Experience & perspective from the Concurrency Forum

HSF Workshop, SLAC 20-21 January 2015
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The Concurrency Forum

- After the initial workshop at Fermilab in November 2011, the **Concurrency Forum**, was started with the aim of :
  - sharing knowledge amongst the whole community
  - forming a consensus on the best concurrent programming models and on technology choices
  - developing and adopting common solutions

- The forum meets **bi-weekly** and there has been an active participation involving many different laboratories and experiment collaborations
  - Complemented by **annual meetings** (every 14-16 months)

- An R&D programme of work was started on a number of **demonstrators** for exercising different capabilities, with clear deliverables and goals   http://concurrency.web.cern.ch
  - Some of these demonstrators has become real development projects

Web Site and Mailing lists

Forum on Concurrent Programming Models and Frameworks

Home | Demonstrators | Projects | Benchmarks | Meetings | Events | Resources | TechLab

Main menu

- Home
- Demonstrators
- Projects
- Benchmarks
- Meetings
- Events
- Resources
- TechLab

Software engineering is moving towards a paradigm shift in order to accommodate new CPU architectures with many cores, in which concurrency will play a more fundamental role in programming languages and libraries. HEP software will also need to accommodate the new hardware architectures by introducing parallelism whenever possible in order to make efficient use of all the available cores. This implies the development of new models and specialized software frameworks to assist scientists in developing their software algorithms and applications in order to benefit from all the available cores.

This web is an attempt to share knowledge among interested parties that should work together to develop 'demonstrators' and agree minimally on technology so that they can share code and compare results.

Mailing lists and archives

We use the rd-multicore@cern.ch mailing for general announcements and discussion forum.
All mails are archived at https://groups.cern.ch/group/rd-multicore
You can subscribe yourself using a CERN mail account (login required) using the e-groups.cern.ch site.

Read more

Announcing Annual Concurrency Forum Meeting - April 1-2, 2014

Submitted by Pere Mato Vila on Thu, 03/06/2014 - 11:12

The Annual Concurrency Forum Meeting will be held on April 1-2, 2014 at CERN. This meeting is the follow-up of the Annual Meeting that took place in February 2013 at Fermilab. We expect to have status reports from all the activities of the Concurrency Forum. The meeting will be followed by the HEP Software Collaboration Meeting in which the proposal for the creation of new software collaboration will be discussed.

Read more

https://concurrency.web.cern.ch

Example Topics

✤ Parallelism in detector simulation

 ✤ Geant4-MT, Geant V, …

✤ Heterogeneous computing

 ✤ GPU applications and techniques, languages OpenCL, Xeon-Phi evaluations, ARM, …

✤ Memory and parallelism

 ✤ Memory saving techniques, KSM

 ✤ Transactional memory

✤ Vectorization techniques and evaluations

 ✤ CilkPlus, SOA, VecGeom,…

✤ Parallelism in algorithms and frameworks

 ✤ Threaded frameworks (CMSSW, GaudiHive, Go-based, …)

 ✤ Multi-process frameworks (ALFA,..)

 ✤ Algorithm parallelization

✤ Tools and libraries evaluations

Experience

- In general the Concurrency Forum has worked pretty well in general

  - very interesting presentations

  - nice and friendly discussions

  - healthy competition of different designs and technical choices

  - allowing us to compare results

  - build-up of common and shared knowledge of what works and what does not

  - general consensus on standardization of libraries and tools

  - etc.

- A mix of spontaneous and solicited reports and evaluations

  - It is important even for R&D activities that evolved to development projects to report on progress regularly

Concurrency Forum in HSF

* The Concurrency Forum should continue under the umbrella of the HSF

    * It is important to continue to share knowledge amongst the whole community, forming a consensus on the best concurrent programming models, technology choices and developing and adopting common solutions

    * It could continue in the same form of bi-weekly meetings complemented by annual meetings to take stock and reflect on what should be the next steps

* Other "Fora" dedicated to other aspects of HEP S&C could also be spawned under the auspices of the HSF following the idea of the Concurrency Forum

    * Examples could be: reconstruction algorithms, modern user interfaces, event display, cloud computing, etc.