ACAT 2013 summary



Adam Alloul, Eric Conte

BATS meeting



ACAT trinity





Typical organization of one conference day:

- Morning: plenary (one talk for each field)
- Afternoon: parallel session (one session dedicated to each field)

Personal comment: some talks were not classified in the proper field.

Bat-prism





Institut Pluridisciplinaire Hubert Curaten Strasbourd

A relevant plot as introduction slide

Initially expected to be true until 2015 (limitations : quantum effects)

Current problem = thermic dissipation

Alternative = multi-core architecture



slide 5



New architectures

- GPU:
 - Example of MadGraph production on GPU
 - C-based language : OpenCl vs CUDA (NVIDIA)
- New APUs
- ARM processor: low power processor (high performance / watt) This has led to the introduction of ARM-based servers in recent years, such as the Boston Viridis:
 - 192 cores in a 2U rack mount, consuming <300W
 - 48 quad-core nodes (1.4GHz Cortex-A9)
 - \$20k

Successful tests on ARM servers for running CMS or LHCb software

• Issue of heterogeneity



Evolution of distributed data and Grid

- Immediate future:
 - new DDM (Distributed Data Management) system
 - new Grid production system for ATLAS: prodSys2. What about Crab ?
 →be ready of the LHC restart
- Concurrency: more efficient usage of modern multi-core processor Ex: AthenaMP (MP=MultiProcess) for ATLAS
- **Cloud computing:** requiring public-private partnership ?
- Usage of HPC (High Performance Computing)
 Firsts tests in USA (Argonne) and Germany (Munich and Mainz)



• Federated storage:

Traditionally, jobs go to data. Accessibility can be improved by local replication of data. With federation, jobs running can run at any site (in fact running on shared storage resources via WAN).

→ Generalization of the **XRootD** system







Computing language & code

- Autovectorization:
 - Heavily compiler depend (ICC & GCC)
 - Gains not as significant as with direct techniques
 - Difficult to control

Vectorialization:

- Cilk+: "C extended array notation"
 - \rightarrow included in ICC but not yet in GCC
- Smart intrinsic wrapping such as Vector Classes (VC)
- Classical parallelism techniques:
 - OpenMP
 - TBB
 - MPI ???!???

Mx technologies \rightarrow good recipe : autovectorization/Cilk+ + OpenMP/TBB + MPI



Computing language & code

- 2 new tools for code profiling:
 - GOODA:

tool developped by ATLAS and Google.
uses Linux performance tools to collect monitoring information.
→ useful to find bottlenecks. Apply on ATLAS code.

• **PIN: dynamic binary instrumentation framework from Intel** instrumentation done on binary at run-time.

 \rightarrow demonstration on CLHEP ! Not a well optimized library

 New diagrams for improving Doxygen documentation VINCIA (<u>http://vincia.hepforge.org/</u>).
 Status = in development. Need manpower.
 Vincia generates workflow diagram (algorithm) whereas Doxygen use by default structure diagrams (interaction between classes). Seems to be restricted to Pythia 8.



Computing language & code





Track 2: Experimental physics



From my point of view, review talks were tasteless. Some instances:

- computing science applied to Earth Physics or astrophysics
- MVA

A wide range of topics for parallel sessions!

- The most relevant talks were dedicated to trigger system and to tracker alignment
 → algorithm + limited time budget
- One talk about MVA application in the ttbar + higgs analysis (Jason Slaunwhite).
- Analysis framework: Nuclear physics: R3Broot & Simone VISPA: a web-based development environment for collaborative data analysis
- Some friends: Delphes 3.0, MadWeight, ...
- Original techniques: monitoring by wavelet, ...

Track 2: Experimental physics



• Original techniques: quasi-optimal weights

Quasi-optimal weights + Oberon =



Track 2: Experimental physics



ROOT overdose !







Adam's talk

The atmosphere was great





Chinese folklore









Next ACAT in September 2014 @ Prague