

Codesys

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UNIMORE
UNIVERSITÀ DEGLI STUDI DI
MODENA E REGGIO EMILIA

High Performance
Real Time **Lab**



Load the main program interface

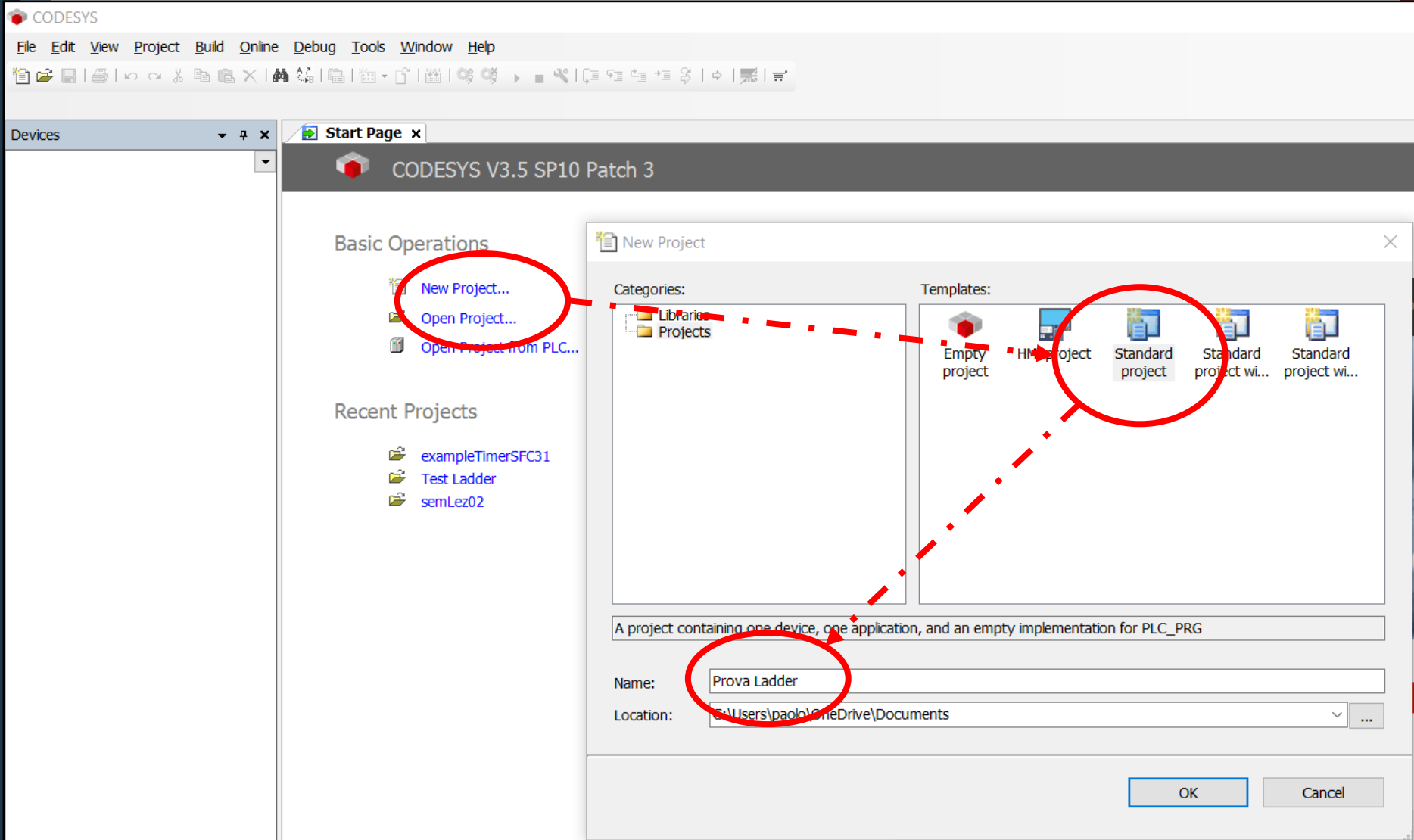
What is it?

- › An IDE to create PLC programs, and **simulate them**
- › In any of the five main languages
- › I use V3.5 SP1 patch 3, recommended version (for compatibility with the examples I'll give you)



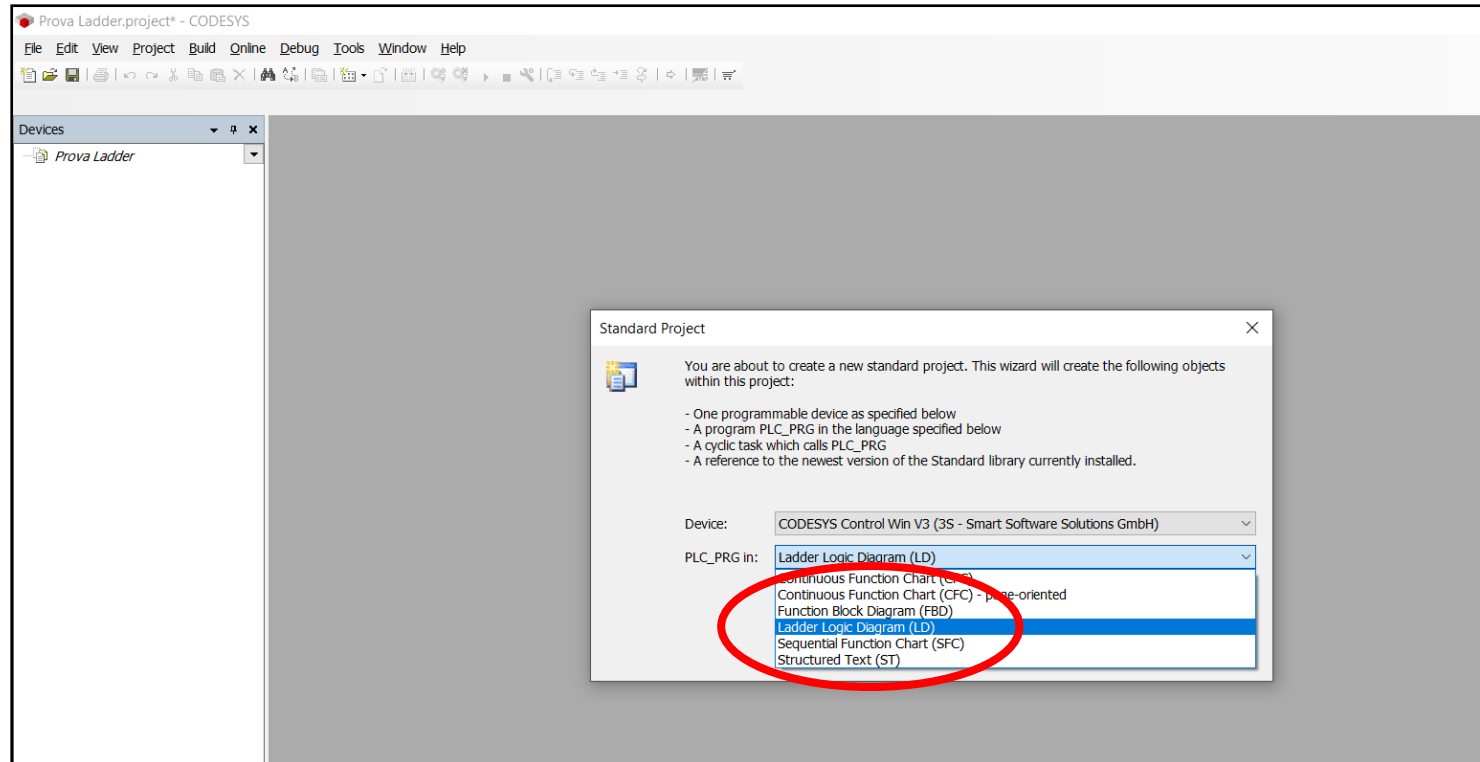


Create a project





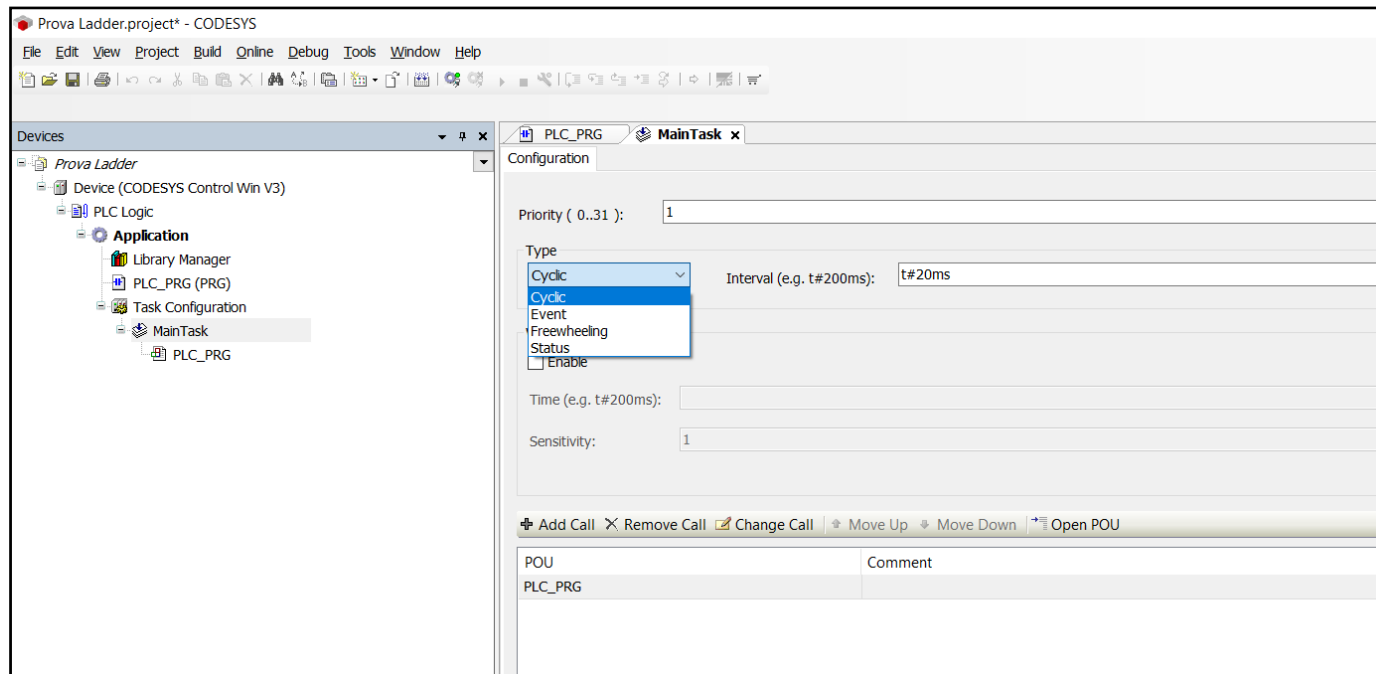
Select the language





Project workbench

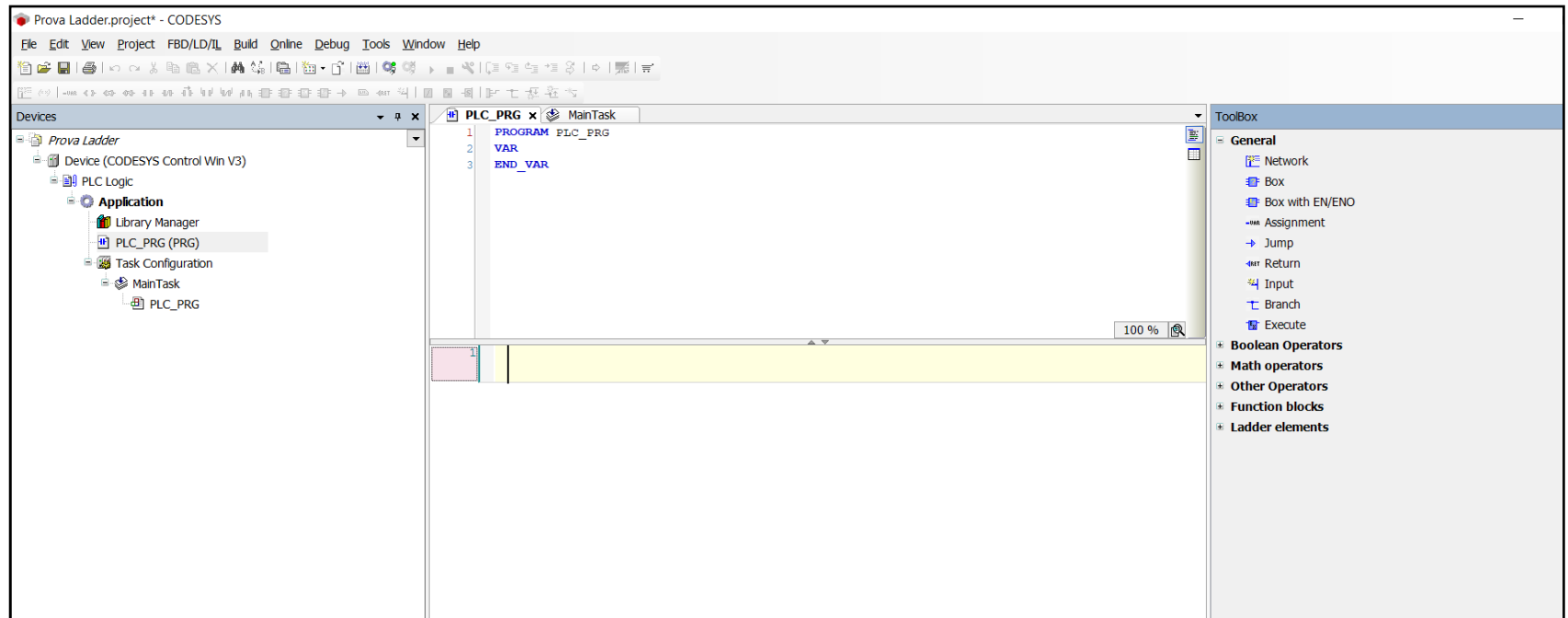
- › Your application has a Main task, that (here) runs cyclically





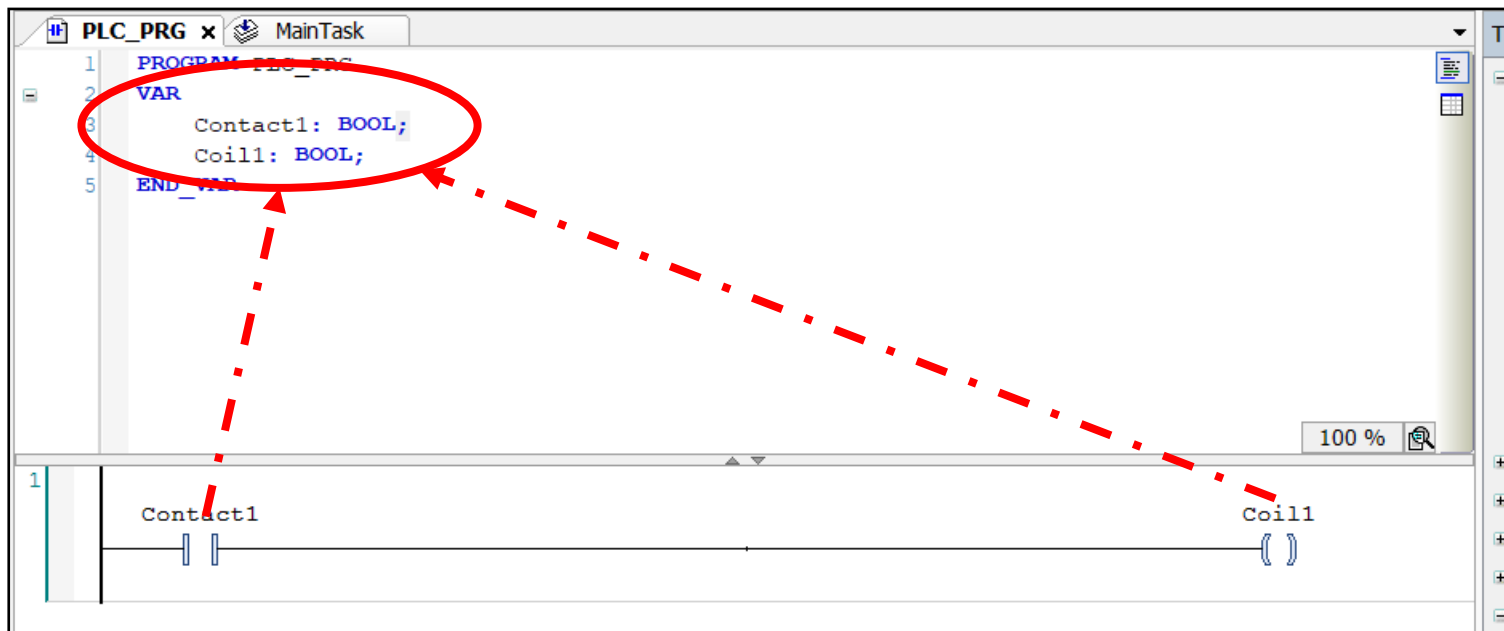
Project workbench - Ladder

- › You can create Ladder diagrams using drag/drop from the toolbox



Adding a contact + coil

- › Two global variables are automatically created in the variable definition window always in ST lang), both of `bool` type, as specified by us
- › Here, we want a switch that turns on a lamp, hence we need a NO contact and a coil
- › PS here you don't see the right power rail as it's implicit

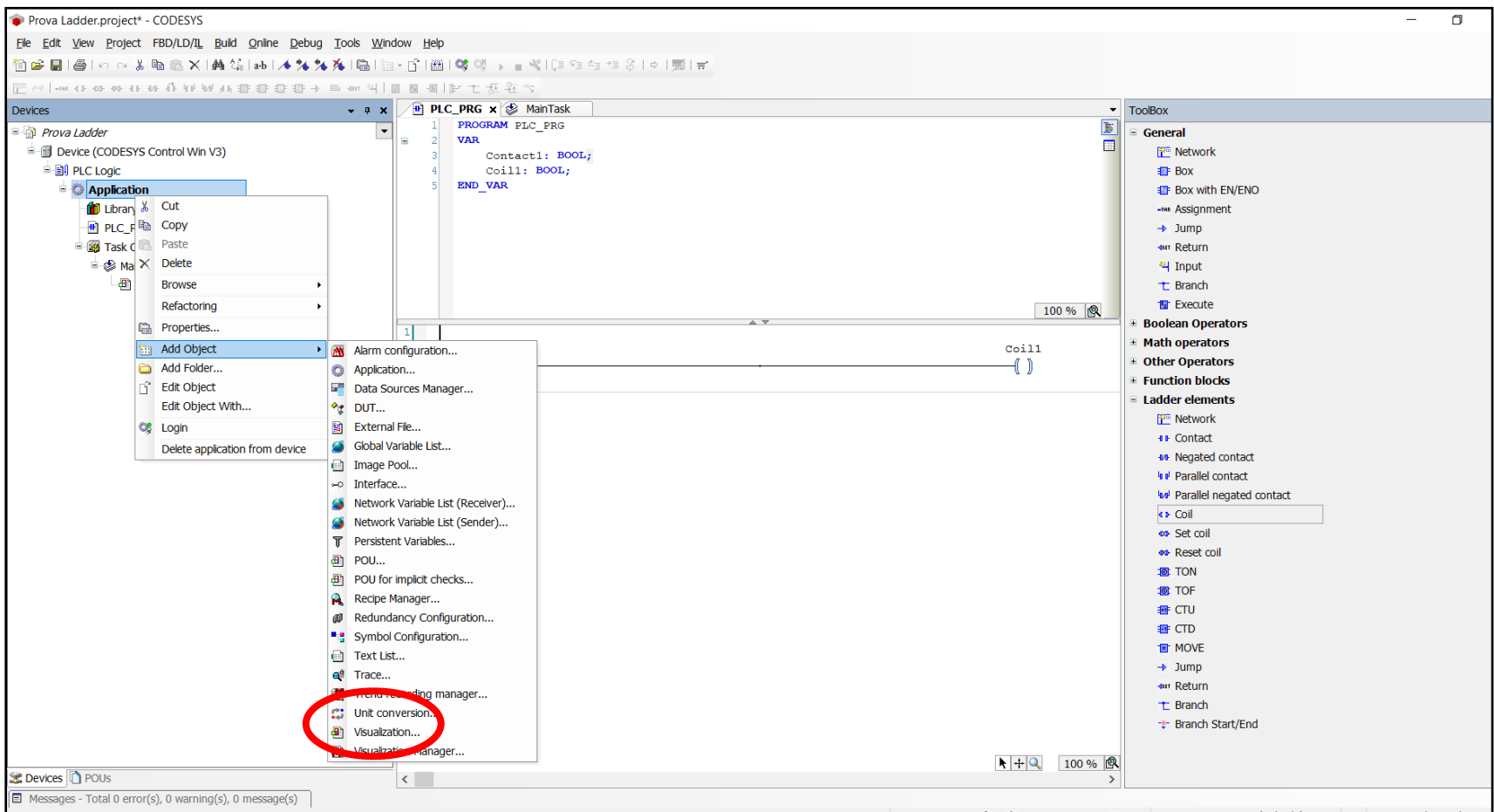




View the simulated system

Add a Visualization object

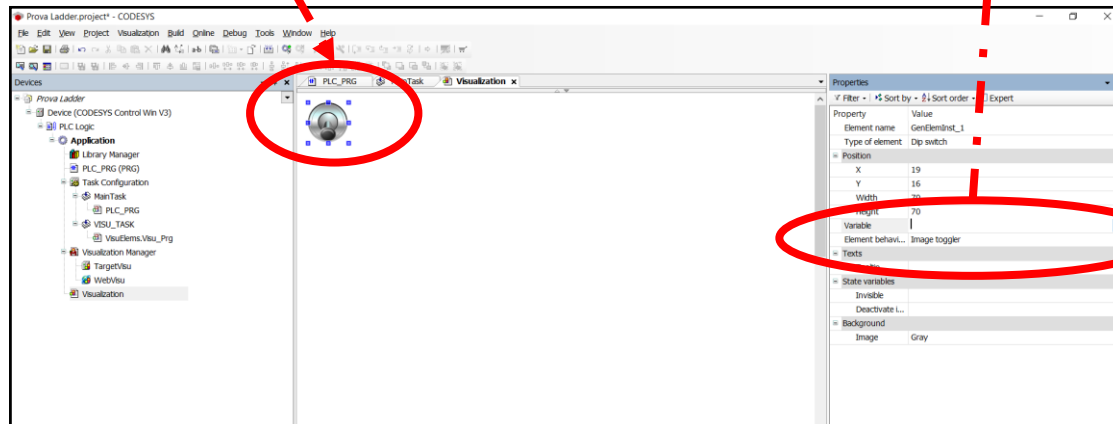
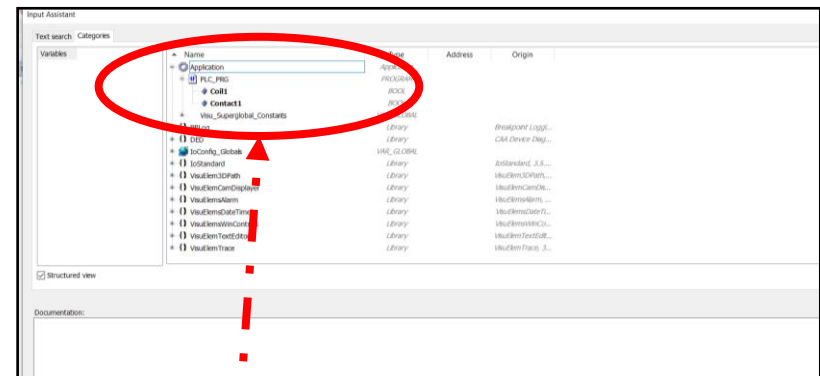
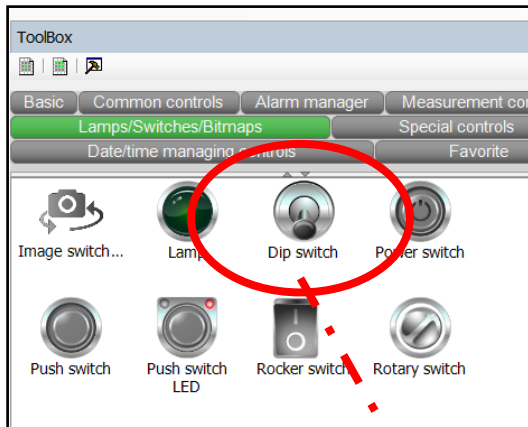
› Application -> Add Object -> Visualization





Add elements, and link to variables

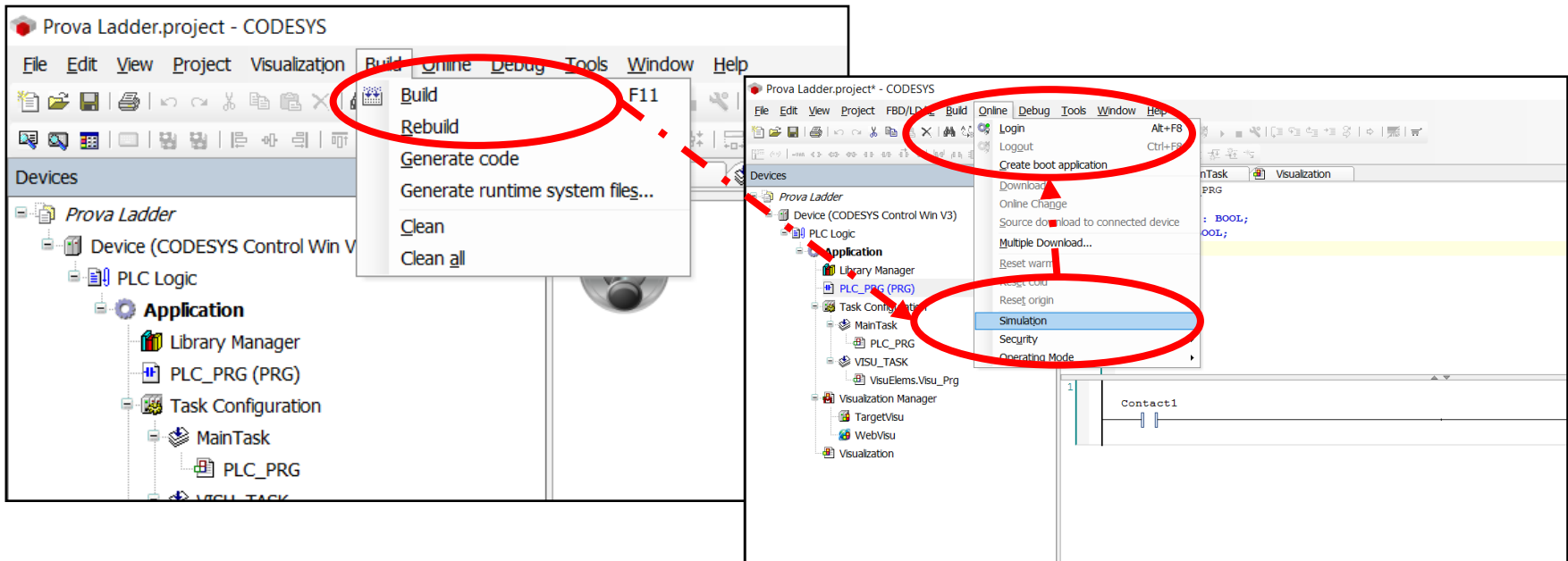
- › Here, we added a dip switch from the toolbox, and we select the `Contact1` var from the Properties window
- › Now, add a lamp and bind it to `Coil1`





Compile and set up simulator

- › Build the system, from the menu or with F11
- › Login from the Online menu to download the required run libs
 - Before..make sure you ticked “Simulation”!
- › Now, we’re ready to go





Run workbench

- › After a while, simulator/simulation is set up
- › Click on Debug -> Start to go
- › Nothing happens

The screenshot shows the CODESYS Run Workbench interface for a project named "Prova Ladder.project* - CODESYS". The interface includes a menu bar (File, Edit, View, Project, Visualization, Build, Online, Debug, Tools, Window, Help) and a toolbar. The left sidebar displays the project tree with "Prova Ladder" as the root, containing "Device [connected] (CODESYS Control Win V3)", "PLC Logic", "Application [stop]", "Library Manager", "PLC_PRG (PRG)", "Task Configuration", "MainTask", "PLC_PRG", "VISU_TASK", "VisuElems.Visu_Prg", "Visualization Manager", "TargetVisu", "WebVisu", and "Visualization". The main workspace shows the "Device.Application.PLC_PRG" variable declaration table and a ladder logic diagram.

Expression	Type	Value	Pre
Contact1	BOOL	FALSE	
Coil1	BOOL	FALSE	

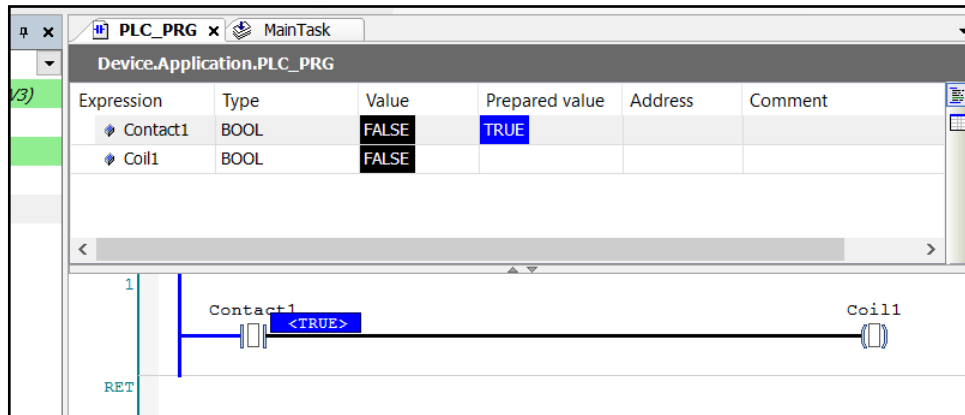
The ladder logic diagram shows a network with a reset coil (RST) for "Coil1" triggered by "Contact1". The network is labeled "1" and "RET".

The "Visualization" window on the right displays the message: "The online visualization is waiting for a connection. Please start the application."



Modify values

- › Via the “watch expression” window, use the “Prepared value”
- › Then, apply the value with the Debug -> Write value menu item (or CTRL+F7)



- › In this case, in our example, we can also manually acting on the switch

Remember to log out after you're done! 😊



Sequential contacts vs. parallel contacts

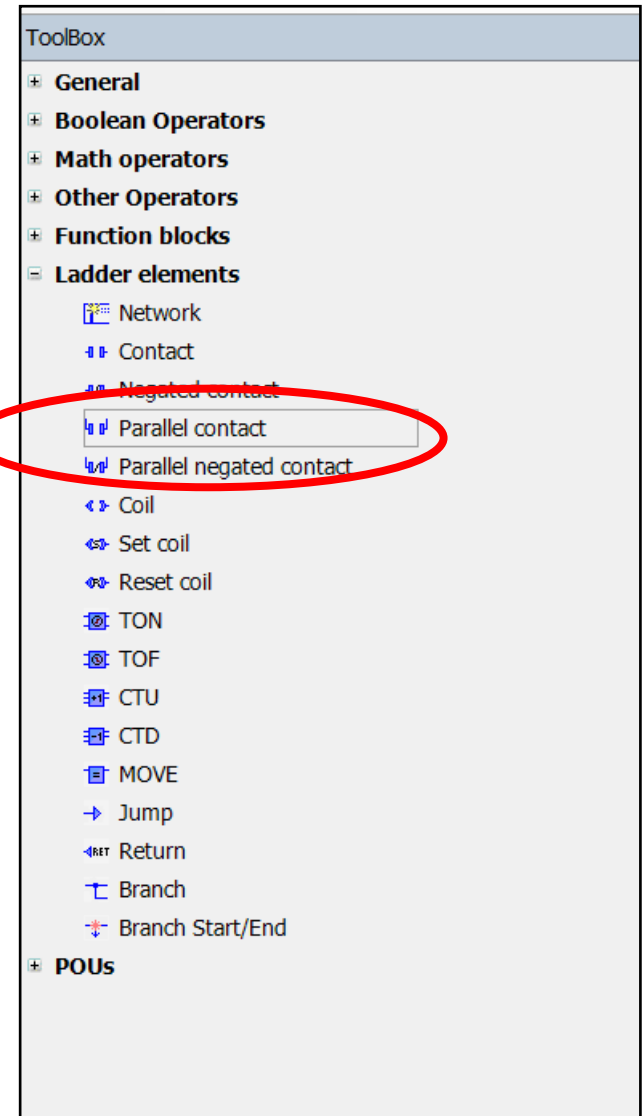
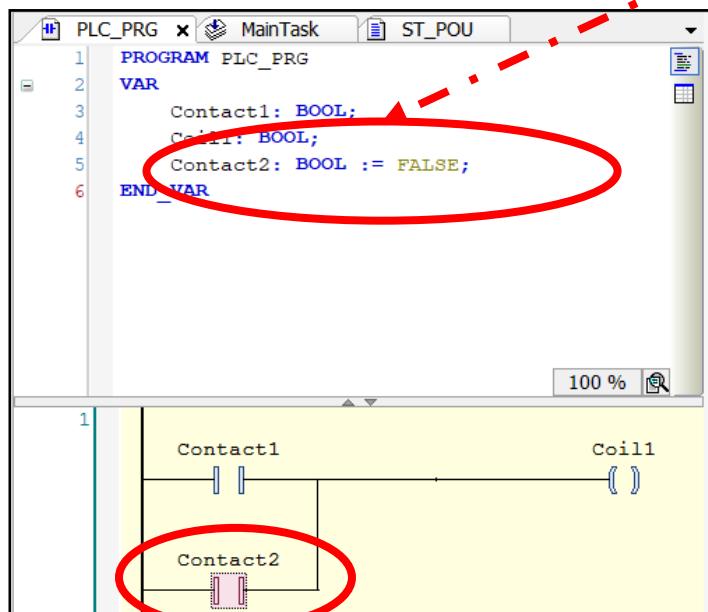
Logical “AND”


- › ..easy, simply drag&drop

Logical “OR”


- › “Parallel contact” components from toolbox
- › IDE helps us to insert it...

PS good programmers remember to initialize vars ;)



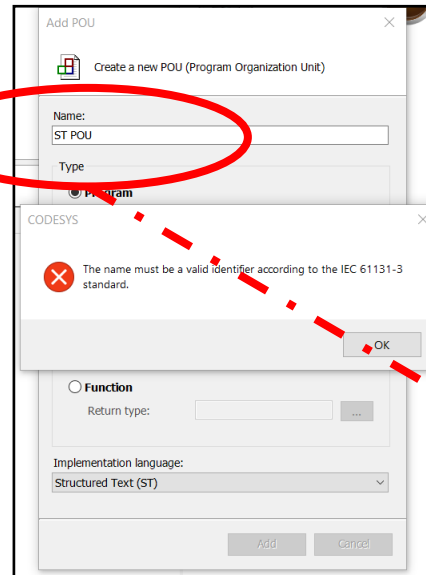
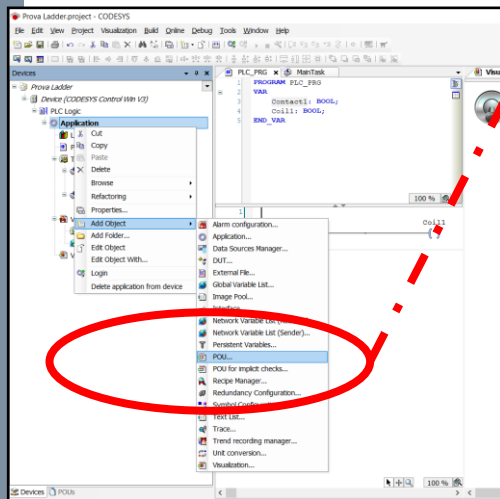


Structured Text

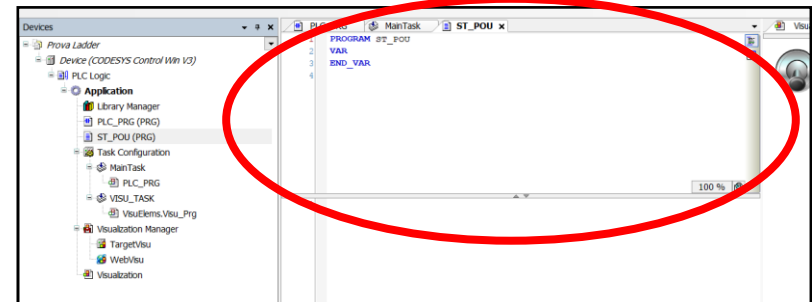


Add new ST POU

- › Program Organization Unit let you add logics in the same application, using different languages
- › We now add a **Program**



IEC 61131 does not allow spaces in names





Write the ST code

Prova Ladder.project* - CODESYS

File Edit View Project Build Online Debug Tools Window Help

Devices

- Prova Ladder
 - Device (CODESYS Control Win V3)
 - PLC Logic
 - Application
 - Library Manager
 - PLC_PRG (PRG)
 - ST_POU (PRG)
 - Task Configuration
 - MainTask
 - PLC_PRG
 - ST_POU
 - VISU_TASK
 - VisuElems.Visu_Prg
 - Visualization Manager
 - TargetVisu
 - WebVisu
 - Visualization

PLC_PRG MainTask ST_POU x

```
1 PROGRAM ST_POU
2 VAR
3     Contact1: BOOL;
4     Coil1: BOOL;
5 END_VAR
6
```

100 %

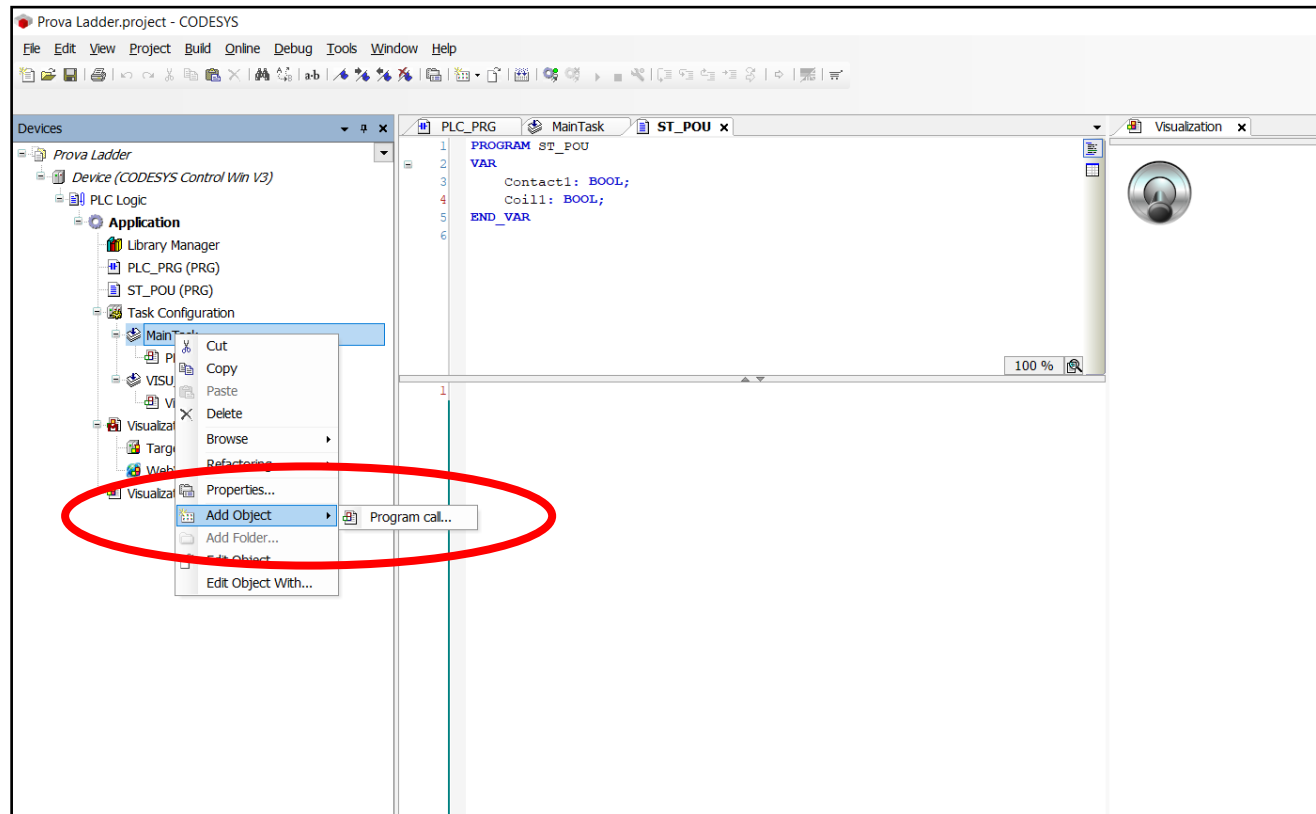
```
1 IF contact1 = TRUE THEN;
2     Coil1:=TRUE;
3 ELSE;
4     Coil1:=FALSE;
5 END_IF;
```

Visualization x



Are we done? Not yet...

- › We created a POU Program, but we haven't called it yet from within the MainTask...





Run and set values

- › If you set `Contact1` to `TRUE`, then `Coil1` goes to `TRUE`
- › ..but the simulated Light & Switch don't turn on!

Why?

- › Because they are **not** attached to those `Contact1` and `Coil1` vars...
- › Look out when you write names...

Should we attach those vars to the two simulated objects?

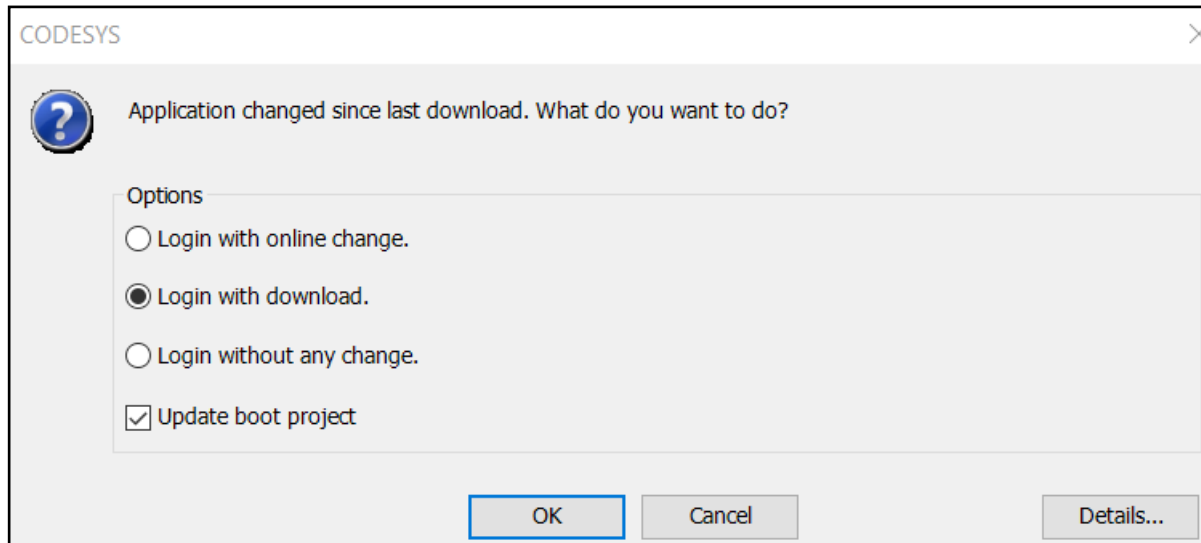
- › (recommendation) Only if requested by the application specs
- › In this case, I use them for debugging/teaching purposes, so my specs say "no" 😊



Compile & Login again

We added a ST block, so the simulation engine might require some components

› Codesys will prompt us





Function and Function Blocks



Timers



Finite state machine



References



Course website

- › http://hipert.unimore.it/people/paolob/pub/Industrial_Informatics/index.html

My contacts

- › paolo.burgio@unimore.it
- › <http://hipert.mat.unimore.it/people/paolob/>

Resources

- › Brian Hobby, Codesys tutorials (a must to learn the tool in 5 mins)
- › A small blog
 - www.google.com