CERN Site Report

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HEPiX Spring Meeting
DESY Zeuthen, DE
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CERN and CERN IT

- European Organization for Nuclear Research (*C*onseil *E*uropéen pour la *R*echerche *N*ucléaire)
  - Founded in 1954, today 21 member states
  - World's largest particle physics laboratory
  - Located at Franco-Swiss border near Geneva
  - ~2'300 staff members, >12'000 users

- CERN IT to enable the laboratory to fulfill its mission
  - Main data center on Meyrin site
  - Wigner data center, Budapest, 23ms distance
  - Connected via two dedicated 100Gbs links
  - Where possible, services have resources at both sites (plus disaster recovery)

MEYRIN DATA CENTRE

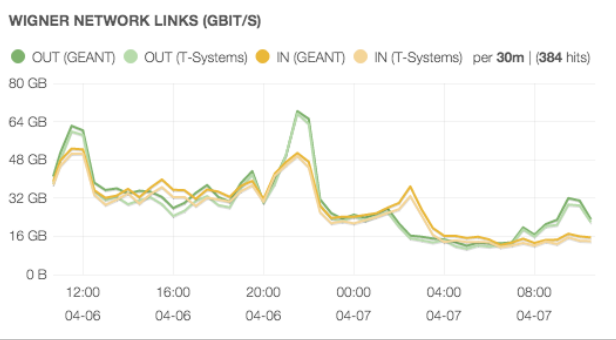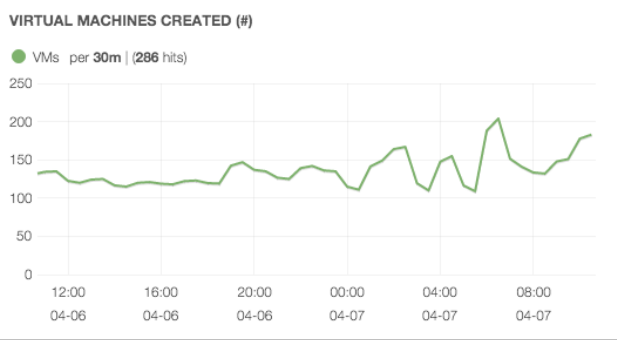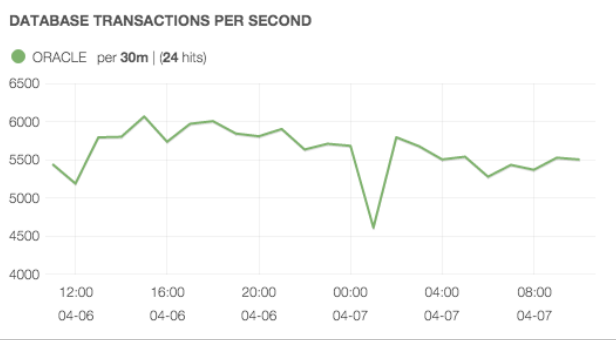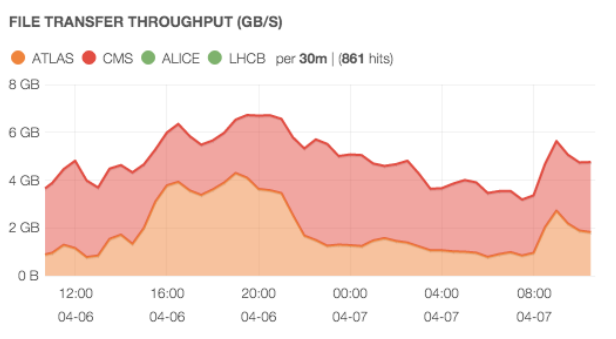|	last_value
Number of Cores in Meyrin	128,291
Number of Drives in Meyrin	73,362
Number of 10G NIC in Meyrin	6,456
Number of 1G NIC in Meyrin	22,105
Number of Processors in Meyrin	22,355
Number of Servers in Meyrin	11,947
Total Disk Space in Meyrin (TB)	133,730
Total Memory Capacity in Meyrin (TB)	523

WIGNER DATA CENTRE

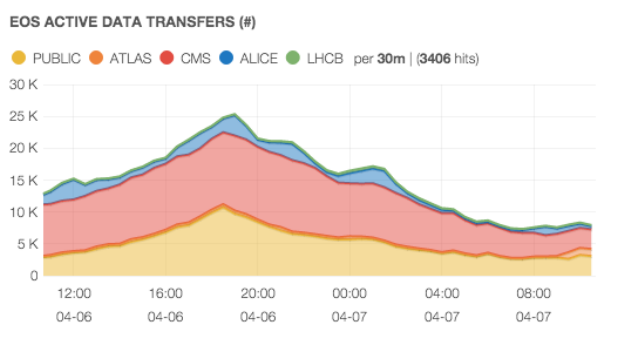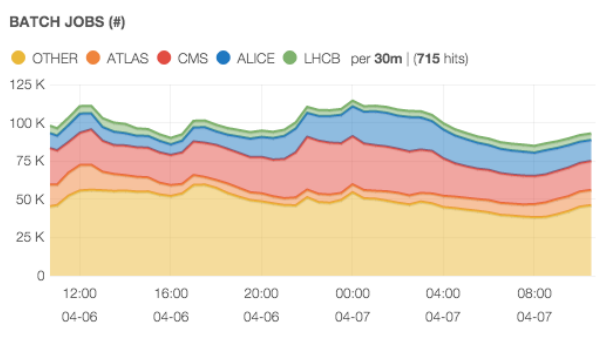|	last_value
Number of Cores in Wigner	43,328
Number of Drives in Wigner	23,180
Number of 10G NIC in Wigner	1,399
Numer of 1G NIC in Wigner	5,067
Number of Processors in Wigner	5,418
Number of Servers in Wigner	2,712
Total Disk Space in Wigner (TB)	71,738
Total Memory Capacity in Wigner (TB)	172

NETWORK AND STORAGE

	last_value
Tape Drives	104
Tape Cartridges	18,520
Data Volume on Tape (TB)	138,415
Free Space on Tape (TB)	27,773
Routers (GPN)	138
Routers (TN)	30
Routers (Others)	107
Switches	3,698

BATCH JOBS (#)
OTHER ATLAS CMS ALICE LHCB per **30m** | (**715** hits)

EOS ACTIVE DATA TRANSFERS (#)
PUBLIC ATLAS CMS ALICE LHCB per **30m** | (**3406** hits)

FILE TRANSFER THROUGHPUT (GB/S)
ATLAS CMS ALICE LHCB per **30m** | (**861** hits)

DATABASE TRANSACTIONS PER SECOND
ORACLE per **30m** | (**24** hits)

VIRTUAL MACHINES CREATED (#)
VMs per **30m** | (**286** hits)

WIGNER NETWORK LINKS (GBIT/S)
OUT (GEANT) OUT (T-Systems) IN (GEANT) IN (T-Systems) per **30m** | (**384** hits)

meter.cern.ch

2016 CERN IT (Re-)Organization
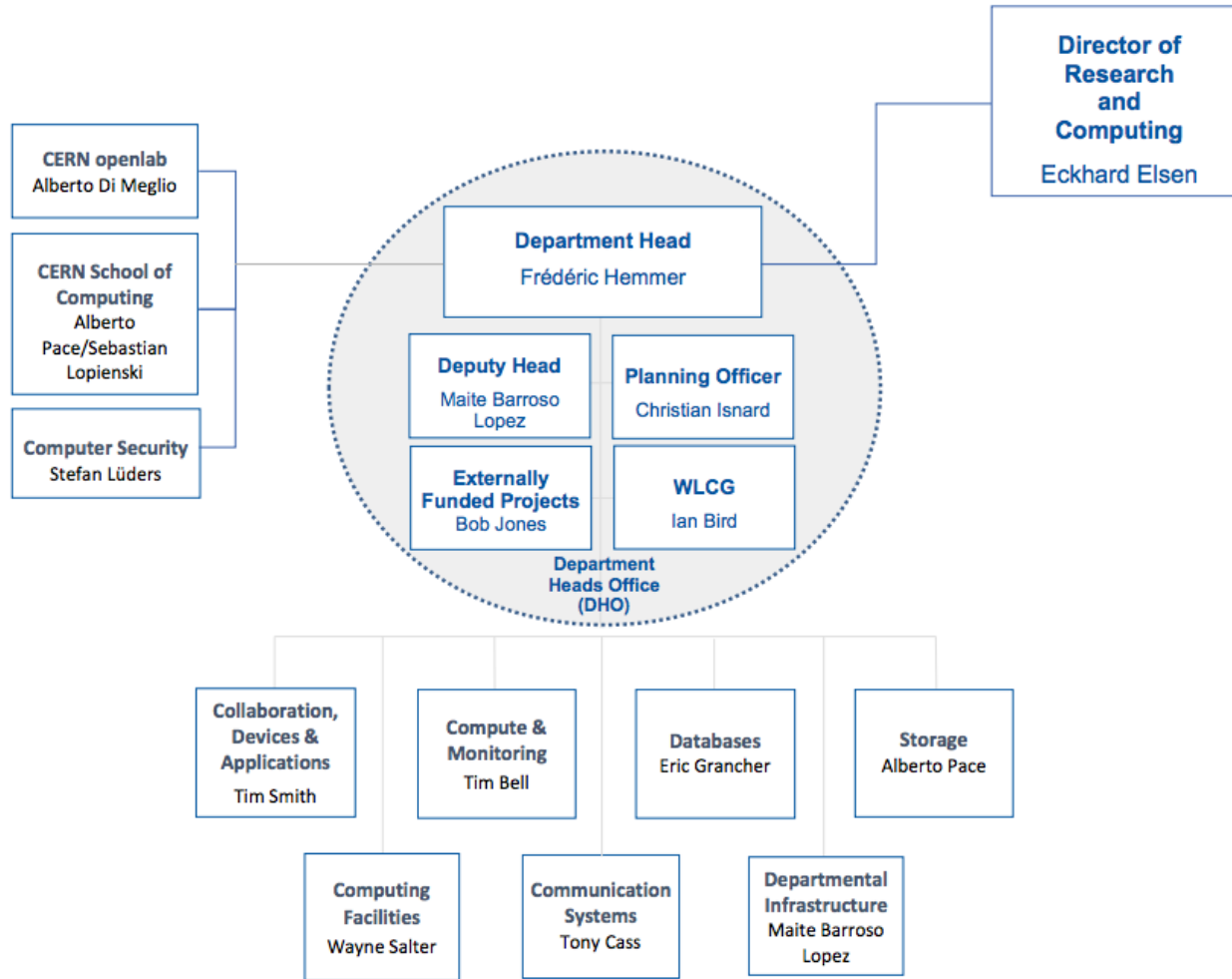
Storage: AFS Phase-out

- Motivation unchanged, see Alberto Pace's talk at BNL meeting
  - Less of a technical, more a community/support issue

- **AFS phase-out has been decided**
  - No hard deadline yet, expect final clean-up during LS2 (2019)

- No single replacement product, gathering input
  - CVMFS took over software distribution use case
  - EOS(+Fuse) plus CERNBox will cover many use cases
  - Discussions about $HOME ongoing

- Heads up!
  - Current Windows clients (1.7.31) will break with SHA-1 deprecation end of 2016
  - Reports about potential data corruption in 4.4 kernels (SLC6, CC7 are OK)

Telephony: PABX Replacement

- **Private Automatic Branch Exchange**
  - Connects cables for office/emergency/lift phones
  - Connections to external providers
  - Network connections for Lync and IP phones
  - Routing, call handling, billing, …

- **Currently: Alcatel OmniPCX Enterprise**
  - Four logical nodes in 17 physical locations
  - Installed in 1994

- **Move to a software solution (Asterisk)**
  - Move to IP or soft phones (Lync)
  - 1H2016: remove unused phones
  - 2H2016: move to s/w PABX
  - 2017: remove active phones
  - Q42018: remove PABX

- Details were given in <u>Francisco Vinagrero's presentation</u> in Oxford

Operating Systems

- ## Windows 7 remains the mainstream version
    - MS will provide security updates until Jan 2020
    - Migration out of Win7 will be needed by the end of LS2

- ## Windows 10 now available as a pilot
    - MS Edge as new default browser
    - Adobe Flash disabled
    - Default PDF app is Edge

- ## CC7.2 current prod release
    - Since January 11, 2016
    - CC7.2 details

- ## Puppet on the desktop
    - Replace Quattor-based setup tools
    - master less configuration

- ## OpenAFS client issues on OS X, v. 10.11
    - Now recommending third party packages (provided by SNA)

Hadoop Service

- Technology
  - 3 production + 1 QA cluster: ~100 nodes
  - Current tech stack: HBase, Map/Reduce, Spark, Impala + Parquet, Avro

- Community
  - Notable users: ATLAS Event Index + DDM, CMS WM Archive, WLCG + IT monitoring, Accelerator logs and controls project, CASTOR dashboards, …

- Hadoop users forum and Analytics Working Group
  - https://indico.cern.ch/category/5894/

Version Control Services

- **Move from GitoLite to GitLab**
  - GitLab in production since more than one year
  - Hosts ~3'300 repositories (> git.cern.ch + svn)
  - Very positive service experience
  - git.cern.ch will be shut down by the end of 3Q2016

- **GitLab-CI as a useful add-on**
  - Simpler than Jenkins, fully integrated with GitLab UI and MRs
  - Docker infrastructure provided for job execution
    - User provided Docker images supported as well
    - User provided Docker infrastructure supported as well (required for heavy lifting)

- **SVN service will be kept alive until LS2**
  - Feature-frozen
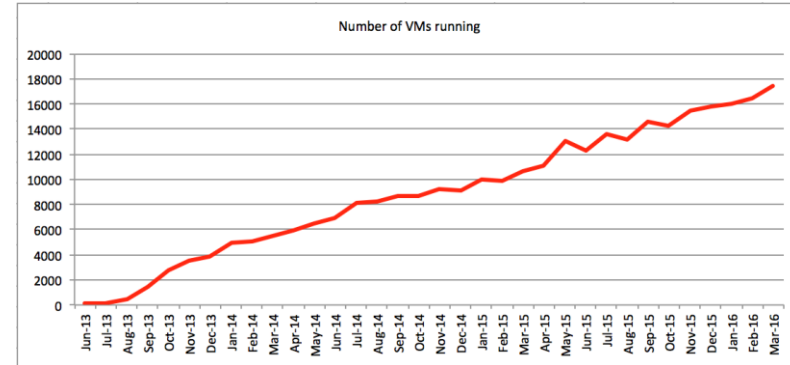
Batch Services

- LSF update to version 9
  - Only minor issues

- HTCondor pool expanded to 15k cores
  - Next increase dependent on migrating local submission (AFS/Kerberos)
  - AFS/Kerberos integration is completed (HTCondor 8.5.4)

- Decommissioned ARC CEs, now 100% HTCondor CEs

- Starting to dedicate multicore resource in HTCondor (initially for CMS)

- Began work adding external cloud resources to HTCondor pool
  - All details in Jérôme's talk on Wednesday

AI: Cloud Service (IaaS)

- **CERN private cloud still growing**
  - ~5'800 hypervisors, ~36% at Wigner
  - Hosting ~18'000 VMs
  - ~1'800 to deploy in 2Q16, another 400kHS06 4Q16
    - No more spinning rust!
  - Retirement of ~2'000 compute nodes by 3Q16
    - Tricky bit: 800 hosts running services

- **Rolling upgrade to Liberty ongoing**
  - Glance, Keystone, Ceilometer, Heat, Neutron done
  - Horizon, Cinder and Nova left to do

- **NUMA/THP configuration rolled out**
  - >2'000 hypervisors reconfigured
  - ~6'000 batch VMs drained/deleted/recreated!

- **Integration of containers moving to production**
  - Magnum: COE as first class OpenStack resources
  - See Bertrand's talk on Thursday

Number of VMs running

No of VMs running since July 2013

VM sizes (cores)	Before	After
4x 8	7.8%	3.3% (batch WN)
2x 16	16%	4.6% (batch WN)
1x 24	20%	5.0% (batch WN)
1x 32	20.4%	3-6% (bare SLC6 … batch WN)

AI: Config' Management

- Currently: puppet-server-1.1.3, puppet-3.8.4, foreman-1.6.1, puppetdb-2.3.8

- Catalog compilations dropped from 73 to 25 seconds
  - Ruby2, puppetserver instead of passenger, removal of file stats
  - All changes merged with upstream

- Puppet4 / Foreman 1.11 planned for this year
  - "Future parser" already available within CERN's infrastructure

- Batch on external clouds (xBatch)
  - Separate Puppet masters and Puppet DB

Miscellaneous Recent Activities

- ## Set up a centralized Elastic Search service: ESaaS
  - There are currently ~20 clusters managed individually
  - Conflicting user requirements, Resource planning,
    Limit user cross-talk, Accounting, …

- ## Investigating time series databases
  - Several requests (from experiments and IT)
  - Proposed implementation: leverage DB on demand infrastructure
  - Being prototyped, still collecting requirements from interested users

- ## Looking at potential cost savings by restructuring the backup service
  - ORACLE and DFS main data producer for backup in TSM
  - Various options being considered

More CERN talks this week

- Update from Database Services
(Katarzyna Dziedziniewicz-Wojcik)

- Automating Operational Procedures
with Rundeck
(Daniel Fernandez)

- xBatch: Extending the CERN Batch Service
into Public Clouds
(Jérôme Belleman)

- First Experiences with Container
Orchestration in the CERN Cloud
(Bertrand Noel)

- Storage at CERN: Towards the Chameleon
(Xavier Espinal Curull)

- Evolution of Printing Services
(Natalie Kane)

- Running Virtualized Hadoop:
Does it make sense?
(Kacper Surdy)

- The Helix Nebula Science Cloud Project
(Helge Meinhard)

- Computer Security Update
(Liviu Valsan)

- CERN Cloud Update
(Arne Wiebalck)

⊘ Service Available   ⊘ Service Degraded   ⊗ Service Unavailable   ⊘ No Information

Accelerator Database	ACRON	Administration Database	AFS	AFS Web Hosting	Alerter	Backup and Restore	Batch	BOINC
Bull					CERN Search	CERNBox	Certificate Authority	CIXP
Confe Roc					Databases Applications	Datacenter Network	DFS	Drupal
E-M					E-Fax	File Transfer	FILER	Fixed Line Phone
General Purpose Database	Git	GRID Compute Element	GRID Development	GRID Information	GRID Infrastructure Monitoring	HADOOP	IIS Web Hosting	Indico Event Application Support
Java Web Hosting	JIRA	Linux Operating System	Load Balancing	LXPLUS				
Monitoring	MultiMedia	MyProxy	Network Database and Registration	Network for Projects and Experiments	Printi			
Single Sign On and Account Management	SVN	Technical Network	Twiki	VOMS	WIFI	Windows Desktop	Windows Terminal Servers	WLCG Network

Starting at the autumn meeting at LBNL

Jérôme Belleman

will take over as the CERN representative for HEPiX

Thanks!