INFN-T1 site report

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On behalf of INFN-T1 staff
HEPiX Spring 2017
Outline

• What’s new in Bologna

• Network

• Data Management and Storage

• Farming
What’s new in Bologna
ECMWF moving to Bologna!

• **Bologna** has been chosen to host the **new Data Center** of the **European Center for Medium-Range Weather Forecasts (ECMWF)**.

• INFN-T1, CINECA and ECMWF all located in Bologna
  – CINECA #12 on top 500
  – ECMWF #24 on top 500

• Bologna to become one of the biggest center for computing in Europe

• The new facility would be shared with other users
  – An opportunity for INFN-T1 to move to the same location
  – May mark the end of “Garage Era” for INFN-T1

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Network
Network status

WAN Connectivity:

- **LHCOPN+LHCONE shared physical link: 6x 10 Gb/s**
  - LHCOPN: 4x10Gb/s dedicated link to CERN
  - LHCONE: Potentially 60 Gb/s (Geant Peering at 100 Gb/s in Milan)

- **General IP: 2x 10 Gb/s**

- **Data Center Interconnection (CNAF-BARI): 2x 10 Gb/s**

LAN evolution status:

- **Installed 2 new CORE Switches (Cisco Nexus 9516)**
  - Every **ToR (Farming) Switch** and every **Disk server** is connected to both **core switches**
  - The old Nexus 7018 is connected to both Core Switches with 3x 40 Gb/s Interfaces (6x 40 Gb/s in total) and aggregates the old single homed resources (connected with only one Ethernet interface).
Recent evolution

- Nexus 9516
- Nexus 9516
- Nexus 7018
- LHCOPN/ONE
- General IP
- Cisco7600
- IT Resources

- 3x10Gb/s
- 3x10Gb/s
- 4x40Gb/s
- VPC Link

- 3x40Gb/s (6x40Gb/s in total)

- Most Recent Computing resources
- Every server or farming switch connected to both core switches

- Old “single homed” resources
- Old “single homed” resources

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Data Management and Storage
• 23 PB of disk space (usable)
  – GPFS (Spectrum Scale) 4.1.1-13
    3-4 PB for each file system
• 39 PB on tapes
  – HSM powered by GEMSS + TSM 7.1 (client)
    and 6.3 – server
  – SL8500 tape library +17 tape drives (T10KD)
• 2016 tender for disks:
  – 3.5 PB (net) in 2 racks (Huawei OceanStor
    6800 V3)
  – Replacement for 7 years old DDN S2A 9900
    systems
• Expanding FC infrastructure
  – New 96-port switch (16 Gbit/s per port)
  – Replacing [10 GbE + 2x FC8] servers with [2x10 GbE + 2x FC16] ones
  – 10 I/O servers x 3.5 PB of usable capacity
    • 700 TB for every pair of I/O servers
  – Preparing to move HSM servers to FC16
Example of storage cluster for one of the LHC experiments

- **Farm WNs**: 820 Gbps to LAN, 180 Gbps to NSD servers.
- **WAN**: 40 Gbps to Storm atlas server.
- **IB SAN**: 2x56 Gbps to GridFTP servers, 1792 Gbps to DDN SFA 12K Disk, 2x56 Gbps to DDN 52A 9900 Buffer.
- **FC SAN**: 2x10 Gbps to GridFTP servers, 2x16 Gbps to metadata servers, 24 Gbps to SSD storage DELL MD3820, 4 Gbps to HSM servers.
- **FC TAN**: Tape library 4.3 PB, Tapes 4.3 PB.
Backup and recovery service

- At the beginning of 2017 the backup system has been reviewed and completely reorganized to exploit advantages of the latest (at that time) version of IBM’s Spectrum Protect (TSM)
  - Aggregation of clients
  - Backup to disk pool and to tape pool
  - 3 copy of active data
  - 2 copy of inactive data
- Significantly reduced backup and restore time

16 TB / 72 million files of Active data on disk
75 TB / 145 million files of Inactive and copy data on tape
2 TB of Archive data on tape.
Farming
Computing resources

Farm power: **250K HS-06**

- 2016 tender just installed
  - **HUAWEI** x6800
  - 255 x Dual Xeon e5-2618Lv4, 128 GB RAM
- Decommissioned 7 racks of old CPU
- AFS phased out
  - now available only on UIs

- Yet another virtualization infrastructure
  - Managed by VMWare
Extending the farm 2\textsuperscript{nd} phase

• We successfully extended our farm to BARI
  • 20k HS06

• New challenge: use a cluster hosted by CINECA
  • Computing nodes from Marconi cluster
    • 2x 2697v4 CPUs
    • 128 GB RAM
    • 2 x 1TB SAS disks
    • 2x 10GbE links
  • Adopted BARI ReCaS approach
  • Next year some pledges may come from this cluster
2017 tender

- Tender specs a little late but almost ready
- Looking at 16 cores CPUs and 10Gbit network speed
- Skylake CPUs look promising
- AMD back to market, will not be on time for this one
- Main concern on RAM/SSD price raise during last period

Corsair 16GB ddr4 kit on amazon.it
Other activities

• OpenStack Pilot to start in May (finally)

• Condor testbed
  – LSF to be phased-out during 2018
Other INFN presentations
More CNAF presentations:

• Stefano Bovina will talk on Thursday about our new monitoring system

• A lot of additional information can be found in our Annual Reports. Check them out!

Available on-line at www.cnaf.infn.it
Thank You for Your Attention!
Köszönöm a figyelmet!
Спасибо за внимание!