Compute Canada: Computing for Particle Physics

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Who/what is Compute Canada?

- A national organization providing **“Advanced Research Computing”**.
- Mandated to support all research disciplines at a variety of scales in a variety of ways.
- We make things more efficient for researchers by sharing:
  - Data centre space, cooling, power
  - Expertise across disciplines and geography
  - CPUs with idle cycles
  - Storage arrays (hardware to serve storage)


WestGrid
Compute Ontario
HPCVL
SHARCNET
SciNet
Calcul Québec
ACEnet
University of Alberta
University of Saskatchewan
University of Calgary
University of Regina
Simon Fraser University
University of British Columbia
University of Victoria
University of Manitoba
Memorial University of Newfoundland
St. Francis Xavier University
University of Prince Edward Island
University of New Brunswick
Université Laval
Université du Québec à Trois-Rivières
Dalhousie University
Saint Mary's University
Carleton University
Université de Sherbrooke
McGill University
Concordia University
Université de Montréal
Université du Québec à Montréal
Queen's University
York University
University of Toronto
McMaster University
University of Ontario Institute of Technologies (UOIT)
Wilfrid Laurier University
University of Waterloo
Brock University
University of Guelph
University of Western Ontario
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CC and Particle Physics

- Many particle physics projects in Canada are already taking advantage of CC resources (ATLAS, T2K, Belle-2, SNO+, DEAP, PIENU, PICO,etc.) with special allocations. More than 4k core-years used last year (plus several PB storage).
- Within a single experiment, these allocations tend to be coordinated. May require a national MOU with host lab.
- CC allocations are made via peer-review process. Renewed each year (not ideal).
- There are other computing facilities in Canada that fall outside CC (eg. ATLAS Tier-1 at TRIUMF, some local facilities in universities).

Who Funds This?

- Now – CFI funds almost all of the hardware (National Platforms, Special Opportunities, JELF, etc.) - matching required.
- CFI funds CC operations through Major Science Initiatives (MSI) programme (like SNOLAB) – matching required.
- CFI has not held a competition for shared cyberinfrastructure since 2006 National Platforms Fund ($60M CFI to build current CC).
- CFI is currently consulting on **a $50-$75M cyberinfrastructure initiative**. Expected launch – this fall.
- Two components:
  - **Renewal of CC platform**
  - **Thematic data-intensive competition**

CC Renewal

"The Compute Canada national platform is reaching the limits of its capacity, and the current computational services being offered are not necessarily designed to meet tomorrow's research challenges. **Therefore, the CFI challenges the Compute Canada community to propose a set of capabilities and services that will meet the needs of Canadian researchers conducting data-intensive and computationally challenging research over the next five years.**"

Thematic Competition

"...the CFI challenges institutions and their researchers to come together to propose cyber-infrastructure projects designed to create tailored and **shared integrated datasets**, data repositories or research data centres that will enable cutting-edge research on significant scientific, social and economic questions. These data-rich infrastructure resources could include **the organization and integration of large and sometimes highly complex datasets** in a research field **as well as the development of analytical tools** to fully exploit these datasets."

Interpretation

- Previous 2 pages from CFI consultation document. **Things can still change**. As of today....
- Unlike NPF, CFI wants a discipline-driven science competition. Some money is also provided to CC to maintain existing facilities.
- CFI also wants shared facilities and expects all proposals to at least consult with CC, most (all?) to be done in close cooperation.
- In other words, **researchers propose it, CC builds and operates it** with operations costs flowing through MSI...unless there is a strong argument against this model.

What Does it Mean for IPP?

- This community is more coherent and more organized than most.
- Our computing needs have much in common:
    - big pipe to external labs
    - special software stacks for data movement and analysis
    - high ratio of disk to CPU
    - IO limited, different mix of floating point vs. integer operations than other fields
- Good candidate for thematic proposal!!

Thematic Proposal?

- NOIs due in early 2015. Probably a strong filter already at NOI stage.
- Could propose a particle physics data processing centre (or 2 geographically separate ones) shared between experiments. Meet the needs of both big experiments and small.
- Tier-1 plus Tier-2 functionality in one place?
- Of course, each big experiment could also go it alone. Might be united by CC after the fact (located in the same physical location).
- However, this will be very competitive and the IPP edge would be to pre-unite more quickly than everyone else.

compute • calcul
CANADA

COMPUTE CANADA ANNOUNCES: SUSTAINABLE PLANNING FOR ADVANCED RESEARCH COMPUTING (SPARC)

A national engagement of Canada's research community to create a national forecast of advanced research computing, data storage and archiving requirements.

We need to plan! - SPARC

- Compute Canada to build and operate the gear and support the researchers for both platform renewal and thematic competition.
- We need a **S**ustainable **P**lan for **A**dvanced **R**esearch **C**omputing.
- Kickstart with Cyberinfrastructure planning this year.
- **Need input** from disciplines, institutions, organizations, etc.:
  - **disciplinary whitepapers (IPP? IPP+CINP?)**
  - institutional strategic plans
  - analysis of current usage patterns
  - direct researcher feedback (surveys, **sparc@computecanada.ca**)

Conclusions

- First **major cyberinfrastructure capital funding** since 2006 is on the horizon.
- **Particle physicists must make their voices heard** through telling CC what they need. Don't take for granted that the next set of resources will continue to serve the community well.
- Particle physicists have an opportunity to work together on a **thematic proposal**.
- First step – aggregation of need in whitepaper for CC.

Who do we support today?

Nearly 2300 Active Faculty Accounts