IHEP tier-2 computing center: status and operation

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RU-Protvino-IHEP site is the one of three biggest WLCG Tier-2 centers in Russia. The computing infrastructure serves for "big four" high energy physics experiments such as Atlas, Alice, CMS, LHCb and local experiments at IHEP such as OKA, BEC, radio biology stands and others. In this presentation the current status of the computing capacities, networking and engineering infrastructure will be shown as well as the contribution of the grid site to the collaboration experiments.

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 **3k CPU** (26875 HEP-SPEC06) and **2.1PTB** 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.
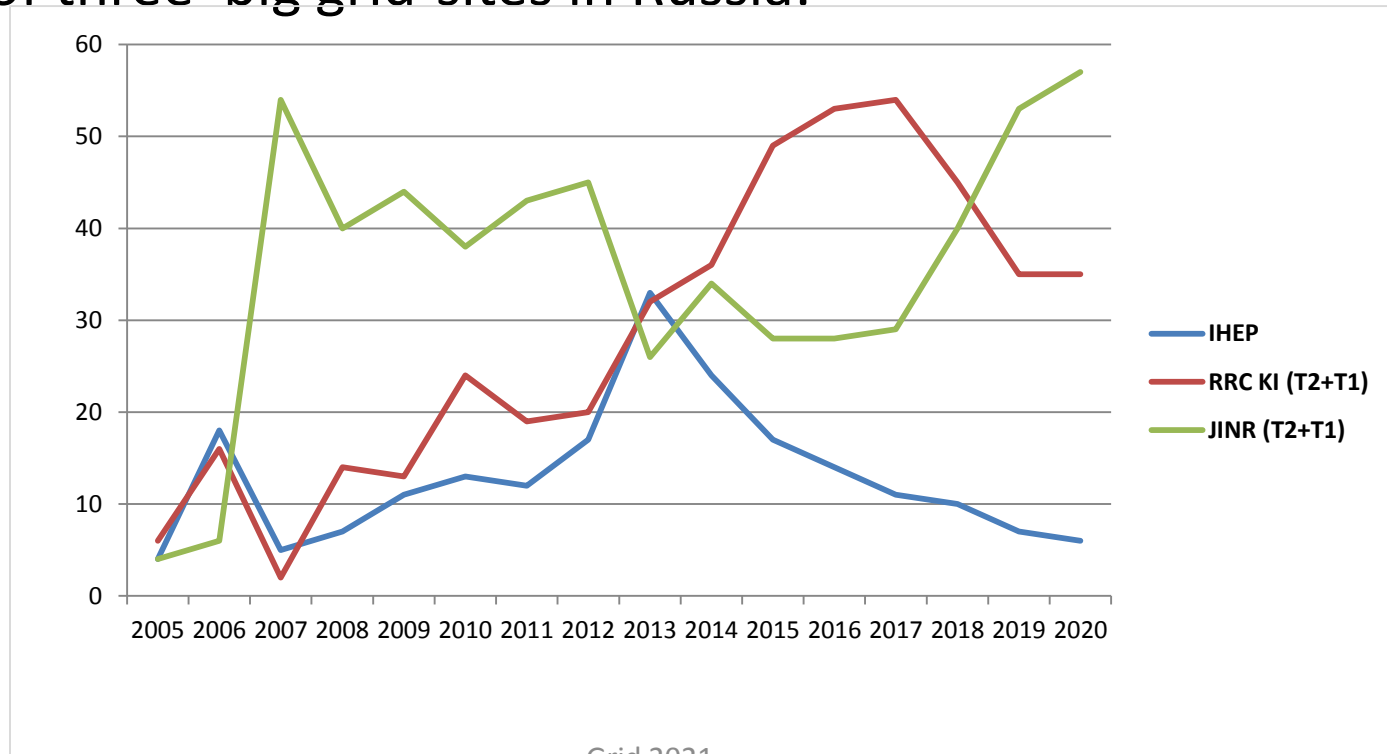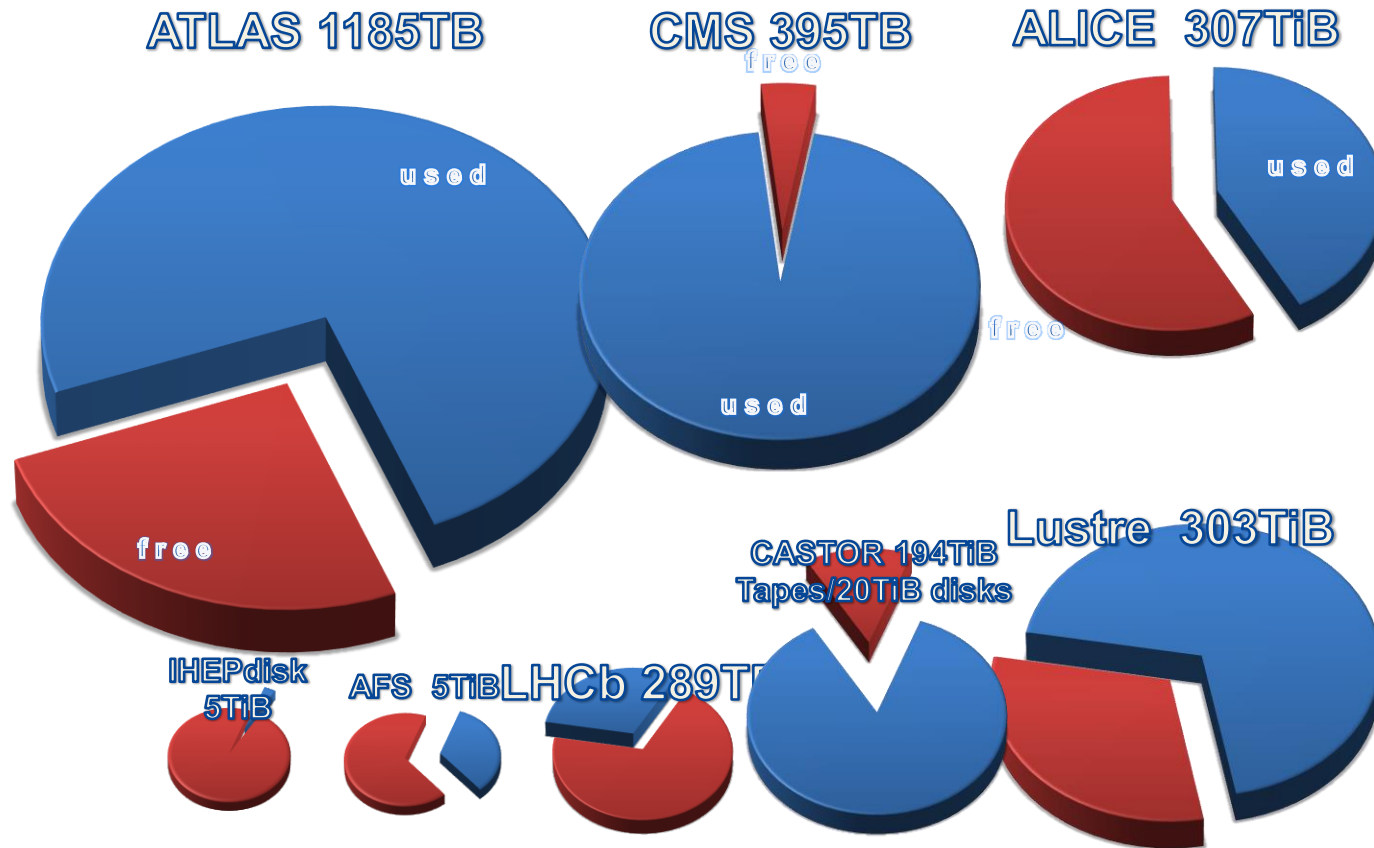
IHEP resources evolution
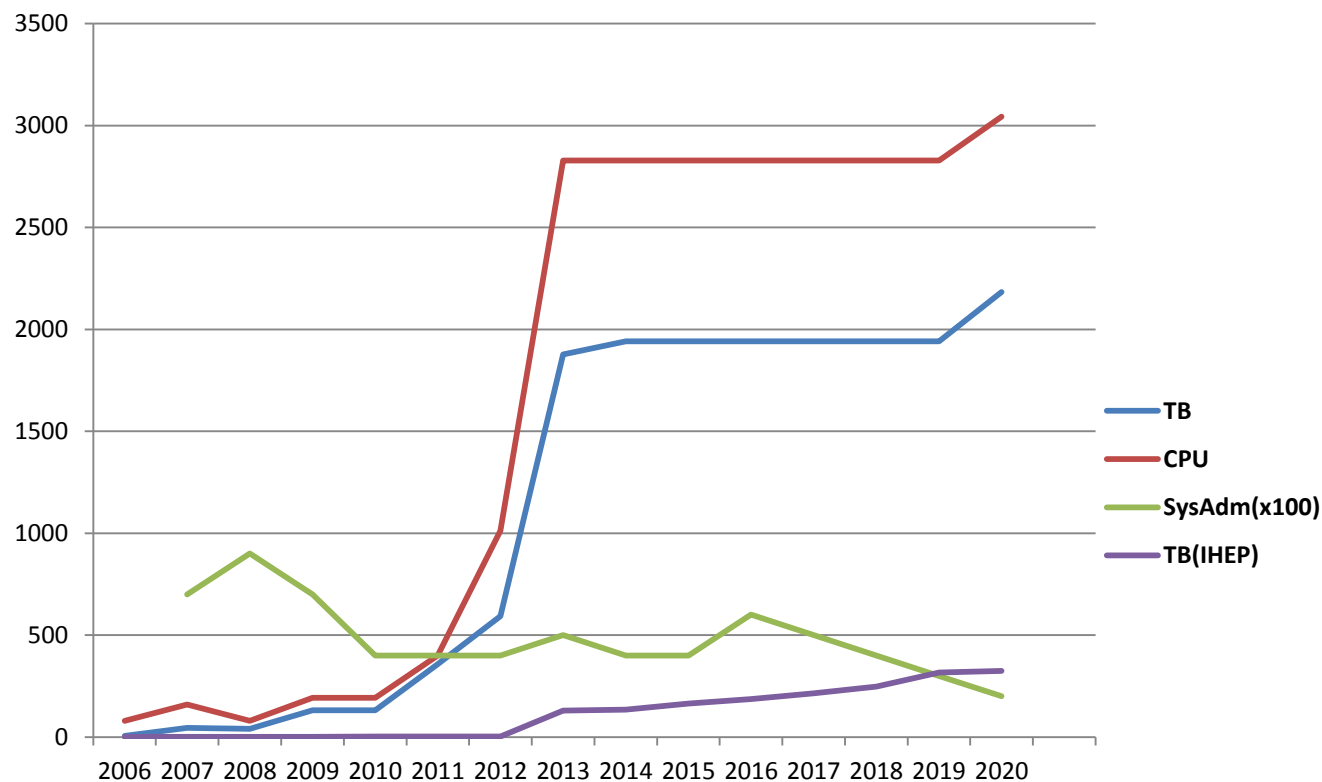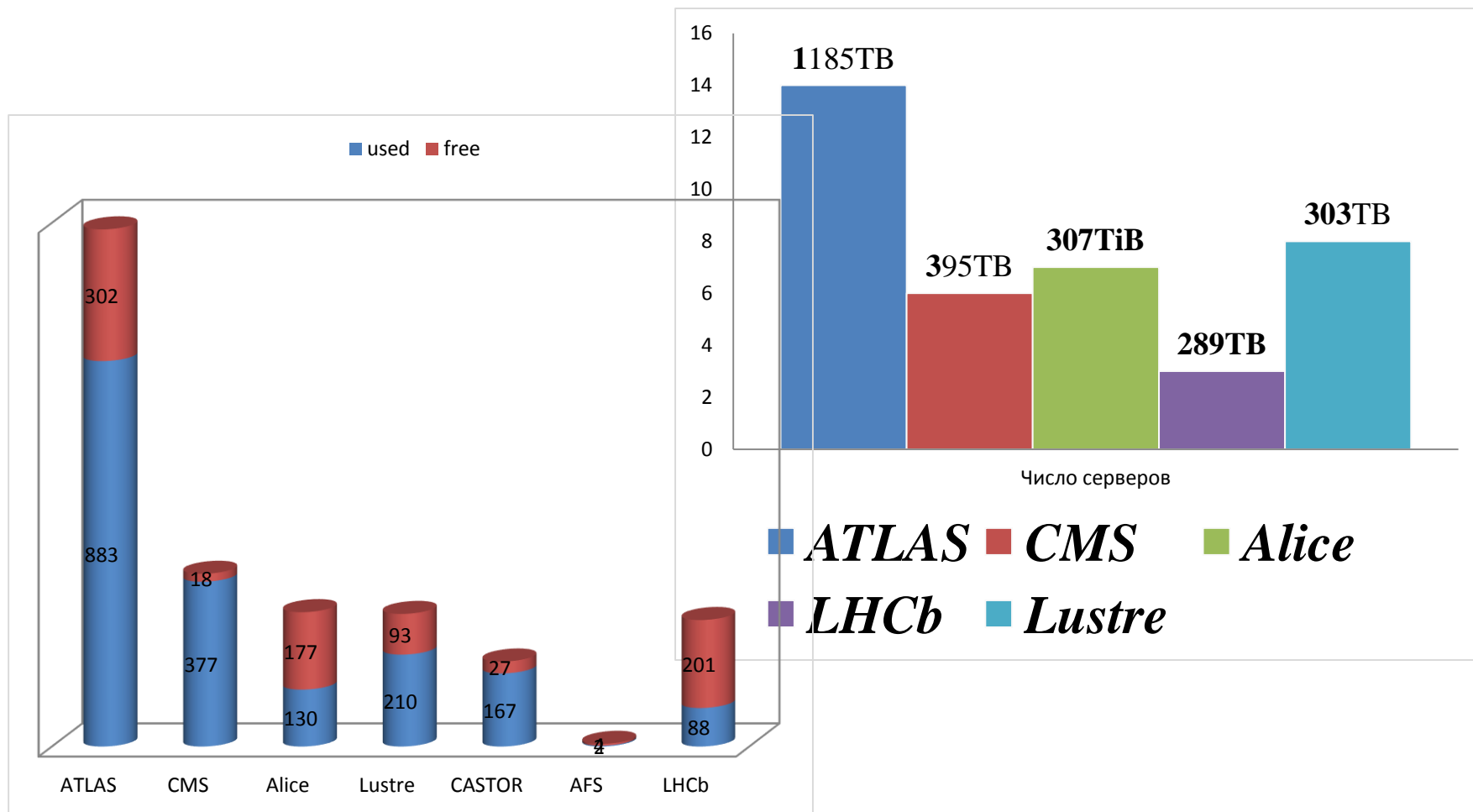
Current status: recourses

- 3044 CPU, 26875 HEP-SPEC06;

- 2183 TB: Atlas 1185, CMS 395, Alice 314 , LHCb 289 ;

- 2x10Gb/s Internet channels IPv6 dual stack;

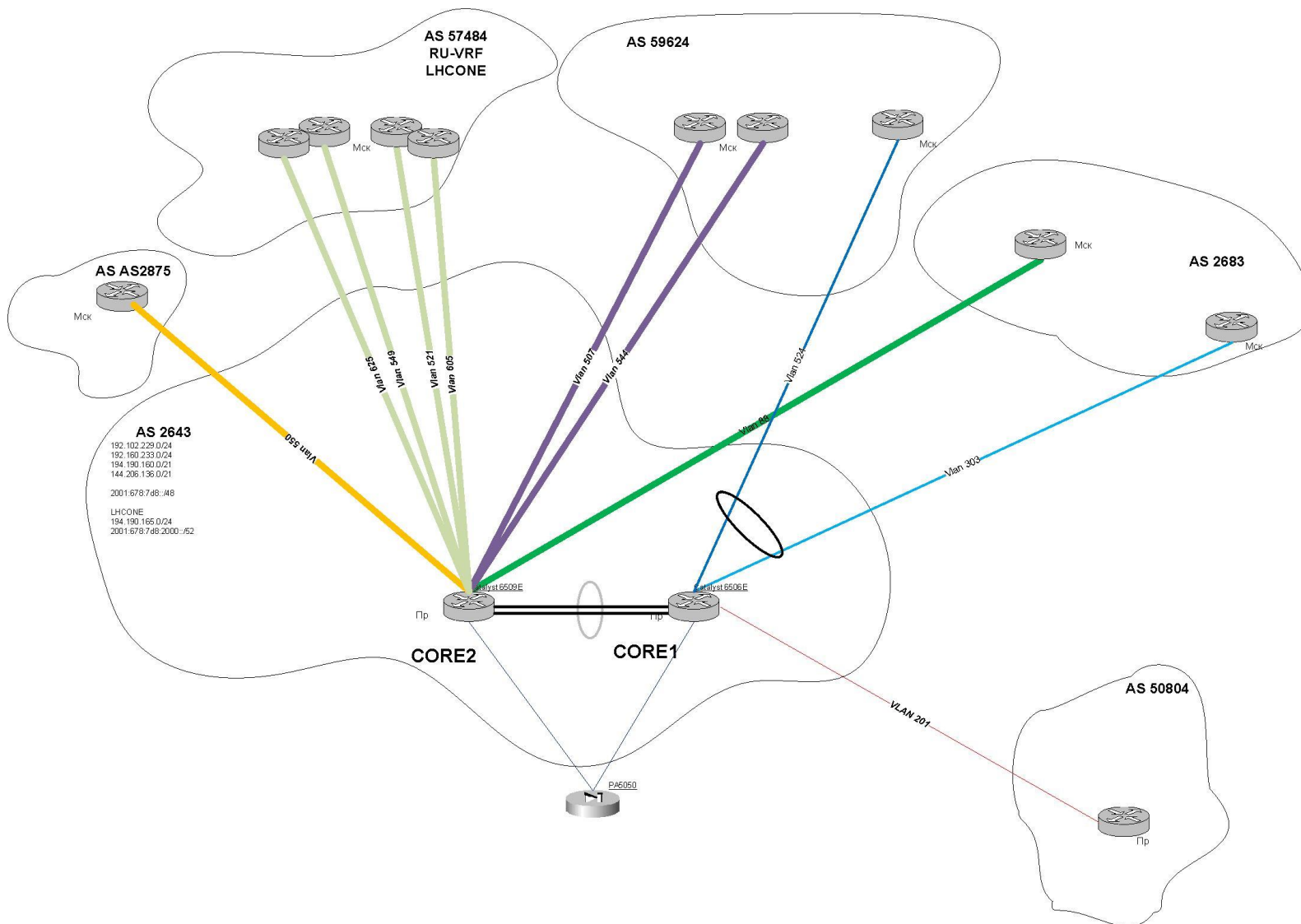- Manpower – 3 people;

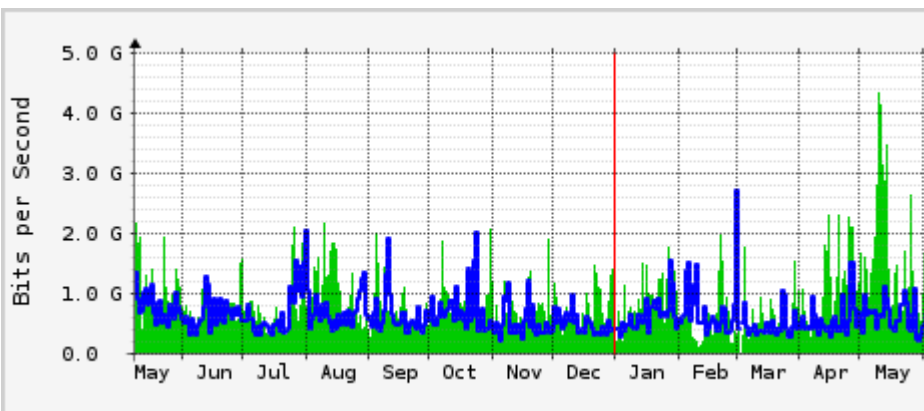- One of three big grid-sites in Russia:
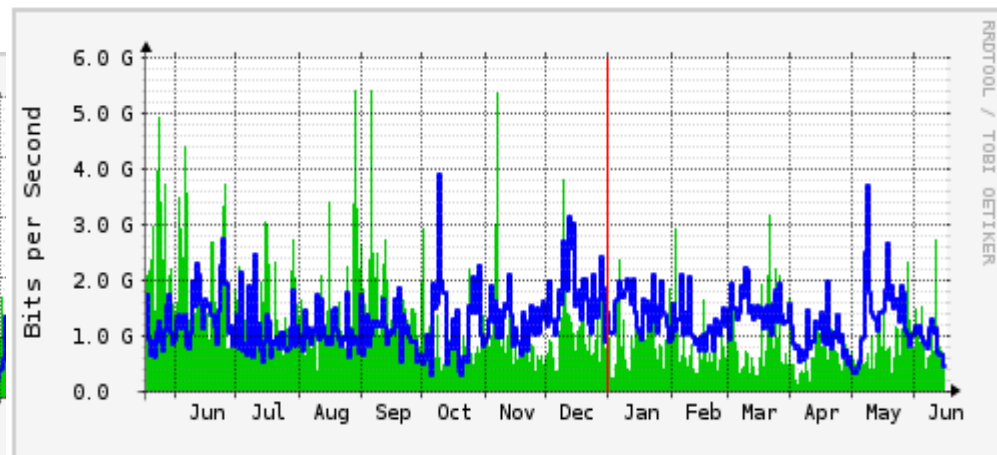
Current status: storages

Current status: storages2

Current status: IHEP external network

Current status: IHEP external network2
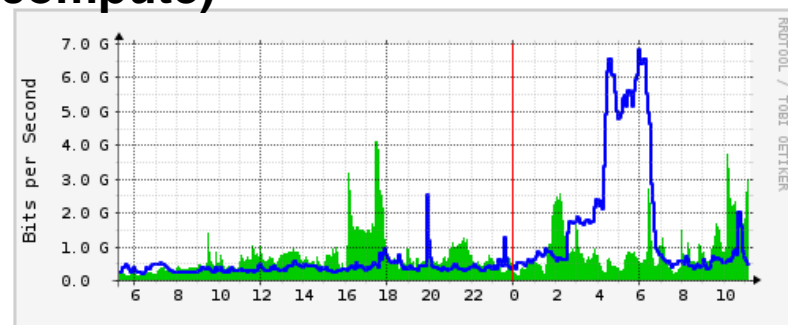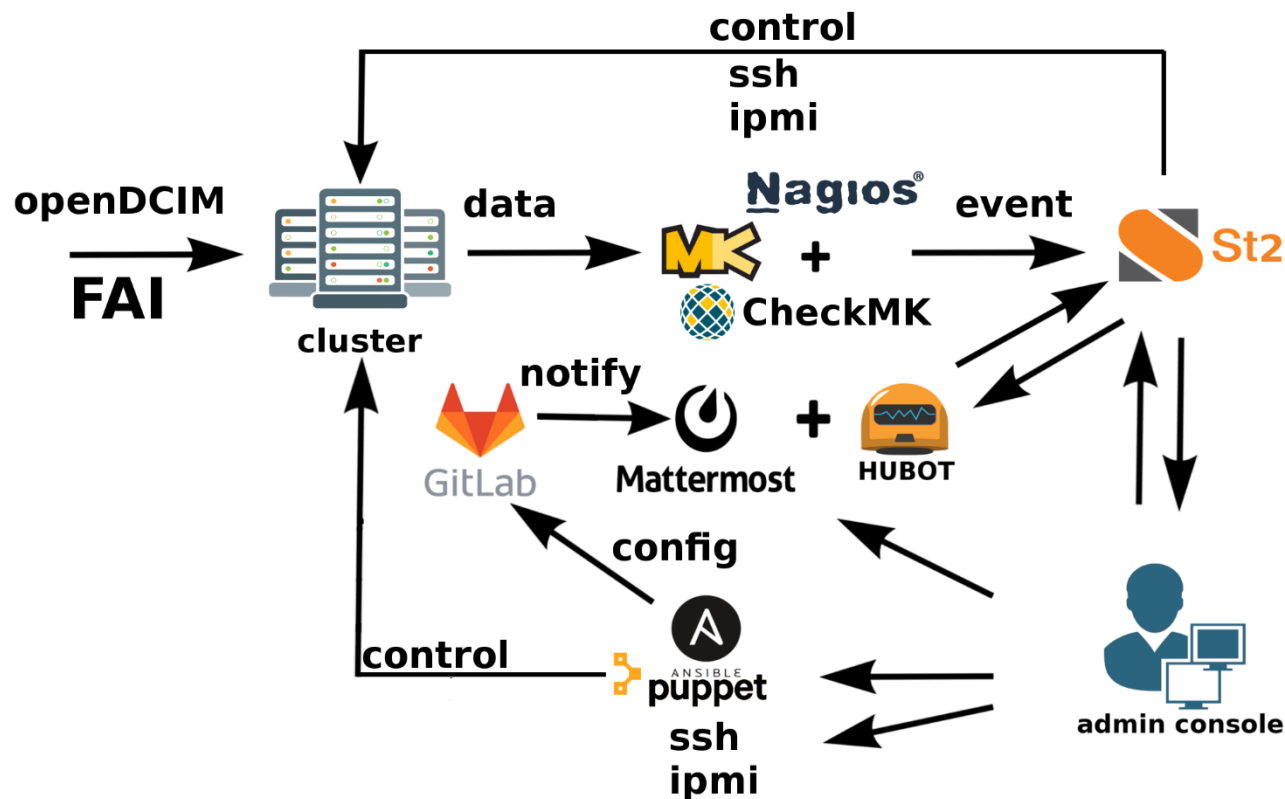

2016

2021

2016->2021
- **IPv6 added (change site configuration for compute)**
- **more connections for RU-LHCONE**
- **No major changes in resources (storage, compute)**

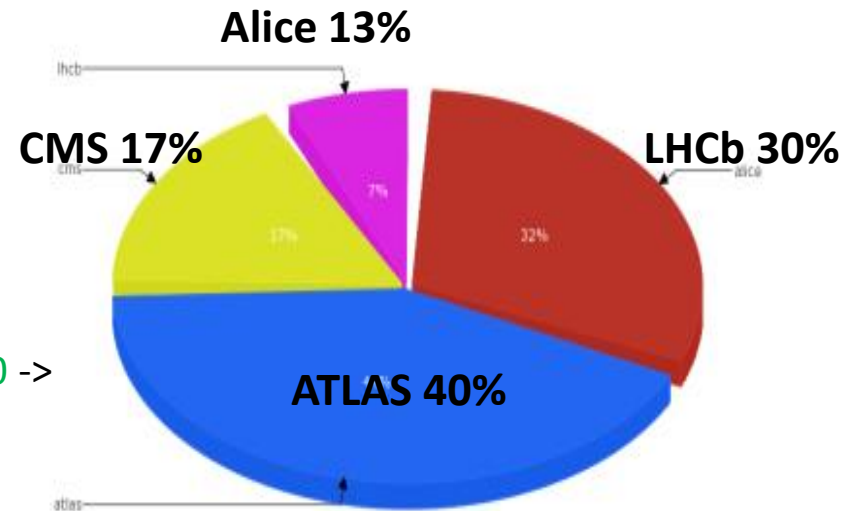# Current status: SW usage

Cluster Management System:
- **Easy migration to CentOS7**
- **Easy deployment of new systems**
- **Added ansible with puppet recently (easy to rewrite simple puppet to playbooks**
- **Easy cluster management (1-2 people)**

Current status: VO usage

Current fairshare setup:

- ATLAS 52%
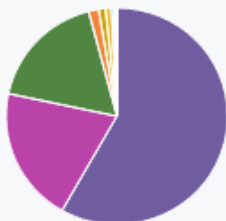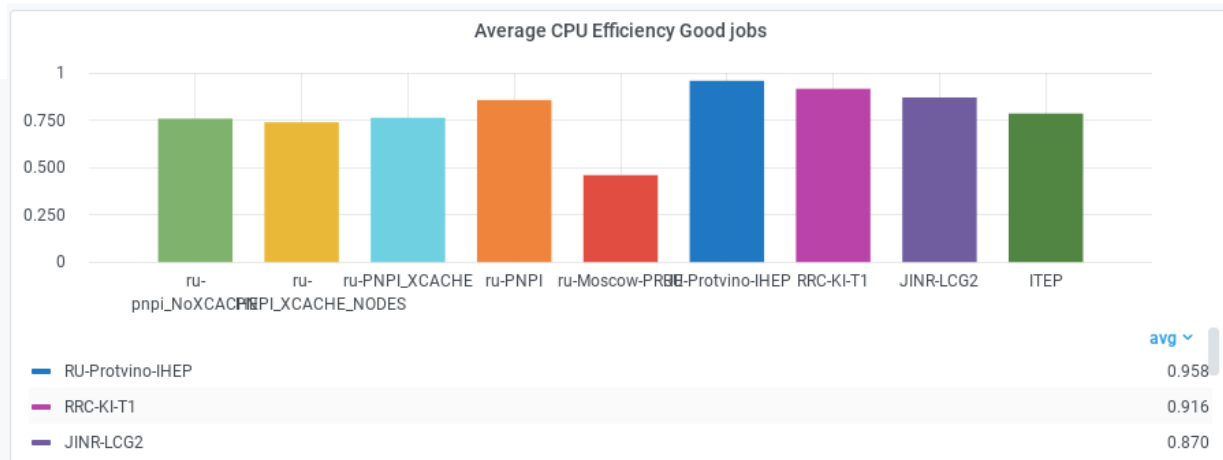
- CMS 30%

- ALICE 12%

- LHCb 6%

Real usage for 2020 ->

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

Alice 13%

CMS 17%

LHCb 30%

ATLAS 40%

Sites usage by ATLAS last year

Jobs in RU for 1Year

Completed jobs

Average CPU Efficiency Good jobs

	avg ∨
RU-Protvino-IHEP	0.958
RRC-KI-T1	0.916
JINR-LCG2	0.870

RRC-KI-T1	3 Mil	58%
RU-Protvino-IHEP	1 Mil	20%
JINR-LCG2	924 K	18%
ru-PNPI	77 K	1%
ITEP	52 K	1%

Completed jobs Cumulative ∨

2020-07-14 15:00:00

RRC-KI-T1:	285 K
RU-Protvino-IHEP:	112 K
JINR-LCG2:	44.7 K
ru-PNPI:	11.4 K
ITEP:	6.78 K
ru-PNPI_XCACHE:	2.90 K
ru-pnpi_NoXCACHE:	2.84 K
ru-Moscow-MEPHI-LCG2:	355
ru-PNPI_XCACHE_NODES:	0
ru-Moscow-PRUE:	0
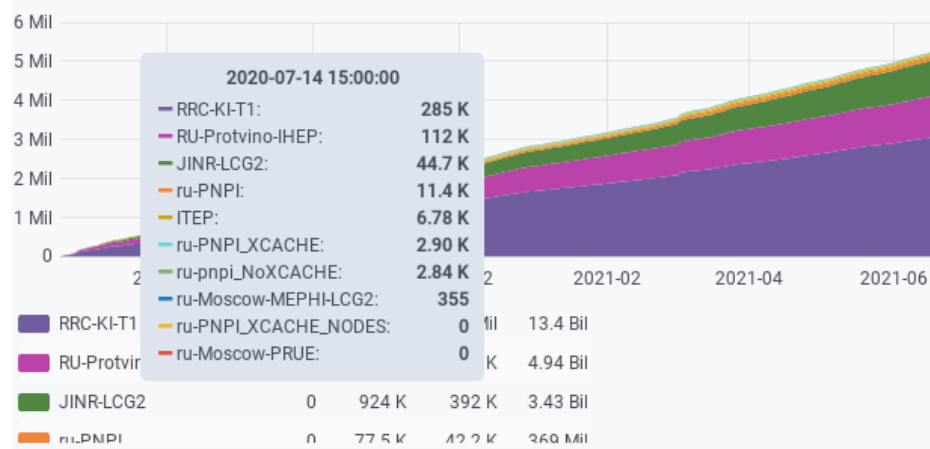
Volume by site ⏱ Last 24 hour

All data in RU
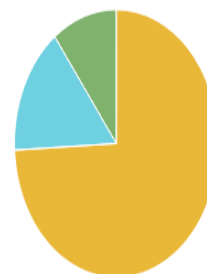
	current ▾	percentage ▾
RRC-KI-T1	7 PB	74%
JINR-LCG2	1 PB	15%
RU-Protvino-IHEP	936 TB	10%

T2 sites usage by CMS last year

Filters   Site = T2_RU_IHEP +

		CPU Usage in jobs						
Tier	Site	Job Count ∨	Failed jobs	CPU Eff	HS06CoreHr	CpuTimeHr	CoreHr	Avg Queue time
T2	T2_RU_IHEP	742461	158613	73.1%	1863107.20	2161668.23	2957465.15	04:39:39

Total number of processed events

IHEP 6%

JINR 17%

JINR-T1 76%
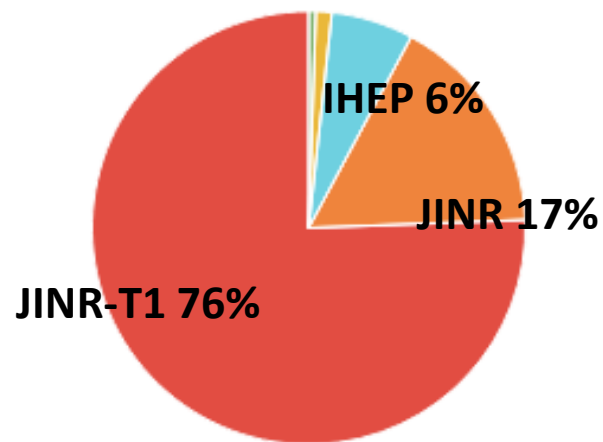
— T2_RU_ITEP	2,055,643,448	1%
— T2_RU_INR	4,638,770,818	1%
— T2_RU_IHEP	23,990,221,600	6%
— T2_RU_JINR	64,844,388,455	17%
— T1_RU_JINR	295,892,373,578	76%

T2 sites usage by Alice last year
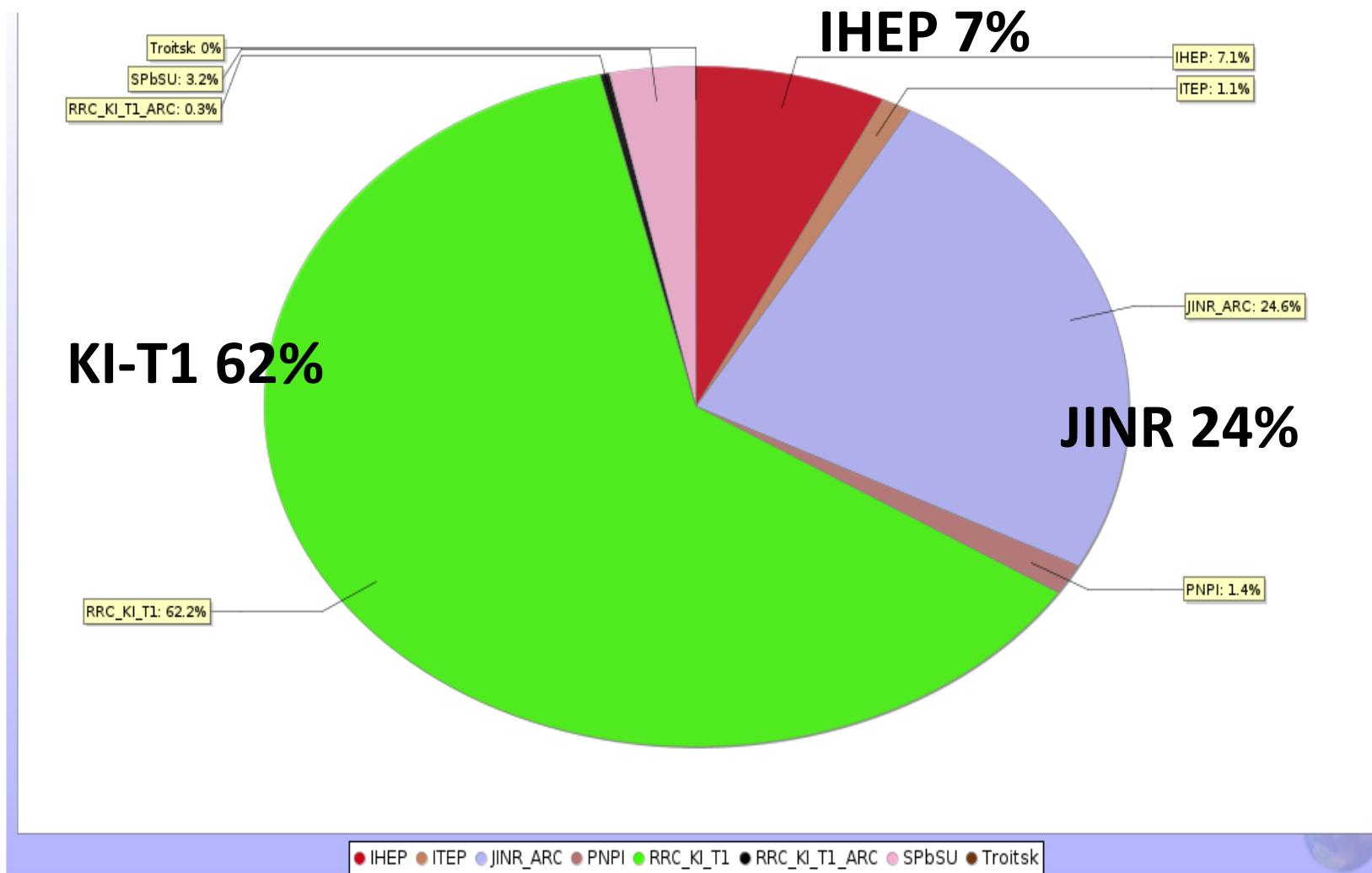
T2 sites usage by LHCb last year

Sum CPU Work (HS06 hours) by Site

RRC-KI-T1 (61.42%)

RRC-KI-T1 61%

IHEP 10%

RU-Protvino-IHEP (10.67%)

RU-Protvino-IHEP
57,679,583(HS06 hours)

ru-PNPI (2.49%)

Other (1.32%)

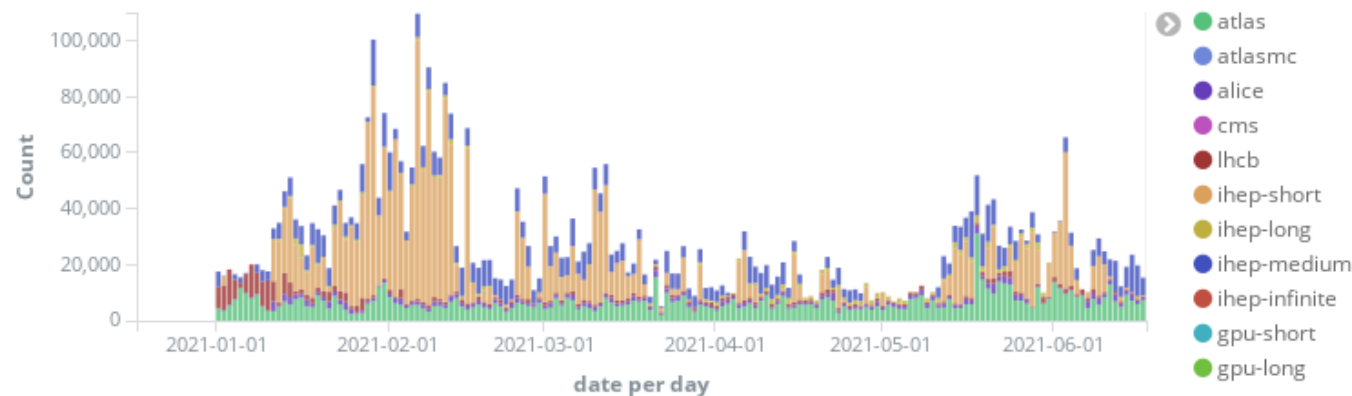**JINR-LCG2 24%**

JINR-LCG2 (24.10%)
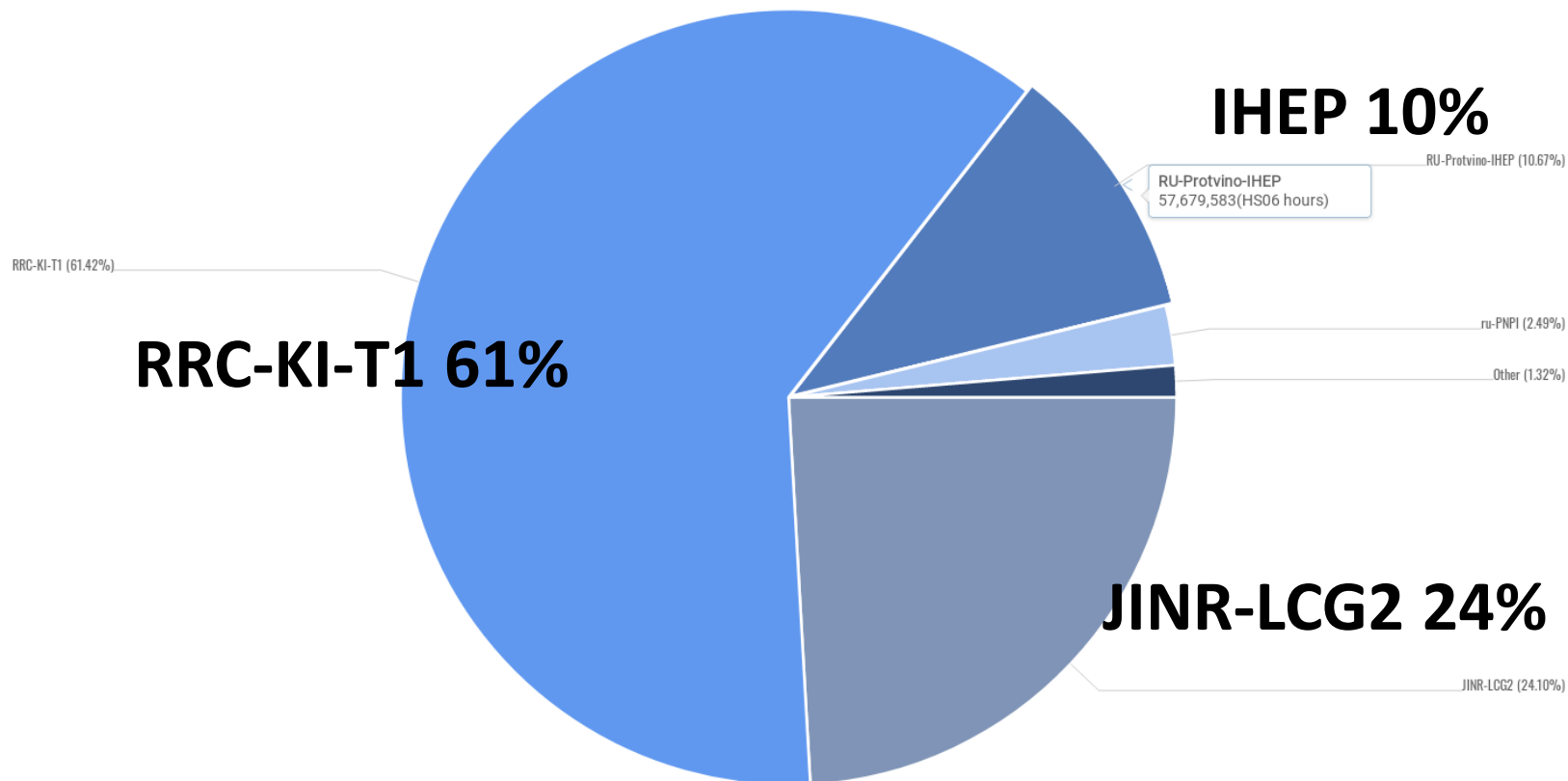
IHEP has status of Tier-2D site in LHCb

IHEP 24x7 cluster with high reliability and availability and efficiency
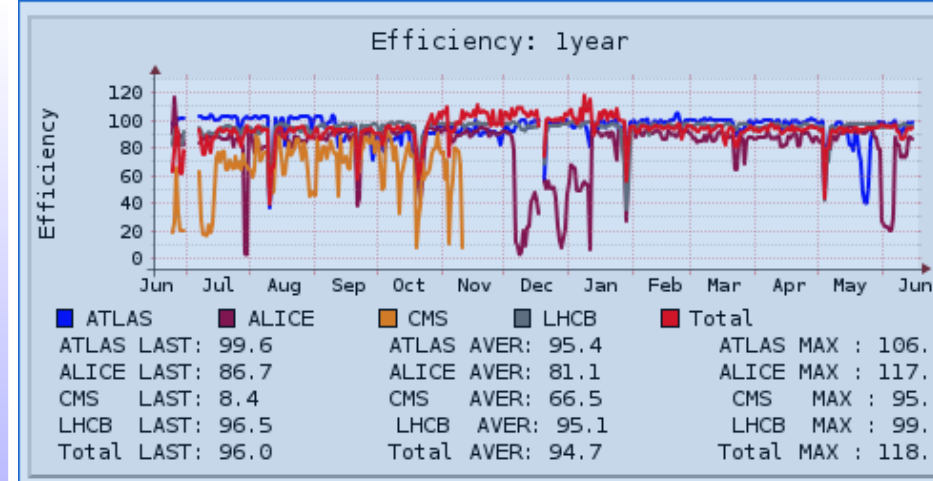
Average 94%

Recent works for stable run

- IHEP data center modernization to renew power connections;

- Constant system and middleware software upgrades;

- Works focused in supporting current infrastructure: availability, reliability, efficiency;

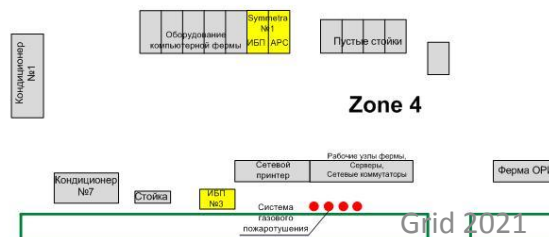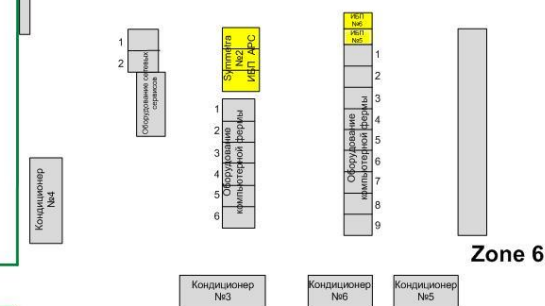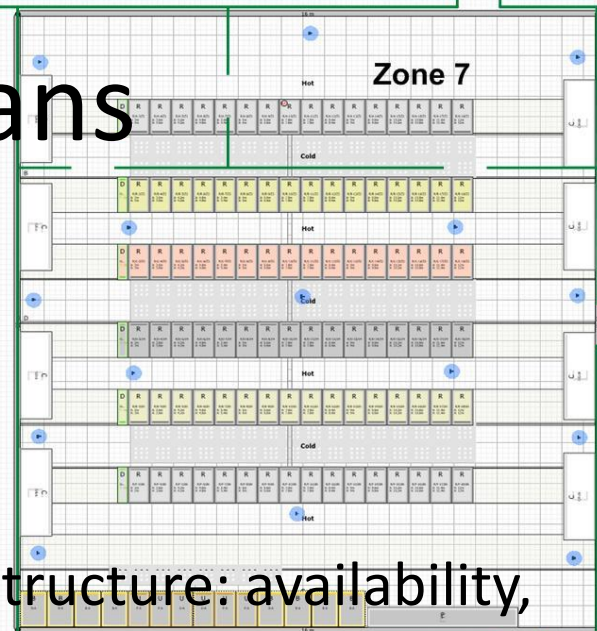- Cluster management system for fast reaction and selfhealing on software level;

Future plans

Minor CPU&DISC increase

- Cluster internal network modernization
- Works focused to support current infrastructure: availability, reliability, efficiency;

Waiting for CentOS7 replacement…

Thank you!

Any questions?