Nel-CH: use cases in SWITCHengines

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AEC - Laboratory for High Energy Physics, University of Bern, Switzerland

SWITCHengines workshop
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FOR FUNDAMENTAL PHYSICS

LABORATORIUM FÜR HOCHENERGIEPHYSIK
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NeI-CH: National e-Infrastructure for CH

NeI-CH: National e-Infrastructure link for Switzerland

Co-funded for 2015-2016 within SUK P-2 *"Wissenschaftliche Information: Zugang, Verarbeitung und Speicherung"*

http://www.lhep.unibe.ch/neich/

The Swiss e-infrastructure link to the European e-Infrastructure EGI

Operated by AEC-LHEP on a mandate from SwiNG

Longer term goal of enabling the Swiss natural sciences community to catch up at European level and establish a link to Horizon 2020

- Swiss membership and access to EGI, representation in the EGI.eu council
- Central operation of Swiss parts of the EGI infrastructure
- Migration to sustain the future evolution of EGI (cloud federation)
- Widen the interdisciplinary use base, creating benefits for a large community
  - an informal eScience team at UniBE
  - application-agnostic computing platforms (e.g. clouds)

Nel-CH: use cases in SWITCHengines

TmLQCD (Twisted Mass Lattice QCD)

- Open Source
- coded in C, MPI
- compiled on Ubuntu
- 8-core, 4GB/core RAM

https://github.com/etmc/tmLQCD

GEANT (Geometry and Tracking)

- Open Source
- coded in C++
- compiled on Ubuntu
- single-core (or multi-threaded), 3GB/core RAM

http://en.wikipedia.org/wiki/Geant4
geant4.cern.ch/

ATLAS Simulation

- Collaboration Software/Framework
- coded in: lots, mainly C, C++ but not only
- compiled in RH equivalent (commonly SL/SLC)
- single-core (or 8-core multi-threaded), 2GB/core RAM

cern.ch/atlas/
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TmLQCD (Twisted Mass Lattice QCD)

TmLQCD is a Hybrid Monte Carlo implementation for Wilson and Wilson twisted mass fermions and inverter for different versions of the Dirac operators, is fully parallelised and tested successfully on various modern architectures. The goal of this exercise is to make some exploratory studies on the features of particles on low-energy regions.

GEANT

Geant4 (Geometry and Tracking) is a platform for simulation of passage of particles through matter. It is a standard tool for design and simulation of particle physics detectors, also used in medical and space physics applications. The outcome of this exercise will be a master thesis on muon background simulation for a neutrino experiment. The general Geant4 image created, can in the future be used in other applications.

ATLAS Simulation

The **ATLAS Simulation** is also based on Geant4. The detector geometry is described and the interactions of the particles with the different layers of the detector is simulated. This is included in the general ATLAS software framework (**Athena**). The outcome of the exercise is to produce real simulated events as part of the general ATLAS Monte Carlo simulation campaign. This requires the transparent integration of the ATLAS framework with the cloud infrastructure.

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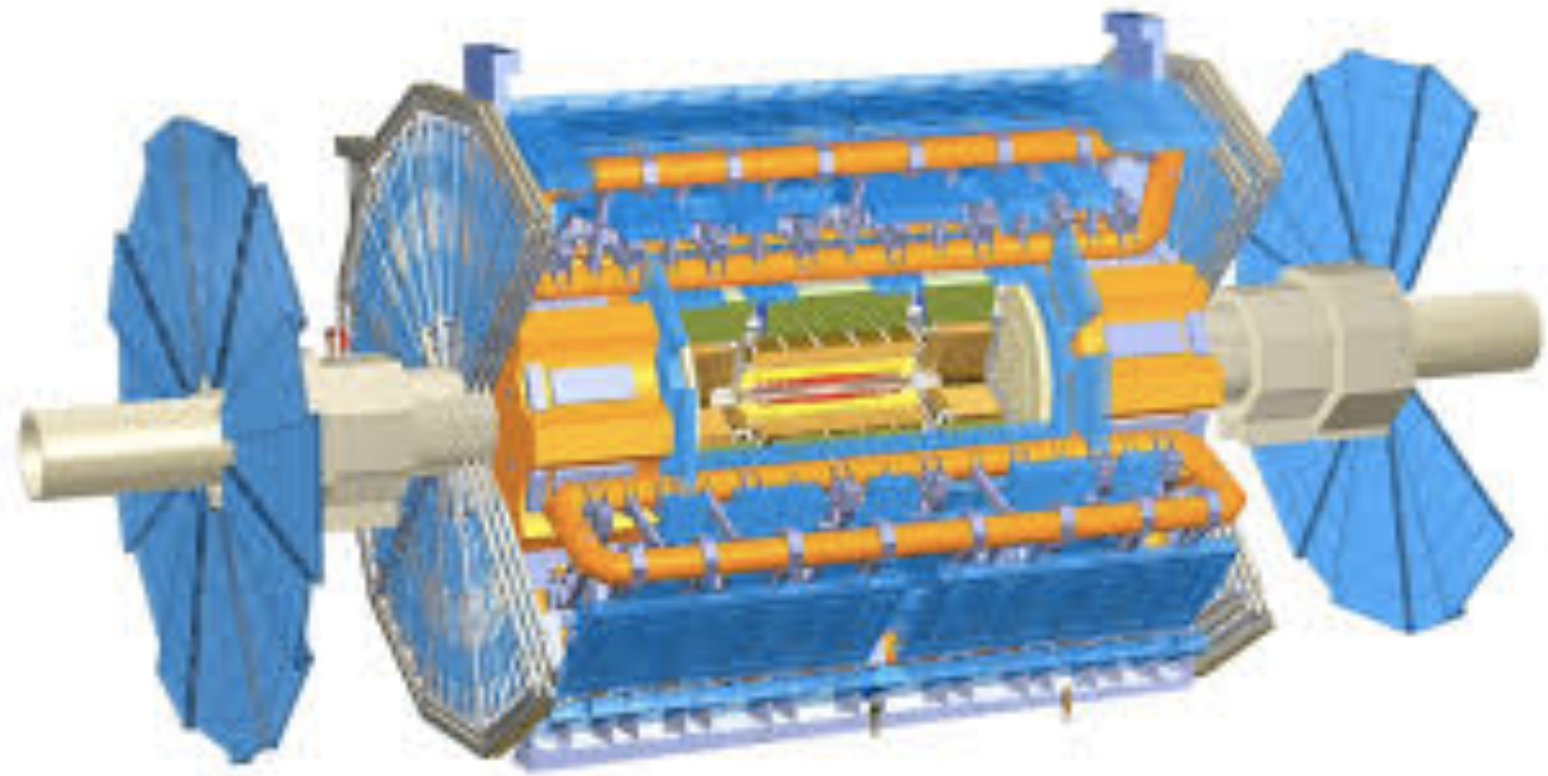

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TmLQCD (Twisted Mass Lattice QCD)

We want to test this set of codes on a cloud infrastructure, and let it run in parallel on dozens of threads distributing on several instances to see how the network interconnection effects the performance and whether this set of codes can run efficiently on cloud infrastructures. We will profile walltime vs number of cores.

GEANT

Geant is a strictly serial workflow (by event). However the sometimes relatively high memory requirements can be offset by running several threads in parallel (each simulating one event) and make effective use of shared libraries. We would like to study of effective this is on a cloud infrastructure, and, together with some batch system to run on multiple instance (10-50)

ATLAS Simulation

Integrating transparently the ATLAS workflow and software stack with a computing platform that is not engineered "to size" (*processor architecture, OS, software provisioning, data management, workload management, etc.*) presents serious challenges. We want to tackle each of these potential "barriers" and ideally achieve a full state of integration. Some sort of batch system to run multiple instances (10-50) will probably be needed. The study of performance is also of interest.

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