Data Acquisition

ECFA DESY
Linear Collider Workshop

ECFA/DESY LC Workshop

Amsterdam, Apr. 3rd 2003

Agenda

Vertex detector readout	J. Goldstein
Silicon envelope readout	A. Savoy-Navarro
Minical/Tile-HCAL readout	V. Korbel
CALICE test beam readout	P. Dauncey
Front End card from TRIUMPF	J.P. Martin
LC DAQ guidelines	P. Le Du
Discussion	All

Activities

ECFA DESY Linear Collider Workshop

- Detector readout R&D

  Using existing (modified) electronics (TPC, HCAL, ...)

  Developing of new front end readout chips (LCFI, SiLC, Calice, ...)

- Test systems and tools

  Existing setup for TPCs in several Labs (based on STAR, ALEPH,....)

  Building of a new test system for ECAL/HCAL beam tests (CMS based)

- In general

  First common tools for different detectors are being prepared

  Discussion on a general data handling model has started

  -> need to coordinate and foster increasing number of activities

Coordinate and Foster DAQ R&D

ECFA DESY Linear Collider Workshop

- To coordinate the DAQ R&D

  Define building blocks and their functionalities

  Identify common parts

  Specify interfaces between these blocks

  Identify uncovered readout R&D areas

- Foster R&D efforts

  Encourage common test systems for different R&D groups

  Develop tools to ease beam tests

  Collect and provide information on existing R&D efforts

- Prepare guidelines

  Guideline document : defines functionalities and interfaces

  These guidelines cannot be static, regular updates are foreseen

Data Handling Model

ECFA DESY Linear Collider Workshop

- Data handling logically divided into 4 layers

  Front end readout

  Central data collection

  Event building and processing

  Permanent storage

- Between these layers interfaces are defined to

  Enable parallel development of components in different R&D groups

  Reduce dependencies, allow technology changes at a later stage

- Control and Monitoring is an essential part

  Clock distribution, bunch tagging

  Run control, process control, calibration, monitoring

  Keep designs Global Detector Network aware !

Functionality of the Layers

ECFA DESY Linear Collider Workshop

- Front end readout

  Hardware : Preamplifier, shaper, ADC, memory, ...

  Functions : zero-suppression, hit/cluster finding, buffer, multiplexing

- Central data collection

  Unique intelligent interface cards (FPGA ?)

  Input buffer, data formatting, data reduction (data compression?)

  output buffer and standardized interface to event building

- Event building and processing

  Commodity hardware : network switches, processor farm (PC?)

  Full event data processing, all bunch crossings of a complete train

  Software finders will tag 'bunches of interest' for permanent storage

Interfaces between Layers

ECFA DESY Linear Collider Workshop

- Front end readout – central data collection

  Serial (optical?) link

  Intelligent driver and receiver cards for flexibility

  Data buffers to desynchronize

- Central data collection – event building

  Commercial network, including a standardized protocol

  Several data streams in parallel ('partitioning')

  Today : 10GbitEthernet and TCP/IP (alternative : Merynet a la CMS)

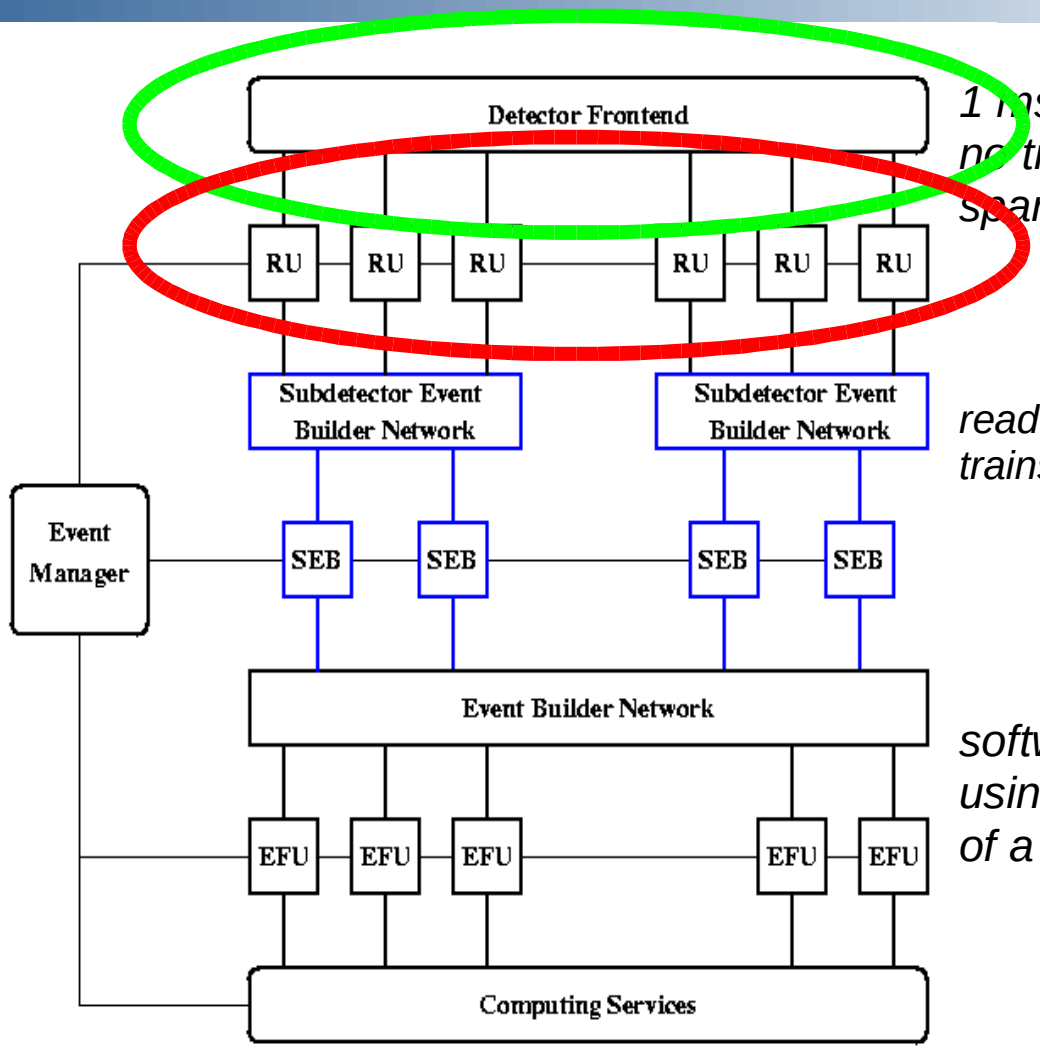
- Event building - permanent storage

  Same type of commercial network and protocol as above

  physically same hardware or dedicated hardware ?

Data Acquisition Overview

ECFA DESY
Linear Collider Workshop



1 ms pipeline, no trigger interrupt, specification

detector specific, common functionality

Uniform interface, standardized

readout between trains (200ms)

Commodity hardware standard protocols

software event selection using full information of a complete train

Outlook

ECFA DESY Linear Collider Workshop

- Guidelines

  First version of the guideline document in preparation

  Detailed documents on specific parts will follow

  Data handling working group needed to coordinate and foster R&D

- Working group for data handling

  Keep guideline documents up to date

  Develop and define standards and tools

  Need input from ALL detector R&D working groups : please join !

  Mailing list : ECFA-DESY-DAQ@desy.de

  To subscribe send a mail to guenter.eckerlin@desy.de

  2-3 meetings per year, next ~ Autumn '03 (next ECFA Workshop)