Correlator Backend Computing

Bruce Rowen
EVLA Computing

Correlator Backend Computing

WIDAR Correlator

- 160 data pipes from the baseline boards
- Potential for > 1 gigabyte per second data rate per pipe
- Hardware performance is “fixed” upon delivery

Backend Computer Configuration

- Probably a loosely coupled cluster to handle data rates
- Use COTS computers to reduce costs
- Keep hardware upgrade path flexible to adapt to new technologies

Correlator Backend Computing

Goals

- Decouple backend computing from the correlator hardware
- Design correlator data pipes with future COTS systems in mind and build for best data rates
- Provide ability to direct data pipes into arbitrary backend computing topology
- Design backend computing topology with near real time self healing capability

Correlator Backend Computing

Correlator Hardware Decoupling

- Use industry standard protocols and media

  Fast, Gigabit, and 10 Gigabit Ethernet, InfiniBand, SONET
  Fiber Optics, Copper, ...

- Have ability to tailor protocol as back end computing scales with technology

  Use Fast Ethernet until cost of Gigabit Ethernet hardware becomes affordable
  Use parallel data pipes or single firehose to scale data rates.
  "Wrap" data frames so data can be sent in packets (i.e. UDP packets)

- Allow for hardware design to be "set" now and allow backend computing hardware decisions to be deferred until later

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Backend Computing Topology

- Use packet switching devices so arbitrary data flow connects can be made
- Have computer “hot spares” available for alternative parallel data processing and near real time swapping with failed systems
- Allow arbitrary paths for data dumping to short term storage (disks), long term storage (archive), or real time image pipelines (or all three).
- Upgrade hardware as new technology becomes available or data rate needs increase
- Allow for a small number of high speed computers or a large number of “throw-away” computers (or both)

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