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SIMATIC S7-PLCSIM Advanced V2.0

Overview over the highlights of the V2.0 and V2.0 SP1

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Highlights V2.0 SP1

S7-PLCSIM Advanced – Control Panel enhancements

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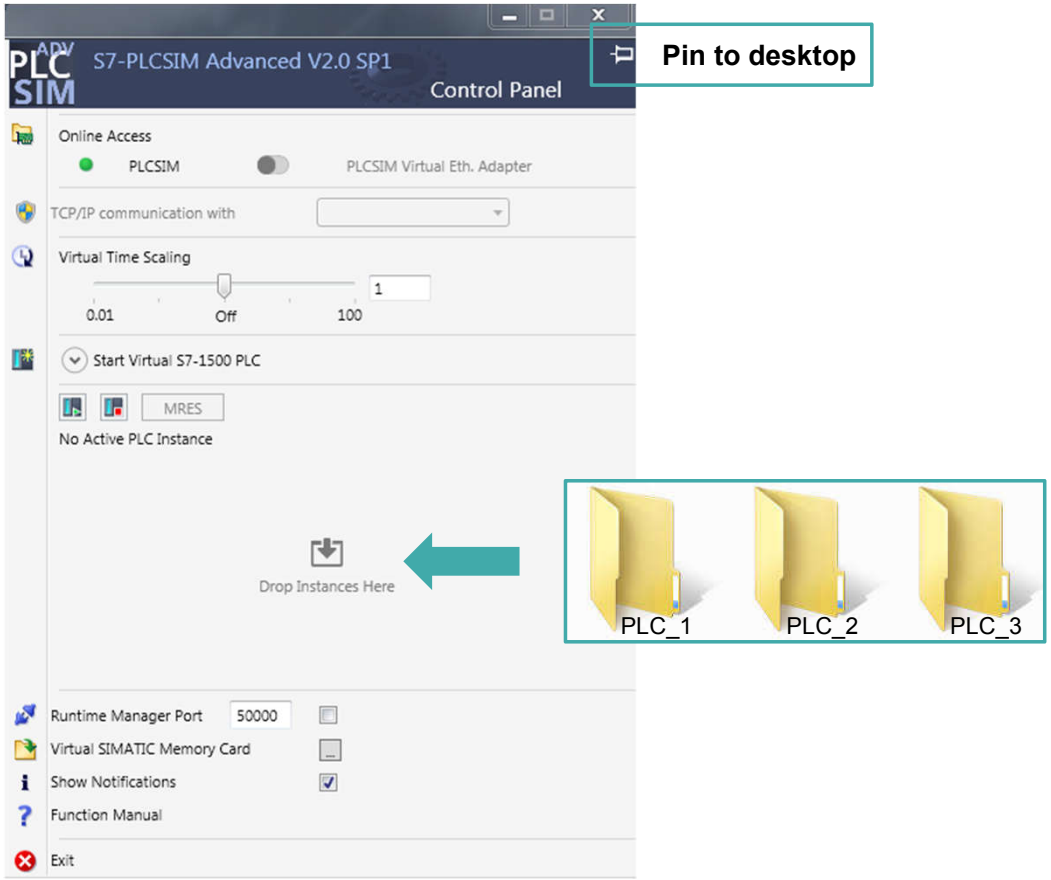
Function

The Control Panel can be used in two different ways

- A right-click on the tray icon opens the Control Panel as before (quick view)
- A double left-click on the tray icon opens the Control Panel as a floating window, which allows you to
  - Move the floating window around freely
  - Drag-and-drop instances from an Explorer window to the Control Panel
  - Pin the Control Panel to the desktop (always on top)



S7-PLCSIM Advanced –
Max. cycle time handling through the API

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Function

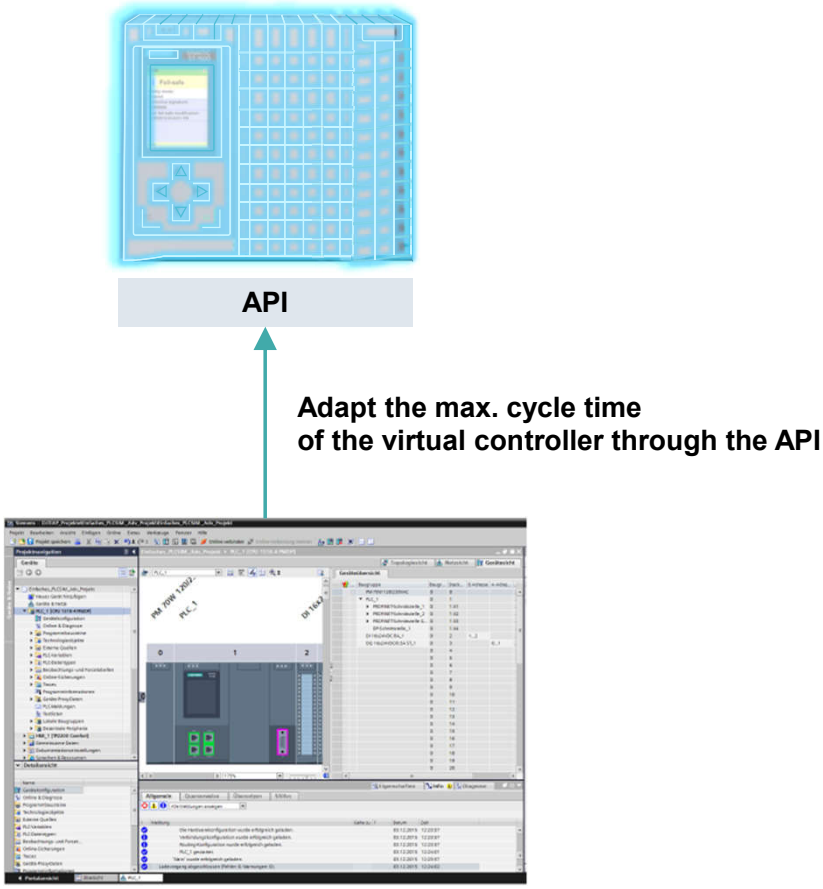
Through the API the maximum cycle time can be either ignored or taken into account, depending on the goal of the simulation

In general there are three operating modes:

- Ignore the max. cycle time; ignore = 1 minute max. cycle time (default)
- Keep the max. cycle time of the downloaded project
- Define another max. cycle time which can be set through the API

Customer value

- This feature helps prevent the virtual controller from changing to stop if the max. cycle time is exceeded in a virtual environment.
- No change of the max. cycle time of the TIA Portal project necessary.



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Highlights V2.0

Licensing concept

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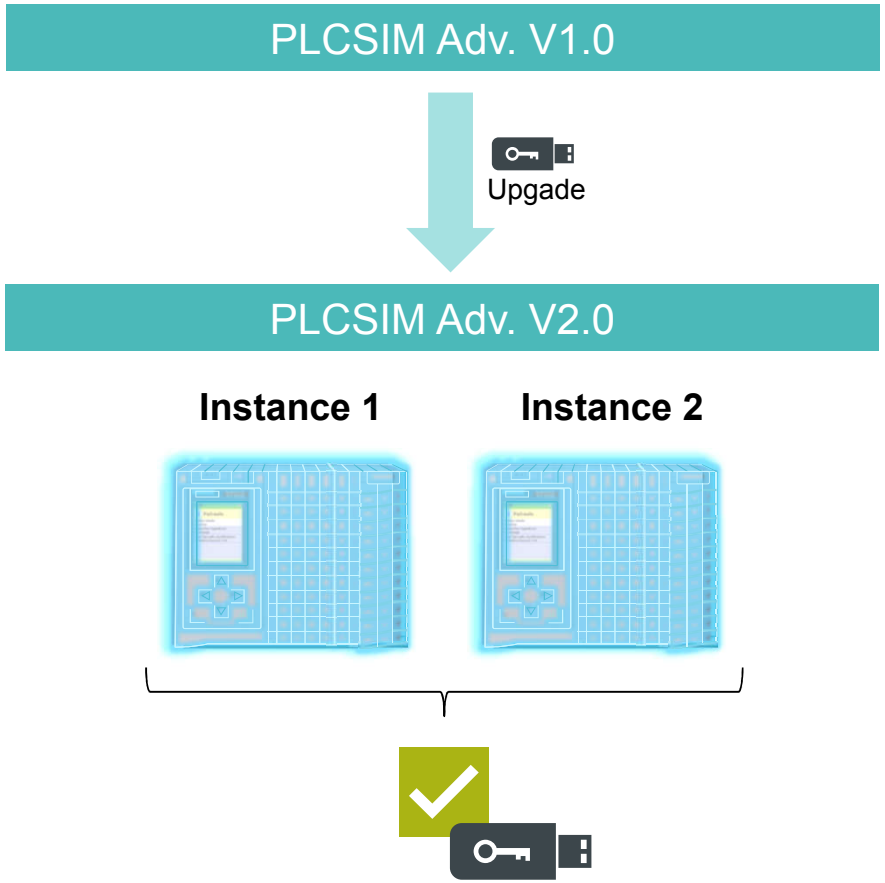
Licensing concept overview

PLCSIM Advanced can be upgrade to the newest version with an upgrade key.

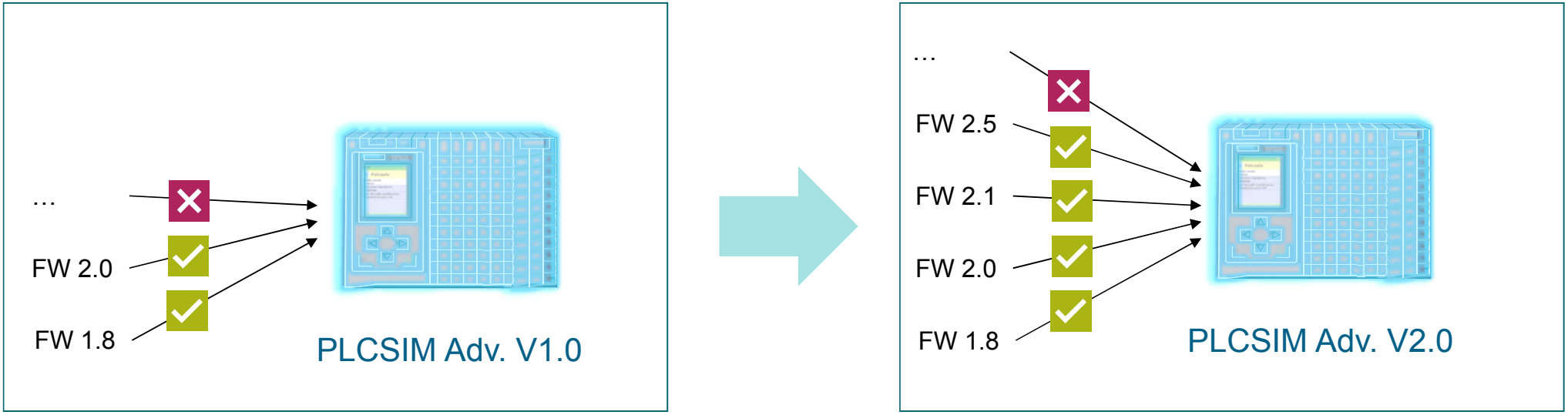
One license enables up to two PLCSIM Advanced instances on one PC. New

Licensing possibilities:

- Floating License
- Trial: free 21 day trial as download: https://support.industry.siemens.com/cs/ww/en/view/109754093



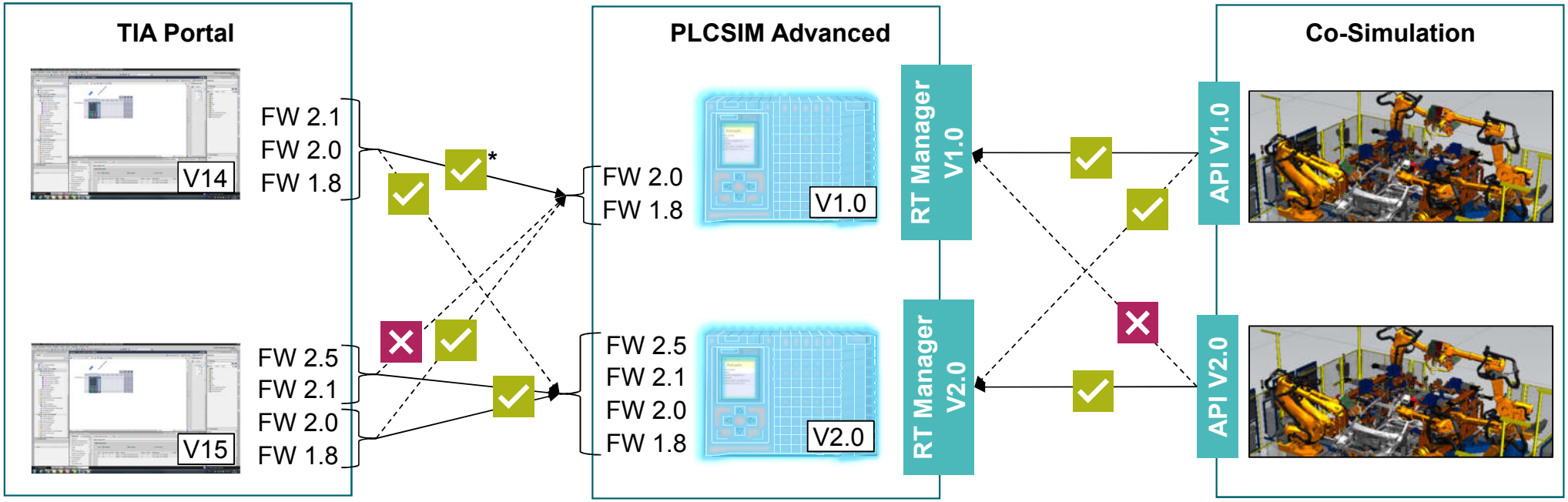
Supported firmware



Strategy

PLCSIM Adv. V2.0 supports the firmware 2.5 which was released with TIA Portal V15 and all earlier firmware releases up to firmware 1.8.
Higher firmware versions will be supported with future PLCSIM Advanced versions adequately.

Compatibility



Compatibility to TIA Portal and API versions

- PLCSIM Adv. V1.0 (SP1) and V2.0 are both compatible to TIA Portal V14 (SP1) and V15 as long as the firmware used in TIA Portal is supported by PLCSIM Advanced
- PLCSIM Advanced V2.0 supports both APIs: V1.0 and V2.0

* Not valid for FW2.1, as this fiwmware is not supported by PLCSIM Adv. V1.0

Synchronisation at Process Image Parts

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Synchronisation at Process Image Parts

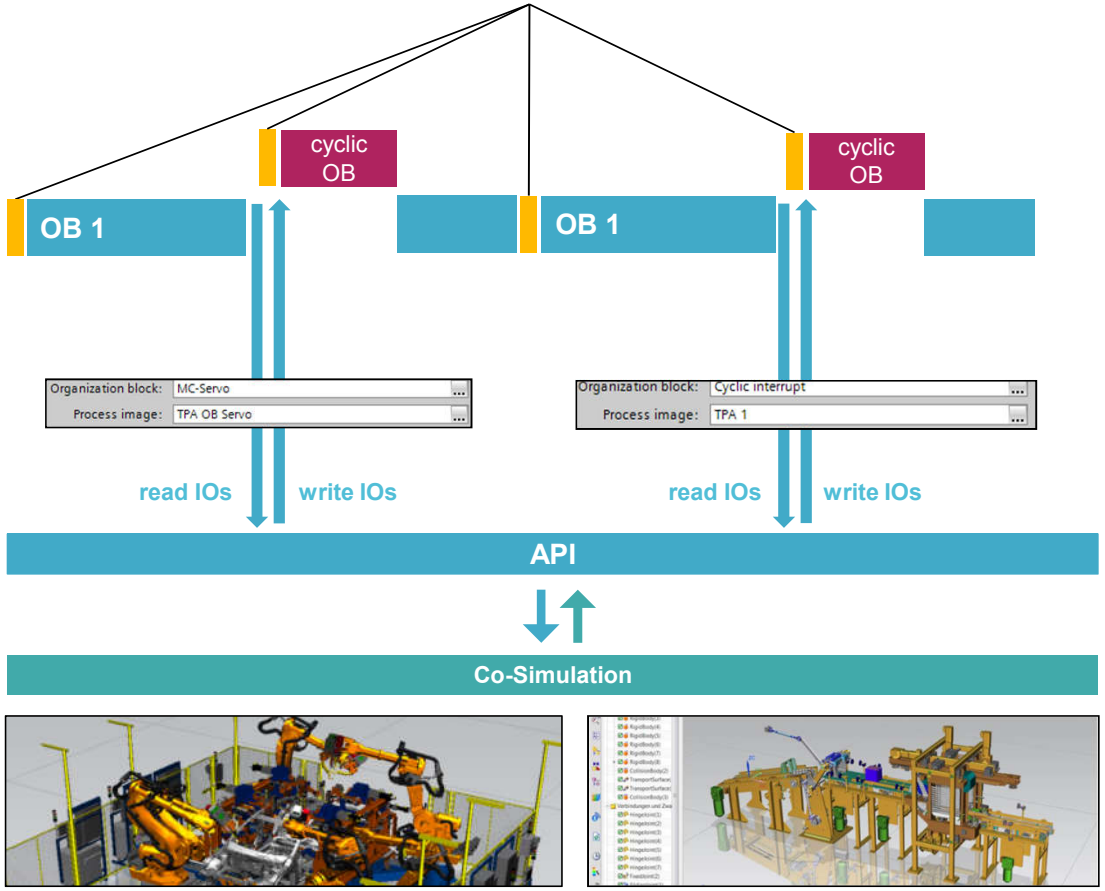
through the API of PLCSIM Advanced with Co-Simulation-Tools when calling cyclic OBs

- through a process image part attached to a cyclic OB (e.g. cyclic interrupt, MC Servo)
- In the application program with SFCs

Advantage

- Verification of the application program including consistent and up to date I/O areas when calling cyclic OBs
- Simulation of Motion Control tasks possible

Synchronisation can take place at a cycle control point and / or at a process image part



Different time-based synchronisation modes in between Co-Simulation and PLCSIM Advanced

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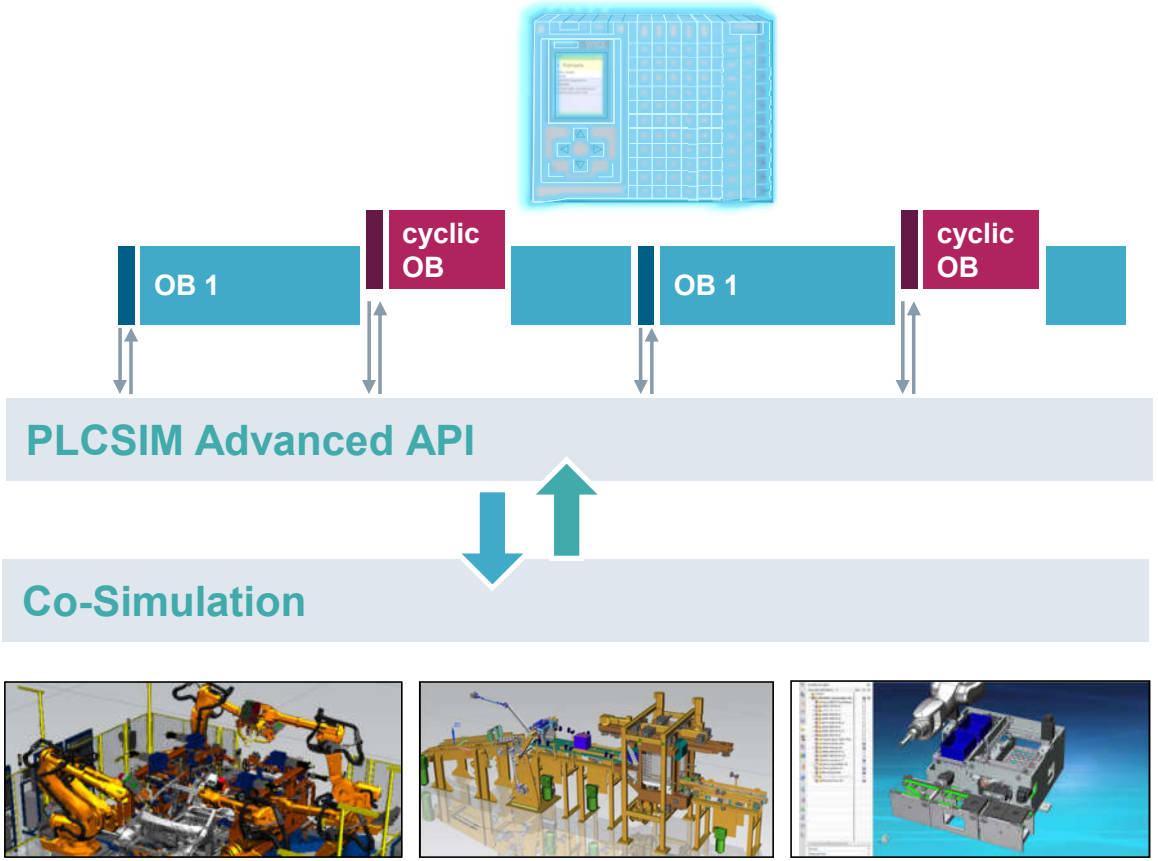
- **Synchronization modes:**
  - synchronization at each cycle control point (beginning of OB1)
  - synchronization at each cyclic OB
  - synchronization at each cycle control point and each cyclic OB
  - Timespan mode: after a defined timespan x the synchronization takes places at the next cycle control point and / or cyclic OB



Synchronisation – different modes (1/4)

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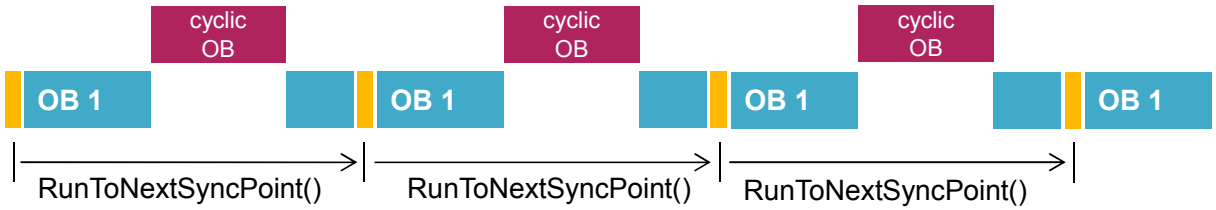
Operating Mode: Single Step C / CT

- Single Step C (cycle control point):
  SROM_SINGLE_STEP_C = 1
- Single Step CT (cycle control point; minimal cycle time overwritten):
  SROM_SINGLE_STEP_CT = 2



Synchronisation – different modes (2/4)

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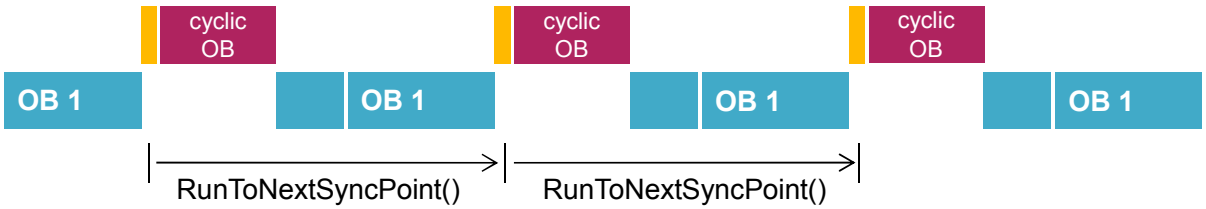
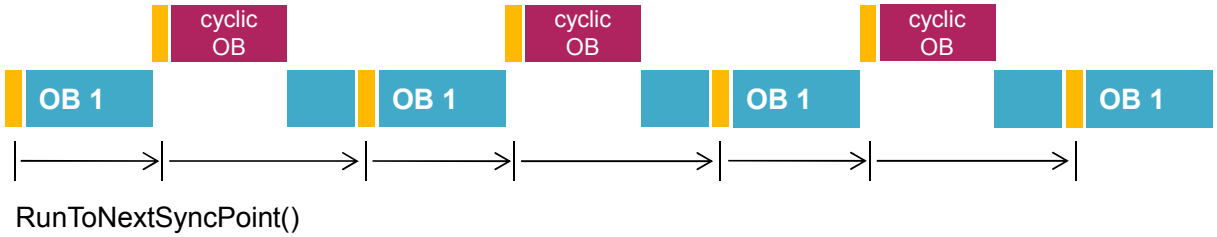
Operating Mode: Single Step P

- Single Step P (process image part): SROM_SINGLE_STEP_P = 4



Operating Mode: Single Step CP / CPT

- Single Step CP (cycle control point & process image part): SROM_SINGLE_STEP_CP = 6
- Single Step CPT (cycle control point & partial process image part; minimal cycle time overwritten): SROM_SINGLE_STEP_CPT = 7



Synchronisation – different modes (3/4)

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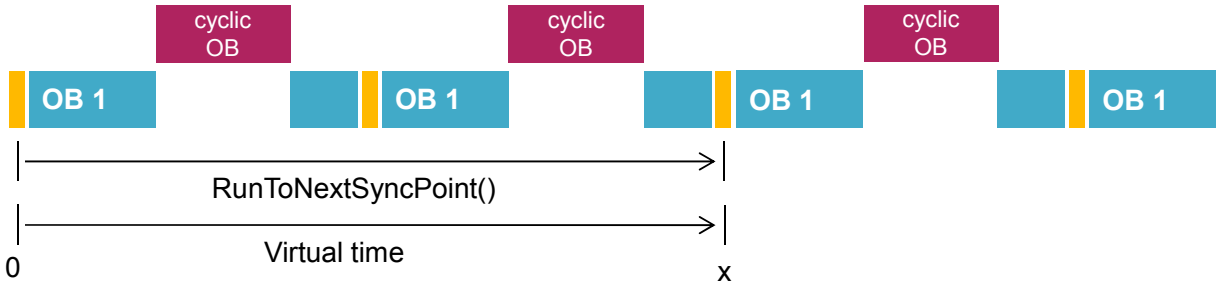
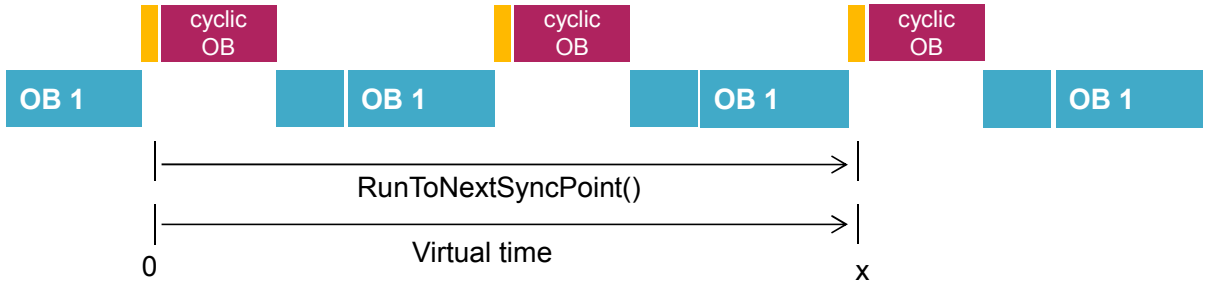
Operating Mode: Timespan Synchronized C

- Timespan Synchronized C (cycle control point): SROM_TIMESPAN_SYNCHNRONIZED_C = 3
- „RunToNextSyncPoint“ will continue to run the simulation until the virtual time x is reached – after the time x is reached the I/O data will be exchanged at the next cycle control point



Operating Mode: Timespan Synchronized P

- Timespan Synchronized P (process image part): SROM_TIMESPAN_SYNCHNRONIZED_P = 5
- „RunToNextSyncPoint“ will continue to run the simulation until the virtual time x is reached – after the time x is reached the I/O data will be exchanged at the next cyclic OB



Synchronisation – different modes (4/4)

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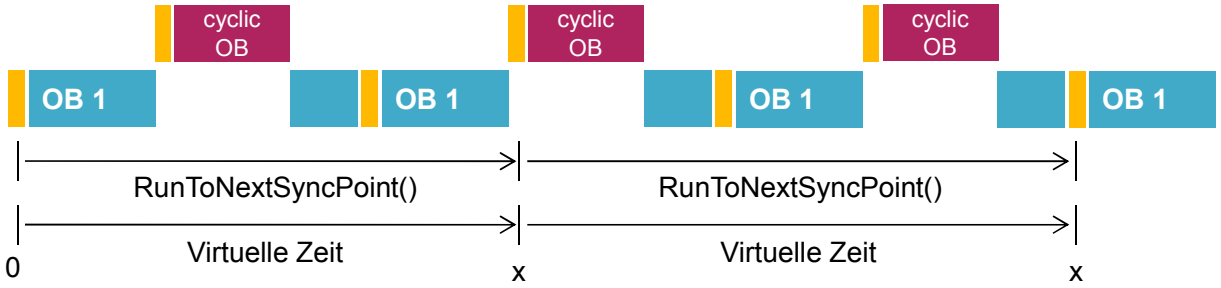
Operating Mode: Timespan synchronized CP

- Timespan Synchronized CP (cycle control point & partial process image update): SROM_TIMESPAN_SYNCHNRONIZED_CP = 8
- „RunToNextSyncPoint“ will continue to run the simulation until the virtual time x is reached – after the time x is reached the I/O data will be exchanged either at the next cyclic OB or the next cycle control point



Support of acyclical services and alarms

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Acyclical services

- Support of read and write actions of parameter data through SFB52 (RDREC) and SFB53 (WRREC).

Triggering alarms through the API

Different alarms can be triggered through the API:

- Hardware interrupt (OB40)
- Status Alarm (OB55)
- Update Alarm (OB56)
- Profile Alarm (OB57)
- Diagnostic error interrupt (OB82)
- Pull or plug of modules (OB83)
- Rack or Station failure (OB86)

C#

```
public struct SPlcSimDiagItems
{
    public UInt16         ChannelNumber;
    public UInt16         ErrorType;
    public UInt16         ExtendedErrorType;
    public EDiagSeverity  Severity;
    public EDiagProperty  Direction
}
```

Advantage

- Possibility to exchange acyclic data of external modules (central or decentral periphery) in betwen a co-simulation tool and the PLCSIM Advanced API (e.g. PROFINET diagnosis/status data, RFID data)
- Test of what happens when spontaneous errors ocurre in a plant/machine

Read in TIA Portal configured hardware interrupts through the API

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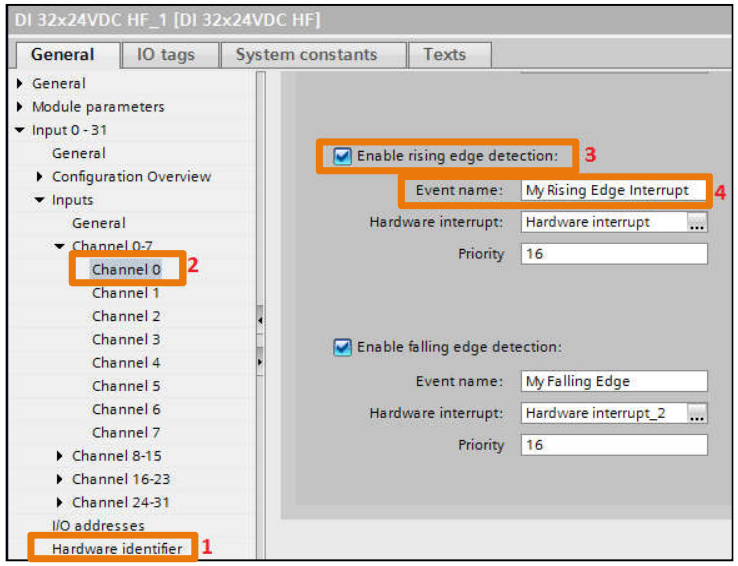
Read hardware interrupts through the API

GetConfiguredProcessEvents: a list of all in TIA Portal configured hardware interrupts (OB40) can be accessed through the API with the following information:

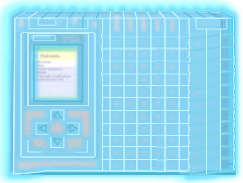
1) HardwareID
2) Channel number
3) Event type
4) Name

Advantage

- A TIA Portal expert and a simulation expert can work independently from each other
- The accessed hardware interrupts can be easily integrated into the Co-simulation tool



When downloading a PLCSIM Advanced instance, the hardware interrupts are part of the download and therefore can be accessed through the API



C#

```
GetConfiguredProcessEvents()
```

Supported organization blocks

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Internal program OBs	V1.0	V2.0
Main (OB1)	✓	✓
Startup (OB100)	✓	✓
Time delay interrupt (OB20)	✓	✓
Cyclic interrupt (OB30)	✓*	✓
Time error interrupt (OB80)	✓	✓
Programming error (OB121)	✓	✓
IO access error (OB122)	✗	✓
MC-Interpolator (OB92)	✓	✓
MC-Servo (OB91)	✓	✓
Synchronous OB(OB61)	✓	✓

Can be triggered by the API	V1.0	V2.0
Hardware interrupt (OB40)	✗	✓
Diagnostic error interrupt (OB82)	✗	✓
Pull or Plug of modules (OB83)	✗	✓
Rack or station failure (OB86)	✗	✓
Status alarm (OB55)	✗	✓
Update alarm (OB56)	✗	✓
Profile alarm(OB57)	✗	✓

* Works already in V1.0 but without up to date data at cyclic OBs

Backup and restore of software and hardware configuration

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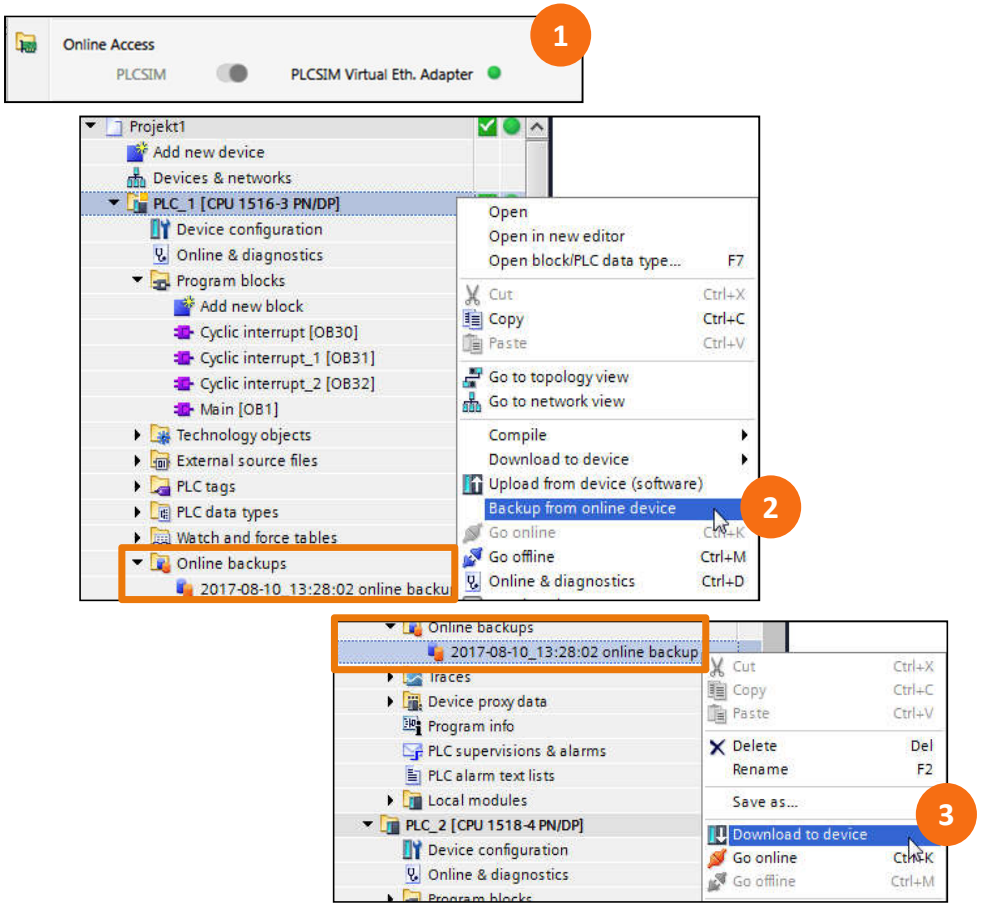
Backup from online device

- Backup of the software- and hardware configuration of a PLCSIM Advanced controller in TIA Portal incl. remanent actual values
- Restore of a backup of the software and hardware configuration into a PLCSIM Advanced instance through TIA Portal
- Pre-requisite: Online Access is set to PLCSIM Virtual Eth. Adapter

Advantage

- A simulation can be paused and resumed with the backed up data



Individual storage path of the virtual SIMATIC Memory Card

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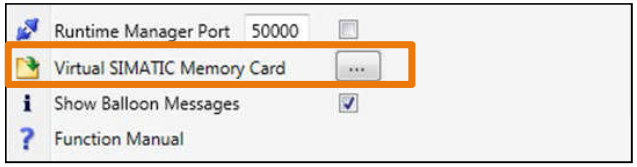
Individual storage path

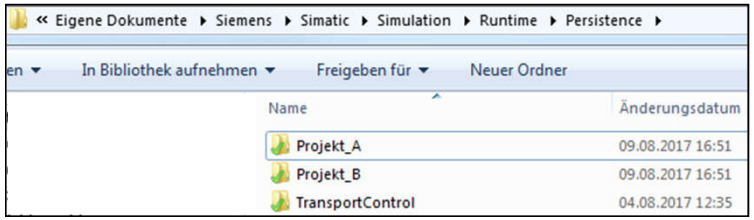
- As soon as a virtual controller is started in PLCSIM Advanced a virtual SIMATIC Memory Card is being created. The storage path of this virtual Memory Card can be chosen freely.
- Pre-requisite: no instance of PLCSIM Advanced is running
  → As soon as an instance is started the chosen storage path is valid for all instances created afterwards

Advantage

- Virtual SIMATIC Memory Cards can be saved per project



A click on the box next to „Virtual SIMATIC Memory Card“ opens up the windows explorer where you can choose the storage path



GUI Enhancements: Auto-fill

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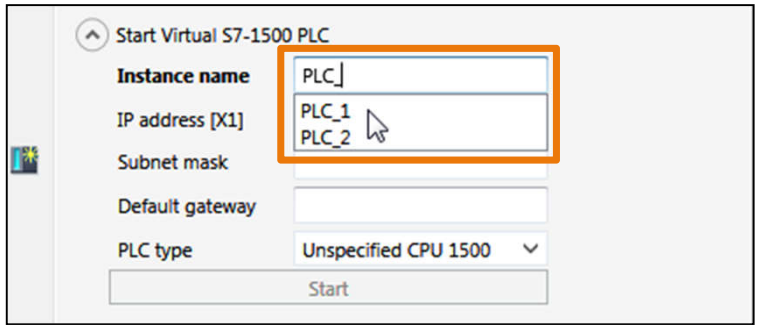
Detection of known controllers

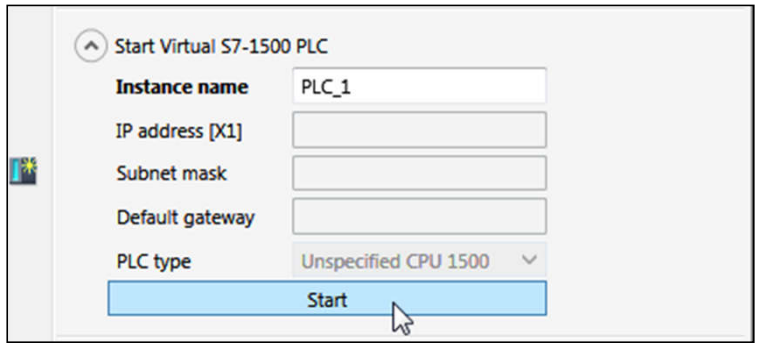
- If a controller was already created in the past, a drop-down menu will be displayed when starting to enter the name of this already known controller. From this drop down menu you can select the apropriate controller (wildcard search) and start it immediately.

Advantage

- Once definded controllers can be found easily and started quickly.



If the name of the controller is already know the field below will get greyed-out (IP Adresse, subnet mask, default gateway) and the start button will get active.



GUI Enhancements: RUN / STOP and Memory Reset

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Change the CPU state to Run/Stop

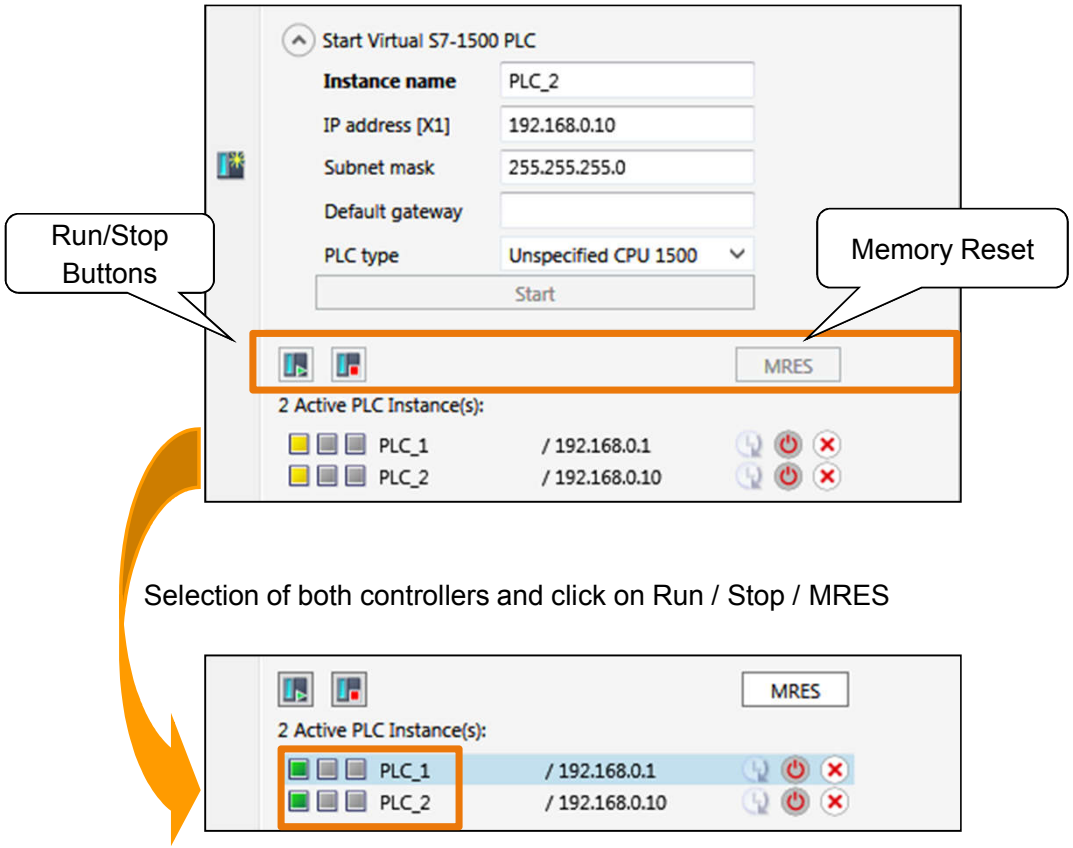
- Change the CPU state of one or more controllers to run/stopp directly in the GUI.

Perform a Memory Reset

- Perform a memory reset of one or more controllers directly in the GUI.

Advantage

- Quick and intuitive change of the state of the controllers.
- Easy possibility to perform a memory reset to bring the controllers into a well known and defined state.



Some more helpful functional enhancements (1/2)

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Independance of the Windows Scheduler

- Leads to a higher performance and a more reliable
  - deterministics
  - simulation of Motion Tasks
- *hint: Windows needs one core and each instance within PLCSIM Advanced needs another core*

Getting access to SIMATIC virtual memory cards through the API

- The virtual SIMATIC Memory Card can be transferred through the API from one PC to another
- *ArchiveStorage*: saves the SIMATIC Memory Card in a .zip format
- *Retrieve Storage*: rebuilds the SIMATIC Memory Card out of the saved.zip data

.Net (C#)	

Syntax	`void ArchiveStorage(`
	`  string in_FullFileName`
	`);`

Parameter	• `string in_FullFileName:` the full file path to the .zip file. The path is based on the directories of the computer the API is being called.

.Net (C#)	

Syntax	`void RetrieveStorage (`
	`  string in_FullFileName`
	`);`

Parameter	• `string in_FullFileName:` the full file path to the .zip file. The path is based on the directories of the computer the API is being called.

Some more helpful functional enhancements (2/2)

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Performance enhancements when using symbolic adressing

- Symbolic adressing and direct adressing are adequate in their performance

Installaion of PCLSIM and PLCSIM Advanced on the same PC

- PLCSIM V15 and PLCSIM Advanced V2.0 can be installed on the same PC. A concurrent use of both simulation tools at the same time is not possible.

Thank you for your attention!

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PLCSIM Advanced Team

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