Controlling a large Data Acquisition System using an industrial SCADA system
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PVSS – an industrial SCADA toolkit:
German abbreviation for ‘Process visualisation and control system’.
Scalability is essential for big experiments!!!
- structured namespace (device oriented) - create and manipulate complex devices
- no built-in fix for number of devices and elements
- data held in memory of event manager and real time DB – accessible from all managers
- attributes used for processing and alerts (config)
- complex value archive arrangements and flexible alarm handling
- interface to record archive data in an Oracle database (accessibility)

- communicating processes: architecture can take advantage of multi-CPU systems
  load distribution is possible
- distributed systems: systems can be distributed across machines
  various autonomous systems may communicate with each other
  allows for hot-standby redundancy
- cross-platform: truly mixed systems possible (Windows GUI & Linux data server)

- highly modular design:
  specific managers (processes) for different tasks
  client-server architecture (provider-consumer relationship):
  server updates services (data/status)
- capable of data held in memory of event manager and real time DB
- client sends commands (write/read)

- Data exchange peer to peer from server
- DIM server running on CCPC or SPECS
- SPECS multi-master board – 4 different busses
  - 15 different types of DAQ and trigger boards (in total some 400)
  - Credit Card sized PC
  - common readout board (Tell1) based on FPGA technology to adopt specific needs
  - readout boards host embedded microcontrollers to access I2C, JTAG and general purpose bus
  - isolated access path to robustness generic server to communicate with ECS (DIM) client

Modelling the Experiment Control System (ECS) with Finite State Machines

- in order to model the experiment at an expert system level states and actions have to be defined
- from the top node (run control) commands can be propagated downwards a hierarchical tree
- in order to model the experiment at an expert system level states and actions have to be defined
- rules defined for control unit if its children make a state transition
- commands can cause state transitions and act on datapoint of device unit
- push-protocol supposes without acknowledgements
- in areas with no radiation:
  - SPECS (Serial Protocol for ECS)
  - SPECS multi-master board
  - SPECS mezzanine board
  - SPECS SLAVE MEZZANINE BOARD
  - SPECS multi-master board

- DIM – Distributed Information Management System
  - portable lightweight communication layer to interface hardware from ECS
  - server crashes it can easily republish on DNS node (Robustness)
  - clients can be installed on any machine just specifying DNS node (Portability) – no need to take care of connectivity
- DIM server running on CCPC or SPECS master PC publishes services to DIM Name Server (DNS) from where the client (ECS) can subscribe to it.
- Data exchange peer to peer from server to client
- Client sends commands (write/read) – server updates services (data/status)

- Electronics Interface:
  - SPECS (Serial Protocol for ECS)
  - SPECS master PC can talk with up to 32 slaves on general purpose bus
  - isolated access path to robustness generic server to communicate with ECS (DIM) client

- DIM client panel from where commands can be launched shows its own and the children’s state