TRIUMF

Scientific Computing Department

Overview

R. Tafirout
ACOT meeting
April 23, 2021

Discovery, accelerated

Scientific Computing Department Organization

- Recently created (October 2020), under Physical Sciences

- Common umbrella for existing activities

  - **Big data & Distributed Computing (ATLAS Tier-1)**

  - **Machine Learning & Quantum Information Systems**

- **Head & Deputy**: R. Tafirout & W. Fedorko
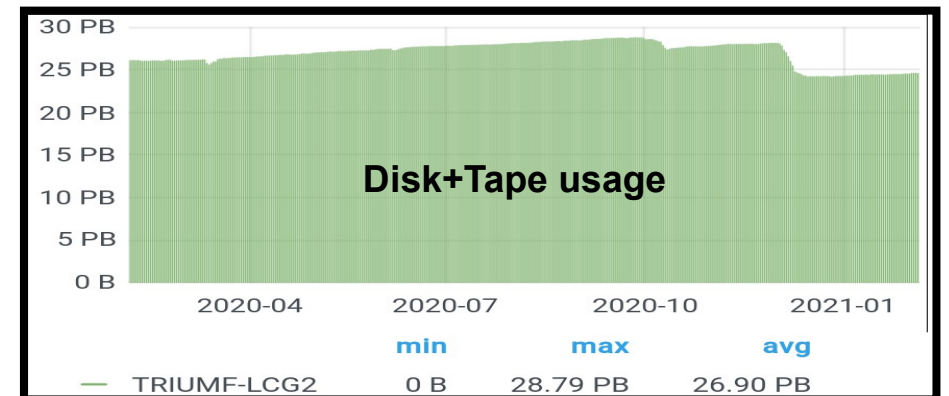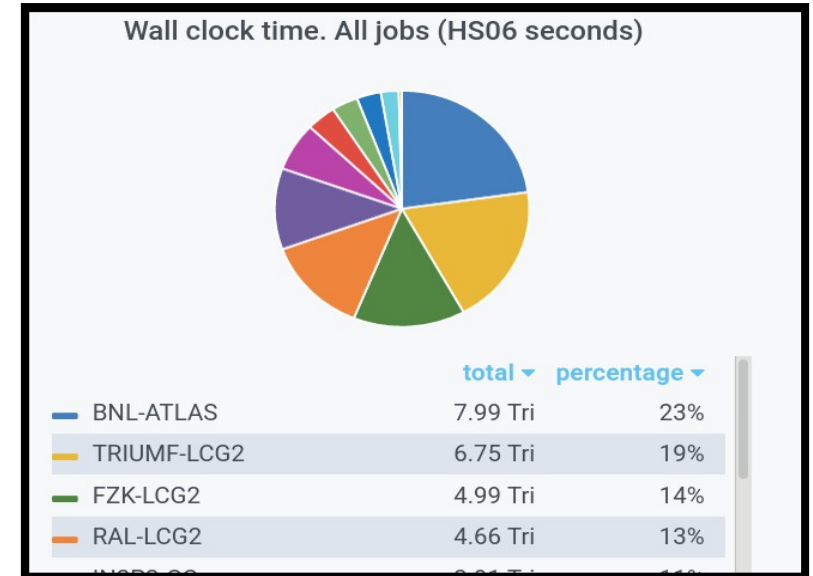
- **Other TRIUMF personnel (Tier-1 group):**

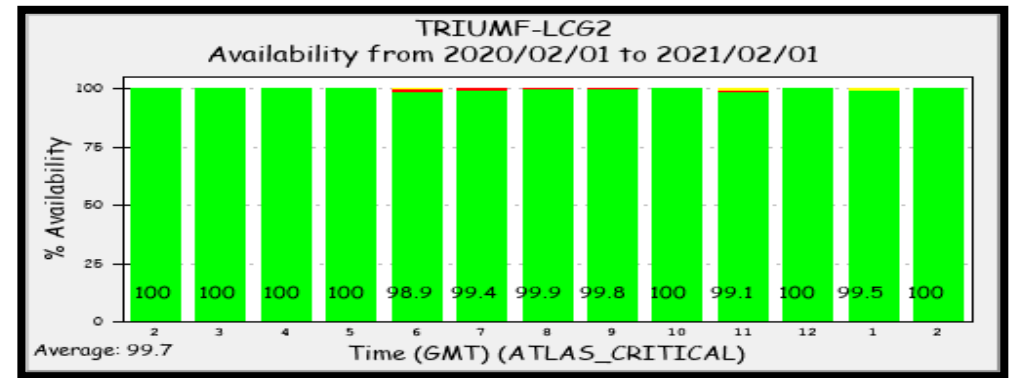 | | |
  |---|---|
  | A. De Silva | X. Liu |
  | R. Debhandari | D. Qing |
  | F. Fernandez Galindo | Y. Shin |
  | V. Kondratenko | A. Wong |

  Affiliated Scientists

  C. Senko (Waterloo)

  R. Islam (Waterloo)

  P. Haljan (Simon Fraser)

  J. Serker (Manitoba)

ATLAS Tier-1 activities

- **Providing 10% of worldwide Tier-1 resources**

- **Primary Tier-1 services and resources relocated from TRIUMF to SFU in 2018**

  - 7680 cores (SFU, data reconstruction, etc.)

  - 4744 cores (TRIUMF, simulation tasks only)

  - 11.3 PB disk storage (SFU)

  - 31 PB tape storage (SFU)

- **Various R&D activities (data mgmt, network)**

- **CFI 2017 IF funds fully spent as of Q1/2021 ($7M)**

- **Successful in recent CFI 2020 IF competition**

  - Conditions lifted / BCKDF stage 2 submitted

- **Strategic planning underway for the next CFI IF competition (to cover the challenging HL-LHC era)**

  - Projections, technology evolution & costing model

TRIUMF-LCG2
Availability from 2020/02/01 to 2021/02/01

100	100	100	100	98.9	99.4	99.9	99.8	100	99.1	100	99.5	100

Average: 99.7   Time (GMT) (ATLAS_CRITICAL)

Wall clock time. All jobs (HS06 seconds)

	total	percentage
BNL-ATLAS	7.99 Tri	23%
TRIUMF-LCG2	6.75 Tri	19%
FZK-LCG2	4.99 Tri	14%
RAL-LCG2	4.66 Tri	13%

Disk+Tape usage

	min	max	avg
TRIUMF-LCG2	0 B	28.79 PB	26.90 PB

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Machine Learning & Quantum Information Systems activities

- **Wide range of activities across TRIUMF research programs with key contributions :** (selected highlights presented later in this session by W. Fedorko)

  - Hyper-K event reconstruction ; NA62 pion/muon identification and background rejection ; Beamline control for ISAC-I operations ; ATLAS pion identification & energy calibration ; QC (annealing) for ATLAS calorimeter simulation; Nuclear theory (ML & QC)

- **Strategic planning, and new funding initiatives**:

  - Pan-Canadian Trapped Ion QC network & planning for next CFI IF competition (SFU & Waterloo initial partners)

  - Design & planning for a Quantum control system (with Waterloo, SFU, Sussex)

    - Consultation, initial concept and scope, acquisition of development hardware

  - BC QAI application submitted last fall (pending decision due to QAI Governance)

  - NFRF with P. de Perio, Hyper-K ML, awarded

  - NFRF with M.Swiatlowski, ATLAS ML on FPGAs ; decision expected in April

Additional activities and efforts

- TRIUMF 20-year vision process / Scientific Computing Topical Group

    - Members: R. Tafirout (chair), C. Senko (Waterloo), I. Trigger, P. Navratil, W. Fedorko, P. Haljan (SFU), A. McCoy (Washington), J. Kavelaars (Victoria).

- TRIUMF Summer Institute, "Cornerstone Models of Quantum Computing" (W. Fedorko)

    - Collaborating institutes: UBC SBQMI (CREATE), QAI, UVic, Sherbrooke

    - Topics covered: Gate Model QC, Annealing Model QC, Continuous Variable QC, Measurement-based QC

- Recent discussions with the European Grid Infrastructure (EGI) / collaboration MoU in preparation (primarily to formalize existing activities & services)

- Collaboration with Helmholtz and Juelich via MITACS programs (for AI and ML).

- TRIUMF-CNL collaboration/focus groups on cyber security

    - TRIUMF team: R. Tafirout (co-chair), T. Lindner, M. Rowe, +TBD.

    - CNL team: D. Trask (co-chair), L. Ivan, R. Rogge

- Participating in NDRIO activities (R. Tafirout, stakeholders committee / NGO rep.)

TRIUMF

Thank you
Merci

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