

# Nuggets from CHEP2012

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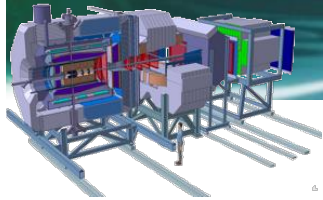
6/13/2012

# Future Hardware Developments

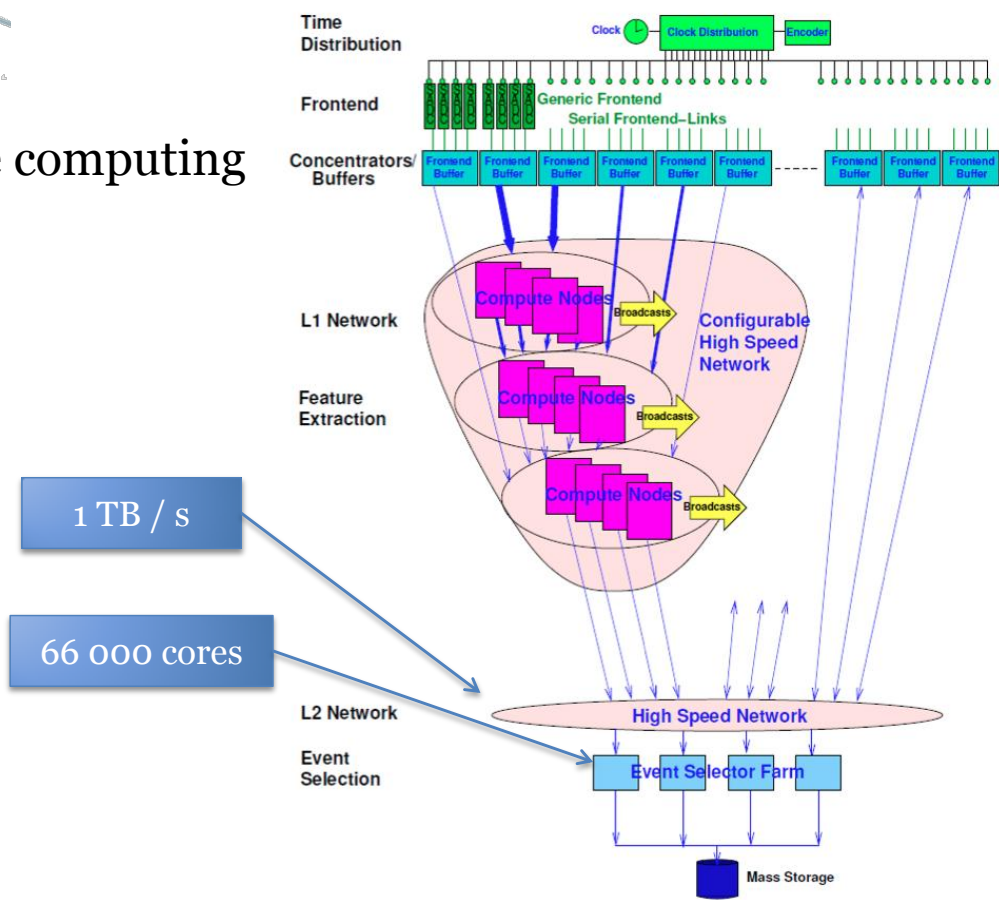
- # of cores/CPU will max out due to DRAM access
- # of sockets (CPUs) will be increased to maintain Moore's Law
- FPGA integrated with CPU
  - Direct implementation of some algorithms
  - Performance/Watt advantage
- GPU integration with CPU
  - First stage will put them on same socket, but then on same die as CPU
- ARM technology may start competing more with x86

# CBM and Panda Will have NO Level-1 trigger!

Full reconstruction will be done online



## Panda Online computing and readout

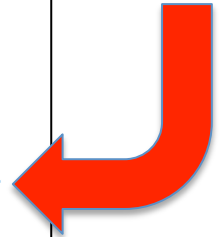


5/24/2012

## The Challenge: Event reconstruction in Real Time!

- Complete reconstruction up to particle identification are necessary to identify signal and background
- Requirement for stability and reliability is even stronger than for “offline code”
  - if we make mistakes here, we can never recover
- The online reconstruction code should deliver the same resolution and efficiency as offline code.

**WOW!**



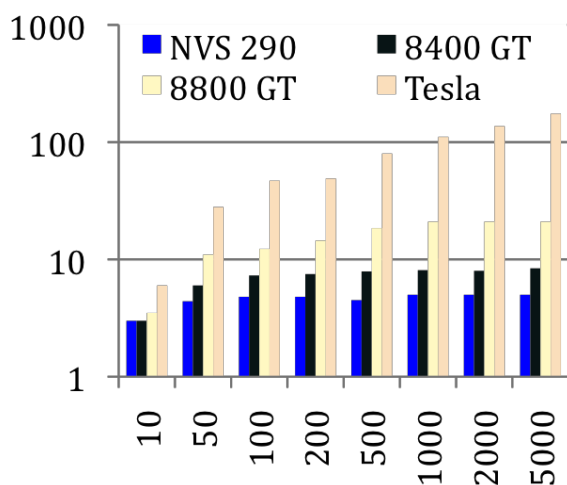
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*Slide from Mohammad Al-Turany from GSI-Scientific Computing shown at CHEP2012*

## We start using more GPU specific features: Texture memory for field maps

### Track propagation (RK4) using PANDA Field



Speedup : up to factor 175

Trk/ Event	NVS 290	8400 GT	8800 GT	Tesla
10	3	3	3.5	6
50	4.4	6	11	28
100	4.8	7.3	12.3	47
200	4.8	7.5	14.5	49
500	4.5	7.9	18.5	80
1000	5	8.1	21	111
2000	5	8	21	137
5000	5	8.4	21	175

ACAT 2010: Applying CUDA Computing Model To Event Reconstruction Software  
<https://indico.cern.ch/contributionDisplay.py?contribId=147&confId=59397>

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Have done  
somewhat  
extensive  
testing of CPU  
vs. GPU vs.  
FPGA

*(GPU wins)*

Slide from Mohammad Al-Turany from GSI-Scientific Computing shown at CHEP2012

# ROOT 6

- ROOT v5.34 will be the last version of the 5.XX line
- ROOT v6
  - Will be released in late Nov. 2012
  - CINT will be replaced by CLING (*based on CLANG*)
  - Parallel I/O
  - Ported to iOS (iPads)

# GEANT4

- **Event-level parallelism** (*as opposed to partial track-level parallelism reported at workshop in Jan. 2011*)
- Only on Linux
- Only Batch mode
- “Parallel Worlds” mechanism will provide similar functionality to GEANT3’s “MANY”
- Special version of CLHEP will be embedded in GEANT4 (*external installation will no longer be required*)
- Geant4 “X” beta release in June 2013
- CMake used for GEANT4 (*seems popular for other projects as well*)