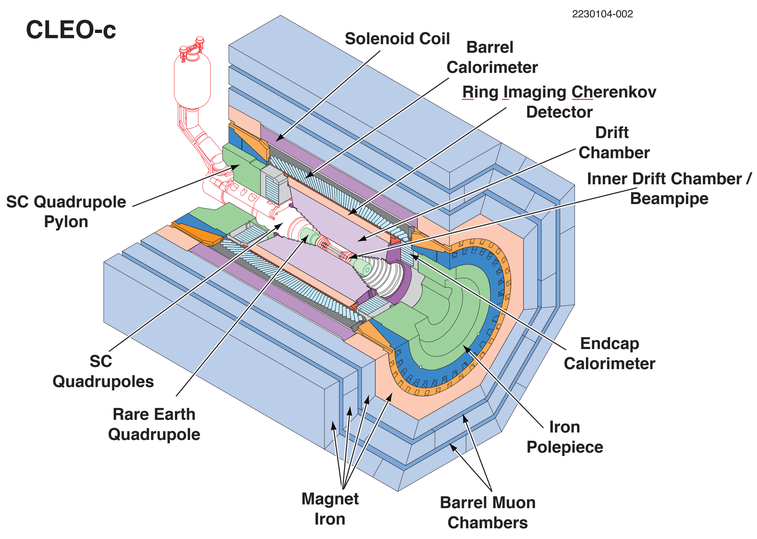
LINUX for the CLEO-c ONLINE SYSTEM

Hubert Schwarthoff, Tim Wilksen, Cornell University, at CHEP04

CESR-c e+e- Collider
at Cornell University, USA

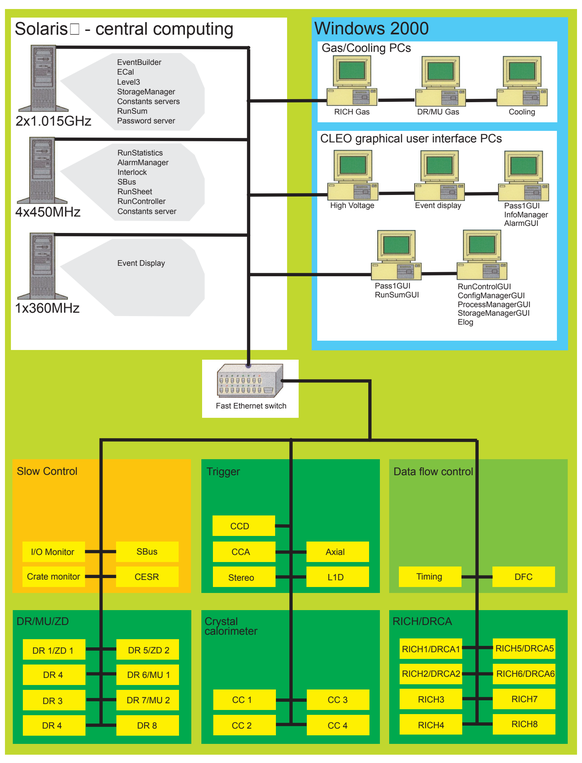
CESR-c: Charm factory for e+e- collisions
at 3 GeV - 5 GeV, 2004 - 2008

CLEO-c: Symmetrical detector for CESR-c
- Crystal Calorimeter (8000 channels)
- Vertex Drift Chamber (96)
- Tracking Drift Chamber (10000)
- Ring Imaging Cherenkov detector (230000)
- Muon chambers (1000)



CLEO-c DAQ system:

- 31 VME PowerPC
- 100MB/s Ethernet
- Central system: 3 Solaris workstations
  - EventBuilder: 1.015 GHz UltraSparc III
- Operation: 5 Windows PCs
- Other: 3 Windows PCs for Gas/Cooling
- Event size: < 20 kBytes
- Readout rate: < 100 Hz
  - Future requirements: J/ψ production
  - threshold at 3.1 GeV @ 1 μb cross section
    - → expect readout rate ~ 300 Hz



Software:
- CORBA/C++ for Slow Control
- VME: VxWorks 5.3 with VisiBroker 3
- Unix: Solaris 8 with VisiBroker 5
  - Slow control database: Objectivity 8
- Data storage:
  - binary files on cache disk,
  - tape robot (Veritas Media Manager)
- PC: Windows 2000 with VisiBroker 5
- Operator interfaces: Java GUIs with
  - VisiBroker 5 on Windows

Current configuration is sufficient for basic operation at 300 Hz. More performance is desirable, e.g. for diagnostics.

The Linux alternative: 3 fold performance for the same price

2002 - 2004: CLEO generic and Offline software ported to
- Red Hat Linux 9 (see poster 183 by V.Kuznetsov)
- Main effort: C++ compiler compatibility
- Added: New event store
  - (see poster 198, presentation 199)
- CLEO is adding Linux nodes to its analysis farms
  - to replace solaris
  - Exception (for now): Tape robot operation

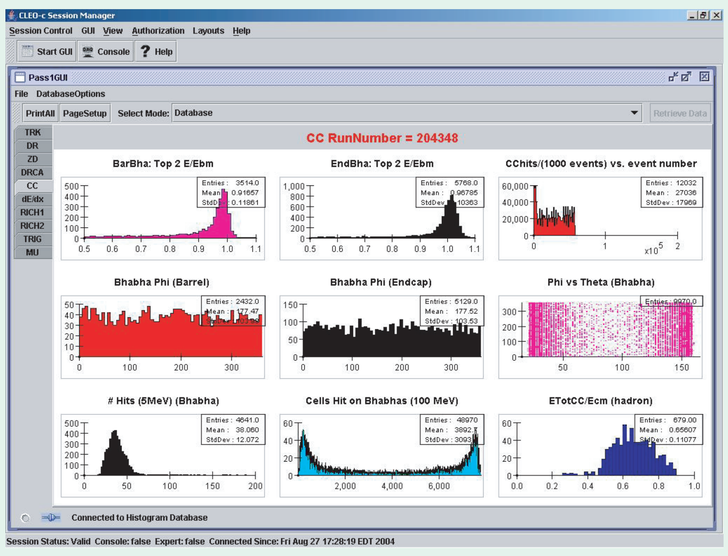
→ 2004: CLEO Online software ported
- to Red Hat Linux 9
- Main effort: third party software!
  - Licensing tightened for new versions
  - - VisiBroker for process communication
  - (v. 6 for Linux)
  - - Objectivity for Online database (v. 8 for Linux)
- Endian conversion for binary data handling

Linux Online!

Performance comparison:

Pass1 diagnostics program
- C++
- Performs data checks
- Simple track reconstruction
- Creates realtime histograms

◆ always CPU limited



Solaris hardware: 1.015 GHz UltraSparc III
- Operating system: Solaris 8

Linux hardware: 2.4 GHz Pentium 4
- Operating system: Red Hat Linux 9

Result:
Solaris Linux
5.2 events/s 17.2 events/s

(Scales by > CPU clock speed!?)

Linux testing checklist
- Operator interfaces (Java) ✓
- Central data readout ✓
- Central slow control ✓
- HV control ✓
- Tape robot control ✗

Plans for 2005:
- Full system upgrade to Linux
- Move tape robot controller to Linux
  - (depends on third party support)