Canada's national laboratory for particle and nuclear physics
Laboratoire national canadien pour la recherche en physique nucléaire
et en physique des particules

TRIUMF Site Report

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HEPiX

17 October 2016 Berkeley, CA
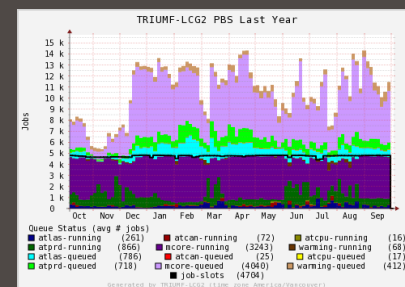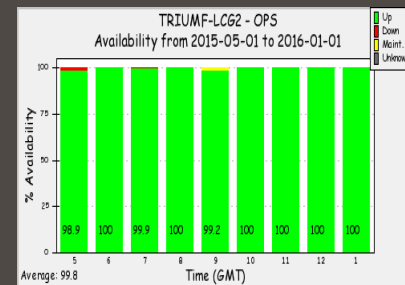
- TRIUMF Site-wide (slides from Steve McDonald)
  - CIO, ERP business process management
  - Network status

- TRIUMF Tier-1
  - Notable projects in 2016:
    - Ansible for configuration management
    - Docker experience
  - Compute Canada transition
    - Next hardware acquisition
    - Transitional federated site operations

- New CIO – Davis Swan (Feb 2016)
  – First TRIUMF CIO appointment

- Deployed new ERP system (Finance, Procurement, Logistics)
  – Legacy system was built in-house over 28 yrs
  – Replaced with Agresso Business World – Unit4
  – 5yrs - deployment, no Steve, no HEPiX ☹
  – Finally launched in Jan 2016

- Deployed new WiFi (802.11ac) (indoor & outdoor)
  – Authentication based on 802.11x
  – ~100 Aruba IAP-225's
  – Eduroam on the horizon

- Deployed new Network Core
  - Routing Juniper cluster 2x EX-9208 (10G, 100G capable)
  - Firewall Juniper cluster 2x SRX-3400 (10Gbps)
    - all traffic except (LHCOPN, LHCONE)
  - ATLAS Tier-1 network core Juniper EX-9214

- Network Edge
  - Migrating from Avaya 5520's to Juniper Ex-3300's

- External connectivity
  - 1x 10G LHCOPN
  - 2x 10G LHCONE
  - 1x 10G General research

- Initiated IPv6 with ATLAS Tier-1

Tier-1 Ansible and Git - 1

- Transitioned to Git from CVS in 2015
- Late in 2015 we did an Ansible (from EPEL) evaluation using Git version control and proof-of-concept tests
- Ansible deployment in 2016:
    - 1) Early Ansible roles and Yum playbooks
    - 2) Generic roles to replace old Kickstart scripts
    - 3) Documentation / training
    - 4) Some server and Storage roles added
- Approximately 2 man-months of work

Ansible - 2

- Current set of 45 Ansible roles:

```
File  Edit  View  Search  Terminal  Help
Last login: Thu Oct 13 15:24:07 2016 from shrugged.triumf.ca
Agent pid 3484
[root@gridadm ~]# . dcd
[root@gridadm ~]# cd /ks/ansible
[root@gridadm ansible]# ls
Archive/   inventory/   library/   playbooks/   readme.md   roles/   scripts/
[root@gridadm ansible]# ls roles/
anaconda/              docker-registry/   iptables/    network/            ssh/
autofs/                docker-worker/     ks/          ntpd/               sudoers/
base/                  ds5020/            kvm-guest/   oracle-java/        syslog/
batch-users/           fetch-crl/         logrotate/   pakiti-mwr/         tcpwrap/
cvmfs/                 ganglia/           logs/        pdsh-hosts/         unpriv/
dcache-config/         generic-node/      mail/        postgres/           worker/
dirvish/               grid-certs/        mhvtl/       root/               xrootd/
dns-client/            httpd-2.4/         multipath/   serial-console/     yaim/
docker-distribution/   ipmi/              mysql/       smallhsm/           zol/
[root@gridadm ansible]#
[root@gridadm ansible]#
```

- Initial Ansible presentation at TRIUMF:

  http://grid.triumf.ca/share/documents/Ansible_presentation.pdf

- Currently using Ansible 2.1 modified slightly and rebuilt at TRIUMF to preserve file timestamps by default

- Next steps:
  - continue adding new roles, up to now done by 3 people in our group
  - involve 2 more staff
  - finish certifying all roles
  - consider making public our Ansible repository

Docker for worker nodes - 1

- This Spring we began evaluating Docker as a solution for worker node deployment

- URL describing this work:
  https://twiki.atlas-canada.ca/bin/view/AtlasCanada/TRIUMFDocker

- Goal: Run ATLAS SL-6 based Docker containers on SL-7 Docker engine nodes

- Current tests are done running containers with condor-master as the container application

- Good results comparing container to host performance with ATLAS software validation

- Good results comparing container to host performance for generic benchmarks:
  - HEPSPEC '06
  - iozone local I/O
  - data transfer protocol tests (gsiftp, dcap, root, http)

- Work to do: Distribution server and image signing, deployment strategies, container logging, image maintenance

Tier-1 Compute Canada Transition

- ## Compute Canada (CC)
  - a non-profit corporation of dozens of member universities and research institutes
  - is the national advanced research computing (ARC) facility of Canada
  - funded by the Canadian Foundation for Innovation (CFI), which also provides funds for the Tier-1
  - CFI wants the Tier-1 integrated under the Compute Canada umbrella to reduce infrastructure and operating costs
  - the Tier-1 needs space to grow in the next hardware refresh, and will thus transition to the new Compute Canada data centre at Simon Fraser University (SFU) starting in early 2017
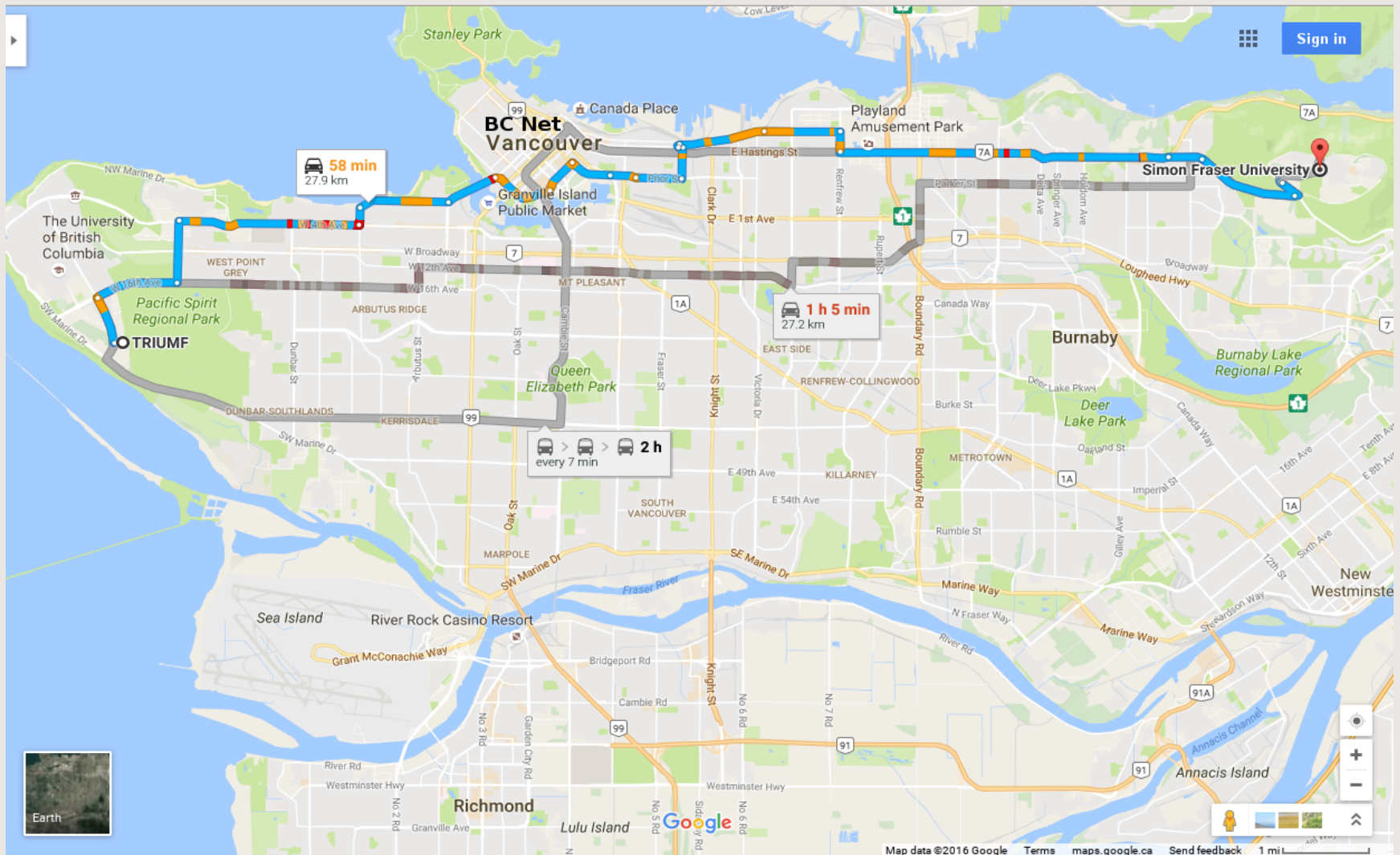
Tier-1 Hardware refresh plans

- Tier-1 data centre at TRIUMF at capacity, the last major refresh was in 2012.
- Tape capacity increased in 2016 by replacing LTO-4 with LTO-6 and adding last frame.
- Current capacity: 4830 cores, 7.8 PB disk (usable), 12 PB tape, and ~85 servers
- Core router replaced with Juniper EX9214 in September 2015
- We are extending warranties for critical hardware into 2018
- New equipment going to SFU, starting with tape services next year, then disk and CPU. Some PO's are imminent – new HSM pools and tape disk SAN buffer space.

TRIUMF/SFU Tier-1 Federated Site

- We need to operate both sites as one federated site (mostly dcache/storage side) while we make the transition to SFU
  - Phase 1
    - Set up pre-production site at SFU – network, basic administrative functions, test setup of grid and storage services on new servers
    - commissioning of new tape library and federation testing
  - Phase 2
    - full production mode with new tape-destined data going only to SFU; start tape migration
    - gradually bring online new disk and CPU resources with disk migration
  - Phase 3
    - gradual diminution of TRIUMF-side services until final decommissioning in 2018 before the end of warranties
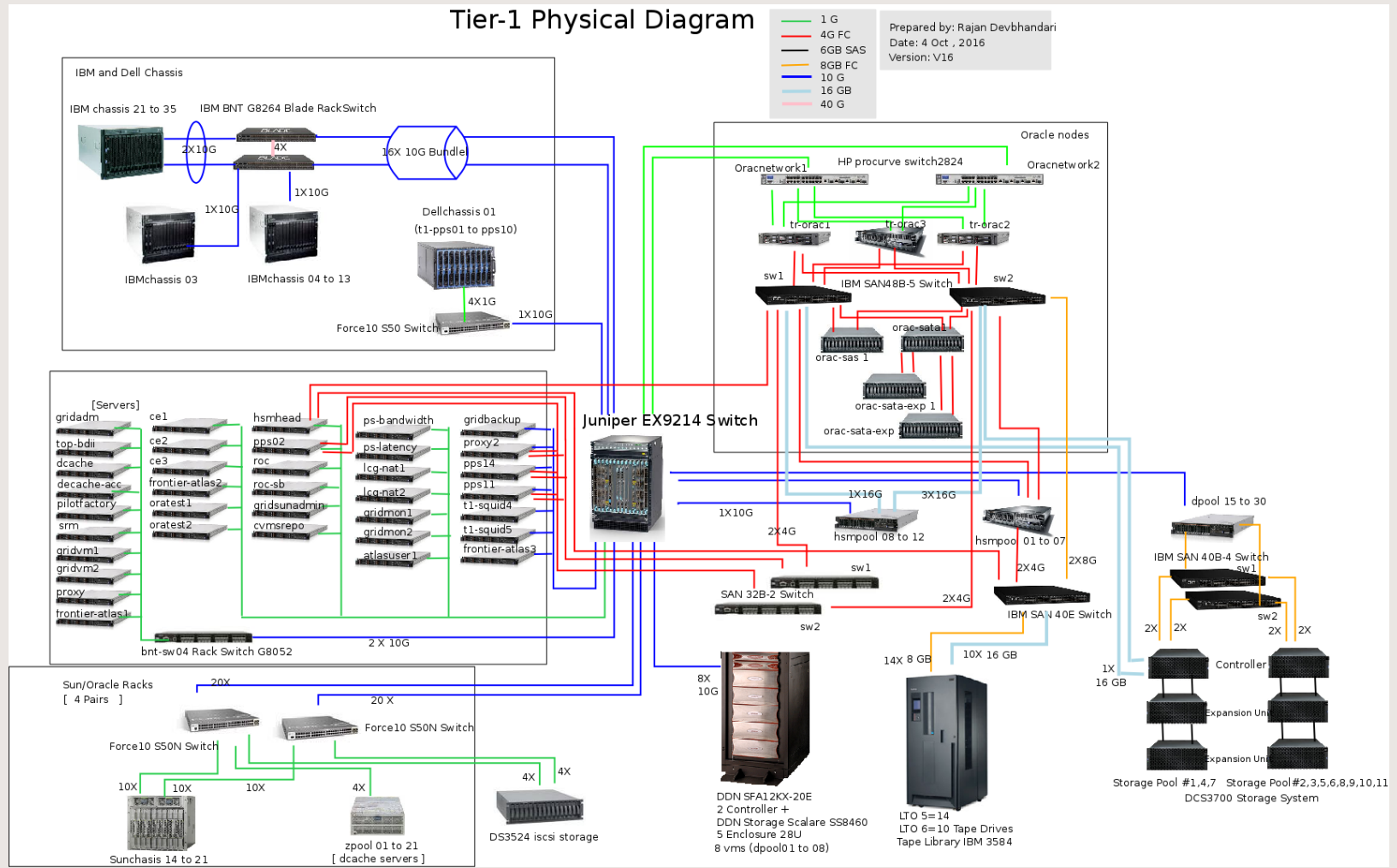
Tier-1 Physical Diagram