

LHC GRID in Slovakia

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Motivation

- ♦ Why at all to build grid centers in small country
 - ♦ with limited financial support
 - ♦ with very limited specialized manpower
 - ♦ with small local physics groups
- ♦ LHC grid computing quite successful, but free resources are quite limited, limited space for training
- ♦ Hope to support Slovak physicists and mainly students with their analyses - mainly disk-space for personal usage
- ♦ Students (physics as well as computing) to learn new technologies - very successful at the beginning, now in routine operations phase not so interesting
- ♦ Bring also some limited contribution to experiment M&O resources

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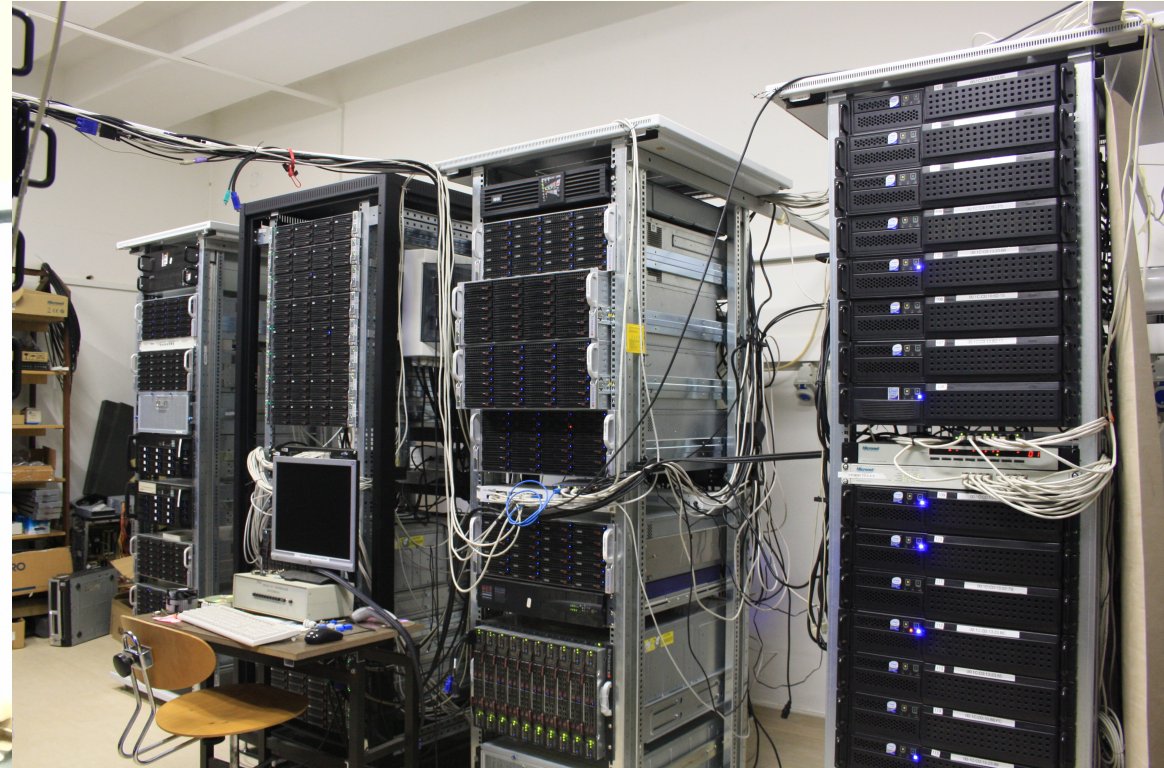
Short history

- ◆ First grid enabled machines appeared in 2004 after decision of Slovak CCC (Committee for Cooperation with CERN) to start funding
- ◆ Decision was made to create two farms (Bratislava University and Kosice Academy of Sciences).
- ◆ First site (KE) was certified in EGEE infrastructure and classified for production in the 2005, first jobs were running in ATLAS VO soon after ALICE. Other supported VOs (CDF, H1) next year (these were discontinued few years ago).
- ◆ In the same year also BA site joined
- ◆ Financing only from the operational budget of groups working on ATLAS and ALICE during the whole period of building the clusters. Both investments to hardware, and running cost (electricity mainly).
- ◆ Memorandum with WLCG was signed in December 2012, we formed Slovak T2 federation out of these two computing farms.
- ◆ Slow but continuous growth over time, smooth running, without any big interruption over last years, regularly delivering to ATLAS and ALICE also over pledge capacities.

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Current status of WLCG clusters

- ◆ How the clusters looks today



- ◆ Some statistics:

SITE	CPU physical	CPU cores	SE [PB]	CE	Other servers
FMPH-UNIBA	168	672	1.25	2	7
IEPSAS-Kosice	109	868	1.66	2	6

Current status of WLCG clusters

- ◆ Trying to maximize performance/price ratio, sometimes compromising the reliability, still learning process for optimal solutions
- ◆ After good start, the not easy task of production support, continuous software changes, overcoming hardware limitations
- ◆ With the current financing/manpower we are on the limit for operational stability
- ◆ Normalized CPU time (HEPSPEC06.Hours) used for some statistics: 20,898 delivered, with 12,800 pledged this year
- ◆ Similarly for disk, 2.91 PB delivered, with 1.3 PB pledged
- ◆ KE site connected with 10Gb to SANET (national research networking infrastructure), but only 4Gb used due to firewall restriction. BA has 10Gb shared with the whole university
- ◆ Kosice site used the opportunity to join the EU infrastructure project, to improve computer room (common with the institute infrastructure), water cooled racks and motor-generator installed
- ◆ Otherwise no external funds for hardware or operations found so far

Current status of WLCG clusters

- ◆ Currently we have only 1.5 FTE people fully dedicated for work on cluster on KE site, the rest of the needs are covered by students and physicists working for small fraction of time on clusters needs
- ◆ Not sustainable for the long time - looking for solutions already long time, but no success yet
- ◆ Nevertheless, stability and performance of clusters are excellent
- ◆ For the illustration, statistics for delivered HEPSPEC06Hours of our clusters from official WLCG monitoring over the last year:

SITE	ALICE	ATLAS	Total	Fraction of the WLCG
FMPHI-UNIBA	23,579,545	35,696,443	59,275,987	0.21%
IEPSAS-Kosice	38,403,737	38,011,569	76,415,305	0.28%

Plans and problems

- ◆ Plan is to continue deliver to experiments (ALICE and ATLAS) as much resources, as we can.
- ◆ Maximal planned capacity is nearly reached (if additional resources and manpower will be not found), the growth only by technology improvements with flat budget.
- ◆ There is a country-wide project (co-funded from EU funds) Slovak-Grid, which serve to all sciences, but running cost are not part of the project, and we have no resources to cover more. The longterm future of this project is not clear yet.
- ◆ Lack of involved manpower (computer specialists) starts to raise, the technology is not anymore so attractive for students, not too much development anymore. Administration and production support are not much fun.
- ◆ Working with SANET (national academic networking provider) on improving the network capacities

Backup slides