SCADA Systems - What is the scope of this talk?

- What are SCADA systems?
- What are their structure and main features?
- How open are they?
- How are they evolving?
- How are they being evaluated?
- Example System
- Conclusions

What is a SCADA System?

- Supervisory Control And Data Acquisition
- Sits on top of process controllers (front-ends)
- User tools to supervise and control the process
- Used extensively in industry and also increasingly at CERN
- Current application sizes from a few hundred I/Os to n*100000 I/Os
- PC/NT-based

SCADA Structure

- Tag-based (Tag=basic data item)
- Distributed Systems
- Server/Client over Ethernet (TCP/IP)
- Polling of Front-End (Mostly)/Event Driven Internally
- Often Proprietary Configuration, RT and Archive DBs

Basic Features (Development)

- Integrated Development Environment
  - Graphics Editor
  - Database Editor
  - Report, Recipe and Script Editors
- Toolkits
  - API
  - Driver Development

Basic Features (Run Time)

- SC Data Acquisition Including Standard Drivers
- Alarm Handling
- Data Logging
- Data Presentation (Synoptic/Trending)
- Access Control
- Redundancy
- Network Connectivity
- Report & Recipe Handling

Openness

- API
- OPC Client & Server
- ODBC (OLEDB)
- COM/DCOM
- ActiveX
- Web
- ASCII/CSV (Configuration)
- DDE

Evolution

- Very fast evolution
- Towards OO
- Internal communication based on DCOM
- MMI based on ActiveX
- Web-based MMI
- OPC for connection to H/W as well as OPC Server for connection to external systems
- Increasing Application Size

Evaluation

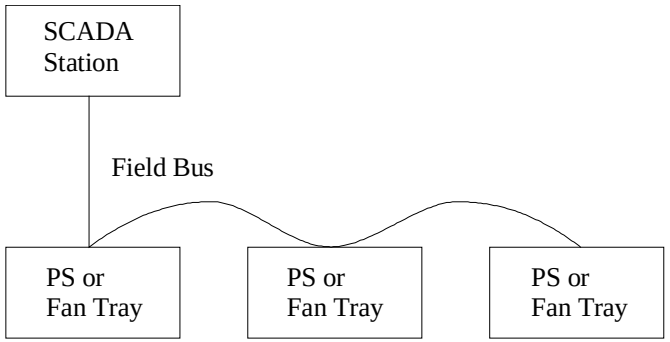
- Extensive Market Survey
- 5 products being evaluated in a hands-on fashion
- 2/3 more potentially interesting products
- Test-bench
- Evaluation findings to be presented at JCOP II Workshop in September

http://itcowww.cern.ch/jcop/subprojects/TSurvey/

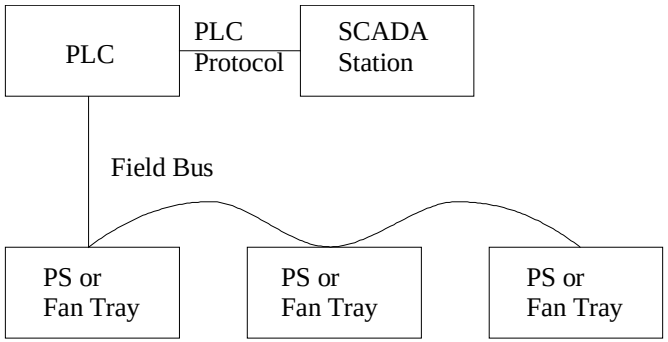
Shared disk on PCITCO04 (Scada Documents)

Power Supply Control System (Example)

- Provide Suitable Connectivity
- Configure Tags
  - Commands (Enable/Disable, On/Off)
  - Values (Status bits, Currents, Voltages)
- Model Device Behaviour
  - Derived Parameters
  - Scripts (Internal Program)
  - API
  - PLC/VME
- Configure Alarms and Logging
- Configure MMI
- Configure Automatic Generation of Report
- Standard Access from Control Room via MMI
- Remotely
  - Web
  - Dial-Up
  - Remote console software



Option A



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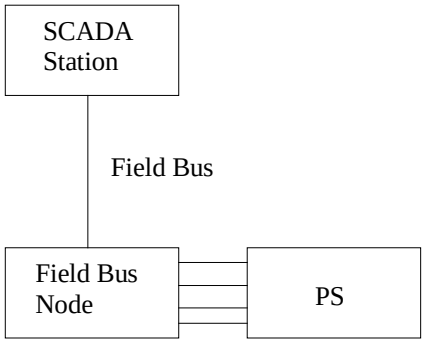

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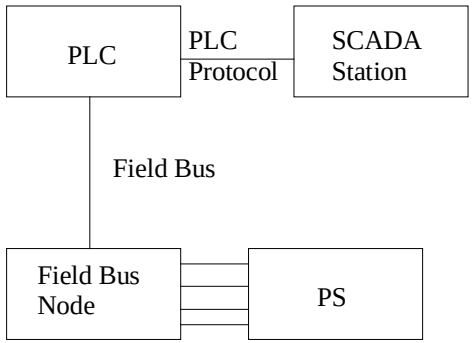

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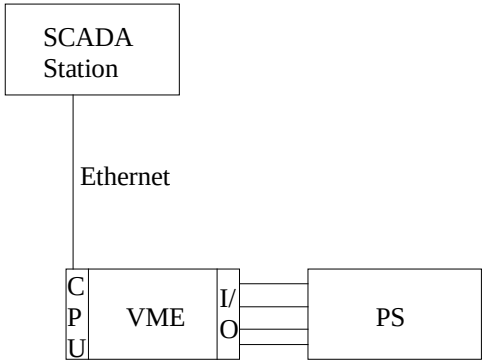

Option E

Features Generally Not Provided (Currently)

- FSM (Batch Management?)
- Array Handling
- Device Handling
- Front-End S/W

Conclusions

- SCADA systems provide many features required by LHC experiments
- Are generally open
- Are evolving very rapidly
- Some features missing
- Evaluation goals:
  - What is covered by SCADA?
  - Can missing features be easily added?
- Results will be presented in JCOP II