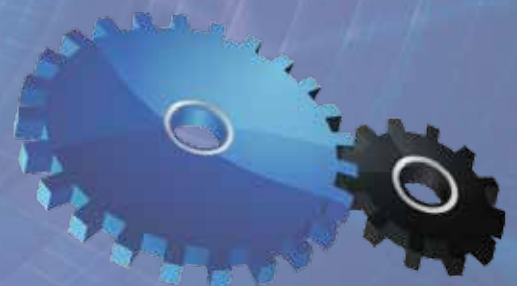


"Smart 4"

The Smart System For Environment Integration



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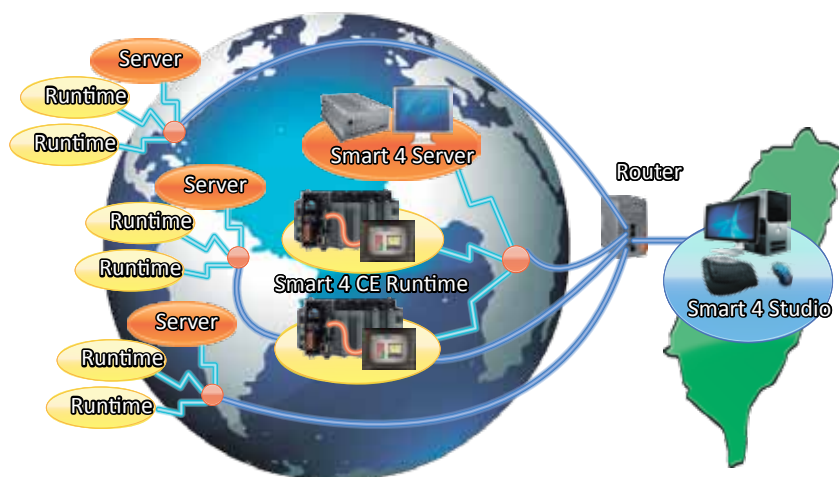


"Smart 4" The star of the Environment Integration Systems

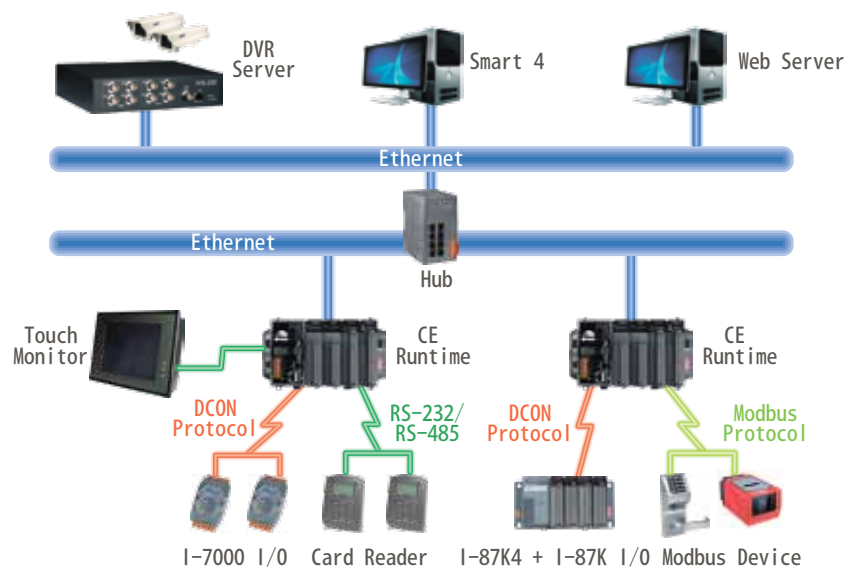
System Components

1. The front-end Runtime (WinPAC) and the Back-end Server (Smart 4 Server) communicate via Ethernet, supplemented by active Field-bus; the remote I/Os transmit data via RS-485.
2. The Front-end Runtime (WinPAC) built-in HMI interface can combine WinPAC with touch screen to replace PLC + HMI in the field case (Better selection: ViewPAC = PAC + HMI).
3. The Back-end server is composed of a PC running the Smart 4 Server software.
4. The I/Os support the high-speed Local bus I/O modules (I-8K Series) and the distributed remote I/O modules (I-87K, I-7K and M-7K Series).
5. With the principles of central management and distributed processing, the back-end server sets up the database center, constructs the system database and collects system data.

📷 Smart 4 System Architecture Diagram (macro)




📷 Smart 4 System Architecture Diagram (micro)



Main Features

1. "Setting" the project instead of "Designing" the project

- Pre-define the frequently used functions as the data structures.
- Provide easy user-interface combining with the new Script-like syntax.
- Setting a temperature/humidity function of a large air condition system just easily as a small on-off light function.

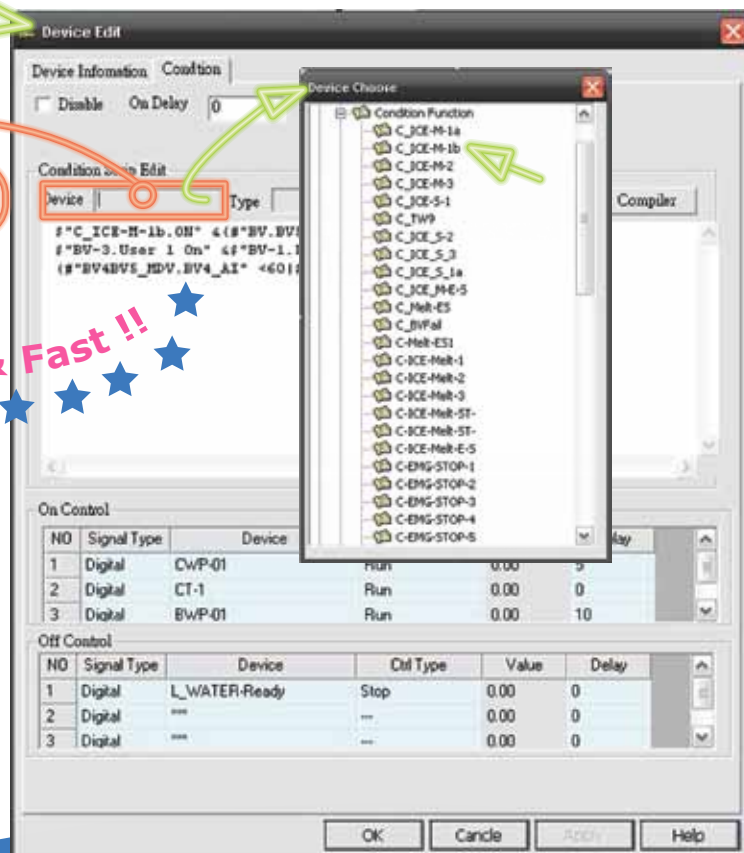
 The built-in functions(fig.1) and the Script-like syntax(fig.2)

15	PID Control	1	1	2	MDV	ICE Water Valve	WindowsCE	Off
16	Analog Meter	1	1	2	Tw9*1E	ICE Temp 9*1E	WindowsCE	Off
17	Condition Function	1	1	3	C_JCE-M-2	C_JCE-M-2	WindowsCE	Off
18	Logical Device	1	1	3	L_WATER-Ready	L_WATER-Ready	WindowsCE	Off
19	Mathematic Function	1	1	3	M_ICE-FINISH	M_ICE-FINISH	WindowsCE	Off
20	Digital Control	1	1	3	BWP-SP	Backup Water pump	WindowsCE	Off
21	Analog Meter	1	1	3	FT	Flowrate	WindowsCE	Off
22	Condition Function	1	1	4	C_JCE-M-3	C_JCE-M-3	WindowsCE	Off

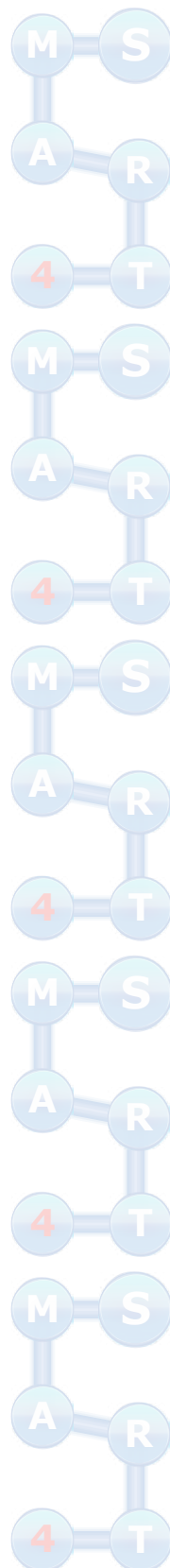
(fig.1)

Click to set up !

★ ★ ★ ★ ★
Easy & Fast !!
★ ★ ★ ★ ★



(fig.2)



WinPAC

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2. Rich types of modular functions

- Built-in 11 kinds of function types described in the following table.

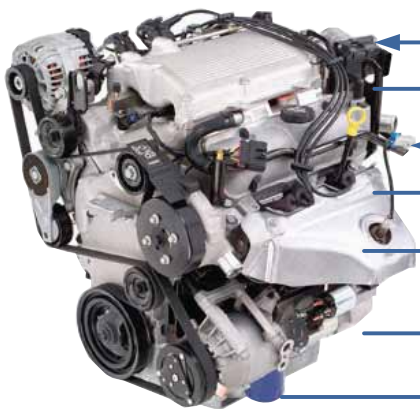
Function Type	Function Applying Situation
Virtual Device	1. For status simulation when no actual I/O connection. 2. For the HMI without connecting to the actual I/O.
Group Device	1. For region lighting control 2. For the equipments that run/stop sequentially (built-in delay function)
Condition Function	1. For the run/stop condition in each step of sequential control 2. For the emergency auto-stop condition of all equipment operation. 3. Ex: the start sequential condition of HVAC.
Mathematic Function	1. For unit conversion, such as the data value from the sensor is not easy to understand. 2. For the data value that sensor measured need to be converted before using. 3. Ex: the conversion of temperature and humidity, the ice consumption forecast of HVAC, etc.
Scheduler Device	1. Duty scheduler: run/stop equipments daily. 2. Non duty scheduler: run equipments temporarily. 3. Routinely run the pre-start process before holiday.
Digital Control (with reply)	1. For general devices such as lights, motors, electric locks, etc. 2. With DI status reply, it provides failure reply control, remote on/off control... in the same function.
Analog Control (with reply)	1. Available for three sets of AI/AO, each can control independently. 2. Obtain the data of three-phase power equipment and detect if the data are unbalanced.
PID Control	1. Constant temperature/pressure/humidity control, 1-to-1 or 1-to-2 set point control. 2. The control accuracy can up to $\pm 5\%$ (the actual HVAC application).
Analog Meter	1. Group the temperature and humidity data in the same region for the planning and management convenience.
Access Device	1. As an access controller without using other features. 2. Need to record video when apply the personnel access control.
UPS Device	1. For the field case that need to monitor the system power state.
Monitor Device	1. For the equipments needing long time monitoring or embedded HMI. 2. For critical equipments or exits that need video record when event is triggered.
Power Demand Monitor/Control	1. For the customers who have signed contract capacity with the power supply company. 2. Monitor the current power usage to forecast the future power demand for a period (15 or 30 minutes). The function can set alarm or power off the equipment when the value over the contract capacity.

3. Function modulization

- The traditional software needs to define the corresponding I/O points individually that causes the maintenance difficulties and poor performance in many large cases.
- Smart 4 applies the function modulization that allows one module to represent all I/O points in an equipment.
- Smart 4 is easy for designing, configuration, management and maintenance for system integrators and customers.



The module definition of traditional integration software

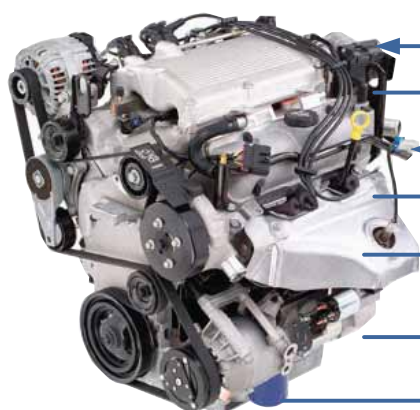


Run/Stop Control
Run/Stop Status
Speed Control
R. /Min.
High Speed
Abnormal Checking
Low Speed
Abnormal Checking
Abnormal Status

Name	Mapping I/O
Run/Stop Control	D0-01
Run/Stop Status	DI-01
Speed Control	A0-01
R. /Min.	AI-01
H. Speed Checking	DI-02
L. Speed Checking	DI-03
Abnormal Status	DI-04



The module definition of Smart 4

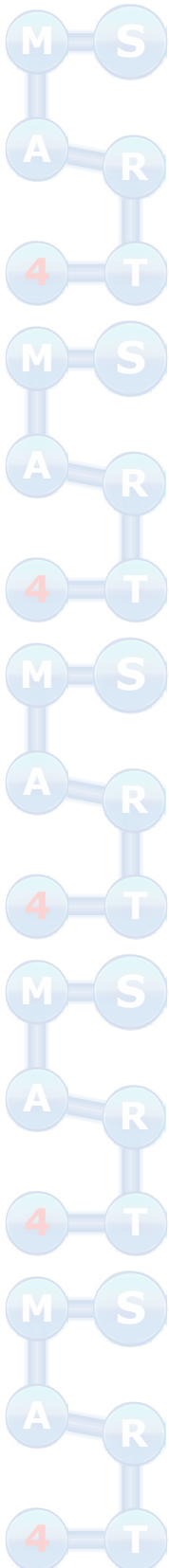


Run/Stop Control
Run/Stop Status
Speed Control
R. /Min.
High Speed
Abnormal Checking
Low Speed
Abnormal Checking
Abnormal Status

Name	Mapping I/O
Engine	Annalog Control

Function modulization:

One module represents
all I/O points
in an equipment.

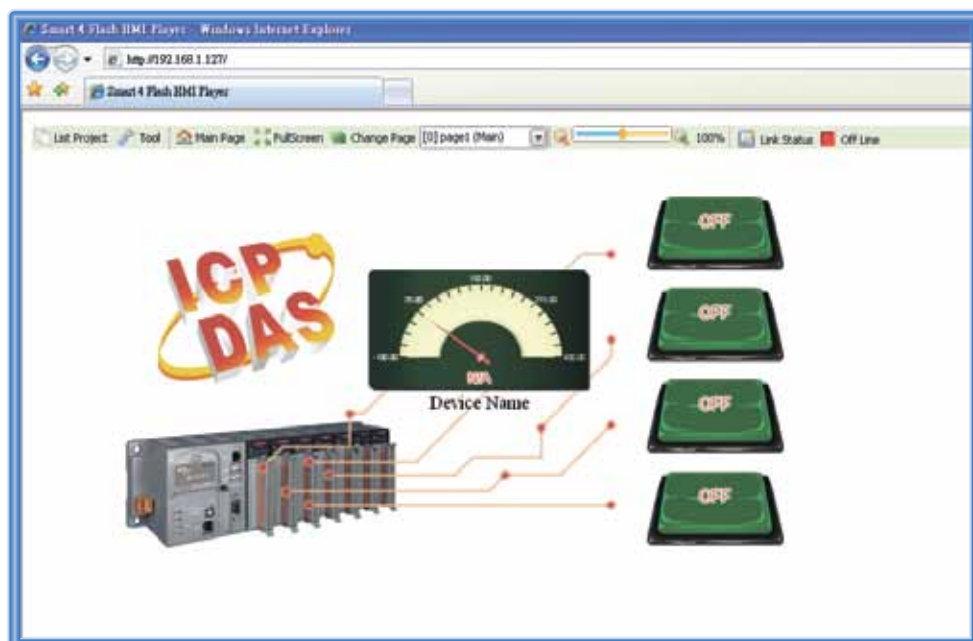


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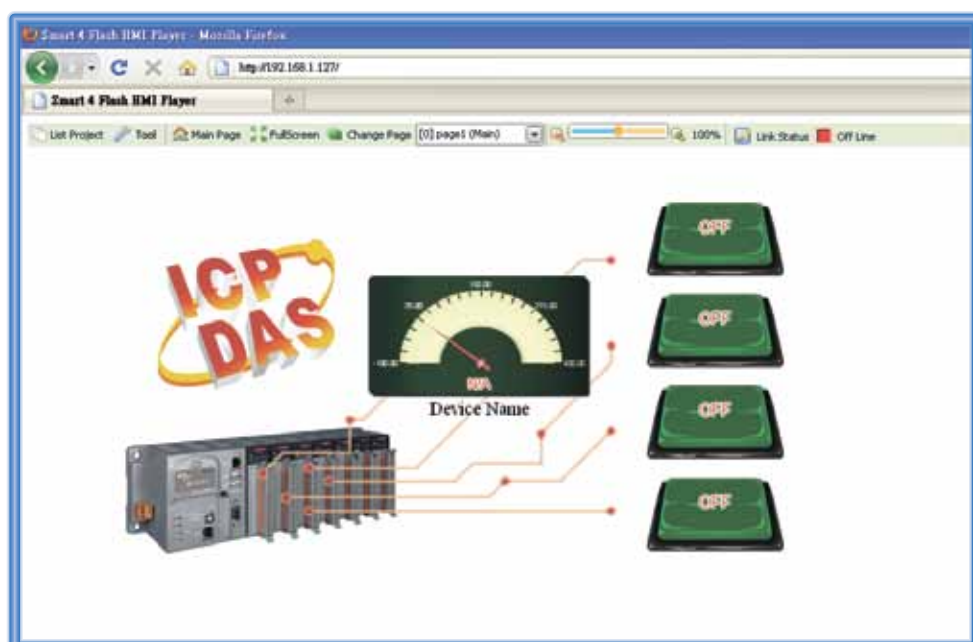
4. True cross-platform Web HMI

- Many graphic control softwares apply ActiveX technology that asks to install components, but based on security reasons, the financial, military units or the company emphasizing data security often prohibit from installing additional software components.
- Smart 4 provides cross-platform Web HMI that allows users applying HMI using various browsers (IE, FireFox, Safari, Chrome) in different platforms (Windows, Linux, Mac OS).

 The HMI using Microsoft IE browser



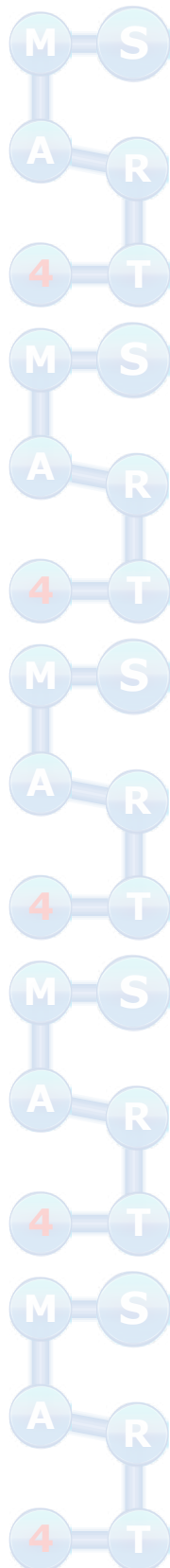
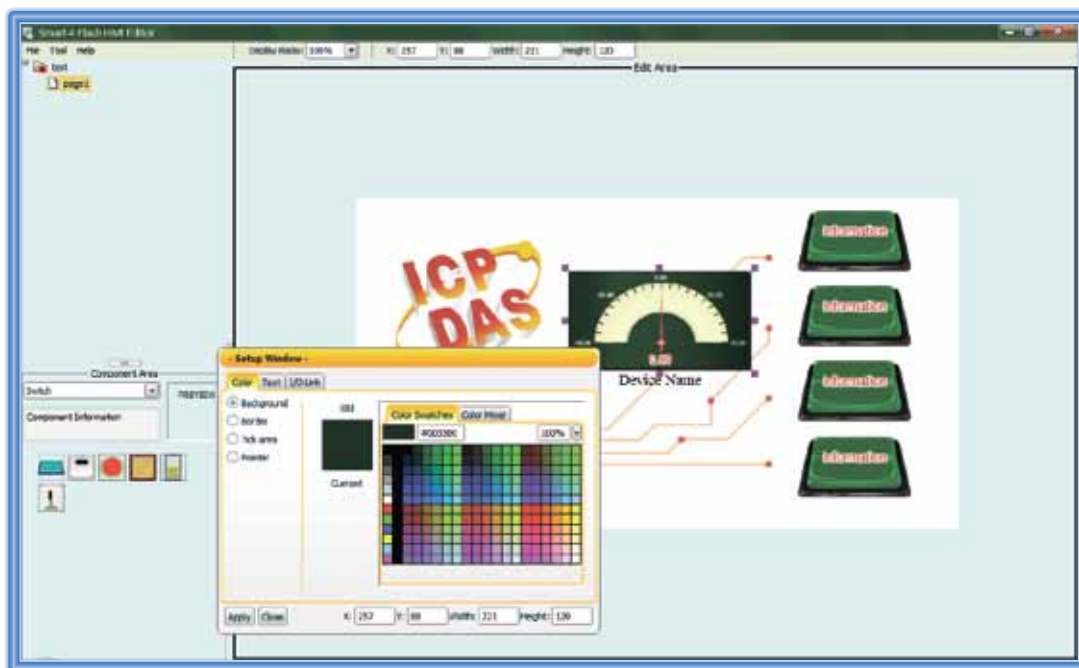
 The HMI using Mozilla Firefox



5. Different browsing interface for control center and management dept.

- For the control center, to display all data of related equipments in HMI is most important.
- For management dept., to get various/distributed messages and to monitor/control remote equipments via hand-held devices are more important.
- Smart 4 allows monitor/control the remote devices through the browser on the remote computers or handheld devices (eg. Smartphone, iPhone) without installing Smart 4 add-ons component.

 HMI editing software in browser



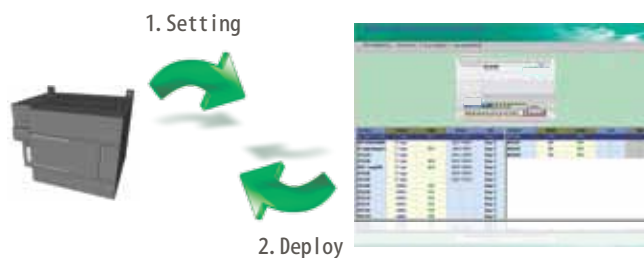
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Development Background

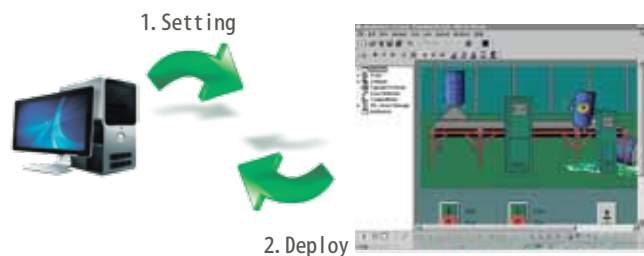
- The graphic control software seldom provides overall system integration, and the data resource sharing among levels is difficult, or even impossible.
- The integrators often need to design systems using the equipment SDK, connect I/O to database through various standards, thus increase the project cost and reduce the working efficiency.
- Smart 4 provides overall integration for all levels to reduce the development time, so that the system integrators can focus on the expert field (such as air conditioning, sewage treatment, etc.) to enhance the trust from the customers..

Traditional graphic control system with I/O modules

Step 1: Configuring the lower level I/O by a toolkit.

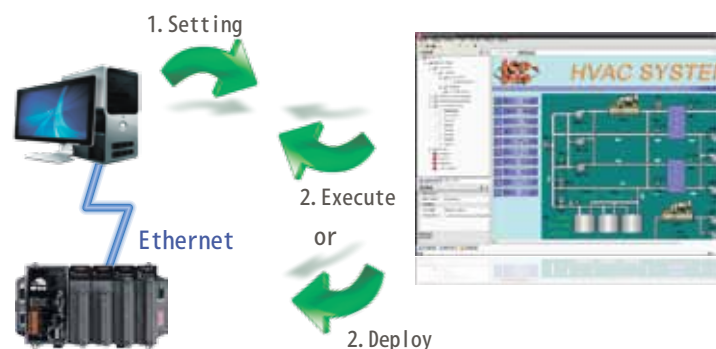


Step 2: Configuring the upper level HMI by another graphic control software.




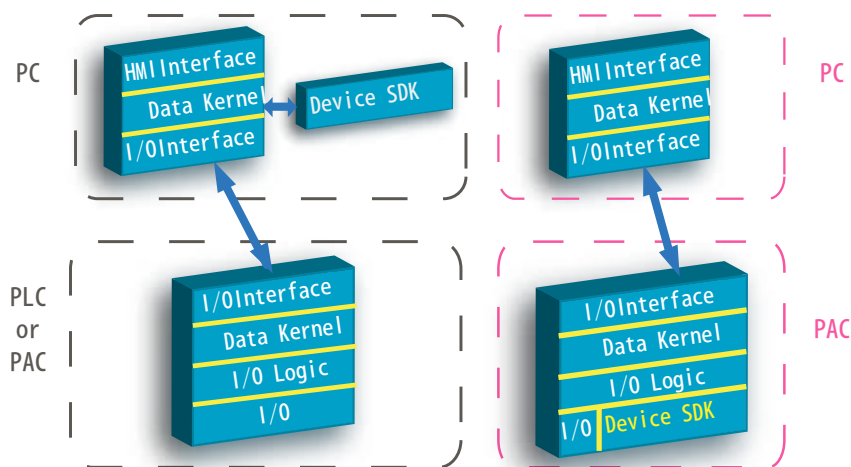
Smart 4 system design and operating with I/O modules

Step: Configuring the lower level I/O and the upper level HMI by the same software.



- The hardware and software of different levels are constituted from different vendors, so the function coordination among equipments is difficult.
- Using the inadequate SDK functions, the integrators cannot perform the system optimum.
- The overall functions may be acceptable in checking step, but the following system performance, reliability and safety are very poor.

 The difference of peripheral Integration between Smart 4(right) and general software(left)



- The overall system integration and the customers add-on requirements (such as data calculation and analysis) make design more difficult, so the integrator cannot satisfy the customers, the system just keep to monitor equipments, do not provide full auto control functions.

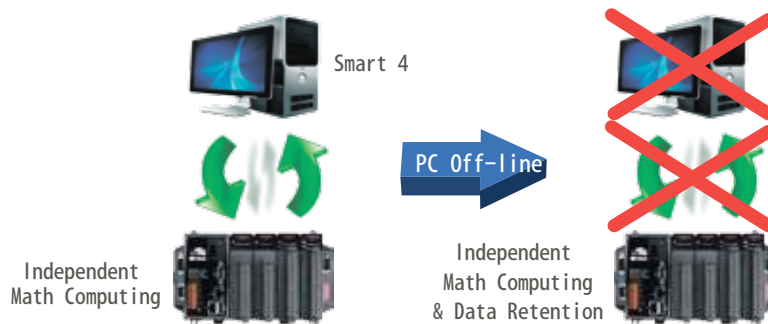
 The traditional software working with PLC or I/O devices



The traditional software, with insufficient math functions, need to compute in the upper level PC then download to PLC. When PC is off-line, it loses computing ability.

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Smart 4 working with WinPAC

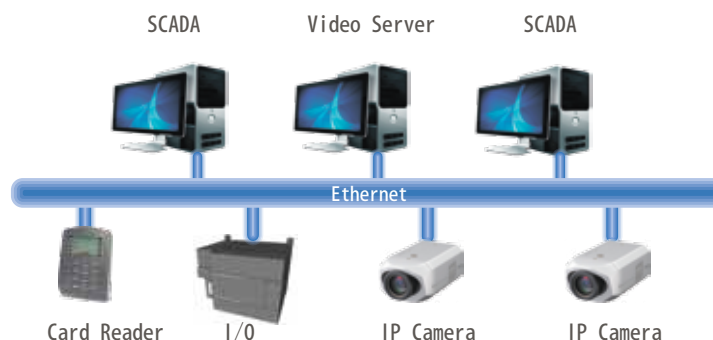


The WinPAC, built-in powerful Math functions, computes data independently.

- The integration of the traditional control system is poor, the user-interface is not friendly, such as, to retrieve or query a record may need to run several programs, hard in access operating, and cause configuring error often (below).
- Smart 4 is the I/O control system of environmental devices, the personnel access control system, and the monitoring system. Users can retrieve the queried card number, machine, personnel data and image record via an easy user-interface using the same software. Smart 4 simplify the operating process, combine various authorize management, and reduce the probability of operating errors.

Compare the traditional software with Smart 4 in querying personnel access record and video data as below.

The querying process for the personnel access record/video in traditional software



- Step 1. Query a specific card number and access time in the access control software of the SCADA server.
- Step 2. Retrieve a specific time video via the access time and screen copy to files in the video software of the Video server.
- Step 3. Compare the video files with the staff image record that queried by the card number in the personnel database of the personnel database server.

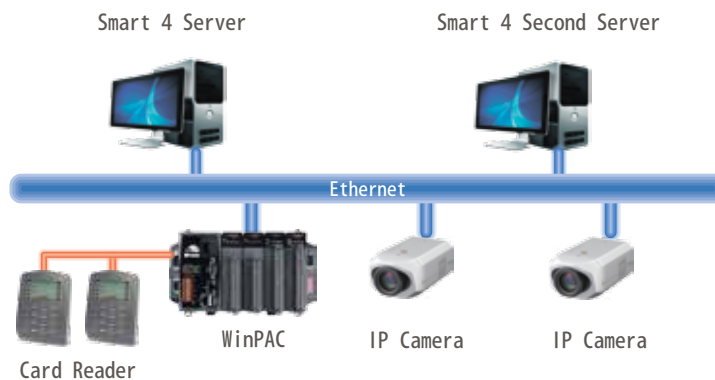
With the complex process and the two-tier structure, once the server computers are offline, the entire system will be useless.



Smart 4 querying process for the personnel access record/Video

All the steps are processed in the Smart 4 Server. Query a specific time/person access data in the historical events window, and also display the corresponding video record and the personnel basic data.

If Smart 4 Server is offline, the card readers can still work, and can copy/query the video record from the Smart 4 Second Server.



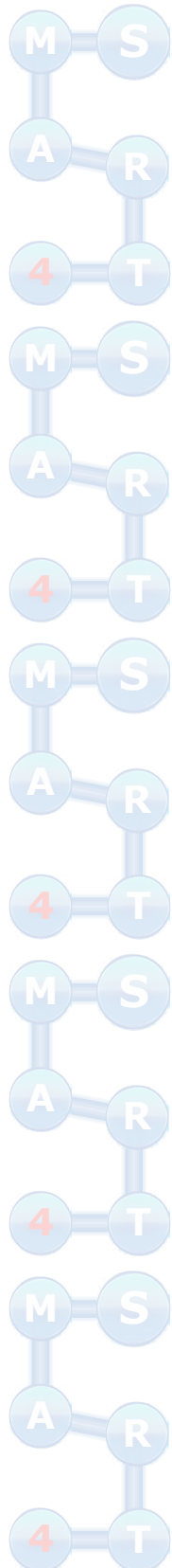
- The Smart 4 system was customized according to the demand at that time, no future expanding planning. After one year warranty, when customers want to expand I/O points or new functions, they often need to build a new system, or to destroy the original structure that always leads to a system architecture collapse.

Based on above, Smart System upgrades with the principles of economic, performance, value and convenience to launch the grand new version "Smart 4".

Conclusion:

Smart 4 gives a new thinking for system development, designs functions in users view, frames the system core on ten years of integration experience, provides an easy-to-use, reliable and overall designing solution for system integrators developing the environmental control systems, and achieves the win-win goal of the end-users, system integrators and equipment manufacturers.

For more information about Smart 4, please refer to the web site: <http://smart.icpdas.com/>





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