Decision Node

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System & Context

Data Transfer
- Latencies
- SVT

Decision Node
- Hardware
- OS
- Algorithms
- Prescales
- Performance

TL2D Formation

Beam Tests
**Pulsar to PC**

**Latency is key**
Construction of system hinges on ability to package data and send it to PC

**Data Source & Sink**

**Slink mezzanine card**
Sends data in S-link format

**Decision Node**

**S32PCI64**
Receives S-link packet
Writes directly to memory (DMA) via PCI bus
Early tests
Round-trip timing

Decision Times (no algo) : Opteron & Xeon

- Opteron 2.4 GHz, Mean: 7.26 µs
- Xeon 3.2 GHz, Mean: 7.39 µs
- Xeon 2.4 GHz, Mean: 7.76 µs

Data Source & Sink
Decision Node
**Two data paths**

SVT data arrives with ~20 $\mu$s latency
Non-SVT data arrives earlier

Split paths allow us to
- *evaluate non-SVT triggers*
- *send L2R for events with no SVT prereqs*

Split paths requires some sifting of packets
Use standard Linux for real-time operations with 2 CPUs

- Tie all interrupts to one CPU
- Free second CPU to process events
**Algorithms**

**Current versions**
Ported directly from alpha
Minimal changes necessary to compile
Extensive bit-level checking

**Future versions**
Overhauled so that code is clean and easy to maintain
Extend beyond 128 trigger bits
Optimized to improve performance
**Hardware**

*Choose between Xeon (Intel) & Opteron (AMD)*

Memory architecture gives AMD faster access.

AMD is our choice.

Very easy to switch back if necessary.
Xeon(Intel) vs Opteron (AMD) Architecture

Intel architecture

AMD architecture
**Speed**

Includes transfer and algorithm times.
Prescales

- Prescales to be done in node

- Sent to node from TriggerDB during configuration
  - [ see next talk ]

- Not conceptually difficult
  - Mimic solutions from alpha
Decisions & TL2D

• Node sends decisions to L2TS
  – Reject: short packet
  – Accept: long packet with TL2D bank

• TL2D bank creation on node
  – Mimic code from alpha
  – Encode scaler counts
    • [ see next talk ]
**Beam Test: Configuration**

**Input from two data paths:**
- Merger (Muon/L1/XFT)
- SVT

**Algorithms**
Hardcoded trigger table “PULSAR_TEST”
- *Muon & Track triggers*

**Control & Mon**
Member of partition
Receives & responds to HRRs

**Output**
Packet sent to L2TS on decision
Beam Test: Results

In parasitic running, all decisions match exactly, with and without prescales.
Next Steps

- TL2D Creation
- Finish AMD porting
- Code optimization
- Test CES/Cluster triggers
- Testing, testing, testing
- Ready for full TriggerTable
Schedule + Manpower

- TL2D Creation
  - People: Kristian
  - Complete: Oct 15

- Finish AMD porting
  - People: Kristian
  - Complete: Oct 15

- Test CES/Cluster triggers
  - People: Daniel (Kristian)
  - Complete: Nov 15

- Code optimization
  - People: Kristian & Daniel
  - Complete: Nov 15

- Testing, testing, testing
  - People: Daniel (Kristian)
  - Complete: Jan 1

- Ready for full TriggerTable
  - Complete: Jan 1