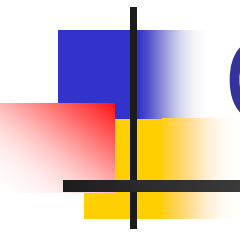
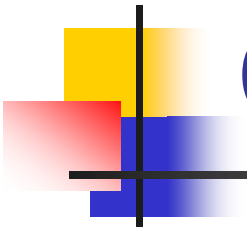


BaBar Transition: Computing/Monitoring

Steffen Luitz

BaBar Online Coordinator

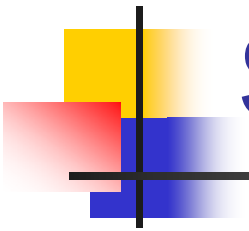
8/6/07



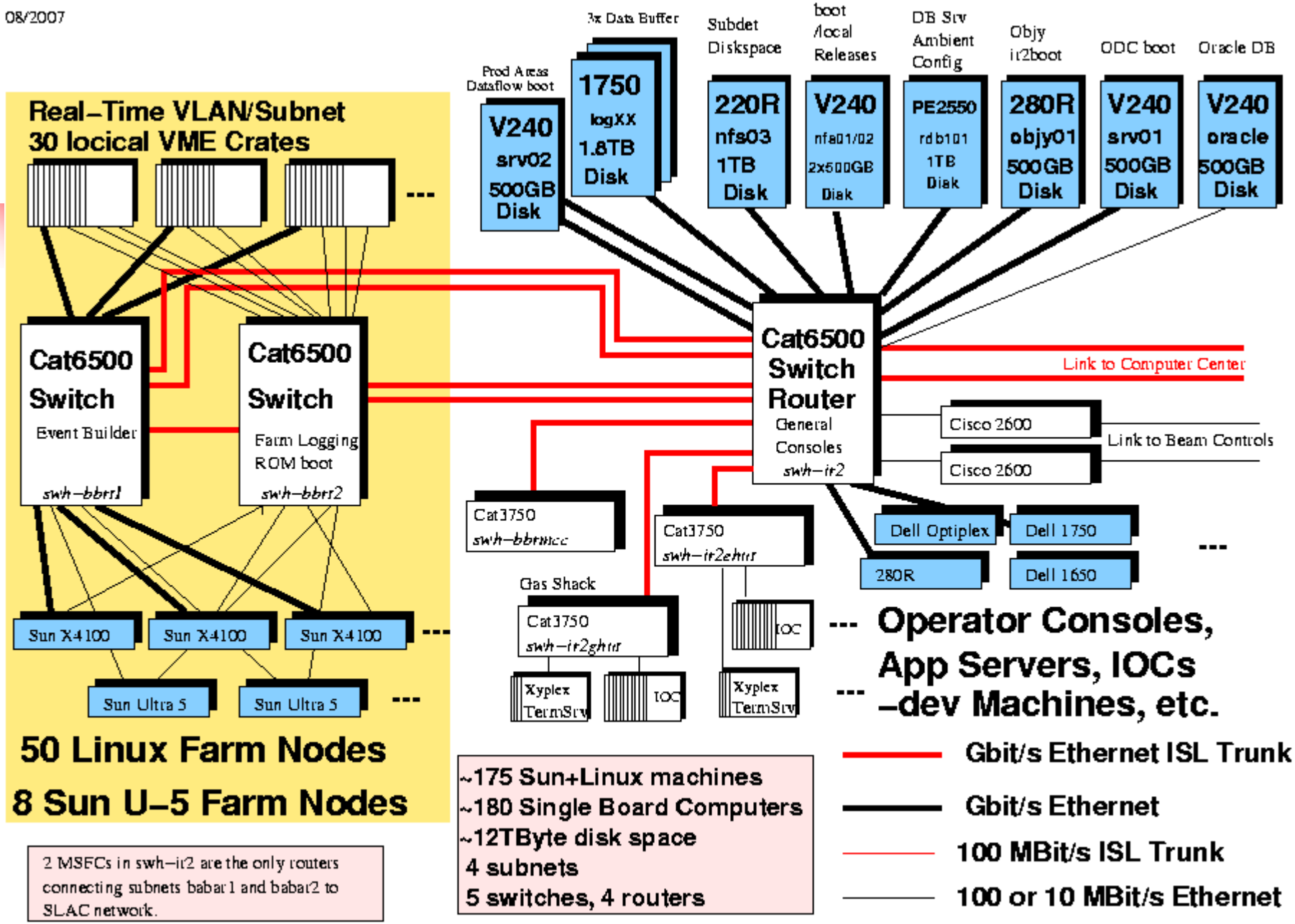
Content

- The current BaBar Online System
- Requirements for minimal maintenance State
- Minimal maintenance state implementation
- Conclusion

The Current BaBar Online System – Main Components



- Data Acquisition
  - ~150 single-board computers (SBCs) in ~ 20 9u VME crates
- Level-3 Trigger / Event Processing Farm
  - 50 1u Dual CPU/Dual Core servers
- Detector Controls
  - ~ 20 SBCs
  - Monitoring and controlling tens of thousands of channels
    - HV, LV, temperatures, pressures, flows, strains, etc.
- Computing Infrastructure
  - 10s of file and application servers
  - Operator and user consoles
  - Network switches and routers

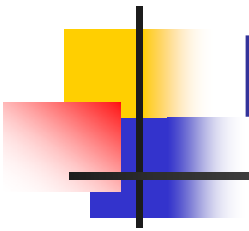


2 MSFCs in swh–ir2 are the only routers connecting subnets babar1 and babar2 to SLAC network.

~175 Sun+Linux machines
~180 Single Board Computers
~12TByte disk space
4 subnets
5 switches, 4 routers

BaBar Data Acquisition and Controls Networks

Minimum Maintenance State Requirements (1)



- Detector monitoring / controls
  - Temperature, humidity, gas flows, strain gauges, power status, etc.
    - Few 100s of “channels”
  - Automatic alerting (e-mail/paging)
  - Logging / archiving of monitoring data
    - Maintain history

Minimum Maintenance State Requirements (2)

- Data Acquisition System
  - Considered to maintain a capability to take calibration data
    - In case it would be needed to understand beam data
    - Significantly more labor intensive to maintain
      - Active maintenance of online software required
        - Keep up with operating system versions, etc.
      - Regular exercising of hardware and software
        - Detect and repair hardware and software rot
    - Not very useful without on-detector front-end electronics powered up
      - Prohibitive amounts of effort needed to power up front-ends
      - Even if done, the credibility of tests may be very limited
  - For now we decided against maintaining such a capability

Minimum Maintenance State Requirements (3)

- Computing and Network Infrastructure
  - Minimize number of systems / devices
  - Minimize power consumption
    - Strong preference for no external A/C required
    - Maximize UPS bridge time
  - Maximizes re-use of still usable systems / devices
  - Secure remote power control and console access
  - UPS for all monitoring – 24h minimum
  - Make everything conform to SLAC computer center standards
    - Hardware and Software

Minimum Maintenance State Requirements (4)

- Other requirements
  - Re-use as many systems/devices as possible
    - BaBar Offline
    - Other SLAC
  - Preserve ALL central Online system data currently on BaBar online system disks (and tapes)
    - Archived ambient data
    - Error logs
    - Software archives
    - Databases
- Physical and Cyber Security
  - Network devices and servers need to be installed in secured locations
  - Isolate controls system network
  - Restrict access to controls system network

Minimal Maintenance State Implementation (1)

- Network infrastructure
  - Use our 3 existing 1u Cisco 3750 to build monitoring network infrastructure
    - No new hardware required
    - Low-powered devices, no A/C required
    - Estimate: ~1FTE-month to rebuild network
  - Asset preservation
    - Re-use 1 Cisco 6500-720 (2 yrs old in 08)
    - Retire 2 old Cisco 6500-SUP1

Minimal Maintenance State Implementation (2)

- Data Acquisition System / Online Event Processing
  - Turn off VME crates and Online Farm
  - Asset preservation
    - Re-use 50 Online Farm nodes (1 yr old in 08)
      - Install in computer center building for BaBar offline processing
    - VME crates and power supplies may be re-usable

Minimal Maintenance State Implementation (3)

- Detector monitoring and controls
  - Set up 1 file server and 1 console
    - Have file sever managed by SCCS
      - Including automated backup of software and archive
  - Needs small number (1-3) of 6u VME crates.
    - Use our most modern Linux IOCs to build monitoring
  - Keep current (already frozen) BaBar EPICS version
  - Build small monitoring software system
    - “From scratch”, re-using existing BaBar detector controls code
  - Use EPICS standard archiver to record monitoring data
  - Asset preservation
    - Except for custom VME cards, and crates, most controls system components are too old to be redeployed in any useful way
  - Effort: total 3 FTE-months to build, 1-2h/week to maintain

Minimal Maintenance State Implementation (4)

- Computing Infrastructure
  - Turn off
  - Asset preservation
    - Re-use newer file servers for BaBar offline
    - Re-use newer disk arrays (T4) for BaBar offline
    - Most other components are to old to be redeployed

Minimal Maintenance State Implementation (5)

- Preservation of data
  - Move data to file servers in SLAC computer center
    - Will need ca. 6 TByte
    - Convert data that is only accessible through special servers (e.g. CMLOG) to flat files for easy browsing
    - Move Oracle server to computer center
      - Holds e.g. electronic logbook

Summary

- Minimal maintenance state requirements well understood
- Overall implementation plan well understood
- Next steps: work out details and schedules