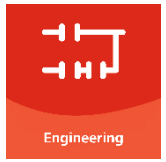
CODESYS® V3.5 SP19

Features and Improvements

Including presentation of component updates since the release of the last Service Pack.

ISSUES



ENGINEERING

RUNTIME / SAFETY

AUTOMATION SERVER

VISUALIZATION

MOTION CNC ROBOTICS

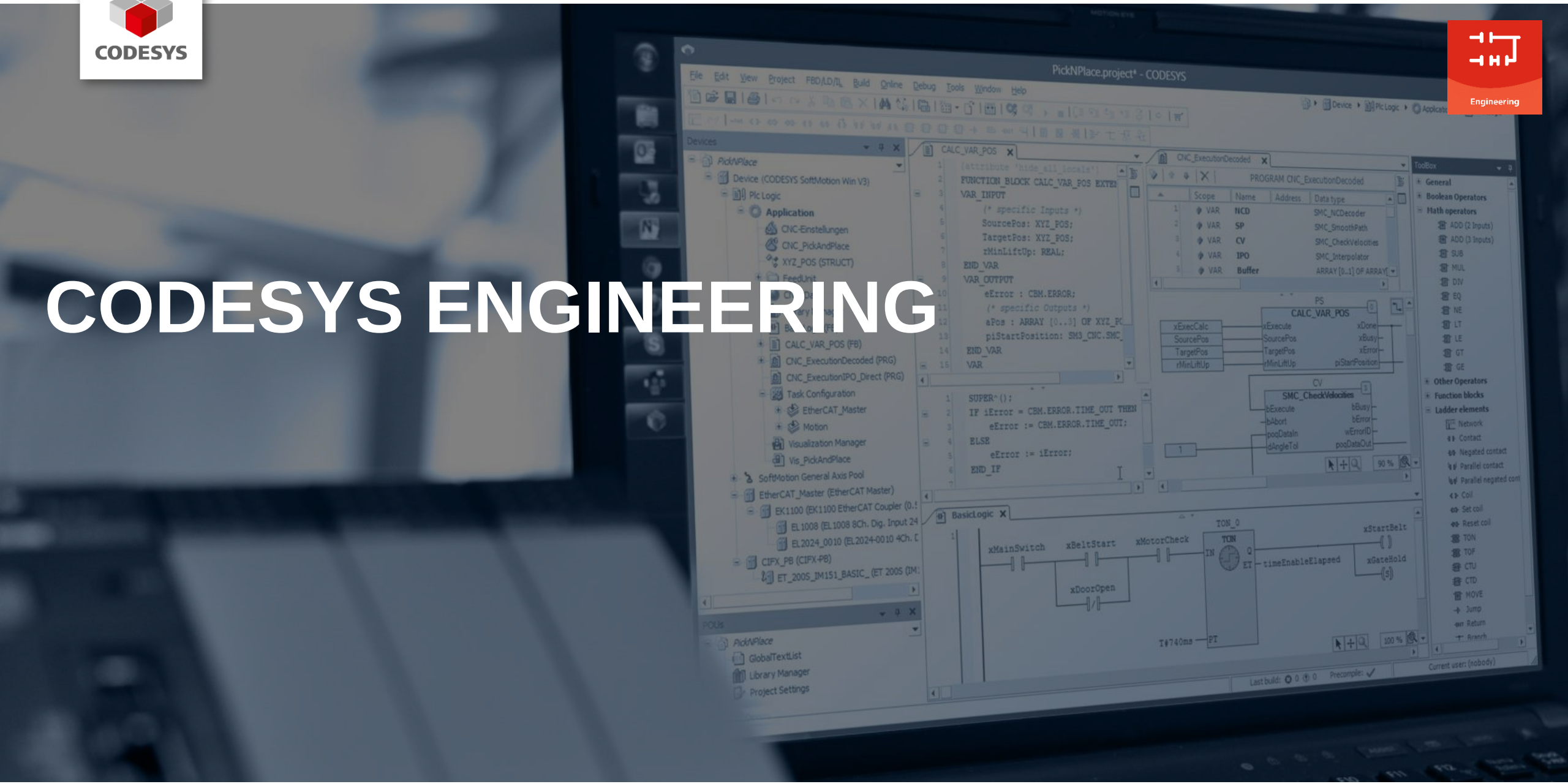
FIELDBUS

COMMUNICATION

CODESYS

Engineering

CODESYS ENGINEERING

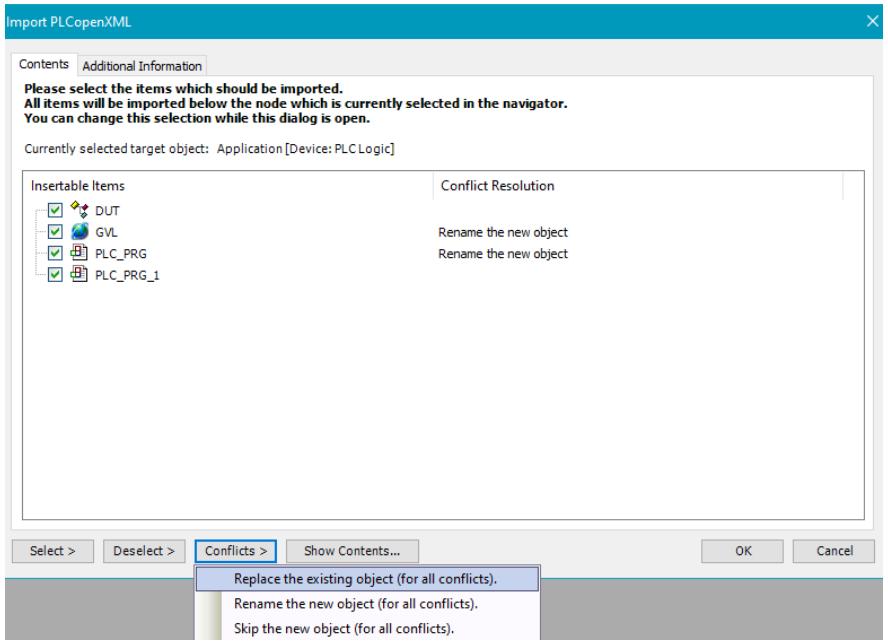


Overview

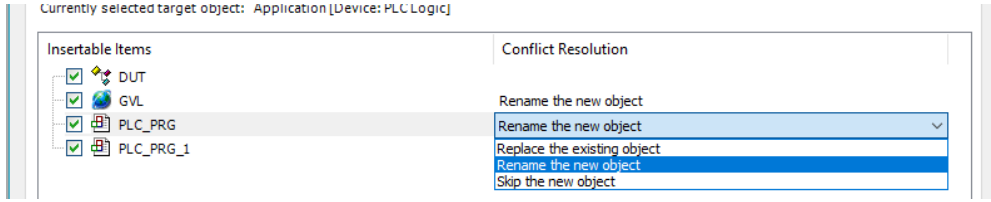
- Improved usability
- Improved security
- Improvements of License Manager
- Improvements of Project Inspection
- Improved Installer
- New Package Designer
- Reworked Library Parameter List
- Partial Access to Bitfields
- Improvements of the Professional Developer Edition
- Update of IIoT Libraries SL

Improved usability – Import PLCopen XML

- **Set conflict handling for all imported items with just one command**

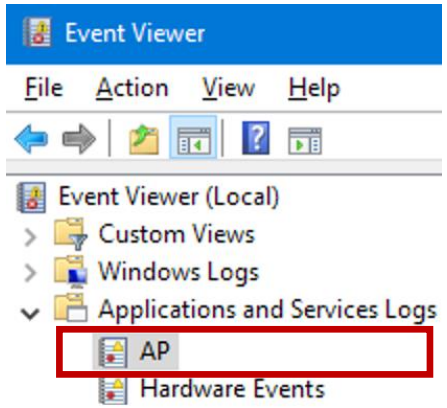


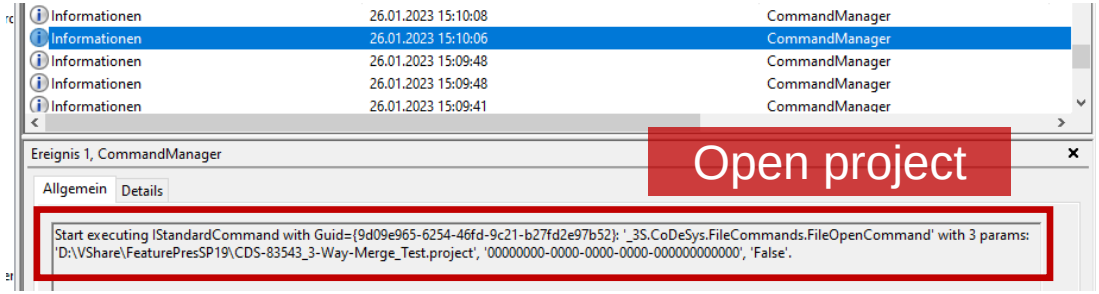
- **Adaptation of preset for handling of single items**

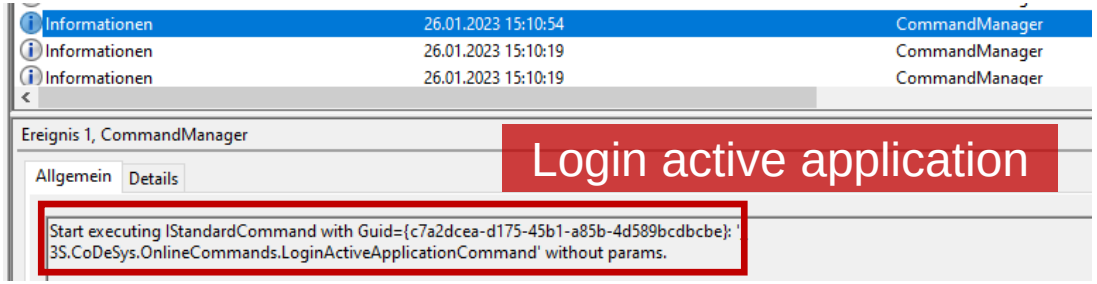


Improved usability – Command Logging

- **Advanced Diagnosis feature**
- **Activation: Starting CODESYS.exe with command line switch *"--enableEventLog="CommandManager"***
  (Admin rights required)
- **Effect:**
  - New MS Windows event view entry “AP”
  - Activity log of the CommandManager:
    - Executed commands
    - Parameters of executed commands
    - Examples

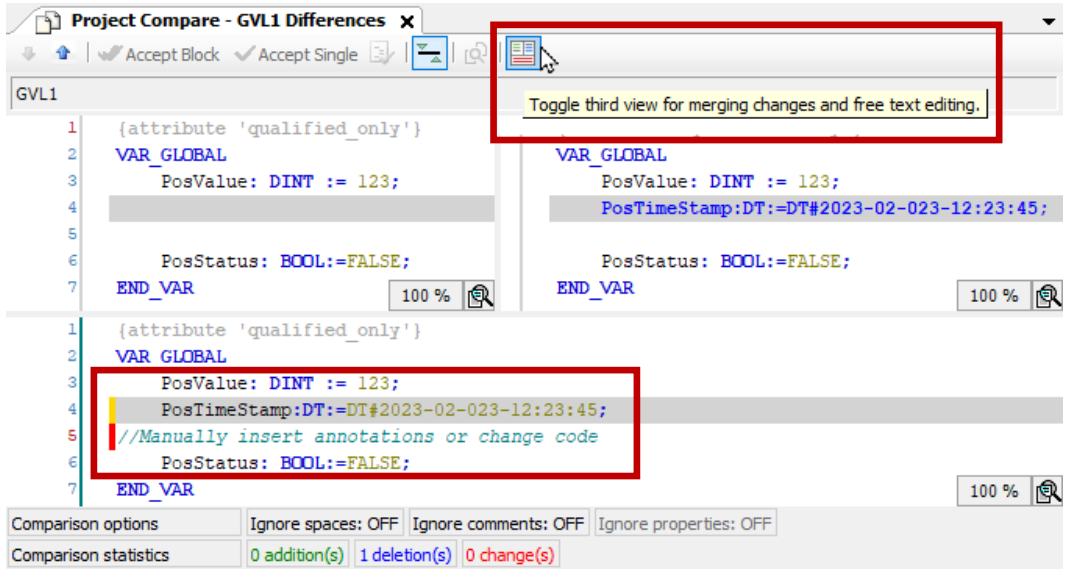


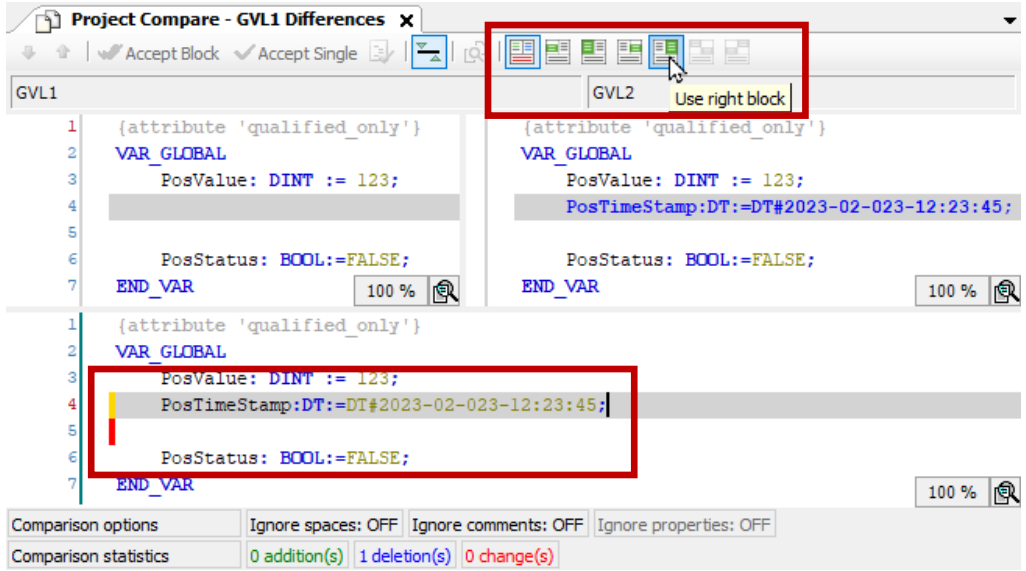




Improved usability – Advanced Project Compare

- **Compare window: additional 3rd window possible**
  - Offers additional commands for more merge options
  - Possibility to edit the changes in text



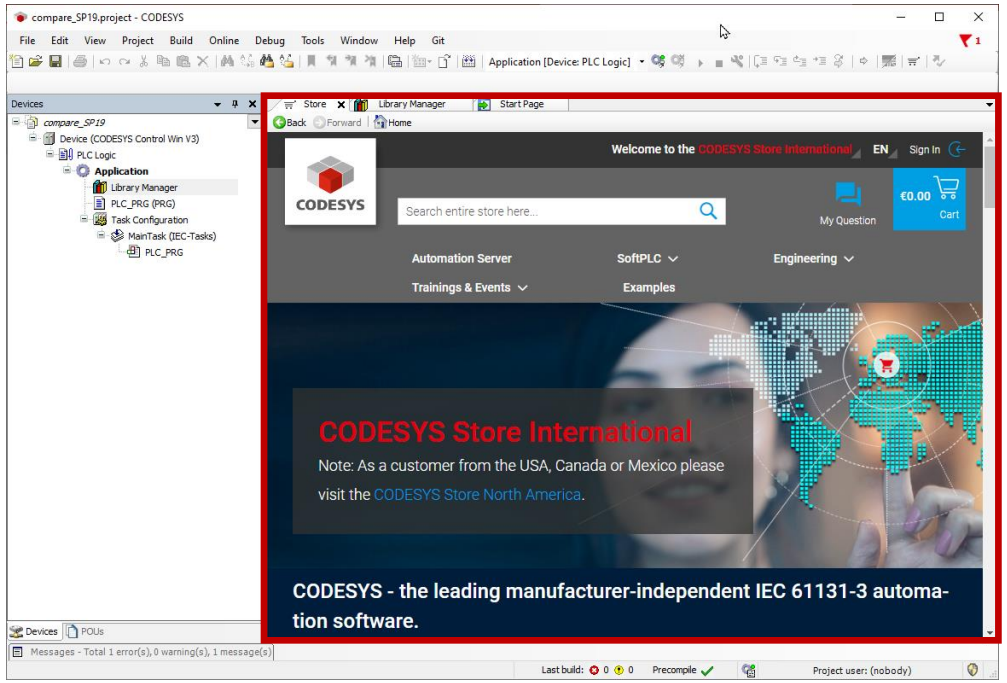


Improved Security – New Web View

- **MS WebView2 replaces Chromium Embedded Framework (CEF) for**
  - Start page
  - Library Manager
  - Integrated CODESYS Store

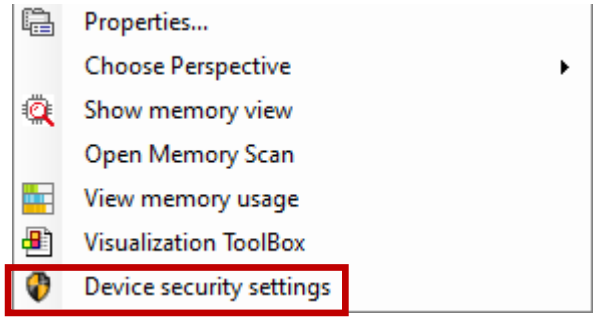
➔ **Self-updating component with recent Patches**

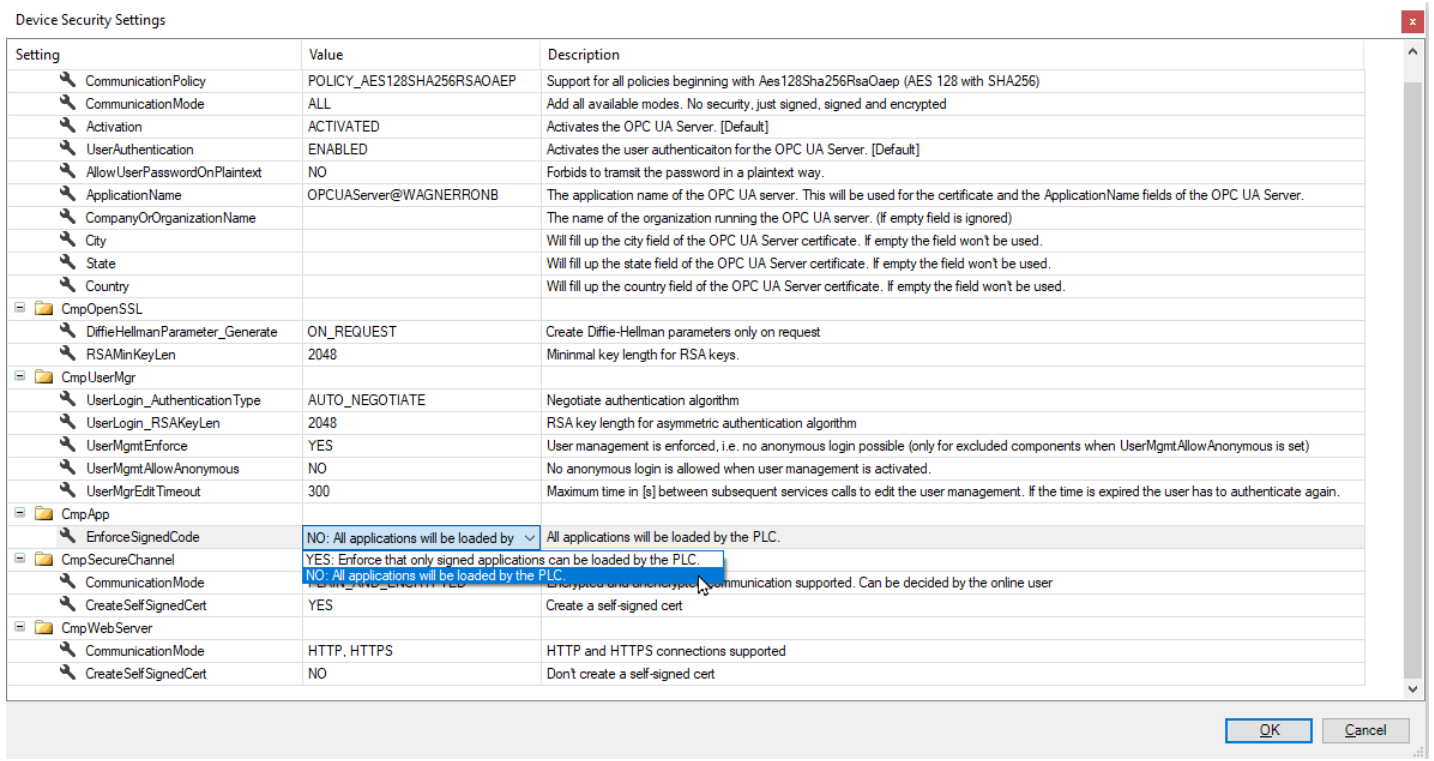
➔ **Reduced setup size (~50 MB)**



Improved security – CODESYS Security Agent

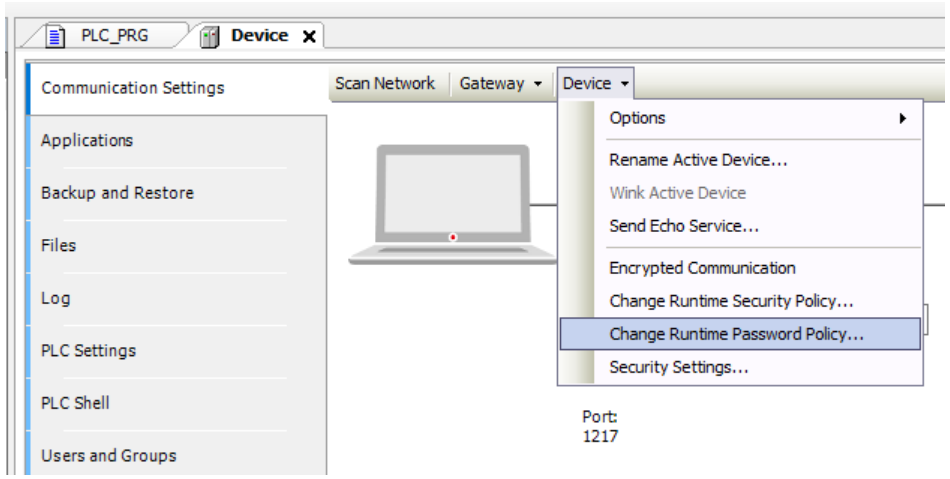
- **Improved certificate handling**
  - Install multiple certificates in one go
  - Allow for import / export of PKCS#12 containers
  - Quick access to all security settings
- **Prerequisites:**
  - Installed add-on “CODESYS Security Agent”
  - Added menu command “Device security settings”

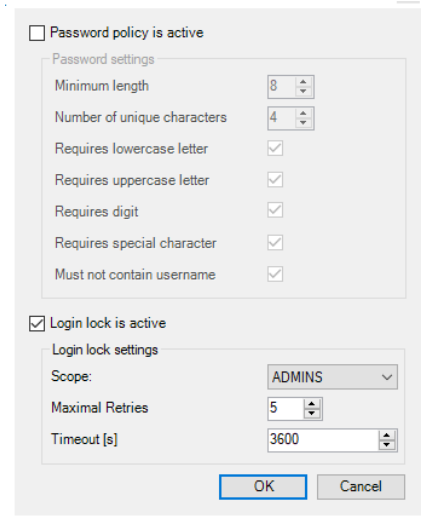




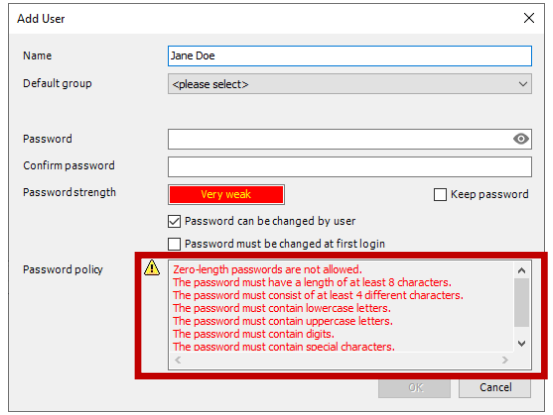
Improved security – Password policy settings

- **Support of runtime feature: Configurable password policy**



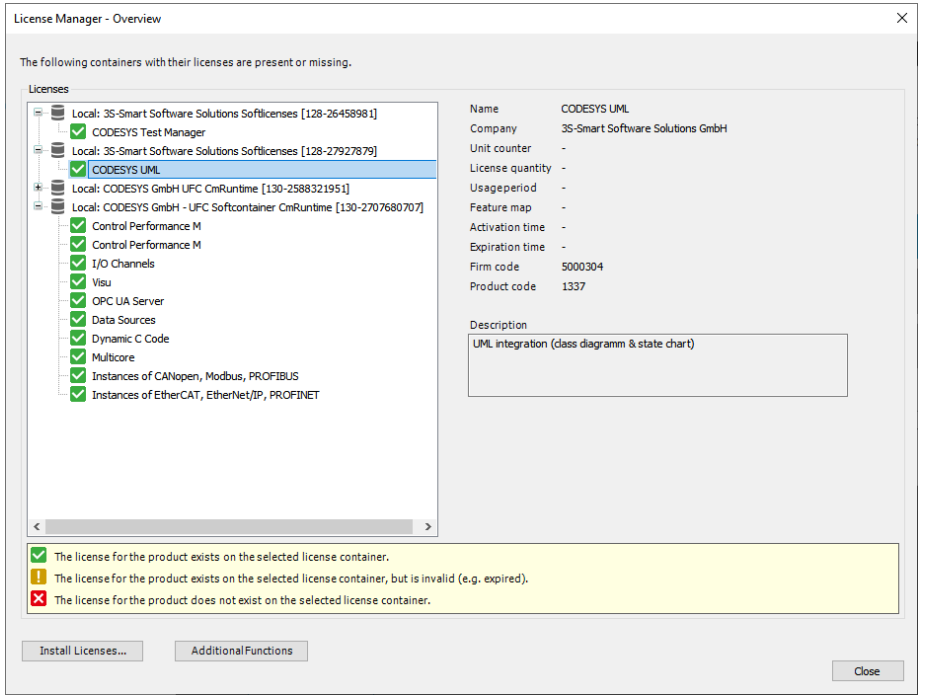


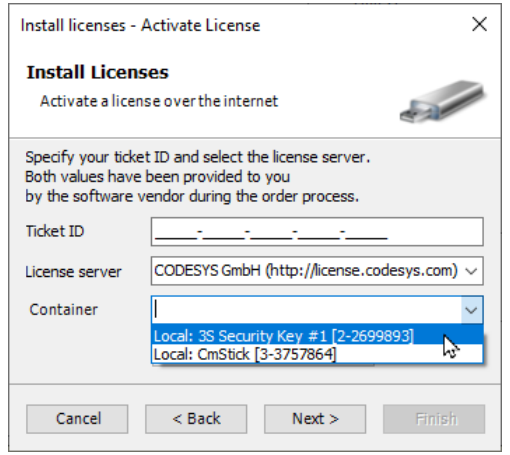
- **Immediate report of violations to security policy when adding a new user**



Improved License Manager

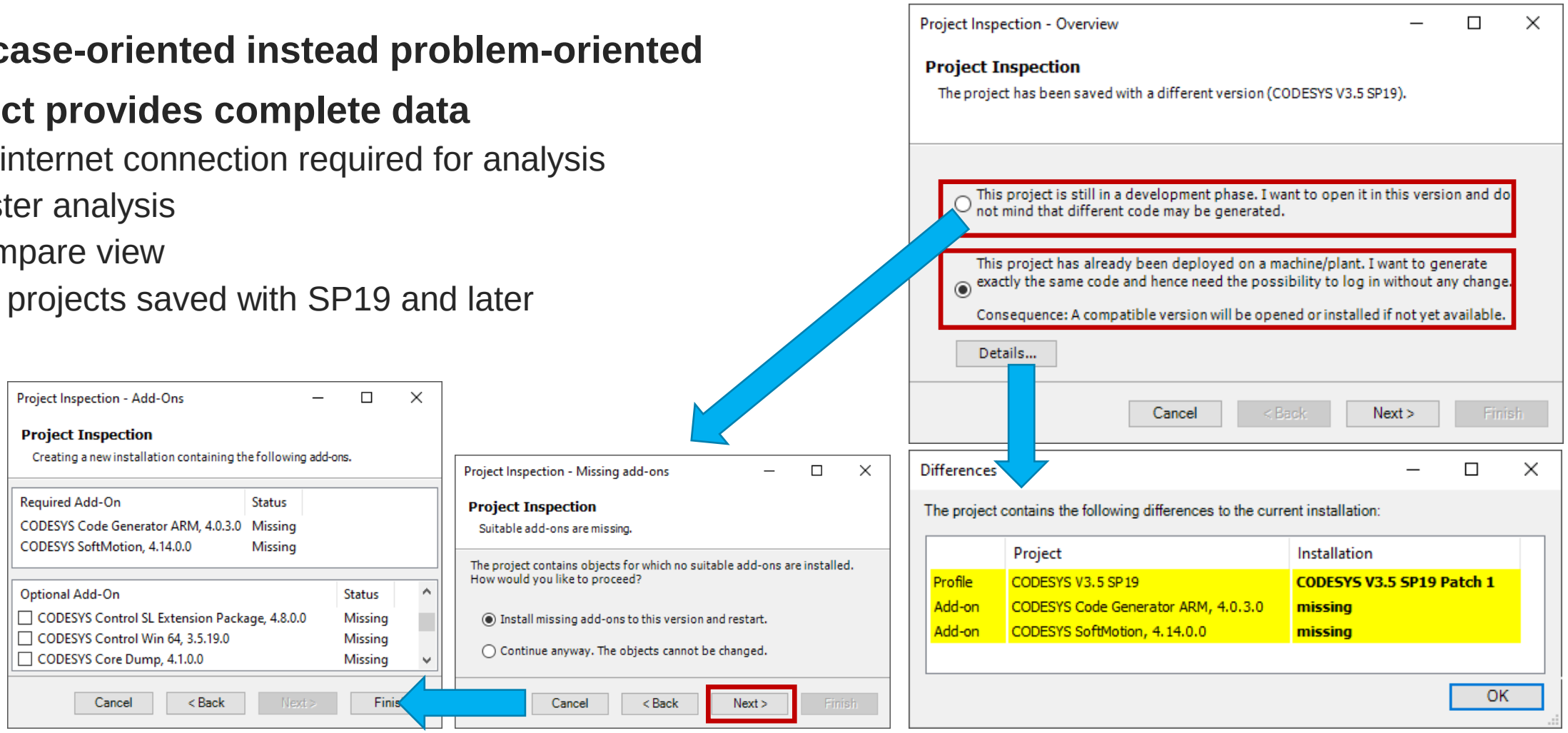
- List of all available containers
- Container selection within license activation workflow
- Automatic container preselection for activation





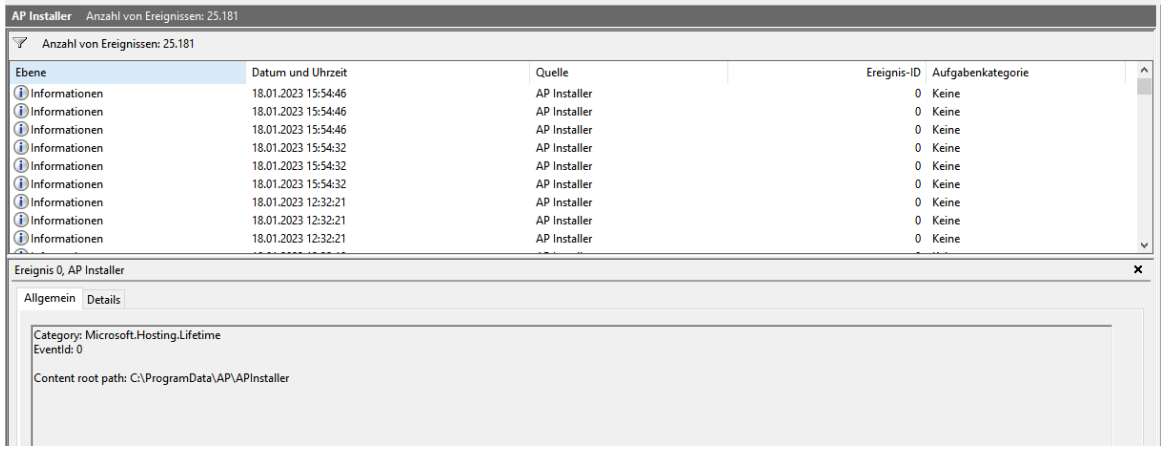
Improved Project Inspection

- **Use-case-oriented instead problem-oriented**
- **Project provides complete data**
  - No internet connection required for analysis
  - Faster analysis
  - Compare view
  - For projects saved with SP19 and later



Improved Installer

- Customization possible
- Multi-selection of add-ons
- Logging into MS Windows event view
- Localization (German / English)
- Updated framework to .Net6
- Reduced administrative rights

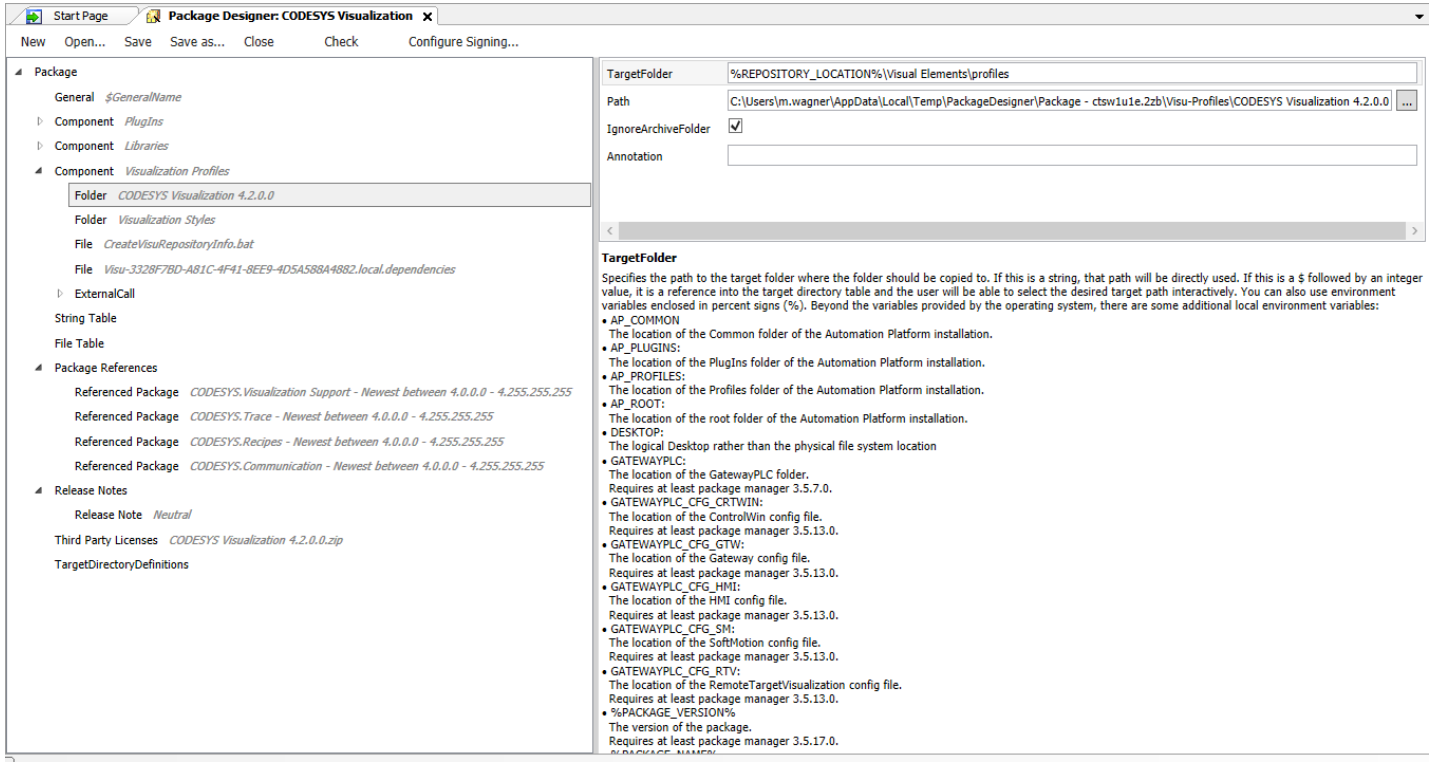


Improved Installer

- Project handling on double click
- Reduced administrative rights

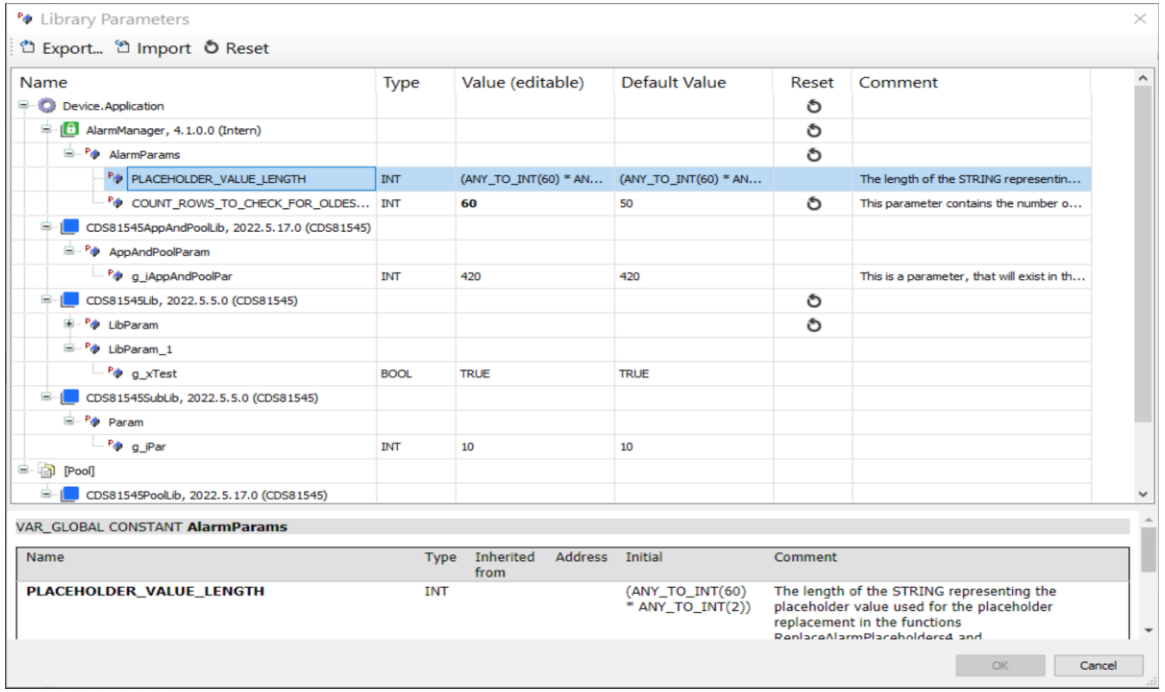
New Package Designer

- **Packages for CODESYS V3.5 SP17 and higher**
- **Properties:**
  - Common functions available
  - New features
  - Package references
  - Signing
  - Release notes



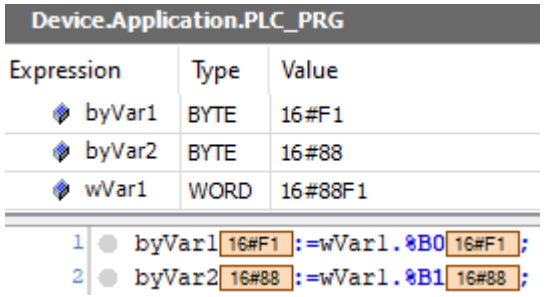
Reworked Library Parameter List

- New editor with export / import / reset
- Re-enabled addition of parameter list object to libraries
- Central edit of all parameters of all libraries in one Library Manager



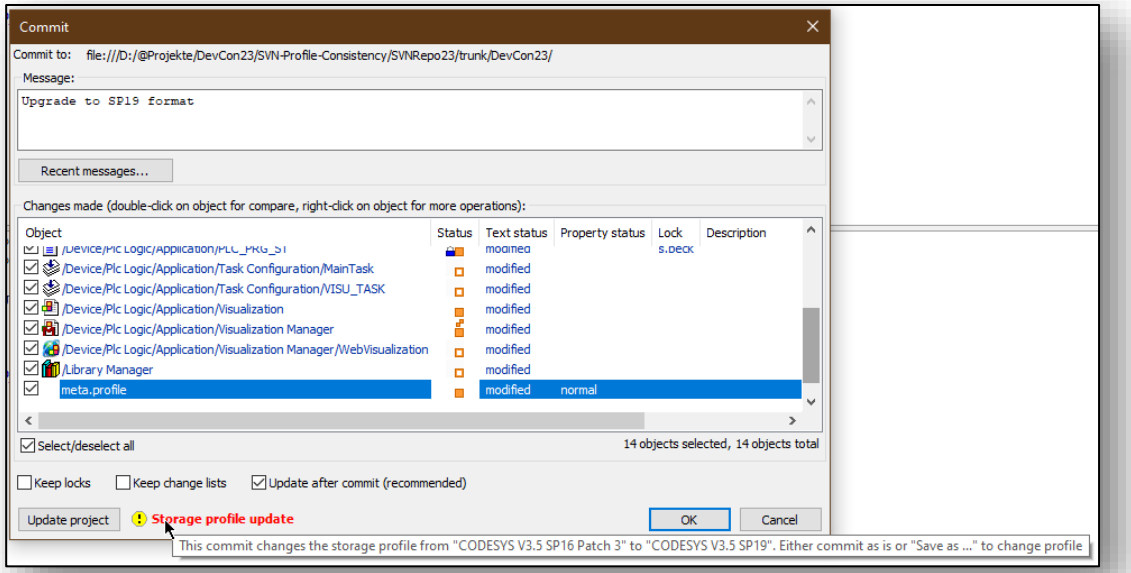
Partial access to bitfields

- **Feature of 61131-3 3rd edition**
- **Similar to bit access „x.1“**
- **Use of % like for direct addresses**
- **Available for bitfield variables** (BYTE, WORD, DWORD, LWORD)
- **Examples:**
  - variable.%B0
  - variable.%W1
  - variable.%D2
  - variable.%L0
  - variable.%X11



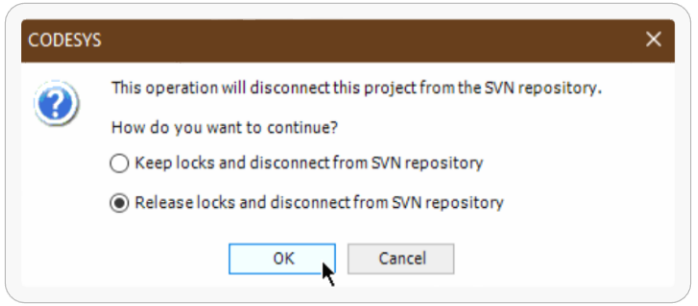
Improvements of the Professional Developer Edition

- **CODESYS SVN**
  - Improved project profile consistency
    - Tool support for consistent storage format among different CODESYS versions
    - No operations possible in case the repository storage format is inconsistent
    - Good to know
      - „meta.profile“:
        Repository storage profile contained –
        mandatory for profile change commits
      - „Save as“:
        The way to change the storage profile of a project explicitly
      - „Project information“:
        Shows the current project storage profile

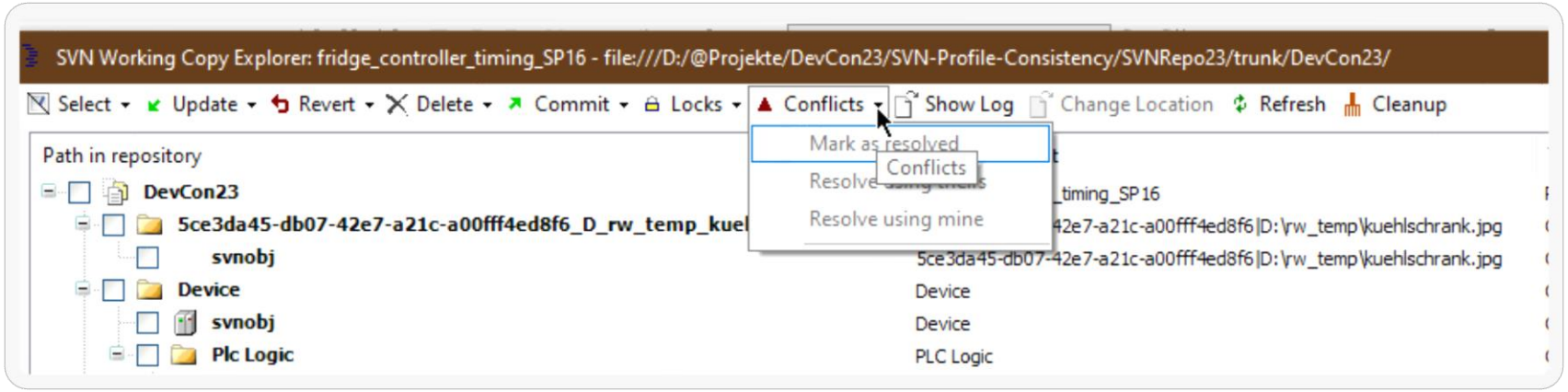


Improvements of the Professional Developer Edition

- **CODESYS SVN**
  - „Disconnect from repository“ now releases locks
    - Disconnect / reconnect:
      Common quick fix for SVN-related problems

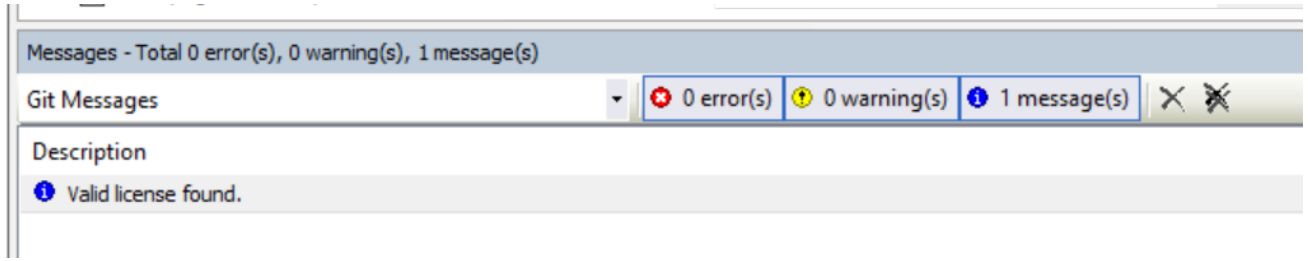


  - Better control over tree conflicts
    - Concurrent deletion now resolvable
    - „SVN Working Copy Explorer“: to resolve tree conflicts

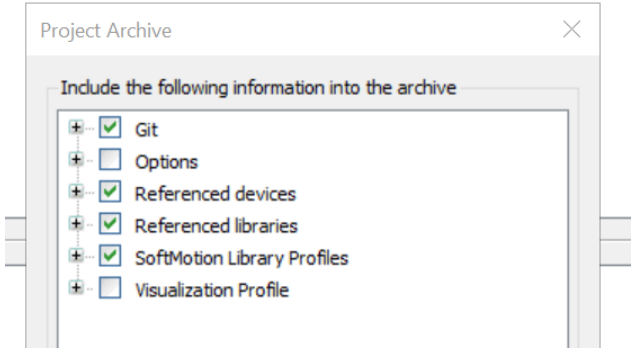


Improvements of the Professional Developer Edition

- **CODESYS Git**
  - License information

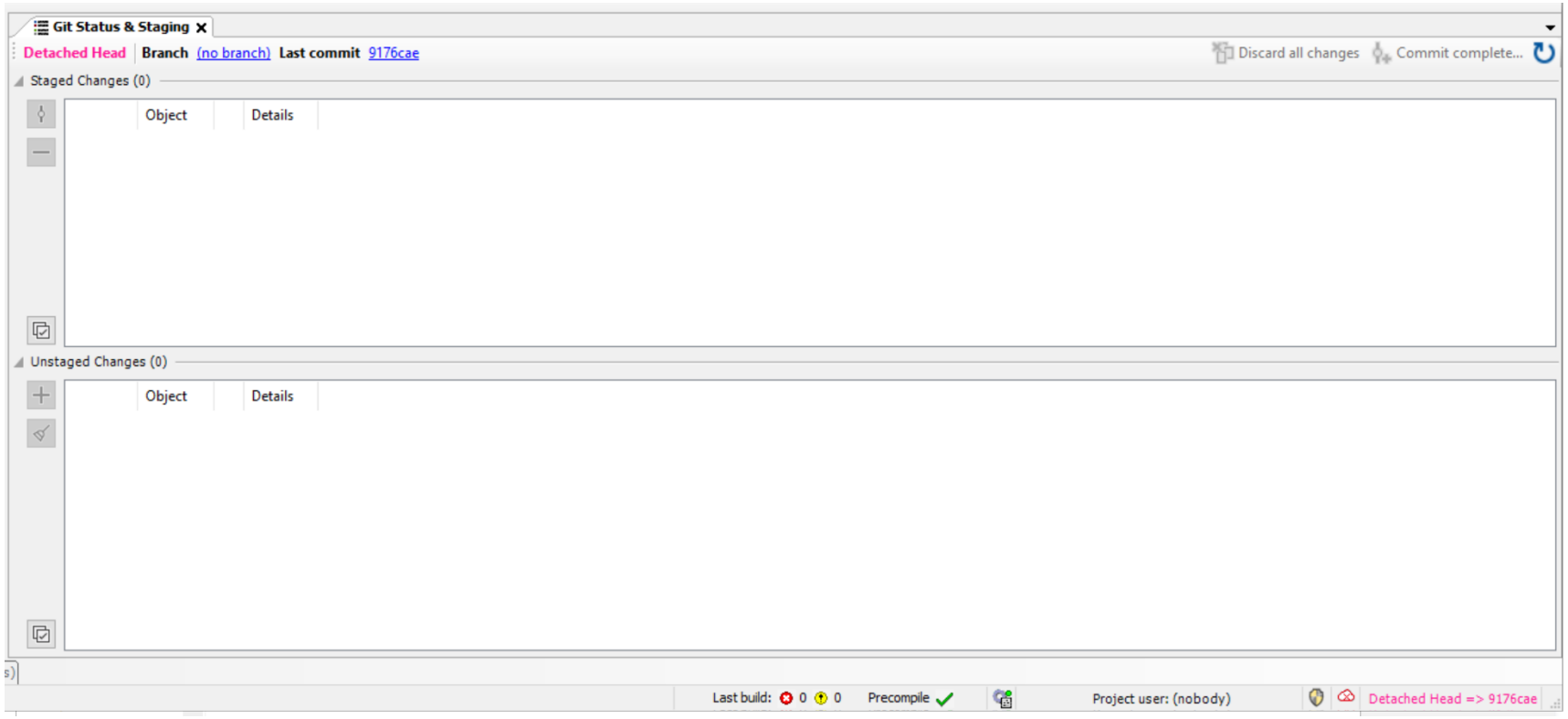


  - Handling of Git repository in the CODESYS Project Archive



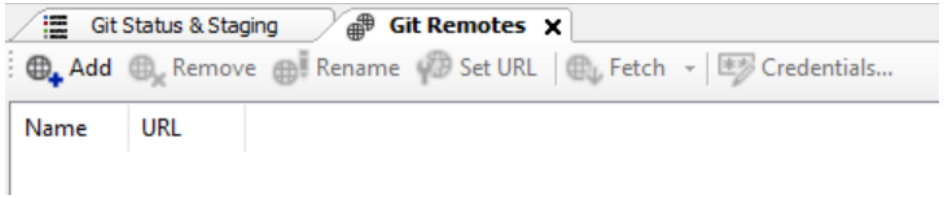
Improvements of the Professional Developer Edition

- **CODESYS Git**
  - Support of “Detached Head”

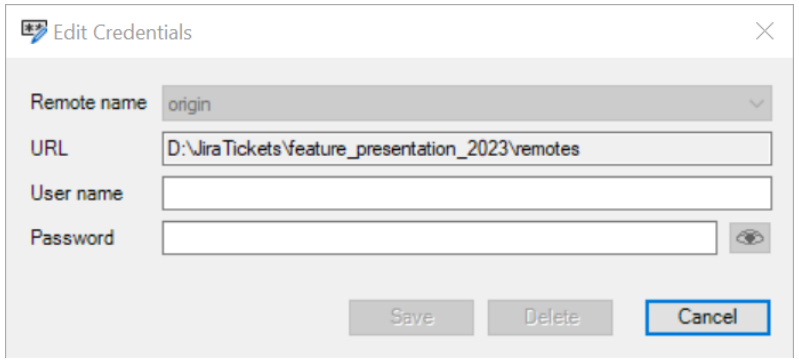


Improvements of the Professional Developer Edition

- **CODESYS Git**
  - Remote commands disabled in case of no remote repository

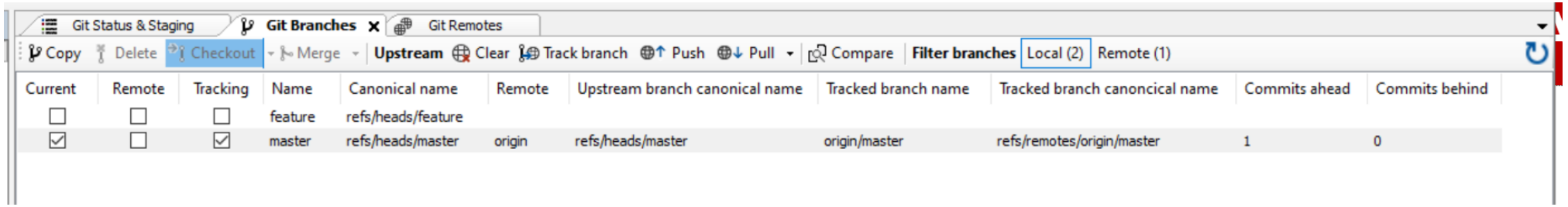


  - Improved credential handling
    - Editing credentials of remote repositories inside CODESYS



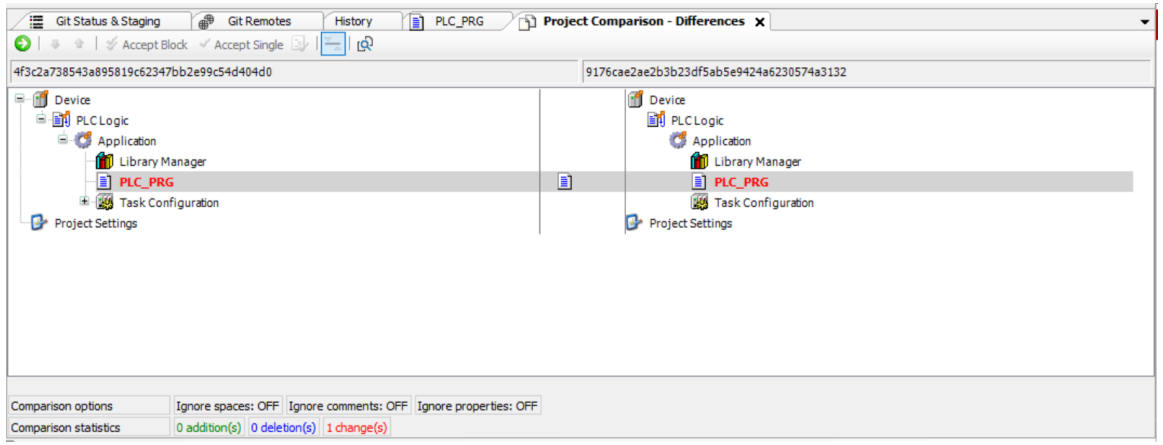
Improvements of the Professional Developer Edition

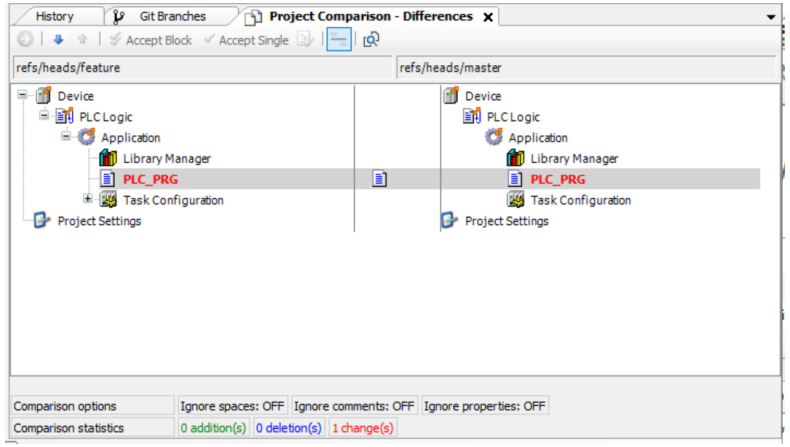
- **CODESYS Git**
  - Display of number of differences of commits in the Git Branches view :
    - Between tracking branch and tracked remote branch



Improvements of the Professional Developer Edition

- **CODESYS Git**
  - Compare two commits in the Git History view

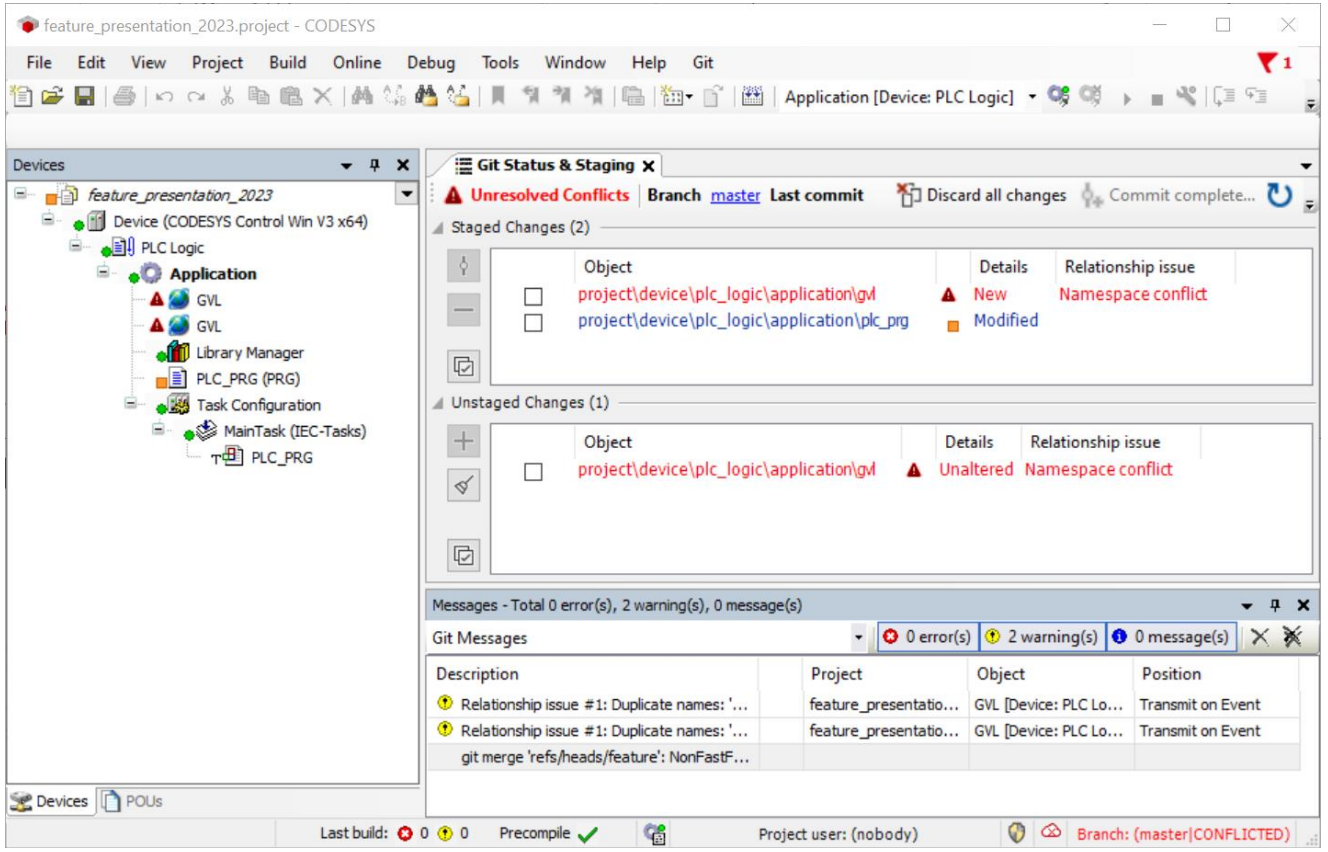




  - Compare two branches in the Git Branches view

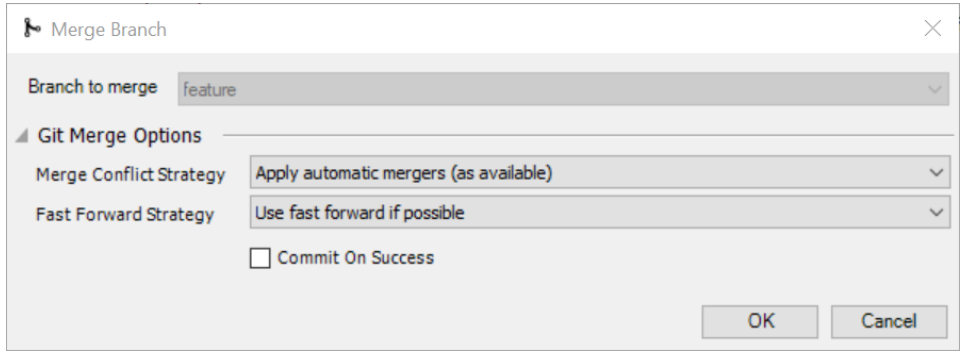
Improvements of the Professional Developer Edition

- **CODESYS Git**
  - Merge: Handling „Relationship Issues“



Improvements of the Professional Developer Edition

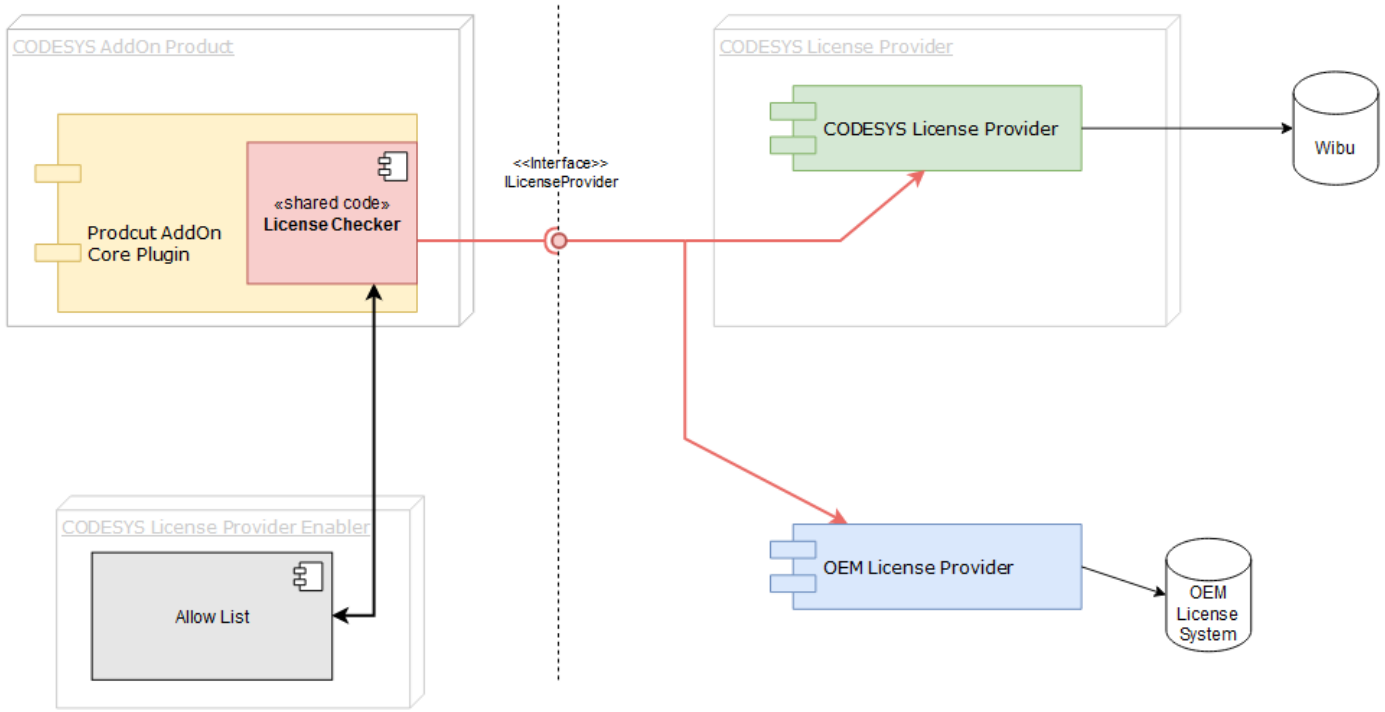
- **CODESYS Git**
  - Merging: With usual Git merge options (same for Git Pull)



  - „Automatic Mergers“ supported if available

Improvements of the Professional Developer Edition

- **Exchangeable licensing system for add-ons (will be released with 3.5.19.3)**
  - “License Provider”
    - Provision of a valid license from OEM or WIBU licensing system
    - Enabling by CODESYS necessary



Update of IIoT Libraries SL

- **Simple Network Management Protocol (SNMP):**
  - Internet Standard protocol for collecting /organizing information about managed devices in IP networks
  - Often used by IT departments to monitor device states
- **New: Support of SNMP V3**
- **Advantages:**
  - User management
  - Strong authentication
  - Data encryption
- **New feature of SNMP V3**
  - Support of SET command in SNMP Agent

CODESYS RUNTIME
CODESYS SAFETY

Overview

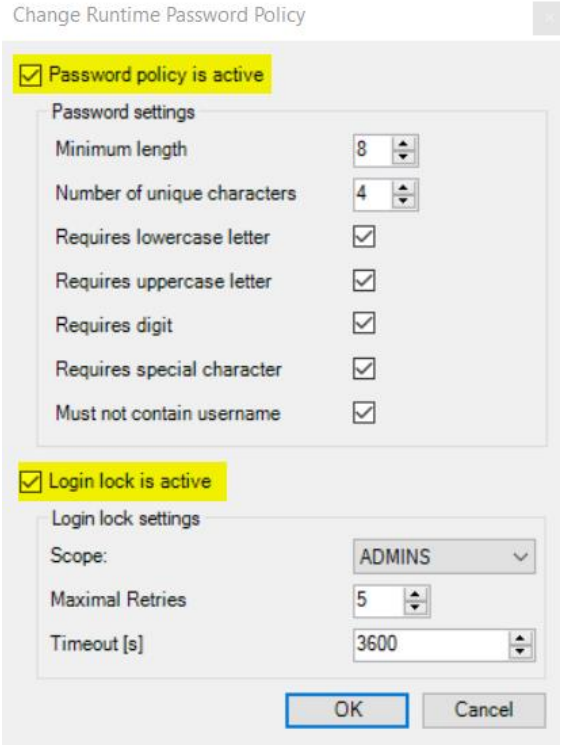
- Improvements in Device User Management
- Support of App-based Licenses
- UFC support
- Further general improvements
- Support of new platforms
- Virtual PLC
- CODESYS Mass Licenser
- CODESYS Safety SIL2 PSP AURIX TC3
- J1939 Safety

Improvements in Device User Management

- **Password policy:**
  - Configurable password strength
  - Configurable user lock after invalid authentication
    Scopes: ADMINS | NONADMINS | ALL
  - Configurable password expiration
  - See “Password Policy Settings“ (Engineering) for further information

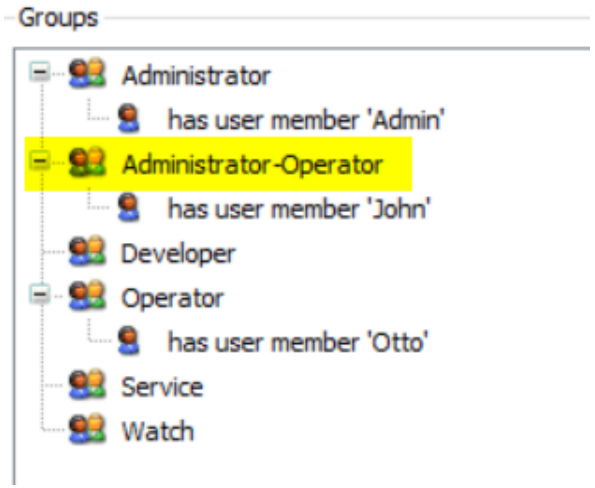
Device Security Settings

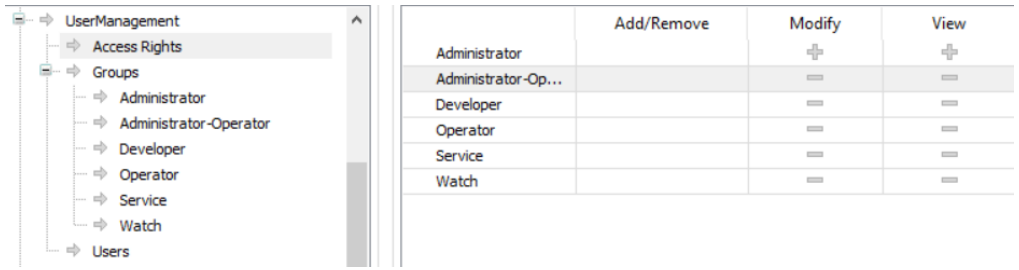
Setting	Value	Description
CmpOPCUAServer		
CmpOpenSSL		
CmpUserMgr		
UserLogin_AuthenticationType	AUTO_NEGOTIATE	Negotiate authentication algorithm
UserLogin_RSAKeyLen	2048	RSA key length for asymmetric authentication algorithm
UserMgmtEnforce	YES	User management is enforced, i.e. no anonymous login possible (only for excluded components when UserMgmtAllowAnonymous is set)
UserMgmtAllowAnonymous	NO	No anonymous login is allowed when user management is activated.
UserMgrEditTimeout	300	Maximum time in [s] between subsequent services calls to edit the user management. If the time is expired the user has to authenticate again.
UserMgmt.PasswordPolicy	DISABLED	User management password policy is disabled
UserMgmt.PasswordPolicy.Length	8	Minimum length
UserMgmt.PasswordPolicy.UniqueCharacters	4	Minimum number of unique characters
UserMgmt.PasswordPolicy.Characters.Lowercase	YES	User management passwords have to contain lowercase letters.
UserMgmt.PasswordPolicy.Characters.Uppercase	YES	User management passwords have to contain uppercase letters.
UserMgmt.PasswordPolicy.Characters.Digits	YES	User management passwords have to contain digits.
UserMgmt.PasswordPolicy.Characters.Special	YES	User management passwords have to contain special characters.
UserMgmt.PasswordPolicy.Characters.NoUsername	YES	User management passwords must not contain the username.
UserLogin.Lock	ENABLED	User login lock enabled.
UserLogin.Lock.Scope	ADMINS	User login lock scope for admins.
UserLogin.Lock.MaxRetries	5	After how many tries of invalid credentials the login user is locked
UserLogin.Lock.TimeoutSec	3600	After how many seconds a locked user is released
Password.Expiration	DISABLED	Check password expiration disabled.
Password.Expiration.Scope	ADMINS	Password expiration scope for admins.
Password.Expiration.TimeoutDays	100	After how many days a new password is required [1..1000]
CmpApp		
CmpSecureChannel		
CmpWebServer		

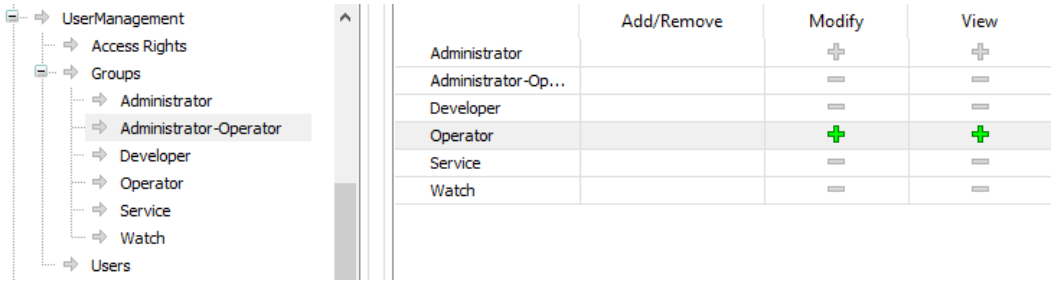


Improvements in Device User Management

- **Group management:**
  - Restricted administrator groups:
    Example: Administrator-Operator







Support of App-based Licenses (as of SP19 Patch 1)

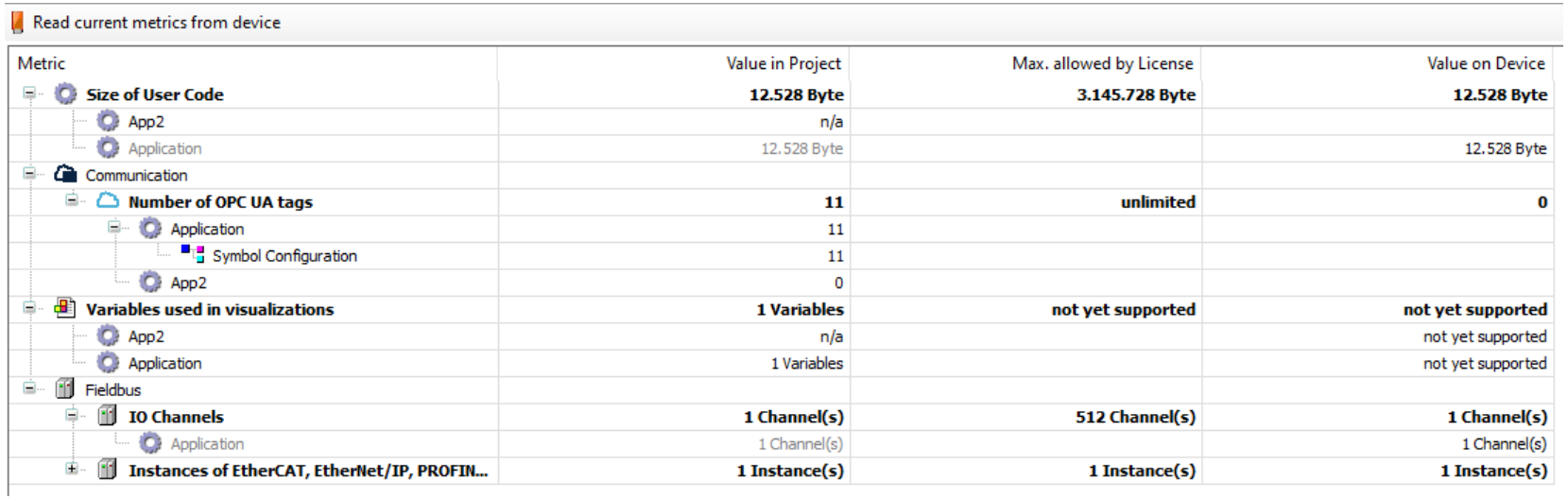
- Licenses dependent on the usage in IEC applications

500 KB 64 IO Basic S	1 MB 128 IO Basic M	3 MB 256 IO Basic L	3 MB 256 IO Standard S	5 MB 1.024 IO Standard M	6 MB 2.048 IO Standard L	8 MB 4.096 IO Performance M	10 MB 8.192 IO Performance L
	2xCANopen/ Modbus	2xCANopen/ Modbus/Profibus	4xCANopen/ Modbus/Profibus 1xECAT/EIP/PN Dynamic C Code	4xCANopen/ Modbus/Profibus 1xECAT/EIP/PN Dynamic C Code	4xCANopen/ Modbus/Profibus 2xECAT/EIP/PN Dynamic C Code MultiCore (4 Cores)	4xCANopen/ Modbus/Profibus 2xECAT/EIP/PN Dynamic C Code MultiCore (4 Cores)	4xCANopen/ Modbus/Profibus 4xECAT/EIP/PN Dynamic C Code MultiCore (4 Cores)

- License values are determined by CODESYS and the associated Plug-ins

Support of App-based Licenses (as of SP19 Patch 1)

- **Investigate license values *before* download:**
  Device dialog „Licensed Software Metrics“:



Read current metrics from device

Metric	Value in Project	Max. allowed by License	Value on Device
Size of User Code	**12.528 Byte**	**3.145.728 Byte**	**12.528 Byte**
App2	n/a		
Application	12.528 Byte		12.528 Byte
Communication			
Number of OPC UA tags	**11**	**unlimited**	**0**
Application	11		
Symbol Configuration	11		
App2	0		
Variables used in visualizations	**1 Variables**	**not yet supported**	**not yet supported**
App2	n/a		not yet supported
Application	1 Variables		not yet supported
Fieldbus			
IO Channels	**1 Channel(s)**	**512 Channel(s)**	**1 Channel(s)**
Application	1 Channel(s)		1 Channel(s)
Instances of EtherCAT, EtherNet/IP, PROFIN...	**1 Instance(s)**	**1 Instance(s)**	**1 Instance(s)**

- **Investigate license values *at* download of an application:**
  - Download/Online Change: Is denied if a value exceeds the license!
  - Loading boot project: Is denied if a value exceeds the license!

UFC Support

- **CodeMeter® UFC (Universal Firm Code) container:**
  - One new CODESYS firm code for all containers: CmAct and CmDongle
  - UFC Firm code = 6000437
- **UFC support:**
  - CmAct: Runtime installer / Runtime system creates UFC container by default if not available
  - CmDongle: 3-xxx dongles required (UFC not supported on 2-xxx dongles!)
- **Available on runtime systems:**
  - CODESYS Control Win SL
  - CODESYS Control Linux SL ➔ next release
  - CODESYS Control RTE SL: not supported in SP19
  - On all targets of device manufacturers with CodeMeter® feature
- **App-based Licenses exclusively installable on UFC containers!**

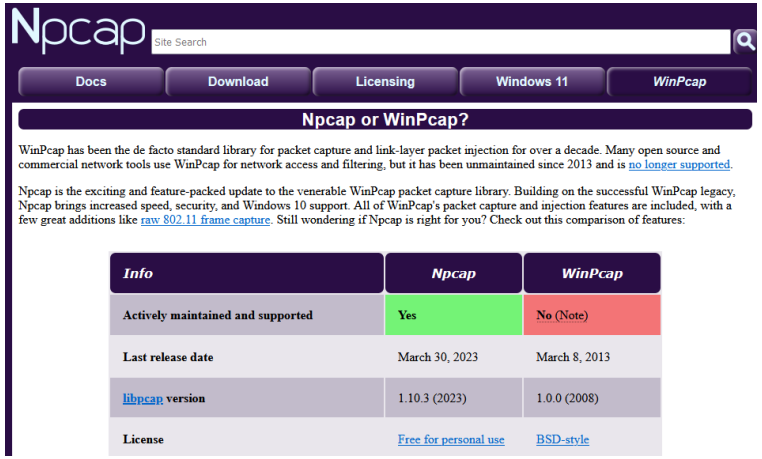
Further improvements

- **IEC-application RUN/STOP transition improved:**
  - Three exactly specified phases for handling IEC tasks and reset IOs:
    - Phase1: Wait max. 10s for all IEC tasks to execute their RUN/STOP cycle
      - Tasks with referenced I/Os: Watchdog error after 10s if no reaction
      - Tasks without referenced I/Os: Can keep running until the end of phase 3
    - Phase2: Reset/Init outputs => Safe state of the machine
    - Phase3: Wait max. 25s for all tasks without referenced I/Os for their RUN/STOP cycle
      - Watchdog error at the end if no reaction
  - Timeouts for phase 1 and 3 can be configured via settings
  - New logfilter to instrument RUN/STOP transition:

```
[CmpLog]
;--Component specific logger filters:--
CmpApp.Filter=0xFFFFFFFF
CmpIecTask.Filter=0xFFFFFFFF
CmpSchedule.Filter=0xFFFFFFFF       ;OPTIONAL
```

Further improvements

- **New SysSocket interface function: SysSockRecvMsg():**
  - Detection of unicast and broadcast UDP messages
  - Details see documentation in SysSocketItf.h
- **CODESYS Control Win - SysEthernet:**
  - WinPcap:
    - Integration in Control Win::SysEthernetWin32
    - WinPcap out of maintenance!
    - Usage: Ethernet-based fieldbuses
  - Porting from WinPcap => Npcap
    - Npcap: already included in wireshark network analyzer
    - Comparison Npcap vs. WinPcap: https://npcap.com/vs-winpcap.html



Runtime Toolkit support for new platforms

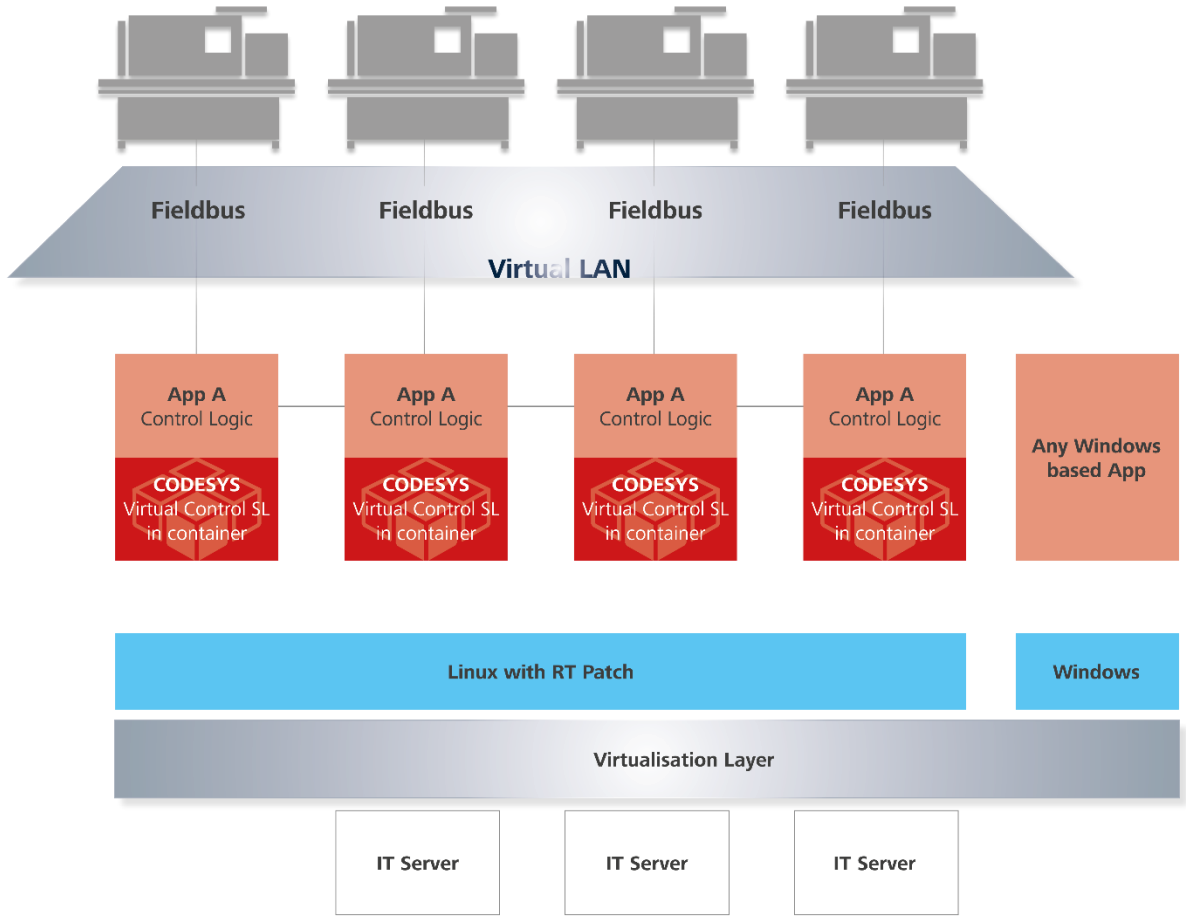
- **Support of DragonCore (Loongson) platform**
  - Integrated compiler
  - Support of add-on functions, e.g.
    - Fieldbus, e.g., EtherCAT, PROFINET, EtherNet/IP
    - Visualization, e.g., WebVisu, TargetVisu
    - Motion / CNC / Robotics

- **Support of VxWorks/ARM64 platform**
  - All known CODESYS features

WNDRVR

Virtual PLC: CODESYS Virtual Control SL

- Hyperconverged infrastructure (HCI)
- Seamless integration IT and OT
- Micro-service approach
- Secure by design
- Pay-per-use



Virtual PLC: CODESYS Virtual Control SL

- **CODESYS Control SL in a container**
- **Use of network licenses**
- **Business model**
  - Application-based
  - Time-based
- **Handling / management with CODESYS Automation Server On Premises (pending)**

CODESYS Mass Licenser: Automatic licensing of devices

- Auto-connect to devices
- Device identity check
- Automatic license download, activation, and validation
- Extensive and comprehensive licensing reports

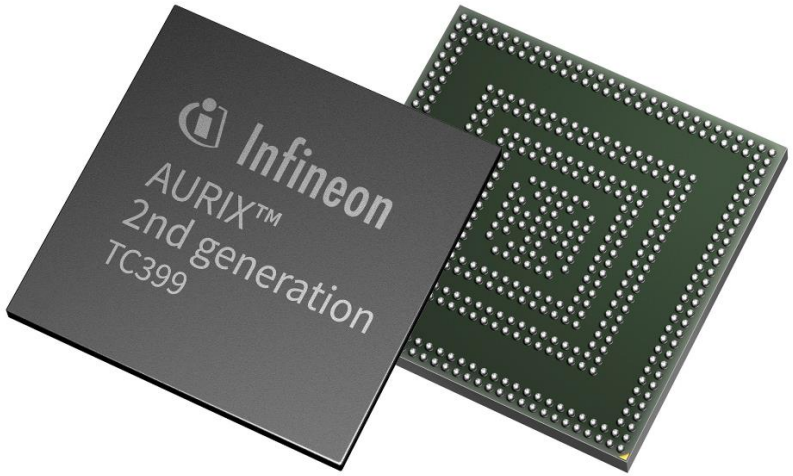
```
CODESYSMassLicenser                                                                                  03.01.2023 09:39:02

WARNING: only 5 license(s) remaining in C:\Users\l.zickl\AppData\Roaming\CODESYS CML\licenses\CML_TestA_LicenseA.txt
PLC Name            DeviceId  SN                      Status                            Online  Step/total
*****************************************************************************************************************

CODESYSControl-4    32833     RTS-00000000ec86d893    Done                              True    2/2
CODESYSControl-6    32833     RTS-00000000753d8f46    Done                              True    2/2
CODESYSControl-1    32833     RTS-000000003fe15b9d    Done                              True    2/2
CODESYSControl-2    32833     RTS-00000000a8a838c2    ConnectingToPLC                   True    1/2
CODESYSControl-7    32833     RTS-0000000069a4d874    WaitingInQueue                    True    1/2
CODESYSControl-3    32833     RTS-00000000525dfa8a    WaitingInQueue                    True    1/2
CODESYSControl-5    32833     RTS-00000000c411b29e    WaitingInQueue                    True    1/2
CODESYSControl-0    32833     RTS-0000000000425caa    WaitingInQueue                    True    1/2
```

Platform Support Package - Infineon AURIX TC39x

- **AURIX TC39x**
  - 6x TriCore™ at 300 MHz (with 4 lockstep cores)
  - 16 MB flash/ ECC protection
  - Up to 6.9 MB SRAM/ ECC protection
  - Built-in HW self tests

- **Pre-certified CODESYS Safety SIL2 adaptation**
  - Platform adaptation
  - Integration manuals
  - Integration tests

- **Customer-specific integration**
  - flexible PSP interface
  - Custom IO drivers
  - Custom components



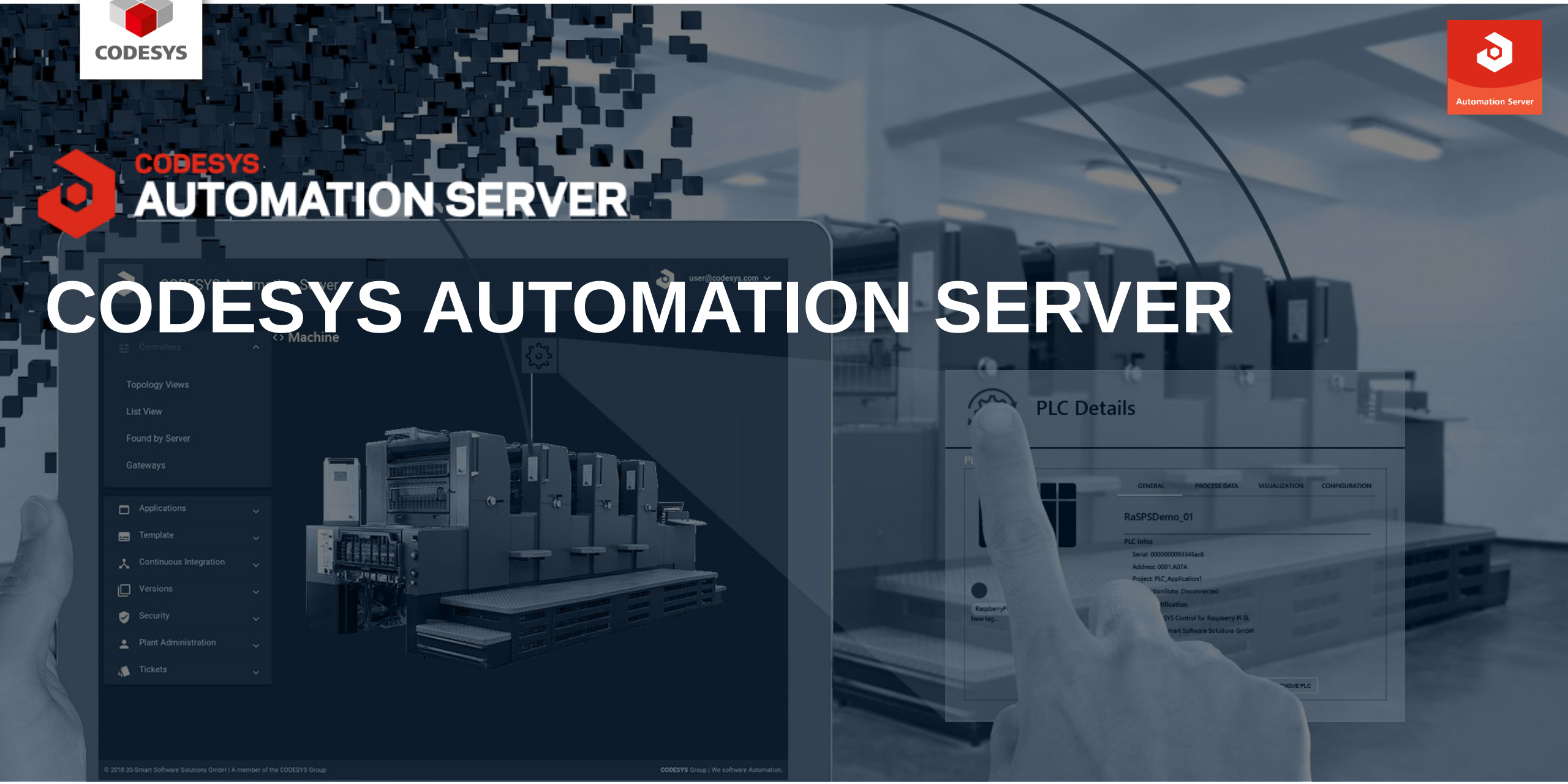
J1939 Safety Library for CODESYS Safety SIL2

- **Certified in combination with CODESYS Safety SIL2**
  - Implementation of the SAE J1939 Safety specification
  - Assessment
  - Specification
  - Manuals (user and integration manual)
  - Unit tests
- **Library**
  - Part of the **CODESYS SAE J1939** package
  - Library interface without CODESYS configurator
    - J1939 Safety
    - J1939 Safety Std
    - J1939 Safety Itf
  - Separated from standard SAE J1939 fieldbus

CODESYS

CODESYS
AUTOMATION SERVER

CODESYS AUTOMATION SERVER



CODESYS Group | We *software* Automation.

CODESYS Automation Server

1.24.0 – 1.29.0

Overview

- **Functional and frontend developments**
  - 1.24.0 Replace PLC without ticket | E-mail address validation | Disabled network scan for offline Edge Gateways | Re-scan for PLCs | Move PLC to new/updated Edge Gateway
  - 1.25.0 Force MFA | Extended multi-edit | Configurable password policy
  - 1.26.0 Activate device user management | Support secure WebVisu | Multi-app information | Display of licenses | Synchronize applications warning
  - 1.27.0 Application update scheduler | Configurable in-app messages | “Password lost” guide
  - 1.29.0 Updates highlighting & visibility | Set default user language | Access notification
- **Backend and infrastructure developments**
  - On-premises | EaaS Manager | Edge Communication rework | CML support
- **Planned developments and activities**
  - LDAP support | Deployment log | Enhanced licensing | Encrypted communication | Certificate handling | Virtual Control synergies | Topology view 2.0 | Security audit

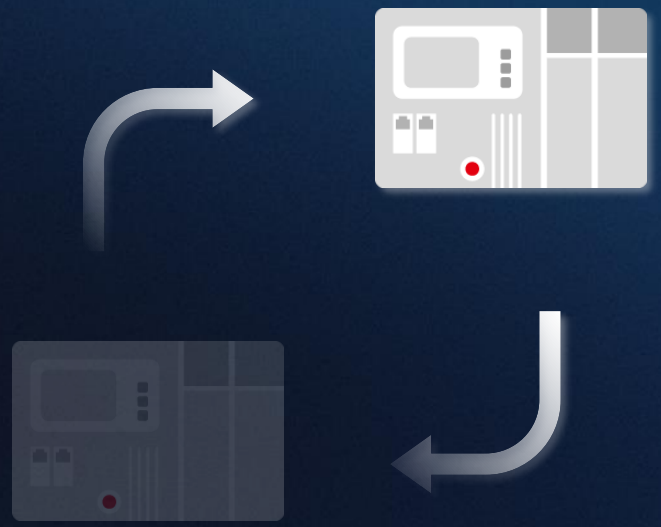
Replace PLC without ticket (1.24.0)

Requirement

- A PLC needs to be replaced with a spare device.

Solution

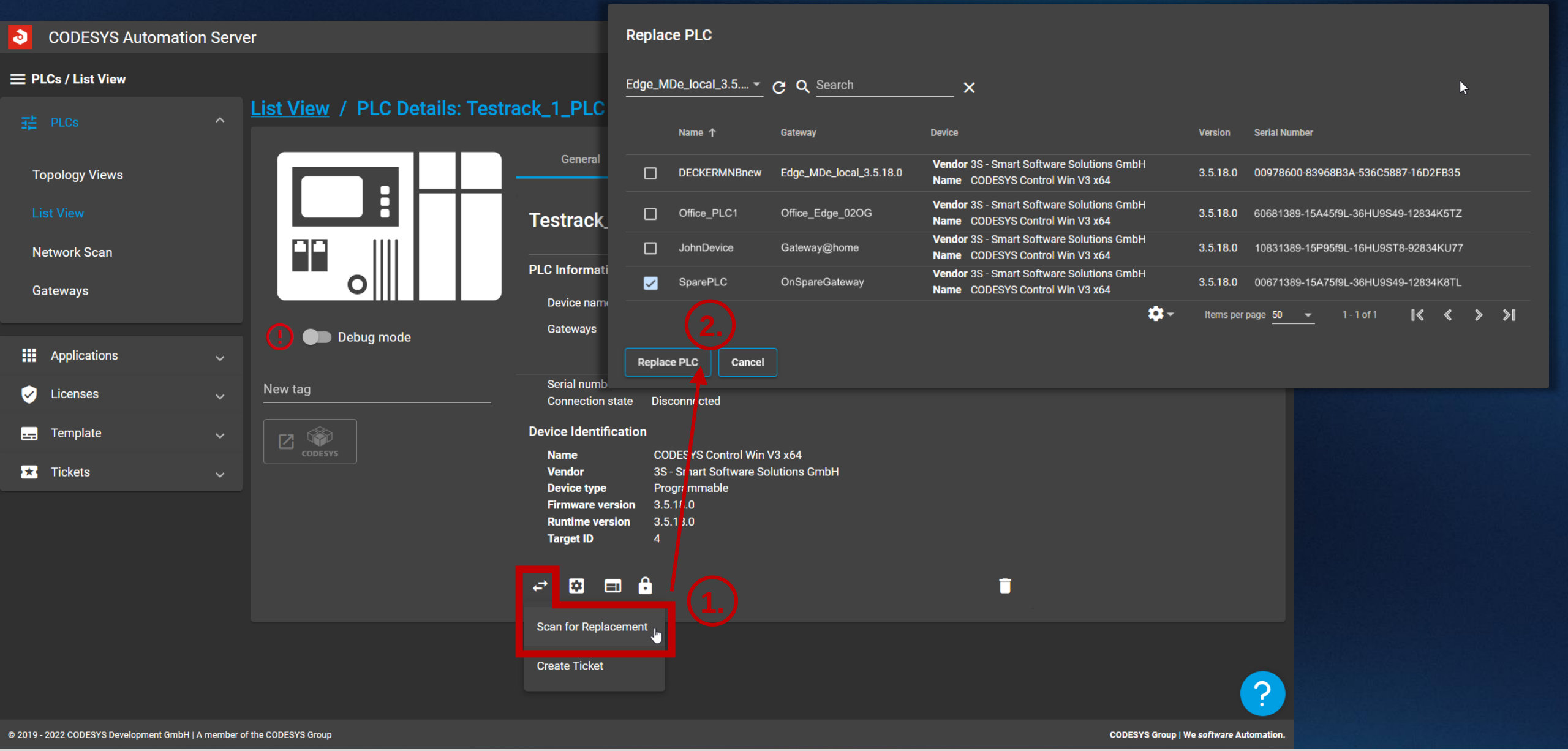
- Already possible: replacement ticket
- New: scan for a replacement device



Benefit

- Very simple - just a few clicks
- Very fast - takes only a few seconds
- Everything is automatically taken over - applications and all other settings.
- The CODESYS Development System is not required to commission new controller.

Visible developments

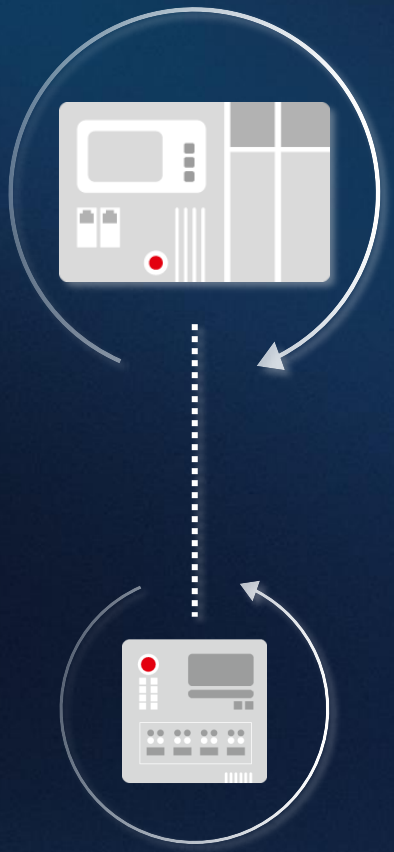


Re-scan for PLCs (1.24.0)

Move PLC to new/updated Edge Gateway (1.24.0)

Requirements

- Rescan for existing PLCs
- Change the PLC name
- Move PLC to another or new Edge Gateway



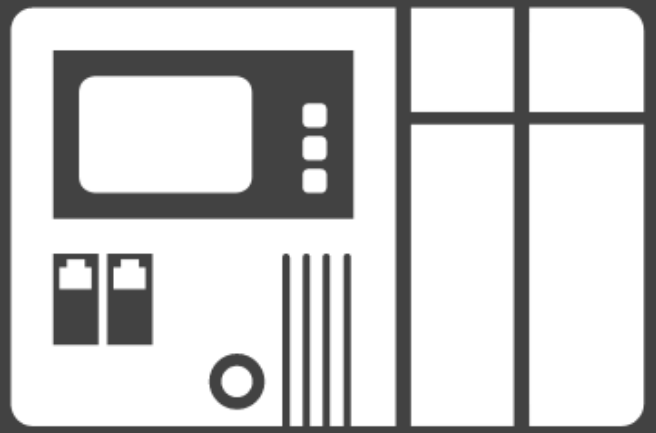
Solution

- Rescanning with automatic recognition of the changed PLC
- Editable PLC names
- Edge Gateway change via drop-down menu

Benefit

- Keep existing PLCs despite changes to connection or name
- Easy transition from test to productive operation

CODESYS Automation Server



Debug mode

New tag

CODESYS

General | State Information | Configuration | Analyzer Projects

Testrack_1_PLC

PLC Information

Device name	DECKERMNBnewname
Gateways	Edge_MDe_local_3_5.18.0
Serial number	00978600-83968B3A-536C5887-16D2EB35
Connection state	Disconnected

Start Scan

Device Identification

Name	CODESYS Control Win V3 x64
Vendor	3S - Smart Software Solutions Gmb
Device type	Programmable
Firmware version	3.5.18.0
Runtime version	3.5.18.0
Target ID	4

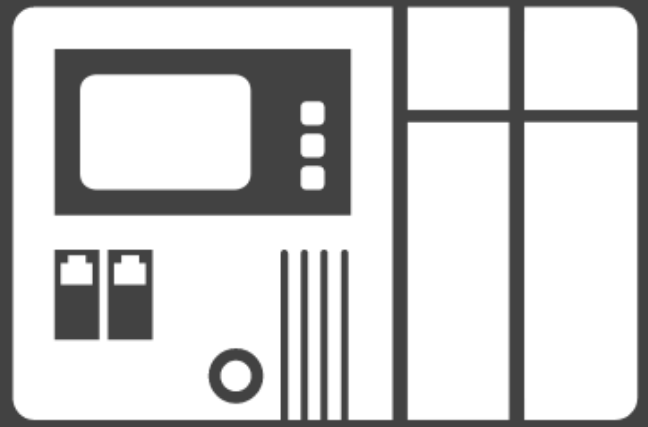
Rescan PLC

Do you want to replace the PLC with the following device?

Name	DECKERMNB
Vendor	3S - Smart Software Solutions GmbH
Device type	Programmable
Firmware version	3.5.18.0
Target ID	4

Confirm | Cancel

CODESYS Automation Server



Debug mode

New tag

CODESYS

General | State Information | Configuration | Analyzer Projects

Testrack_1_PLC

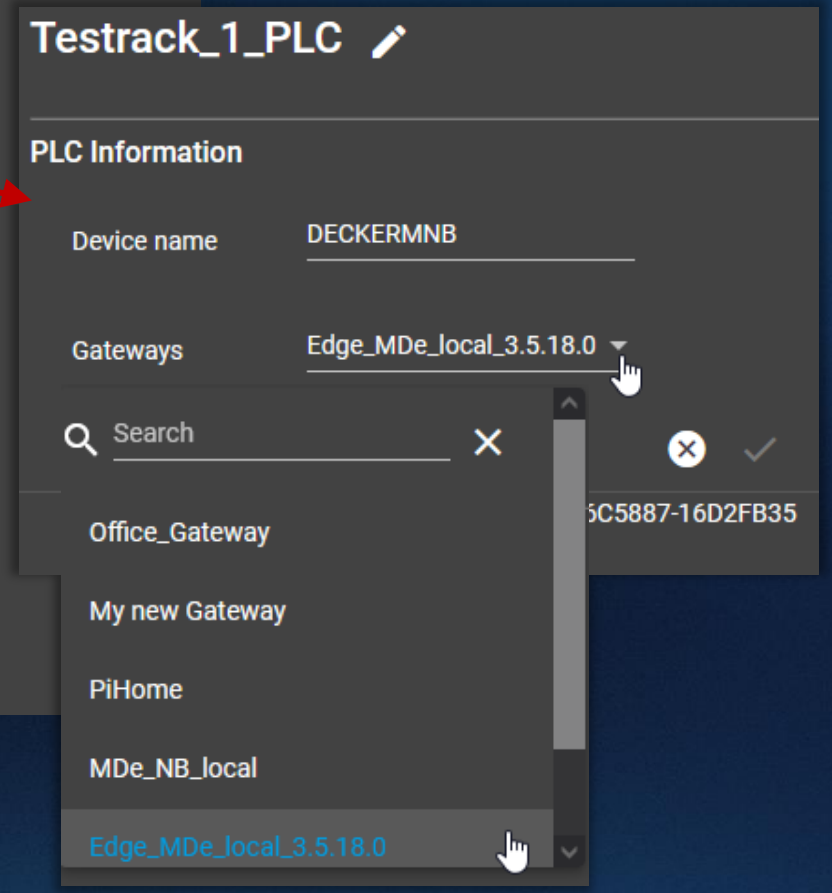
PLC Information

Device name	DECKERMNB
Gateways	Edge_MDe_local_3.5.18.0
Serial number	00978600-83968B3A-536C5887-16
Connection state	Disconnected

Edit

Device Identification

Name	CODESYS Control Win V3 x64
Vendor	3S - Smart Software Solutions GmbH
Device type	Programmable
Firmware version	3.5.18.0
Runtime version	3.5.18.0
Target ID	4

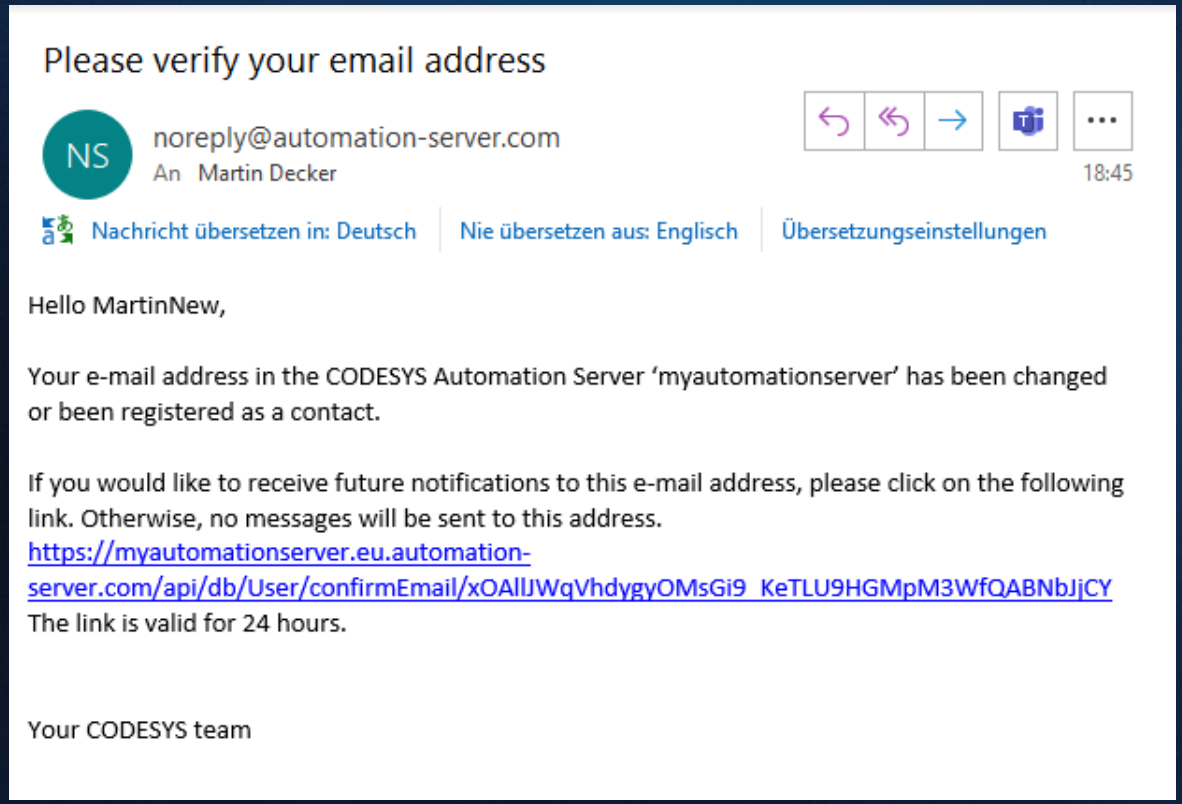


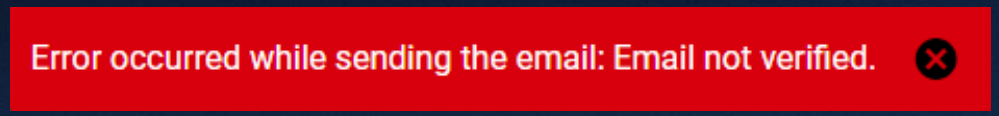
E-mail address validation (1.24.0)

Requirement
- Verification of email address

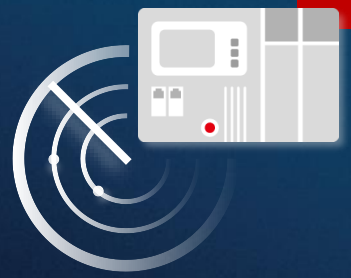
Solution
- Mandatory verification of email addresses before use

Benefit
- Increased protection against unauthorized use of the email address
- Reachable at known address
- Better protection against typos





Improved network scan (1.24.0)



Requirement

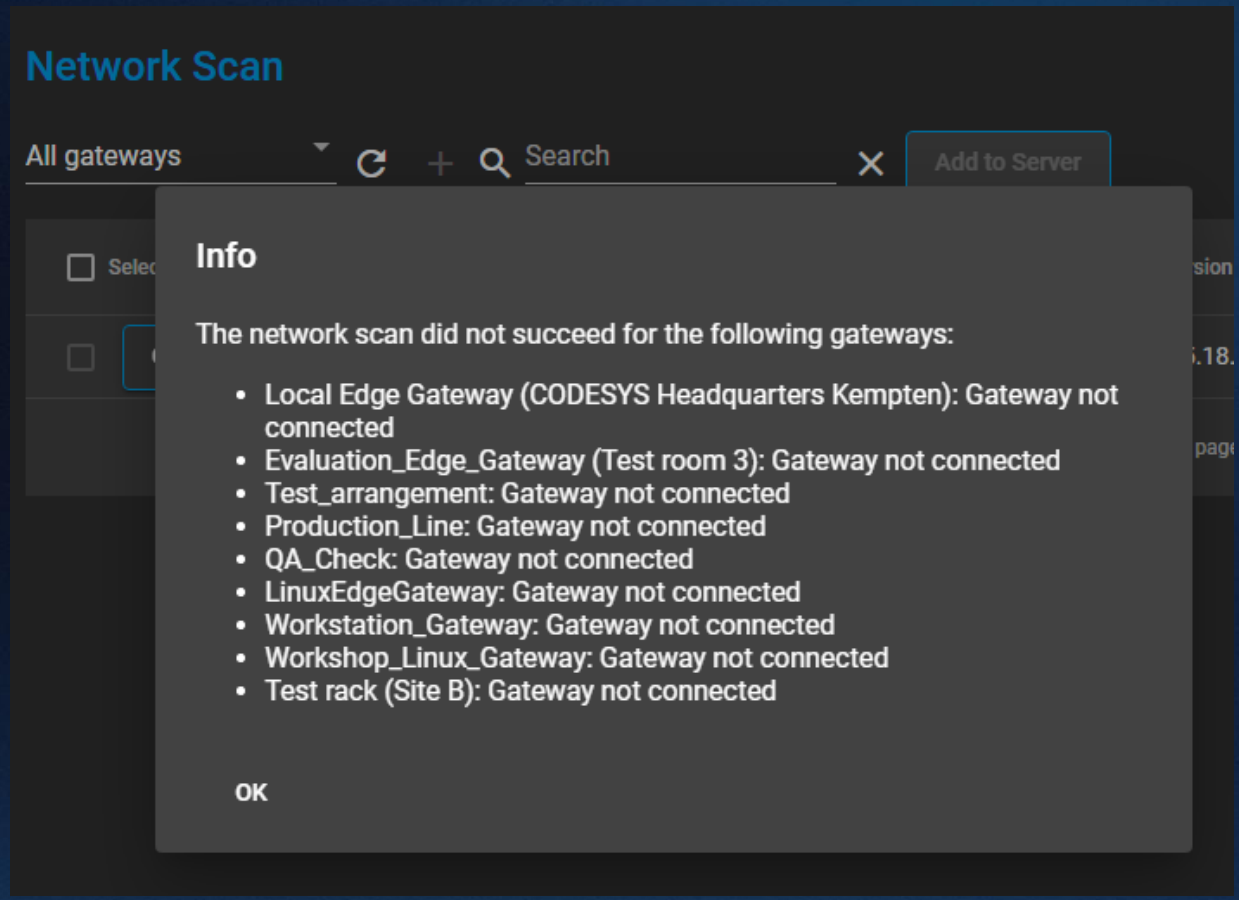
- Fast network scan across all available Edge Gateways

Solution

- Automatic detection of disconnected edge gateways
- Skipping of the scan process via the respective Edge Gateways

Benefit

- Fast scan result
- Manual scan configuration not required
- Overview of non-available Edge Gateways

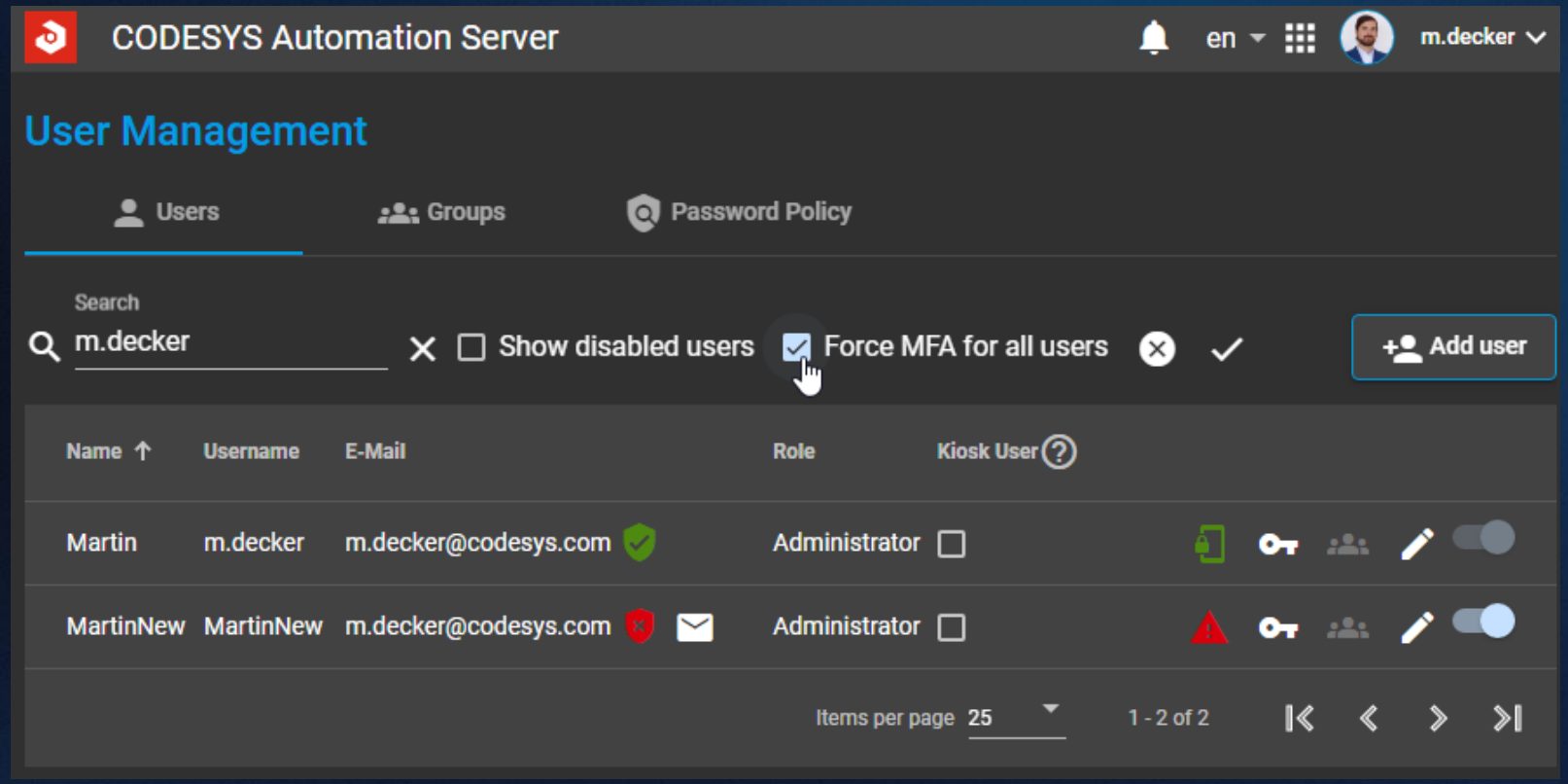


Force MFA (1.25.0)

Requirement
- Tenant-wide mandatory multi-factor authentication

Solution
- MFA enforcement by administrators

Benefit
- Tenant-wide increased access protection



Extended multi-edit (1.25.0)

Requirement

- Change settings of multiple PLCs at the same time

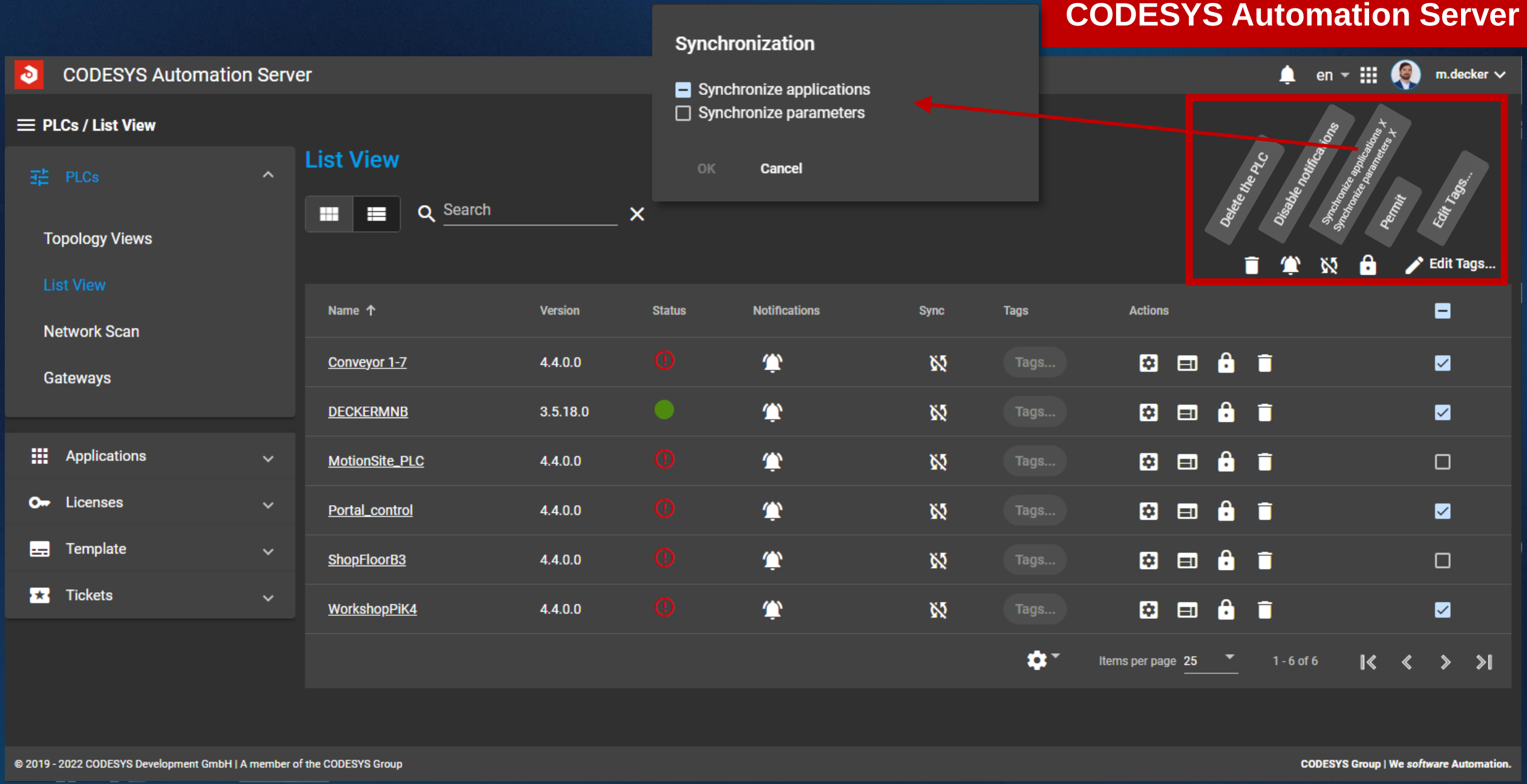
Solution

- Multi-selection in the list view
- Already available: set notifications, delete PLCs, edit tags
- New: synchronization, permissions

Benefit

- Time savings through bulk handling
- Easier editing
- Improved overview

CODESYS Automation Server



Configurable password policy (1.25.0)

Requirement

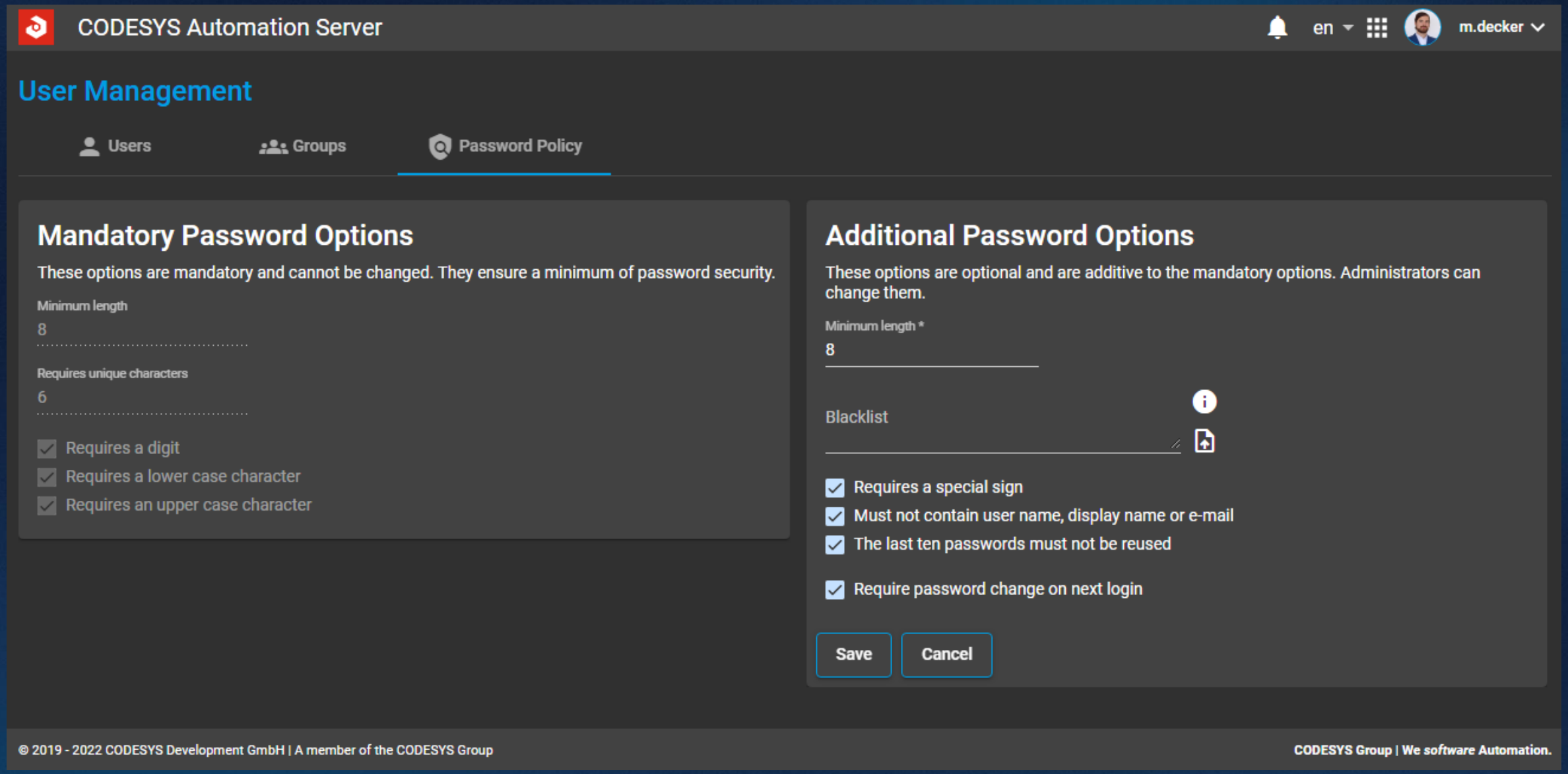
- Password policy adaptable to company security policies

Solution

- Configurable password policy for tenant administrators

Benefit

- Enhanced security
- Conformity of passwords with company specifications


CODESYS Automation Server
en
m.decker
User Management
Users
Groups
Password Policy
Mandatory Password Options
These options are mandatory and cannot be changed. They ensure a minimum of password security.
Minimum length
8
Requires unique characters
6
Requires a digit
Requires a lower case character
Requires an upper case character
Additional Password Options
These options are optional and are additive to the mandatory options. Administrators can change them.
Minimum length *
8
Blacklist
Requires a special sign
Must not contain user name, display name or e-mail
The last ten passwords must not be reused
Require password change on next login
Save
Cancel
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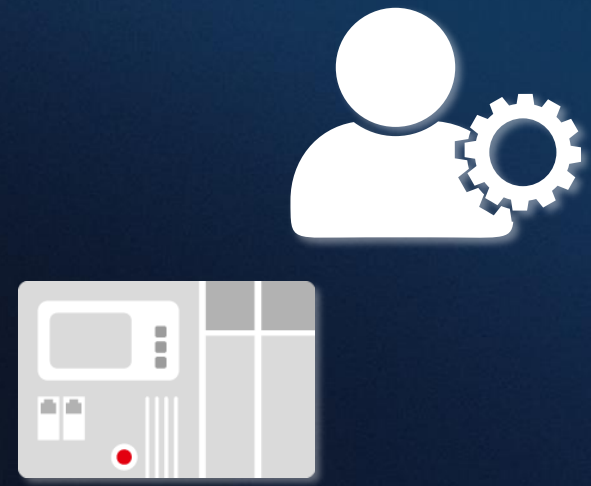
Activate device user management (1.26.0)

Requirement

- Activate device user management on PLC
- Create initial administrator user

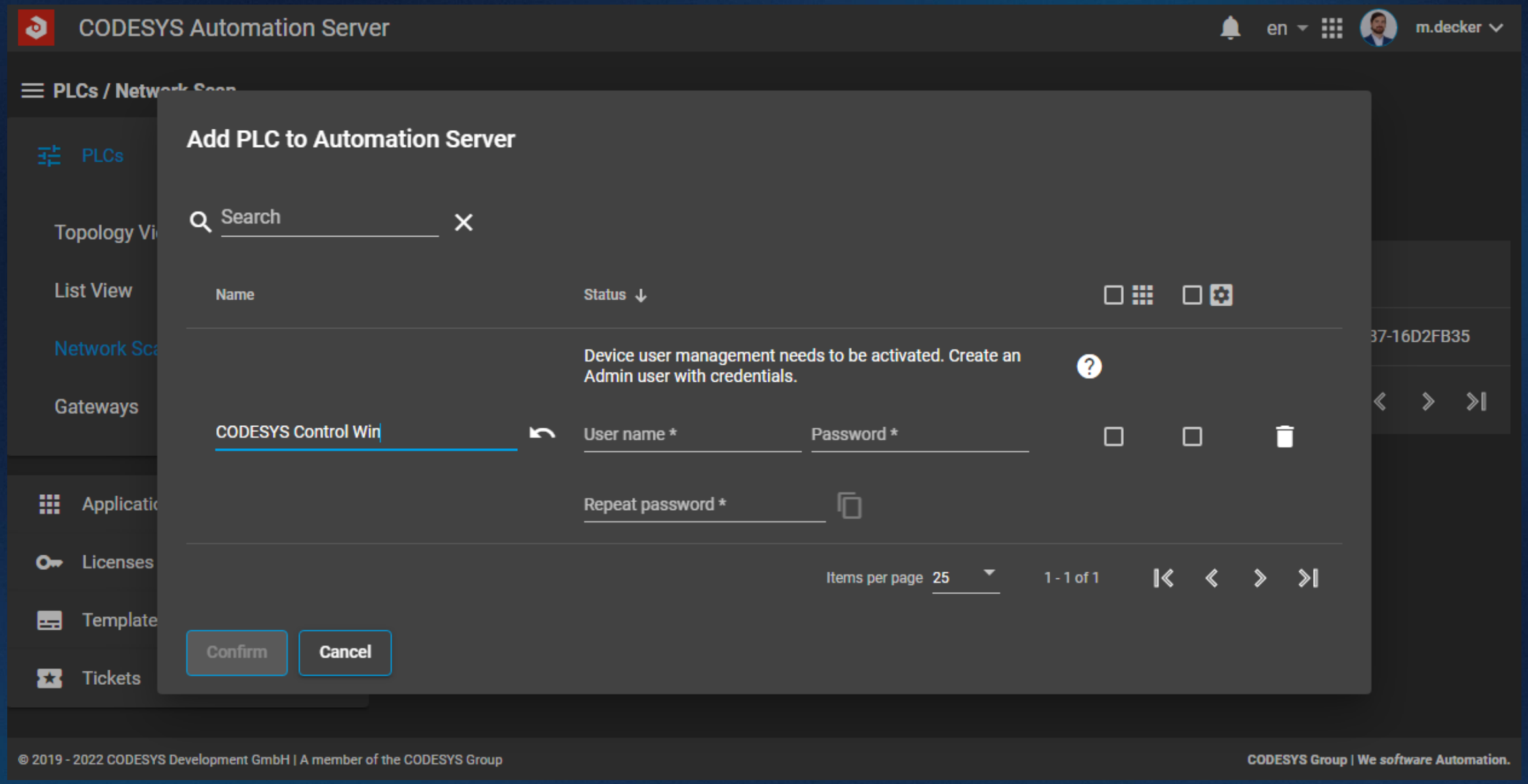
Solution

- Automatic check of the device user policy
- Detection of forced device user management
- Possibility to set up an initial admin user



Benefit

- Straightforward workflow
- Simply secure
- No CODESYS Development System required


CODESYS Automation Server
en
m.decker
PLCs / Network Scan
PLCs
Topology Vi
List View
Network Sca
Gateways
Applicati
Licenses
Template
Tickets
Add PLC to Automation Server
Search
Name
Status
Device user management needs to be activated. Create an Admin user with credentials.
CODESYS Control Win
User name *
Password *
Repeat password *
Items per page 25
1 - 1 of 1
Confirm
Cancel
37-16D2FB35
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Support secure WebVisu (1.26.0)

Requirement

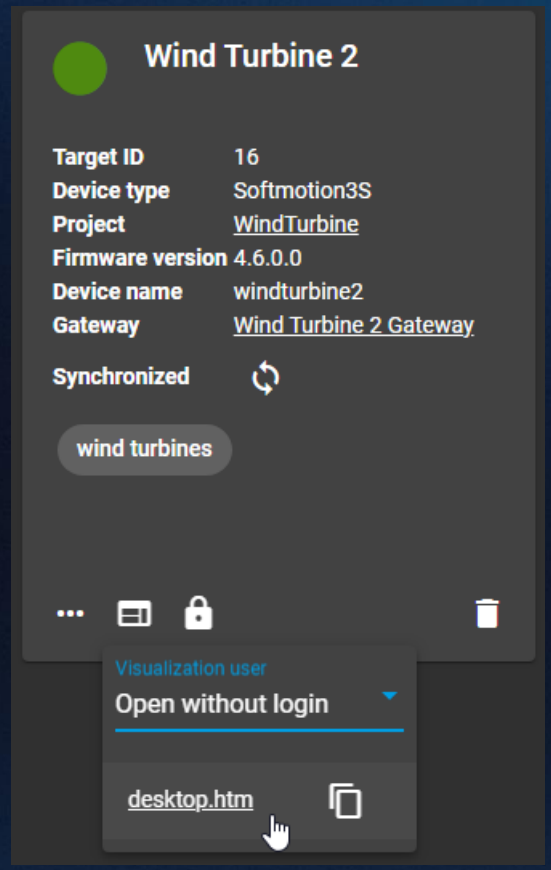
- Support new user management for CODESYS Visualization ≥ 4.2.0.0 (based on Toolkit 3.5.18.0) (Runtimes ≥ 4.5.0.0 (3.5.18.20))
- Enable automatic login

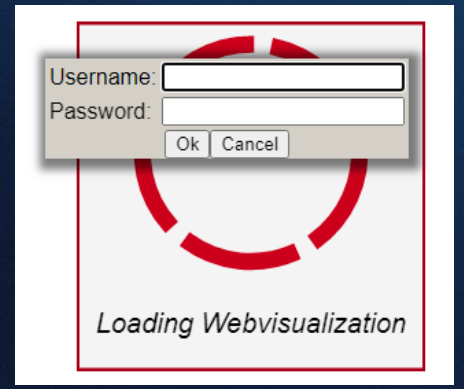
Solution

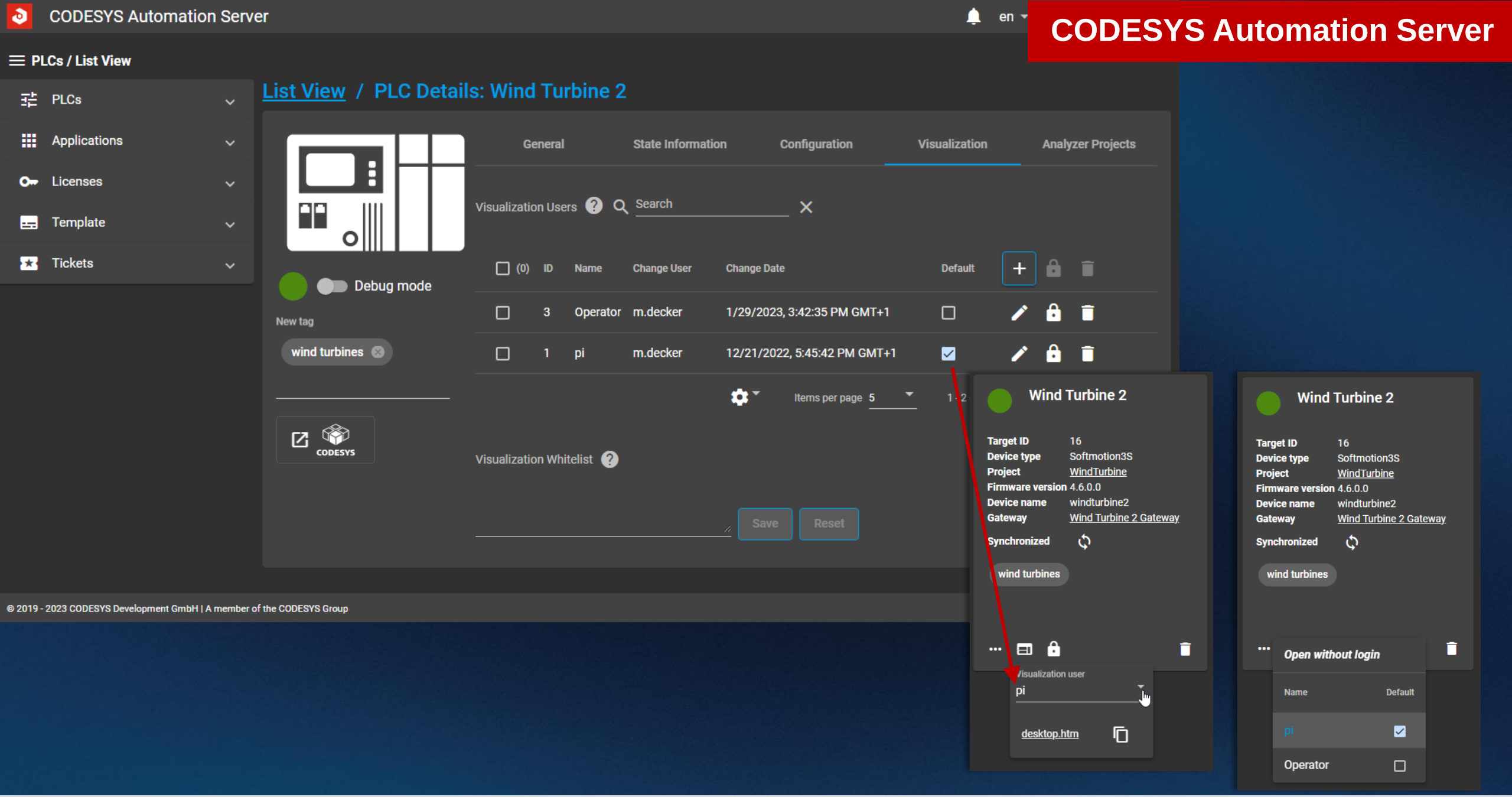
- Automatic detection of active device user management
- Possibility to store credentials of different users
- Preselection of a default user

Benefit

- No unauthorized access to runtime at administrator level
- Compatibility with new Visu user management
- Convenient login
- Straightforward workflow
- Simply secure






CODESYS Automation Server
en
CODESYS Automation Server
PLCs / List View
PLCs
Applications
Licenses
Template
Tickets
List View / PLC Details: Wind Turbine 2
General
State Information
Configuration
Visualization
Analyzer Projects
Visualization Users
Search
(0) ID Name Change User Change Date Default
3 Operator m.decker 1/29/2023, 3:42:35 PM GMT+1
1 pi m.decker 12/21/2022, 5:45:42 PM GMT+1
Debug mode
New tag
wind turbines
Items per page 5
CODESYS
Visualization Whitelist
Save
Reset
Wind Turbine 2
Target ID 16
Device type Softmotion3S
Project WindTurbine
Firmware version 4.6.0.0
Device name windturbine2
Gateway Wind Turbine 2 Gateway
Synchronized
wind turbines
Visualization user
pi
desktop.htm
Wind Turbine 2
Target ID 16
Device type Softmotion3S
Project WindTurbine
Firmware version 4.6.0.0
Device name windturbine2
Gateway Wind Turbine 2 Gateway
Synchronized
wind turbines
Open without login
Name Default
pi
Operator
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Multi-app information (1.26.0)

Requirement

- Clear identification of applications and devices within a project
- Clear assignment to run application and PLC

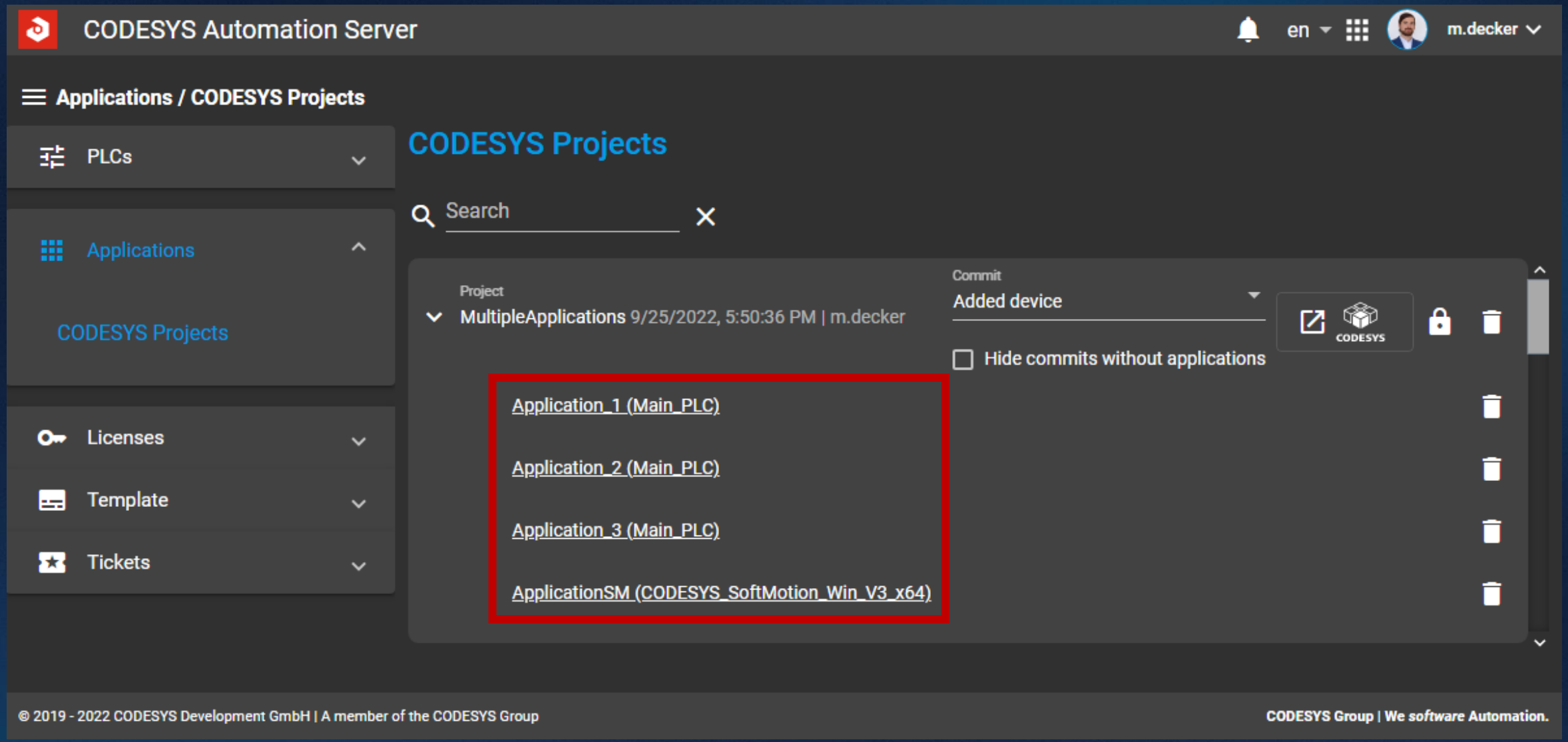
Solution

- Display of application name and associated device
- Available in project view and deployment details

Benefit

- Significantly reduced risk of mix-ups in projects with multiple applications

CODESYS Automation Server



Display of licenses (1.26.0)

Requirement

- Display licenses available on a PLC

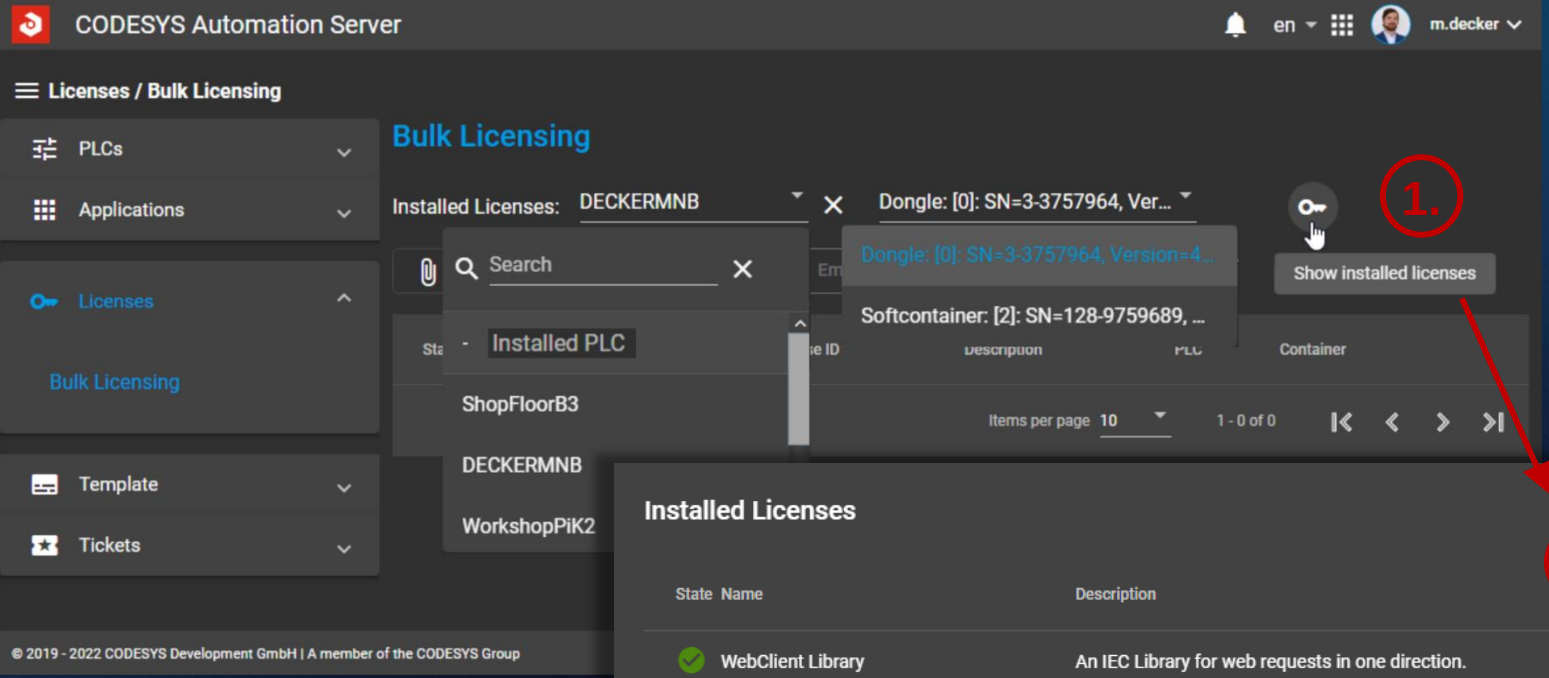
Solution

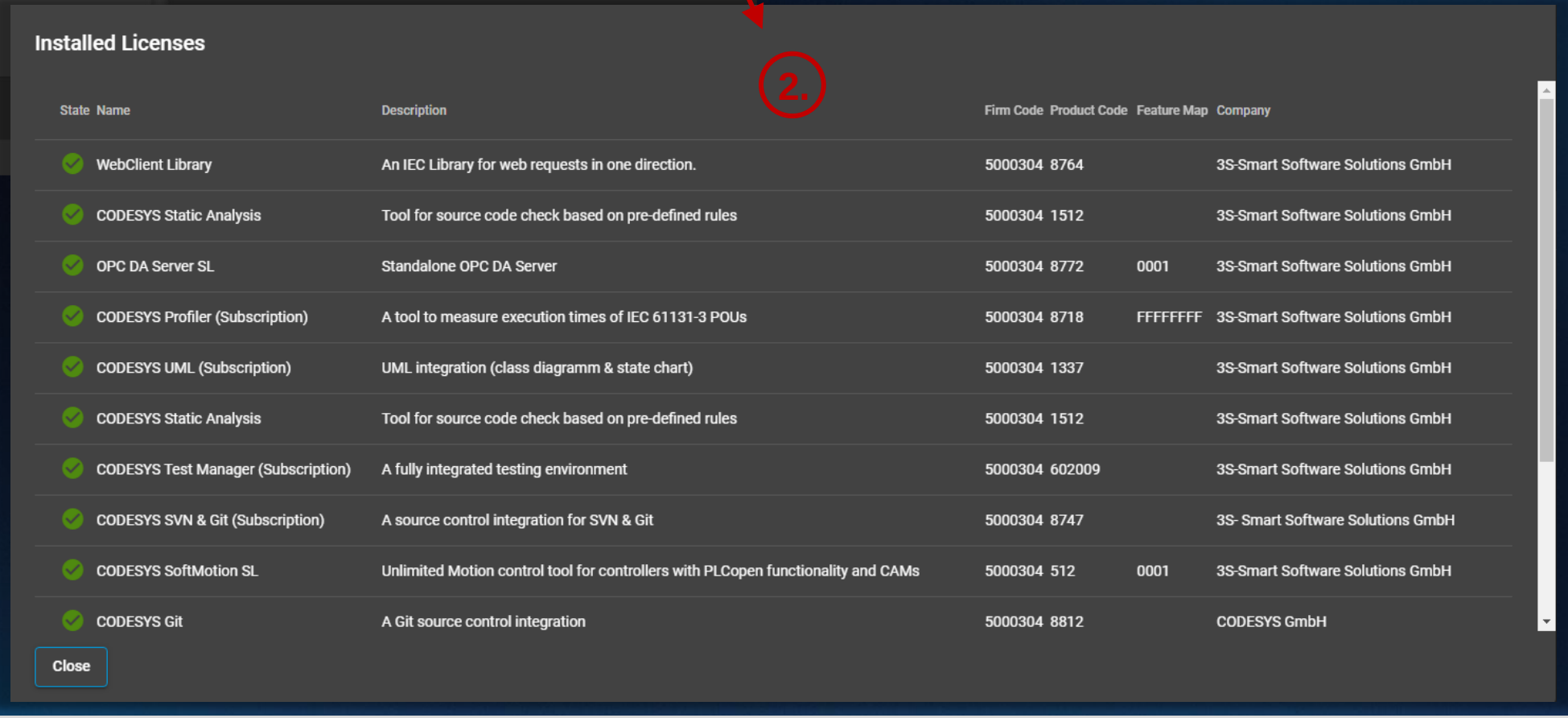
- Read out license container of a device
- Optionally software container or hardware dongle
- Detailed display of available licenses

Benefit

- Quick and easy access to license information
- Usable for licensing as well
- Independent from the CODESYS Development System

CODESYS Automation Server





State	Name	Description	Firm Code	Product Code	Feature Map	Company
✓	WebClient Library	An IEC Library for web requests in one direction.	5000304	8764		3S-Smart Software Solutions GmbH
✓	CODESYS Static Analysis	Tool for source code check based on pre-defined rules	5000304	1512		3S-Smart Software Solutions GmbH
✓	OPC DA Server SL	Standalone OPC DA Server	5000304	8772	0001	3S-Smart Software Solutions GmbH
✓	CODESYS Profiler (Subscription)	A tool to measure execution times of IEC 61131-3 POUs	5000304	8718	FFFFFFFF	3S-Smart Software Solutions GmbH
✓	CODESYS UML (Subscription)	UML integration (class diagramm & state chart)	5000304	1337		3S-Smart Software Solutions GmbH
✓	CODESYS Static Analysis	Tool for source code check based on pre-defined rules	5000304	1512		3S-Smart Software Solutions GmbH
✓	CODESYS Test Manager (Subscription)	A fully integrated testing environment	5000304	602009		3S-Smart Software Solutions GmbH
✓	CODESYS SVN & Git (Subscription)	A source control integration for SVN & Git	5000304	8747		3S- Smart Software Solutions GmbH
✓	CODESYS SoftMotion SL	Unlimited Motion control tool for controllers with PLCopen functionality and CAMs	5000304	512	0001	3S-Smart Software Solutions GmbH
✓	CODESYS Git	A Git source control integration	5000304	8812		CODESYS GmbH

Synchronize applications warning (1.26.0)

Requirement

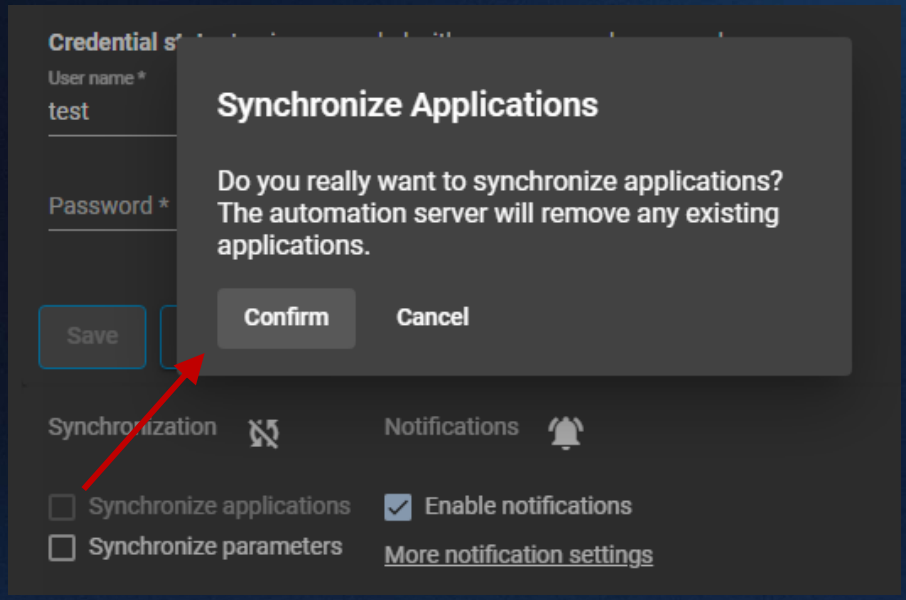
- Warning about possible overwriting of existing application by the Automation Server

Solution

- Additional confirmation dialog when activating the "Synchronize applications" option

Benefit

- Extra protection against accidental deletion/overwriting of existing applications



Application update scheduler (1.27.0)

Requirement

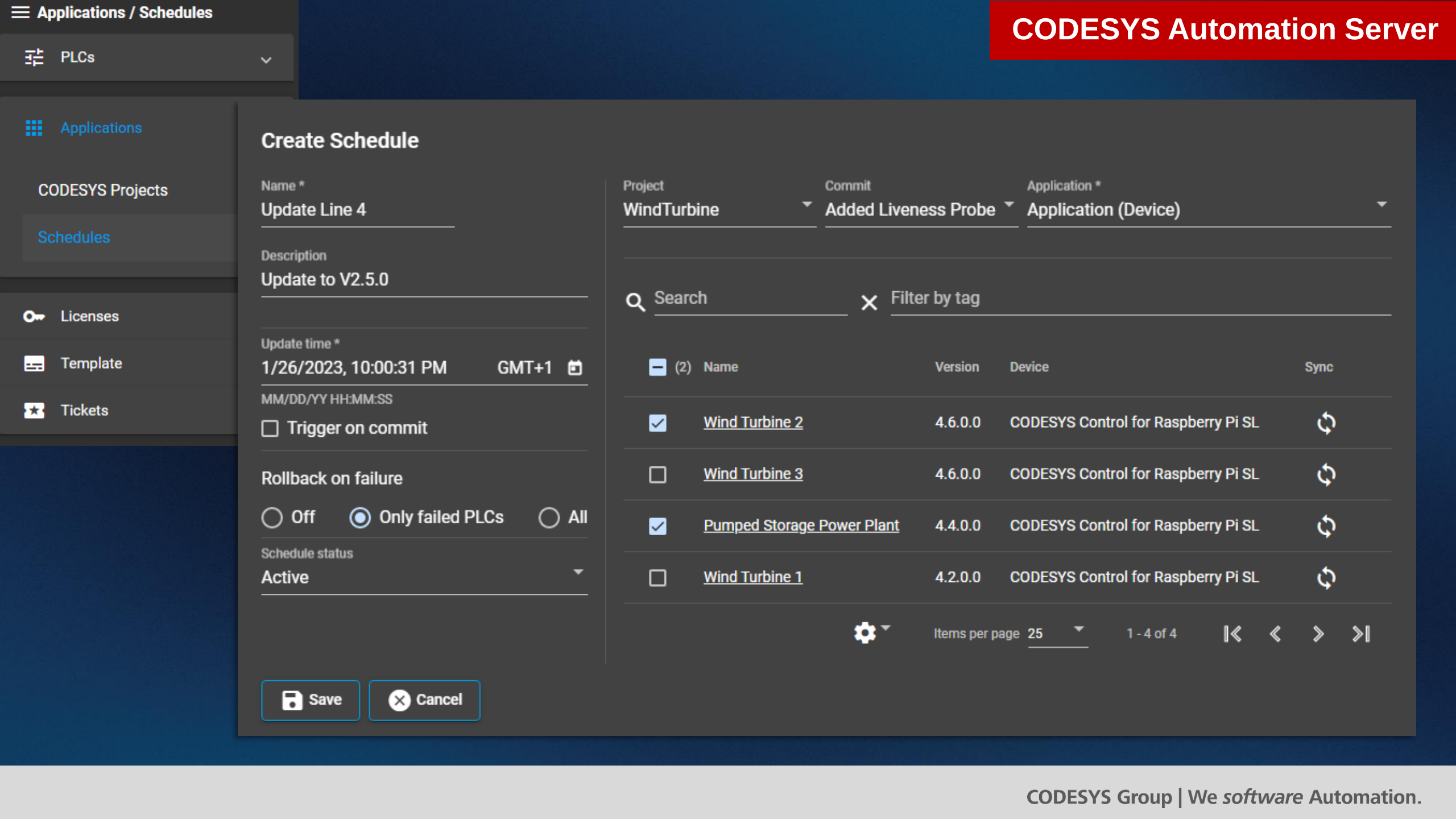
- Application updates outside working hours
- Automatic application updates to the latest version
- Rollback in case of an error

Solution

- Scheduling tool for user-defined application updates

Benefit

- Full control over application updates
- No overtime, regulated working hours


Applications / Schedules
CODESYS Automation Server
PLCs
Applications
CODESYS Projects
Schedules
Licenses
Template
Tickets
Create Schedule
Name *
Update Line 4
Description
Update to V2.5.0
Update time *
1/26/2023, 10:00:31 PM
GMT+1
MM/DD/YY HH:MM:SS
Trigger on commit
Rollback on failure
Off
Only failed PLCs
All
Schedule status
Active
Save
Cancel
Project
WindTurbine
Commit
Added Liveness Probe
Application *
Application (Device)
Search
Filter by tag
(2) Name
Version
Device
Sync
Wind Turbine 2
4.6.0.0
CODESYS Control for Raspberry Pi SL
Wind Turbine 3
4.6.0.0
CODESYS Control for Raspberry Pi SL
Pumped Storage Power Plant
4.4.0.0
CODESYS Control for Raspberry Pi SL
Wind Turbine 1
4.2.0.0
CODESYS Control for Raspberry Pi SL
Items per page
25
1 - 4 of 4

Configurable in-app messages (1.27.0)

Requirement (internal)

- Alternative to "Pendo" necessary, which is no longer used
- Ability to show users configurable in-app messages
- Configurable start date and text
- User language recognition
- Remember whether a user already closed the notification

Solution

- DIY ;)

Benefit

- Ability to play out content via the web app at any time
- No more dependency on third-party tool

Password lost guide (1.27.0)

Requirement

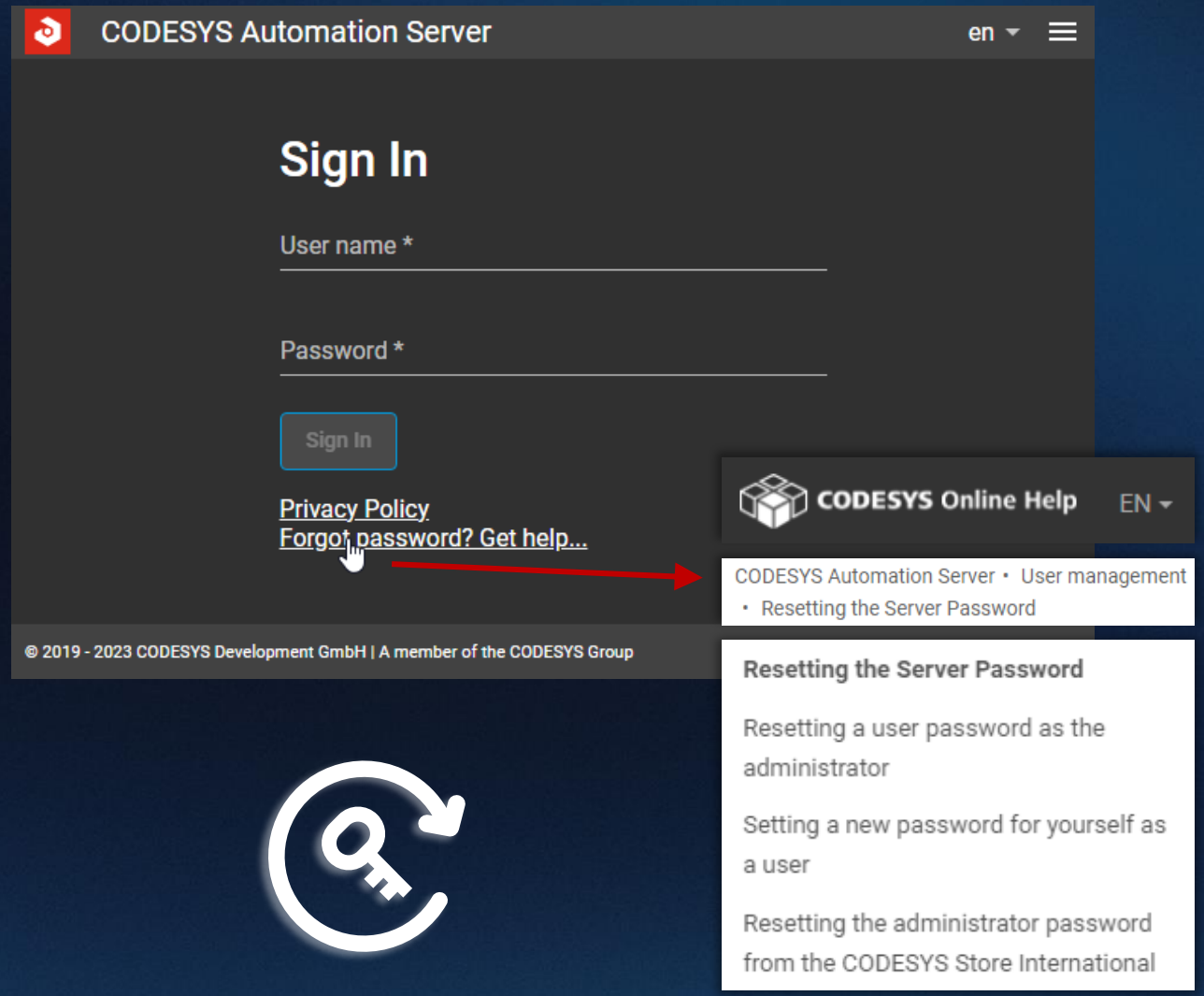
- Instructions for users in case of password loss
- Internal guide

Solution

- Content for CODESYS Online Help (link)
- Internal work instruction “Tenant admin needs help with access” (link)

Benefit

- Password reset by users without contacting us
- Internal decision-making basis, if action required



Updates highlighting & visibility (1.29.0)

Requirement

- Prominently visible information about available application updates
- Clear distinguishability: selected vs. running version

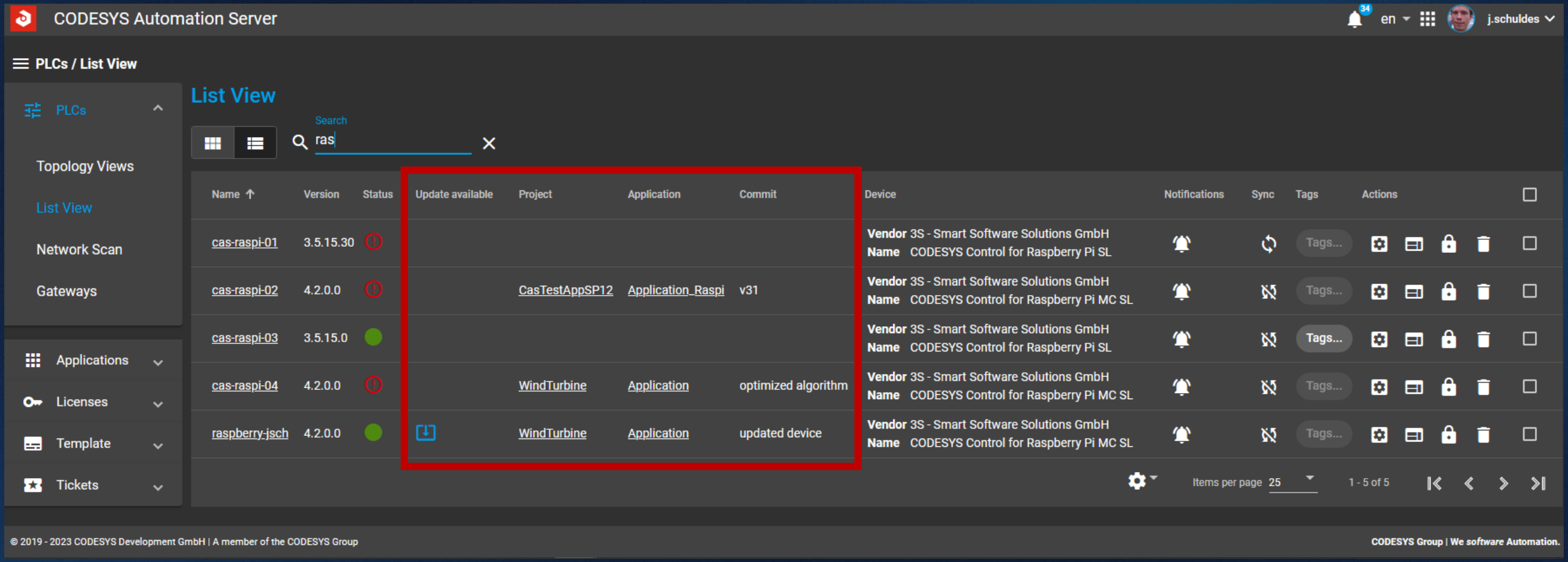
Solution

- Additional configurable columns in the list view
- Update indicator in list view and detail view
- Additional indicators and re-ordered columns in the deployment view

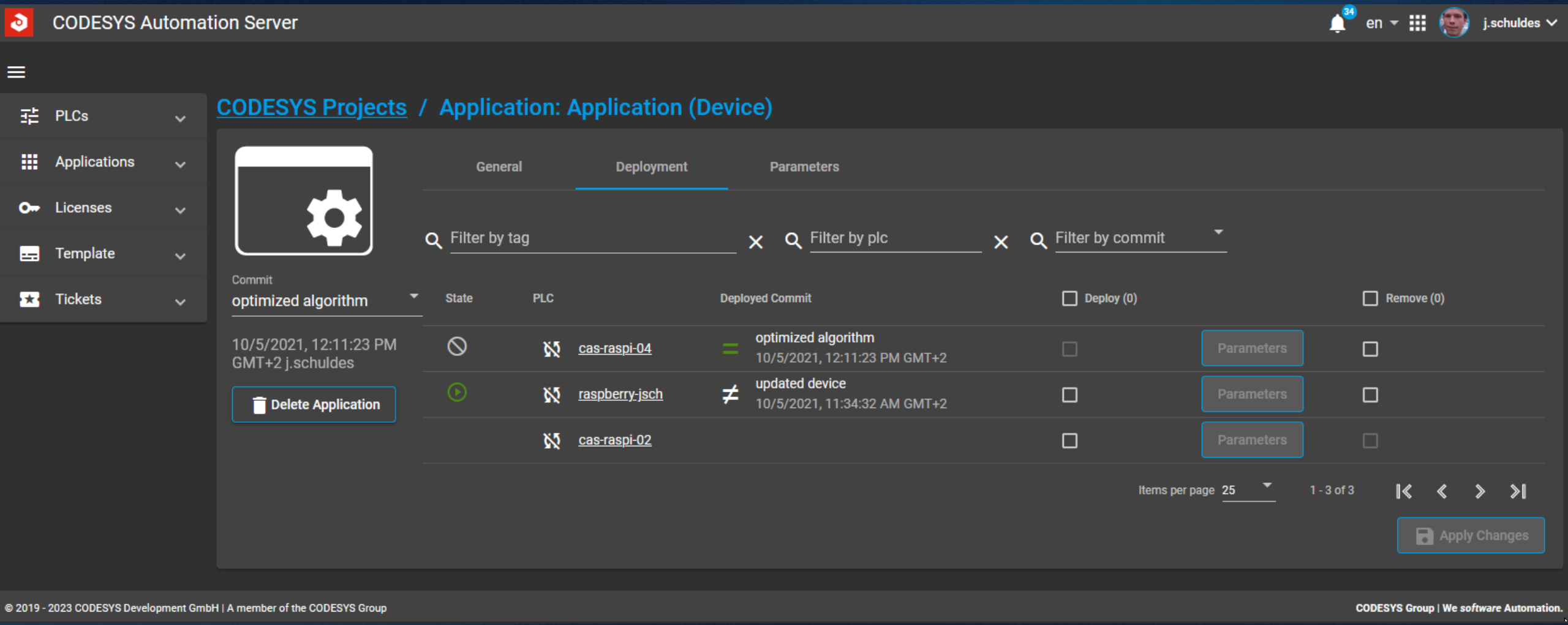
Benefit

- Information about current version and available updates at one glance

CODESYS Automation Server



CODESYS Automation Server



Set default user language (1.29.0)

Requirement

- Send notifications (email confirmation, reset password) to users in matching language

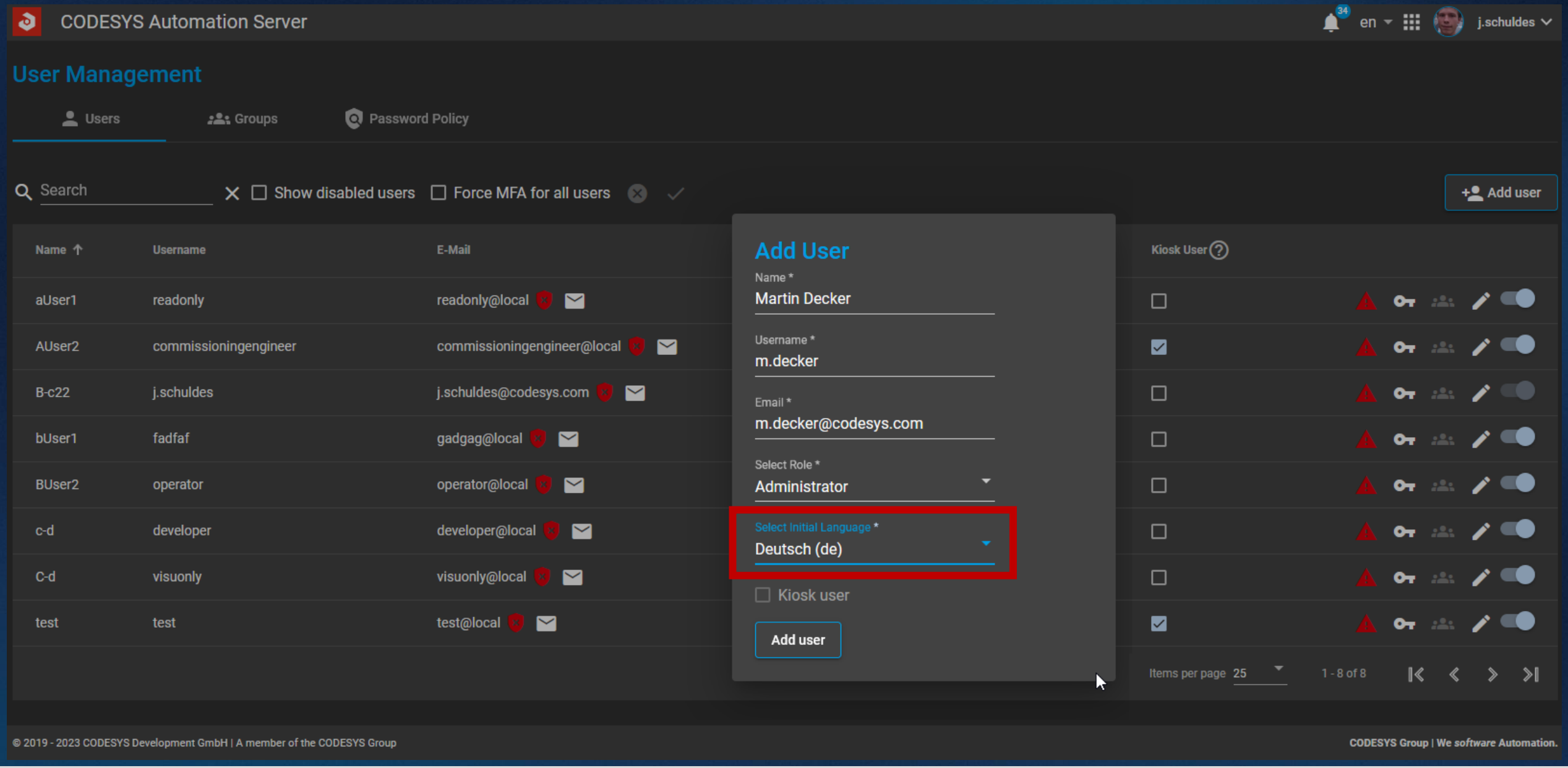
Solution

- Language pre-selection by administrators when creating new users

Benefit

- Notifications to users in appropriate language

CODESYS Automation Server

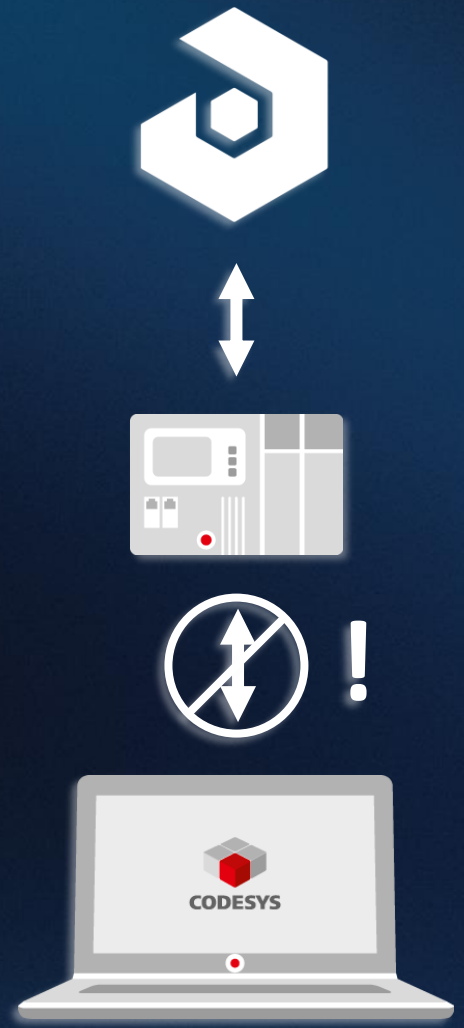


Access notification in CDS (1.29.0)

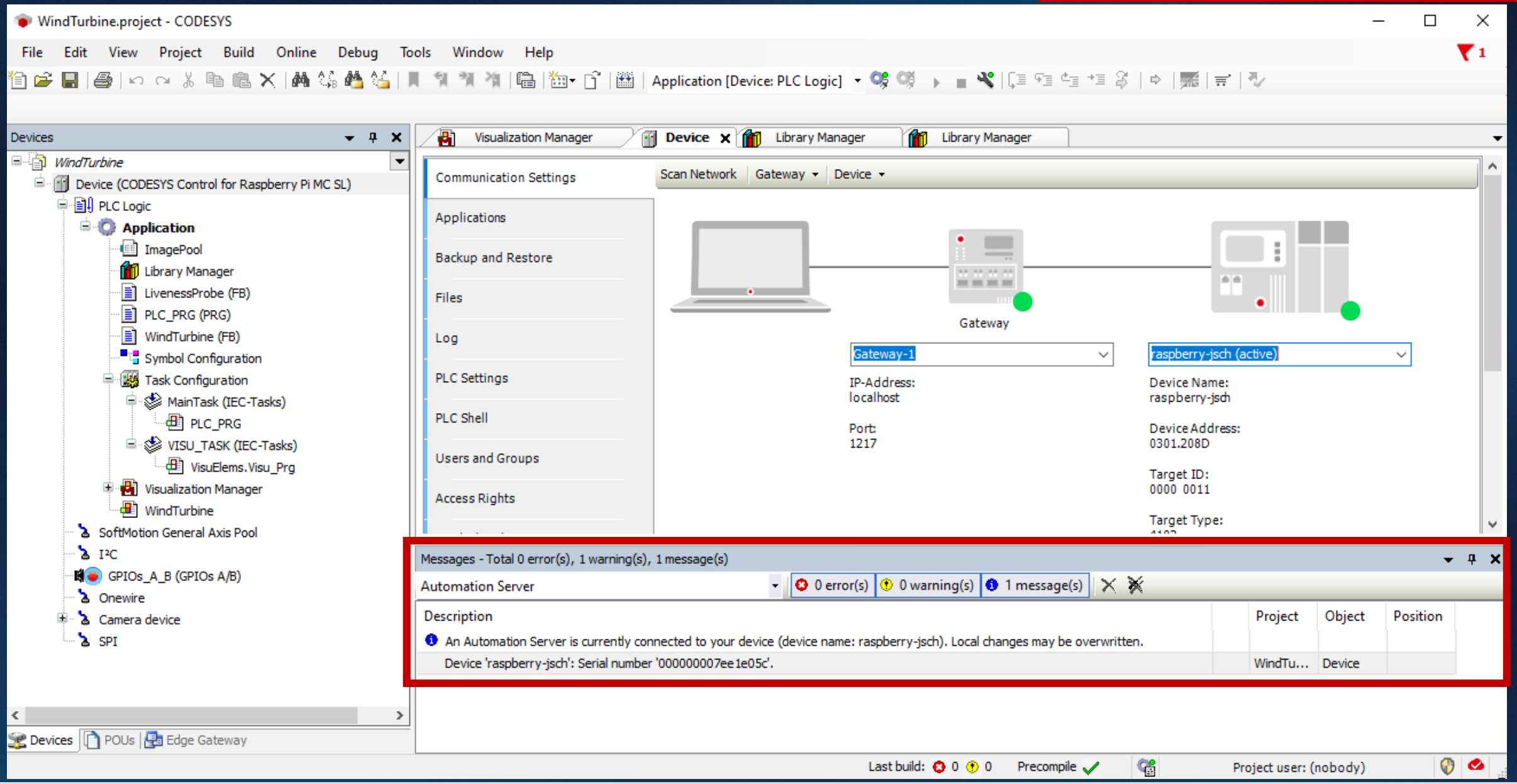
Requirement
- Avoid perceived misbehavior when working with CODESYS on server-connected PLC

Solution
- Notification in CODESYS Development System

Benefit
- Awareness of possible “misbehavior”
- Avoided troubleshooting



CODESYS Automation Server



Overview

- **Functional and frontend developments**
  - 1.24.0 Replace PLC without ticket | Email address validation | Disabled network scan for offline Edge Gateways | Re-scan for PLCs | Move PLC to new/updated Edge Gateway
  - 1.25.0 Force MFA | Extended multi-edit | Configurable password policy
  - 1.26.0 Activate device user management | Support secure WebVisu | Multi-app information | Display of licenses | Synchronize applications warning
  - 1.27.0 Application update scheduler | Configurable in-app messages | “Password lost” guide
  - 1.29.0 Updates highlighting & visibility | Set default user language | Access notification
- **Backend and infrastructure developments**
  - On-premises | EaaS Manager | Edge Communication rework | CML support
- **Planned developments and activities**
  - LDAP support | Deployment log | Enhanced licensing | Encrypted communication | Certificate handling | Virtual Control synergies | Topology view 2.0 | Security audit

On-premises Automation Server

- **Epic: CAS-3147**
- **Automation Server services that use AWS services will be reimplemented, e.g. email delivery**
- **Other topics include**
  - Delivery method
  - Licensing
  - Ops guide
  - Security / OSS
  - …
- **Goals**
  - Operation of the Automation Server by the customer
  - Quick adaptation of the Automation Server to new environments

EaaS Manager

- **Epic: CAS-2936**
- **Manager = administration tool of Automation Server**
  - Create, modify, delete tenants
  - Store communication
  - Management of Automation Server deployment
- **Generalization of implementation – deployment no longer hard-coded**
- **Ability to use the manager outside of the AWS cloud**
- **Goals**
  - Dealing with (any) other services
  - Use on-premises

Edge communication rework

- **Epic: CAS-3039**
- **Current implementation right from the start of the Automation Server**
  - Lots of decisions were not made when the development started.
  - Contains many shortcut implementations due to lack of time.
- **Goals**
  - Stability
  - Scalability
  - Maintainability
  - Extensibility

Support CODESYS Mass Licenser

- **CAS-3314**
- **Activate device user management by Mass Licenser**
- **Creation of separate NuGet package for Mass Licenser**

Overview

- **Functional and frontend developments**
  - 1.24.0 Replace PLC without ticket | Email address validation | Disabled network scan for offline Edge Gateways | Re-scan for PLCs | Move PLC to new/updated Edge Gateway
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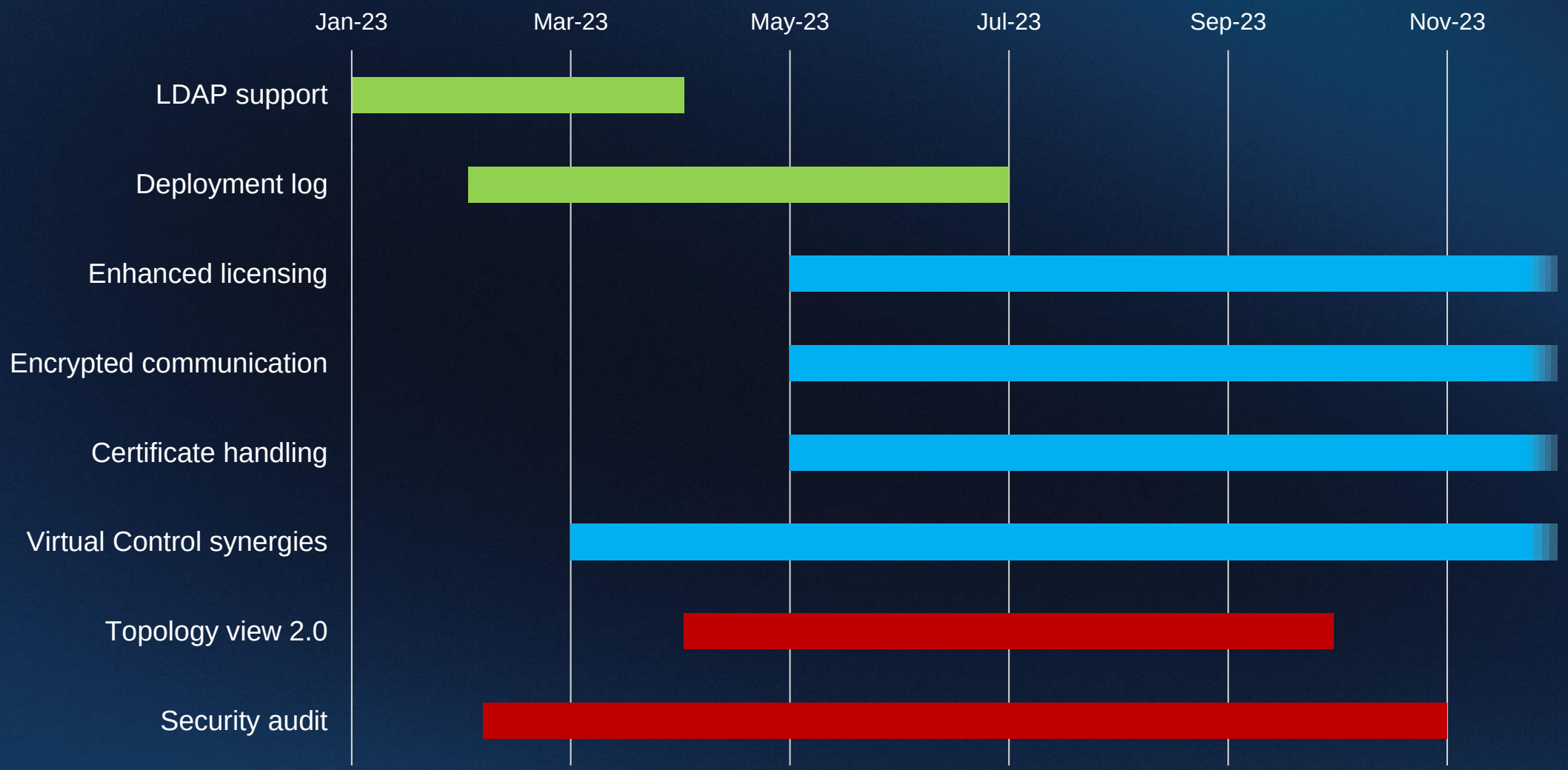
CODESYS Automation Server



CODESYS VISUALIZATION

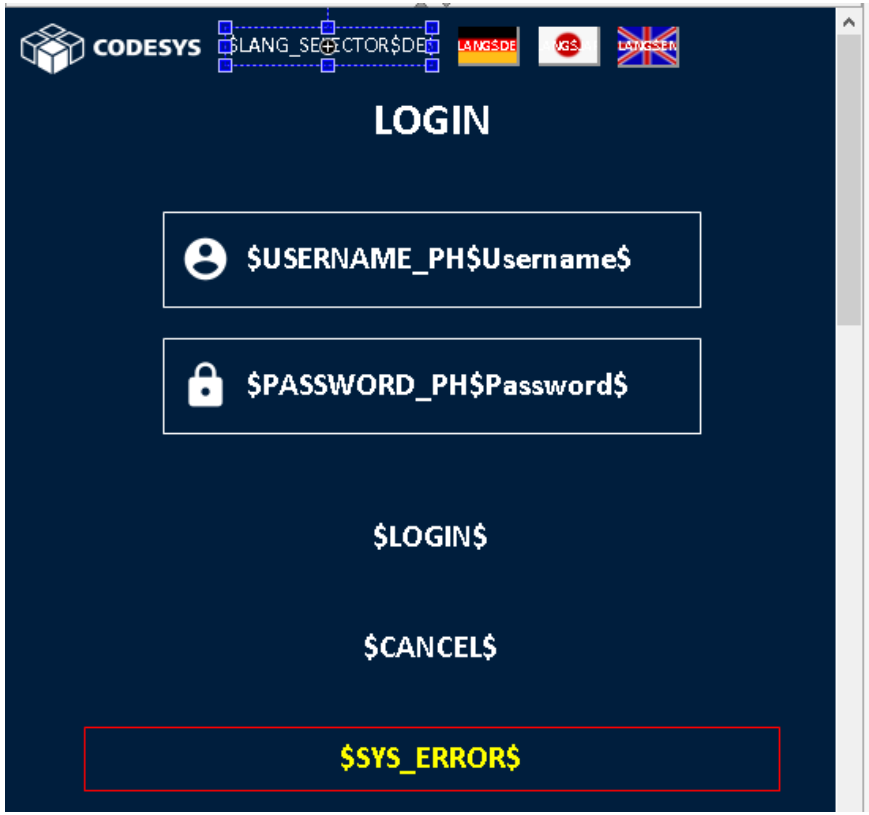
Overview

- Customizable dialogs
- Improvements in file transfer
- Improvements for HTML5 Controls
- Further improvements

Customizable dialogs

- **Possibility to localize the login dialog**
  - New placeholders
  - Rectangle + $LANG_SELECTOR$DE$
  - Button with bitmap info

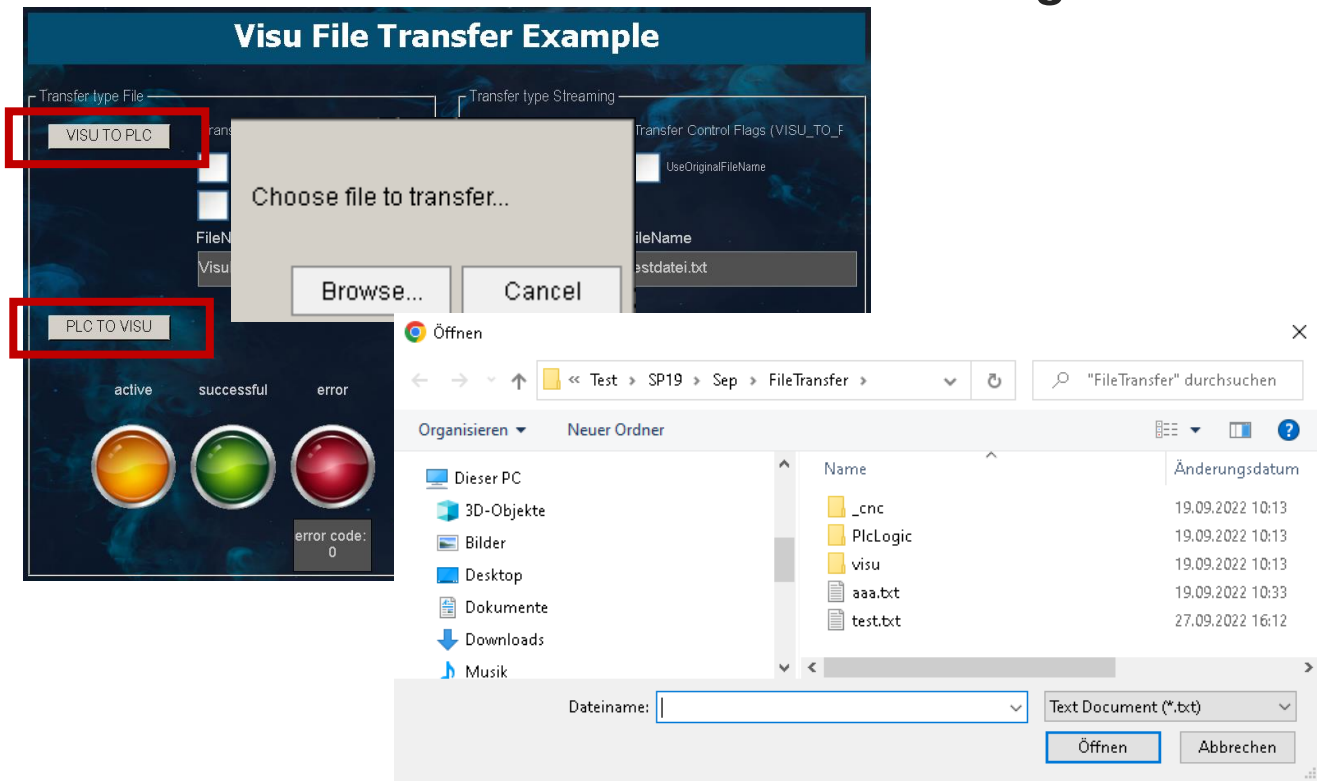
Type of element	Button
Bitmap info	
Static ID	IP_Common.Japan
Texts	
Text	$LANG$JAP$

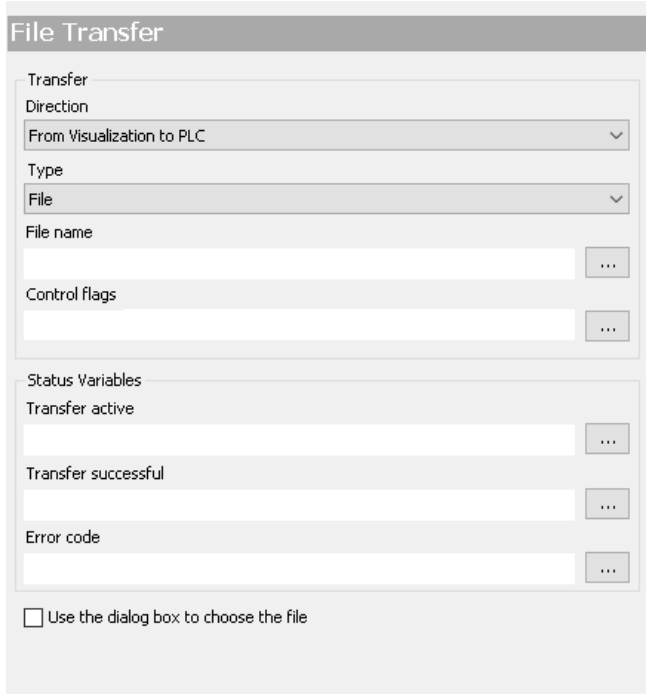


Use gradient color	
Gradient setting	linear, Black, White
Appearance	
Line width	1
Fill attributes	Filled
Line style	Solid
Texts	
Text	$LANG_SELECTOR$DE$
Tooltip	
Text properties	
Horizontal alignment	Left
Vertical alignment	Centered
Text format	Default
Font	Default
Font color	White
Absolute movement	
Movement	
X	
Y	
Rotation	
Scaling	
Interior rotation	
Use REAL values	
Relative movement	
Text variables	
Text variable	
Tooltip variable	

Filetransfer improvements

- **Download of files without additional dialog**



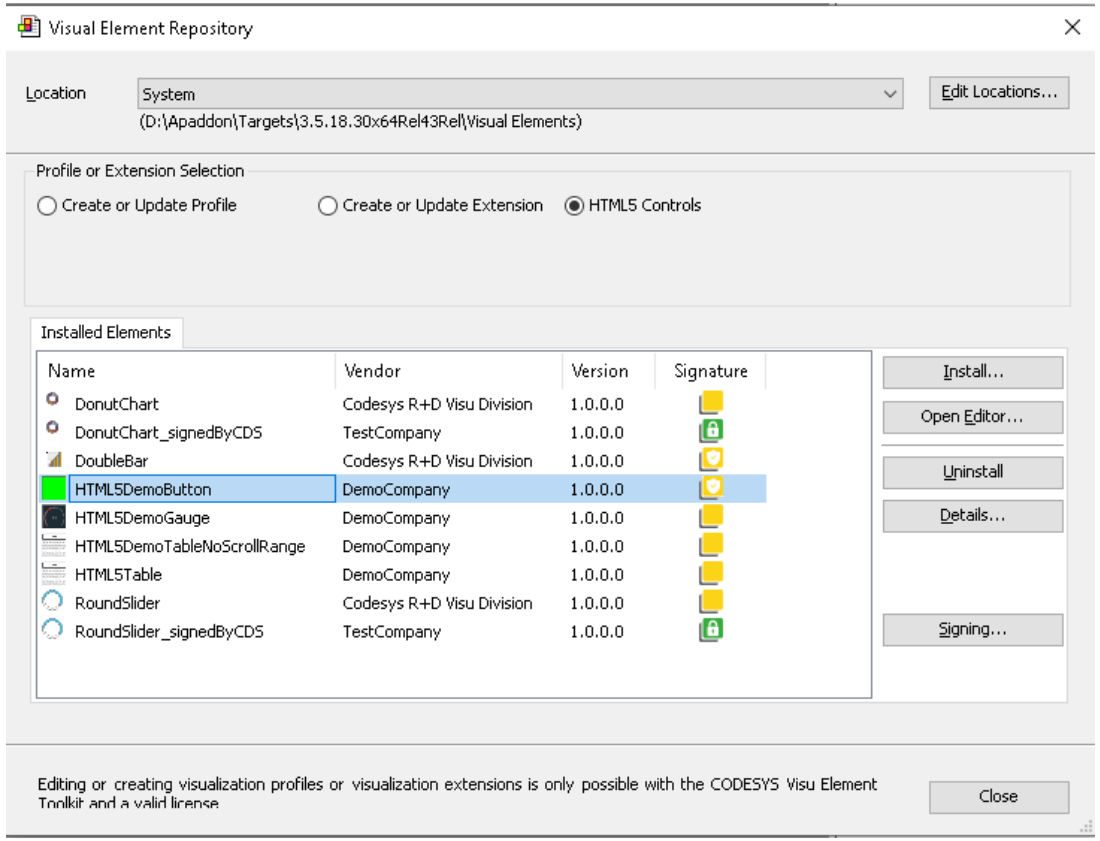


- **Overwrite message is shown as standard browser dialog.**

Signed HTML5 controls

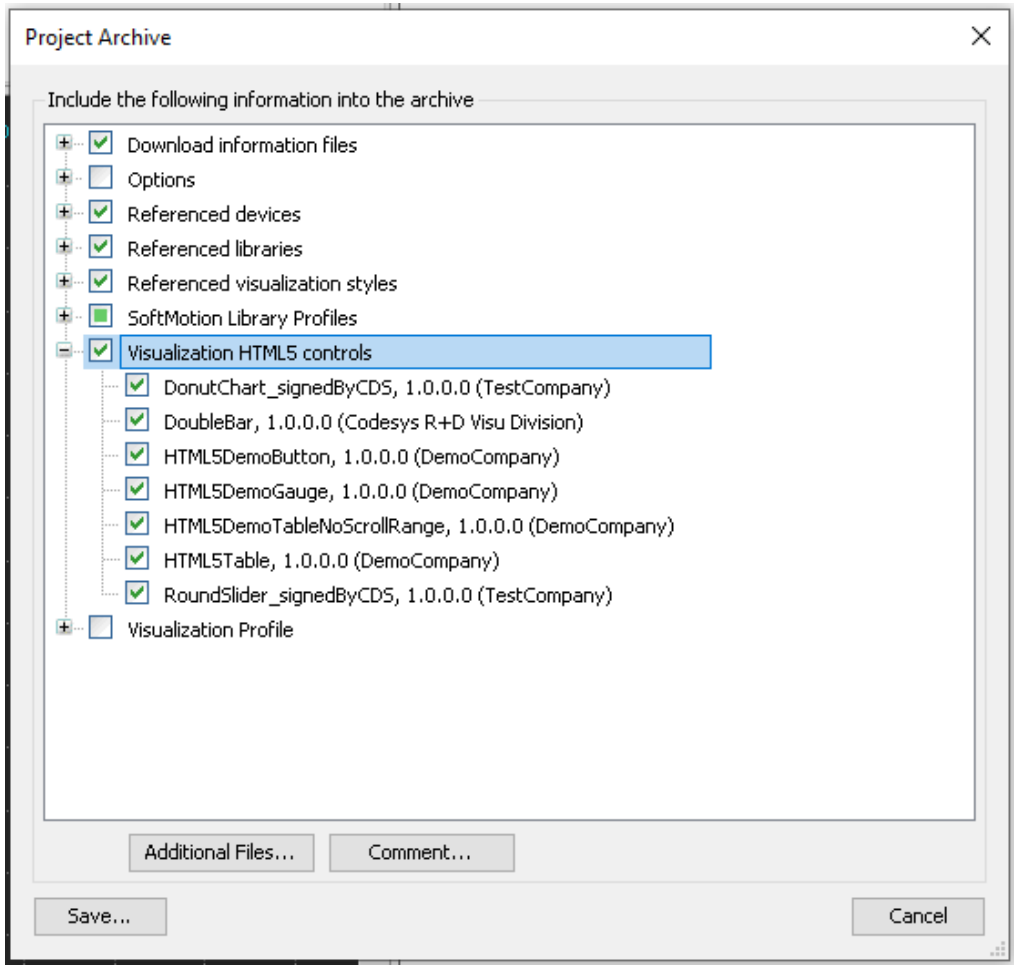
- Signing using CA or self-signed certificates
- Timestamped certificates supported
- Signing of HTML5 controls with GUI or scripting
- Warnings against using HTML5 controls without trusted certificate

➔ Security issue to trust the code and all content of HTML5 controls



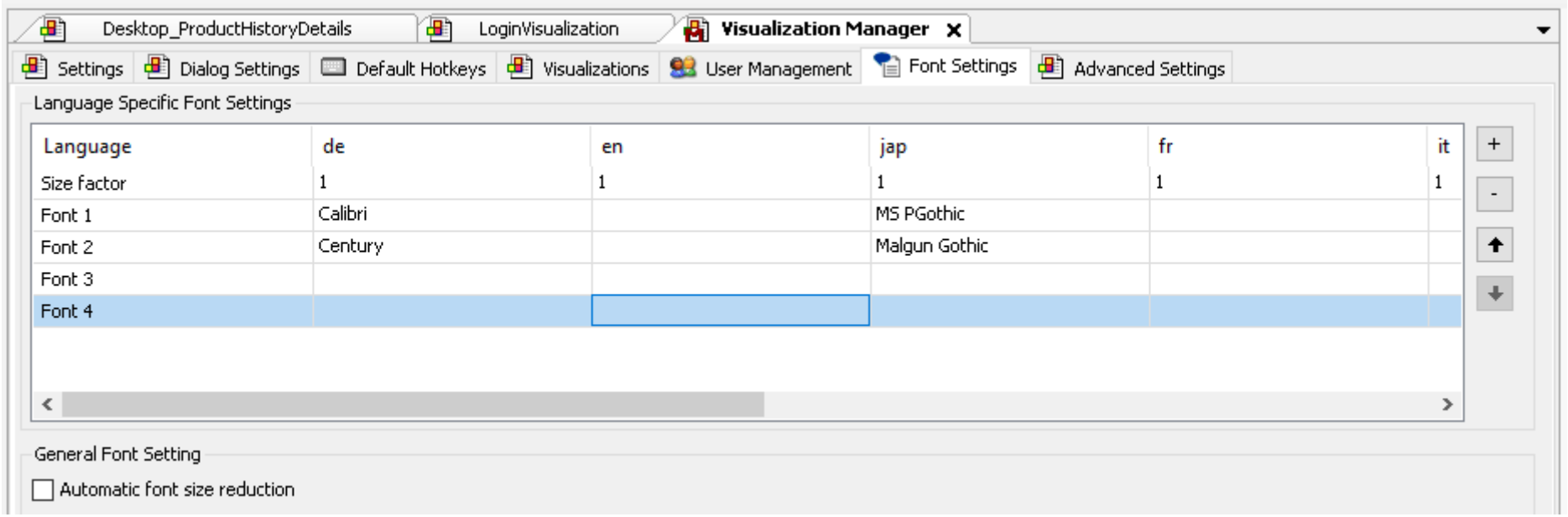
HTML5 controls in project archives

- Include HTML5 controls into project archives
- Common easy way to distribute projects with all components



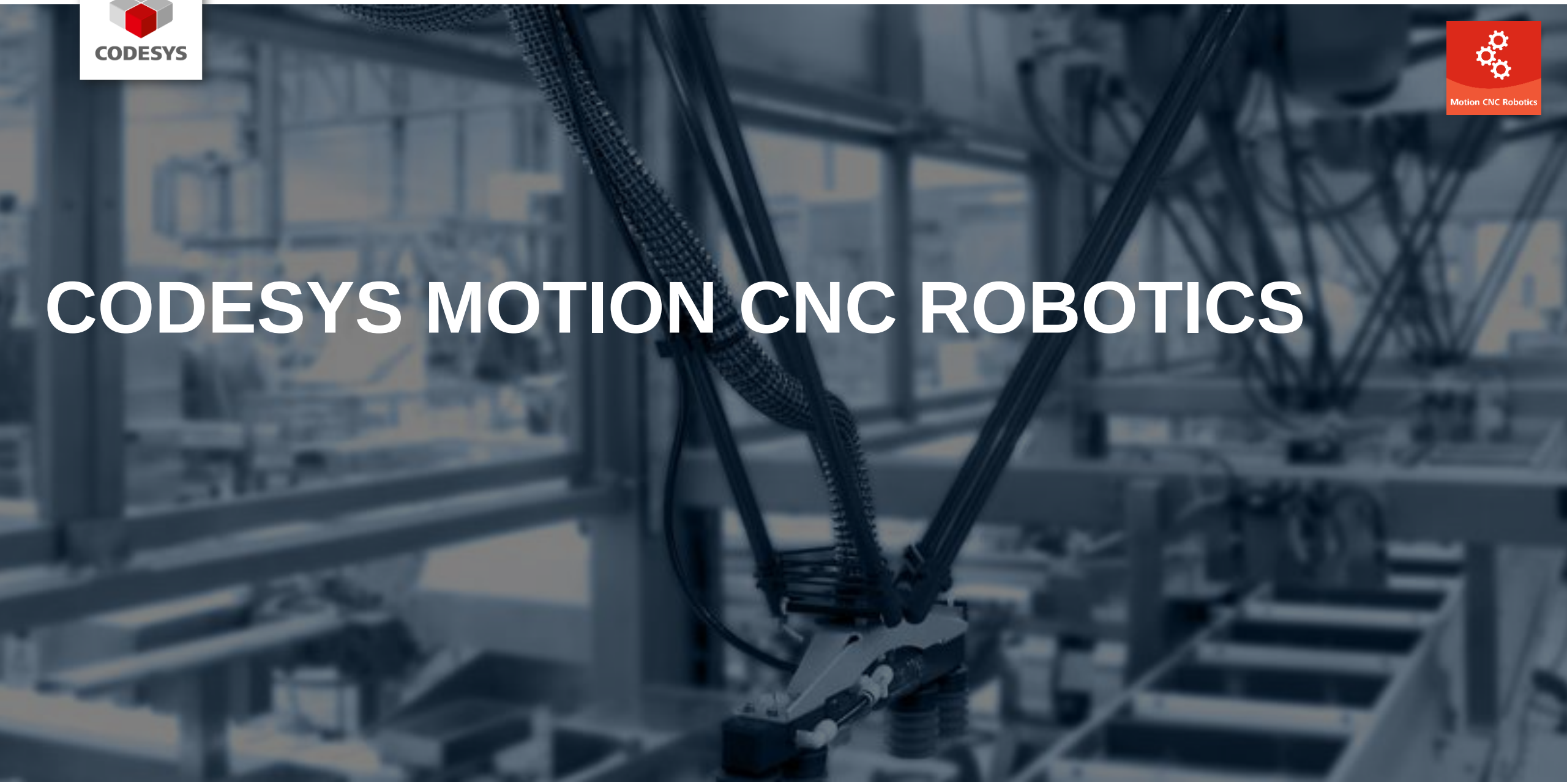
More than one language-dependent font

- Important if fonts are not available on all devices
- Only supported for WebVisu
- The first available font is used.



Usage of UTF8-encoded STRING variables in the visualization

- **Compile options**
- **Support of UTF8-encoded STRING variables**
  - All kind of visualization types
  - Keypad
  - Text field



CODESYS MOTION CNC ROBOTICS

Overview

- CNC improvements
- Robotics improvements

CNC improvements

- **Indirect subprogram calls using string variables**

  - Variables

```
G01 X$varX$ Y10 F50 E100 E-100
```

  - Subprogram calls

```
SUB1(2)
```

  - Indirect subprogram call

```
DYNCALL($SUBNAME$, 2)
```

```
VAR
    varX: STRING:='100';
    SUBNAME: STRING:='Move3';
END_VAR
```

Robotics improvements

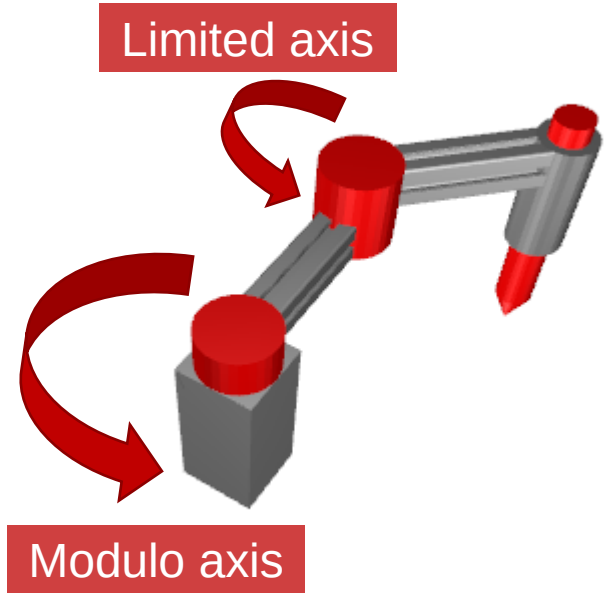
Continue from stop position

- Similar to MC_GroupInterrupt
- Command MC_GroupHalt/GroupStop with input ClearMovements=FALSE
- Save continue data (SMC_GroupSaveContinueData) once stopped
- Use MC_GroupContinue to continue the interrupted path

- **Advantages over GroupInterrupt**
  - Immediate stop (zero latency)
  - Configurable dynamics for stopping

Robotics Improvements

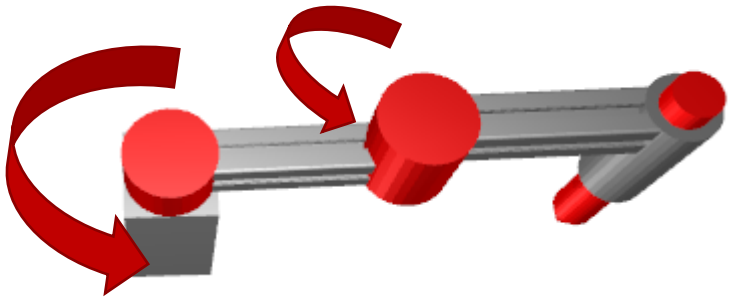
- **Support for modulo-axes**
  - Rotary axes with period 360°
  - Any unlimited rotary joint of a kinematics
  - Only mode „shortest“

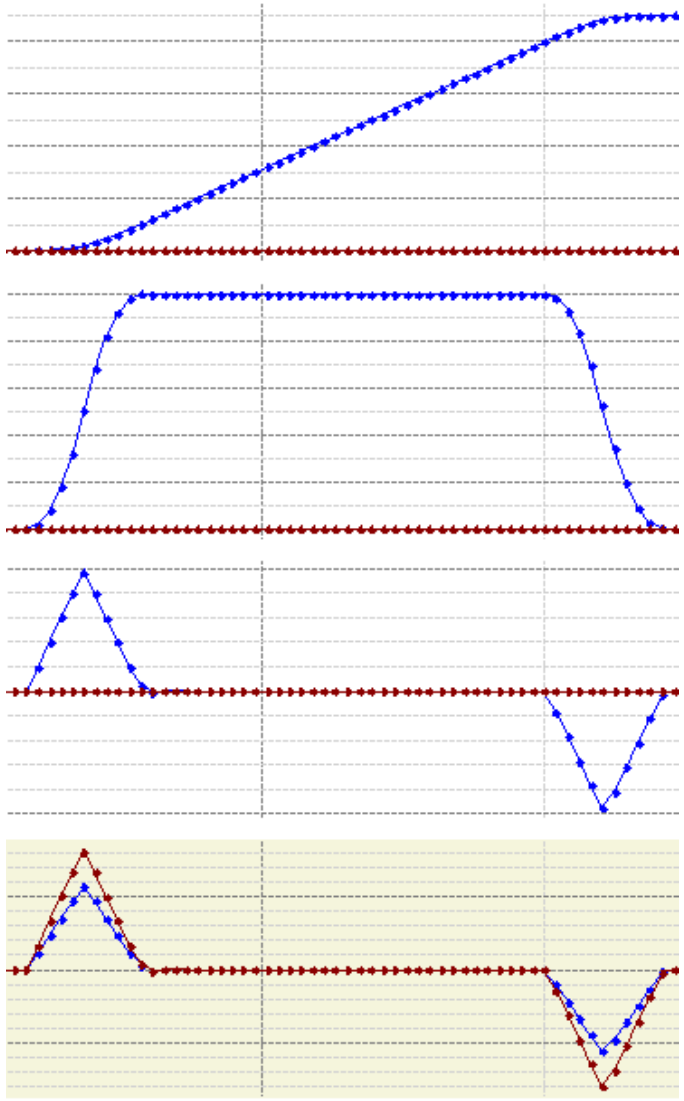


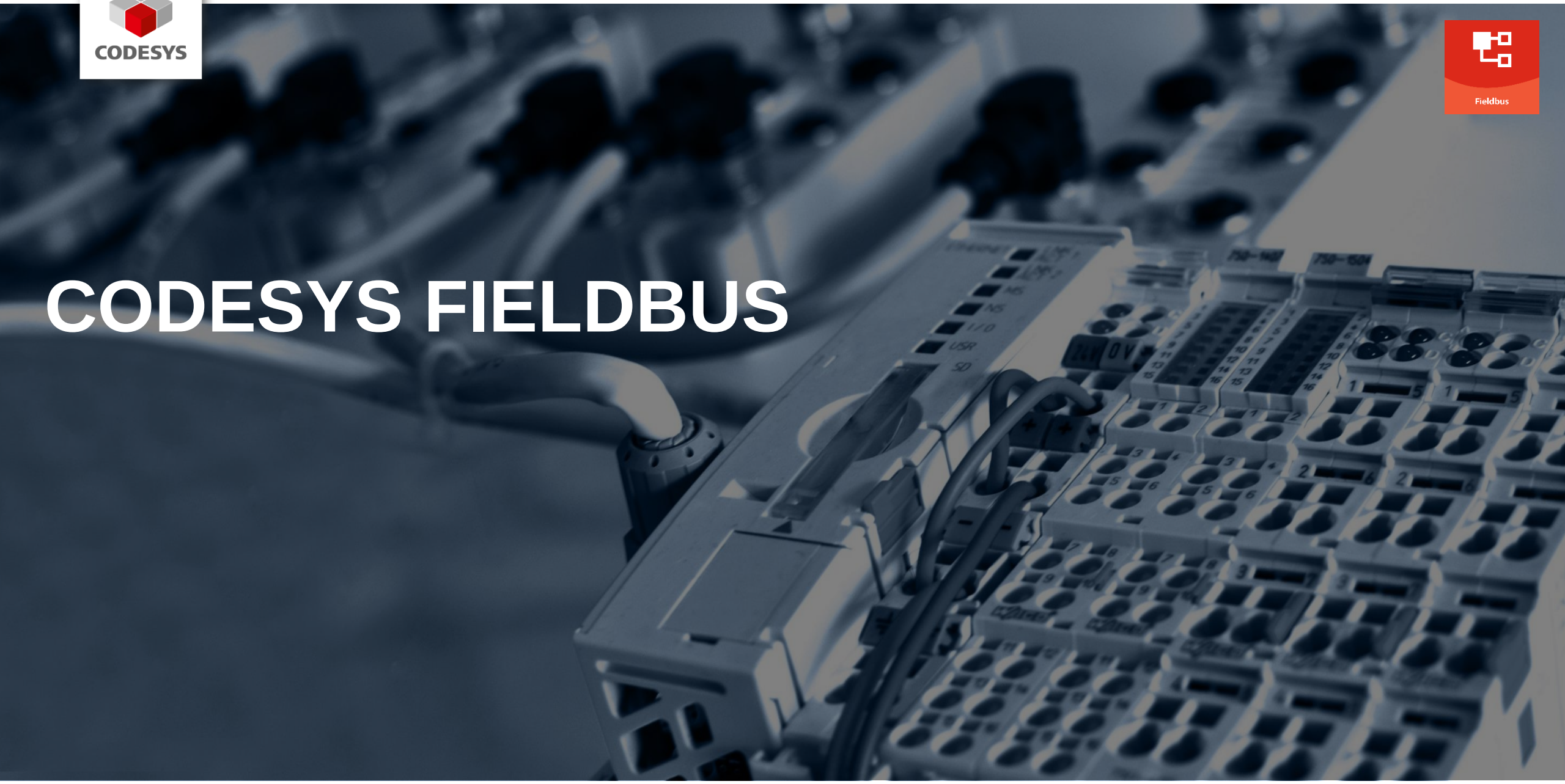
Robotics improvements

- **Torque limitation**
  - Dynamic model required
  - Limit torques directly
  - Account for coupling
    - One axis moves

    ➔ Other axes must generate a torque.







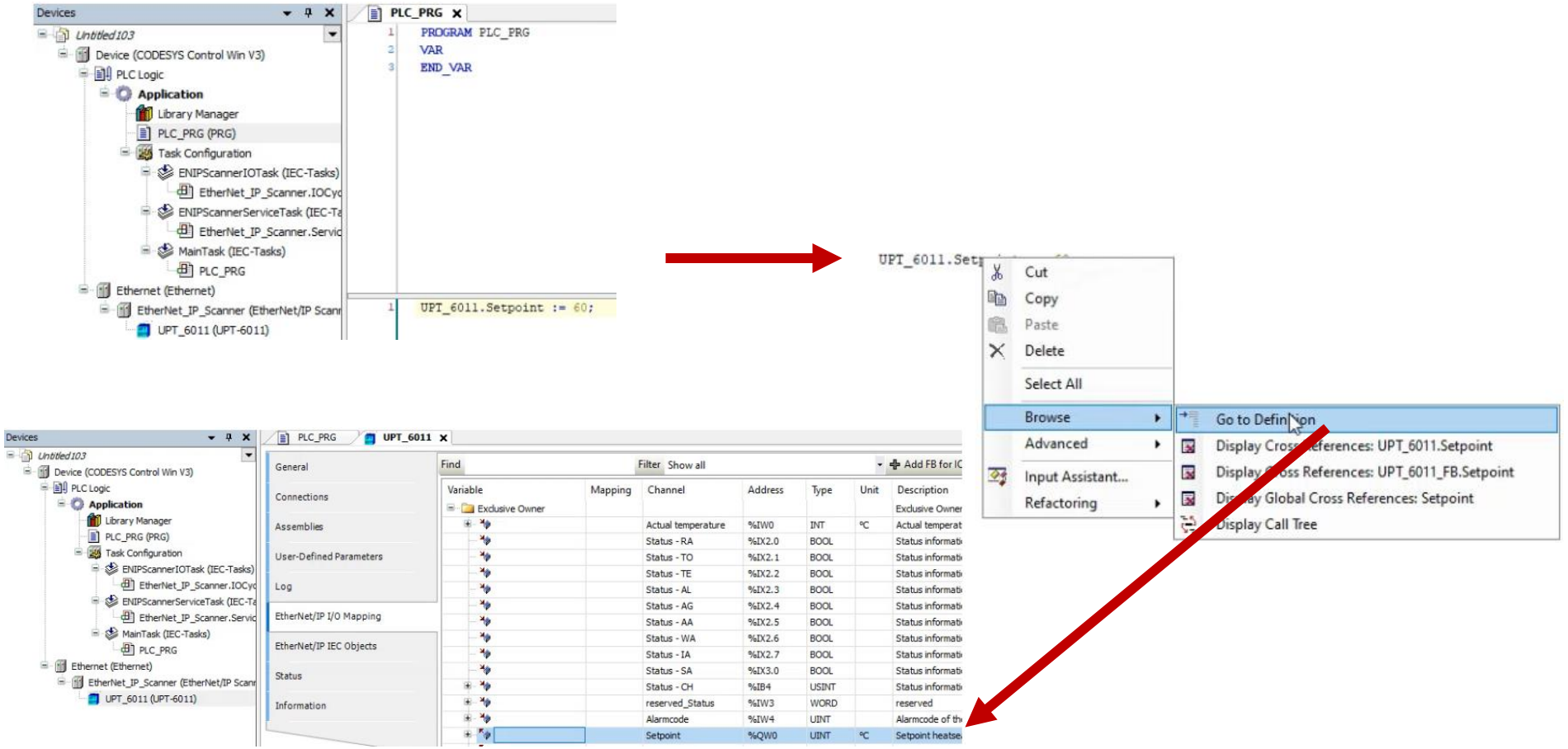
CODESYS FIELDBUS

Overview

- **General improvements**
- **Specific improvements:**
  - EtherNet/IP
  - CANopen
  - EtherCAT
  - PROFINET
  - Ethernet Adapter
  - IO-Link

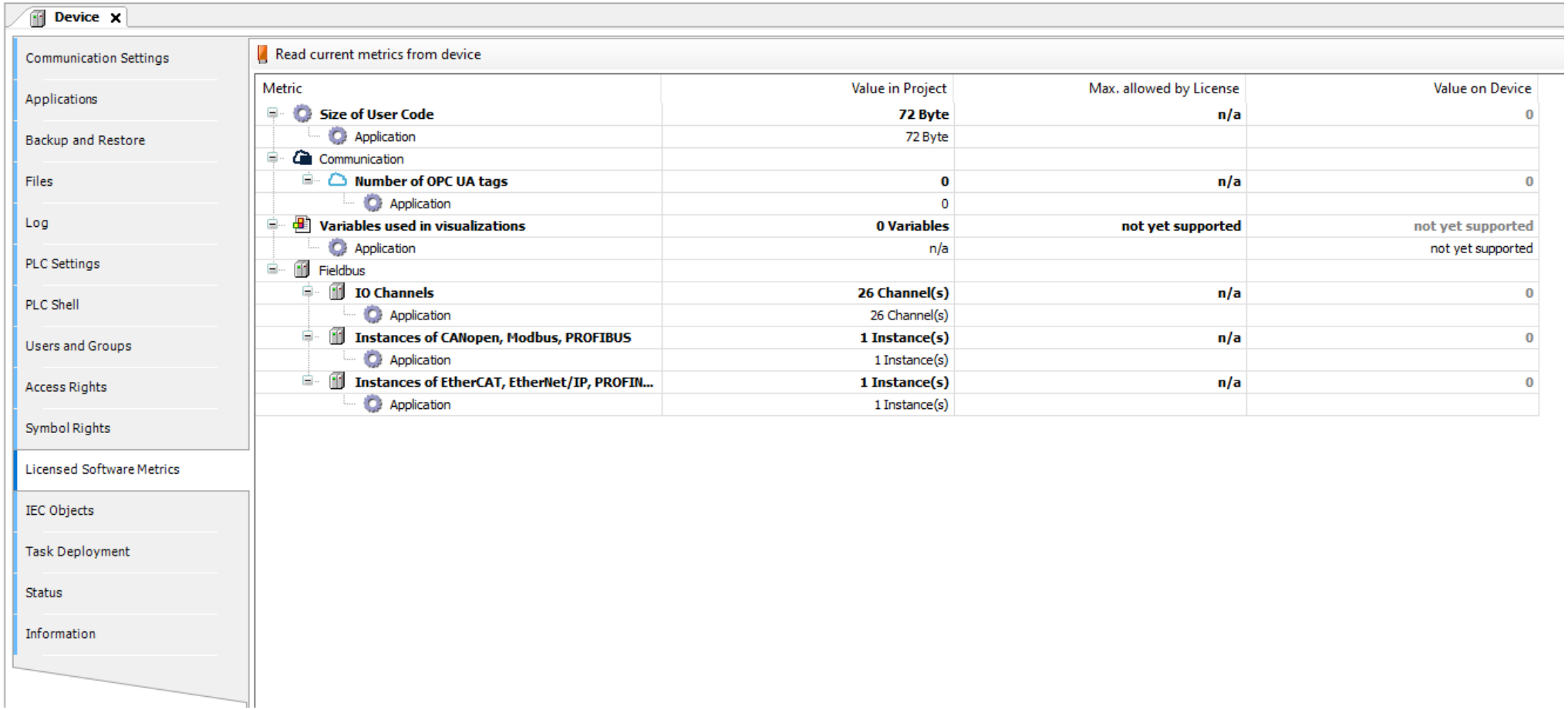
General improvements

- **Go to Definition for Symbolic Access I/Os**



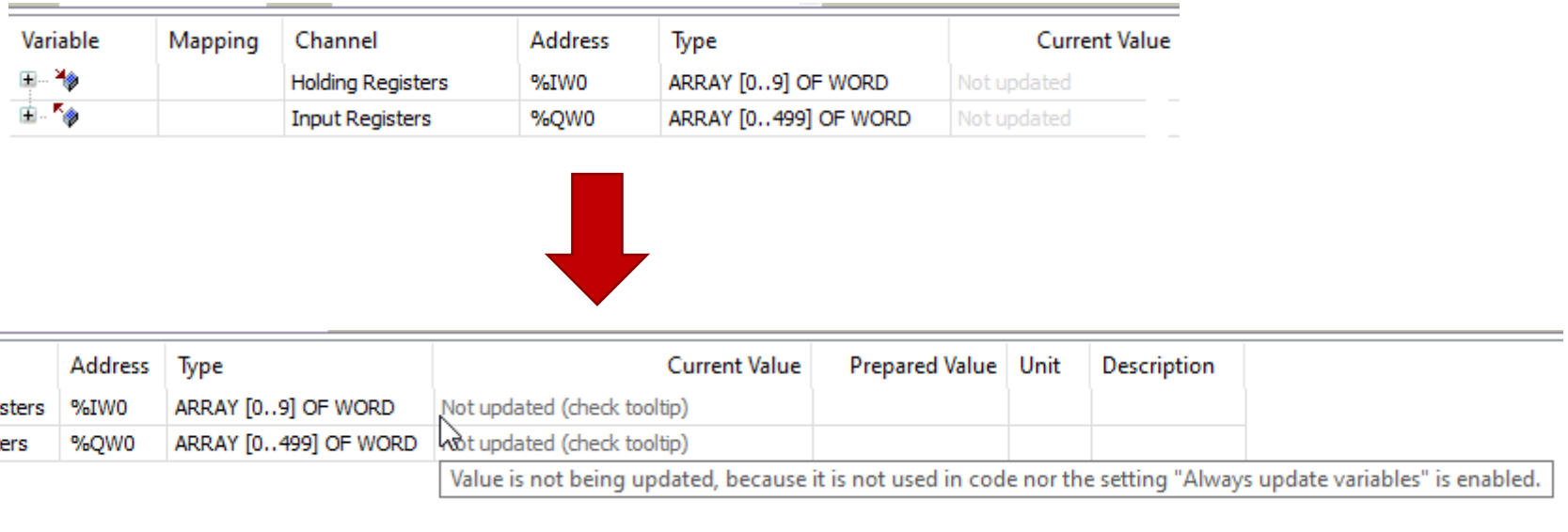
General improvements

- **Detection of metrics for application-based licensing**



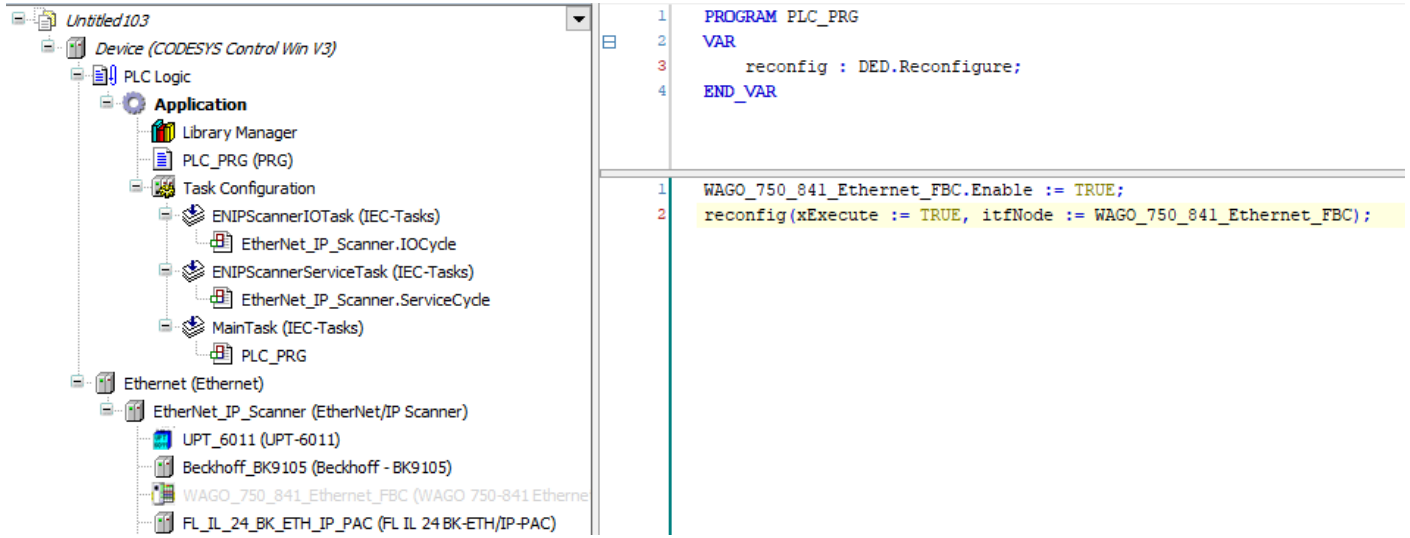
General improvements

- **Performance**
  - Project loading
  - Device Object Serialization
- **Usability**
  - Improved display of unused I/O channels



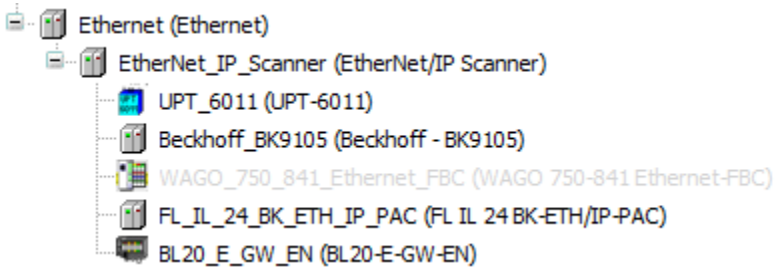
EtherNet/IP improvements

- **LLDP**
- **Support of CT 18.1 and CT 19**
  - Certification on CODESYS Control RTE possible with runtime version ≥ 3.5.18.40
- **Reconfigure for Remote Adapter**
  - Possibility of enabling/disabling a remote adapter without restarting the complete stack



EtherNet/IP improvements

- **API for accessing I/O Assembly data**



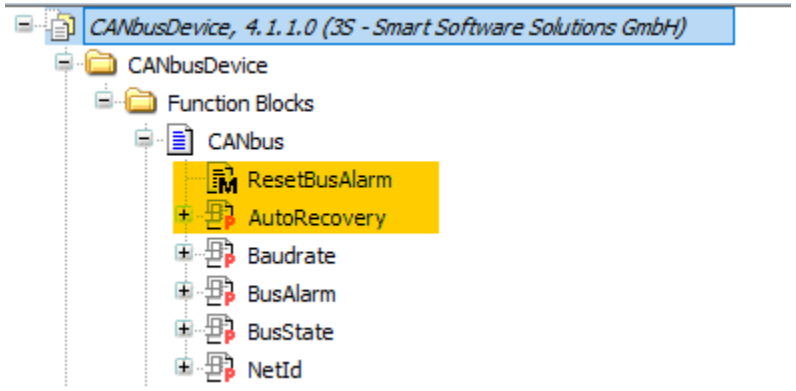

```
1  PROGRAM PLC_PRG
2  VAR
3      itfProducingAssembly : CIP_Object.IAssembly;
4      pbyAssemblyData : POINTER TO BYTE;
5      udiAssemblySize : UDINT;
6  END_VAR
```

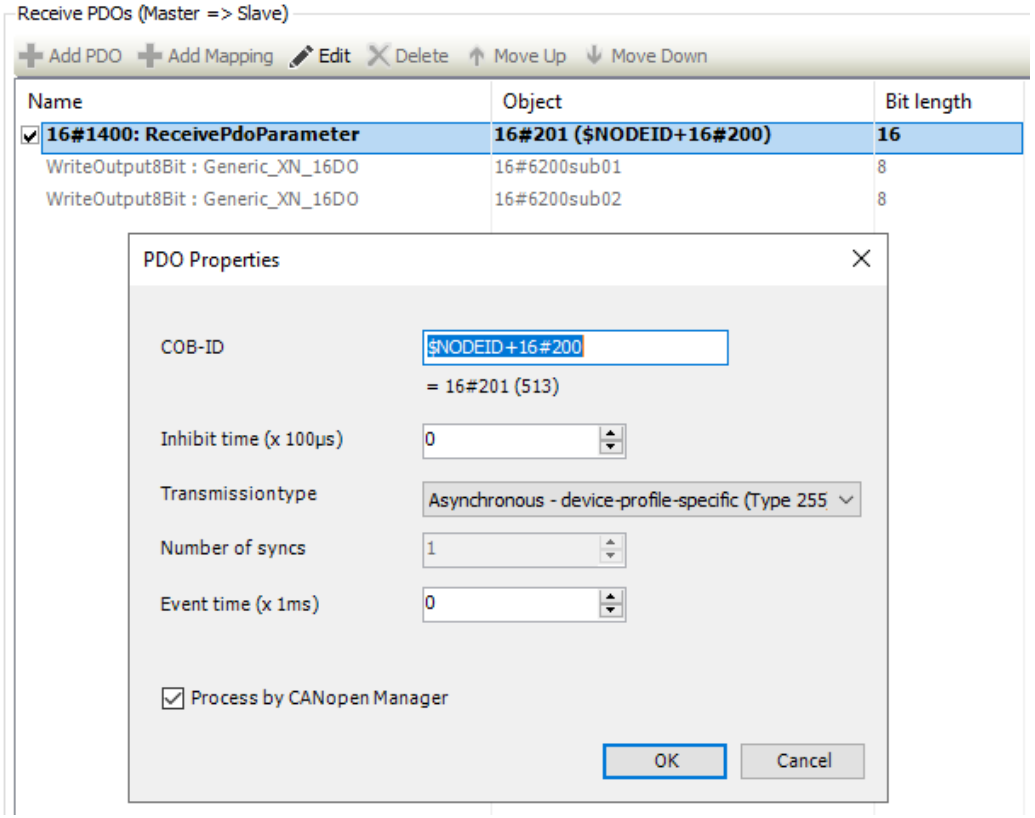
```
1  itfProducingAssembly := UPT_6011.GetAssemblyByID(100);
2  IF itfProducingAssembly <> 0 THEN
3      pbyAssemblyData := itfProducingAssembly.Data;
4      udiAssemblySize := itfProducingAssembly.Datasize;
5  END_IF
```

- **Possibility to deactivate the creation of I/O channels**

CANopen improvements

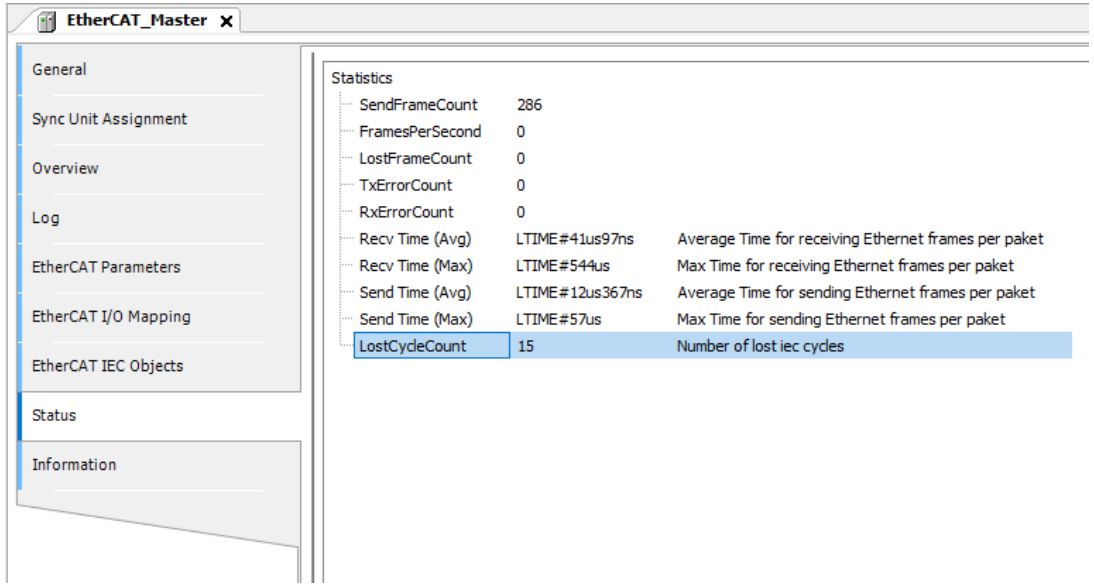
- **Event time for RPDOs**
- **Deactivation of auto recovery for CAN stacks possible**
  - Required in rough environments





EtherCAT improvements

- Support for KEBA DA33x_SDC drive
- SafetyESIConverter: Support of ETG.6100.3 (generic Safety drive profile) communication objects
- Diagnosis counter for lost cycles



EtherCAT improvements

- **GetStatistics: Return of average and maximum send and receive time**

IoDrvEtherCAT.GetStatistics (METH)

METHOD GetStatistics

Reads the statistics data and copies it to the output values. The number of sent frames or TX error counts could be then used within the application. The statistic information could be reset by calling ClearStatistics In a well working runtime system the values of udiLostFrameCount, udiTxErrorCount and udiRxErrorCount should be always zero. The same information is also shown at the status page of each EtherCAT master.

InOut:

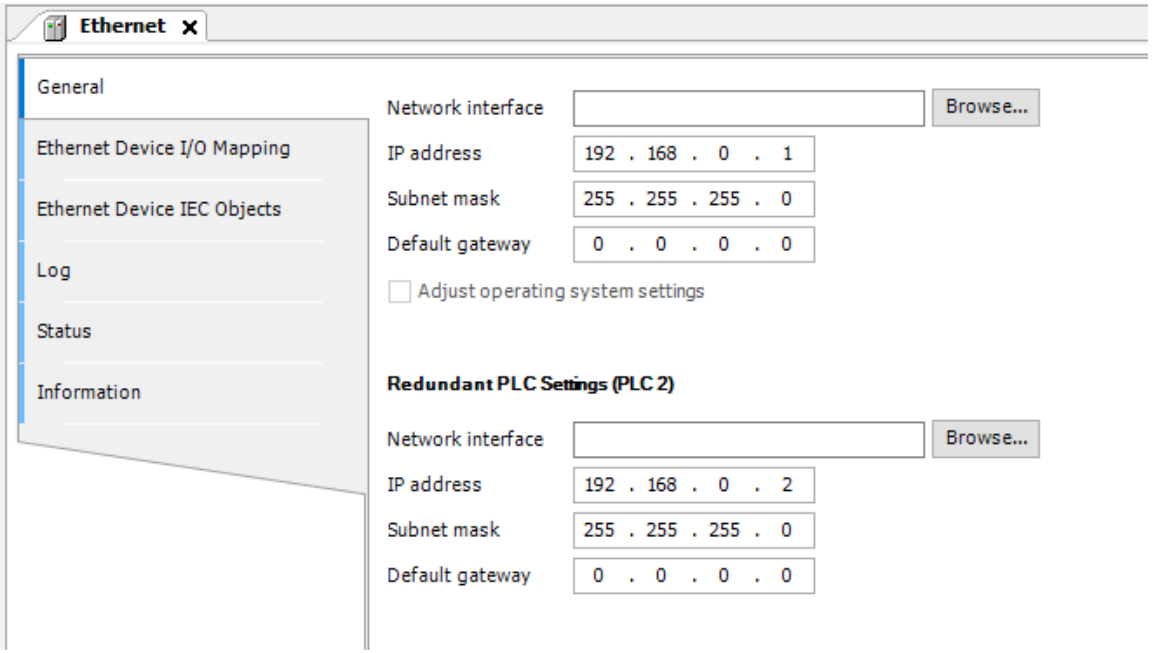
Scope	Name	Type	Comment
Output	udiSendFrameCount	UDINT	Number of total EtherCAT frames sent
	udiFramesPerSecond	UDINT	Number of frames per second
	udiLostFrameCount	UDINT	Number of total lost frames. A frame is lost due to EMC, connection or other hardware problems for example. In addition, if the CRC does not match then this counter is increased as the network driver skips the frame.
	udiTxErrorCount	UDINT	Number of frames that could be not sent as the runtime function sendethframe returns not ERR_OK.
	udiRxErrorCount	UDINT	Number of missing received frames. Each sent frame must be also received at least in the next IEC cycle. If the runtime system (TCP-IP stack) is busy or the priority is low then frames could be delayed for sending or receiving and this counter will increase.
	udiLostCyclesCount	UDINT	Number of lost iec cycles. If the EtherCAT Stack is not called for a complete cycle then this counter will be increased by onee.
	ltRecvAvg	LTIME	Average time for receiving Ethernet frame per packet (EnableTimeMeasurements must be set to true otherwise values are zero)
	ltRecvMax	LTIME	Maximum time for receiving Ethernet frame per packet
	ltSendAvg	LTIME	Average time for sending Ethernet frame per packet
	ltSendMax	LTIME	Maximum time for sending Ethernet frame per packet

PROFINET improvements

- **MRP Client for device and controller**
  - Dual port interface required!
- **System redundancy S2 for PROFINET Controller**

Ethernet adapter improvements

- **Support of PLC redundancy**



IO-Link improvements

- **Support of multiple IO-Link instances**

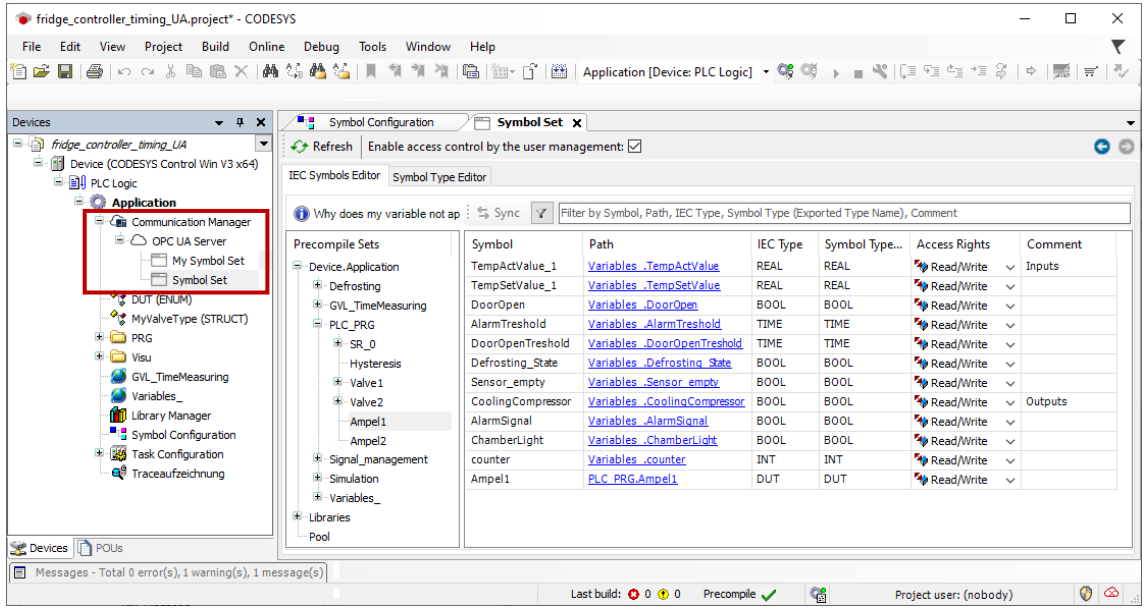
CODESYS COMMUNICATION

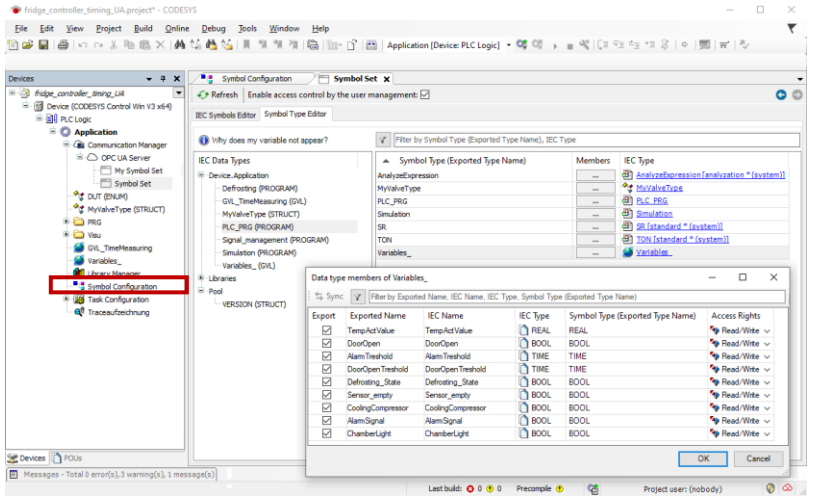
Overview

- OPC UA improvements
- Certification of the CODESYS OPC UA Server
- BACnet improvements

OPC UA improvements

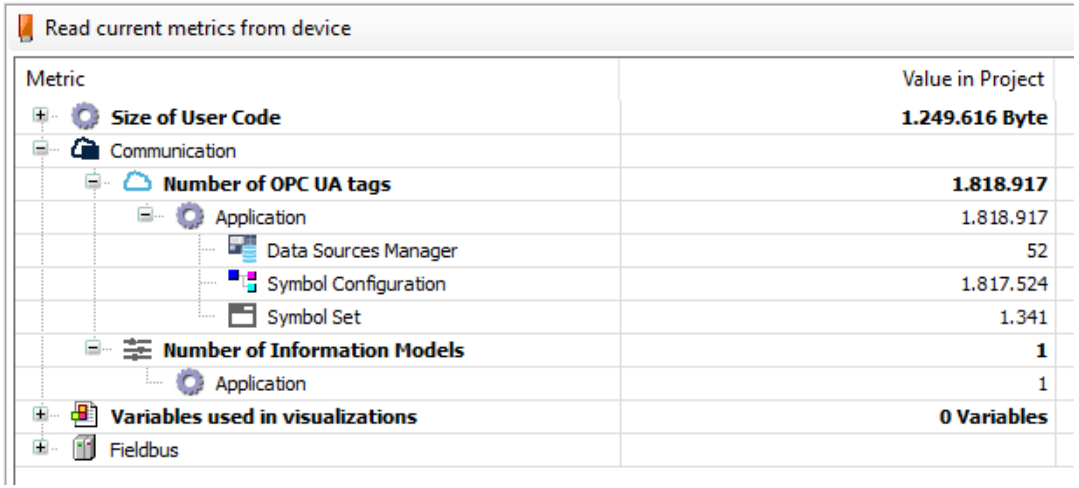
- **New editor for symbol configuration**
  - Usage by „OPC UA Server“ object below Communication Manager
  - New workflow
    ➔ No compilation of application necessary
- **Support of independent symbol sets**
- **Legacy symbol configuration**
  - Usage in parallel to latest editor possible
  - Only support of PLCopen information model
  - Support of PLC Handler

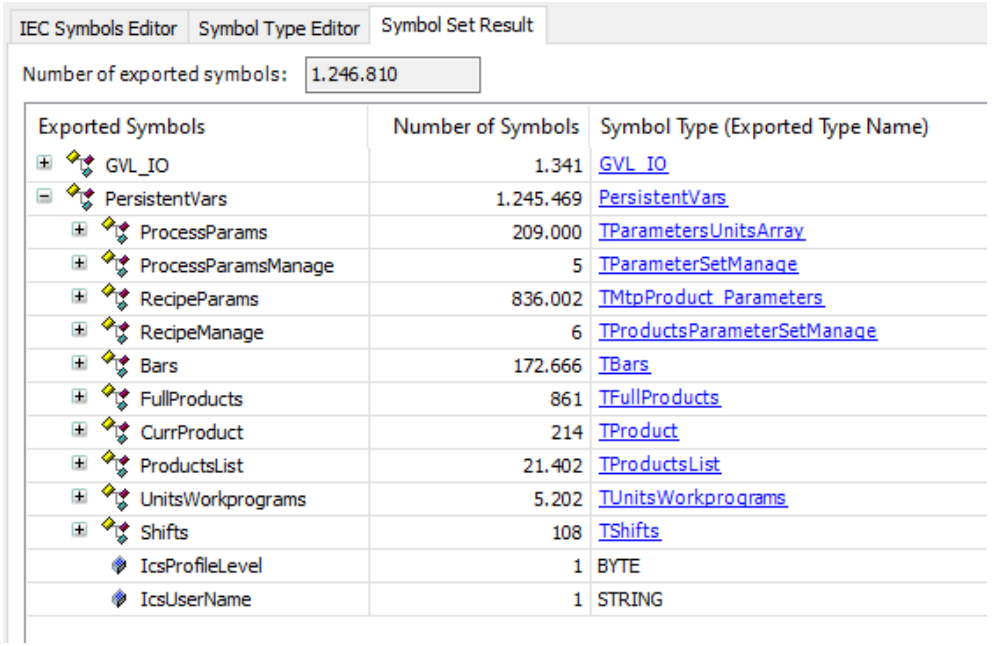




OPC UA improvements

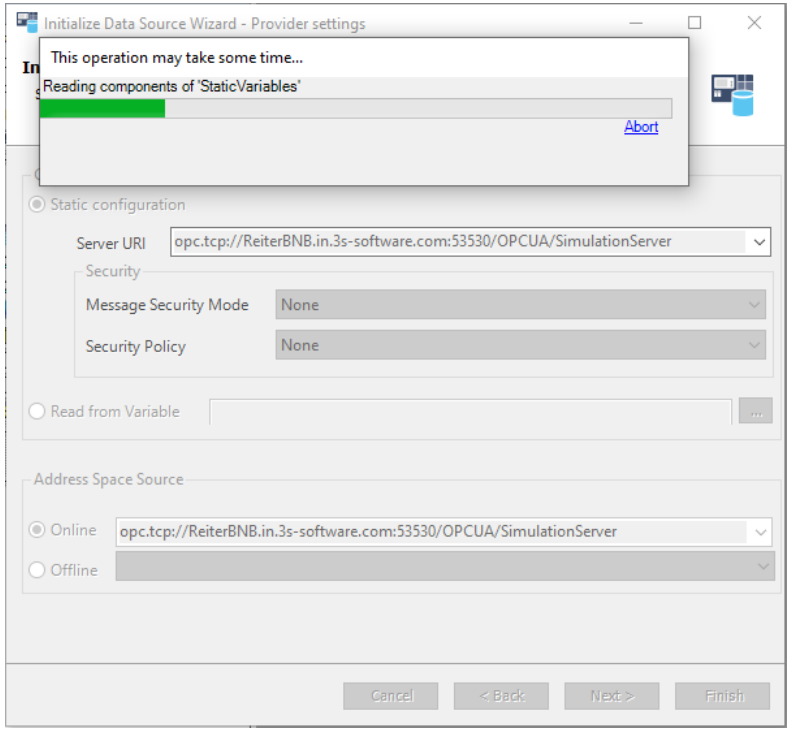
- **New metrics and statistics**
  - Metrics in core dialog
  - Detailed statistics for new editor





OPC UA improvements

- **Usability improvements of OPC UA Datasource**
  - Improved usability of wizard and browsing of server
  - Access to OPC UA options for more fine-grained control of data exchange
    - Publishing interval for variables
  - Connection to servers requiring authorization



Certification of the CODESYS OPC UA Server

- **Micro Embedded Device Profile completed**
- **Certification passed**
- **Specifications:**
  - Micro Embedded Device 2017 Server Profile
  - Method Server Facet
  - SecurityPolicy [B] - Basic256Sha256
  - SecurityPolicy [A] - Aes128-Sha256-RsaOaep
  - SecurityPolicy - Aes256-Sha256-RsaPss
  - User Token - Anonymous Server Facet
  - User Token - User Name Password Server Facet
- **Listed as certified on OPC Foundation website:**
  https://opcfoundation.org/products/view/codesys-opc-ua-server/

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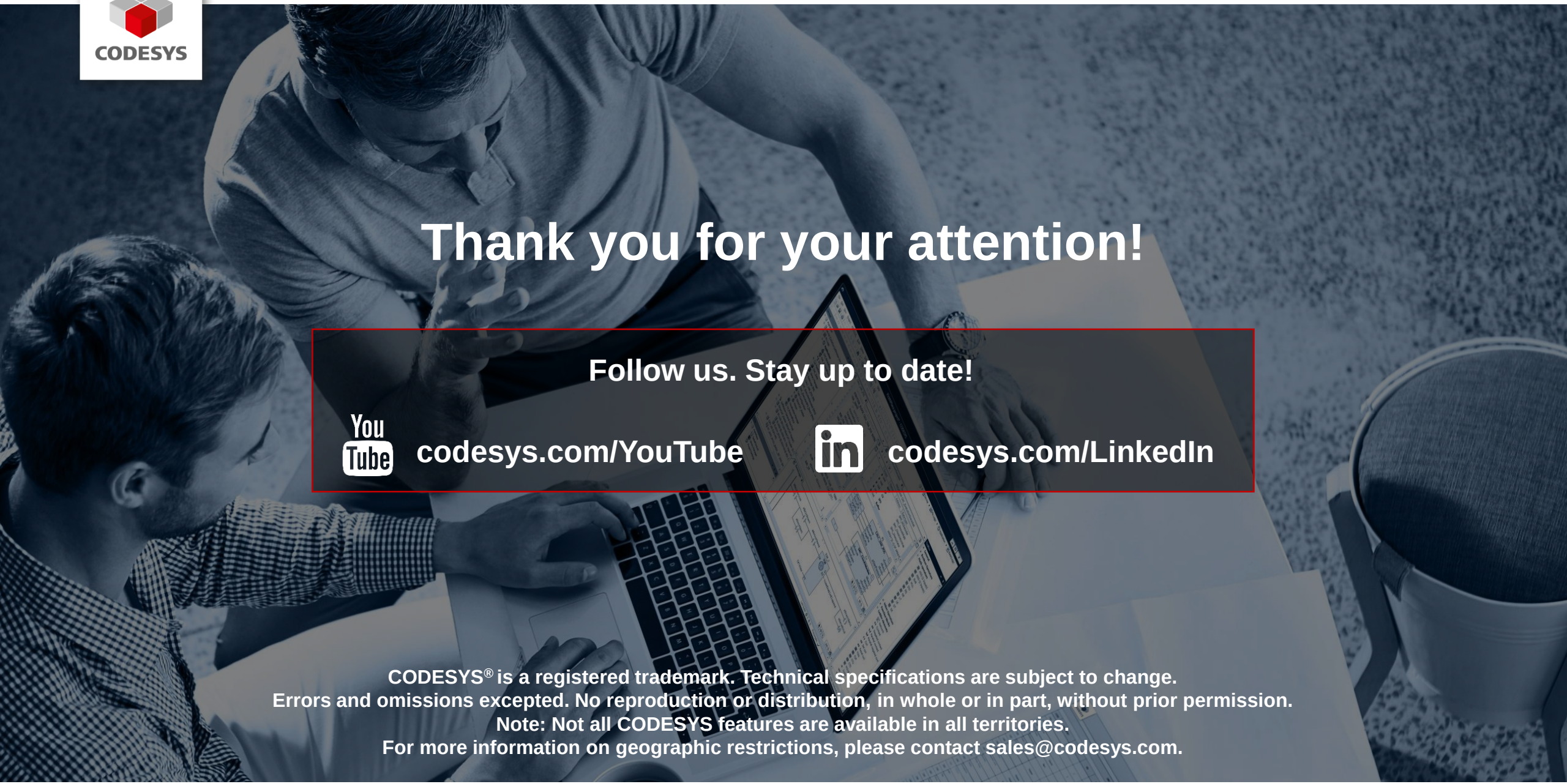
BACnet improvements

- **Support of BACnet protocol revision 23**
  - Required for certification of new devices from 2024 onwards
  - Incompatible changes in new revision
    - Existing projects cannot be updated.
    - However, both revisions can be mixed in projects.



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