MetaCentrum

J. Chudoba, M. Ruda, J. Sitera, M. Mulač, Z. Šustr, I. Křenková

CESNET, a. l. e., Prague

1996–2016 CESNET 20

Map of the Czech Republic showing participating institutions:
Děčín, Liberec, Czech Technical University in P., University of West Bohemia, CESNET, Hradec Králové, PIONIER, NTIS Research Center, Praha, Institute of Org. Chem. and Biochem. ASCR, Institute of Physics ASCR, Pardubice, Plzeň, Ostrava, Karviná, CESNET, Inst. of Experiment. Botany ASCR, Olomouc, Jihlava, Institute of Vertebrate Biology, Palacký University Olomouc, University of South Bohemia, Brno, Zlín, AMS-IX, NIX, CESNET, MU Loschmidt Laboratories, Masaryk University Faculty of Informatics, SANET, GÉANT, České Budějovice, CEITEC, CESNET, Masaryk University CERIT-SC, ACONET

About Czech National Grid Infrastructure

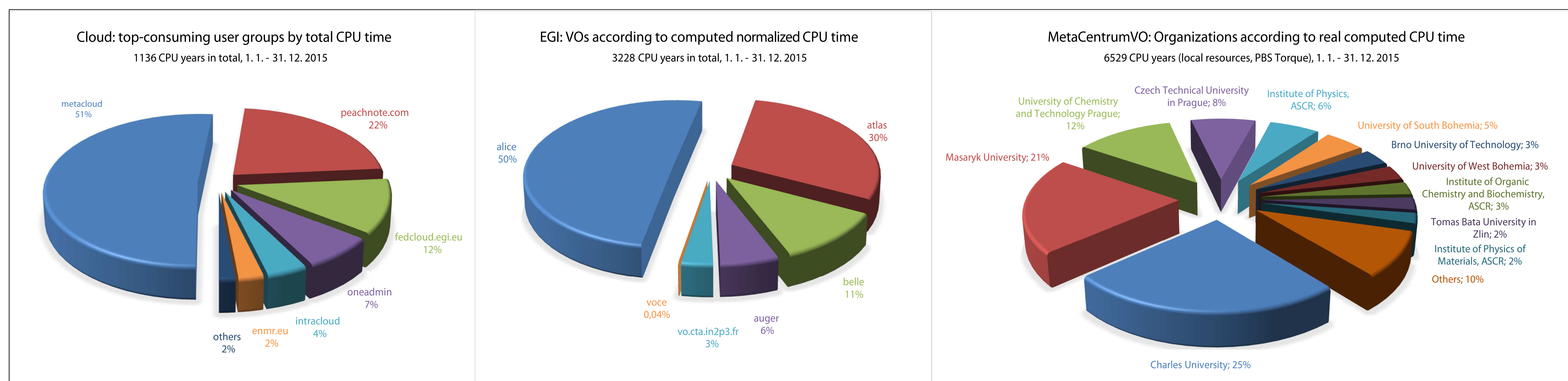**MetaCentrum NGI (**activity of the **CESNET association)**

- **operates and manages distributed computing infrastructure** consisting of computing and storage resources owned by research e-Infrastructures CESNET and CERIT-SC as well as co-operative academic centers in the Czech Republic,
- is responsible for building the **Czech National Grid Infrastructure (Czech NGI)** as a part of the **European Grid Infrastructure (EGI)**,
- is responsible for management and development of the **national ELIXIR infrastructure** and its integration to related international activities.

NGI Highlights

- distributed computing and storage capacities of **10** academic institutions
- users from over 40 Czech universities and research institutions
- application SW for **wide range of disciplines**: computing chemistry bioinformatics, climate modeling, material sciences, astrophysics, etc.
- **Hadoop, Chipster, Galaxy** platforms
- **GP-GPU, SGI UV2** architecture available

1. 1. - 31. 12. 2015	MetaCentrumVO (local resources)				EGI
	Total	Torque job scheduler	Cloud	Hadoop	Torque job scheduler
Number of jobs / VMs running	2 943 066	2 837 135	25 674	80 257	5 059 899
CPU time usage [CPU years]	7685	6 529	1 136	20	3228
Number of users	1338	1338	129	17	5607
Number of CPUs (end of 2015)	12408	11992 (shared resources between Torque and Cloud)		416	3312
Storage	2.4 PB	829 TB used	23 TB used	289 TB	3.8 PB
Acknowledgements to NGI in users' publications	362				n/a

Cloud: top-consuming user groups by total CPU time
1136 CPU years in total, 1. 1. - 31. 12. 2015
metacloud 51%, peachnote.com 22%, fedcloud.egi.eu 12%, oneadmin 7%, intracloud 4%, enmr.eu 2%, others 2%

EGI: VOs according to computed normalized CPU time
3228 CPU years in total, 1. 1. - 31. 12. 2015
alice 50%, atlas 30%, belle 11%, auger 6%, vo.cta.in2p3.fr 3%, voce 0,04%

MetaCentrumVO: Organizations according to real computed CPU time
6529 CPU years (local resources, PBS Torque), 1. 1. - 31. 12. 2015
University of Chemistry and Technology Prague; 12%, Czech Technical University in Prague; 8%, Institute of Physics, ASCR; 6%, University of South Bohemia; 5%, Brno University of Technology; 3%, University of West Bohemia; 3%, Institute of Organic Chemistry and Biochemistry, ASCR; 3%, Tomas Bata University in Zlín; 2%, Institute of Physics of Materials, ASCR; 2%, Others; 10%, Masaryk University; 21%, Charles University; 25%

Services

Torque Batch System

Fork of the original Torque batch system enhanced for stability covering all features provided by the Czech NGI. The system is coupled with either a high-performance queue-based scheduler using backfilling or a planning-based scheduler that uses advanced schedule-optimizing metaheuristic.
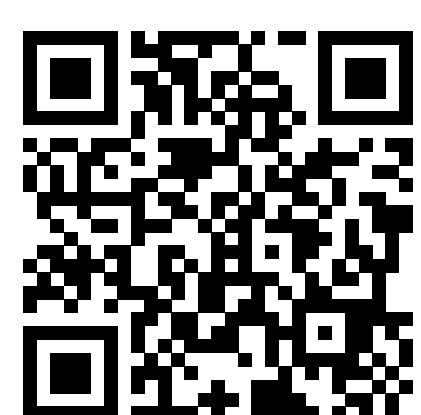
HPC Cloud

Cloud site based on OpenNebula, oriented on high performance computing use, available for all users of Czech NGI and integrated into EGI Federated Cloud. The system is intended for use cases where traditional grid approach with pre-installed nodes does not work.

Perun

CESNET cooperates on design and development of Perun system used for managing users, groups and access to resources in distributed environments. Perun has been integrated with a number of infrastructures and projects on national and international level.

PBSmon

A web-based framework for monitoring and accounting in the Czech NGI. It visualizes the current state of computing resources, Torque (PBS) state and user personalized job information.

Most Important International Projects

ELIXIR–Excelerate: Development and integration activities in Compute Platform workpackage, with aim of AAI in clouds.

EGI–Engage: Provisioning of all necessary services to allow seamless integration of national resources and local end users into pan-European grid infrastructure.

EGI Federated Cloud: Coordination and implementation of technical solutions in cloud federation scenarios.

INDIGO DataCloud: Coordination and development activities in project's build ant pilot services, virtual networks, and AAI.

AARC: Expertise in the area of group management and federated access for non-web applications.

Cross Discipline Cooperation

Supported projects: ELIXIR, CEITEC, BBMRI, CzechGlobe, ELI, ICOS, Auger, Belle,…

Leveraging the grid resources efficiently requires non-trivial effort by both the application area and IT experts. We look for such collaborations actively, involving also both under- and post-graduate students of computer science. The outcomes of this work are scientific results in the application areas, which would not be possible without the wide usage of computational resources, as well as more generally applicable results in the computer science itself. The scientific areas we work with include, but are not limited to, bioinformatics, chemistry, structural biology, neurology, earth observation, and astronomy.

http://metacentrum.cz
meta@cesnet.cz

1996–2016 CESNET 20

MŠMT