
Global L2 Outputs (and inputs)

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Conventions on L2G Inputs? Docs should specify

- E, P, Pt in GeV?
- sort descending in Pt (in intelligent cutoff)
- η if reported in $[-4,4]$
- ϕ if reported in standard $[0,2\pi]$
 - integerized variables: least count $1/2^n$; give units
 - IEEE byte order for floating
 - integers little-endian in alpha
 - no fields crossing 4B boundaries
- keep total for avg event < 1 KB
- details on L2 data transfer web pages

L2G Input Compression Tradeoffs

- Compression saves
 - transfer time into Global
 - transfer time from L2G memory to cache
 - (less so) L3 readout time
 - conversion time in preprocessors
 - trade $N_{\text{preprocessor}}$ v.s. $\text{Speed}(\text{Global})/\text{Preprocessors}$
- Compression costs: conversion time if
 - different units used in different detectors
 - desire to change to “natural” units or floating point

Tradeoff in L2Global α

(500 M Inst/s, 320MB/s)

- $500 / 320 = 1.56$ instructions in time to move 1 B
- Time Budget roughly $80 \mu \text{ sec} = 40\text{K}$ instructions
- Compressed inputs about .5 KB \Rightarrow 80 Inst/B budget
 - “tolerable” overhead (once): 5% = 4 Inst/B or so
 - 1B \rightarrow 4B: move extra 1.5 KB costs $5 \mu \text{ sec} = 4.7$ Inst/B
- Access of B data: {Load,Mask,Shift,Sto}
- Convert B data: {Load,Mask,Shift,Float,Mult,Sto} (once?)
- Access float Data: {Load} gains 3-4 Inst/B per access
- IF data accessed more than once,
 - attractive to convert in preprocessors
- To evaluate tradeoff, need better model of size,use patterns--
code and simulators
- These estimates ignore multiple pipelines on α ...

Serial Command Link from L1, L2 HW FW

- L1 accept

 - 128 bit L1 trigger mask, geographic sector event number

- 16 bits of qualifiers (total, not per sector)

 - Mark and Pass Event*

 - Monitoring Event* (need own L1 bit, or just qualifier?)

 - signal to capture Monitoring data

 - allows synchronization to 1-event level in L1/L2

 - Needed:* Should L2 Preprocessor run (6 bits at least?)

 - 8 or more available for L2 subsystems (Hi/Lo obj thresh?)

 - Is This Enough?*

- L2 accept

 - 128 bit mask + geographic sector event number

L2 Outputs to L3

- 128 bit L2 trigger mask
- **All inputs to L2 Global?**
 - for compactness, but .5-2 KB overhead in Global
- Passed L2 objects for L3 filter guidance
 - Tie to L2 trigger(s) which passed
 - just pointers to input objects? Or also cut set ID?
 - Loses information, but not location...
 - timing tests needed to assure feasibility
- translate into C++ object w/ pointers in L3?
- Full “transcript” of results only on M+P events
 - data volume limitation: most filters, objects fail

L2 to L3: More discussion needed

- Hope to be able to build L3-like objects for L2 in L3 code from L2G output data; hope to avoid needing full L2 script in L3 to do this
 - candidates for passed bits => slow scan and copy if event passes
 - sending all candidates likely too large in data volume for L2G VME readout
- What is needed? Ability to map candidates to bits, or greater detail?
 - Some worries about building most detailed structure:
 - 128 bits X 10 instructions = 3% of budget
 - avoid overheads for (most) bits which fail
 - Mark and Pass: L3 send both passed and failed candidates, or passed in 1 structure and both in a second structure?
- High Level tools (mass):
 - how to point to relevant candidates?
 - Tool entry points? Pointers? Peeking into frame's data structure?
 - just latest run of the lower level tools needed?

Questions on Traceability

- did this event pass my trigger
 - easy--stamp L2 bit mask on event, supply named-access routines
- did this object actually participate in the triggering
 - not too bad: stamp objects “passed” by tools in script with this L2 bit which are “passed” objects in a complex script?
 $J(2,50)*J(1,25)*e(15)*M(e,j>25)$
Good objects list unique, or duplicates if passed by multiple tools?
- Which cuts did this object pass
 - in addition, stamp objects with parameter set number and tool ID(s) using them (e.g. jet, plus mass)?
 - need trigger script to find cuts used (database or run header)
- Did this object also pass the lower-level trigger
 - L2 candidates must be possible to associate (or not) with L1 trigger
 - need trigger script again