if this is really required for example for screen reader support.

Enforcing the Notification to End Users When a Script Attaches to SAP GUI for Individual SAP Systems

If you want to establish an explicit additional protection of specific SAP systems against scripts that are unintentionally executed by users, you can activate the `sapgui/user_scripting_force_notification` profile parameter.

Setting this profile parameter to `TRUE` in an SAP system results in the following behavior:

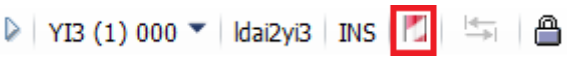
- If a script is started **after** a connection to this SAP system has been established and the script is targeting this connection:
  - The user is asked via a dialog box whether SAP GUI scripting is supposed to be allowed or not.
    - If the user declines, SAP GUI scripting is disabled for this connection.
    - If the user accepts, SAP GUI scripting will be allowed.
  - When another attempt to use the same connection via SAP GUI scripting is made, the user is asked again.
- If a script is started **before** a connection to this SAP system has been established:
  - As soon as SAP GUI can determine that a system uses `sapgui/user_scripting_force_notification`, the user is asked via a dialog box whether SAP GUI scripting is supposed to be allowed or not.
    - If the user declines, SAP GUI scripting is disabled for this connection.
    - If the user accepts, SAP GUI scripting will be allowed.
  - When another attempt to use the same connection via SAP GUI Scripting is made, the user is asked again.

Further Information

- Technical prerequisites related to SAP GUI for Windows and SAP Kernel for using this feature are listed in 3591984. Additionally, an SAP system with at least SAP_BASIS 7.00 is required.
- From a technical perspective, each call to `GetScriptingEngine` will trigger a dialog box for all connections with `sapgui/user_scripting_force_notification` active.
- If a user has declined SAP GUI scripting access for a connection, SAP GUI scripting will remain disabled for this connection and the user will not be prompted again.
- Combining this profile parameter with the notifications that can be activated via the SAP GUI options dialog (see above) may in some cases result in multiple dialog boxes asking the user for confirmation.

> **Note**
>
> If you just want to prevent your users from changing the notification settings mentioned above, the recommended way is to use the read-only feature of the SAP GUI options dialog (more information can be found in the SAP GUI Administration Guide).

Indicator Icon for a Currently Running Script

In the Blue Crystal theme and older themes, the user is notified about a script's execution through an animated icon on SAP GUI's status bar: 

While a script is running, the icon in the red rectangle is animated. The icon's tooltip will also notify you if SAP GUI Scripting is disabled for some reason.

In the Belize theme and newer themes, this notification icon has been moved into the system information section in the header area: 

While a script is running the icon above will be displayed in green. The icon's tooltip will also notify you if SAP GUI Scripting is disabled for some reason.

Disable Writing to Disk

You can also disable the scripting functionality to write information to the hard disk. This is done via the registry value `DisableWriteToDisk` under the following registry path:

`HKEY_LOCAL_MACHINE\software\sap\SAPGUI Front\SAP Frontend Server\Scripting`

You can switch to the new behavior, when setting the registry value (REG_DWORD) to **1**.

Please note that on 64bit operating systems when running a 32bit version of SAP GUI for Windows, the value mentioned above needs to be created under `HKEY_LOCAL_MACHINE\Software\Wow6432Node\sap\SAPGUI Front\SAP Frontend Server\Scripting`.

7 Notes for Users

Windows Script Host and SAP GUI for Windows

The SAP GUI for Windows script recorder can record scripts using JScript (Javascript) or VBScript (Visual Basic Script). To automate tasks, users can modify such scripts by adding commands from these powerful scripting languages and can run those scripts directly from the file system of the client PC. As an alternative, users can also migrate scripts into other script languages like Powershell.

The execution of such scripts directly from the file system of the client PC requires the Windows Script Host (WSH) or other environments like Powershell to be installed. However, tools for automatic testing or client analysis such as eCATT will typically not use this approach and therefore do not need the Windows Script Host / Powershell.

When run for example via Windows Script Host the scripting languages mentioned above are capable of accessing the file system and the Windows registry, and they can execute arbitrary commands (given the authorizations). This allows very powerful automation approaches, but it can also cause security concerns. In the past, the WSH has on some occasions been used by computer viruses encoded as VBScript to attack a machine. Therefore, SAP does not generally encourage customers to install / activate WSH or similar environments. As long as scripts are not run from the file system, SAP GUI for Windows does not need these environments.

Do not write passwords into scripts

A user may decide to store scripts locally on his /her client PC. As a script can be used to start a connection, the user might try to automate the login process by writing his login data (user/password) into the script. We strongly discourage users from doing so, because scripts are not encrypted and anybody having access to the file can read the login data. If such a script can be obtained by another user, the credentials of the user who wrote the script have been compromised.

Instead of this approach, if an automated login is really required, SAP GUI connections opened from a script should use SSO enabled connections (for example via the method OpenConnection of GuiApplication using the description of an SSO / SNC enabled connection in SAP Logon).

8 Security Q&A

1. Can a script corrupt the SAP system's data?
   No. All changes done from a script are subject to the same data validation rules as end user interaction.
2. Can a script influence the system performance?
   Yes. A script executes significantly faster than an end user, and may therefore put more load onto the system.
3. Can a script access data for which the end user does not have the necessary privileges?
   No. The script has only access to the data to which the end user has access rights.
4. Can a script export data that the end user could otherwise not export?
   Yes. Even if the download of a list is not allowed, an end user can extract the data from SAP GUI. Of course, the end user could also create a screen shot instead. SAP GUI Scripting can only export data that is displayed on the screen.
   A script developer can, for example, create a script that iterates through a Table Control or ALV Grid Control and captures the values from all cells. This can be used to emulate a download of all data in this Table Control / ALV Grid Control. Of course the user could do the same by focusing each cell individually and using CTRL+C. However, a script would allow doing this more conveniently. If you need to check data accessed by users, you should consider using Read Access Logging.
5. Can a script record end user interaction with SAP GUI?
   Yes. However, the end user will be notified about this, unless he disabled the notification.
6. Can a script record passwords?
   No. Passwords are never recorded and, thus, you cannot replay a script which recorded actions on a logon screen without further modification. However, we strongly discourage storing password in SAP GUI Scripts and you should be aware that you must comply with SAP End User Agreements and cannot simply distribute scripts running under the same user account to all users.
7. Can a script run in the background without the end user's knowledge?
   No. The end user will be notified when the script starts, unless she disabled the notification. In addition, SAP GUI Scripting needs to display SAP GUI for running a script. Regardless of this, users should be careful when executing scripts and should only run scripts from trusted sources."
8. Can SAP GUI Scripting be used to corrupt the client PC?
   No. The functionality of SAP GUI Scripting is limited to driving SAP GUI. However, if you use the Windows Script Host or similar environments to access the SAP GUI Scripting interface, the functionality of the scripting languages (like VBScript or Jscript) or the Windows Script Host object model could theoretically be used to perform arbitrary operations on the client PC.

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