



WLCG Tier-2 computing infrastructure at IHEP

V. Gusev¹, V. Kotlyar^{1*}, V. Kukhtenkov¹, E. Popova¹, N. Savin¹, A. Soldatov¹

¹State Research Center of Russian Federation Institute for High Energy Physics,
RU-142281, Protvino, Moscow region, Russia

E-mail: Victor.Gusev@ihep.ru, Victor.Kotlyar@ihep.ru, kvi@ihep.ru,
Ekaterina.Popova@ihep.ru, Nikolay.Savin@ihep.ru, Anatoly@ihep.ru

* – Corresponding author



RU-Protvino-IHEP site participates in the Worldwide LHC Computing Grid. The computing infrastructure serves for big four high energy physics experiments such as Atlas, Alice, CMS, LHCb. In this presentation we would like to talk about recent changes in the site infrastructure and software upgrades. Also we would like to present current status and future plans.

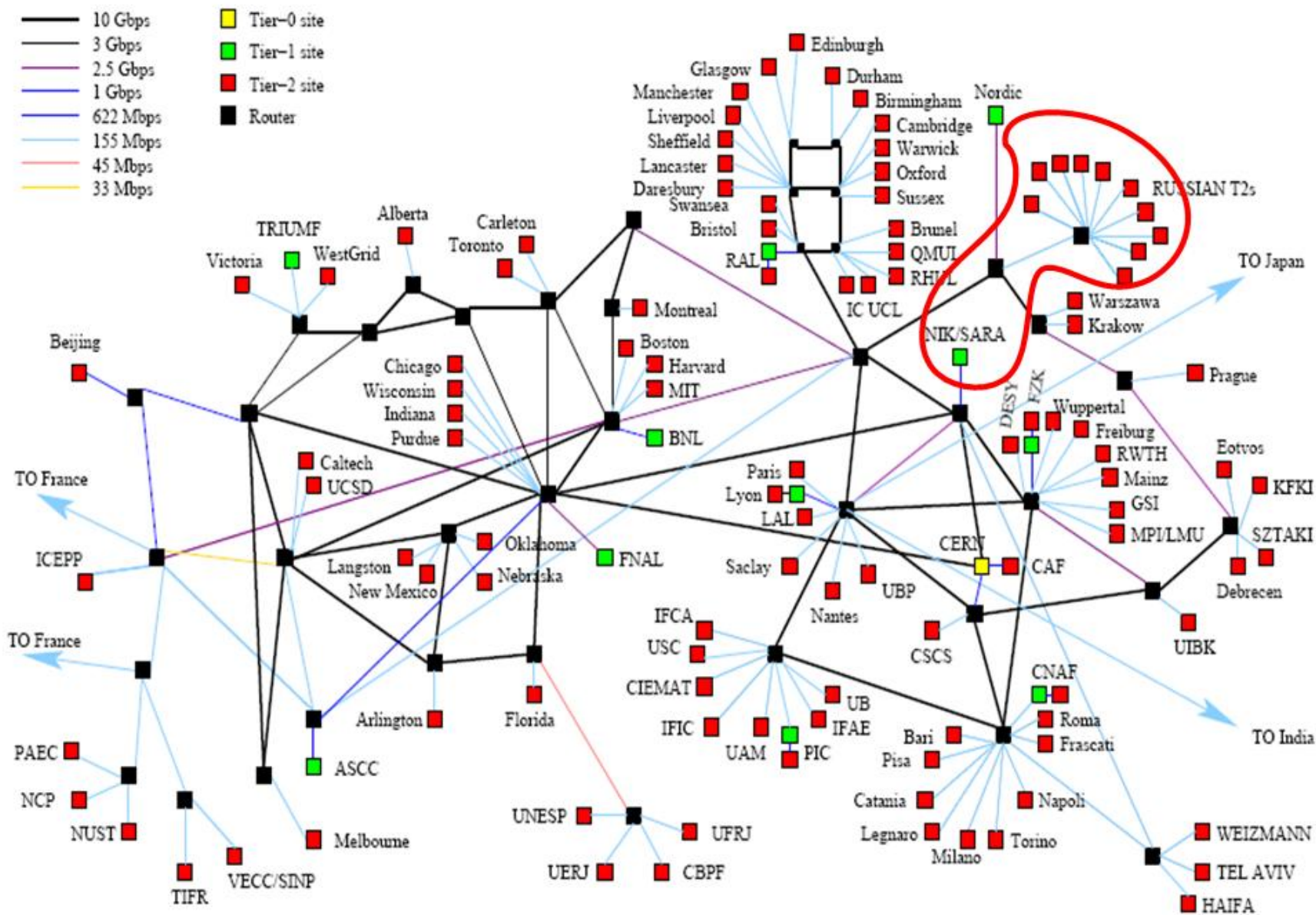


Introduction

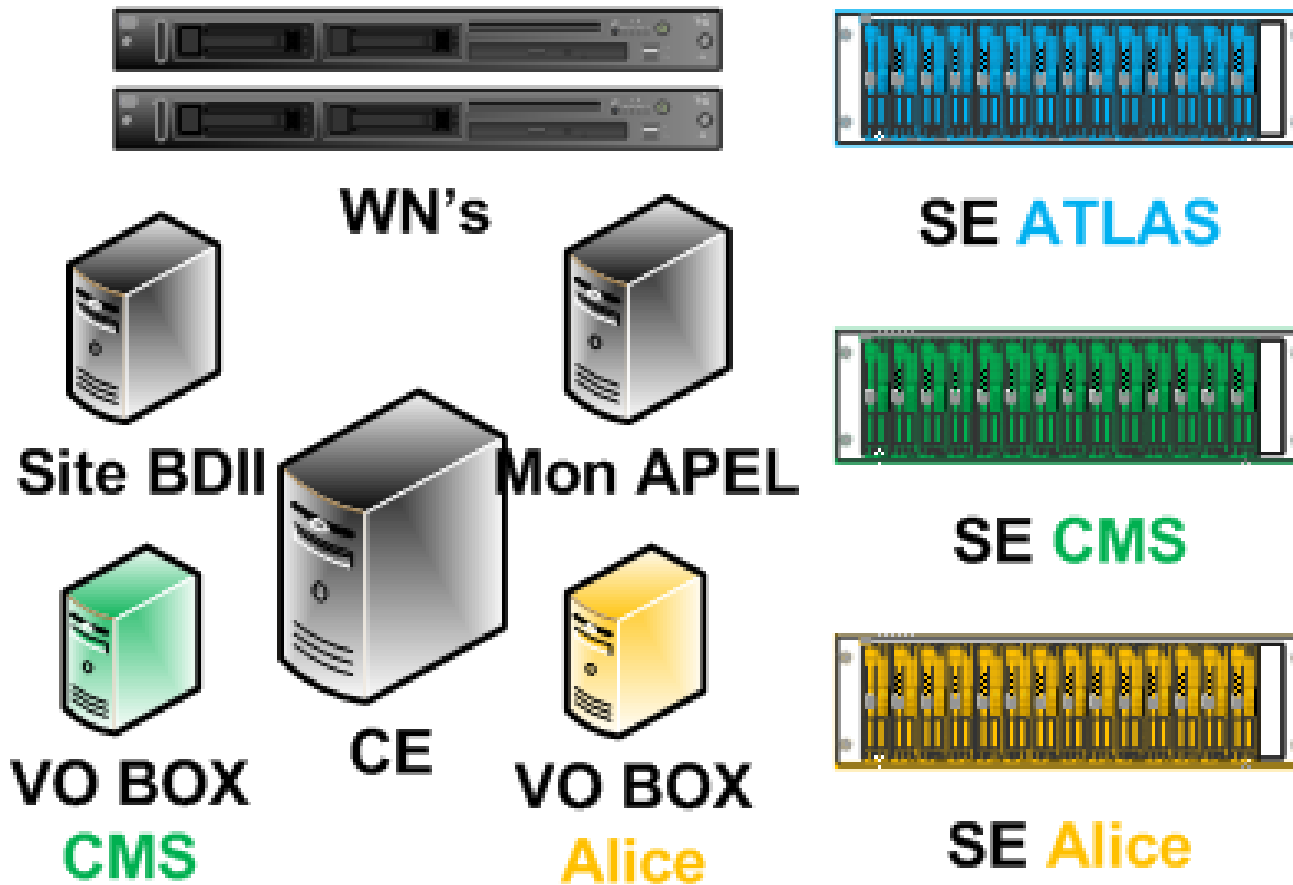
- RU-Protvino-IHEP site participates in the Worldwide LHC Computing Grid from very beginning since **2003**.
- In that time were installed and configured the first grid infrastructure services like CE, SE, WNs, UI on **16** two-core Pentium III 900MHz.
- After increasing network bandwidth to 100Mb/s, then to 1Gb/s and in the end to 10Gb/s we became one of the biggest Tier-2 site in Russia with 1k CPU (8800 HEP-SPEC06) and 800TB disks space.
- In the present time our site serves for four LHC experiments (Atlas, Alice, CMS, LHCb) and many small experiments inside the Institute. We implement shared CPU schema that allows achieving 24x7 CPU resource usage.



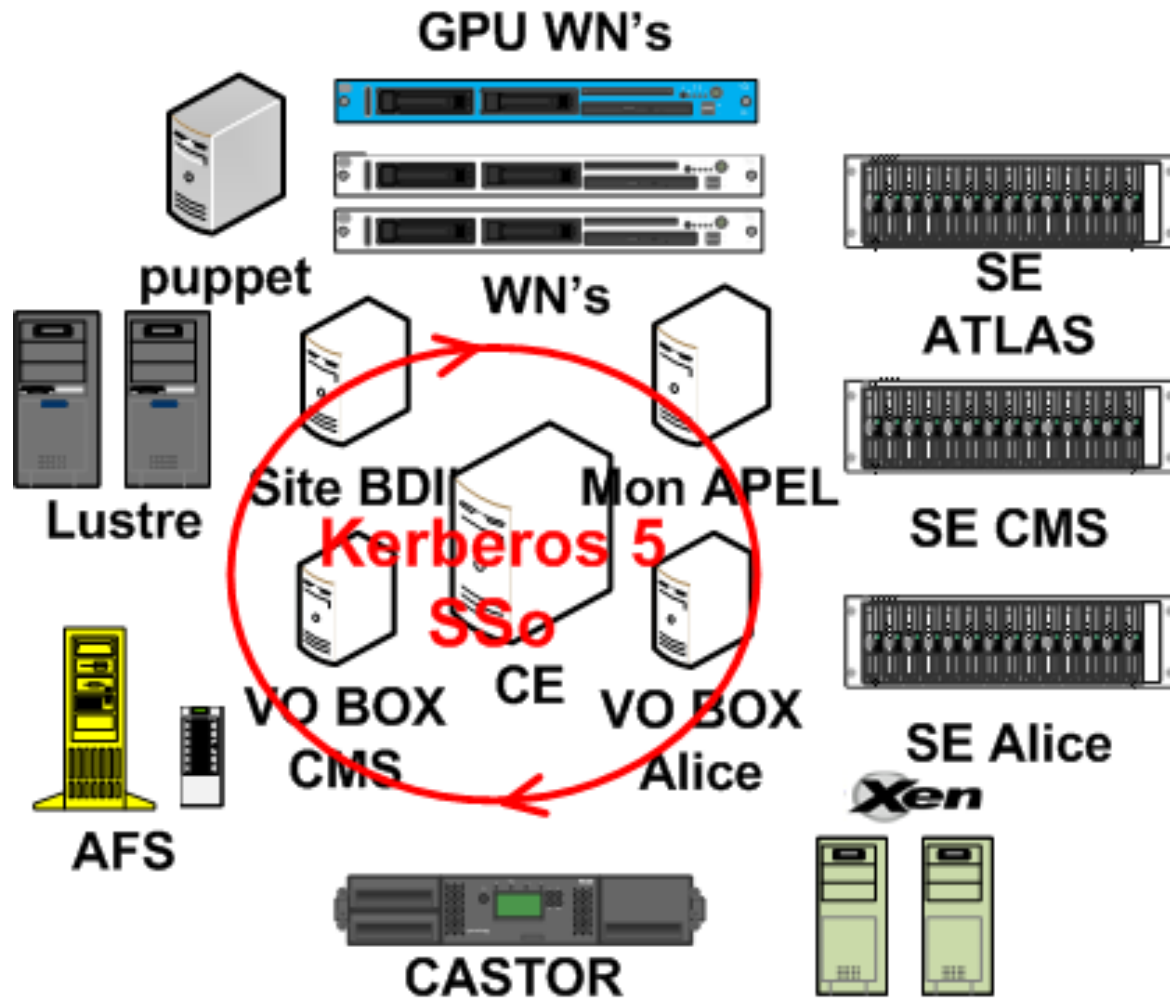
IHEP in WLCG



Simple RU_Tier2-IHEP



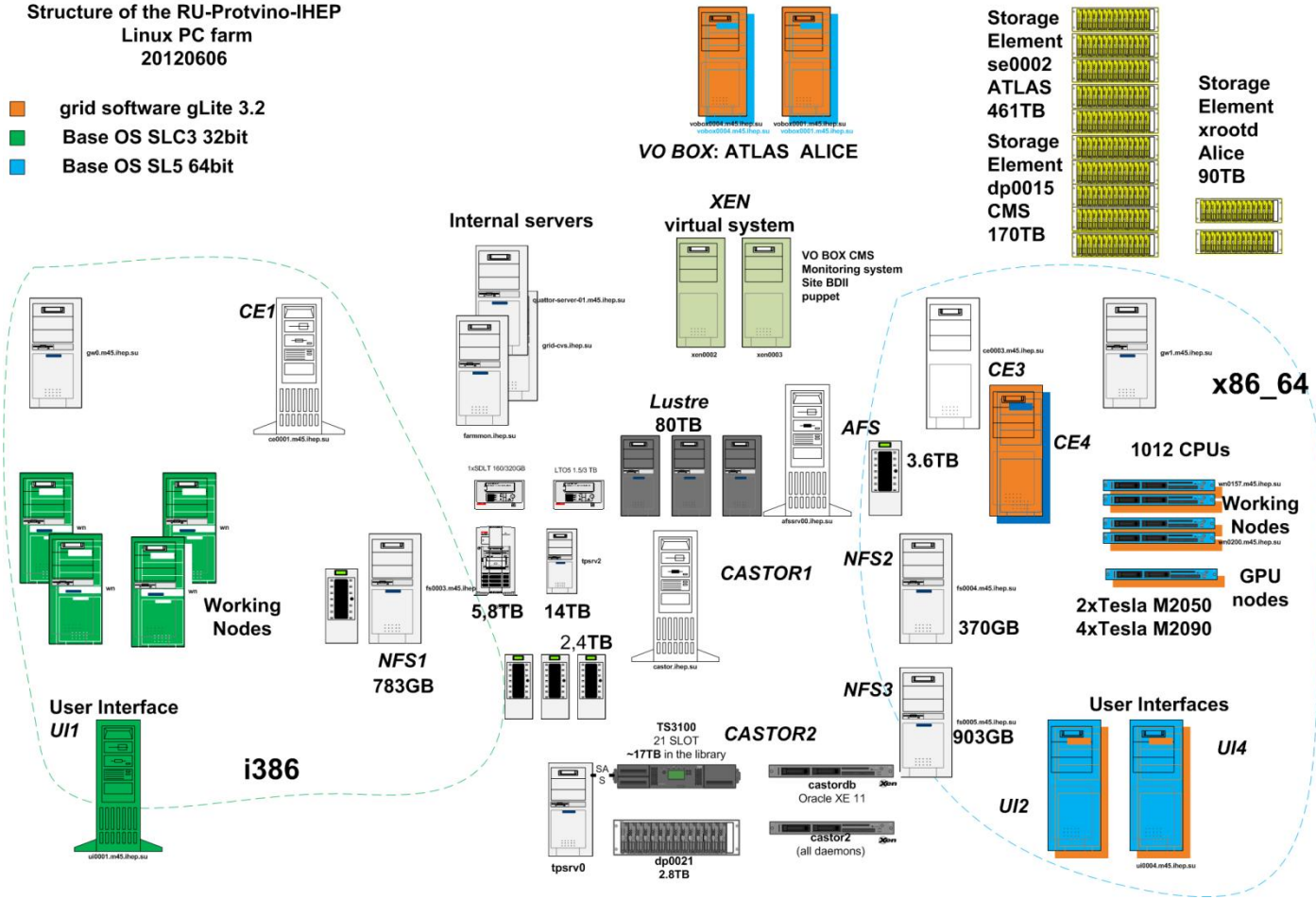
Complex RU_Tier2-IHEP



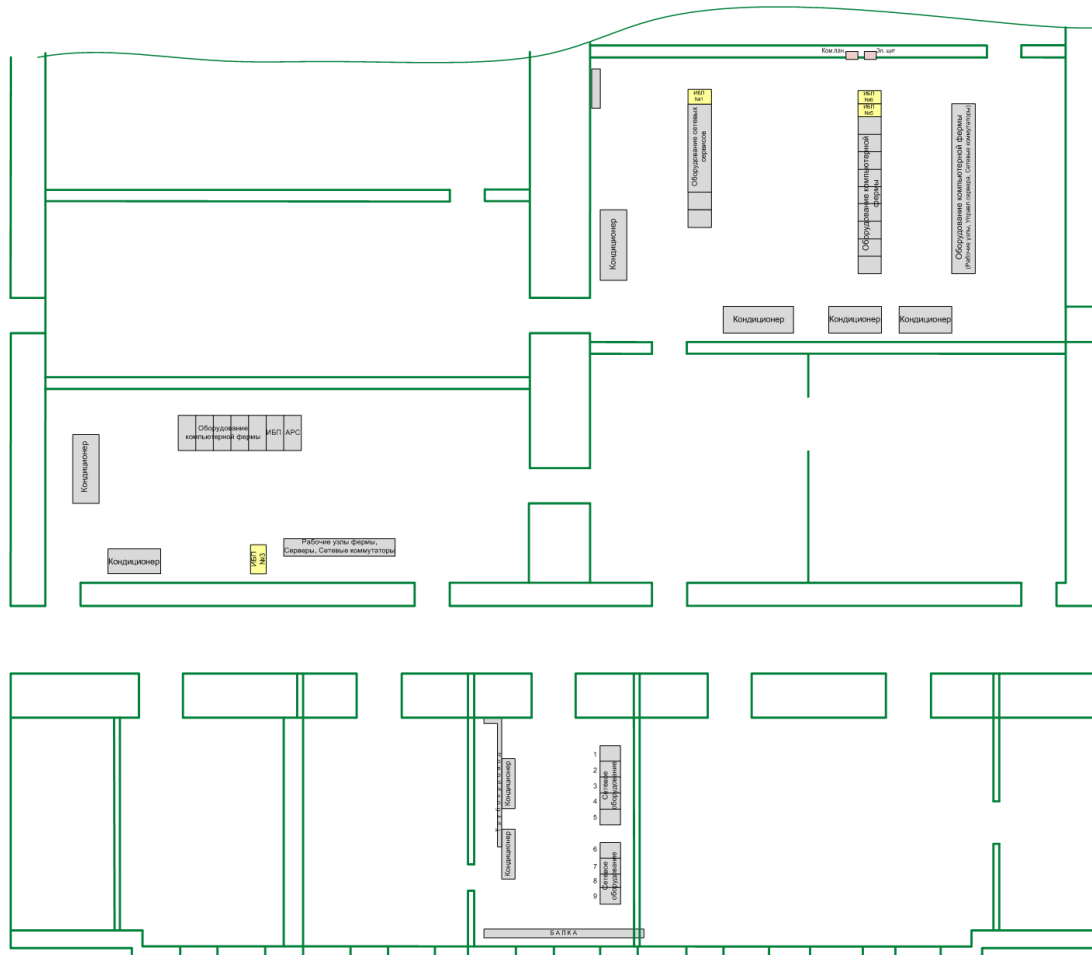
site structure

Structure of the RU-Protvino-IHEP
Linux PC farm
20120606

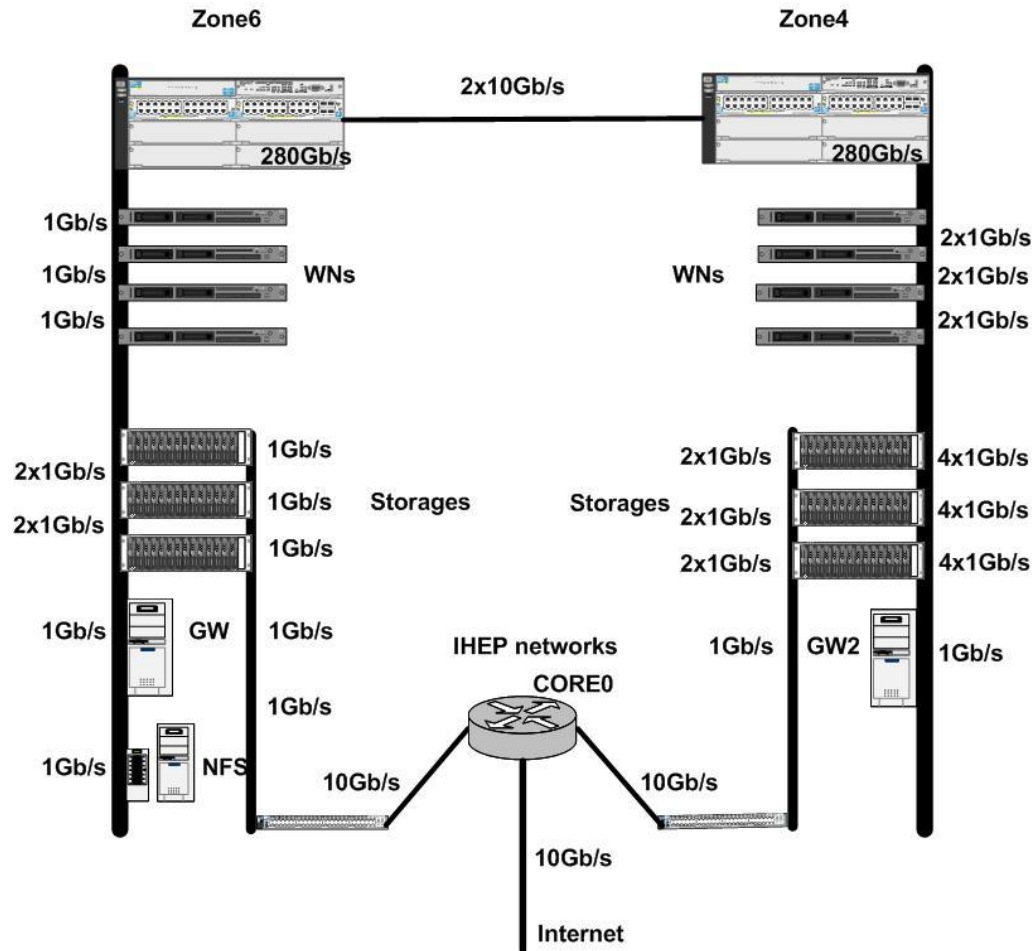
- grid software gLite 3.2
- Base OS SLC3 32bit
- Base OS SL5 64bit



Site physical location



site networking





Recent upgrades (May 2012)

Hardware:

- From 400 CPU to **1000**CPU (CPU – job slot, cores with HT on);
- From 360TB to **800**TB;

Problems:

- **Maui limit for 1024 jobs:**

```
diff /opt/maui-3.3.1/include/moab.h /opt/maui-3.3.1.orig/include/moab.h
314c314
< #define MAX_MRES      2048
---
> #define MAX_MRES      1024
```

- **CREAM-CE performance and memory usage:**

hardware upgrade to 8 CORES and 12GB RAM

Tomcat java heap size increase

Enable caching for mysql

```
diff /etc/my.cnf /etc/my.cnf.0
14,16d13
< query_cache_type = 1
< query_cache_size = 40M
```

- **Alice move from Lustre to p2p;**
- **ATLAS move libraries to local drive from shared area:**

```
cat /lustre/ihep.su/grid/atlas/setup.sh.local
export LD_LIBRARY_PATH=`echo $LD_LIBRARY_PATH | sed -e "s/lustre/ihep.su/grid/atlas/lib/opt/grid/atlas/lib/"`
```

- **Home and cache dirs on WN's switched to XFS over stripe raid:**
looks like CMS, Lhcb and Atlas software can not handle big partitions under XFS about 1.6TB (64bit inodes problem?)

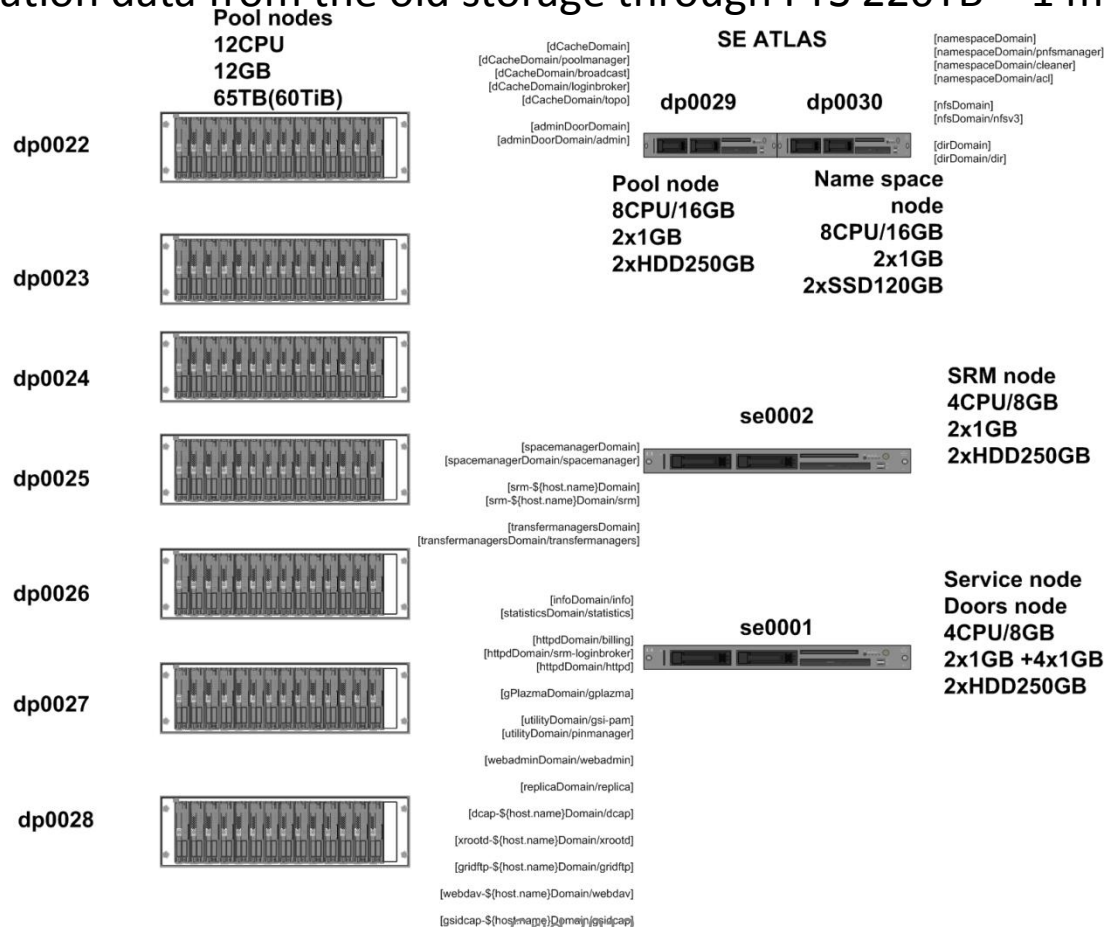


A new SE for ATLAS

460TB

move to Debian and dCache 2.2.0

migration data from the old storage through FTS 220TB – 1 month



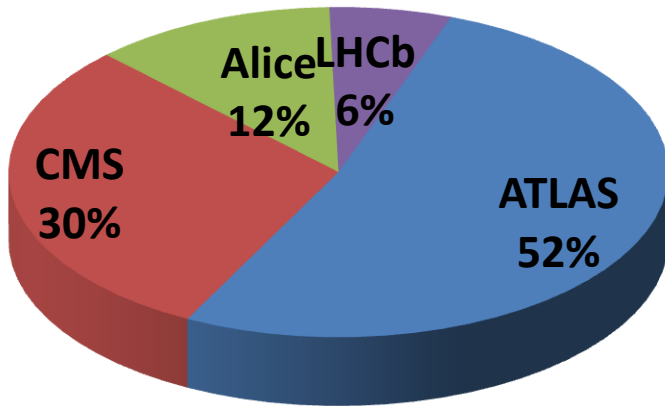
Site resources and usage

Developed by CESSGA 'EGI View': / normcpu / 2012:1-2012:7 / SITE-VO / lhc (x) / GRBAR-LIN / I

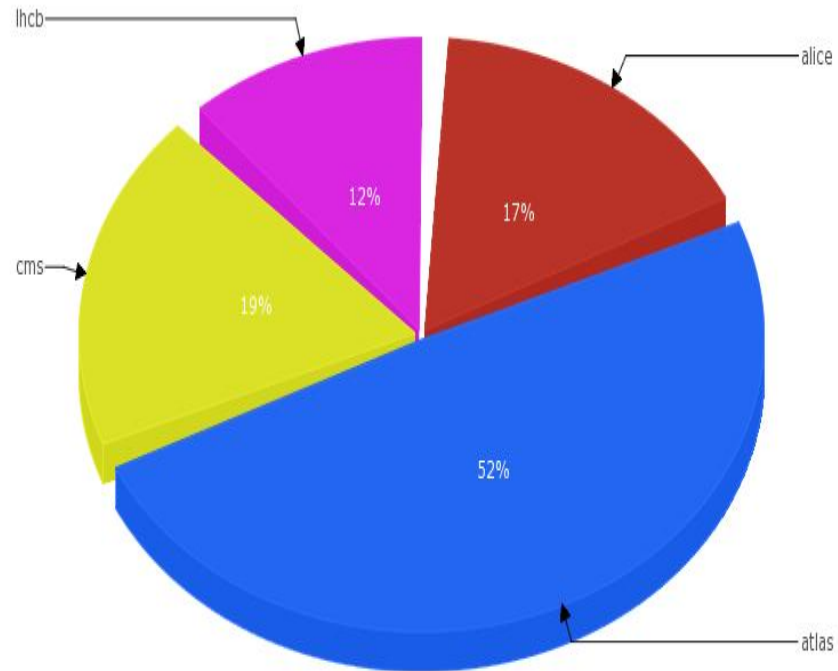
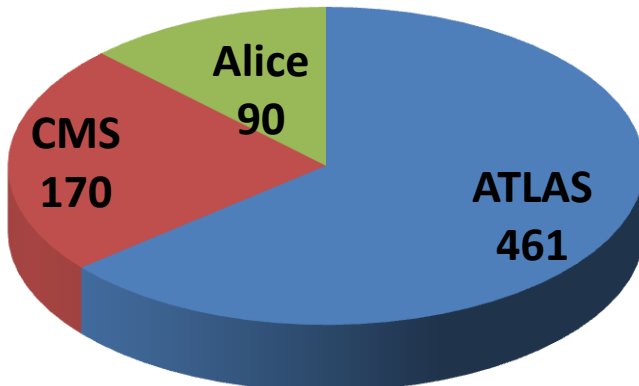
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RU-Protvino-IHEP Normalised CPU time (kSI2K) per VO

VO fair share, %



VO disks ,TB





Future plans (end of 2012)

Hardware:

- CPU from 1000 to **1600**
- Storage from 800 to **1200TB**

Software:

- split CREAM-CE by experiments;
- Move CMS to Lustre;
- Upgrade to WN EMI (full installation under puppet);
- Add CASTOR support for local group ATLAS;
- CMS dCache storage upgrade to 2.2.x ;



Future plans strategic 2017

Achieve (maximum by Air conditioning):

- 5000CPU ;
- 6000TB;
- 8x10Gb external network;

Physical Power + Air conditioning upgrade.



Thank you!

Any questions?