

GRID computing and analysis of LHC data on SKAF cluster

Pavol Strizenec (*IEP SAS Kosice*)

- ◆ Two parts, WLCG clusters (P. Strizenec) and SKAF cluster (M. Vala)
- ◆ Overview of the first part:
 - ◆ Introduction
 - ◆ Motivation
 - ◆ Short history
 - ◆ Current situation with WLCG clusters
 - ◆ Plans

Introduction

- ◆ Special computing needs in Experimental Particle Physics
- ◆ The only viable solution is distributed computing - currently World-Wide LHC Grid
- ◆ I assume that concept is well known, so nothing general here, only Slovak situation and contribution
- ◆ Grid infrastructure 2 centers (Bratislava and Kosice)
- ◆ Concentrate on operational issues, not too much on technicalities
- ◆ Short but hopefully gives the overall picture
- ◆ Special needs (like HPC for Theoretical Physics) are not discussed here

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 with their analyses - not there fully yet
- ◆ Students (physics as well as computing) to learn new technologies - very successful so far
- ◆ Bring also some limited contribution to experiment M&O resources

GRID computing and analysis of LHC data on SKAF cluster

Short history

- ◆ First grid enabled machines appeared in 2004 after decision of Slovak CCC (Committee for Cooperation with CERN) to start funding
- ◆ Enthusiastic team of physicists and computer students.
 - ◆ People were deeply involved and interested, even building the farms themselves, not ordering “ready-to-go” solutions
 - ◆ Most computer students which helped in the beginning are now working with Grid elsewhere (CERN, GridKa, ...) or on similar projects in industry
 - ◆ Very quick start, big thanks to all involved over the years
- ◆ First site (KE) was certified in EGEE infrastructure in 02/2005 and after some testing period classified for production in the same year
- ◆ First jobs were running in ATLAS VO soon after (summer 2005), ALICE and other supported VOs (CDF, H1) next year
- ◆ In the same year also BA site joined
- ◆ With financing and coordination from CCC new hardware acquired every year, steady growth in capacity and performance

GRID computing and analysis of LHC data on SKAF cluster

Short history

- ◆ This brings higher requirements for infrastructure, equipping dedicated rooms
- ◆ Trying to maximize performance/price ratio, sometimes compromising the reliability, 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 soon the limit for operational stability will be hit
- ◆ Normalized CPU time (HEPSPEC06.Hours) used for some statistics

First year of operation (2005)

SITE	alice	atlas	cdf	hone	Total	%
FMPH-UNIBA		1524	0	0	1524	1.82
IEPSAS-Kosice		79112	0	3004	82116	98.18
Total	0	80636	0	3004	83640	
%	0	96.41	0	3.59		

After three years (2008)

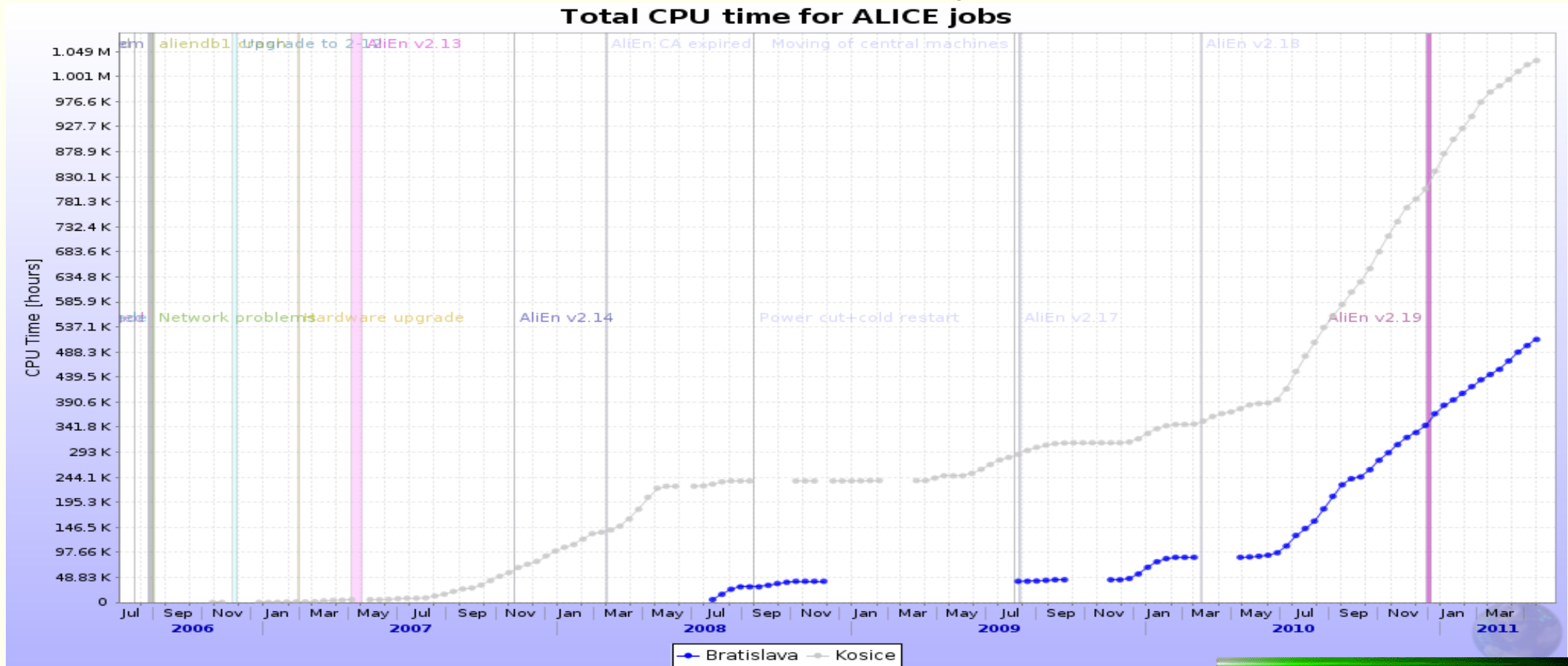
SITE	alice	atlas	cdf	hone	Total	%
FMPH-UNIBA	495048	218776	0	0	713824	45.81
IEPSAS-Kosice	662840	56308	66972	58132	844252	54.19
Total	1157888	275084	66972	58132	1558076	
%	74.32	17.66	4.3	3.73		

GRID computing and analysis of LHC data on SKAF cluster

Last year (2010)

SITE	alice	atlas	cdf	hone	Total	%
FMPH-UNIBA	3226108	464	0	0	3226572	45.96
IEPSAS-Kosice	2727136	866248	84552	116572	3794508	54.04
Total	5953244	866712	84552	116572	7021080	
%	84.79	12.34	1.2	1.66		

◆ Other view to see development in recent years:



GRID computing and analysis of LHC data on SKAF cluster

Current status of WLCG clusters

- ◆ How the clusters looks today



- ◆ Some statistics:

SITE	WN	CPU cores	SE [TB]	CE	Other servers
FMPH-UNIBA	91	428	238	2	8
IEPSAS-Kosice	32	340	110	1	5

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
- ◆ Some minor hardware issues, but we are learning
- ◆ Nevertheless, stability and performance of clusters are excellent
- ◆ For the illustration, statistics for availability of our clusters from official NGI_SK monitoring for this year (142 days of operation):

SITE	Up	Scheduled DT	Unscheduled DT	Unreachable
FMPHI-UNIBA	98.05%	1.95%	0%	0%
IEPSAS-Kosice	93.33%	4.67%	0%	0%

Plans and problems

- ◆ Our contribution to WLCG is still not formalized
 - ◆ MoU should be signed this year,
 - ◆ federated Tier-2 with two sub-clusters
- ◆ We would like to deliver to experiments (ALICE and ATLAS) as much resources, as we can
- ◆ Maximal planned capacity will be reached soon (if additional resources and manpower will be not found)
- ◆ There is a country-wide project (co-funded from EU funds) Slovak-Grid, which should serve to all sciences, but it's still in very early stage (the tender for HW supplier was issued recently). Not clear, how it can help us in near future
- ◆ 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

Backup slides

Thanks to all who contributed

- ◆ We would like to mention here, and express big thanks to all people involved in the work over the whole period of building and running the clusters:
 - ◆ prof. B. Sitar, doc. S. Tokar, Dr. L. Sandor, Dr. D. Bruncko for their coordinating roles
 - ◆ Dr. P. Chochula for the initial work on conception and help with strategic planning
 - ◆ Dr. P. Stavina[†] for enthusiastic building of BA cluster, with big help from Dr. T. Zenis, V. Fekete, R. Breier
 - ◆ Ing. A. Jusko, Ing. M. Babik, Ing. M. Zvada, Ing. R. Chytacek, Ing. T. Daranyi for quick and successful start of KE cluster, and Ing. M. Straka, Ing. I. Kulkova for running it smoothly now.

[†]deceased