泓格科技股份有限公司

Win-GRAF

July 01, 2018

What is Win-GRAF?

- **A Programming Tool supports IEC61131-3 Standard**
- **Programming Languages:**

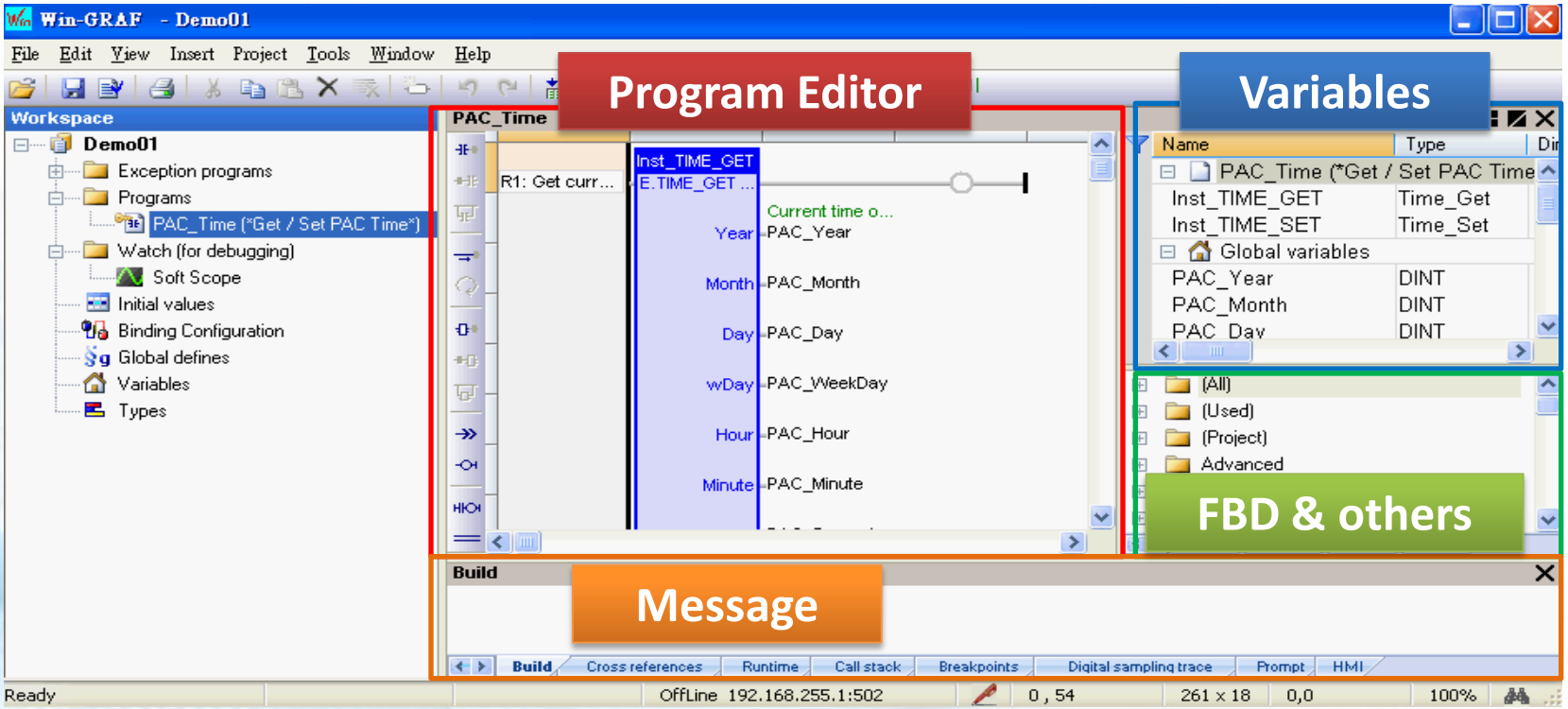
Ladder Diagram	(LD)
Function Block Diagram	(FBD)
Structured Text	(ST)
Sequential Function Chart	(SFC)
Instruction List	(IL)

- **An Useful Debugging Tool**

Win-GRAF Workbench

Available on Windows XP/7/8/10 (32-bit or 64-bit)

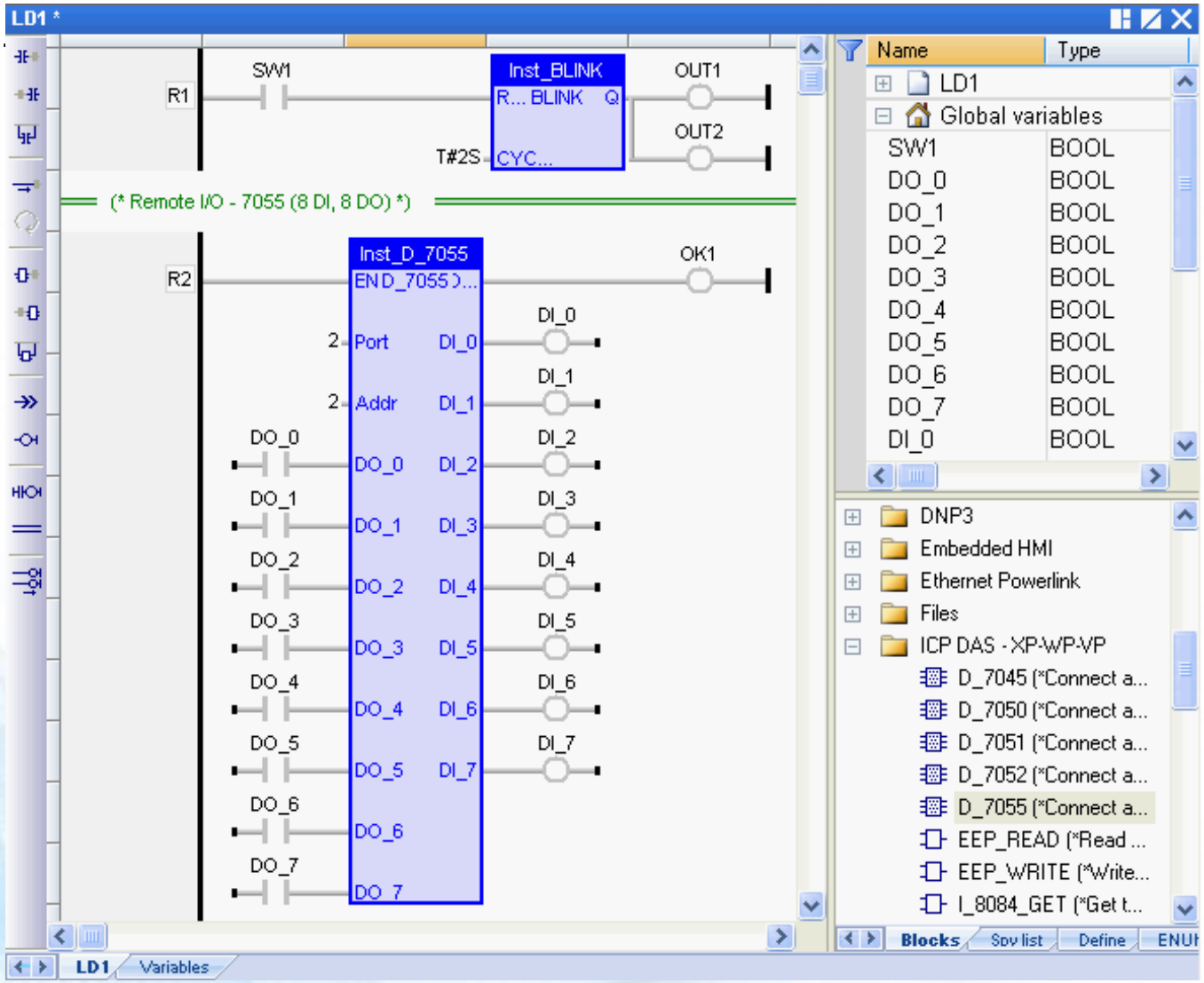
- Delivered with a Win-GRAF USB Dongle.
- It becomes Trial (Demo) Version if without the USB Dongle.



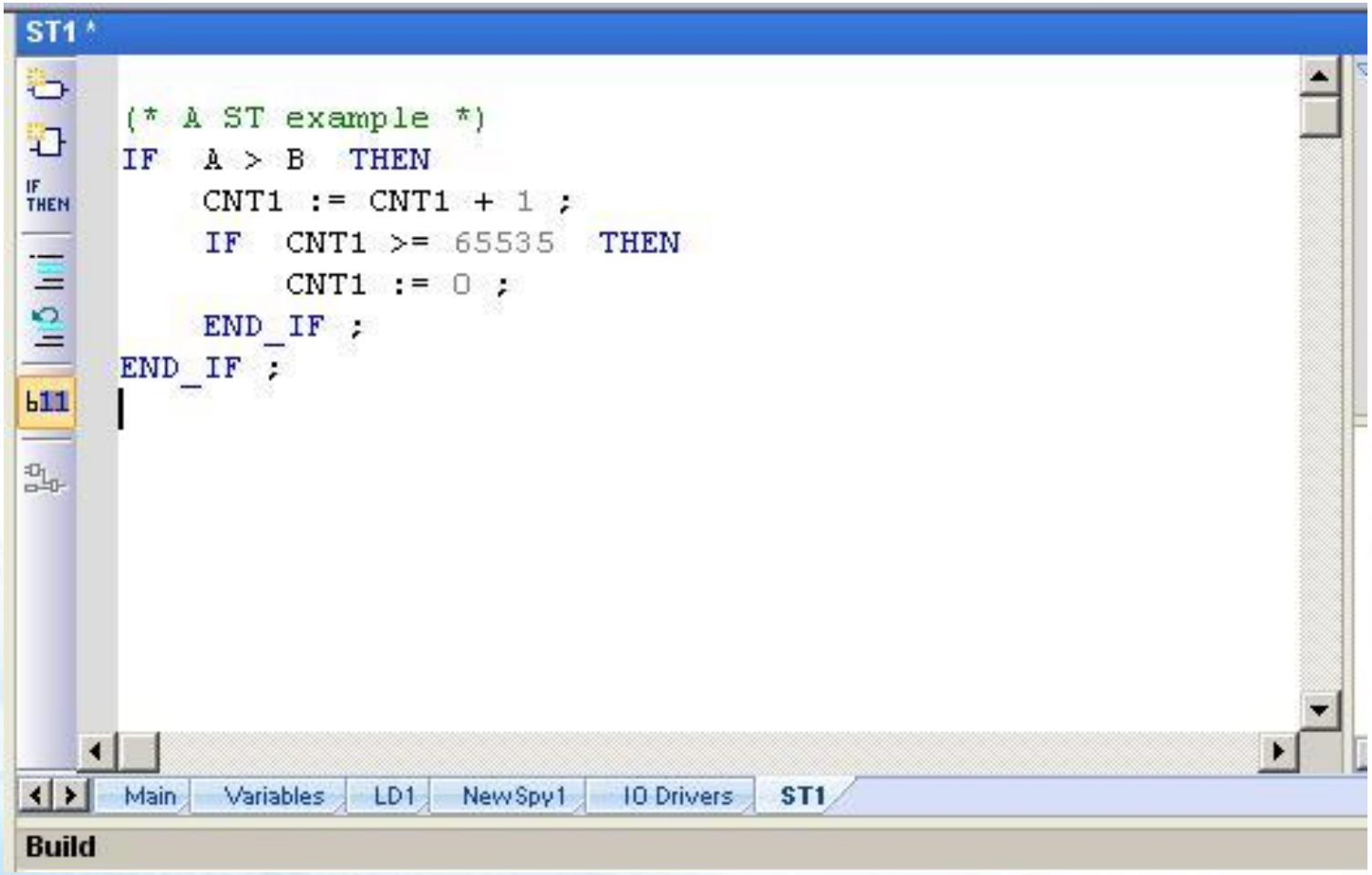
Protocols embedded in the Win-GRAF PAC

- Modbus TCP (Slave, Master)
- Modbus RTU (Slave, Master)
- Modbus UDP (Master)
- Modbus ASCII (Master)
- DCON (ICP DAS I-7000 series modules, RU-87P8/P4 + I-87xxxW cards, I-87K8/K4 + I-87xxxW cards)

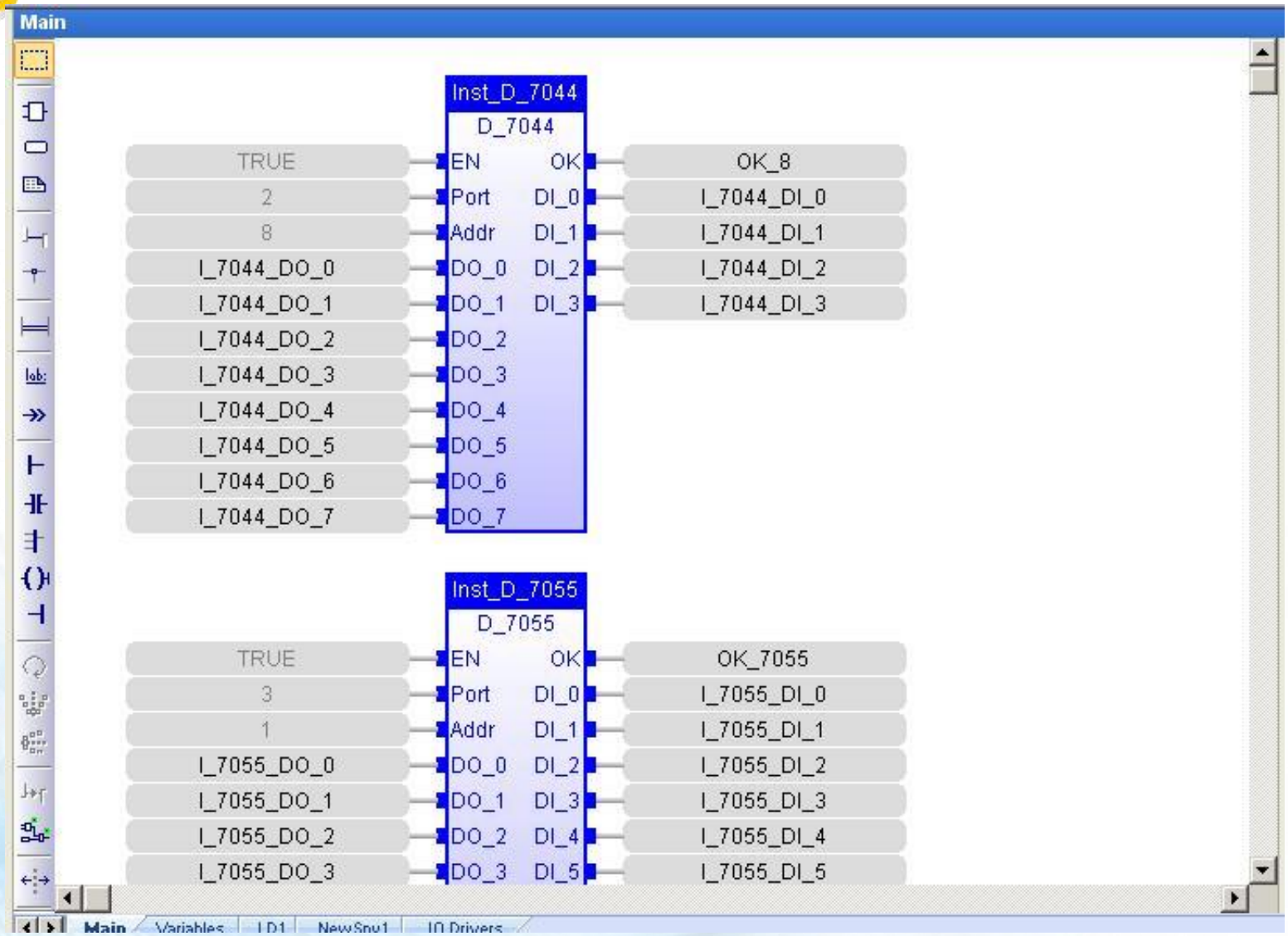
Ladder Diagram



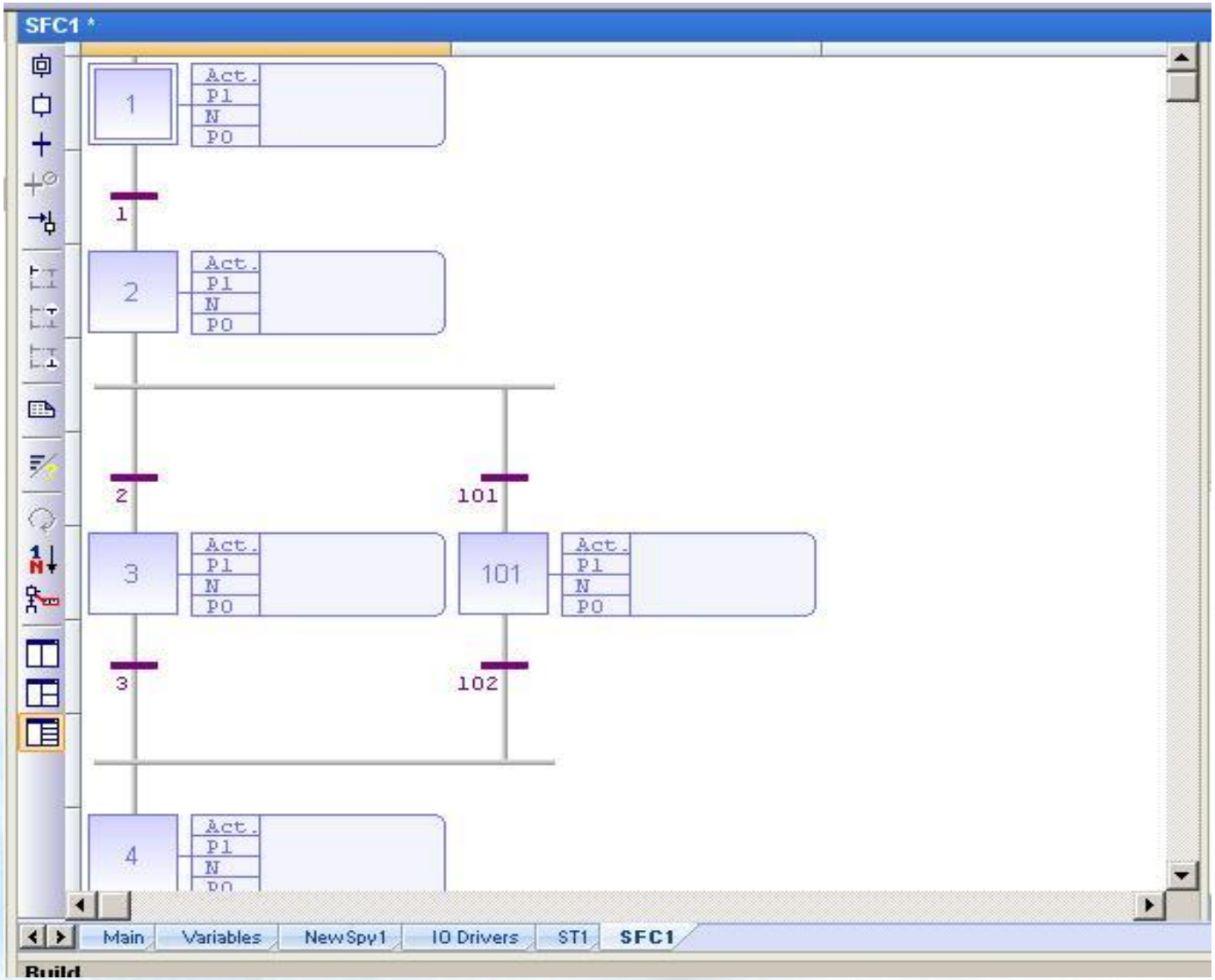
ST


ST1 *
(* A ST example *)
IF A > B THEN
CNT1 := CNT1 + 1 ;
IF CNT1 >= 65535 THEN
CNT1 := 0 ;
END_IF ;
END_IF ;
IF THEN
Main
Variables
LD1
NewSpy1
IO Drivers
ST1
Build

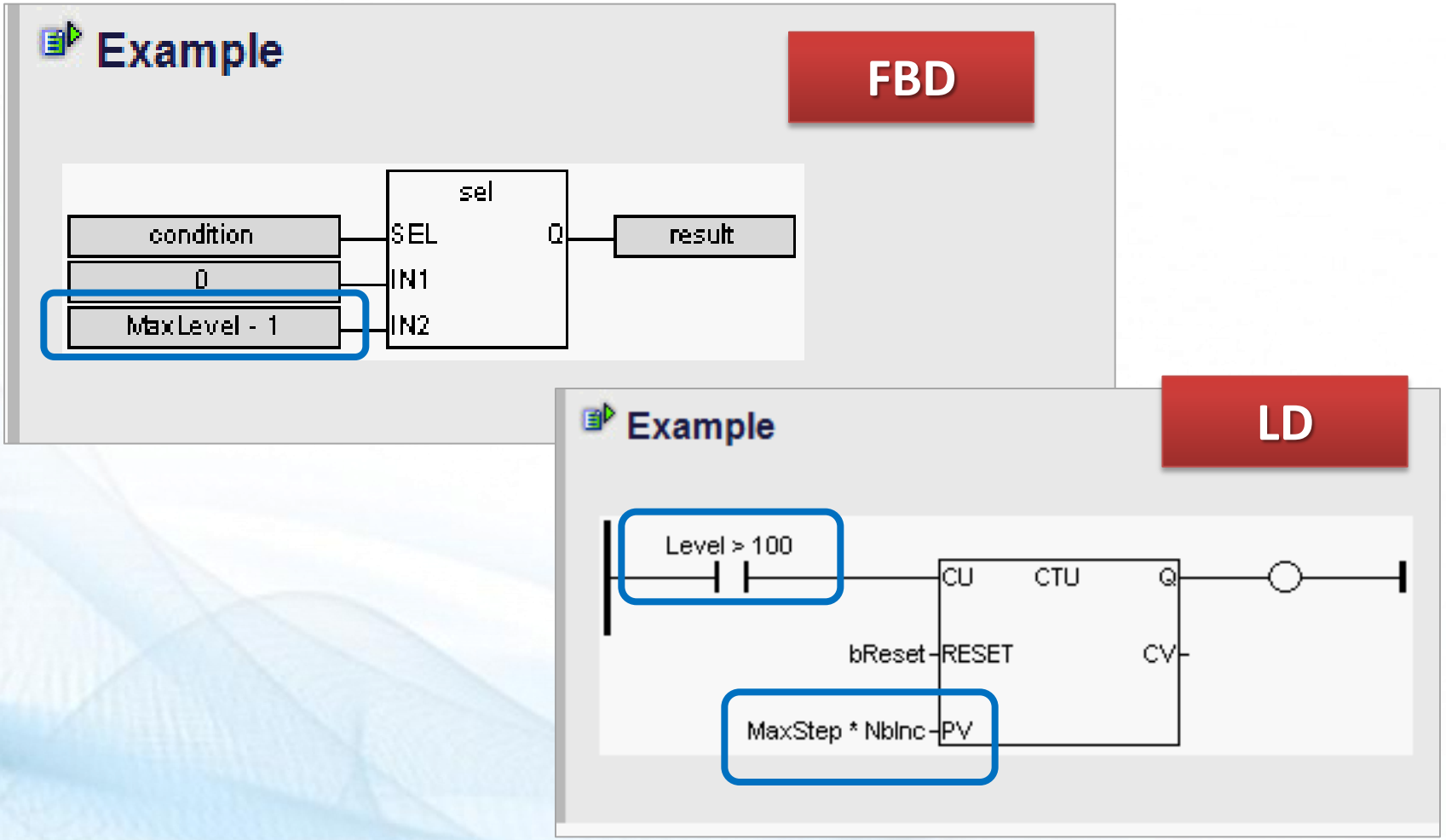
FBD


Main
Inst_D_7044
D_7044
TRUE
EN
OK
OK_8
2
Port
DI_0
I_7044_DI_0
8
Addr
DI_1
I_7044_DI_1
I_7044_DO_0
DO_0
DI_2
I_7044_DI_2
I_7044_DO_1
DO_1
DI_3
I_7044_DI_3
I_7044_DO_2
DO_2
I_7044_DO_3
DO_3
I_7044_DO_4
DO_4
I_7044_DO_5
DO_5
I_7044_DO_6
DO_6
I_7044_DO_7
DO_7
Inst_D_7055
D_7055
TRUE
EN
OK
OK_7055
3
Port
DI_0
I_7055_DI_0
1
Addr
DI_1
I_7055_DI_1
I_7055_DO_0
DO_0
DI_2
I_7055_DI_2
I_7055_DO_1
DO_1
DI_3
I_7055_DI_3
I_7055_DO_2
DO_2
DI_4
I_7055_DI_4
I_7055_DO_3
DO_3
DI_5
I_7055_DI_5
Main
Variables
LD1
NewSpu1
IO Drivers

SFC


SFC1 *
1
Act.
P1
N
P0
1
2
Act.
P1
N
P0
2
101
3
Act.
P1
N
P0
101
Act.
P1
N
P0
3
102
4
Act.
P1
N
Main
Variables
NewSpy1
IO Drivers
ST1
SFC1
Build

Uses ST in Graphical Editor



Win-GRAF PAC

(Programmable Automation Controller)

- WP-8148/8448/8848

- WP-8128-CE7/8428-CE7/8828-CE7
- WP-5238-CE7 (1x LAN)

- VP-1238-CE7 (5.7”, 3x I/O Slots)
  VP-2208-CE7 (7” , w/o I/O Slot)
  VP-4208-CE7 (10.4”, w/o I/O Slot)
  VP-4238-CE7 (10.4”, 3x I/O Slots)

- XP-8038-CE6/8138-CE6/8338-CE6/8738-CE6

Various Local I/O Modules (1)

(Plugged in the PAC)

Digital Input (DI)	I-8040W, I-8046W, I-8051W, I-8052W, I-8053W, I-8053PW, I-87040W, I-87040PW, I-87046W, I-87051W, I-87052W, I-87053W, I-87053PW, I-87053W-A2, I-87053W-A5, I-87053W-E5
Digital Input/Output (DIO)	I-8042W, I-8050W, I-8054W, I-8055W, I-87042W, I-87054W, I-87055W
Digital Output (DO)	I-8037W, I-8041W, I-8041AW, I-8056W, I-8057W, I-87037W, I-87041W, I-87057W, I-87057PW
Relay Output	I-8060W, I-8063W, I-8064W, I-8068W, I-8069W, I-87061W, I-87061PW, I-87063W, I-87064W, I-87065W, I-87066W, I-87068W, I-87068W-2A, I-87069W, I-87069PW
AC Input	I-8058W, I-87053W-AC1, I-87058W, I-87059W
Analog Input (AI)	I-8017DW, I-8017HW, I-8017HCW, I-87017W, I-87017RW, I-87017RCW, I-87017DW, I-87017EW, I-87018W, I-87018RW, I-87018PW, I-87018ZW, I-87019PW, I-87019RW, I-87019ZW
Analog Output (AO)	I-8024W, I-87024CW, I-87024UW, I-87024DW, I-87024RW, I-87024W, I-87028CW, I-87028UW, I-87028VW, I-87028VW-20V

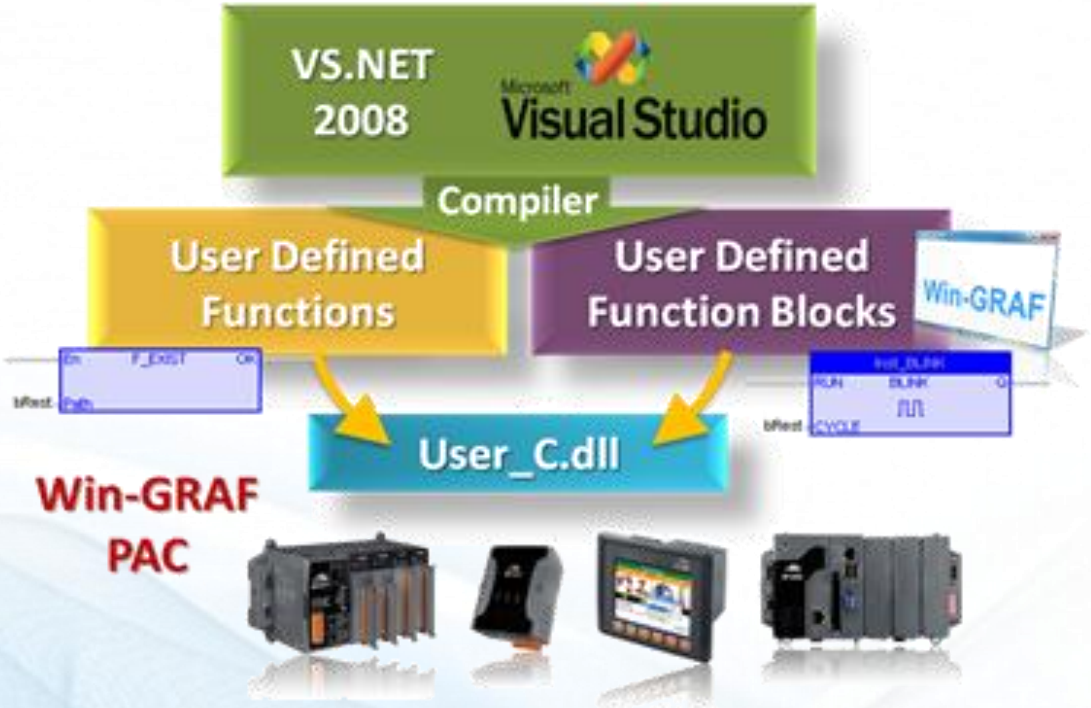
Various Local I/O Modules (2)

(Plugged in the PAC)

Multifunction (DIO, AIO)		I-87026W
Temperature Input	Thermister	I-87005W
	RTD	I-87013W, I-87015W, I-87015PW
	T/C	I-87018W, I-87018RW, I-87018PW, I-87018ZW, I-87019PW, I-87019RW, I-87019ZW
Strain Gauge		I-87016W
Counter/Frequency Input		I-8084W, I-87082W, I-87084W
Encoder Input		I-8093W
PWM Output		I-8088W
Communication Module		I-8112iW, I-8114W, I-8114iW, I-8142iW, I-8144iW
Temperature & Humidity Input		DL-100T485, DL-100T485-W, DL-100T485P, DL-100T485P-W (DCON Protocol) DL-100TM485, DL-100TM485-W, DL-100TM485P, DL-100TM485P-W (Modbus RTU Protocol)

Win-GRAF Features

Create your own C Function & Function Blocks



Win-GRAF Features

Working With VB.net , C# App.

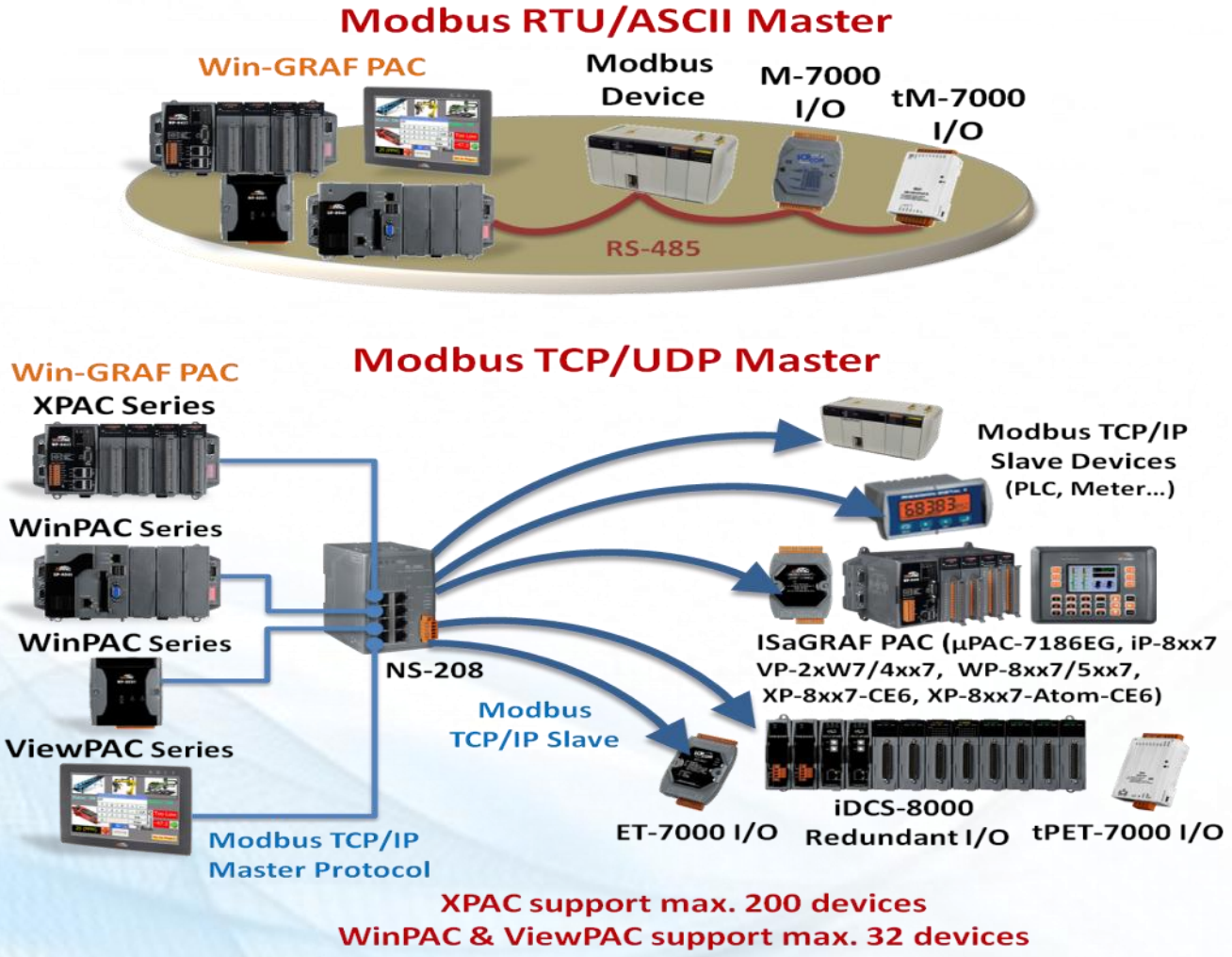
Win-GRAF Features

Protect your Software

- **Win-GRAF PAC is equipped with a unique 64-bit serial number. It can be used to generate a license key to protect the software against illegal copy.**

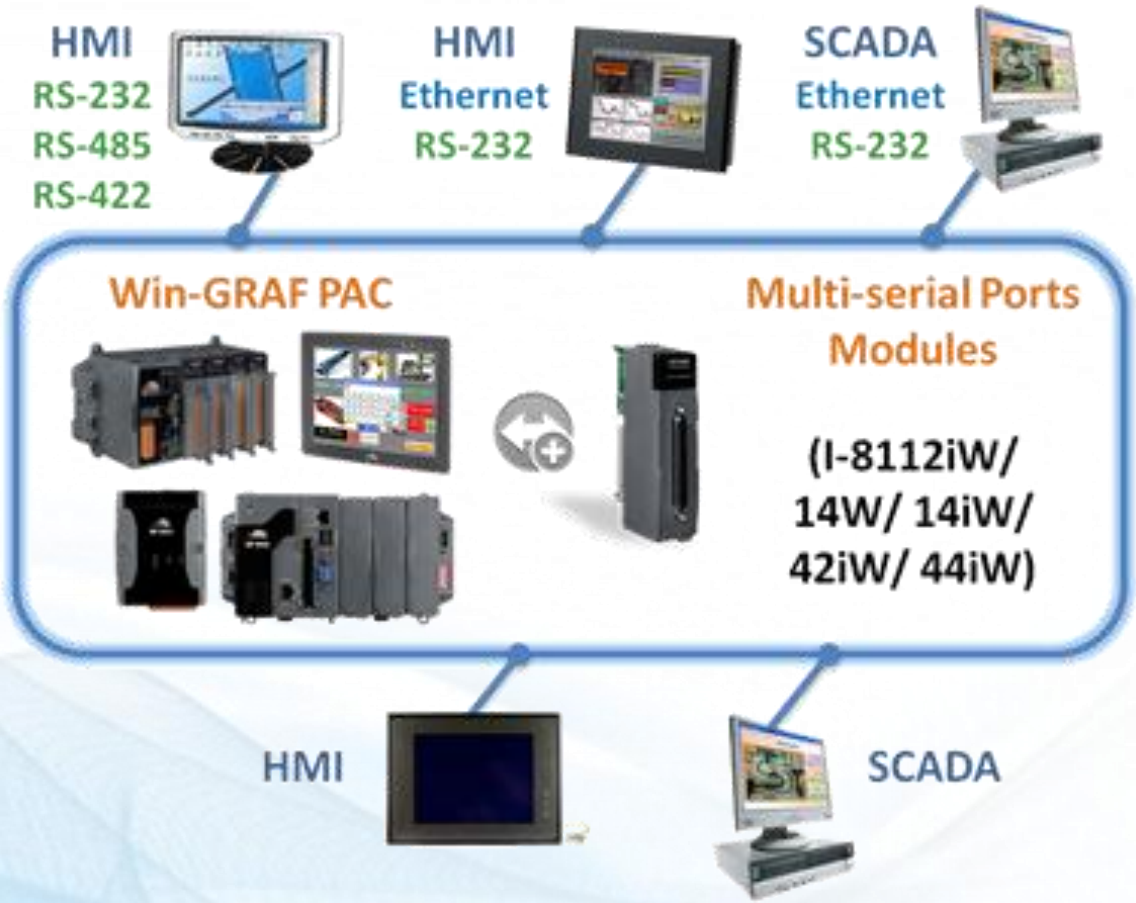
Win-GRAF Features

Multi-Modbus Master



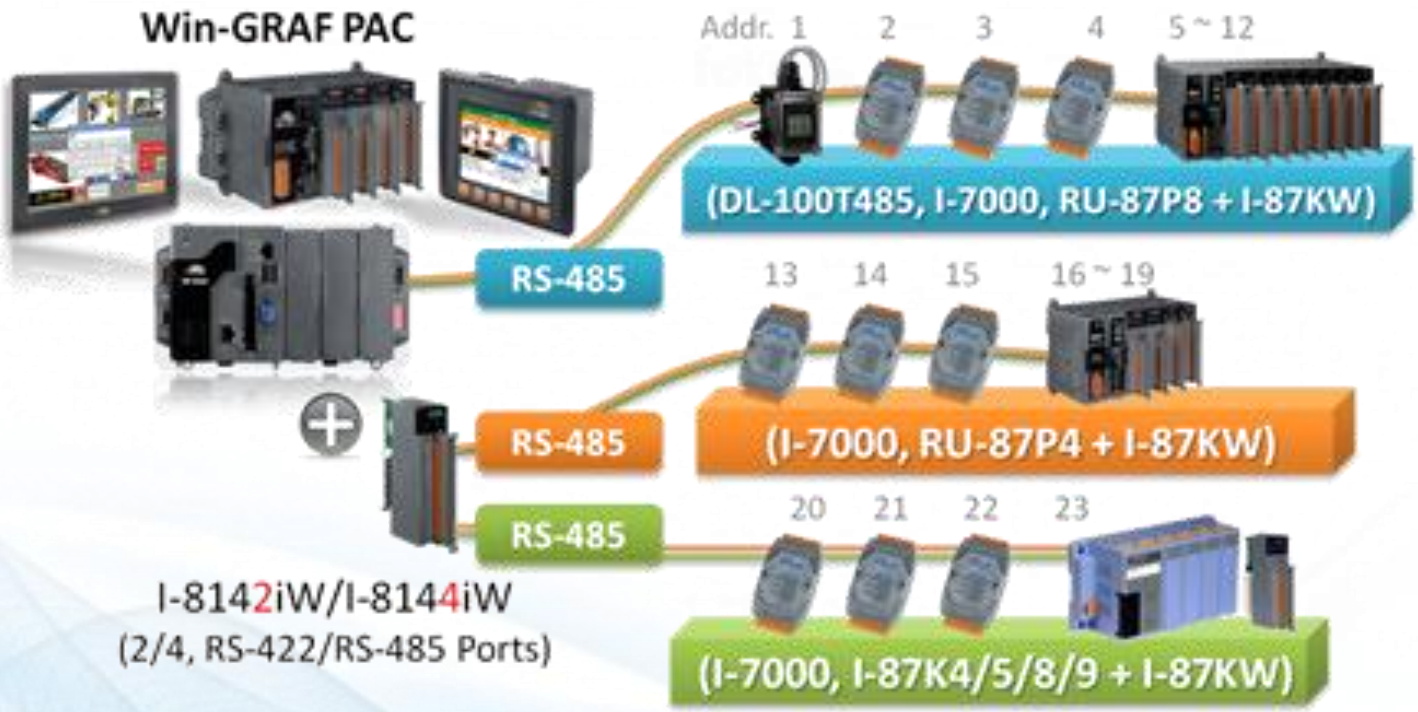
Win-GRAF Features

Multi-Modbus TCP/RTU Slave



Win-GRAF Features

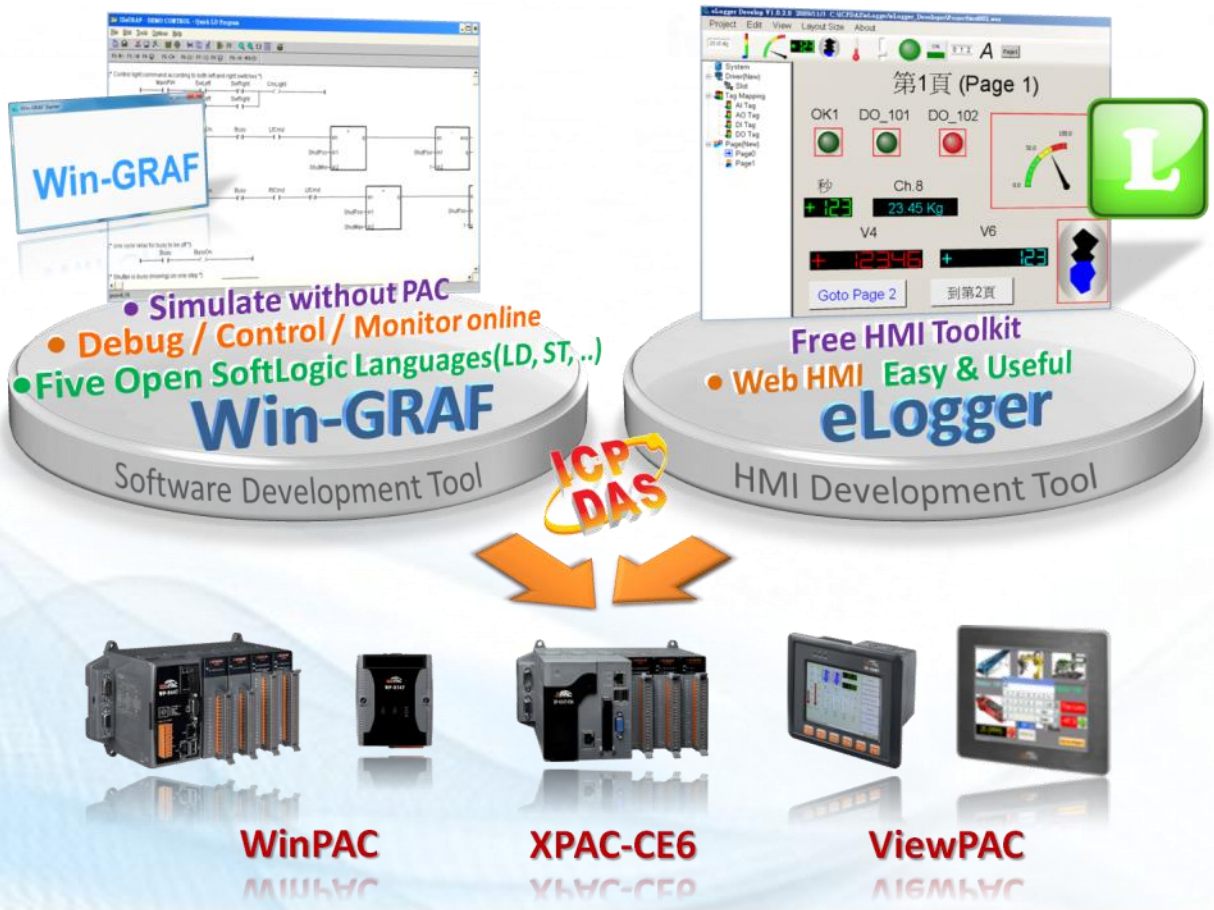
DCON Remote I/O



Win-GRAF Features

Local & Web HMI

- **Support remotely device control by using a smart phone, tablet, or laptop.**



Win-GRAF & eLogger

- http://www.icpdas.com/root/support/faq/win-graf.php

Win-GRAF Soft-Logic PAC

- 繁體中文 -

No. Title

018 How to Use Win-GRAF SoftLogic and eLogger HMI in the Win-GRAF PAC?

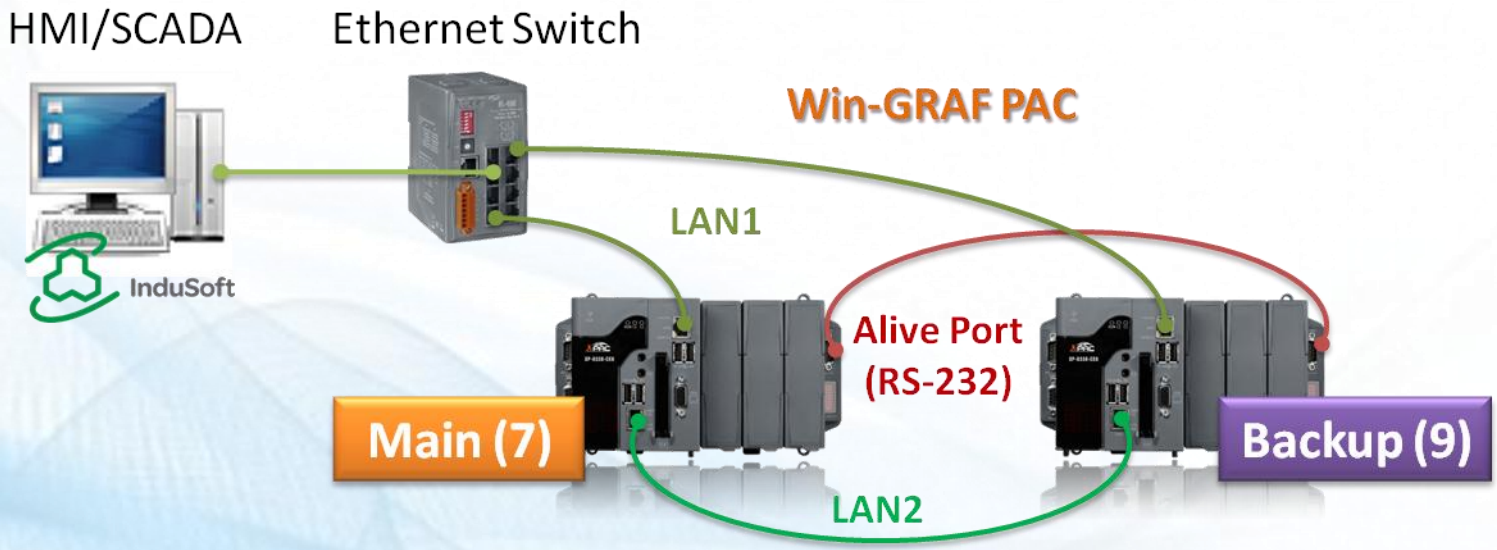
017 How to build Your own Function, Function Block and Library Project in the Win-GRAF PAC ?

Win-GRAF & eLogger

- http://www.icpdas.com/root/news/products/2017/2017062807.php

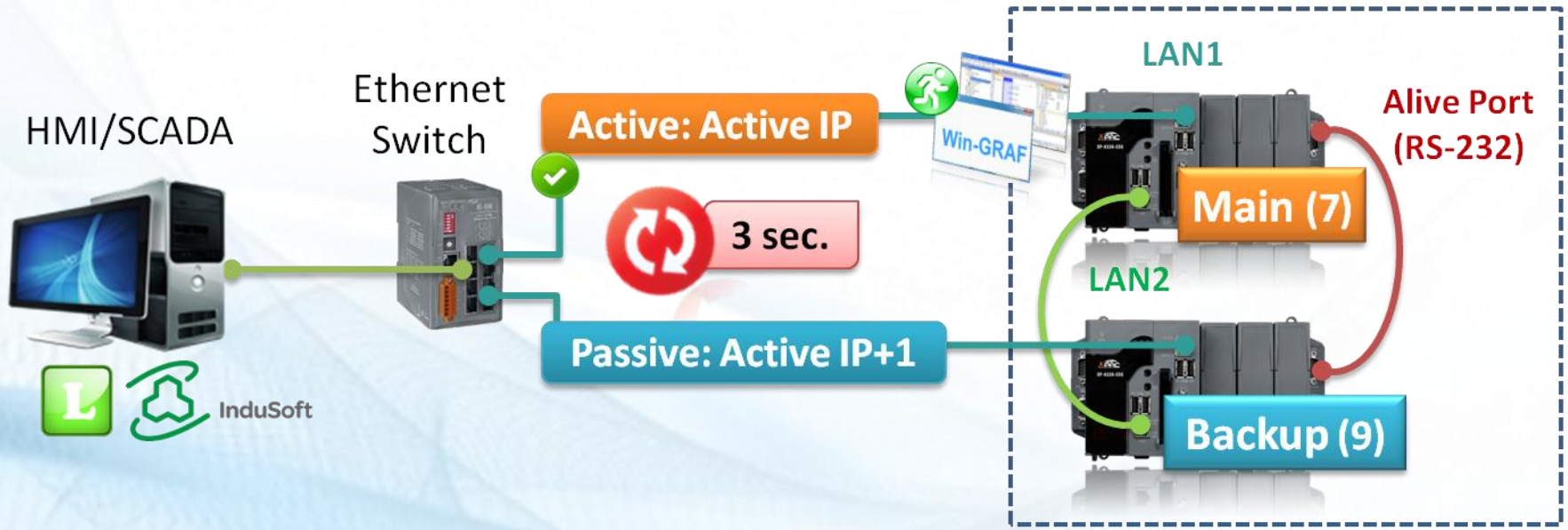
Win-GRAF Features
Controller Redundancy #1

- LAN1: Public port (to connect the SCADA)
- LAN2: Replication port (to synchronize data between two PACs)
- RS-232: Alive port (to detect the PAC living)
- Even one cable can make the redundancy work



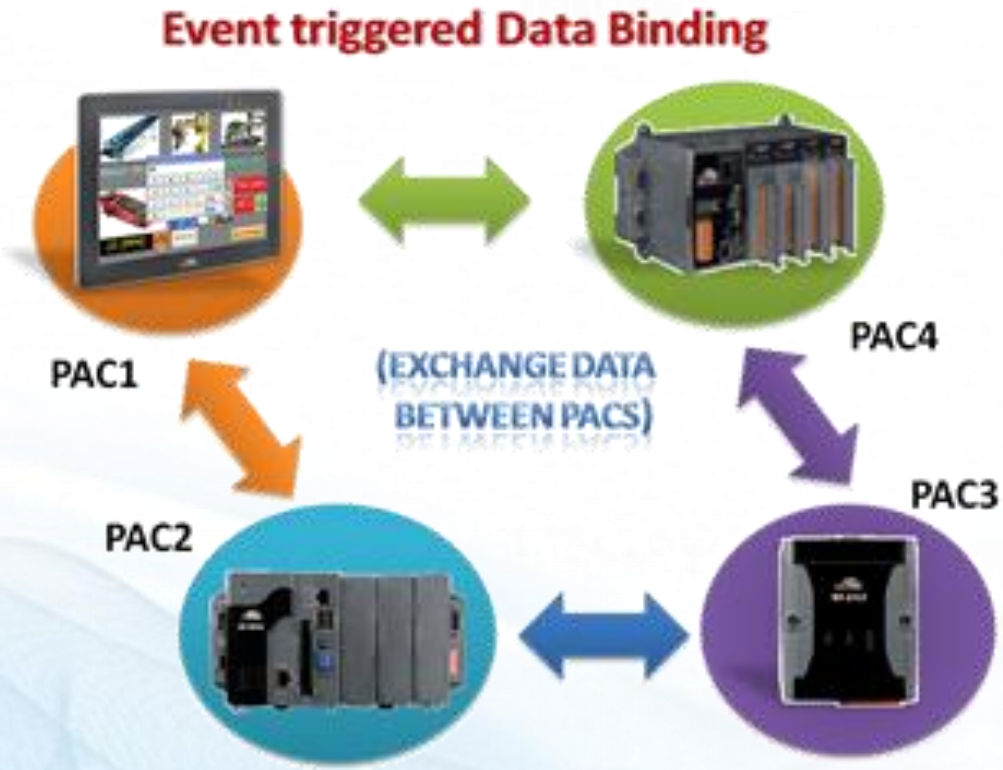
Win-GRAF Features
Controller Redundancy #2

- SCADA just connects to the Active_IP
- The two PAC will automatically switch Active_IP and Passive_IP
- If the Active PAC is unavailable, the normal one will take over in 3 seconds
- The project will be automatically restored to the new one



Win-GRAF Features
Data Binding

- Can get data from max. of another 16 PACs



Win-GRAF Features

Schedule Control

- Supports “Schedule-Control Utility” (freeware)
- One PAC can implement max. 10 Targets (devices) with different schedule control.
- Can apply schedule in Day, Holiday, Special Day, Season, Year.

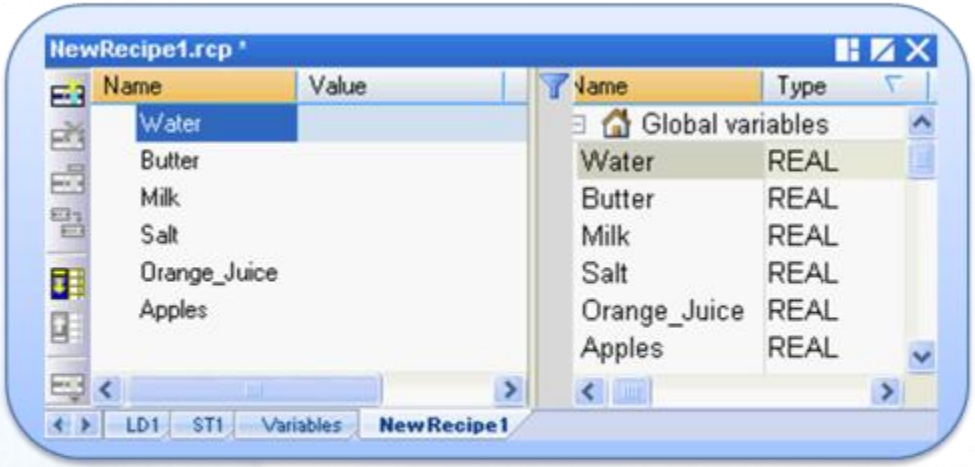
Win-GRAF Features
On-line Change

- Change the code of a program (LD, ST, IL)
- Change the condition of a SFC transition or the actions of a SFC step
- Create, rename or delete global and local variables
- Create, rename or delete global and local function block instances

Win-GRAF Features

Recipe

PC/Win-GRAF



WP-8xx8

Variables:

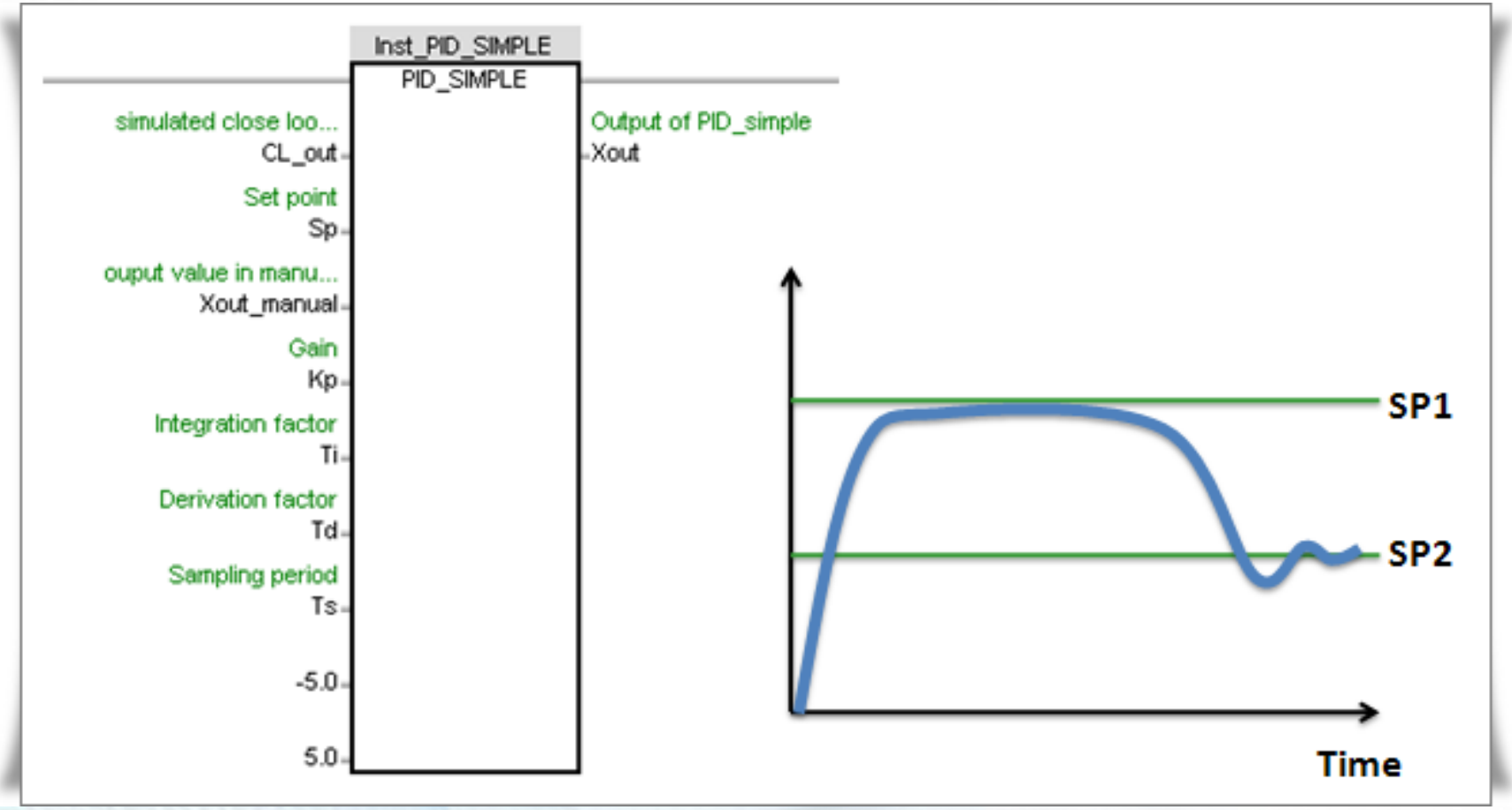
Water
Butter
Milk
Salt
Orange Juice
Apple

Recipe Value

Win-GRAF Features

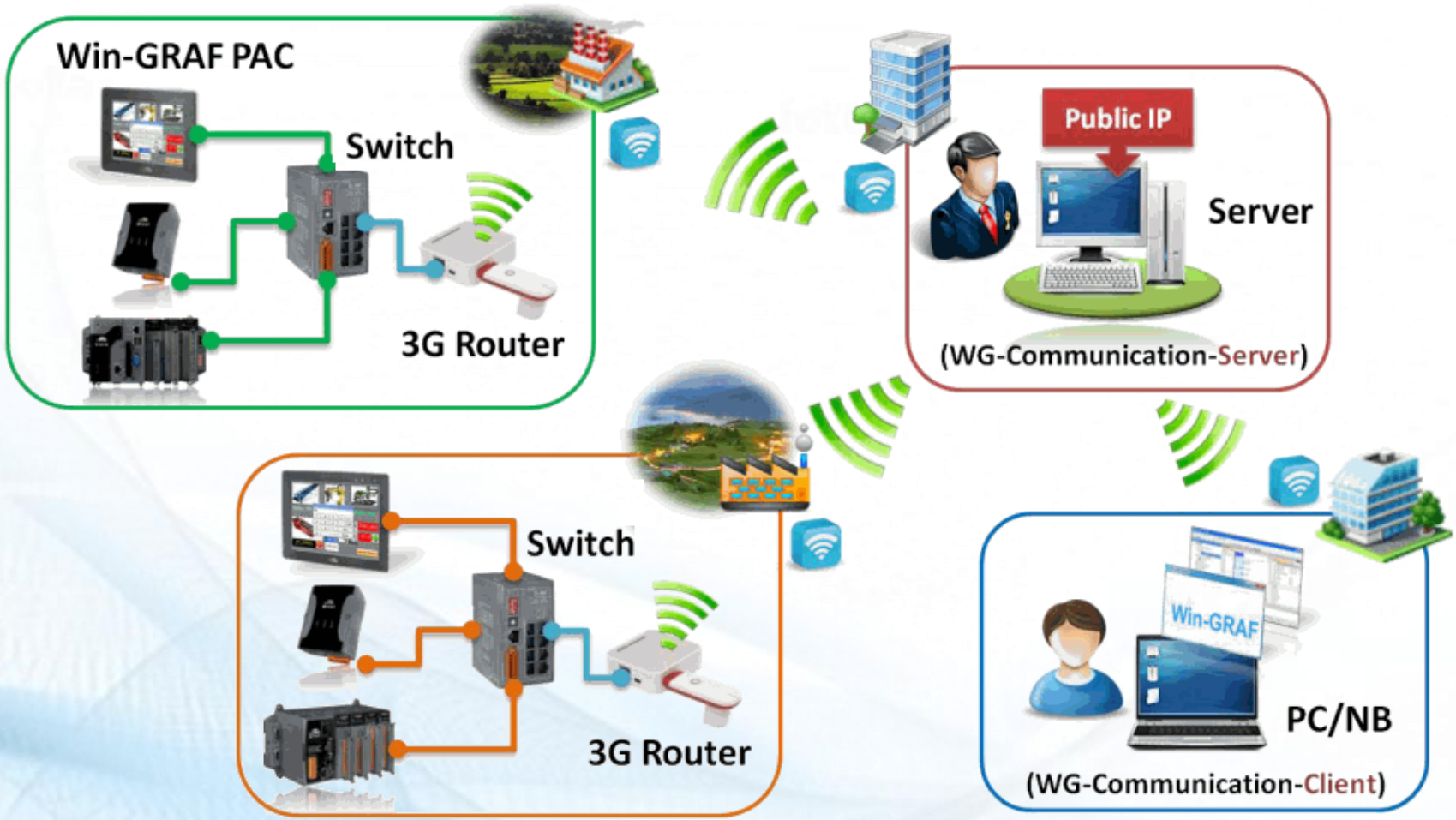
PID Control

- One PAC can handle more than 200 PID.



Win-GRAF Features

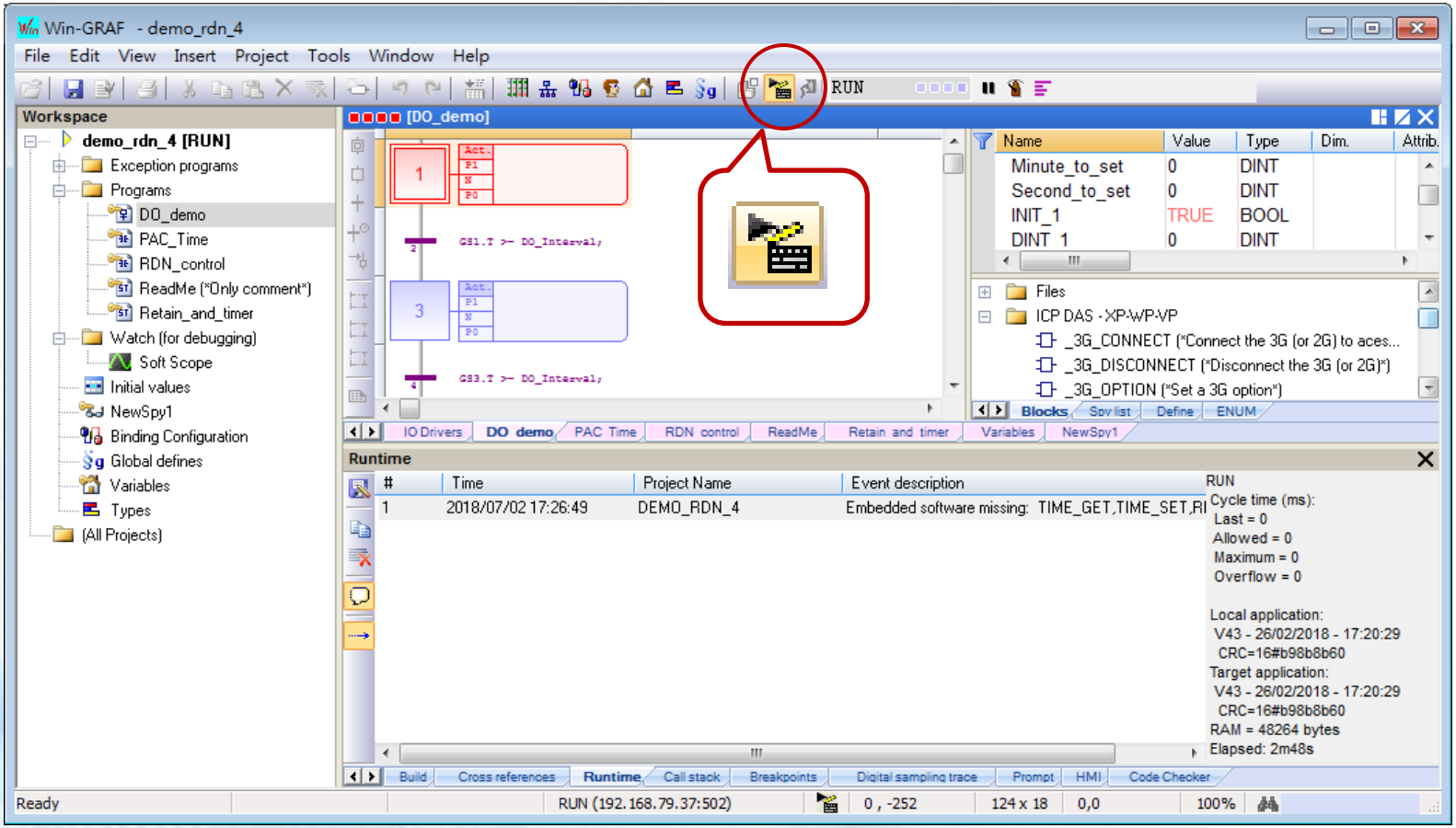
Intelligent Win-GRAF 3G Solution



Win-GRAF Features

Simulation

- Using the Simulation to test or debug the program.



Basic Concepts For Programming

Variables

- Name : Starting with “A” ~ “Z”

  Case insensitive , “MOT” is same as “moT”

  Can use 0 ~ 7 or “_” for 2nd ~ *th character
- Input / Output variable only appear in I/O boards
- Function block instance variables must assign type as a function block name, for example, the type of the Inst_TIME_GET variable must be TIME_GET.

Variable Types

Type	Bits	Value range
BOOL (*)	---	TRUE，FALSE
SINT	8 bits (Small int, signed)	-128 ~ +127
USINT BYTE	8 bits (Unsigned small int)	0 ~ +255
INT	16 bits (Int, signed)	-32768 ~ +32767
UINT WORD	16 bits (Unsigned int)	0 ~ +65535
DINT (*)	32 bits (Double int, signed)	-2147483648 ~ +2147483647
UDINT DWORD	32 bits (Unsigned double int)	0 ~ +4294967295
LINT	64 bits (Large int, signed)	-2^{63} ~ $+(2^{63}-1)$
ULINT (No support) LWORD (No support)	64 bits (Unsigned large int) No support the Win-GRAF PAC.	0 ~ $+(2^{64}-1)$
REAL (*)	32 bits (Floating point)	$\pm 3.4 \times 10^{-38}$ ~ $\pm 3.4 \times 10^{38}$
LREAL	64 bits (Floating point)	$\pm 1.7 \times 10^{-308}$ ~ $\pm 1.7 \times 10^{308}$
STRING (*)	Max. 255 characters	---
TIME (*)	32 bits	T#0ms ~ T#23h59m59s999ms

*: Common

TIME Variable

- Value : T#23h59m59s999ms
- Always positive, “-T#5s “ is wrong
- “T#10.5s” is wrong, “T#10s500ms” is correct
- Can tick / stop / reset a time variable

```
tStart(TIME_VAR1) ;
tStop(TIME_VAR1) ;
TIME_VAR1 := T#0s ;
```

Type Conversion

- Math calculation should use same type.

  Wrong : DINT01 := REAL01 + 5 ;

  Correct: DINT01 := Any_To_DINT(REAL01) + 5 ;

- Comparing value should use same type.

  Wrong : if DINT01 > REAL01 then

  Correct: if Any_To_REAL(DINT01) > REAL01 then

Type Conversion Functions

- Help on Win-GRAF workbench, search “conversion”

  Any_To_BOOL , Any_to_SINT

  Any_To_INT , Any_To_DINT

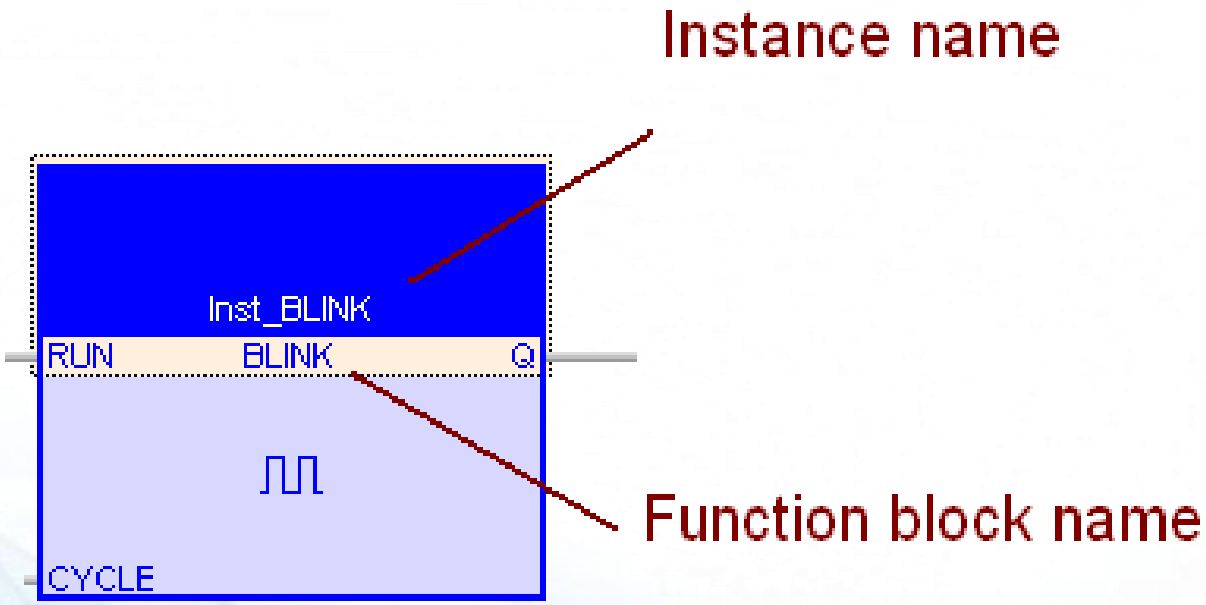
  Any_To_LINT , Any_to_REAL

  Any_To_LREAL , Any_To_TIME

  Any_To_STRING , NUM_To_STRING

  BIN_To_BCD , BCD_To_BIN

Function Block Instance



ST Basics 1

- (* Here is comment *)
- Each statement ends with a “;”

```
A := B + C ;   (*  “:=“ means assign *)
if   A <= D  then
   (* do operations … *)
end_if ;
```

ST Basics 2

- ":=" means assignment

  A := B * 5 ; (* correct *)

  A = B * 5 ; (* wrong *)

- "=" means "are they equal ?", result is TRUE or FALSE

  if A = B then (* correct *)

  end_if ;

  if A := B then (* wrong *)

  end_if ;

Call a Function in ST

- Return_val := fun_name(par1,par2, …) ;

  or

  fun_name(par1,par2, …) ;

  example:

  OK1 := COM_OPEN(2 , ‘9600,N,8,1’) ;

  COM_OPEN(2 , ‘9600,N,8,1’) ;

Call a Function Block in ST

- First declare a FB instance , type = FB name
- fb_instance_name(par1,par2, …) ;

  Return1 := fb_instance_name.out_par1;

  Return2 := fb_instance_name.out_par2;

  …

  example: my_unpack8 (type “unpack8”)

  my_unpack8(BYTE1) ;

  BOO0 := my_unpack8.Q0 ;

  …

  BOO7 := my_unpack8.Q7 ;

Have a try
Runtime Driver for PAC

Products	Version	Download	Size	Update
WP-8xx8	1.09	wp-8xx8-driver.zip	545 KB	Nov-02-2016
XP-8xx8-CE6	1.07	xp-8xx8-ce6-driver.zip	538 KB	Oct-07-2016
VP-x2x8	1.04	vp-x2x8-driver.zip	579 KB	Nov-23-2016
WP-5xx8	1.05	wp-5xx8-driver-1.05.zip	522 KB	Jul-27-2015
Win-GRAF Lib	1.07	Win-GRAF-Lib-1.07.zip	496 KB	Jun-24-2015

Note: The Win-GRAF Driver can run only 2 hours on the controller (PAC) without runtime license.

Have a try
Developer for PC

Products	Version	Download	Size	Update
Win-GRAF Workbench	1.07	Win-GRAF-setup-ver-1.08.zip	55.6 MB	Jul-29-2015

- Available on Windows **XP/7/8/10**
- Limitation in Demo Mode:
  - Applications are limited to **40 I/Os**
  - The code generated by the compiler and run in the controller (PAC) stops after **15 minutes**
  - The simulation on PC stops after **15 minutes**

Further Information

http://www.icpdas.com/root/product/solutions/softplc_based_on_pac/win-graf/download.html

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Thank you!

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