

The Software Trigger Concept for the TESLA Detector



G. Eckerlin
DESY / Hamburg

Outline

Introduction

Boundary Conditions

Trigger/DAQ Concept

Introduction

TESLA will be a high luminosity collider aiming for precession physics

- large data volume due to
 - high background rates
 - high event rates from some $\gamma\gamma$ reactions
 - high detector granularity
- rare physics processes may be hidden in a large data rate
 - need deadtime free data acquisition and event selection
 - need full event information for high efficient event selection
 - need highly flexible for event selection

Long lifetime of the experiment

- scalability, maintainability, modularity is essential !

Boundary Conditions TESLA operation mode



2820 bunches grouped in trains at a rate of 5 Hz

Very long time between bunch trains: 199 ms

time between bunches: 337 ns

bunch trains length : 950 μs

Boundary Conditions

The Detector

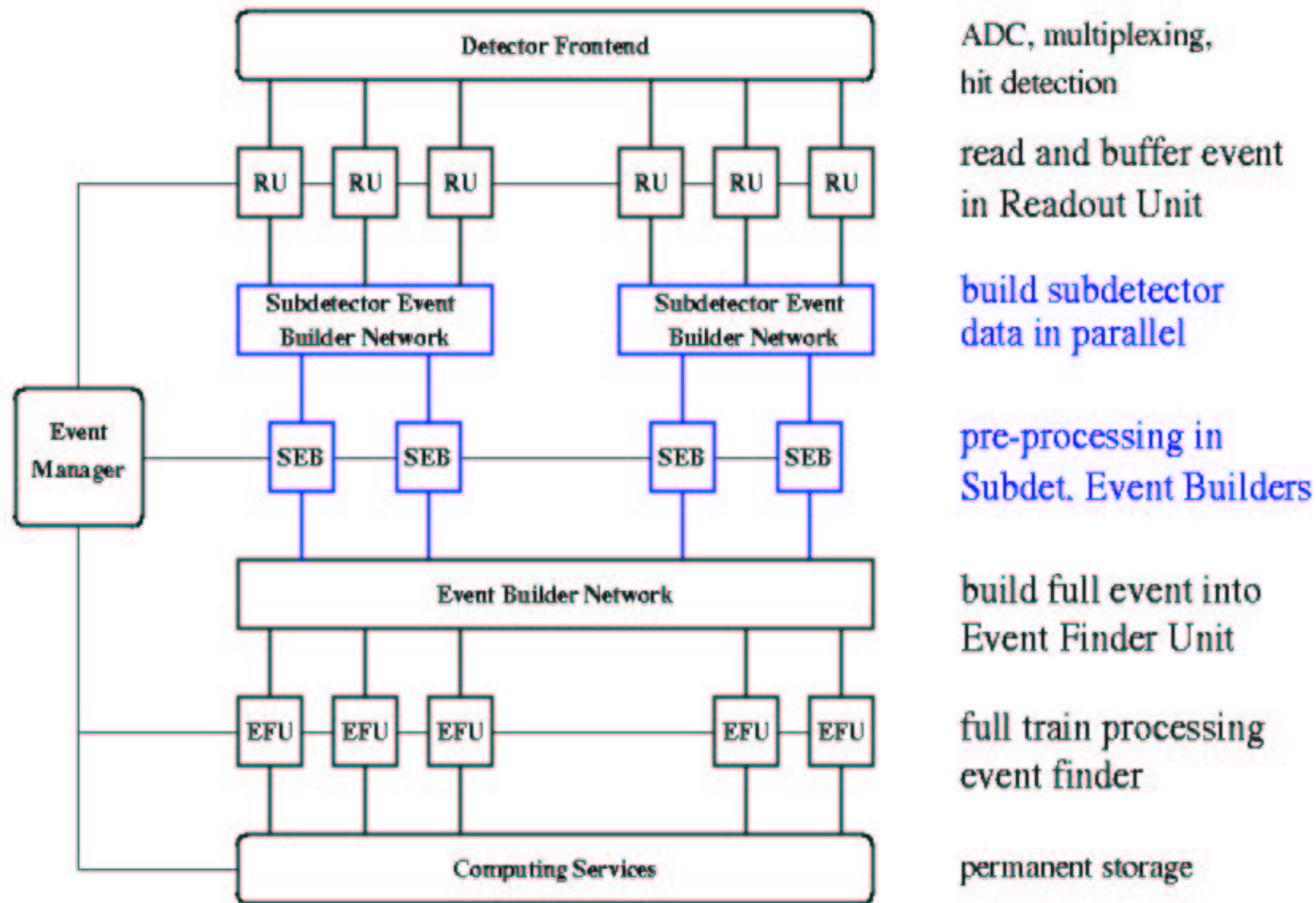
Large hermetic detector with high granularity

- 5 layer vertex (CCD) ($8 \cdot 10^8$ channels)
- main tracking (TPC) ($1.5 \cdot 10^6$ channels)
- ECAL (SiW) ($32 \cdot 10^6$ channels)
- HCAL, IRON,
- total $8.5 \cdot 10^8$ channels

Trigger and DAQ Concept

- read and store data of complete bunch train into pipeline
 - no hardware trigger interrupt
 - 1 ms active front-end pipeline
- perform zero suppression and/or data compression
 - manageable data volumes online
- event read out between trains (200ms)
 - may need multi train buffer and readout in parallel
- apply software selection online
 - full event data information of complete train available
 - store classified events according to (physics) needs

Trigger and DAQ Concept Overview



To be adressed....

Hardware (this session)

- where to put the boundary subsystem DAQ / central DAQ
- decide on the interface
- when start design of the common parts for the DAQ ?

Software (simulation session)

- need simulation of realistic event and background
- design algorithms and selection strategies
- develop a (common) on-line and off-line computing model
 - event filter strategies, analysis and processing, data access