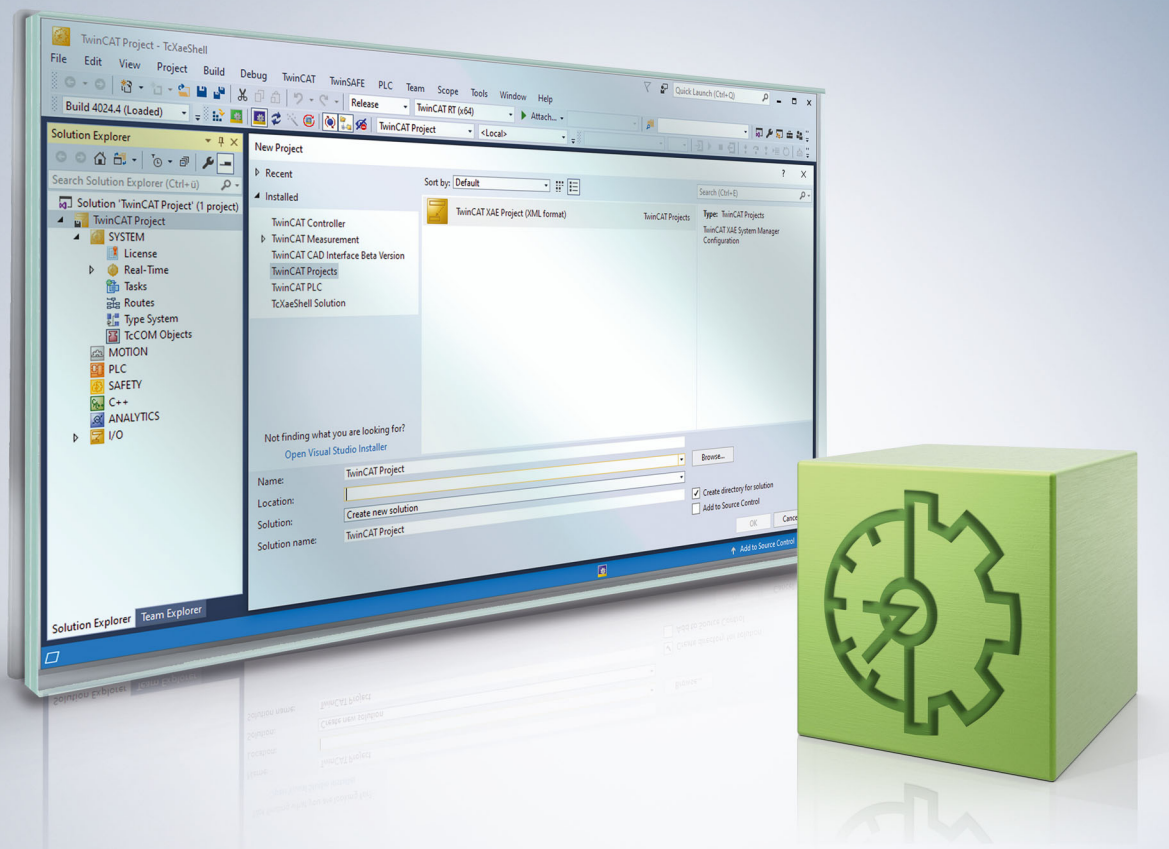
BECKHOFF New Automation Technology

Manual | EN

TE1000

TwinCAT 3 | Multiuser



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1 Foreword

1.1 Notes on the documentation

This description is intended exclusively for trained specialists in control and automation technology who are familiar with the applicable national standards.
The documentation and the following notes and explanations must be complied with when installing and commissioning the components.
The trained specialists must always use the current valid documentation.

The trained specialists must ensure that the application and use of the products described is in line with all safety requirements, including all relevant laws, regulations, guidelines, and standards.

Disclaimer

The documentation has been compiled with care. The products described are, however, constantly under development.
We reserve the right to revise and change the documentation at any time and without notice.
Claims to modify products that have already been supplied may not be made on the basis of the data, diagrams, and descriptions in this documentation.

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Read the following explanations for your safety.
Always observe and follow product-specific safety instructions, which you may find at the appropriate places in this document.

Exclusion of liability

All the components are supplied in particular hardware and software configurations which are appropriate for the application. Modifications to hardware or software configurations other than those described in the documentation are not permitted, and nullify the liability of Beckhoff Automation GmbH & Co. KG.

Personnel qualification

This description is only intended for trained specialists in control, automation, and drive technology who are familiar with the applicable national standards.

Signal words

The signal words used in the documentation are classified below. In order to prevent injury and damage to persons and property, read and follow the safety and warning notices.

Personal injury warnings

⚠ DANGER
Hazard with high risk of death or serious injury.

⚠ WARNING
Hazard with medium risk of death or serious injury.

⚠ CAUTION
There is a low-risk hazard that could result in medium or minor injury.

Warning of damage to property or environment

NOTICE
The environment, equipment, or data may be damaged.

Information on handling the product

This information includes, for example:
recommendations for action, assistance or further information on the product.

1.3 Notes on information security

The products of Beckhoff Automation GmbH & Co. KG (Beckhoff), insofar as they can be accessed online, are equipped with security functions that support the secure operation of plants, systems, machines and networks. Despite the security functions, the creation, implementation and constant updating of a holistic security concept for the operation are necessary to protect the respective plant, system, machine and networks against cyber threats. The products sold by Beckhoff are only part of the overall security concept. The customer is responsible for preventing unauthorized access by third parties to its equipment, systems, machines and networks. The latter should be connected to the corporate network or the Internet only if appropriate protective measures have been set up.

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To stay informed about information security for Beckhoff products, subscribe to the RSS feed at https://www.beckhoff.com/secinfo.

2 Installation

As of TwinCAT 3.1 Build 4026 the installation of TwinCAT Multiuser is required. All earlier versions of TwinCAT 3 include TwinCAT Multiuser as part of the standard installation.

TwinCAT Multiuser is installed via the TwinCAT Package Manager. Further information on this can be found in the installation documentation.

You can perform the installation using either the user interface (UI) or the command line interface (CLI).

You can use the UI to display all available workloads and install them as needed. To do this, follow the corresponding instructions in the interface.

You can use the following command to display the available workloads on the system in the CLI:

```
tcpkg list -t workload
```

Explanations on installation via CLI can be found in the chapter Working with the command line.

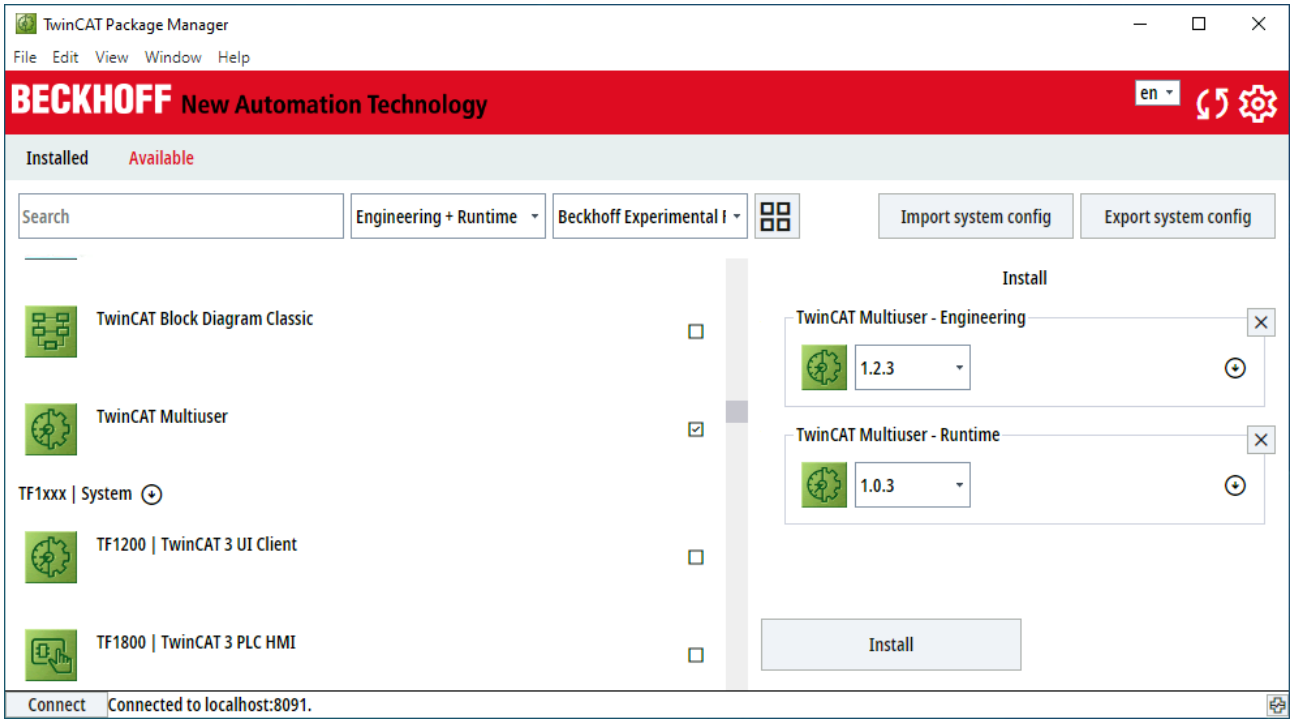
When referring to the TwinCAT Multiuser installation in the following, a distinction is made between PCs with TwinCAT Engineering and systems with TwinCAT Runtime only.

On a PC with Engineering or with Engineering and Runtime

If TwinCAT Engineering and TwinCAT Runtime or only TwinCAT Engineering are installed on your system, install both Multiuser Editor and Multiuser Server.

To do this, choose the following two workloads in the TwinCAT Package Manager UI:

- TwinCAT Multiuser - Engineering
- TwinCAT Multiuser – Runtime



Or install the workloads via the CLI using the following commands:

```
tcpkg install TwinCAT.Multiuser.XAE
tcpkg install TwinCAT.Multiuser.XAR
```

Multiuser Editor and Multiuser Server are installed.

On a runtime PC

Multiuser Server can be used on a runtime-only PC without Visual Studio. In this case, receiving the data and populating the GIT repository is handled by a simplified implementation of the Git commands on the server which maps the minimum requirements for exchange with the engineering system.

Customers who wish to use the full Git functionality in combination with the Multiuser Server are advised to install Git first and then the XAR workload for the Multiuser Server component.

GIT installation:

1. Open the download page on the official GIT website: https://git-scm.com/download/win
2. Depending on your system architecture, choose either the 32-bit or 64-bit version to download.
3. Perform the installation.

> If possible, do not change the installation path, as Multiuser Server expects GIT in a defined path. If the change is still necessary, the corresponding path must be added to the server's gitpath.config file at
> *C:\Program Files (x86)\Beckhoff\TwinCAT\Functions\Multiuser\TcAdsGitServer*

Multiuser installation:

Select the following workload in the TwinCAT Package Manager UI:

- TwinCAT Multiuser – Runtime

Or use the following command to install the workload via CLI:

```
tcpkg install TwinCAT.Multiuser.XAR
```

Multiuser Server is installed.

3 Concept

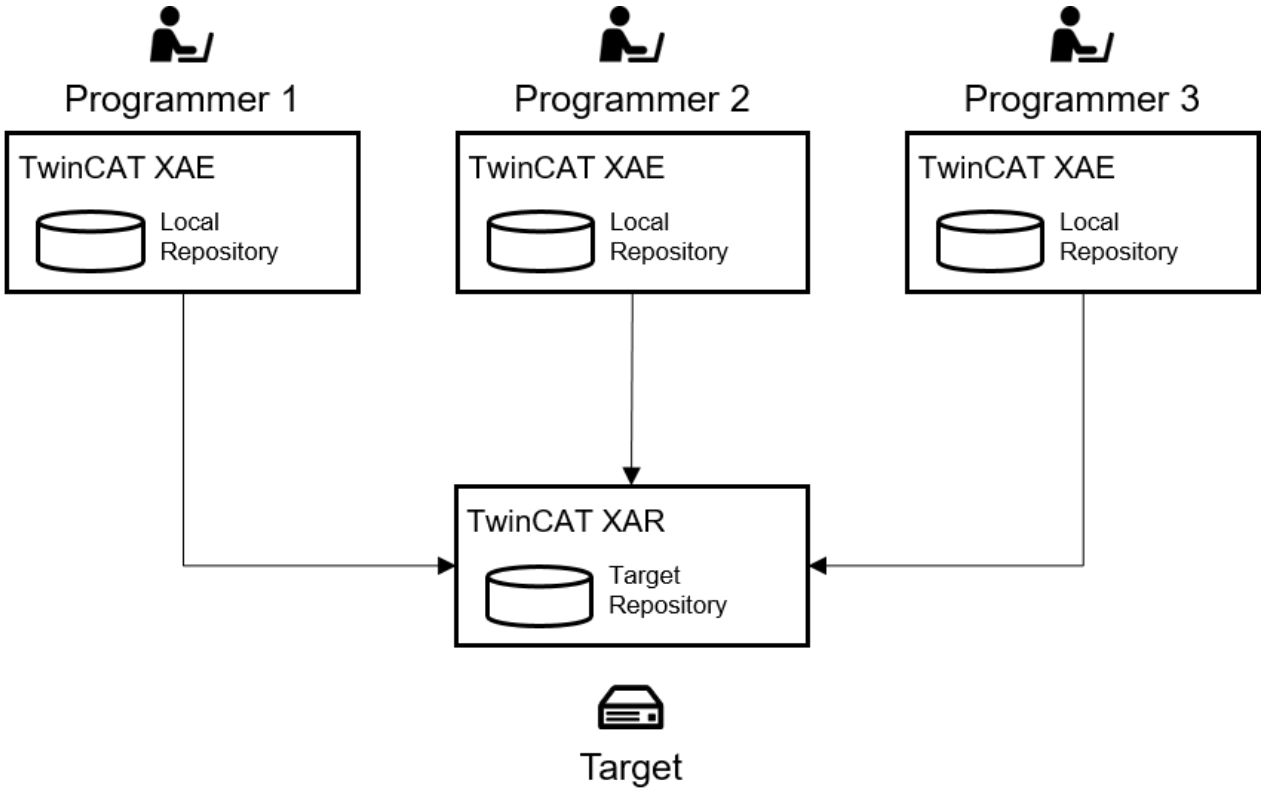
More and more machine and system functions are implemented in software. To allow for this, nowadays teams of several programmers are involved in creating the control code and subsequently the commissioning of these machines and systems. This poses several challenges, especially during commissioning:

- In many cases, access to Source Control Systems is not guaranteed.
- The latest (active) software version on the machine may differ from the local version.
- If changes that are "downloaded" to the target system turn out to be incorrect, it is not possible to undo the "download".

TwinCAT Multiuser was developed to meet these challenges. This is a "local" Source Control System on the target system, the handling of which has been fully integrated into the existing workflow. This means that no in-depth knowledge of the exact functionality of Source Control Systems is required to use TwinCAT Multiuser.

TwinCAT Multiuser is available from version TC3.1.4024.0. In this version, TwinCAT Multiuser mainly facilitates collaboration of several programmers, with each programmer working on one PLC project. If several PLC projects are integrated in a TwinCAT project, the multiuser functionality can be enabled separately for each project. In this case, separate repositories are automatically created for each of these projects, both locally and on the target system.
Since version 3.1.4024.4.0, complete TwinCAT projects can also be managed with the multiuser function. It can now be selected in the settings whether complete TwinCAT projects or only individual PLC projects are managed by the multiuser function.

The following diagram illustrates the concept:



The target system is selected as the Source Control Server during commissioning, since a connection to the target system is required in any case in order to load a control program onto the target system. This avoids the need for additional infrastructure.

Another objective of multiuser integration is to avoid the need for specific Source Control knowledge. The Source Control functionality is integrated in the standard workflow. For example, the current project status is automatically transferred to the target system during a download or online change of a project, without the

need to trigger the transfer separately. The history is also created automatically. All changes are recorded, including user name, timestamp and change. If required, a query for a comment can be set for each change transfer.

To ensure that the history created in this way continues to be available after commissioning, a Source Control System was integrated, which permits several repositories and also transfers the full history into all repositories. After successful commissioning, it is thus possible to transfer the active project status of the machine/system to a "development repository", including traceability of all steps performed during commissioning. The latter is done with the on-board resources of the Source Control System.

The Source Control System on which the multiuser functionality is based is Git.

NOTICE

The TwinCAT 3 Multiuser function uses Git

Git itself is separate and is installed optionally. If a standard Git installation is available on a computer, this can be used for the TwinCAT 3 Multiuser function (see Reference server settings [▶ 29]).

The TwinCAT 3 Installer allows customers who do not have a Git installation on the computer to install a MinGit that is only intended for use from TwinCAT 3 Multiuser and therefore is not entered in the Path environment variable.

Differentiation from the Source Control Integration of TwinCAT:

The general interfacing of TwinCAT with Source Control Systems remains unaffected by the multiuser functionality and can take place independently of it. By using the standard interface of the Microsoft Visual Studio Shell integrated in TwinCAT, a large number of Source Control Systems are available for this purpose. In addition, all aspects of a TwinCAT project can be handled by this integration.

The TwinCAT multiuser functionality is based on the Git standard. As already described, the aim of this functionality is to enable a team of several programmers to collaborate on a control program during the commissioning phase, without the need for a special infrastructure or special knowledge of Source Control Systems on the part of the programmers.

Although it is therefore possible to use different Source Control Systems for both functionalities, the full capabilities can only be achieved if both functionalities are based on Git. This refers to the transfer of the history during commissioning to the "main" Source Control System.

4 Workflow

4.1 Management of a TwinCAT project

4.1.1 Activating the multiuser function for a TwinCAT project

Carry out the following steps to activate this function for a TwinCAT project that is not yet managed through the multiuser functionality.

1. Activate the **Use Multiuser** option in the **Settings** tab of the **SYSTEM** node of the TwinCAT project. (See TwinCAT project settings [▶ 27])
2. Click the **Init** button to make the settings for the multiuser function and initialize the function.
   ⇨ The Settings tab of the **Multiuser Explorer** window opens.
   If you close the window by mistake, you can find it at the menu **TwinCAT -> Multiuser Explorer**.
3. In the **ADS Route** field, select a target system for the multiuser repository.
4. In the **Multiuser Repository** field, select a name for the multiuser repository.
5. If required, select the option **Ask for update message on each usage**. (See also Settings tab [▶ 19])
6. Click the **Init local and remote** button.

⇨ The multiuser repositories in the project and on the target system are initialized.

1. Click the button **Init** once again so that the URL of the multiuser repository is stored in the project.

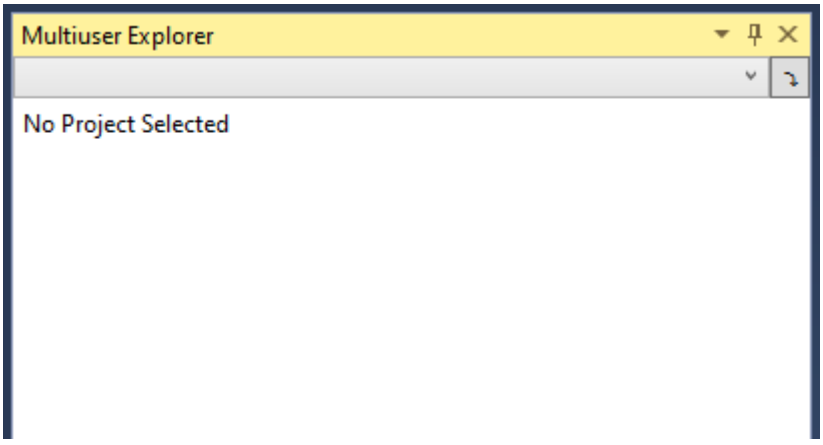
⇨ If the URL is stored directly in the project, this facilitates local initialization for this project on additional systems.

4.1.2 Use of an already set up TwinCAT project on another system

If an existing TwinCAT project for which a repository has already been set up on the target system is to be linked to the multiuser server, proceed as follows:

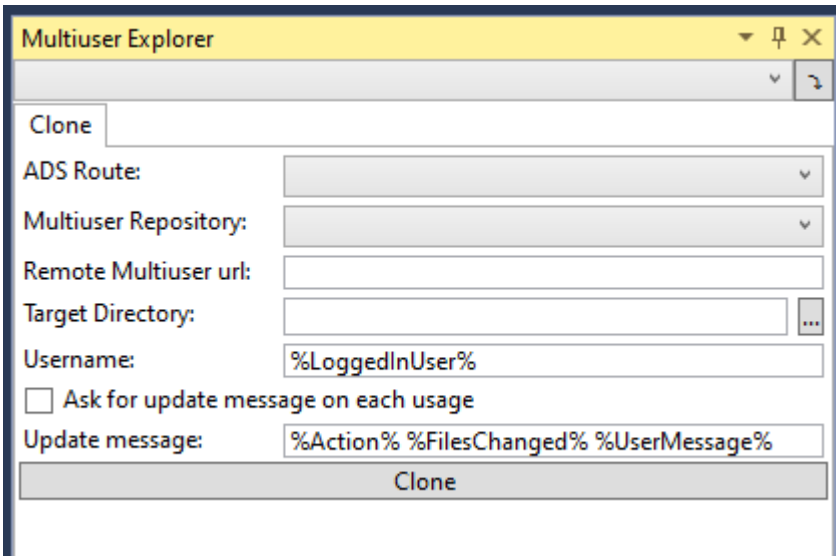
✓ The current status of the project is not available locally.

1. Open the **Multiuser Explorer** from the menu **TwinCAT -> Multiuser Explorer**.
   ⇨ An empty **Multiuser Explorer** opens.



2. Use the **Clone** button  to clone a project from the target system repository to the local system.

⇨ The following view opens.



3. Select the target system from which you want to clone the project.
4. Select the repositoy you want to clone.
5. Select the local folder (Target Directory) to which the project will be cloned.
6. Select the option **Ask for update message on each usage** if you want to be asked for update messages.
7. Click the **Clone** button.

⇨ The project has been copied to the selected folder and can be opened for further editing.

⇨ The multiuser function is already switched on and configured.

✓ The current status of the project is already available via a Source Control system.

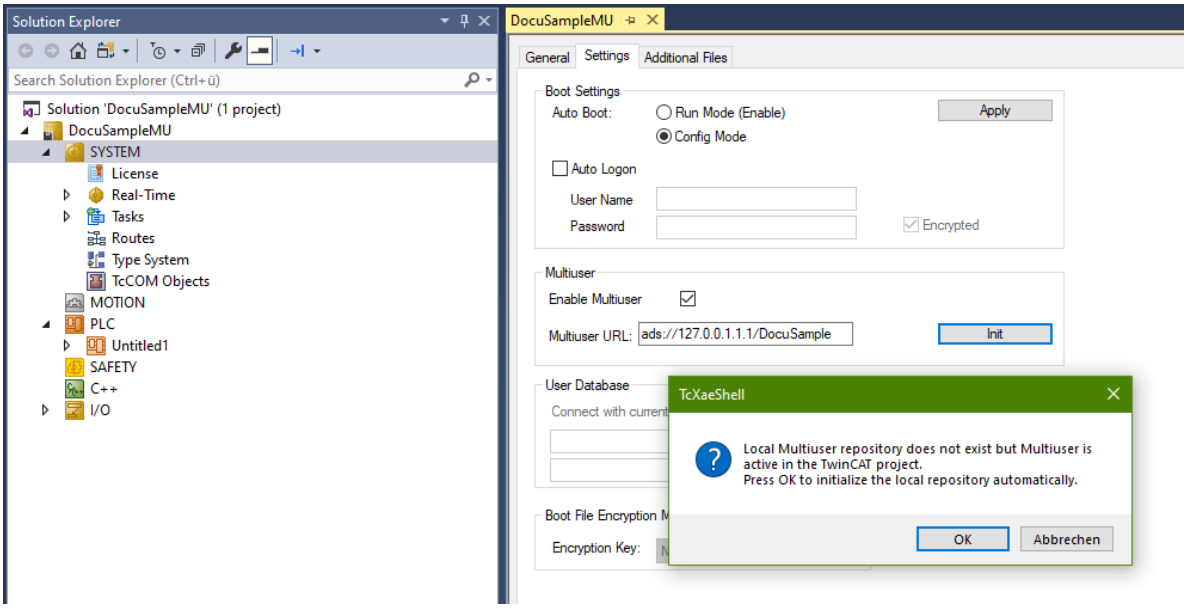
1. Open the TwinCAT project.
2. In the **Settings** tab of the project's SYSTEM node, check whether the **Use Multiuser** option (see TwinCAT project settings [▶ 27]) is enabled and the multiuser URL is stored in the project.

⇨ Depending on whether the multiuser URL is stored in the TwinCAT project, the further procedure differs.

✓ The multiuser URL is stored in the project.

1. Click the **Init** button to initialize the multiuser function locally.

⇨ The following dialog opens.



2. Click the **OK** button.

⇨ The multiuser function is initialized locally for the TwinCAT project and can be used.

✓ The multiuser URL is not stored in the project.

1. Click the **Init** button.
   ⇨ The **Settings** tab of the **Multiuser Explorer** opens automatically.
2. In the **ADS Route** field, select the target system that contains the multiuser repository.
3. In the **Multiuser Repository** combo box, select the name of the multiuser repository to which the project is to be linked.
4. If required, select the option **Ask for update message on each usage**. (See also Settings tab [▶ 19].)
5. Click the **Init local and remote** button.
   ⇨ The multiuser repository in the TwinCAT project is now initialized.

4.2 Management of a TwinCAT 3 PLC project

4.2.1 Activating the multiuser function for a PLC project

To activate this function for a PLC project that is not yet managed through the multiuser functionality, carry out the following steps:

1. Activate the **Use Multiuser** option in the project settings of the PLC project that is to be managed through the multiuser functionality. (See PLC project settings [▶ 27])
2. Click the **Init** button to make the settings for the multiuser function and initialize the function.
   ⇨ The **Settings** tab of the **Multiuser Explorer** window opens automatically.
   If you close the window by mistake, you can find it under the menu **TwinCAT -> Multiuser Explorer**.
3. In the **ADS Route** field, select a target system for the multiuser repository.
4. In the **Multiuser Repository** field, select a name for the multiuser repository.
5. If required, select the option **Ask for update message on each usage**. (See also Settings tab [▶ 19])
6. Click the **Init local and remote** button.

⇨ The multiuser repositories in the project and on the target system are initialized.

1. Click the button **Init** once again so that the URL of the multiuser repository is stored in the project.

⇨ If the URL is stored directly in the project, this facilitates local initialization for this project on additional systems.

Also see about this

- Reference project settings [▶ 27]

4.2.2 Use of an already set up PLC project on another system

If an existing PLC project is to be linked to the multiuser server for which a repository has already been set up on the target system, proceed as follows:

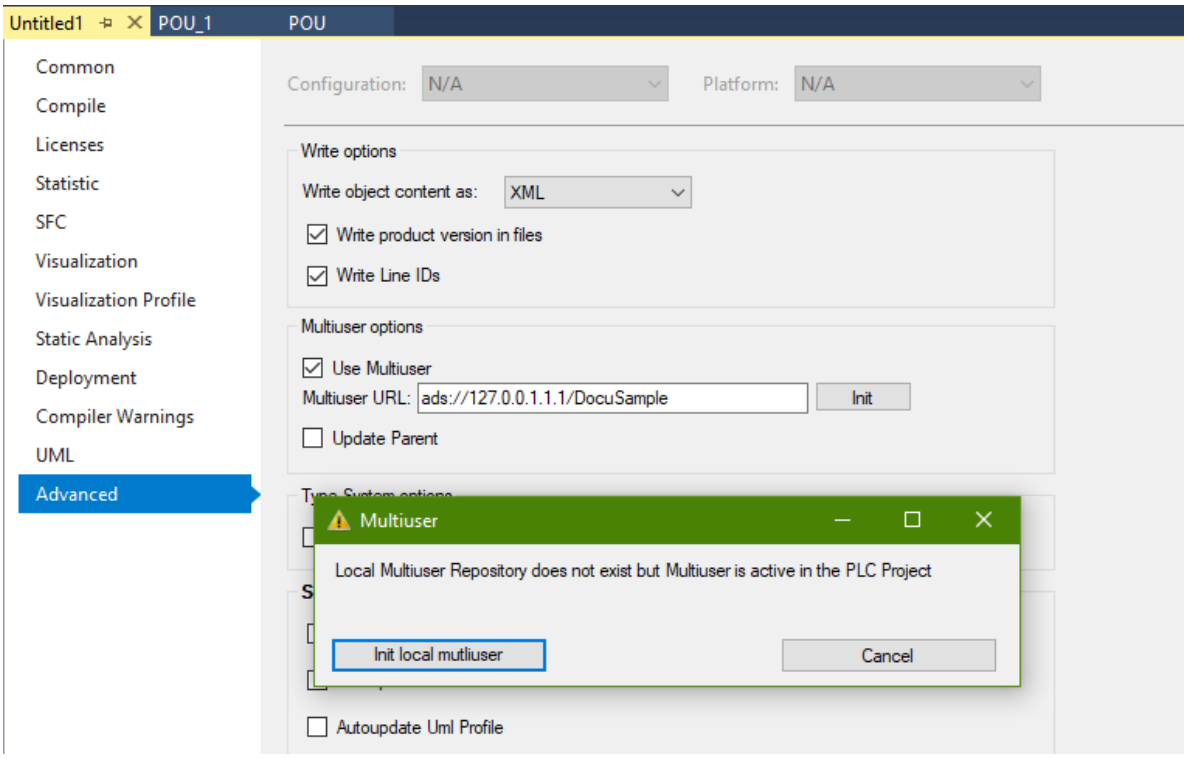
1. Open the project.
2. In the project settings of the PLC project that is to be managed by the multiuser functionality, check whether the option **Use Multiuser** (see Reference project settings [▶ 27]) is activated and the multiuser URL is stored in the project.

⇨ Depending on whether the multiuser URL is stored in the TwinCAT project, the further procedure differs.

✓ The multiuser URL is stored in the project.

1. Click the **Init** button to initialize the multiuser function locally.

⇨ The following dialog opens.



2. Click the **Init local multiuser** button.

⇨ The multiuser function is now initialized locally for the PLC project and can be used.

✓ The multiuser URL is not stored in the project:

1. Click the **Init** button.
   ⇨ The **Settings** tab of the **Multiuser Explorer** opens automatically.
2. In the **ADS Route** field, select the target system that contains the multiuser repository.
3. In the **Multiuser Repository** combo box, select the name of the multiuser repository to which the project is to be linked.
4. If required, select the option **Ask for update message on each usage**. (See also Settings tab [▶ 19])
5. Click the **Init local and remote** button.
   ⇨ The multiuser repository in the project is now initialized.

If you do not have an existing project, you can create a TwinCAT project. Add an empty PLC project and link it to the multiuser repository on the target system as described above.

Git uses absolute paths in the repository

The Git Source Control System uses absolute paths in the repositories. This means that copying a project in which multiuser functionality is already installed (including the .TcGit folder) will result in the multiuser functionality not working correctly.

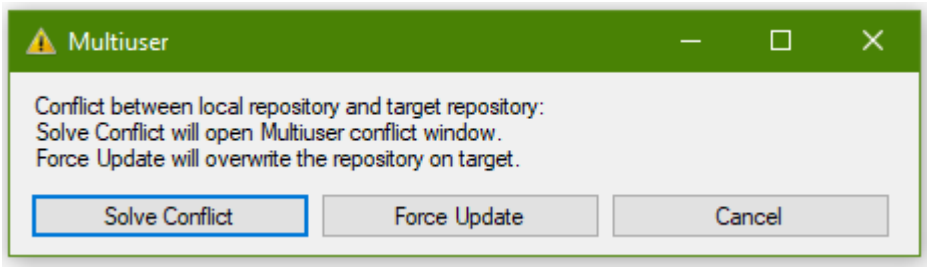
4.3 Working with set functionality

If the multiuser functionality has been set up as described in the previous chapters, this functionality integrates automatically into the existing workflow.

Transferring the data to the target repository

The changes generated while working on the project are automatically transferred to the target repository during an Activate, Download or Online Change if multiuser functionality is activated.

Checks are carried out to ascertain whether there is a conflict with the data in the target repository. This is the case if other programmers working on the project have already made changes to the same project parts (e.g. POUs, settings etc.) and transferred them to the target repository. If there is a conflict, it is displayed in the following dialog.



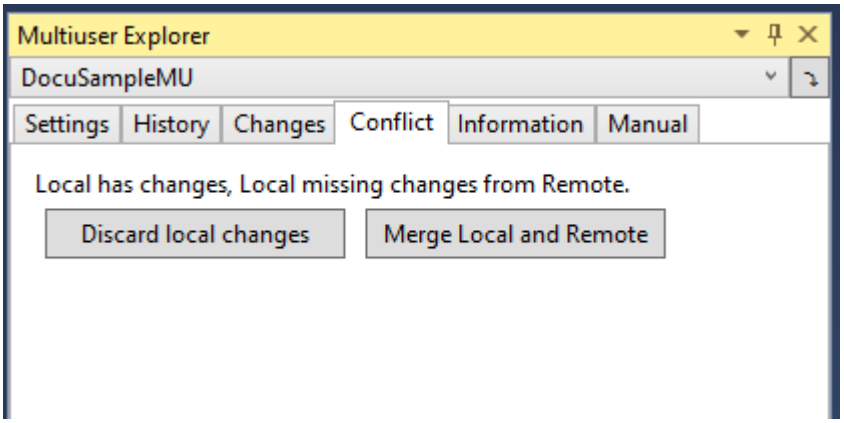
In this selection dialog you then have the option to

- resolve the conflicts using the TwinCAT Project Compare Tool,
- force an update of the target system including the target repository, or
- cancel the Activate, Download or Login.

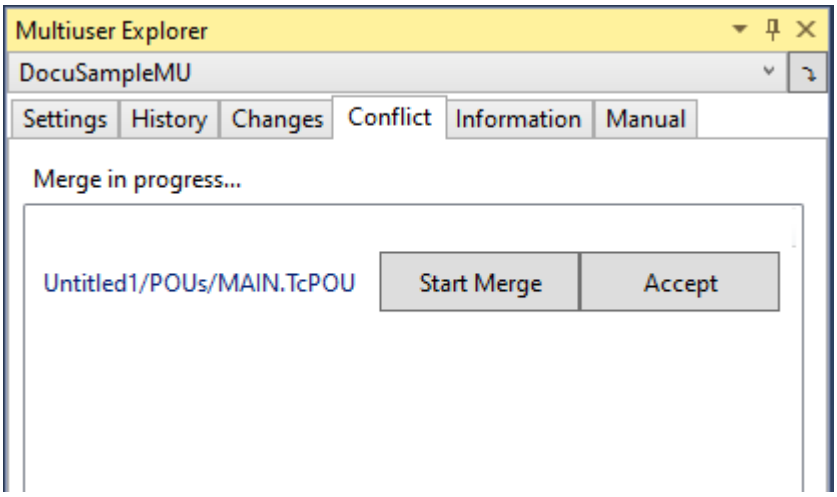
The Force Update button can be used if the target system is required to run with the current project without taking into account the changes made by the other programmers involved in the project. There is no synchronisation with the multiuser repository. Once the project is running, the synchronisation with the multiuser repository must be done manually at a later time (see Manual tab [▶ 25]).

The normal workflow for collaborating on a project involves resolving conflicts. In this step, you can merge the changes you have made to the project with those of the other programmers working on the project.

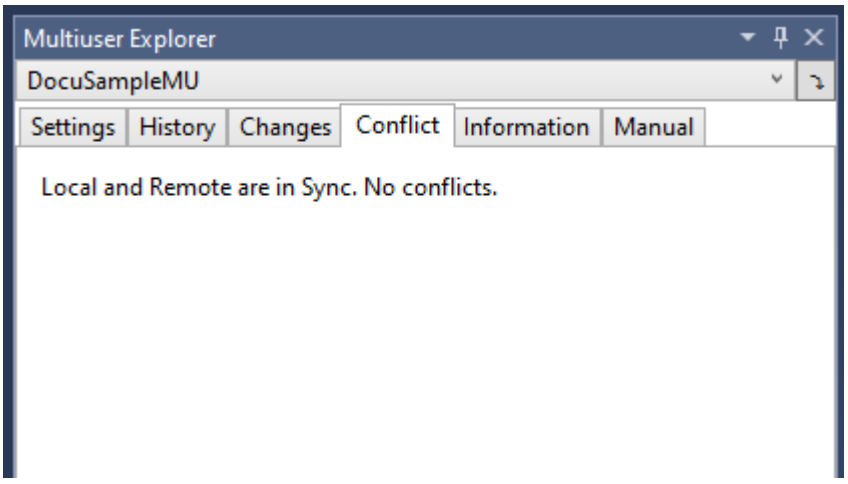
1. To do this, click **Solve Conflict**.
   ⇨ The **Conflict** tab now opens.
   This allows you to discard all your local changes and apply the version from the target repository, or to merge the two versions.
2. To merge the versions, click **Merge Local and Remote**.



⇨ The subsequent overview shows you all files (e.g. POUs (Programming Organization Unit)) where changes have led to conflicts with the target repository.



3. For each conflict displayed, click **Start Merge**.
   ⇨ The TwinCAT Project Compare Tool opens, in which you can merge the changes.
4. Accept the result with **Accept**.
   ⇨ If the merge is confirmed in the TwinCAT Project Compare Tool and the tool is closed, the accept of the merge takes place automatically from TwinCAT version 3.1.4024.40 onwards. If you want to accept the changes directly, confirm it with the **Accept** button. Proceed in the same way in the previous TwinCAT versions.
   ⇨ Once all changes have been merged, you are notified that there are no further conflicts.



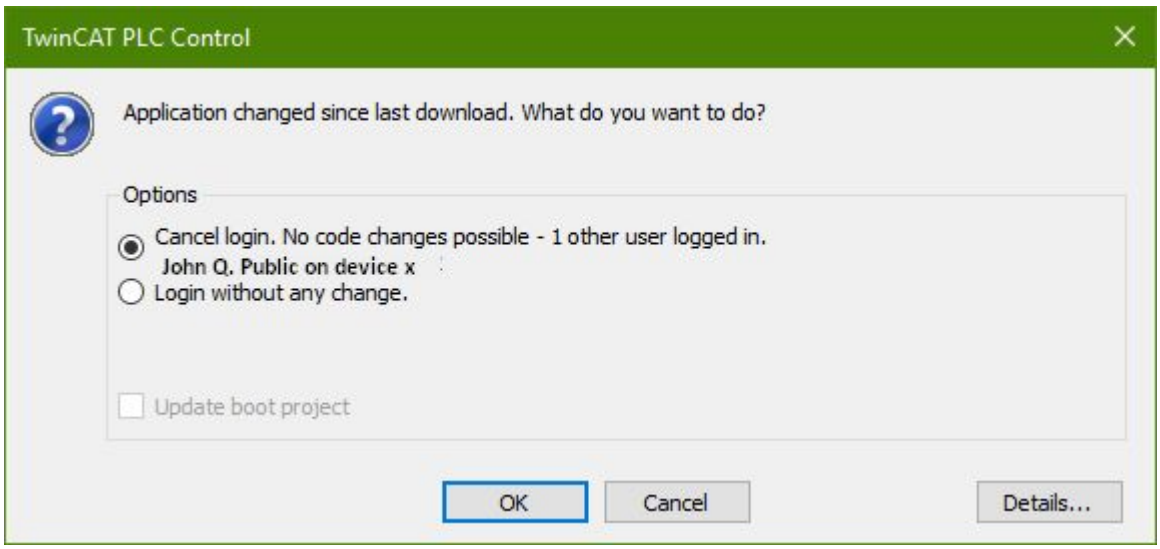
5. Now perform an Activate, Download or Login again.

⇨ The current and merged version of the project is transferred to the target system and stored in the target repository.

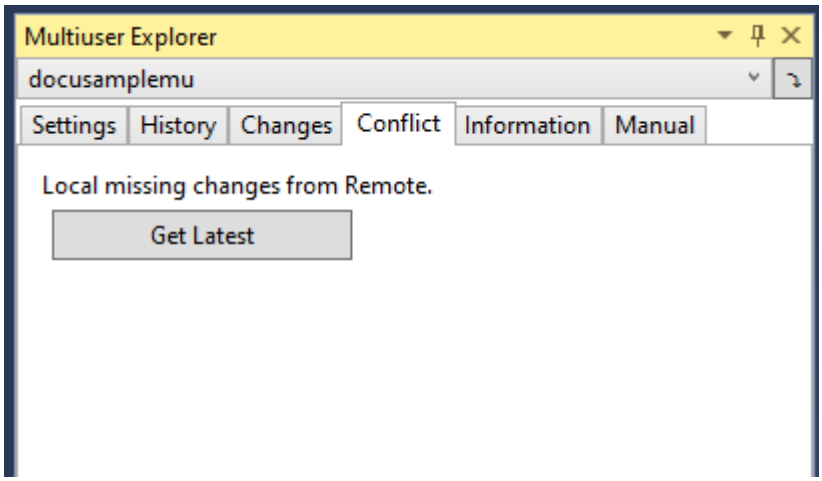
No simultaneous changes by multiple programmers

Simultaneous changes by several programmers are not possible.

Although several programmers can be logged into the target system at the same time to view the project status, only one programmer can make changes at any one time. All other programmers have to log out. The logged-in programmers are shown in the following dialog.

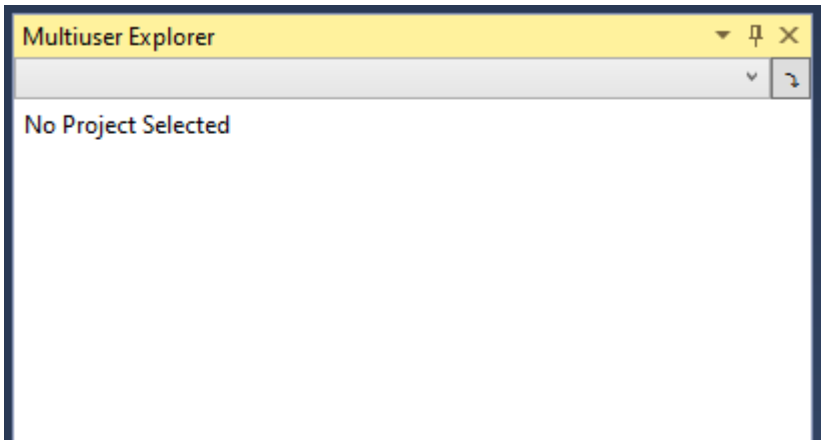


Once the changes have been made, the other programmers can log in again and the workflow shown above is triggered to merge the changes with those of the other programmers. If the other programmers have not yet made any further changes to the project, they are notified that a newer version is available on the remote system.



5 Reference user interface

The Multiuser Explorer is the central administration tool for the multiuser functionality. This window remains empty as long as no project has been associated with multiuser functionality.



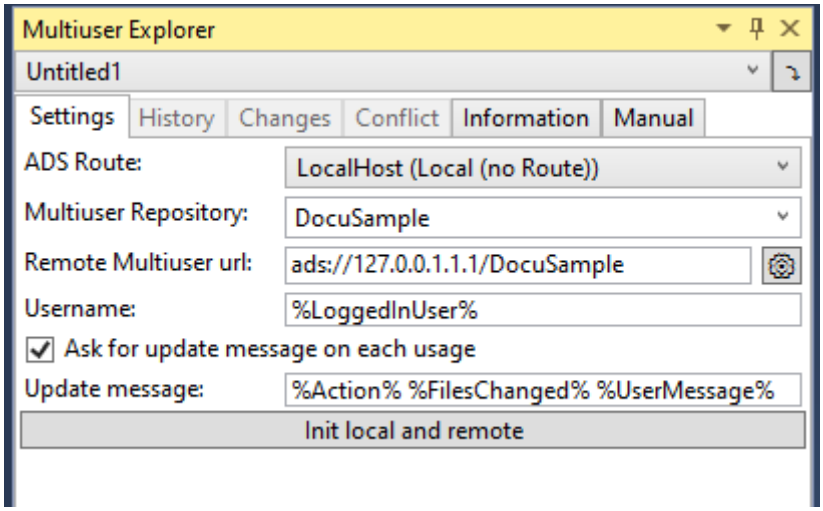
	Using the **Clone** button, the status of the project can be retrieved from the target system repository on an engineering system and stored locally.

Once a project is selected, the tabs described in this chapter become visible.

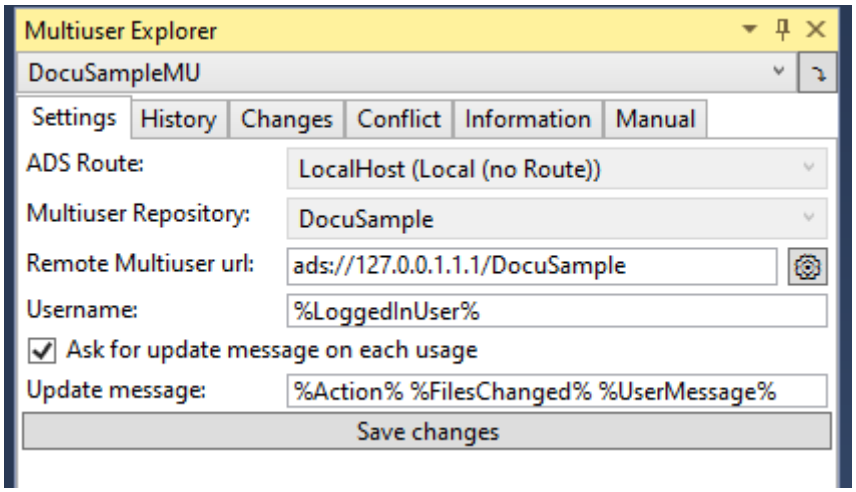
5.1 Settings tab

Once a project has been selected, the **Settings** tab appears as follows:

- If the multiuser function is not yet initialized:



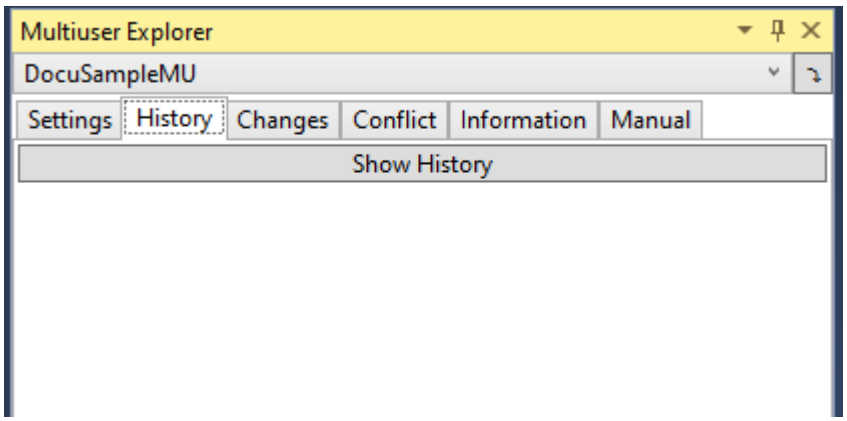
- If the multiuser function is already initialized:



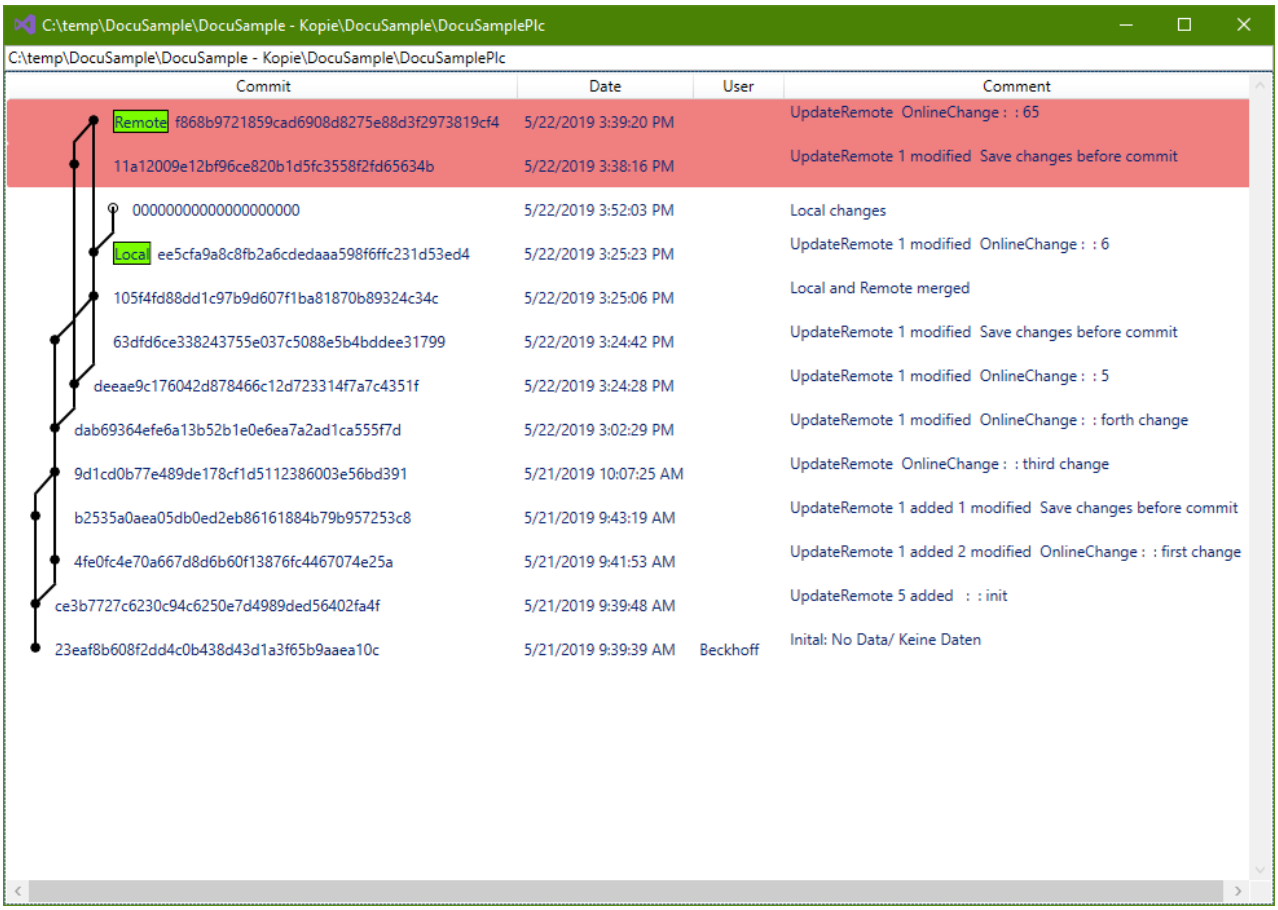
ADS Route	Combo box for selecting an existing ADS route
Multiuser repository	Combo box for selecting an existing multiuser repository or creating a new one.
Remote Multiuser URL	URL for repository
User name	User name to be used for the entries in the history. The default setting is the placeholder "%LoggedInUser%“. This is automatically replaced by the locally logged in user as user name in the comment.
Ask for update message on each usage	Option to query change messages.
Update message	Structure of the update message The placeholders "%Action%", "%FilesChanged%" and "%UserMessage%" are automatically replaced by the corresponding information during an online change or download. If a placeholder is removed, the corresponding information is removed from the automatically generated comment. Placeholder: "%Action%": indicates whether an online change or download was performed. "%FilesChanges%" indicates the number and reason for the changed files (e.g. 2 added). "%UserMessage%" is replaced by the user-specific comment if the option **Ask for update message on each usage** is activated.
Init local and remote	Initializes the multiuser function with the selected settings.
Save changes	Saves the changes made to the settings.

5.2 History tab

The **History** tab has a **Show History** button. This opens a tool window which shows the history of the current project.



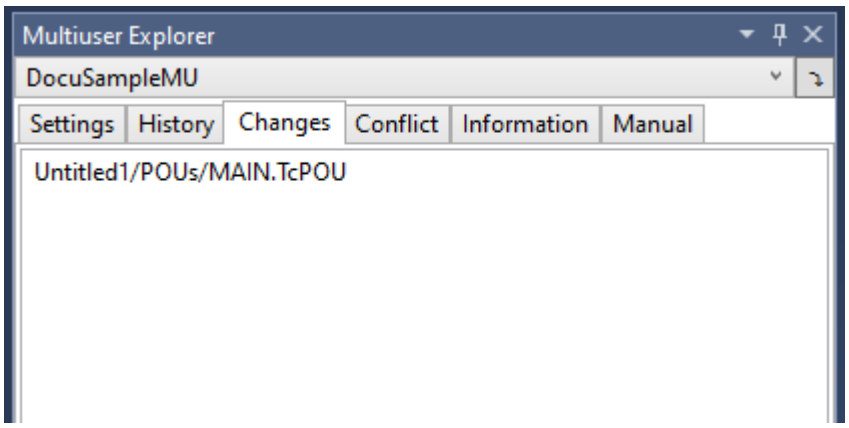
Example: History of the documentation example. In this example, changes were made both on the target system and on the local system.



5.3 Changes tab

The **Changes** tab shows all files where changes have been made that have not yet been transferred to the target repository.

In the following image, exemplary changes have been made to the MAIN-POU (Program Organization Unit) of the Untiteld1 project.



Updating of the target system only in case of changes in the code

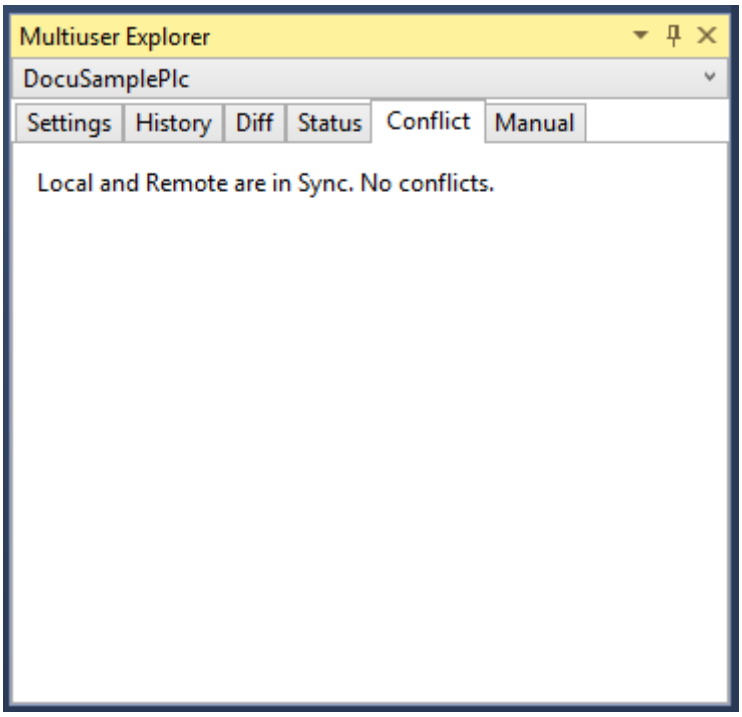
Not every change displayed is a code change. The changes are only transferred to the target system if there is a change in the code that requires a new download of the project or project parts.

Example: A change in a comment within a POU is a change within a file that does not require recompiling. For this reason, it is possible to log in without online change and thus without downloading the changes.

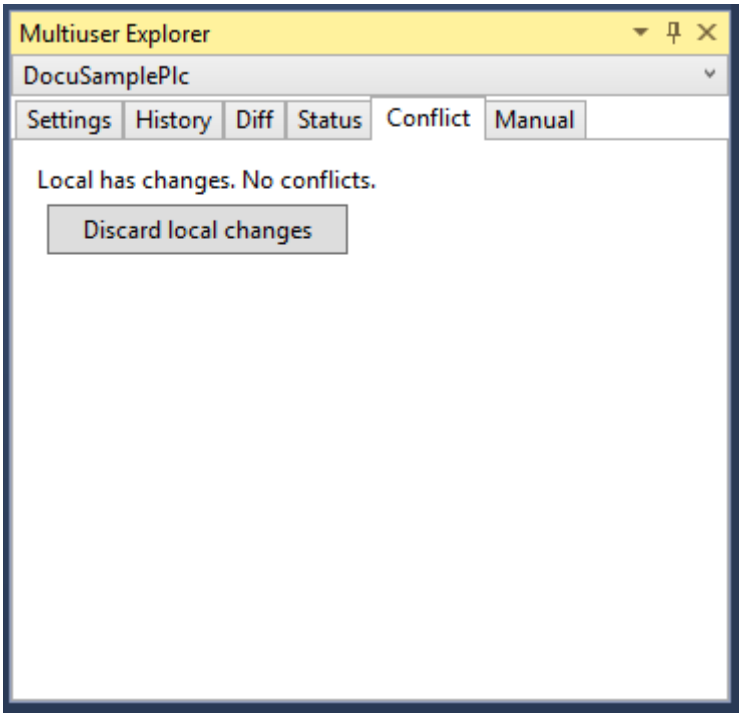
5.4 Conflict tab

The **Conflict** tab shows whether there are any conflicts between the local status and the status in the target repository, or if a merge has been triggered. The following cases are possible:

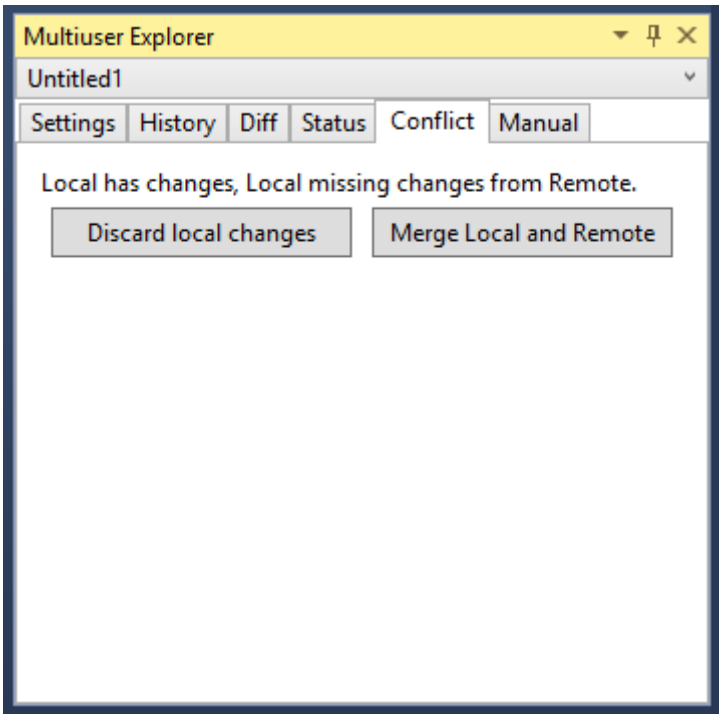
Local and target repositories have the same status:



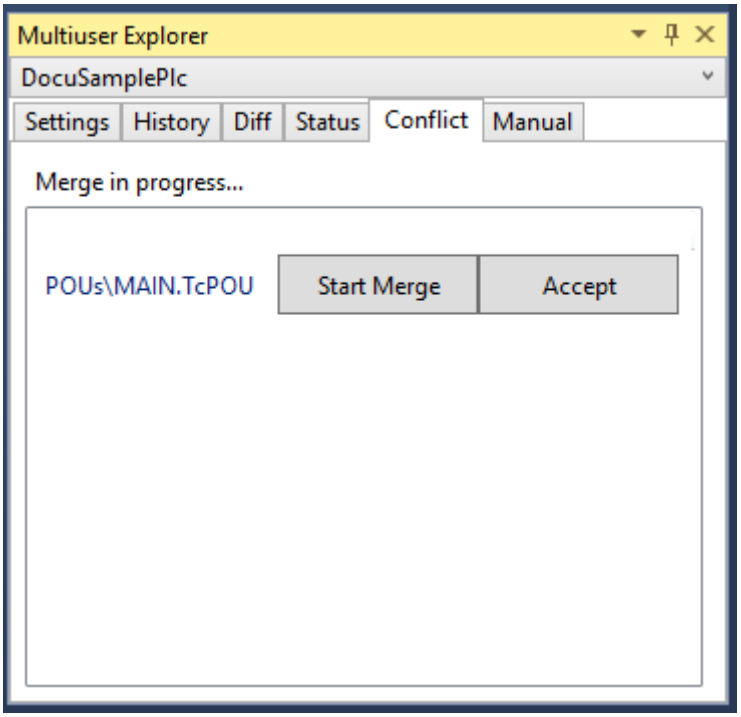
The local system contains changes that have not yet been transferred:



Changes were made on both the local and the remote system:

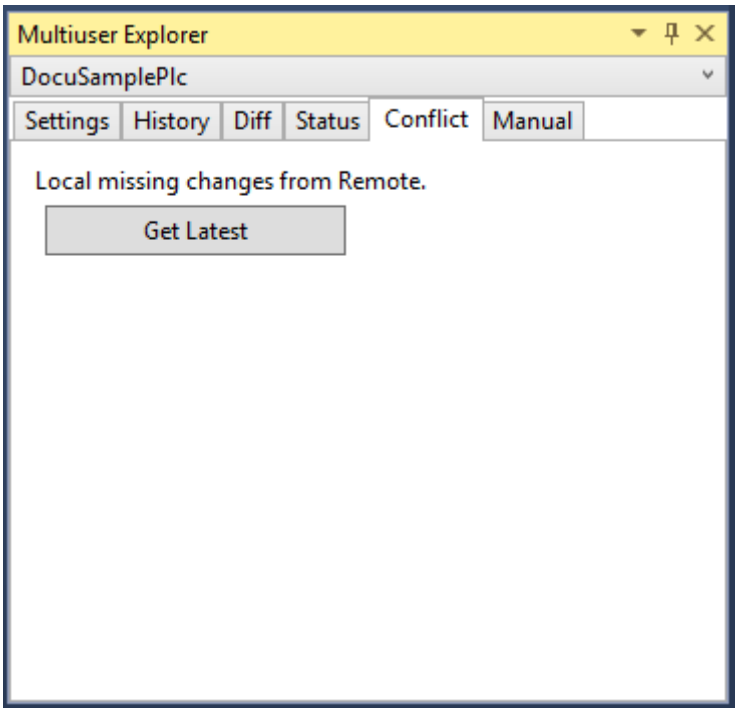


Click the **Merge Local and Remote** button to show a list of the changes. In the following view you will see all objects in which changes have been made on both sides (for example the POU Main in the following figure).



To merge the changes, click the **Start Merge** button. The TwinCAT Project Compare Tool opens, in which you can merge the objects. After a successful merge, please confirm the changes with **Accept**, both in the TwinCAT Project Compare tool and in the Multiuser Explorer.

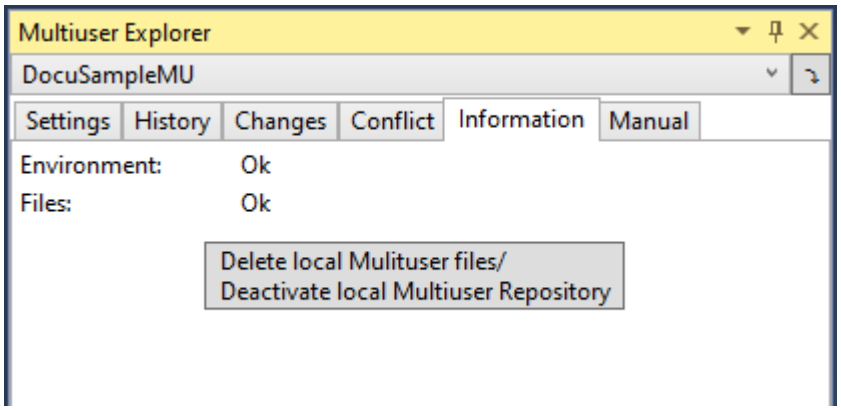
The target repository contains changes that have not yet been implemented locally:



Click the **Get Latest** button to fetch the current status of the target repository. TwinCAT now informs you that files have changed in the background and asks whether you want to reload them. Confirm this question with **OK**.

5.5 Information tab

Displays the status of the multiuser functionality and provides the option to disable this setting. This will delete the local repository.

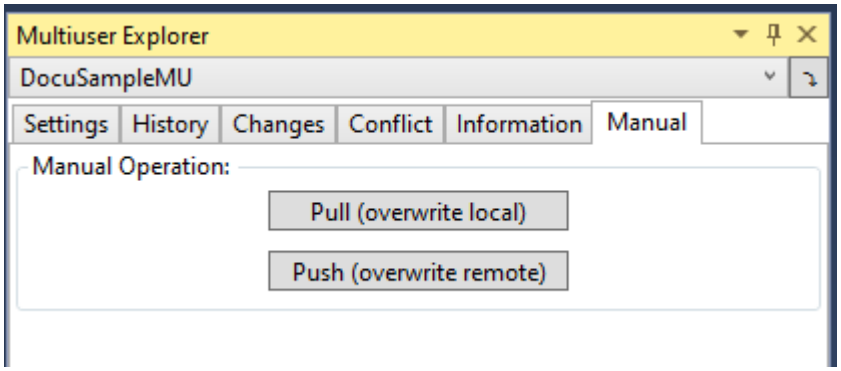


Environment	Displays the state of the multiuser server: **OK**: local and target repository found. **LocalNotExists**: no local repository was found. **RemoteNotExists**: no target repository was found.
Files	Shows the status of the files: **OK**: local and target repository found, no newer project status on target repository. **LocalNotExists**: no local repository was found. **RemoteNotExists**: no target repository was found. **LokalsbehindRemote**: a newer version exists on the target repository.
Delete Multiuser files / Deactivate Multiuser	Deletes the local repository and deactivates multiuser functionality.

The **Files** status entry also displays **OK** if the local files status is newer than that in the repository. You can see which files have been changed in the Diff [▶ 21] tab.

5.6 Manual tab

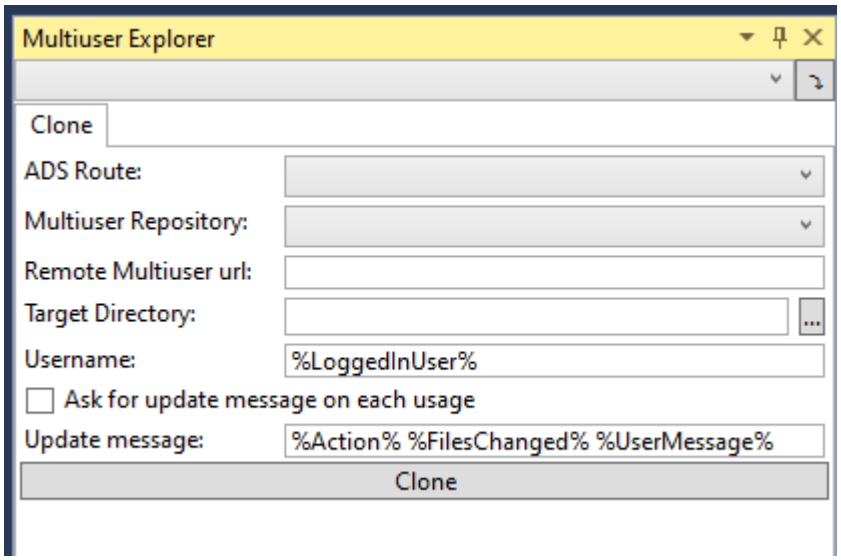
The **Manual** tab is used to write the current project status to the target system or to fetch it from there.



Pull (override local)	Fetches the current project status from the target system and overwrites the local project. There is no merge of the project statuses.
Push (override remote)	Overwrites the status on the target system. There is no merge of the project statuses.

5.7 Project cloning from target system

If you have selected in the Multiuser Explorer that an existing project is to be cloned from the target system (using the button ), then the following view opens in the Multiuser Explorer:

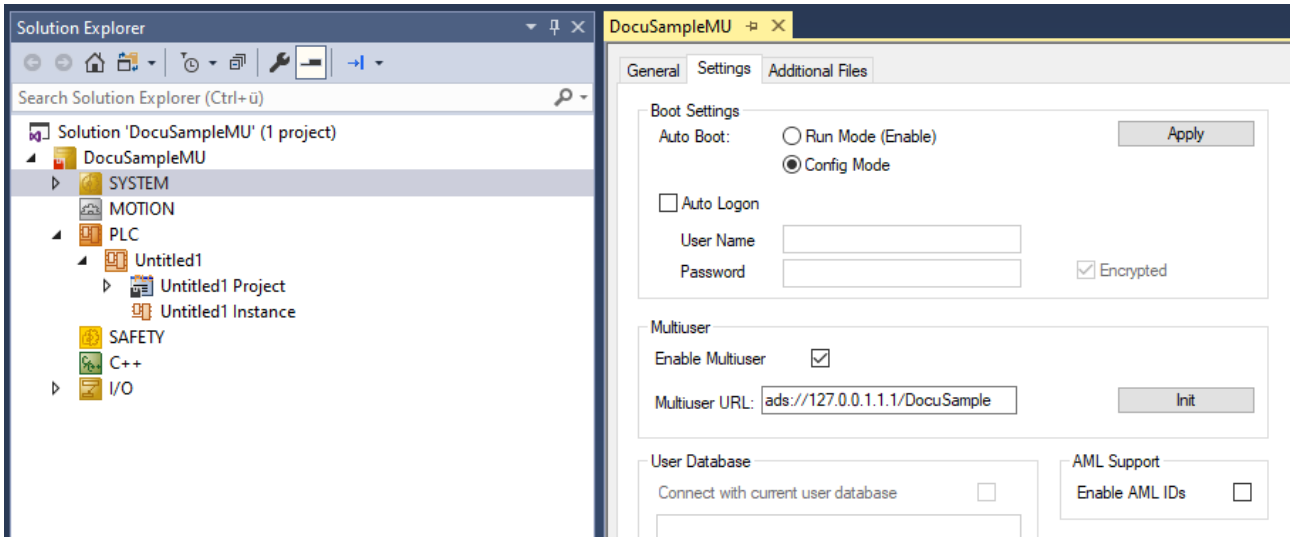


ADS Route	Combo box for selecting an existing ADS route
Multiuser repository	Combo box for selecting an existing MU repository
Remote Multiuser URL	URL for repository
Target Directory	Selection of the target directory to which the project is to be cloned
User name	User name to be used for the entries in the history. The default setting is the placeholder "%LoggedInUser%“. This is automatically replaced by the locally logged in user as user name in the comment.
Ask for update message on each usage	Option to query change messages.
Update message	Structure of the update message The placeholders "%Action%", "%FilesChanged%" and "%UserMessage%" are automatically replaced by the corresponding information during an online change or download. If a placeholder is removed, the corresponding information is removed from the automatically generated comment. Placeholder: "%Action%": indicates whether an online change or download was performed "%FilesChanges%": indicates the number and reason for the changed files (e.g. 2 added). "%UserMessage%": is replaced by the user-specific comment if the option **Ask for update message on each usage** is activated.
Clone	Clones the selected repository to the selected target directory.

6 Reference project settings

6.1 TwinCAT project settings

In order to have the TwinCAT project managed by the multiuser function, this function must be activated in the project settings.



Use Multiuser	Enables the multiuser functionality of the TwinCAT project.
Multiuser URL	Displays the URL of the remote/target system repository.
Init	Initializes the multiuser function for this TwinCAT project.

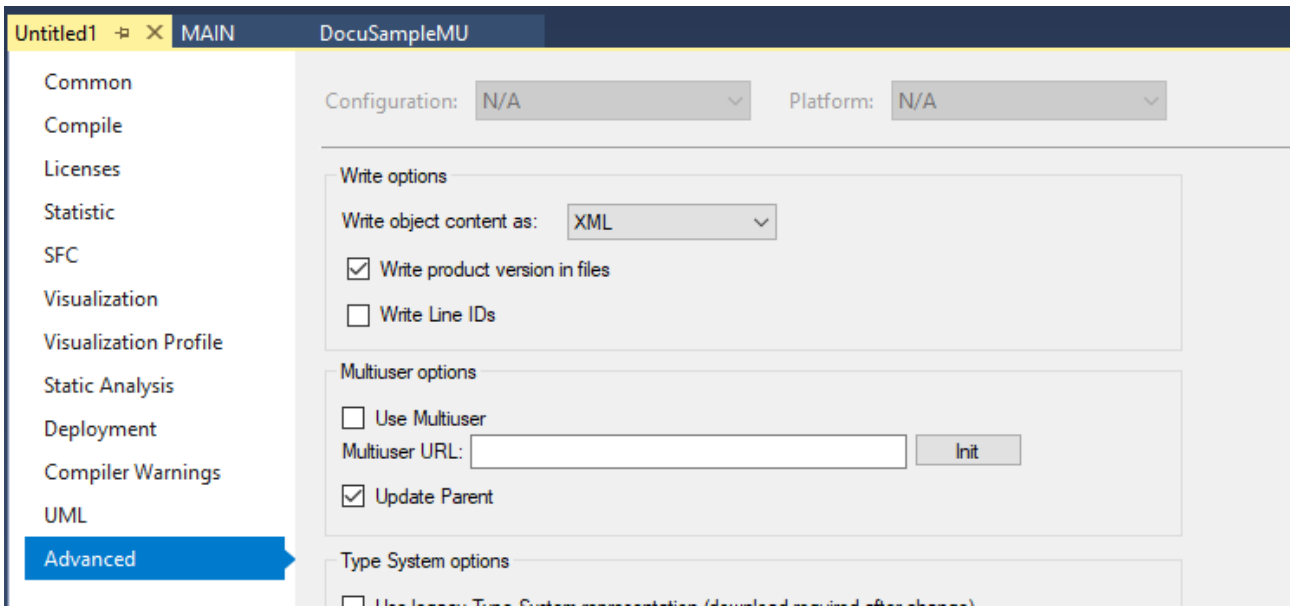
Reuse of PLC projects

The multiuser function is implemented in such a way that in a future version the TwinCAT project and the PLC projects can be managed independently of each other using the multiuser function. Especially in combination with Git as Source Control system during engineering, this offers some advantages if you want to reuse PLC projects in multiple projects. For this reason, it must be defined in the settings of the PLC projects whether they are managed with the overall project or separately.

- Define in the settings of the PLC projects whether they are managed with the overall project or separately. (See PLC project settings [▶ 27])

6.2 PLC project settings

To use the multiuser function only in one PLC project, this function must be enabled in the PLC settings.



Use Multiuser	Enables the multiuser functionality of the PLC project.
Multiuser URL	Displays the URL of the remote/target system repository.
Init	Initializes the multiuser function for this PLC project.
Update Parent	If the entire TwinCAT project is managed by the multiuser function, use this to activate that the TwinCAT project is informed about user activities that require an alignment of the repository (login, download).

Manage TwinCAT project as a whole

The current multiuser function can be used to manage either the entire TwinCAT project or the PLC project. Both are not yet possible, but will follow in a future version. If the entire TwinCAT project is managed, the multiuser function must not be switched on in the PLC, but only the **Update Parent**. In this state the TwinCAT project is informed about corresponding user actions, so that the update of the target system repository takes place from the TwinCAT project.

- Activate the **Update Parent**.

7 Reference server settings

The TwinCAT 3 Multiuser function uses Git. Git itself is separate and is installed optionally, this is selectable during the TwinCAT 3 installation. If a standard Git installation is available on a computer, this can be used for the TwinCAT 3 Multiuser function.

Changing the location of the Git repositories

If necessary, you can change the default storage location of the Git repositories on the target system. The default location is "*C:\ProgramData\Beckhoff\MultiuserRepository*".

To adjust the path, change the entry in the file *"<TwinCAT Folder>/Functions/Multiuser/directorypath.config"* so that it points to the desired path.

8 FAQ

The multiuser function is behaving in a way that is not described. What can I do?

The status of the multiuser function can be viewed in the **Multiuser Explorer** in the **Status** tab. This is the first place that you should look if there is any unexpected behavior when using the multiuser function. (See Information tab [▶ 25])

Also, check whether the TwinCAT 3 AdsGitServer Windows service has been started on the target system and restart it if necessary.

How can I restart a project that has already been created?

Local Git repositories can be deleted in the **Status** tab in the **Multiuser Explorer** using the **DeleteMultiuser files/ Deactive Multiuser** button, which allows you to restart a project that has already been created. (See Information tab [▶ 25])

I'm getting a "RepositoryExistsException" message. How can I resolve this?

A Git repository has already been created for the current project due to an invalid operation in the past. Delete this invalid repository in the **Status** tab in the **Multiuser Explorer** using the **DeleteMultiuser files/ Deactive Multiuser** button.

The History View seems to be messed up, why is this?

Entries are added to the History View in descending order according to their timestamp (with the newest entry at the top). Check whether the times set on the target system and the engineering system are identical.

"Force Update" does not update the multiuser repository on the target system, why is that?

The multiuser function is built on top of the Git source control system. Git always needs to be in a conflict-free state before pushing changes. To this end, the "**Force Update**" function was created, which allows the current local state to be activated on the target system without having to take the Git state into account. This function should only be used if the current state of the local system needs to be run during commissioning without taking the changes made by the other programmers into account. Once the project has been activated, the synchronization of the underlying Git must be performed later on. Start the synchronization either by logging in, reactivating the configuration, or via a manual push. (See Manual tab [▶ 25])

I'm getting an "ADS error 0x745: Timeout has expired" message. How can I resolve this?

In **Multiuser Explorer**, open the **Status** tab. The message "RemoteNotExists" indicates that the remote repository has not been created or has been deleted.

Alternatively, look at the target system, which can also be accessed in the Windows Explorer under *C:\ProgramData\Beckhoff\MultiuserRepository*.

If you get this message several times, restart the TwinCAT 3 AdsGitServer Windows service on the target system.

I'm getting an "ADS error 0x1: An internal error has occurred" message. How can I resolve this?

Check whether the multiuser function has been properly installed. The LibGit2Sharp.dll, TcAdsGitPackage.dll, and TcAdsGitServer.exe files, along with the cmd and mingw32 folders and other elements, must be present in the *C:\TwinCAT\Functions\Multiuser* folder.

9 3rd Party Licenses

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Version 2, June 1991

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