

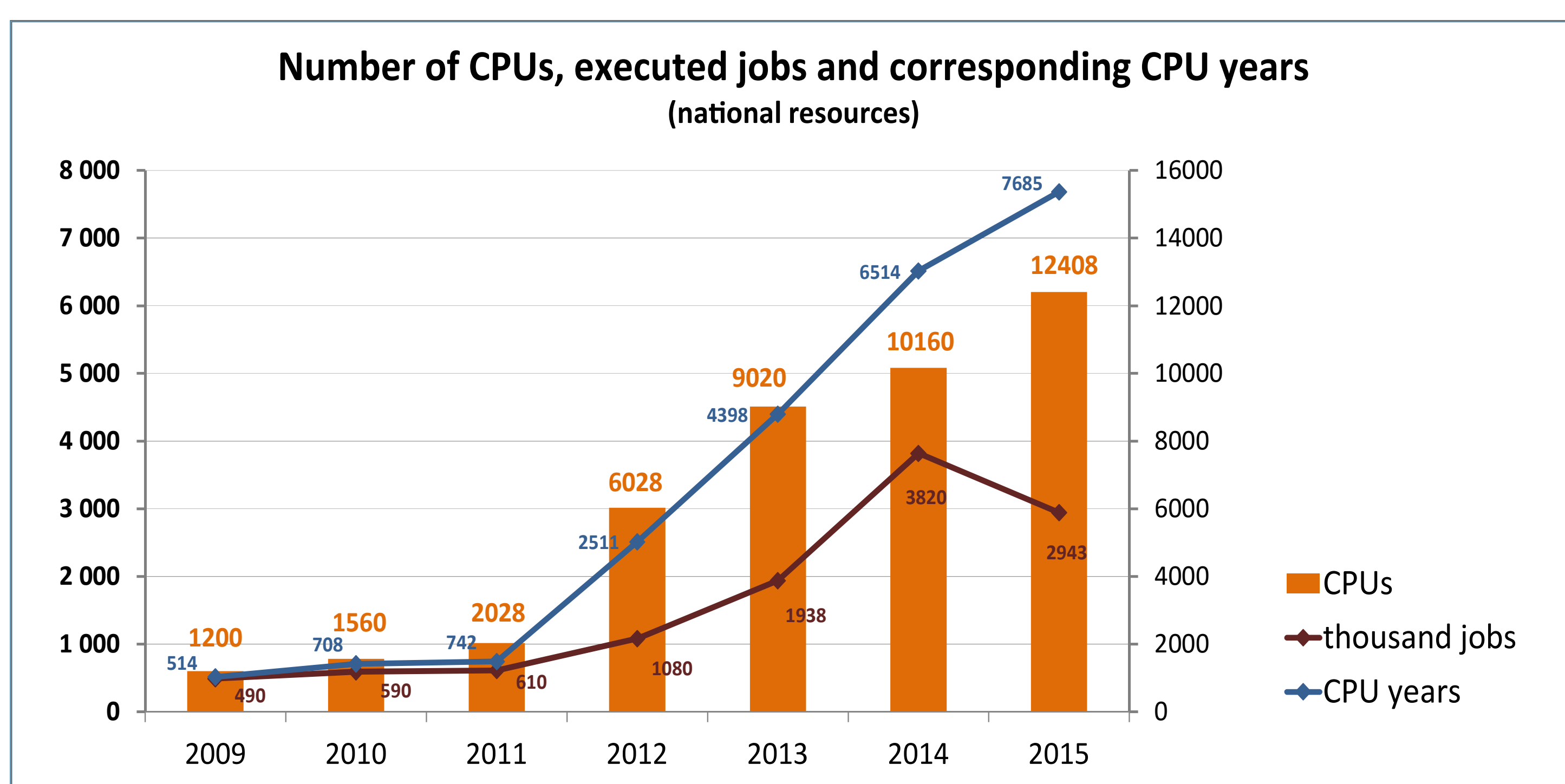
About Czech National Grid Infrastructure

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 (January 2016)

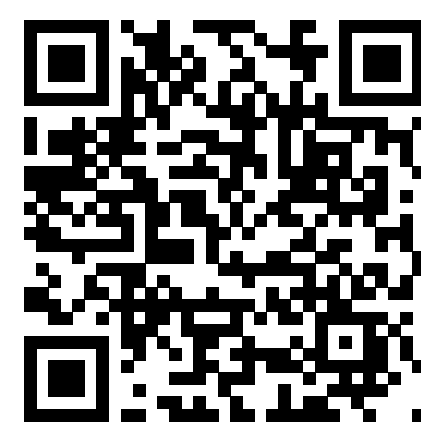
- distributed computing and storage capacities of **10** academic institutions
- more than **1100** users from over 40 universities and research institutions
- application SW for **wide range of disciplines**: computing chemistry bioinformatics, climate modeling, material sciences, astrophysics, etc.
- Hadoop, Chipster, Galaxy** platforms
- 12408** CPU cores (national resources) + **3312** CPU cores (connected to EGI)
- GP-GPU, SGI UV2** architecture available
- 2.4 PB** (national resources) + **3.8 PB** (connected to EGI) disk capacity



Clouds and Scheduling Development

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.



Alea Simulator

Open source and platform independent job scheduling simulator. It allows for highly detailed simulations of various real-life inspired scheduling scenarios involving, e.g., analyses of various scheduling algorithms, fair-sharing policies as well as dynamic user-to-system interactions. Using Alea, a complex system reconfiguration has been tested and later put into practice, greatly improving the overall fairness and efficiency of MetaCentrum.



OCCI Standard Development and Support

Participation in OGF's OCCI Working Group to develop the Open Cloud Computing Interface; support of OCCI for server- and client-side applications through the rOCCI framework and jOCCI Java libraries.



Identity Management and Security Development

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.



Handling and Prevention of Security Incidents



In order to face new threats, Metacentrum develops tools and procedures to efficiently handle security incident and to detect them quickly. We are also part of EGI security teams that are responsible for the security operations of the EGI infrastructure.

Beyond Identity Federations

Based on experience with a world-wide used set of clinical and histological medical images, we have developed a concept of user-centric identity federations. We piloted non-web federation technology *Moonshot* with several use-cases.



Complex Monitoring and Accounting Development

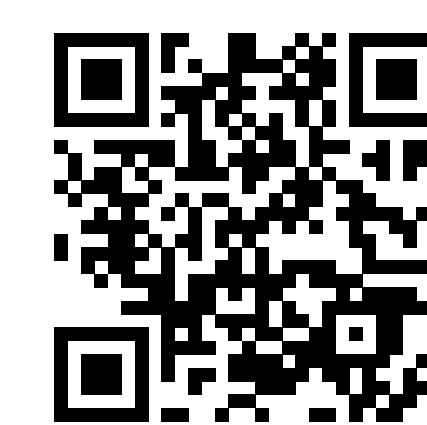


PBSmon

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.

Pakiti

Service *Pakiti* is developed to detect machines that are not properly updated with security patches. Utilizing the Pakiti service site administrators can detect unpatched machines, which otherwise pose a significant risk for the whole infrastructure.



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.

