Features & Improvements CODESYS V3.5
Service Pack 9
## Agenda

1. **Runtime**
2. **Engineering**
3. **Visualization**
4. **Motion + CNC**
5. **Fieldbus**
6. **Other**
Overview

- X.509 certificates
- Consistent monitoring via PLCHandler / IecVarAccess
- Separated provider component for CODESYS OPC UA Server
- CODESYS Control for BeagleBone SL
X.509 Certificates – Benefits in general

- **Certificate:**
  - Digital identification of an entity (e.g. server, user, software module)
  - Contains public key for an asymmetric method
  - Owner has associated private (secret) key for an asymmetric method

- **Application for asymmetric cryptography method:**
  - Encryption of messages → confidentiality
    (Transmission read by sender and receiver only)
  - Signing of messages → integrity
    (Transmission not changed / changes detected)
  - Authentication of sender and receiver → authentication
    (Detection of the identity of a user or a server)
X.509 Certificates – Integration in CODESYS

- Uniform interface for
  - Certificate management in the runtime system (RTS)
  - Use of cryptography method
  - Encrypted communication (TLS; previously SSL)

- Central component for certificates and cryptography in the RTS: OpenSSL

- Detection of all servers in the RTS that require a certificate
  - Now: WebServer registers a certificate for itself.

- Creation of self-signed server certificates

- PlcShell commands for certificate management

- Other integration steps in preparation
Consistent monitoring via PLCHandler / IecVarAccess

- Requirement from the process industry: Clock and cycle consistent monitoring

- Previous methods available:
  - No consistency
  - Defensive consistency (interruption by an IEC task is detected; errors are issued when monitoring)

- New: Offensive monitoring method
  - Values of a complete variable list from one cycle
  - Client and PLCHandler: Definition of the consistency method per variable list
  - Activation of the new method in the symbol configuration or device dialog
  - Effect on task jitter
OPC UA Server – Separate provider components

- Requirements:
  - Management of own objects in the CODESYS OPC UA server
    ➔ Extension of the OPC UA server
  - Integration of the CODESYS IecVarAccess provider in the OEM OPC UA server

- Uniform interface for linking the OPC UA provider
- IecVarAccess as standalone provider component separated
- Sample component of a provider for OEMs
CODESYS Control for BeagleBone SL

- BeagleBone Black: Single-board computer comparable to Raspberry Pi; Linux operating system (Debian)
- Ready-to-use SoftSPS available as Debian package; installation directly within the CODESYS Development System
- Supported functions: WebVisu, GPIO (analog / digital), OPC UA server, EtherCAT, EtherNet/IP, CANopen/J1939 (additional cape module required)
- Available in the CODESYS Store
- Standard delivery:
  - Debian package
  - CODESYS package
  - Tutorials for cape activation
PFC200 Support

- 750-632 modules: Support for additional specialized modules
<table>
<thead>
<tr>
<th></th>
<th>Agenda</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Runtime</td>
</tr>
<tr>
<td>2</td>
<td>Engineering</td>
</tr>
<tr>
<td>3</td>
<td>Visualization</td>
</tr>
<tr>
<td>4</td>
<td>Motion + CNC</td>
</tr>
<tr>
<td>5</td>
<td>Fieldbus</td>
</tr>
<tr>
<td>6</td>
<td>Miscellaneous</td>
</tr>
</tbody>
</table>
Overview

- Navigator
- ST editor
- CFC editor
- Online
- Library manager
- Frame
- Project localization
- Application Composer
- Test Manager
Navigator

- Indicators (mini icons) for access specifier

- Indicator for external POUs
ST editor

- Zoom
  - Zoom factor in the editor and with Ctrl key + mouse wheel
  - Settings transient; separate for each text field (incl. declaration part)
    Global setting possible as before in the options by means of font size
ST editor

- Pragmas
  - New: Region for structuring code segments:
    Expand/collapse code segments identified with "region"

  ```
  7 | {region 'Go to definition in online mode'}
  8 | ci(input := 2, cst := 5);
  9 | c2(input := 3, cst := 3);
 10 | {endregion}
  ```

- AutoFormat for pragmas:
  To prevent syntax errors
  Example: Only pragma operators in capital letters are executed.

  ```
  12 | {define ID_TEST1}
  13 | {if defined(ID_TEST1)}
  14 | testId := TRUE;
  15 | {ELSE}
  16 | testId := FALSE;
  17 | {END_IF}
  ```
CFC editor

- Improved connectors
  - Keyboard navigation

- IntelliSense® for connectors

- Page-oriented CFC:
  - PLCopen XML support
Library manager

- Resolution of library placeholders dependent on device
  - Libraries in the POU tree can be used for different devices in the device tree. ➔ Different resolution of placeholders
  - Display of the resolution by indicator icon as tooltip

- Indicator icon for redirected placeholders

![Diagram of Library Manager](image-url)
Online

- "Go to definition" in online mode
  - Now jumps directly to the instance of the open FB
- Watch view
  - Flagging of the expanding status of structured variables
Library manager

- Automatic resetting of error messages due to missing libraries after post-installation in the library repository
- Export of libraries from the library repository

Requirement: Installation of library in source code
### Frame

- Visual distinction between project and library POUs:
  - ID for library POUs:
  
  `<POU name>[from <library name>]`

![Diagram showing visual distinction between project and library POUs](image-url)
Project localization (displaying projects in other languages)

- Switch between source language and target language by means of selected localization file in the project
- Use case: Simplified commissioning/debugging of existing project
  - Only view in target language
  - No editing / save in target language
Project localization (displaying projects in other languages)

- Workflow for translating project contents into other languages:
  - Creation of a localization template *.pot format with the project data in the original language
  - Generation of localization files in *.po format using external tools (e.g. Poedit)
  - Translation of project information in the localization files
  - Import and management of the localization files in CODESYS
Application Composer

- New generator: source template
  - Creation of an FB based on a template POU
  - Specific template POU possible for each top-level module
  - Target: Modules commented out manually per instance
    - Incorporation of own source code permanently in the generated project
    - No overwriting by recent generator cycle
Application Composer

- Significant performance improvements
- Many detail improvements, including
  - Device parameters for device generator
  - New composer options
  - Links as part of module description / metadata
  - Option for generating multiple web/target visualization with visualization generator
  - Convenient functions for module declaration (automatic suggestion of text list entries)
  - Non-deletable default module instances
  - Improved online view for parameter and I/Os
Test Manager

- Updated version available in the CODESYS Store
- New: Test tables
  - Tabular definition of test cases for unit tests
  - Separate object: Test table editor
  - Easy configuration of parameters
  - Automatic generation of visible test code for the test bed
    ➔ Detailed diagnosis in the test code (if necessary)
Test Manager

- Additional functions:
  - Configuration of long-running test cases
  - Detailed conditions for time-dependent processing
  - Export/import of test specification in XML format
## Agenda

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Runtime</td>
</tr>
<tr>
<td>2</td>
<td>Engineering</td>
</tr>
<tr>
<td>3</td>
<td>Visualization</td>
</tr>
<tr>
<td>4</td>
<td>Motion + CNC</td>
</tr>
<tr>
<td>5</td>
<td>Fieldbus</td>
</tr>
<tr>
<td>6</td>
<td>Other</td>
</tr>
</tbody>
</table>
Overview

- New visualization element "Date picker"
- New visualization element "Date and time picker"
- Enumerations with text lists
- Keypad text field – Input with selection
- Event for value changes in the visualization
- Miscellaneous
- Depictor
New visualization element "Date picker"

- For selecting a date and saving to a DATE variable
- Processing by applications
- Manual configuration and by visualization profile
New visualization element "Date and time picker"

- For selecting a date and time and saving to a DATE_AND_TIME variable
- Selection and processing of individual cells
- Date selection similar to combo box
Enumerations with text lists

- Previously:
  Visualization to an enumeration requires parallel maintenance of a text list for text list output of an enumeration variable,

- New:
  - Activation of "Text list support" when creating an enumeration
  - Multilingual enumeration texts
  - Easy configuration in text output elements as well as within the combo box
  - Easy conversion of existing projects with command
Keypad text field – Input with selection

- IEC variables configurable for selection information
- Significant improvement of numpad/keypad operation
Event for value changes in the visualization

- Registration of applications by means of an instance of IValueChangedListener in the visualization:

```java
FUNCTION_BLOCK FB_ValueChangedListener IMPLEMENTS VisuElems.IValueChangedListener
```

- The ValueChanged method is called when a variable value is changed in the visualization.

- Typical application: Logging user input from the visualization

- CODESYS Store sample: Logging value changes with the visualization in the standard logger of the CODESYS Development System
Other

- Use of symbol commands with `REAL` coordinates
  ➔ Precise rotation of polygons and rectangles
- CODESYS command for copying the alarm history to a separate file
- Remote TargetVisu with network scan interface
- Improved operability of visualization elements on devices with multi-touch capability
  - Scrolling a scrollable frame or tab controls by means of swiping gestures
- Easy multi-touch implementation for WinCE
Depector

- Revision of the user interface
  - Unrestricted definable window (sandbox) and toolbar

- Numerous detail improvements:
  - New transformation type (eye target)
  - 3D navigation (additional zoom option)
  - Expression evaluation
  - Movement of camera positions from the application per index
Features & Improvements CODESYS V3.5 SP9

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Overview

- Robotics
Robotics - General

- Robotics functionality integrated in CODESYS SoftMotion CNC
- Product renamed to CODESYS SoftMotion CNC+Robotics

Available for

- Device manufacturers: Device licensing with 3s.dat
- End users: Licensing per single device ("SL" extension)

Provided as separate package with update mechanism

Package included as a demo in the setup of the CODESYS Development System; additional post-installation possible from the CODESYS Store
Robotics – New functionality

- Easy parameterization of axis groups for pre-defined kinematics in a dedicated editor
- Integrated motion planning with coordinate values for robot positions in different coordinate systems
- Support of numerous kinematics providing easy configuration, such as different portal robots (2/3/5 axes), bipod/tripod robots, SCARA robots
Robotics – New functionality

- Additional tool kinematics
- Function library with POUs according to PLCopen Motion Part 4, such as MC_GroupEnable/Disable/Reset/ReadError, MC_MoveDirectAbsolute, MC_MoveDirectRelative, MC_GroupHalt, MC_GroupStop ➔ Easier programming
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<table>
<thead>
<tr>
<th></th>
<th>Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Runtime</td>
</tr>
<tr>
<td>2</td>
<td>Engineering</td>
</tr>
<tr>
<td>3</td>
<td>Visualization</td>
</tr>
<tr>
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<tr>
<td>5</td>
<td>Fieldbus</td>
</tr>
<tr>
<td>6</td>
<td>Miscellaneous</td>
</tr>
</tbody>
</table>
Overview

- General extensions
- CANopen
- J1939
- EtherCAT
- PROFINET
- IoDriver
- PFC200
General extensions

- **DeviceEditor**
  - Configurable location of menu display
General extensions

- **DeviceEditor**
  - The I/O mapping page provides filtering by mapping.
General extensions

- **DeviceRepository**
  - Drag devices from the device repository to the device tree
  - Long path functions for devices now supported

- Project localization for device configuration editors
General extensions

- **DeviceObject**
  - Redundant type declarations for different instances of the same device type
    - For improved performance
  - Auto-conversion of BOOL to BIT now suppressed
  - Project compare shows changes in bus task cycle settings

- Extension of devices by config version and Environment" dialog
CAN

- CANMinidriver
  - Conformance test

- CANopen scan
  - Selection for device descriptions shown in case more than one matching description was found

- J1939
  - Implementation of CAA device diagnosis
EtherCAT

- DIP/DIL switches as second option for setting the optional device address
- EtherCAT master
  - Show differences to the PLC logger for better diagnostic in case of missing slaves on the network
- DeviceEditorEthercat
  - Support of EP6224 IO link gateway
PROFINET

- PROFINET Configurator
  - Editor for configuring controller ports and topology
PROFINET

- PROFINET Configurator
  - Advanced check for SendClock - by determining lowest reduction ratio, phases, and bus cycle time
IoDriver

- IoDrvTemplate
  - Extension as master driver with slaves and modules

- IoDrvBase
  - Encapsulation of the handling of connector flags in an separated function block
Agenda

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Discontinuations

- As of SP9, the following products are no longer supported for systems with a Windows version earlier than Windows 7:
  - CODESYS Control RTE
  - CODESYS Control RTE (for Beckhoff CX)
  - CODESYS Control SoftMotion RTE
  - CODESYS Control SoftMotion RTE (for Beckhoff)
  - CODESYS Control Win
  - CODESYS Automation Platform SDK
  - CODESYS OPC Server
  - CODESYS HMI
  - CODESYS Gateway
Thank you for your attention.