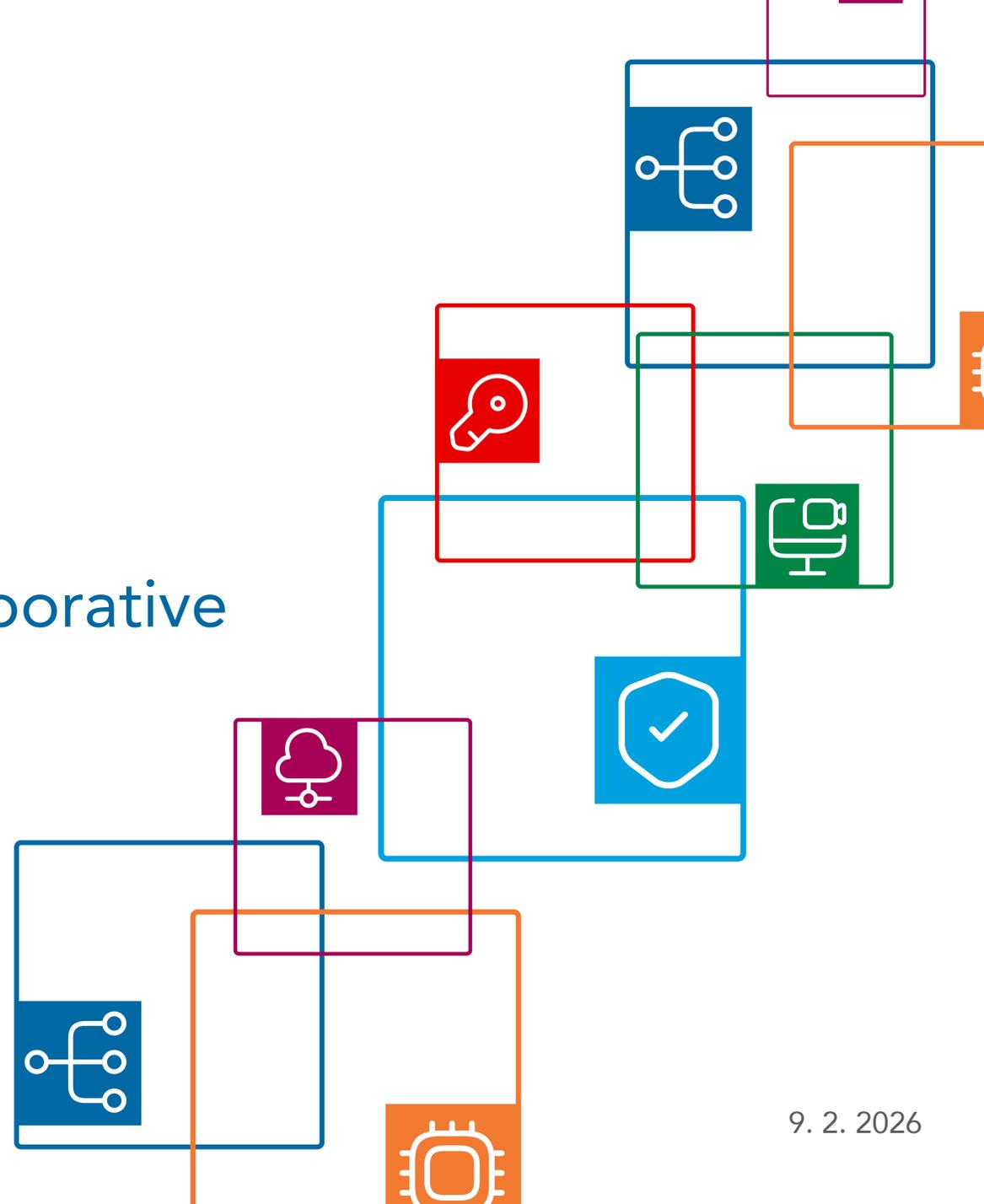# MetaCentrum NGI

For scientific computations, collaborative research and its support services

Jiří Vorel

The Institute of Computer Science CAS, Prague

vorel@cesnet.cz   meta@cesnet.cz

9. 2. 2026

- **MetaCentrum is**

  - A national grid infrastructure (NGI)

  - The activity of the CESNET association

  - Part of the e-INFRA CZ e-infrastructure

  - A provider of computational resources, application software (both commercial and free/open source) and data storage

  - Free of charge (users 'pay' by acknowledging the project 'e-INFRA CZ ID:90254' in their publications)

  - Available to the entire academic and research community in the Czech Republic

https://www.cesnet.cz/   https://www.metacentrum.cz/

https://www.e-infra.cz/   https://docs.metacentrum.cz/

https://docs.metacentrum.cz/en/docs/access/terms#acknowledgements-and-publications

MetaCentrum is

- A national grid infrastructure (NGI)
- The activity of the CESNET association
- Part of the e-INFRA CZ e-infrastructure
- A provider of computational resources, application software (both

https://www.cesnet.cz/   https://www.metacentrum.cz/

https://www.e-infra.cz/   https://docs.metacentrum.cz/

🙏 **Acknowledgement formula for the MetaCentrum infrastructure**

Computational resources were provided by the e-INFRA CZ project (ID:90254), supported by the Ministry of Education, Youth and Sports of the Czech Republic.

ID:90254 in their publications)

🙏 **Acknowledgement formula for ELIXIR CZ resources**

Computational resources were provided by the ELIXIR-CZ project (ID:90255), part of the international ELIXIR infrastructure.

MetaCentrum offers

- Access without the grant competitions

- The possibility to apply for membership at any time

- Access to all resources without submitted projects (with one exception)

- Immediate access to hardware resources and licences (once an application has been approved)

- Grid (shared) usage principle (privileged access for cluster owners)

- Various application software (commercial, free and open source)

- CPU/GPU resources, CLI access, GUI applications, Kubernetes and cloud services, etc.
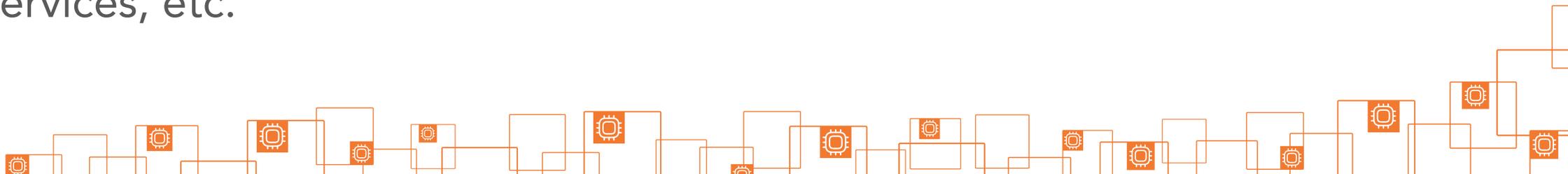
- ## MetaCentrum is available for

  - Individual users (we have HW resources)

  - Projects (collaboration and sharing of data within a group)

  - Organisations (incorporating their resources under the central management of MetaCentrum, while retaining privileged access)

  - Employees and students from Czech universities and the Czech Academy of Sciences, as well as non-commercial research facilities and foreign partners, etc.

  - Collaborating industry users (non-profit and public research only, upon individual request)

- **MetaCentrum cannot help with**

  https://www.cesnet.cz/   https://www.metacentrum.cz/

  https://www.e-infra.cz/   https://docs.metacentrum.cz/

  - Purely commercial research

  - Allocating resources for a fee

  - Long-term and secure storage of valuable data (i.e. data archiving) https://du.cesnet.cz

  - Providing extreme amounts of resources to individual tasks

  - Processing sensitive data (Kubernetes Sensitive Cloud within e-INFRA CZ, coordinated by CERIT-SC) https://www.cerit-sc.cz/

  - Tools whose installation or use would violate the licence terms

  - Windows OS
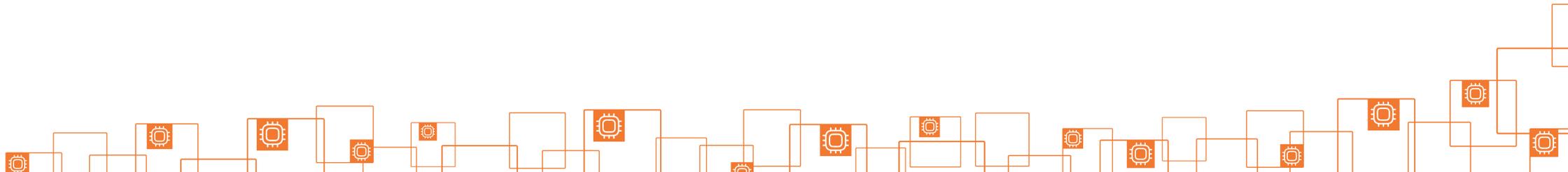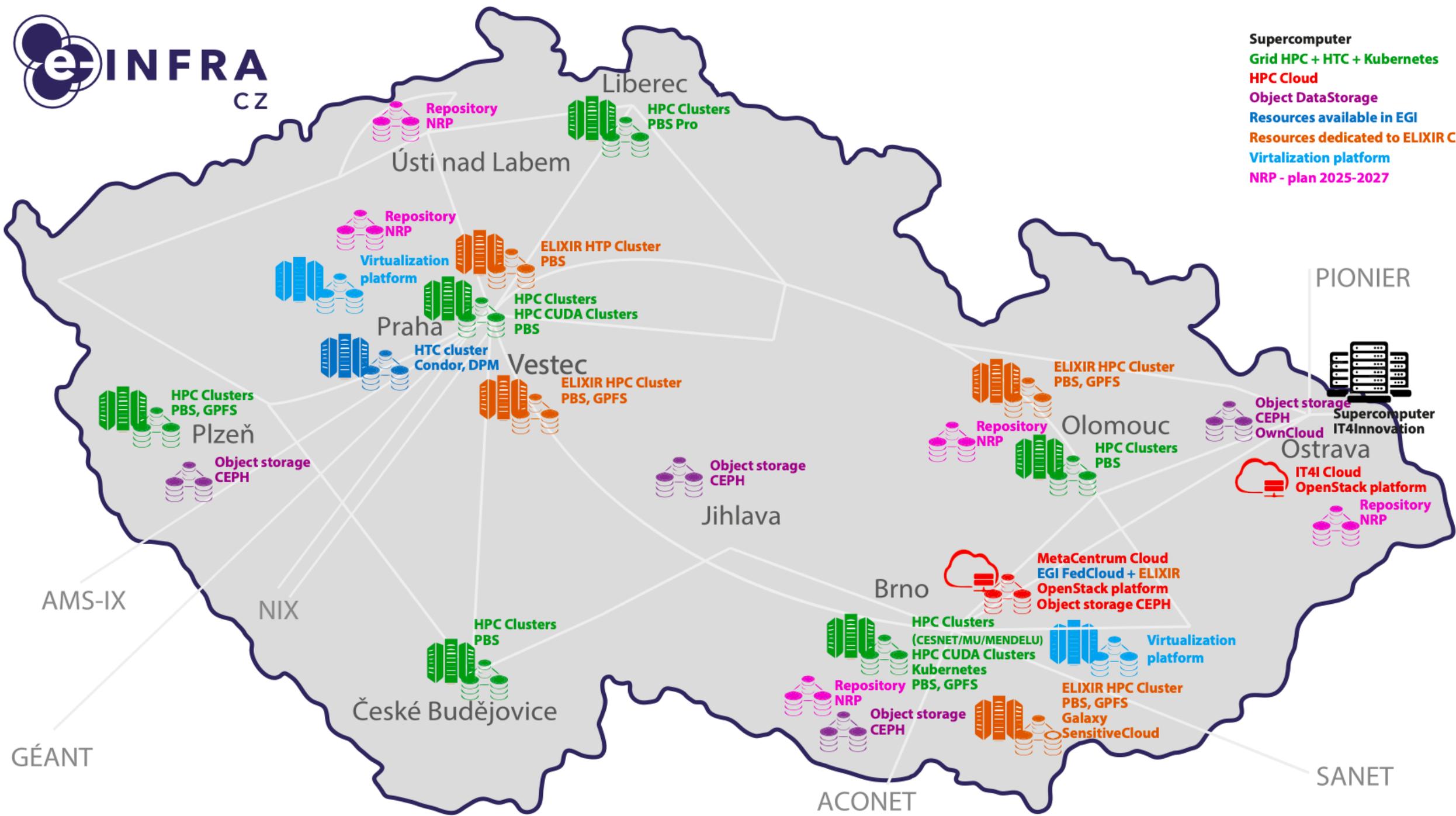
- ## Link your e-INFRA CZ account to ORCID

  - The future of national computing and storage services depends on demonstrating that researchers are truly using them

  - Currently, much of the valuable research output of e-INFRA CZ users is 'invisible' to our funders

  - We are developing a new automated system that will harvest users' publications

  - Users only need to link their ORCID iD and use the correct acknowledgement in their publications.

  - This can easily be done in the e-INFRA user profile

https://www.e-infra.cz/en/news/link-your-e-infra-cz-account-to-orcid-a-small-step-for-smarter-impact-reporting

e-INFRA CZ
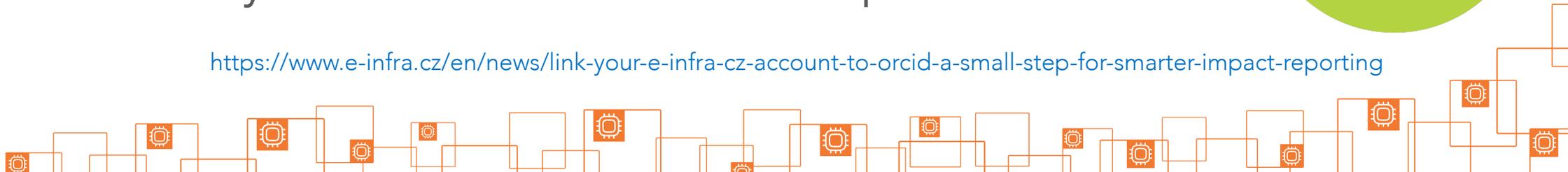
Legend:
- **Supercomputer**
- **Grid HPC + HTC + Kubernetes**
- **HPC Cloud**
- **Object DataStorage**
- **Resources available in EGI**
- **Resources dedicated to ELIXIR CZ**
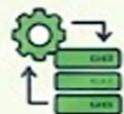- **Virtalization platform**
- **NRP - plan 2025-2027**

Liberec — **HPC Clusters PBS Pro**

Ústi nad Labem — **Repository NRP**

Repository NRP
Virtualization platform
ELIXIR HTP Cluster PBS

Praha — **HPC Clusters HPC CUDA Clusters PBS**

HTC cluster Condor, DPM

Vestec — **ELIXIR HPC Cluster PBS, GPFS**

Plzeň — **HPC Clusters PBS, GPFS**

Object storage CEPH

Jihlava — **Object storage CEPH**

ELIXIR HPC Cluster PBS, GPFS

Olomouc — **Repository NRP**, **HPC Clusters PBS**

Ostrava — **Object storage CEPH OwnCloud**, **Supercomputer IT4Innovation**

IT4I Cloud OpenStack platform

Repository NRP

Brno — **MetaCentrum Cloud EGI FedCloud + ELIXIR OpenStack platform Object storage CEPH**

HPC Clusters (CESNET/MU/MENDELU) HPC CUDA Clusters Kubernetes PBS, GPFS

Virtualization platform

ELIXIR HPC Cluster PBS, GPFS Galaxy SensitiveCloud

Repository NRP
Object storage CEPH

České Budějovice — **HPC Clusters PBS**

PIONIER

AMS-IX

NIX

GÉANT

ACONET

SANET

MetaCentrum in Numbers 2025

registered users
4 621

PBS (meta-pbs)

- **7.6 mil.** jobs
- **25 392** CPU years
- **283** GPU years
- **39 988** CPU cores / **332** GPU
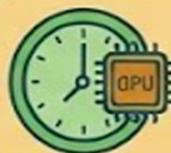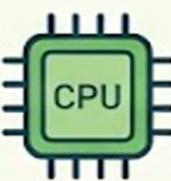
OPENSTACK
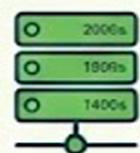
- **80.7 thous.** VM
- **4 235** CPU years
- **23** GPU years
- **9 670** CPU cores / **84** GPU
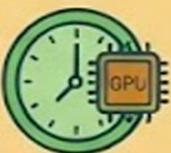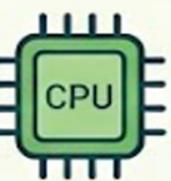
KUBERNETES
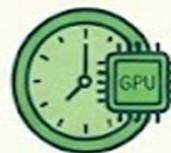
- **6.4 mil.** pods
- **1 760** CPU years
- **43** GPU years
- **3 008** CPU cores / **47** GPU
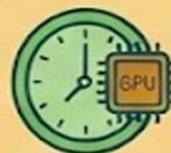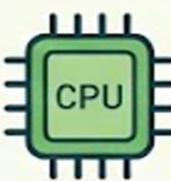
SENSITIVE CLOUD
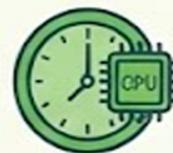
- **37.8 thous.** pods
- **657** CPU years
- **35** GPU years
- **1 112** CPU cores / **40** GPU
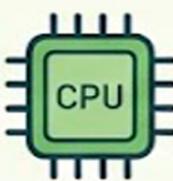
ONE APPLICATION TO RULE THEM ALL

One application to rule them all

Kubernetes orchestrator of Docker images, Rancher dashboard (also CLI), GUI environment

A job scheduler and hardware allocator for users' jobs

Virtual machine management infrastructure, CLI environment

A classic command line environment (CLI), Linux system

Modular applications, Apptainer images, local installations, NGC, LLM

User-controlled platforms, web interface (GUI)

OPEN OnDemand — HPC systems web interface, remote access

jupyter — Web platform for interactive programming

useGalaxy.cz — Web platform for various data processing

☝️ *A complete overview of e-INFRA CZ services*

One application to rule them all

kube

Op

ope

Documentation   Account   MetaCentrum Grid   Supercomputing   Data Storages   NRP   Kubernetes   Compute Cloud   About e-INFRA CZ
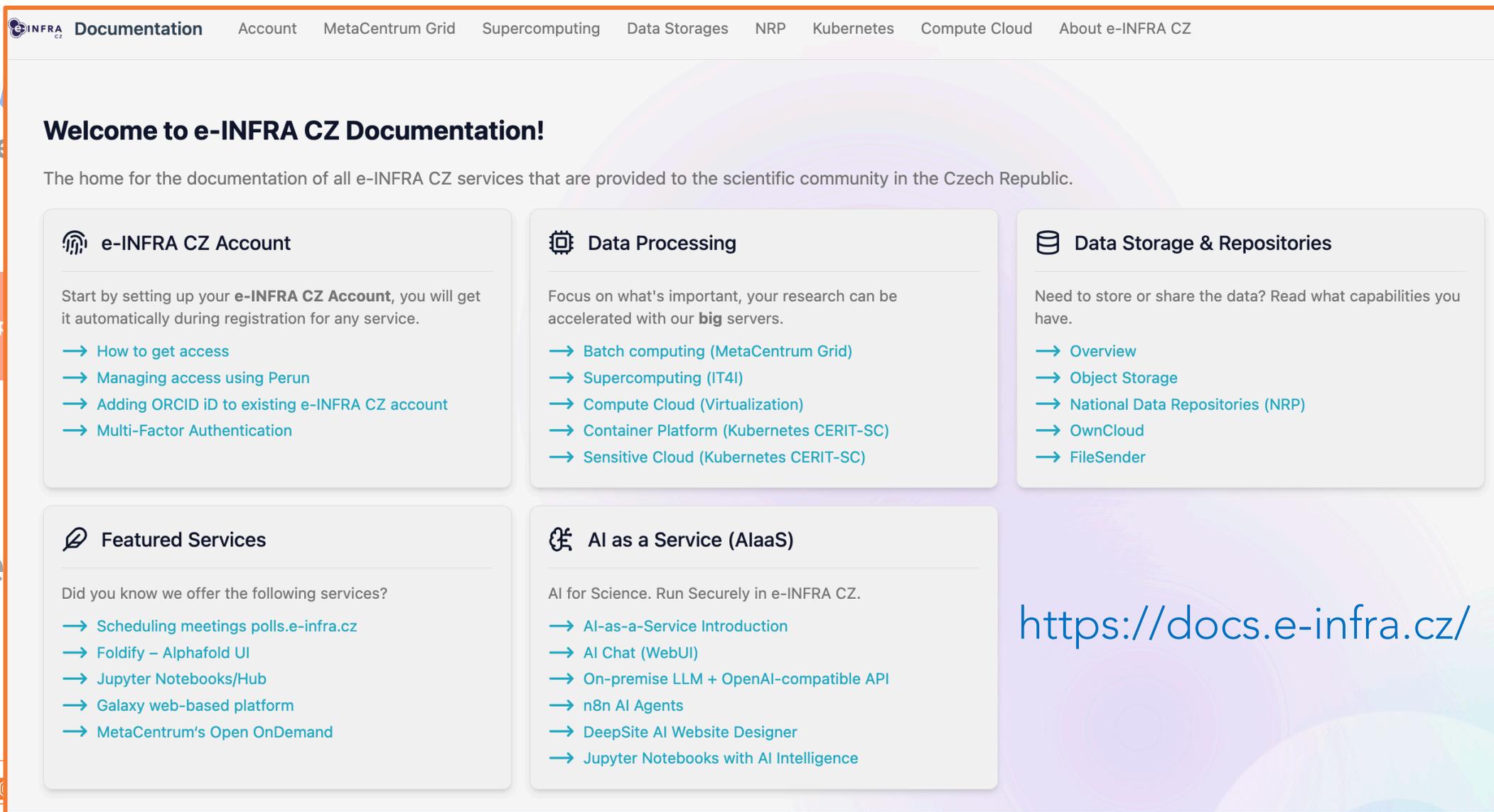
Welcome to e-INFRA CZ Documentation!

The home for the documentation of all e-INFRA CZ services that are provided to the scientific community in the Czech Republic.

e-INFRA CZ Account

Start by setting up your **e-INFRA CZ Account**, you will get it automatically during registration for any service.

→ How to get access
→ Managing access using Perun
→ Adding ORCID iD to existing e-INFRA CZ account
→ Multi-Factor Authentication

Data Processing

Focus on what's important, your research can be accelerated with our **big** servers.

→ Batch computing (MetaCentrum Grid)
→ Supercomputing (IT4I)
→ Compute Cloud (Virtualization)
→ Container Platform (Kubernetes CERIT-SC)
→ Sensitive Cloud (Kubernetes CERIT-SC)

Data Storage & Repositories

Need to store or share the data? Read what capabilities you have.

→ Overview
→ Object Storage
→ National Data Repositories (NRP)
→ OwnCloud
→ FileSender

Featured Services

Did you know we offer the following services?

→ Scheduling meetings polls.e-infra.cz
→ Foldify – Alphafold UI
→ Jupyter Notebooks/Hub
→ Galaxy web-based platform
→ MetaCentrum's Open OnDemand

AI as a Service (AIaaS)

AI for Science. Run Securely in e-INFRA CZ.

→ AI-as-a-Service Introduction
→ AI Chat (WebUI)
→ On-premise LLM + OpenAI-compatible API
→ n8n AI Agents
→ DeepSite AI Website Designer
→ Jupyter Notebooks with AI Intelligence

https://docs.e-infra.cz/

OpenPBS

- **Grid computing (OpenPBS scheduler)**
  - Centrally managed HTC/HPC clusters
  - Classic command line environment (CLI)
  - The 'most powerful' environment
  - Long batch jobs (days/weeks)
  - Interactive jobs (test computing)
  - Parallel and multi-node computing
  - Apptainer container running, NGC
  - GPU acceleration (NVIDIA H100)
  - Disk arrays and local scratch storage

https://docs.metacentrum.cz/en/docs/welcome

```
                                                            cesnet
 _ _ _ _ ___ __   __ _ _ ___ ___ _ _ _ __ _ _ _ _ _ __
| | | | / _ \  \ /  | | /  _  / _  | | | / | | | | | | |
| | | | | | | |  V  | | | | | | | | | | | | | |  _ | | |
|_| |_| |_| |_|_/ \_\_| |_| |_|_| |_| |_| |_| |_| |_| |_|

Your Home Directories
--------------------------------------------------------------
Avail |    DATA    |    FILES    |Backup |Storage
space |quota  used |quota   used |       |
--------------------------------------------------------------
 565T    none  200G    none     36   snap   brno12-cerit
 113T   4.29T 33.9G    2.5M  31.0k   snap   brno2
  22T   3.32T   24k      1M      9   full   budejovice1
  37T   10.4G   12k    none      8    -     liberec3-tul
 403T   4.29T 1.71T      3M   133k   snap   plzen1
  64T   7.34G   44k    none     18    -     praha2-natur
 235T   5.36T  940G   1.01M   113k   full   praha5-elixir
  70T   7.34G   32k    none     12   full   pruhonice1-ibot
  12T   2.14T   80k      2M     33   snap   vestec1-elixir

CPUs
-----
 Free    Used    Total         Centre
 7034   28627    35661         META


Contact
--------
 E-mail:       meta@cesnet.cz
 Web:          http://www.metacentrum.cz/

Tip of the day:     You can check allocated/available storage in the table above.

(BOOKWORM)vorel@skirit:~$ echo "MetaCentrum seminar 2025"
MetaCentrum seminar 2025
(BOOKWORM)vorel@skirit:~$
```

MetaCentrum provides access to hundreds of software tools giving thousands of individual modules

- We can run almost anything that doesn't violate the licence terms and is for Linux

- Most application software is open source, but…

https://docs.metacentrum.cz/en/docs/software

Paid licence

For registered individuals

For all users

Free licence
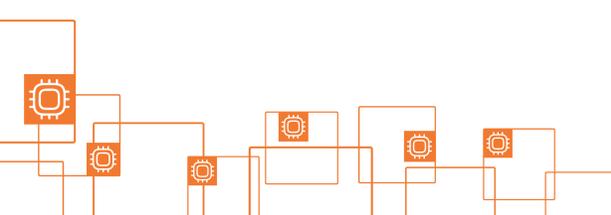
Open OnDemand

https://ondemand.metacentrum.cz/

- Web application on top of OpenPBS scheduler
- Running (not only) GUI applications

Open OnDemand

https://ondemand.metacentrum.cz/

- Web application on top of OpenPBS scheduler
- Running (not only) GUI applications

Open OnDemand

https://ondemand.metacentrum.cz/

- Web application on top of OpenPBS scheduler
- Running (not only) GUI applicat

Open OnDemand

OPEN OnDemand

https://ondemand.m...

- Web appli...
  OpenPBS...
- Running (...

Open OnDemand

- ## Open OnDemand

OPEN OnDemand

https://ondemand.metacentrum.cz/

Session was successfully created.   ✕

Home / My Interactive Sessions

| Interactive Apps | Matlab (17158555.pbs-m1.metacentrum.cz)   **1 node** | **4 cores** | **Running** |
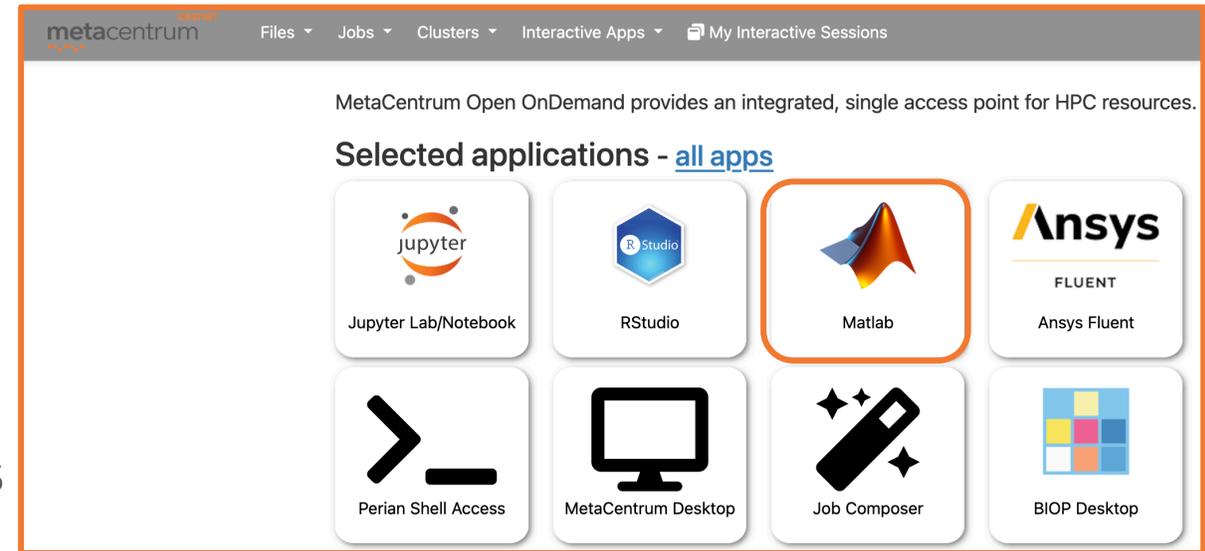
Interactive Apps

Cloud

⚙ Kubernetes on OpenStack (KOST) (beta)

▢ OpenStack VM (beta)

Desktops

Ansys Ansys/Ensight

Ansys Ansys/Fluent

Ansys Ansys/Workbench

▦ BIOP Desktop

Gx CLCgenomicsWB

Matlab (17158555.pbs-m1.metacentrum.cz)   **1 node** | **4 cores** | **Running**

Host: galdor20.metacentrum.cz

❌ **Delete**

Created at: 2026-02-04 11:36:14 CET

Time Remaining: 4 hours and 58 minutes

Session ID: 803f66c0-0228-4b47-93ed-a5fbae0841dc

Compression   **Image Quality**

0 (low) to 9 (high)   0 (low) to 9 (high)

Launch Matlab   View Only (Share-able Link)

HOME   PLOTS   APPS

Search (Ctrl+Shift+Space)

Sign In

Design App   Get More Apps   Install App

FILE

Search

No items match your search.

FAVORITES
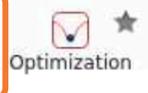
Curve Fitter | Optimization | PID Tuner | System Identification | Wireless Waveform... | Wireless Channel ... | Signal Analyzer | Instrument Control | SimBiology Model ... | SimBiology Model ... | MATLAB Coder | Standalone Applicatio...
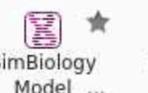
MATLAB

Class Diagram ... | Code Analyzer | Code Compatibili... | Data Cleaner | Dependency Analyzer | Experiment Manager | Hardware Manager | Profiler | Test Browser

MACHINE LEARNING AND DEEP LEARNING

Classification Learner | Deep Network ... | Deep Network ... | Neural Net Clustering | Neural Net Fitting | Neural Net Pattern ... | Neural Net Time Series | Regression Learner | Reinforce... Learning ...

MATH, STATISTICS AND OPTIMIZATION

Curve Fitter | Distribution Fitter | Optimization | PDE Modeler
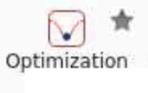
CONTROL SYSTEM DESIGN AND ANALYSIS

Control System ... | Control System ... | Diagnostic Feature ... | Fuzzy Logic Designer | Health Indicator... | Linear System ... | MPC Designer | Model Reducer | Neuro-Fuzzy Designer | PID Tuner | System Identification

SIMSCAPE

Battery Builder | Flexible Body Mod... | Graph Data Extractor

RF AND MIXED-SIGNAL

Antenna Array ... | Antenna Designer | Matching Network ... | Mixed-Signal Analyzer | PCB Antenna Designer | Parallel Link Designer | RF Budget Analyzer | SerDes Designer | Serial Link Designer | Signal Integrity ... | Transmission Line ...

ROBOTICS AND AUTONOMOUS SYSTEMS

Flight Log | Inverse | ROS 2 | ROS Data | SLAM Map | UAV

Files

Name

.icewm
NikolK_Klimno_genome
NikolK_Ktang_genome
NikolR_metabarcoding

Workspace

Name   Value   Size

Initializing...

Open OnDemand

https://ondemand.metacentrum.cz/

- Web application on top of OpenPBS scheduler
- Running (not only) GUI applications
- Browsing repositories (tab 'Files')

Open OnDemand

https://ondemand.metacentrum.cz

- Web application o
  OpenPBS schedu
- Running (not only
- Browsing reposito

>_ Open in Terminal ▸ | ↻ Refresh | + New File | ▤ New Directory | ⬆ Upload | ⬇ Download | ▣ Copy/Move | 🗑 Delete

Home Directory

- 📁 brno2
- 📁 brno12
- 📁 praha5-elixir
- 📁 brno11-elixir
- 📁 brno14-ceitec
- 📁 brno3-cerit
- 📁 budejovice1
- 📁 liberec3
- 📁 plzen1
- 📁 plzen4-ntis
- 📁 praha1
- 📁 praha2-natur
- 📁 praha5-elixir
- 📁 praha6-fzu
- 📁 pruhonice1-ibot
- 📁 projects
- 📁 projects2
- 📁 projects-du-praha
- ☁ cesnet_s3

↑ | **cesnet_s3:** / meta-archive / | ✎ Change directory | 📋 Copy path

☐ Show Owner/Mode   ☐ Show Dotfiles   Filter: [_____]

Showing 12 rows - 0 rows selected

	Type ▲	Name		Size	Modified at
☐	📁	03_E_nip_genom	⋮▾	-	28. 9. 2025 11:11:36
☐	📁	03_E_nip_trans	⋮▾	-	28. 9. 2025 11:11:36
☐	📁	04_Viremie_AV_Kapr_Karas	⋮▾	-	28. 9. 2025 11:11:36
☐	📁	04_Viremie_AV_Plotice_Cejn	⋮▾	-	28. 9. 2025 11:11:36
☐	📁	05_Nikol_Kmentova	⋮▾	-	28. 9. 2025 11:11:36
☐	📁	06_Kasa_mansoni_hepatica_vejce	⋮▾	-	28. 9. 2025 11:11:36
☐	📁	07_Haem_cont_metylaceDNA	⋮▾	-	28. 9. 2025 11:11:36
☐	📁	08_JI_hetero_trans	⋮▾	-	28. 9. 2025 11:11:36
☐	📄	01_Echo.tar.gz	⋮▾	662.80 GB	9. 10. 2022 15:21:53
☐	📄	02_TomasPakosta.tar.gz	⋮▾	3.56 GB	14. 11. 2020 18:46:42
☐	📄	02_TomasPakosta_posledni_vymysl.zip	⋮▾	13.46 GB	19. 3. 2025 14:40:50
☐	📄	Kapentagyrus_July2022.tar.gz	⋮▾	473.75 GB	11. 12. 2023 19:47:56

Open OnDemand

https://ondemand.metacentrum.cz/

- Web application on top of OpenPBS scheduler
- Running (not only) GUI applications
- Browsing repositories (tab 'Files')
- Command line (tab 'Clusters')

■ Open OnDemand

https://ondemand.metacentrum.cz/

- ■ Web application or
  OpenPBS schedule
- ■ Running (not only)
- ■ Browsing repositor
- ■ Command line (tab

Default

Bright

CLRS

Github

Solarized Light

✓ Tomorrow

Dark

Cobalt2

idleToes

Monokai Remastered

Pastel Dark

Red Alert

Tomorrow Night Blue

Tomorrow Night Bright

Tomorrow Night Eighties

Tomorrow Night

4 updates could not be installed automatically. For more details,
see /var/log/unattended-upgrades/unattended-upgrades.log
Last login: Sun Sep 28 11:25:00 2025 from ondemand.grid.cesnet.cz

```
                                                               cesnet
                  _   _
  _ __ ___   ___ | |_ __ _  ___ ___ _ __  | |_ _ __ _   _ _ __ ___
 | '_ ` _ \ / _ \| __/ _` |/ __/ _ \ '_ \ | __| '__| | | | '_ ` _ \
 | | | | | |  __/| || (_| | (_|  __/ | | || |_| |  | |_| | | | | | |
 |_| |_| |_|\___| \__\__,_|_____|_| |_| \__|_|   \__,_|_| |_| |_|
  _   _    _   _   _    _
 | | | |  | | | | | |  | |
 |_| |_|  |_| |_| |_|  |_|
  |_|        |_|
```

Your Home Directories

Avail | DATA | FILES |Backup |Storage
space |quota used |quota used | |

 558T   none 200G   none   36   snap   brno12-cerit
 110T   4.29T 33.9G   2.5M 31.0k   snap   brno2
  22T   3.32T 24k   1M   9   full   budejovice1
  37T   10.4G 12k   none   8   -   liberec3-tul
 403T   4.29T 1.71T   3M   133k   snap   plzen1
  64T   7.34G 44k   none   18   -   praha2-natur
 235T   5.36T 940G   1.01M 113k   full   praha5-elixir
  69T   7.34G 32k   none   12   full   pruhonice1-ibot
  12T   2.14T 80k   2M   33   snap   vestec1-elixir

CPUs

 Free   Used   Total   Centre
 7923   27738 35661   META

 Contact

  E-mail: meta@cesnet.cz
  Web: http://www.metacentrum.cz/

Tip of the day: Have you ever heard about a Chipster? Chipster is a web-based interactive analysis software for NGS and microarray data. More information at https://docs.metacentrum.cz/en/docs/related/chipster.

(BOOKWORM)vorel@zenith:~$ pwd
/storage/brno12-cerit/home/vorel
(BOOKWORM)vorel@zenith:~$ qstat -u vorel

pbs-m1.metacentrum.cz:

                                                    Req'd Req'd   Elap
Job ID   Username Queue   Jobname   SessID NDS TSK Memory Time S Time
------------------- -------- -------- ---------- ------ --- --- ------ ----- - -----
13264531.pbs-m1.met* vorel   interac* STDIN   40155   1   1 400mb 18:00 R 00:11
13264536.pbs-m1.met* vorel   interac* STDIN   49799   1   1 400mb 18:00 R 00:00
(BOOKWORM)vorel@zenith:~$ []

👆 *Copying text via the clipboard is problematic*

- # Open OnDemand

https://ondemand.metacentrum.cz/

  - Web application on top of OpenPBS scheduler
  - Running (not only) GUI applications
  - Browsing repositories (tab 'Files')
  - Command line (tab 'Clusters')
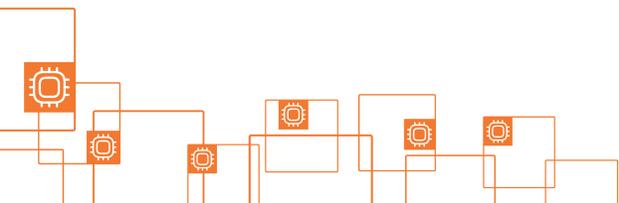 - Creating and submitting a batch job (tabs 'Jobs' and 'Job Composer')

metacentrum   Files ▾   Jobs ▾   Clusters ▾   Interactive Apps ▾   🗗 My Interactive Sessions
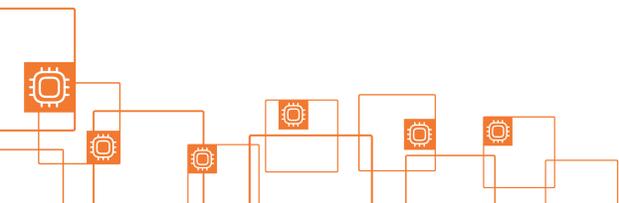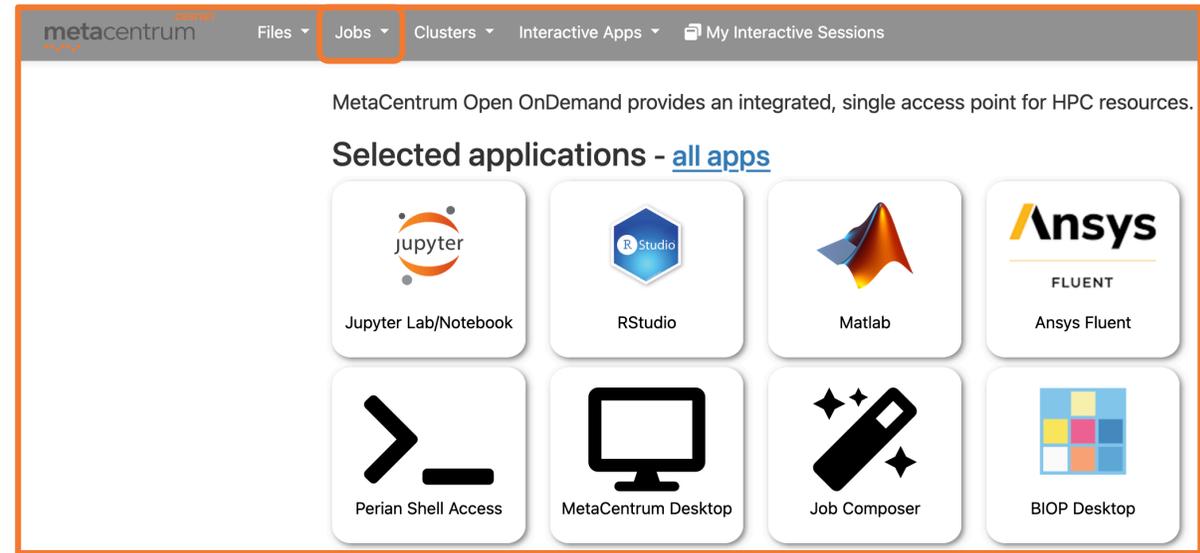
MetaCentrum Open OnDemand provides an integrated, single access point for HPC resources.

Selected applications - all apps

| Jupyter Lab/Notebook | RStudio | Matlab | Ansys Fluent |
| Perian Shell Access | MetaCentrum Desktop | Job Composer | BIOP Desktop |

Open OnDemand

https://o...

- Web...
  Ope...
- Run...
- Browsing repositories (tab 'Files')
- Command line (tab 'Clusters')
- Creating and submitting a batch job (tabs 'Jobs' and 'Job Composer')

Jobs

+ New Job ▾

☆ Create Template

⌕ Edit Files   ⚙ Job Options   ⌞ Open Terminal   ▶ Submit   ■ Stop   🗑 Delete

Show [25] entries
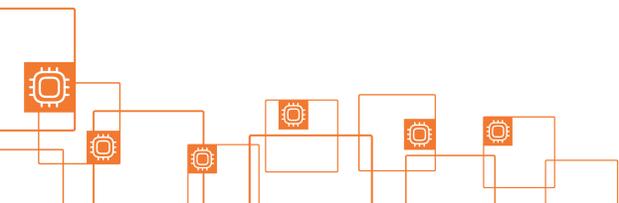
Search: [_____]

Created	Name	ID	Cluster	Status
October 1, 2025 2:07pm	(default) Metacentrum simple sequential job		Perian	Not Submitted

Showing 1 to 1 of 1 entries

Previous **1** Next

Job Details

Job Name:

(default) Metacentrum simple sequential job

Submit to:

Perian

Account:

Not specified

Script location:

/storage/brno2/home/vorel/ondemand/data/sys/myjobs/projects/default/1

Script name:

main_job.sh

Folder Contents:

main_job.sh

Submit Script

main_job.sh

Script contents:

```
#PBS -N hello_world
#PBS -l ncpus=1
#PBS -l walltime=24:00:00
#PBS -l mem=400mb
#PBS -j oe
##PBS -l scratch_local=1g

cd $PBS_O_WORKDIR
echo "Hello World" > output_file

echo "Created output_file with 'Hello World'"
```

✎ Open Editor   ⌞ Open Terminal   ⎋ Open Dir

/storage/brno2/home/vorel/ondemand/data/sys/myjobs/projects/default/1/main_job.sh

Save

Key Bindings

Default

Font Size

12px

Mode

Text

Theme

Solarized Light

Wrap

☐

```
 1  #PBS -N hello_world_test
 2  #PBS -l ncpus=1
 3  #PBS -l walltime=1:00:00
 4  #PBS -l mem=1gb
 5  #PBS -j oe
 6  ##PBS -l scratch_local=1g
 7
 8  cd $PBS_O_WORKDIR
 9  echo "Hello World" > output_file
10
11  echo "Created output_file with 'Hello World'"
```

Job was successfully submitted.

Jobs

+ New Job ▾   ☆ Create Template

✏ Edit Files   **⚙ Job Options**   **≥_ Open Terminal**   **▶ Submit**   **■ Stop**   🗑 **Delete**

Show [25 ▾] entries   Search: [   ]

Created ↓	Name ↑↓	ID ↑↓	Cluster ↑↓	Status ↑↓
October 1, 2025 2:07pm	**(default) Metacentrum simple sequential job**	13351946.pbs-m1.metacentrum.cz	Perian	Completed

Showing 1 to 1 of 1 entries   Previous **1** Next

Job was successfully submitted.   ✕

Jobs

➕ New Job ▾

☆ Create Template

☑ Edit Files   ⚙ Job Options   ⌘ Open Terminal   ▶ Submit   ⬛ Stop   🗑 Delete

Show [25 ⌄] entries   Search: [   ]

Created ⇅	Name ⇅	ID ⇅	Cluster ⇅	Status ⇅
October 1, 2025 2:07pm	**(default) Metacentrum simple sequential job**	13351946.pbs-m1.metacentrum.cz	Perian	Completed

Showing 1 to 1 of 1 entries   Previous 1 Next

Job Details

13351946.pbs-m1.metacentrum.cz

Job Name:

(default) Metacentrum simple sequential job

Submit to:

[Perian]

Account:

Not specified

Script location:

[/storage/brno2/home/vorel/ondemand/data/sys/myjobs/projects/default/1]

Script name:

[main_job.sh]

Folder Contents:

hello_world_test.o13351946

main_job.sh

output_file

/storage/brno2/home/vorel/ondemand/data/sys/myjobs/projects/default/1/output_file

```
1  Hello World
2
```

Save

Key Bindings

Default

Font Size

12px

Mode

Text

Theme

Solarized Light

Wrap

☐

Open OnDemand

https://ondemand.metacentrum.cz/

- Web application on top of OpenPBS scheduler
- Running (not only) GUI applications
- Browsing repositories (tab 'Files')
- Command line (tab 'Clusters')
- Creating and submitting a batch job (tabs 'Jobs' and 'Job Composer')
- Running virtual machines (OpenStack) and Docker images (Kubernetes on OpenStack)
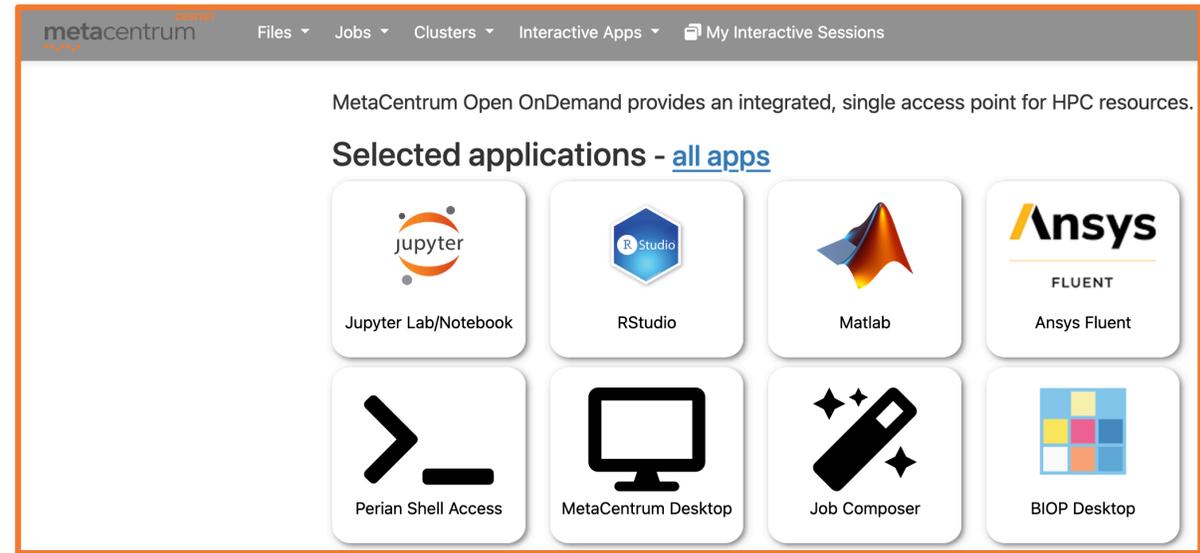
Galaxy

useGalaxy.cz

https://usegalaxy.cz/

- National instance hosted by MetaCentrum
- Web application based on OpenPBS
- A system for complex data analysis, workflow creation and sharing and teaching
- Processing of '-omic' data, LLM, ML, material science, ecology, chemistry, statistical analysis and humanities studies, and more
- Users do not need to worry about hardware reservation

Tools ▼ ☆

search tools

Upload Data

Get Data

External Data

Send Data

Collection Operations

GENERAL TEXT TOOLS

Text Manipulation

Filter and Sort

Join, Subtract and Group

Convert Formats

GENOMIC FILE MANIPULATION

FASTA/FASTQ

Quality Control

SAM/BAM

BED

VCF/BCF

Nanopore

Extract Features

Operate on Genomic Intervals

Fetch Sequences / Alignments

GENOMICS ANALYSIS

Assembly

Upload

Tools

Workflows

Workflow
Invocations

Interactive
Tools

Visualization

Histories

History
Multiview

Datasets

Pages

Libraries

☰ useGalaxy.cz

Welcome to the Czech Galaxy instance of E-Infra CZ and ELIXIR CZ hosted at MetaCentrum. We aim to enable accessible, reproducible, and transparent computational research in Czechia. We support thousands of documented and maintained tools that are free to use and backed by a robust public infrastructure.

Please visit our Documentation for details about using this service. In case of any further questions, please contact us at galaxy@cesnet.cz.

Have a look at one of our trainings or you can start with an interactive tour:

Galaxy UI   Galaxy History   Window Manager   Deferred Datasets

Galaxy is an open platform for supporting data intensive research developed by its many contributors.

e-INFRA CZ

elixir CZECH REPUBLIC

Co-funded by the European Union

MINISTRY OF EDUCATION, YOUTH AND SPORTS

National Czech Programme

eosc

Galaxy
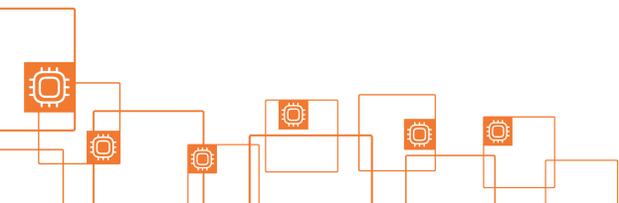
Upload | Tools | Workflows | Workflow Invocations | Interactive Tools | Visualization | Histories | History Multiview | Datasets | Pages | Libraries

Tools

search tools

Upload Data
Get Data
External Data
Send Data
Collection Operations

GENERAL TEXT TOOLS

Text Manipulation
Filter and Sort
Join, Subtract and Group
Convert Formats

GENOMIC FILE MANIPULATION

FASTA/FASTQ
Quality Control
SAM/BAM
BED
VCF/BCF
Nanopore
Extract Features
Operate on Genomic Intervals
Fetch Sequences / Alignments

GENOMICS ANALYSIS

Assembly

Upload from

Regular

search

Label	Details
📁 FTP Directory	Galaxy User's FTP Directory
📁 InvenioRDM TESTING	Testing instance of Invenio, content is NOT preserved and DOIs created in this instance are not real.
📁 Zenodo TESTING	Testing instance of Zenodo, content is NOT preserved and DOIs created in this instance are not real.
📁 Zenodo	Zenodo is a general-purpose open-access repository. For each submission, a DOI is created, making items easily citeable.

Create a new remote file source

+ Create new ✕ Cancel ✓ Select

eset | Close

*** Co-funded by the European Union

MINISTRY OF EDUCATION, YOUTH AND SPORTS

National Czech Programme

eosc

Using 0% of 200.0 GB   👤 vorel ⌄

Upload from Disk or Web to Unnamed history

| Regular | Composite | Collection | Rule-based |

New File   115 b   Auto-detect ⌄   🔍   unspecified (?) ⌄   ⚙   100%   ✓

Download data from the web by entering URLs (one per line) or directly paste content.

https://ftp.ncbi.nlm.nih.gov/genomes/all/GCA_029_291_075/GCA_029291075.1_E_nip/GCA_029291075.1_E_nip_genomic.fna.gz

Type (set all): Auto-detect ⌄   🔍   **Reference (set all):** unspecified (?) ⌄

🖳 Choose local file   📁 Choose remote files   ✎ Paste/Fetch data   Start   Pause   Reset   Close

Tools

search tools

Upload Data
Get Data
External Data
Send Data
Collection Operations

GENERAL TEXT TOOLS

Text Manipulation
Filter and Sort
Join, Subtract and Group
Convert Formats

GENOMIC FILE MANIPULATION

FASTA/FASTQ
Quality Control
SAM/BAM
BED
VCF/BCF
Nanopore
Extract Features
Operate on Genomic Intervals
Fetch Sequences / Alignments

GENOMICS ANALYSIS

Assembly
Annotation
Mapping
Variant Calling
RNA Analysis
Multiple Alignments

Upload
Tools
Workflows
Workflow Invocations
Interactive Tools
Visualization
Histories
History Multiview
Datasets
Pages
Libraries
Notifications
More

History

search datasets

Unnamed history ✎

🗄 0 B   📍1

1: GCA_029291075.1_E_nip_genomic.fna.gz

Co-funded by the European Union

MINISTRY OF EDUCATION, YOUTH AND SPORTS

National Czech Programme

eosc

Galaxy

Tools

Upload

Tools

Workflows

Workflow Invocations

Interactive Tools

Visualization

Histories

History Multiview

Datasets

Pages

Notifications

More

search tools

Upload Data

Get Data

External Data

Send Data

Collection Operations

GENERAL TEXT TOOLS

Text Manipulation

Filter and Sort

Join, Subtract and Group

Convert Formats

GENOMIC FILE MANIPULATION

FASTA/FASTQ

Quality Control

SAM/BAM

BED

VCF/BCF

Nanopore

Extract Features

Operate on Genomic Intervals

Fetch Sequences / Alignments

GENOMICS ANALYSIS

Assembly

Annotation

Mapping

Variant Calling

RNA Analysis

Multiple Alignments

Upload from Disk or Web to **Unnamed history**

Regular   Composite   Collection   Rule-based

New File   115 b   Auto-detect   unspecified (?)   100%

Download data from the web by entering URLs (one per line) or directly paste content.

https://ftp.ncbi.nlm.nih.gov/genomes/all/GCA_029_291_075/GCA_029291075.1_E_nip/GCA_029291075.1_E_nip_genomic.fna.gz

Type (set all): Auto-detect   **Reference (set all):** unspecified (?)

Choose local file   Choose remote files   Paste/Fetch data   Start   Pause   Reset   Close

Co-funded by the European Union

MINISTRY OF EDUCATION, YOUTH AND SPORTS

National Czech Programme

eosc

History

search datasets

Unnamed history

295 MB

1: GCA_029291075.1_E_nip_genomic.fna.gz

Upload

Tools

Workflows

Workflow Invocations

Interactive Tools

Visualization

Histories

History Multiview

Datasets

Pages

Libraries

Notifications

More

Tools

search tools

Upload Data

Get Data

External Data

Send Data

Collection Operations

GENERAL TEXT TOOLS

Text Manipulation

Filter and Sort

Join, Subtract and Group

Convert Formats

GENOMIC FILE MANIPULATION

FASTA/FASTQ

Quality Control

SAM/BAM

BED

VCF/BCF

Nanopore

Extract Features

Operate on Genomic Intervals

Fetch Sequences / Alignments

GENOMICS ANALYSIS

Assembly

Annotation

Mapping

Variant Calling

RNA Analysis

Multiple Alignments

1: GCA_029291075.1_E_nip_genomic.fna.gz   ok

21,044 sequences

format **fasta.gz**   database ?   size **281.4 MB**

Preview | Visualize | Details | Edit

⚠ This dataset is large and only the first megabyte is shown below.

Show all | Save

```
>JAQBSW010000001.1 Eudiplozoon nipponicum isolate JV_EN_01 E_nip_1, whole genome shotgun sequence
gcaatgttctctcattcgagtaattaaccgtctggtcgatcggcctacgtaagttgatcgacaacttgcgcatgtatctt
ggtaaaaaatatttgatattgacattaacgactgtttctctttgattactggtaaaggcaagtgtgttacactaaataac
actcgtagtttagctgcattaaatatgcgtgttaatgctgcttcaactttctttgtgtcattcgggaaactgcatccac
cataaatgggatgtttaggtagaccgtttctttctggccgtaataagtctgtttctgtttgattcctctttaataat
tgattcaattaatagtCTAGGATacccattagacattaaatcgttaattgctttattatattaattttctttagaatatt
gactaaccaacctgtcaattcttaaaaagcaaccacgaactgttgataatttatattgaaatggtacaaaactgctgtat
aacaaatactgtgcagaccatgttggtttatgtaaattgttcgtgtttaatttaccattagttttttcattaatagtata
tctaggaaaggcagacagtcatctttctcgtgctctgtcgtgaagccgatattcttatgtgctttgttgaaactttaaag
taatgttcgtgattgcgacctgttcttaagtacaagaaatatatcatccacgtaccgtatatattgagcacatttaatta
tgtattttctaggtgccctagaaaaatctcagccaacactggagataaggggcttcccattgcgacaccatttcattaat
tactttgcgctccaccttgtctatttcatctgatttatcgtctagacgtgtgaattttgtattgcatttaacacgtttc
catctttgtacgtagtcagatttgtccattataagtgcgctctttccttgcgttcttgtacttaagaacaggtcgcaa
tcacgaacattgcttcaaagtttcaacaaagcacataagaatatcggcttcacgtcggagcacgagaaagatgactgtct
gccttcctagatgtactattaaagaaagaaactaatggtaacttaaacagaacaattaccataaaccaacatggtctg
cacagtatttgcataacagcagtttgtgtcatttaaacataaattatcaacagttcgtggttgcttttcaagaatagac
aggttggttagtcaagattctaaagaaaatgaatataataaagcaattaacggtttaatgctcaatggcctatcccagaca
attaattgaatcaattattaaaagggggagttaaccagaaacagacgtattatgggcagaaaagaaaatagtctacctaa
acataccatttaagggggatgcagtctcccgaatggcacaaaagaaagatgaagcagcattgacacacacatttaatgca
gccaaactacgagtgttatttagggtaacacacttgcctttactagcaatcaaagagaaacagccgttaatgtcgatatc
aaatattatttaccaatatgcatgcgcatgttgtcgatcaacttacgtaggccgatcgaccagacggttaattactcgaa
tgagagaacattgcaacttaaacgcccgttttaaatcaaatggtgaatacacgtctgctattgcgcaacacatcatcgaa
gcatcgcacgtatgttcttcagacgtagcattcaaagtaattactaaatgcaaaacaaaaggggagctagccacattatgg
ataaacaattgcagccggatttatgcaagcagaagaagcacgtacaagcattgagcctgaactggatgtgaggcacgca
atttgattggtttccgtgtttcacactctctctatgttcacatatttctatcttgtttcgctttcaaatttatatataaa
atatgttcattagaagtatattcagaagacaatgcgaaagaaaattttcttgtacctgatataattcaaatttatttgca
taGGCTCTTATGGAAACTAAGCTATAGGTGACATAGTTCGCTGTTTACGTATGCAACATTGATGTAGGCGAAATCGTGGC
AAAGAAAAGGCTGTAGGATGTTCACCGTTGTTATGAATGCTTAAGCACTGCTTGGTAAATAGGAAGGTGTTGTCACCAAT
CGAACCCTAGTTATTCCAGGAACTCGGGAACACGAGCACGAACTTTATGGTGTCCGTACCTGGAAAAAAGTATGCAGCCA
ACATAGGCAACCTTCCAATTAGTCTATAAATCAACAATaatgtcatttttataattaaacgaacattgtttgcgcgggcg
atcATAACCTTTtttttataatcagggttgcgaacttgttataaaaacctgacccattaagttctAAAATTTAGTCATTATA
ATCTAAgatttgtagtgtagaaaaggcaattcacccagtagaccggtttcgttcttattgggaactcatcatgtactggc
ctgtgtagcatccatttagccgtaaagttcgaactaaccatccacaatctgtcattaacgaAAGGATACTACGTTATATG
GGGAAATTGGGatagttatttggaactttagcgCTAAATGGATGATATATAGGCTCTACacaaaggaaagactaaccaag
acgcattagttagtatataactgaaaattgtgcgtagtttgCGGCACAGTGACTcggtagttagagcaccacattcggaa
acagacgttcccaggttcgcgCCCTGACCGcttcaaattctggcaagtacatgaggagttctcaataaggacgaatccgg
tctactggacgaattgcgtttctacactgtacaattcttagtttatactgcaaatgtatgcacttaatggatcaggtga
tcatatcaagttcgaaaccttgattataatttatgTCATTTTGCTACTCAGTGTATGCAACATATTTTATCATCGTTTCC
TCACTATTTAACCCGCAAAGAAACAATTGACACAGTAGAAAAAAAAAGATCAGctaaaaattattagaaaattatagaaa
gcatgcataaaaaataaatagctcACTCACGAGAACACGCTGCCTATCCGCATTTAAGTGACTGAGCAAATTGTATGCAC
```

History

search datasets

Unnamed history

295 MB   1

1: GCA_029291075.1_E_nip_genomic.fna.gz

Upload

Tools

Workflows

Workflow Invocations

Interactive Tools

Visualization

Histories

History Multiview

Datasets

Pages

Libraries

Notifications

More

▼ **Tools**   ☆

search tools   ⌄   ✕

Upload Data

Get Data

External Data

Send Data

Collection Operations

GENERAL TEXT TOOLS

Text Manipulation

Filter and Sort

Join, Subtract and Group

Convert Formats

GENOMIC FILE MANIPULATION

FASTA/FASTQ

Quality Control

SAM/BAM

BED

VCF/BCF

Nanopore

Extract Features

Operate on Genomic Intervals

Fetch Sequences / Alignments

GENOMICS ANALYSIS

Assembly

Annotation

Mapping

Variant Calling

RNA Analysis

Multiple Alignments

⌃ **1: GCA_029291075.1_E_nip_genomic.fna.gz**   ok

21,044 sequences
format **fasta.gz**   database **?**   size **281.4 MB**

[👁 Preview]   [📊 Visualize]   [ℹ Details]   [✏ Edit]

⚠ This dataset is large and only the first megabyte is shown below.

Show all | Save

>JAQBSW010000001.1 Eudiplozoon nipponicum isolate JV_EN_01 E_nip_1, whole genome shotgun sequence
gcaatgttctctcattcgagtaattaaccgtctggtcgatcggcctacgtaagttgatcgacaacttgcgcatgtatctt
ggtaaaaaatatttgatattgacattaacgactgtttctctttgattactggtaaaggcaagtgtgttacactaaataac
actcgtagtttagctgcattaaatatgcgtgttaatgctgcttcaactttctttgtgtcattcgggaaactgcatccac
cataaatgggatgtttaggtagaccgttttcttttctggccgtaataagtctgtttctgtttgattcctctttaataat
tgattcaattaatagtCTAGGATacccattagacattaaatcgttaattgctttattatattaattttctttagaatatt
gactaaccaacctgtcaattcttaaaaagcaaccacgaactgttgataatttatattgaaatggtacaaaactgctgtat
aacaaatactgtcgacagcatgttggtttatgtaaattgtctgtttaatttaccattagtttttttcattaatagtata
tctaggaaaggcagacagtcatctttctcgtgctctgtcgtgaagccgatattcttatgtgctttgttgaaactttaaag
taatgttcgtgattgcgacctgttcttaagtacaagaaatatatcatccacgtaccgtatatattgagcacatttaatta
tgtattttctaggtgccctagaaaaatctcagccaacactggagataaggggcttcccattgcgacaccatttcattaat
tactttgcgctccaccttgtctatttcatctgatttatcgtctagacgtgtgaattttgtattgcatttaacacgttttc
catctttttgtacgtagtcagatttgtccattataagtgcgctctttcctttgcgttcttgtacttaagaacaggtcgcaa
tcacgaacattgcttcaaagtttcaacaaagcacataagaatatcggcttcacgtcggagcacgagaaagatgactgtct
gcctttcctagatgtactattaaagaaagaaactaatggtaacttaaacagaacaatttaccataaaccaacatggtctg
cacagtatttgcataacagcagtttgtgtcatttaaacataaattatcaacagttcgtggttgcttttcaagaatagac
aggttggttagtcaagattctaaagaaaatgaatataataaagcaattaacggtttaatgtctaatggctatcccagaca
attaattgaatcaattattaaaagggggagttaaccagaaacagacgtattatgggccagaaaagaaaatagtctacctaa
acataccatttaagggggatgcagtctcccgaatggcacaaaagaaagatgaagcagcattgacacacacatttaatgca
gccaaactacgagtgttatttagggtaacacacttgcctttactagcaatcaaagagaaacagccgttaatgtcgatatc
aaatattatttaccaatatgcatgcgcatgttgtcgatcaacttacgtaggccgatcgaccagacggttaattactcgaa
tgagagaacattgcaacttaaacgcccgtttttaaatcaaatggtgaatacacgtctgctattgcgcaacacatcatcgaa
gcatcgcacgtatgttcttcagacgtagcattcaaagtaattactaaatgcaaaacaaaaggggagctagccacattatgg
ataaacaattgcagccggatttatgcaagcagaagaagcacgtacaagcattgagcctgaactggatgtgaggcacgca
atttgattggtttccgtgtttcacactctctctatgttcacatatttctatcttgttttgcttttcaaatttatatataaa
atatgttcattagaagatatttcagaagacaatgcgaaagaaaattttttcttgtacctgatataattcaaatttatttgca
taGGCTCTTATGGAAACTAAGCTATAGGTGACATAGTTCGCTGTTTACGTATGCAACATTGATGTAGGCGAAATCGTGGC
AAAGAAAAGGCTGTAGGATGTTCACCGTTGTTATGAATGCTTAAGCACTGCTTGGTAAATAGGAAGGTGTTGTCACCAAT
CGAACCCTAGTTATTCCAGGAACTCGGGAACACGAGCACGAACTTTATGGTGTCCGTACCTGGAAAAAAGTATGCAGCCA
ACATAGGCAACCTTCCAATTAGTCTATAAATCAACAATaatgtcatttttataattaaacgaacattgtttgcgcgggcg
atcATAACCTTtttttataatcagggttgcgaacttgttataaaaacctgacccattaagttctAAAATTTAGTCATTATA
ATCTAAgatttgtagtgtagaaaaggcaattcacccagtagaccggtttcgttcttattgggaactcatcatgtactggc
ctgtgtagcatccatttagccgtaaagttcgaactaaccatccacaatctgtcattaacgaAAGGATACTACGTTATATG
GGGAAATTGGGatagttatttggaactttagcgCTAAATGGATGATATATAGGCTCTACacaaaggaaagactaaccaag
acgcattagttagtatataactgaaaattgtgcgtagtttgCGGCACAGTGACTcggtagttagagcaccacattcggaa
acagacgttcccaggttcgcgCCCTGACCGcttcaaattctggcaagtacatgaggagttctcaataaggacgaatccgg
tctactggacgaattgcgttttctacactgtacaattcttagtttatactgcaaatgtatgcacttaatggatcaggtga
tcatatcaagttcgaaaccttgattataatttatgTCATTTTGCTACTCAGTGTATGCAACATATTTTATCATCGTTTCC
TCACTATTTAACCCGCAAAGAAACAATTGACACAGTAGAAAAAAAAAGATCAGctaaaaattattagaaaattatagaaa
gcatgcataaaaaataaaatagctcACTCACGAGAACACGCTGCCTATCCGCATTTAAGTGACTGAGCAAATTGTATGCAC

▾ **History**   ➕ ⇄ ☰

search datasets   ⌄   ✕

Unnamed history   ✏

🗃 295 MB   📍1 ⟳

☑ ⊡   ⚙

1: GCA_029291075.1_E_nip_geno   👁 ✏ 🗑
mic.fna.gz

Using 0% of 200.0 GB   👤 vorel ▾

Tools ⭐

statistics

👁 Show Sections

Statistics on presence-absence of a numeric variable

Summary Statistics for any numerical column

FASTQ Summary Statistics by column

Fasta Statistics display summary statistics for a FASTA file

SeqKit statistics of FASTA/Q files

Compute quality statistics

Genome annotation statistics

Read length statistics from a set of FAST5 files

BAM Index Statistics

Stacks: statistics on stacks found for multiple samples

MiModD Coverage Statistics calculates coverage statistics for a BCF file as generated by the MiModd Variant Calling tool

ProteomIQon PSMStatistics utilizes semi supervised machine learning techniques to integrate search engine scores as well as the mentioned quality scores into one single consensus score.

MapStatistics Extract extended statistics on the features of a map for quality control

zonal statistics over each area

Boxplot of quality statistics

Dr. Disco (classify) Classifies detected break-points in RNA-seq based on corresponding statistics and blacklists

cmstat Summary statistics for covariance model

BAM/SAM Mapping Stats reads mapping statistics for a provided BAM or SAM file.

Upload / Tools / Workflows / Workflow Invocations / Interactive Tools / Visualization / Histories / History Multiview / Datasets / Pages / Libraries / Notifications / More

≫ **1: renamed_GCA_029291075.1_E_nip_genomic.fna.gz** ok

21,044 sequences

format **fasta.gz**   database **?**   size **281.4 MB**

👁 Preview   📊 Visualize   ℹ Details   ✏ Edit

Edit Dataset Attributes

☰ Attributes   🗄 Datatypes   👤 Permissions

Name

renamed_GCA_029291075.1_E_nip_genomic.fna.gz

Info

My genome file

Annotation - optional

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Nullam justo enim, consectetuer nec, ullamcorper ac, vestibulum in, elit. Maecenas aliquet accumsan leo.

Add an annotation or notes to a dataset, annotations are available when a history is viewed.

Database/Build - optional

unspecified (?)

💾 Save   🔄 Auto-detect

History ＋ ⇄ ≡

search datasets

Unnamed history ✏

Unnamed history

Annotation (optional)

Add Tags 🏷

💾 Save   ↺ Cancel

💾 295 MB   📍1 ⟳

☑ ⊡

1: **renamed_GCA_029291075.1_E _nip_genomic.fna.gz**

Using 0% of 200.0 GB   👤 vorel ▾

▼ Tools

statistics

👁 Show Sections

Statistics on presence-absence of a numeric variable

Summary Statistics for any numerical column

FASTQ Summary Statistics by column

Fasta Statistics display summary statistics for a FASTA file

SeqKit statistics of FASTA/Q files

Compute quality statistics

Genome annotation statistics

Read length statistics from a set of FAST5 files

BAM Index Statistics

Stacks: statistics on stacks found for multiple samples

MiModD Coverage Statistics calculates coverage statistics for a BCF file as generated by the MiModd Variant Calling tool

ProteomIQon PSMStatistics utilizes semi supervised machine learning techniques to integrate search engine scores as well as the mentioned quality scores into one single consensus score

MapStatistics Extract extended statistics on the features of a map for quality control

zonal statistics over each area

Boxplot of quality statistics

Dr. Disco (classify) Classifies detected break-points in RNA-seq based on corresponding statistics and blacklists

cmstat Summary statistics for covariance model

BAM/SAM Mapping Stats reads mapping statistics for a provided BAM or SAM file.

Upload

Tools

Workflows

Workflow Invocations

Interactive Tools

Visualization

Histories

History Multiview

Datasets

Pages

Libraries

Notifications

More

⌃ 1: renamed_GCA_029291075.1_E_nip_genomic.fna.gz   ok

21,044 sequences

format **fasta.gz**   database **?**   size **281.4 MB**

👁 Preview   📊 Visualize   ⓘ Details   ✏ **Edit**

🖉 Edit Dataset Attributes

☰ **Attributes**   🗄 **Datatypes**   👤 **Permissions**

Name

renamed_GCA_029291075.1_E_nip_genomic.fna.gz

Info

My genome file

Annotation - optional

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Nullam justo enim, consectetuer nec, ullamcorper ac, vestibulum in, elit. Maecenas aliquet accumsan leo.

Add an annotation or notes to a dataset; annotations are available when a history is viewed.

Database/Build - optional

unspecified (?)

💾 **Save**   ↻ **Auto-detect**

History   ➕ ⇄ ☰

search datasets

Unnamed history   🖉

Unnamed history

Annotation (optional)

Add Tags 🏷

💾 **Save**   ↺ **Cancel**

🗄 295 MB   📍1 ⟳

☑ ⊡   ⚙

1: renamed_GCA_029291075.1_E _nip_genomic.fna.gz

🔧 Tools

statistics

👁 Show Sections

Statistics on presence-absence of a numeric variable

Summary Statistics for any numerical column

FASTQ Summary Statistics by column

Fasta Statistics display summary statistics for a FASTA file

SeqKit statistics of FASTA/Q files

Compute quality statistics

Genome annotation statistics

Read length statistics from a set of FAST5 files

BAM Index Statistics

Stacks: statistics on stacks found for multiple samples

MiMoDD Coverage Statistics calculates coverage statistics for a BCF file as generated by the MiModd Variant Calling tool

ProteomIQon PSMStatistics utilizes semi supervised machine learning techniques to integrate search engine scores as well as the mentioned quality scores into one single consensus score

MapStatistics Extract extended statistics on the features of a map for quality control

zonal statistics over each area

Boxplot of quality statistics

Dr. Disco (classify) Classifies detected break-points in RNA-seq based on corresponding statistics and blacklists

cmstat Summary statistics for covariance model

BAM/SAM Mapping Stats reads mapping statistics for a provided BAM or SAM file.

🔧 **Fasta Statistics** display summary statistics for a FASTA file (Galaxy Version 2.0)   ⭐ ▾ ▶ Run Tool

Tool Parameters

FASTA or Multi-FASTA file *

📄 📑 📁 ⋯ | Select a dataset   ▲

accepted formats ▾   **1: renamed_GCA_029291075.1_E_nip_genomic.fna.gz (as fasta)**   ☑

FASTA dataset to get sta

Estimated genome size - optional

This parameter is optional. If provided, it will be used for calculating the NG50 statistic. (--genome_size)

Generate gap stats

⬤ No

(--gaps_option)

Additional Options

Email notification

⬤ No

Send an email notification when the job completes.

Attempt to re-use jobs with identical parameters?

⬤ No

This may skip executing jobs that you have already run.

▶ **Run Tool**

Help

ℹ **Purpose**

Displays the summary statistics for a FASTA file.

ℹ **Outputs**

This tool generates two outputs: a general summary and an optional gap stats file.

The general summary includes the following information:

- Lengths: n50, min, max, median and average
- Number of base pairs: A, C, G, T, N, Total and Total_not_N
- Number of sequences
- GC content

In addition the optional gap stats BED file includes the information about gaps localization.

History   + ⇄ ☰

search datasets

Unnamed history   ✏

Unnamed history

Annotation (optional)

Add Tags 🏷

💾 Save   ↺ Cancel

🗄 295 MB   📍1 ⟳

1: **renamed_GCA_029291075.1_E _nip_genomic.fna.gz**

Tools

statistics

Show Sections

Statistics on presence-absence of a numeric variable

Summary Statistics for any numerical column

FASTQ Summary Statistics by column

Fasta Statistics display summary statistics for a FASTA file

SeqKit statistics of FASTA/Q files

Compute quality statistics

Genome annotation statistics

Read length statistics from a set of FAST5 files

BAM Index Statistics

Stacks: statistics on stacks found for multiple samples

MiModD Coverage Statistics calculates coverage statistics for a BCF file as generated by the MiModd Variant Calling tool

ProteomIQon PSMStatistics utilizes semi supervised machine learning techniques to integrate search engine scores as well as the mentioned quality scores into one single consensus score

MapStatistics Extract extended statistics on the features of a map for quality control

zonal statistics over each area

Boxplot of quality statistics

Dr. Disco (classify) Classifies detected break-points in RNA-seq based on corresponding statistics and blacklists

cmstat Summary statistics for covariance model

BAM/SAM Mapping Stats reads mapping statistics for a provided BAM or SAM file.

✅ Started tool **Fasta Statistics** and successfully added 1 job to the queue.

It produces this output:

- **2: Fasta Statistics on data 1: summary stats**

You can check the status of queued jobs and view the resulting data by refreshing the History panel. When the job has been run the status will change from 'running' to 'finished' if completed successfully or 'error' if problems were encountered.

Here is a link to the job: **83e4c30195971270**

History

search datasets

Unnamed history

Unnamed history

Annotation (optional)

Add Tags

Save   **Cancel**

295 MB   2   1

🕐 **2: Fasta Statistics on data 1: summary stats**

1: **renamed_GCA_02929107 5.1_E_nip_genomic.fna.gz**

Using 0% of 200.0 GB

vorel

Tools

statistics

Show Sections

Statistics on presence-absence of a numeric variable

Summary Statistics for any numerical column

FASTQ Summary Statistics by column

Fasta Statistics display summary statistics for a FASTA file

SeqKit statistics of FASTA/Q files

Compute quality statistics

Genome annotation statistics

Read length statistics from a set of FAST5 files

BAM Index Statistics

Stacks: statistics on stacks found for multiple samples

MiModD Coverage Statistics calculates coverage statistics for a BCF file as generated by the MiModd Variant Calling tool

ProteomIQon PSMStatistics utilizes semi supervised machine learning techniques to integrate search engine scores as well as the mentioned quality scores into one single consensus score

MapStatistics Extract extended statistics on the features of a map for quality control

zonal statistics over each area

Boxplot of quality statistics

Dr. Disco (classify) Classifies detected break-points in RNA-seq based on corresponding statistics and blacklists

cmstat Summary statistics for covariance model

BAM/SAM Mapping Stats reads mapping statistics for a provided BAM or SAM file.

✓ Started tool **Fasta Statistics** and successfully added 1 job to the queue.

It produces this output:

- **2: Fasta Statistics on data 1: summary stats**

You can check the status of queued jobs and view the resulting data by refreshing the History panel. When the job has been run the status will change from 'running' to 'finished' if completed successfully or 'error' if problems were encountered.

Here is a link to the job: **83e4c30195971270**

History

search datasets

Unnamed history

🗄 1.25 GB   ◉ 2   🚫 1   ⟳

☑ ⤢ ⚙

⟳ 2: **Fasta Statistics on data 1: summary stats**

1: **renamed_GCA_02929107 5.1_E_nip_genomic.fna.gz**

🔻 **Tools**   ⌄ ⭐

[statistics   ⌄ ✕]

⊙ Show Sections

Statistics on presence-absence of a numeric variable

Summary Statistics for any numerical column

FASTQ Summary Statistics by column

Fasta Statistics display summary statistics for a FASTA file

SeqKit statistics of FASTA/Q files

Compute quality statistics

Genome annotation statistics

Read length statistics from a set of FAST5 files

BAM Index Statistics

Stacks: statistics on stacks found for multiple samples

MiModD Coverage Statistics calculates coverage statistics for a BCF file as generated by the MiModd Variant Calling tool

ProteomIQon PSMStatistics utilizes semi supervised machine learning techniques to integrate search engine scores as well as the mentioned quality scores into one single consensus score.

MapStatistics Extract extended statistics on the features of a map for quality control

zonal statistics over each area

Boxplot of quality statistics

Dr. Disco (classify) Classifies detected break-points in RNA-seq based on corresponding statistics and blacklists

cmstat Summary statistics for covariance model

BAM/SAM Mapping Stats reads mapping statistics for a provided BAM or SAM file.

⏫ ⌃ 2: **Fasta Statistics on data 1: summary stats**   ok

30 lines 2 columns

format **tabular**   database ❓   size **664 b**

[👁 Preview] [📊 Visualize] [ⓘ Details] [✏ Edit]

Column 1	Column 2
Scaffold L50	3219
Scaffold N50	87067
Scaffold L90	11600
Scaffold N90	19508
Scaffold len_max	557136
Scaffold len_min	4973
Scaffold len_mean	44658
Scaffold len_median	23894
Scaffold len_std	52885
Scaffold num_A	305506036
Scaffold num_T	305603756
Scaffold num_C	164346741
Scaffold num_G	164346396
Scaffold num_N	0
Scaffold num_bp	939802929
Scaffold num_bp_not_N	939802929
Scaffold num_seq	21044
Scaffold GC content overall	34.97
Contig L50	3219
Contig N50	87067
Contig L90	11600
Contig N90	19508
Contig len_max	557136
Contig len_min	4973
Contig len_mean	44658

History   ➕ ⇄ ☰

[search datasets   ⌄ ✕]

Unnamed history   ✏

🗄 1.25 GB   📍2 🚫1 🔄

☑ ⊡   ⚙

2: **Fasta Statistics on data 1: summary stats**   👁⊙ ✏ 🗑

1: **renamed_GCA_02929107 5.1_E_nip_genomic.fna.gz**   ⇄ 👁⊙ ✏ 🗑

☝️ *Web hosting can be arranged, but please discuss this in advance.*

Other related services

■ Kubernetes

- Open-source container orchestration engine that automates the deployment, scaling and management of containerised applications

- A Docker image is an essential part of container infrastructure. It contains an application and all its necessary components, such as libraries and other files
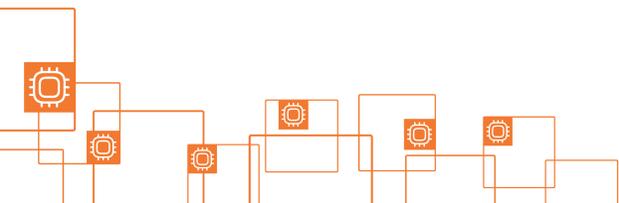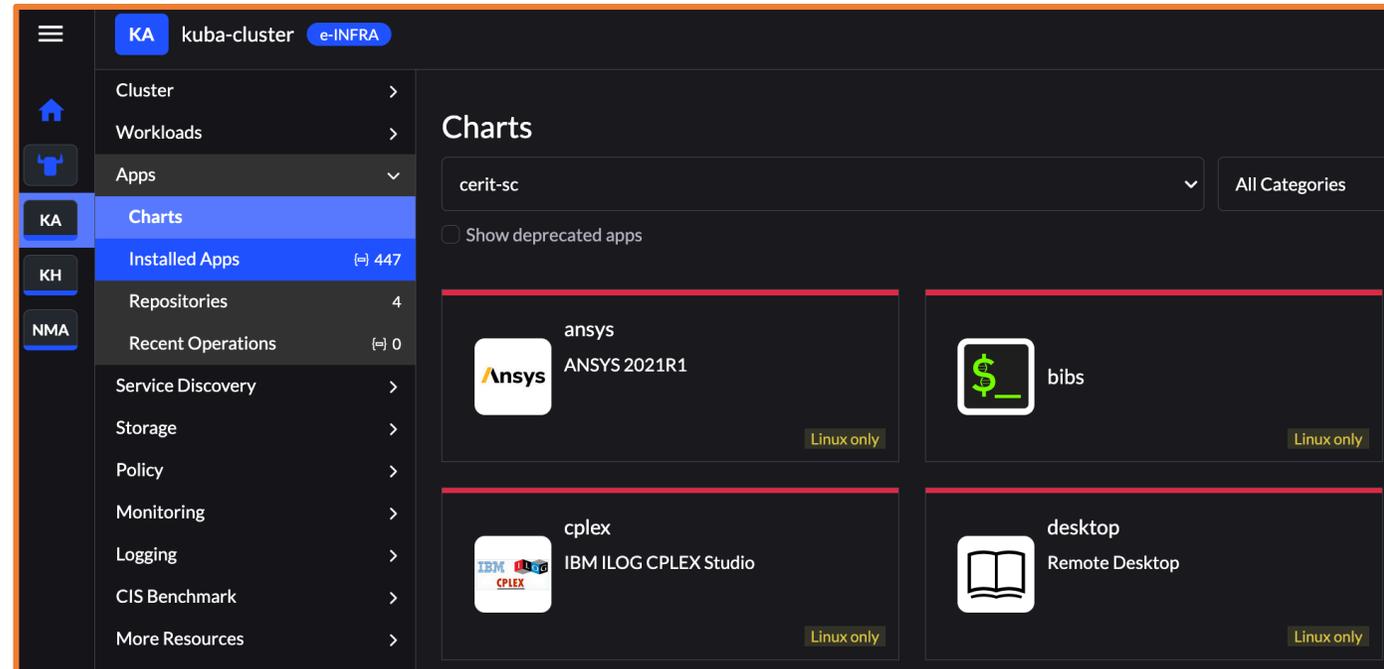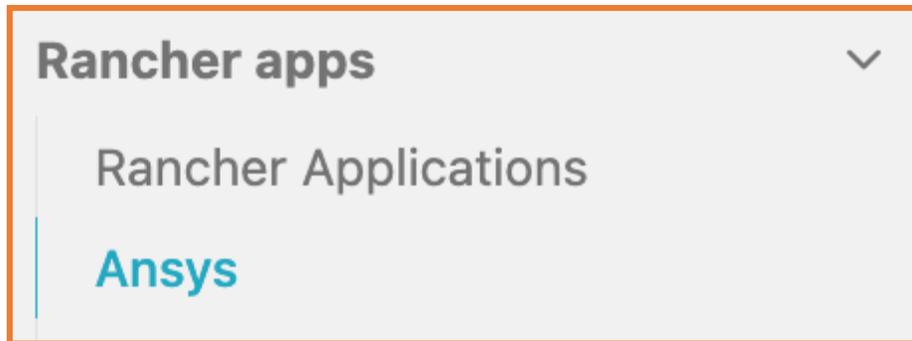
- **AI chatbot (Open WebUI)**   https://docs.cerit.io/en/docs/ai-as-a-service/chat-ai

  - The AI-powered chatbot interface runs strictly on local hardware

  - Open WebUI itself logs at the 'INFO' level by default, meaning that request/response data is not logged

  - Only system administrators have access to these logs, which are not transmitted anywhere else

  - Image generator and picture editor included

  - Can extract text from images (e.g. Mistral 3 model)

  - Programming languages proficiency

  - REST API (integrate models into applications, scripts, or AI workflows)
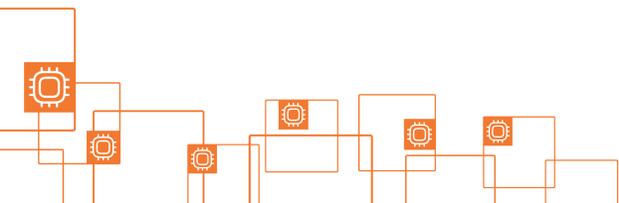
New Chat

Search

Notes

Workspace

Folders

Chats

Today

Sticky Header Demo 🚀

GPT OSS 120B   +

Search a model

Model similar to OpenAI's Mini series, optimized for everyday use.

default thinking mode

-ai

GPT OSS 120B   ...   ✓

DeepSeek v3.2

Mistral 3 Large

GLM 4.7

Qwen3-Coder-480B

Mistral-Small 3.2

Phi4

☝️ *You can select any available model and view its notes*

GPT OSS 120B

Model similar to OpenAI's Mini series, optimized for everyday use.

How can I help you today?

+   ⊞

⚡ Suggested

Give me ideas
for what to do with my kids' art

Tell me a fun fact
about the Roman Empire

Help me study
vocabulary for a college entrance exam

Compute cloud
https://docs.platforms.cloud.e-infra.cz/en/docs

- Runs on OpenStack (allows users to create and manage their own cloud computing resources)
- 17 computational clusters with 8,968 cores, 96 GPU cards, and 178 TB RAM
- Virtual machines are accessed using SSH keys

Sensitive cloud
https://docs.cerit.io/en/docs/sensitivecloud/account

- Secured computing and storage environment provided by CERIT-SC (part of e-INFRA CZ) for sensitive data processing and research
- Follows security standards such as ISO 27000, C5, ISO 15189, and ECRIN
- Relies on container technology via Kubernetes, MFA required
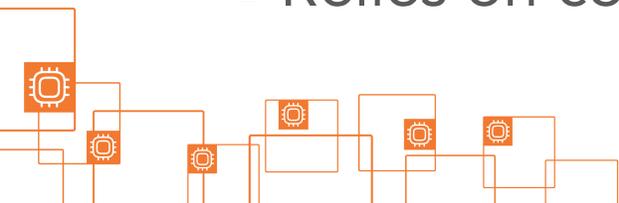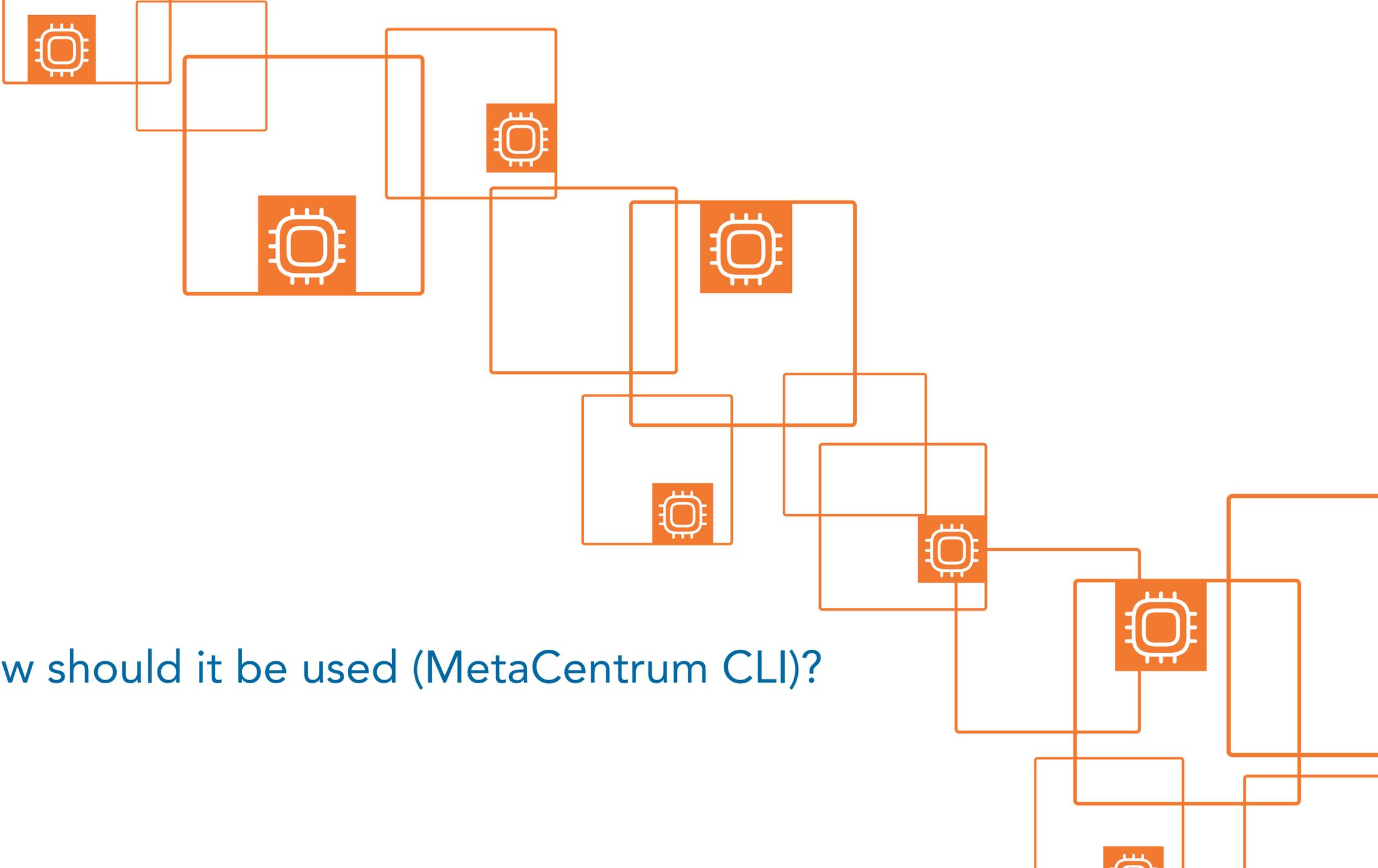
How should it be used (MetaCentrum CLI)?

- Anytime during the year, manual approval

- Log in through the institution (i.e. local name and password) from the eduID federation

- Accounts are valid until 2 February of the following year

- Accounts are renewed in January

- Immediate access to hardware resources

- Partner access by prior arrangement

Most new applications are approved within one or two working days

- Anytime during the year, manual approval

- Log in through the institution (i.e. local name and password) from the eduID federation

- Accounts are valid until 2 Februa[ry] of the following year

- Accounts are renewed in January

- Immediate access to hardware resources

- Partner access by prior arrangem[ent]

Log in with | mental |

Institute of Chemical Process Fundamentals of the AS CR

Institute of Experimental Botany AS CR

Institute of Experimental Medicine CAS

National Institute of Mental Health

NUDZ NÁRODNÍ ÚSTAV DUŠEVNÍHO ZDRAVÍ

CESNET
Personal data processing

https://docs.metacentrum.cz/en/docs/computing/infrastructure/frontends

- Primary access point

- SSH access via password (creating a Kerberos ticket)

https://docs.metacentrum.cz/en/docs/access/security/kerberos

  - SSH keys are not supported

  - A valid Kerberos ticket enables you to submit tasks and browse the infrastructure

  - Beware of leaving sessions open for too long – ticket validity is only10 hours

  - You can generate Kerberos tickets on a local PC and log in without a password
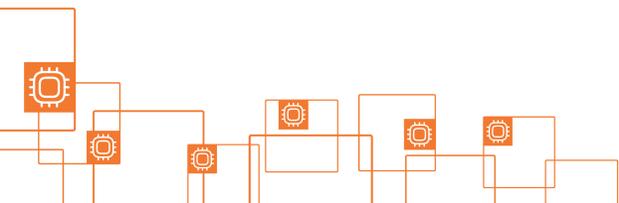
Geographically separated servers mean better distribution of users and load, which makes the servers more stable and provides an alternative during an outage

- **Primary access point**
- **SSH access via password**
  - SSH keys are not supporte
  - A valid Kerberos ticket en infrastructure
  - Beware of leaving session
  - You can generate Kerbero

Frontend address	Aliased as	Native home	OS	Physically located in	Note
charon.nti.tul.cz	charon.metacentrum.cz	/storage/liberec3-tul	Debian 12	Liberec	
elmo.elixir-czech.cz	elmo.metacentrum.cz	/storage/praha5-elixir	Debian 12	Praha	Elixir users
nympha.meta.zcu.cz	nympha.metacentrum.cz, nympha.zcu.cz, minos.zcu.cz, minos.meta.zcu.cz, alfrid.meta.zcu.cz	/storage/plzen1	Debian 12	Plzen	
metafzu.fzu.cz	metafzu.metacentrum.cz	/storage/praha1	Debian 12	Praha	dedicated for FZU users
oven.metacentrum.cz		/storage/brno2	Debian 12	Brno	oven node only
perian.grid.cesnet.cz	perian.metacentrum.cz, onyx.metacentrum.cz	/storage/brno2	Debian 12	Brno	
skirit.ics.muni.cz	skirit.metacentrum.cz	/storage/brno2	Debian 12	Brno	
tarkil.grid.cesnet.cz	tarkil.metacentrum.cz	/storage/praha1	Debian 12	Praha	
tilia.ibot.cas.cz	tilia.metacentrum.cz	/storage/pruhonice1-ibot	Debian 12	Pruhonice	
zenith.cerit-sc.cz	zenith.metacentrum.cz	/storage/brno12-cerit	Debian 12	Brno	

https://docs.metacentrum.cz/en/docs/computing/infrastructure/frontends

- Primary access point

- SSH access via password (creating a Kerberos ticket)

  https://docs.metacentrum.cz/en/docs/access/security/kerberos

  - SSH keys are not supported

  - A valid Kerberos ticket enables you to submit tasks and browse the infrastructure

  - Beware of leaving sessions open for too long – ticket validity is only10 hours

  - You can generate Kerberos tickets on a local PC and log in without a password

- Do not run calculations on frontends

  - They are small virtual machines   https://docs.metacentrum.cz/en/docs/computing/run-basic-job#interactive-job

  - They are at risk of significant slowdown or crashing

  - Automatic mechanisms terminate demanding and/or long processes

    - Even for short tests, an interactive task is more suitable
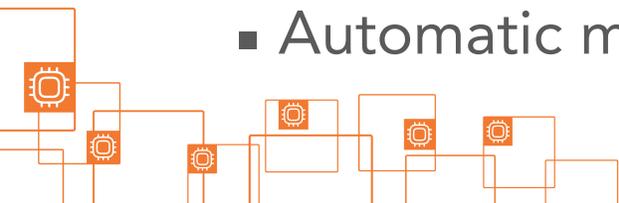
Frontend servers

...uting/infrastructure/frontends

- Primary acce...

- SSH access ...

...access/security/kerberos

  - SSH keys a...

  - A valid Ker... e the infrastructure

  - Beware of ... s only10 hours

  - You can ge... hout a password

- Do not run ...

...ting/run-basic-job#interactive-job

  - They are sr...

  - They are a...

  - Automatic ... cesses

... re suitable

```
Dear user,

one or more your processes running on the frontend skirit.ics.muni.cz
exceeded limits for more than limits, see below. This situation has
negative impact on other users working on the frontend.
The following process was terminated by the system.

User:

PID TTY ELAPSED TIME CMD
855050 pts/50 7583 6111 gzip -d

PID - a number representing the process ID on skirit.ics.muni.cz
TTY - controlling tty (terminal)
ELAPSED - elapsed time since the process was started, in seconds
TIME - cumulative CPU time, in seconds
CMD - command with all its arguments

Limits:
    >2h wall_time AND >1h cpu_time AND >30% average_cpu_usage

Please consider that frontends are shared among all users. If you need
to run interactively some demanding activity, like working with huge
amount of data or software compilation, please don't use the frontend
but rather reserve some computing node for an interactive jobs. Such
operations could slow down the frontend and bother other users.

https://docs.metacentrum.cz/en/docs/computing/run-basic-job

Please note this is an automatically generated e-mail. If you
have any questions concerning this particular job or future strict
limits enforcement, please contact us on meta@cesnet.cz .

Best regards,
MetaCentrum
```

- Several geographically separated disk arrays (storages) are available

  https://docs.metacentrum.cz/en/docs/computing/infrastructure/mount-storages

- Designed for so-called live data

  https://docs.metacentrum.cz/en/docs/data/storage-department

  - Backups of valuable primary data and results preferably to S3/NRP object storage

    https://docs.du.cesnet.cz/en/docs/object-storage-s3/s3-service

    - Available to all users
    - *s3cmd*/*s5cmd* commands are available for manipulating data on S3 storage
    - Need to request the creation of an S3 bucket ('folder') and create a configuration file

☝️ *By default, a user's home directories have permissions set to 755 (= other users can read it). To increase privacy, permissions can be set to 700 on /storage/city/home/$USER.*
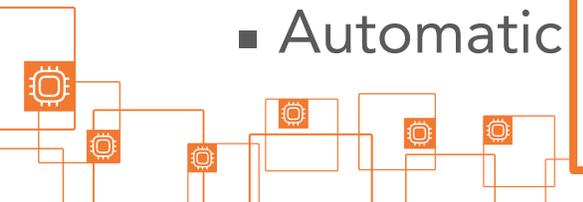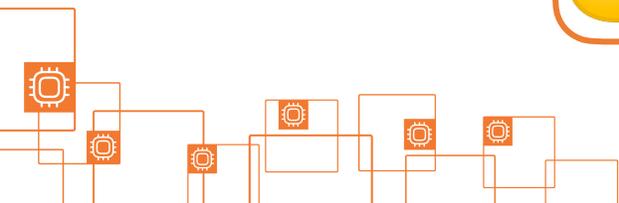
Disk storage arrays

- Several geographically separated disk arrays (storages) are available

- Designed for so-called live data

  - Backups of valuable primary data and results preferably to S3/NRP object st...

Configuring the S3cmd Tool

Add the following lines to the configuration file located at **/home/user/.s3cfg**.

```
[default]
    host_base = https://s3.clX.du.cesnet.cz
    use_https = True
    access_key = xxxxxxxxxxxxxxxxxxxxxxx
    secret_key = xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
    host_bucket = s3.clX.du.cesnet.cz
```

Disk storage arrays

- Several geographically separated disk arrays (storages) are available

- Designed for so-called live data

  https://docs.metacentrum.cz/en/docs/computing/infrastructure/mount-storages

  https://docs.metacentrum.cz/en/docs/data/storage-department

  - Backups of valuable primary data and results preferably to S3/NRP object storage

    - Available to all users

      https://docs.du.cesnet.cz/en/docs/object-storage-s3/s3-service

    - *S3cmd/s5cmd* commands are available for manipulating data on S3 storage

    - Need to request the creation of an S3 bucket ('folder') and create a configuration file

- User quotas are set for the total volume of data and the number of files

  - Storage capacity is not unlimited (keep only needed data)

  - Disk storages come in different sizes and quotas are set the same for everyone

  - Some disk storages have owners with higher quotas

      - Manipulating many small files is more problematic (use archives)
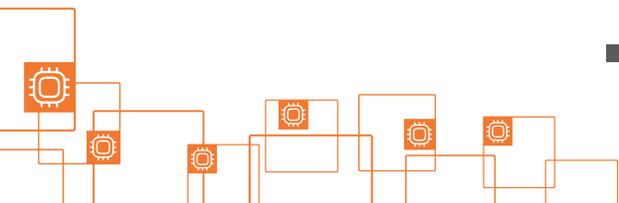
Only members of the project Elixir CZ have a high quota on the storage praha5-elixir

- Several geographically separated disk arrays (storages) are available

user	dir	space				files			
		used	soft quota	hard quota	grace	used	soft limit	hard limit	grace
vorel	/storage/brno12-cerit/home/vorel	200.55728 GB	-	-	none	35	-	-	none
vorel	/storage/brno2/home/vorel	40.40222 GB	4294.967296 GB	4294.967296 GB	none	31062	2500000	2550000	none
vorel	/storage/budejovice1/home/vorel	24 kB	3323.625472 GB	5522.30912 GB		9	1000000	1100000	
vorel	/storage/liberec3-tul/home/vorel	12 kB	10.48576 GB	15.72864 GB		8	-	-	
vorel	/storage/plzen1/home/vorel	1714.056364 GB	4294.967296 GB	6442.450944 GB	none	133431	3000000	3100000	none
vorel	/storage/praha2-natur/home/vorel	44 kB	7.340032 GB	10.48576 GB		18	-	-	
vorel	/storage/praha5-elixir/home/vorel	940.99644 GB	5369.757696 GB	6014.107648 GB		113327	1010000	1212000	
vorel	/storage/pruhonice1-ibot/home/vorel	32 kB	7.340032 GB	10.48576 GB		12	-	-	
vorel	/storage/vestec1-elixir/home/vorel	80 kB	2147.483648 GB	2202.0096 GB	none	33	2000000	2100000	none

- Disk storages come in different sizes and quotas are set the same for everyone
  - Some disk storages have owners with higher quotas
    - Manipulating many small files is more problematic (use archives)
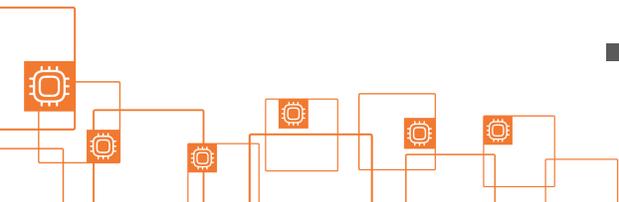
The concept of multiple home directories and disk storages

👆 *Geographically separated servers mean better distribution of users and load, which makes the servers more stable and provides an alternative during an outage*

👆 *All frontend servers can also be reached in the domain 'metacentrum.cz'*

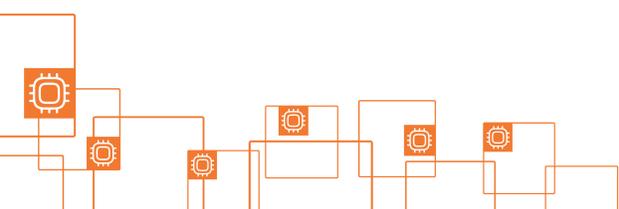| Frontend address	Aliased as	Native home	OS	Physically located in	Note
charon.nti.tul.cz	charon.metacentrum.cz	/storage/liberec3-tul	Debian 12	Liberec	
elmo.elixir-czech.cz	elmo.metacentrum.cz	/storage/praha5-elixir	Debian 12	Praha	Elixir users
nympha.meta.zcu.cz	nympha.metacentrum.cz, nympha.zcu.cz, minos.zcu.cz, minos.meta.zcu.cz, alfrid.meta.zcu.cz	/storage/plzen1	Debian 12	Plzen	
metafzu.fzu.cz	metafzu.metacentrum.cz	/storage/praha1	Debian 12	Praha	dedicated for FZU users
oven.metacentrum.cz		/storage/brno2	Debian 12	Brno	oven node only
perian.grid.cesnet.cz	perian.metacentrum.cz, onyx.metacentrum.cz	/storage/brno2	Debian 12	Brno	
skirit.ics.muni.cz	skirit.metacentrum.cz	/storage/brno2	Debian 12	Brno	
tarkil.grid.cesnet.cz	tarkil.metacentrum.cz	/storage/praha1	Debian 12	Praha	
tilia.ibot.cas.cz	tilia.metacentrum.cz	/storage/pruhonice1-ibot	Debian 12	Pruhonice	
zenith.cerit-sc.cz	zenith.metacentrum.cz	/storage/brno12-cerit	Debian 12	Brno	

The concept of multiple home directories and disk storages

☝️ *Geographically separated servers mean better distribution of users and load, which makes the servers more stable and provides an alternative during an outage*

☝️ *All frontend servers can also be reached in the domain 'metacentrum.cz'*

☝️ *Although disk storage servers cannot be accessed interactively, it is possible to send specific commands to them*

Frontend address	Aliased as	Native home	OS	Physically located in	Note

Server	Directory	Backup Class	Note
storage-brno2.metacentrum.cz	/storage/brno2/	2	
storage-brno11-elixir.metacentrum.cz	/storage/brno11-elixir/	2	dedicated to ELIXIR-CZ
storage-brno12-cerit.metacentrum.cz	/storage/brno12-cerit/	2	
storage-plzen1.metacentrum.cz	/storage/plzen1/	2	
storage-plzen4-ntis.metacentrum.cz	/storage/plzen4-ntis/	3	dedicated to iti/kky groups
storage-praha2-natur.metacentrum.cz	/storage/praha2-natur/	0	
storage-praha6-fzu.metacentrum.cz	/storage/praha6-fzu/	0	
storage-praha5-elixir.metacentrum.cz	/storage/praha5-elixir/	3	
storage-budejovice1.metacentrum.cz	/storage/budejovice1/	3	
storage-liberec3-tul.metacentrum.cz	/storage/liberec3-tul/	0	
storage-pruhonice1-ibot.metacentrum.cz	/storage/pruhonice1-ibot/	3	
storage-vestec1-elixir.metacentrum.cz	/storage/vestec1-elixir/	2	also /storage/praha1/

| zenith.cerit-sc.cz | zenith.metacentrum.cz | /storage/brno12-cerit | Debian 12 | Brno | |
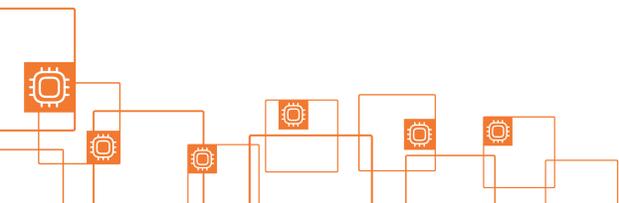
The concept of multiple home directories and disk storages

- Comes from the nature of the grid (distributed) infrastructure

- Generally, with a group of compute clusters in each geographical location there is also a disk storage

- Compute nodes also have a mounted some native home directory

- Compute jobs can run on clusters with a different home directory

- Users cannot rely on the same data being on all nodes
  - Because of different home directories…
  - But everything is accessible, you just need to specify correct path

https://docs.metacentrum.cz/en/docs/computing/infrastructure/frontend-storage
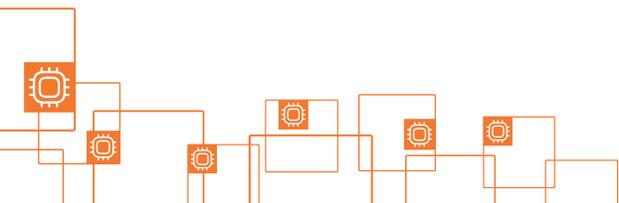
The concept of multiple home directories and disk storages

```
[(BOOKWORM)vorel@skirit:~$ ls
CASTEP-25.12  META_SUPPORT  ondemand  OpenMolcas  pcangsd  Smilei  test_crys  test_CZ_shift  test_phyluce  test_unic
[(BOOKWORM)vorel@skirit:~$ pwd
/storage/brno2/home/vorel
[(BOOKWORM)vorel@skirit:~$ ssh adan1
Linux adan1.grid.cesnet.cz 6.1.0-38-amd64 #1 SMP PREEMPT_DYNAMIC Debian 6.1.147-1+zs2 (2025-08-22) x86_64

5 updates could not be installed automatically. For more details,
see /var/log/unattended-upgrades/unattended-upgrades.log

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Tue Aug 12 12:57:42 2025 from nympha.meta.zcu.cz
[(BOOKWORM)vorel@adan1:~$ pwd
/storage/praha1/home/vorel
[(BOOKWORM)vorel@adan1:~$ ls
geometry.in  inp.xyz  ondemand  xyz_to_aims.py
(BOOKWORM)vorel@adan1:~$
```

https://docs.metacentrum.cz/en/docs/computing/infrastructure/frontend-storage
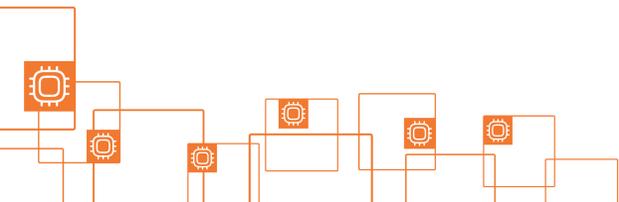
The concept of multiple home directories and disk storages

```
name@my_pc:~$ ssh vorel@perian.metacentrum.cz

vorel@perian.metacentrum.cz's password:          ⟵  Type a password

vorel@perian:~$ pwd                              ⟵  Where am I?

/storage/brno2/home/vorel

vorel@perian:~$ cd /storage/plzen1/home/vorel

vorel@perian:~$ pwd

/storage/plzen1/home/vorel                       ⟵  Hmm, I forgot that my
                                                    data is on different
                                                    storage...

name@my_pc:~$ ssh vorel@minos.metacentrum.cz

vorel@minos.metacentrum.cz's password:           ⟵  Direct access to the same storage
                                                    through different frontend
vorel@minos:~$ pwd

/storage/plzen1/home/vorel
```

PC / Laptop

Lab Servers

Frontend server

Compute Nodes Type 1

Normal nodes, bulk of most clusters, appropriate for most jobs.

Storage 2

Storage 1

Compute Nodes Type 2

Specialized nodes with, e.g. Large Memory, GPU, MIC, etc.
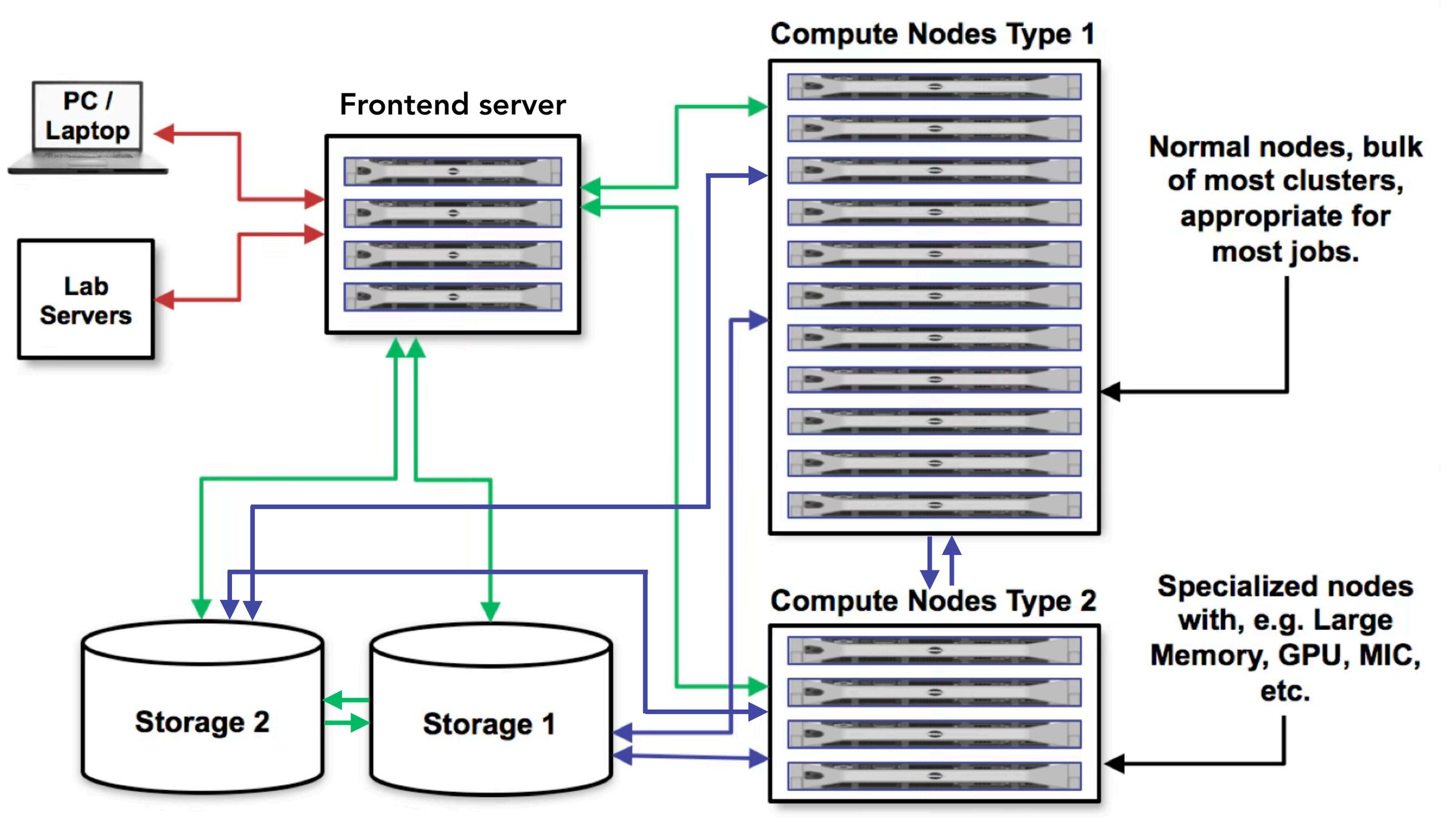
By default, data in the scratch directory cannot be read by other users (the main directory has 700 permissions).

https://docs.metacentrum.cz/en/docs/computing/concepts#scratch-directory

- A different type of storage (than the classic home directories)
- An internal part of each compute node
- ONLY for data that is used in a running job
  - Old, unused data can be deleted at any time without warning
- Each job automatically defines a *$SCRATCHDIR* variable
- Direct access to data for CPU/GPU (=faster calculation)
- Every job that reads input data more than once should scratch
  - Reduces network traffic
  - Does not overload the disk storage
  - The task is faster and more robust (e.g. network outages)

Scratch storage

- **Different types of scratch can be reserved**
  - scratch_local
    - On every node, mostly SSH, but can also be HDD, TBs
    - Located in */scratch/USERNAME/job_JOBID*
  - scratch_ssd
    - Explicitly requires SSD, not on all nodes, TBs
    - Ideal for intensive IO calculations
    - Located in */scratch.ssd/USERNAME/job_JOBID*
  - scratch_shm
    - Scratch in RAM, on all nodes, the fastest solution, GBs/TBs
    - The RAM reservation (PBS 'mem' parameter) is the sum of data volume (input and output) and memory requirements of the calculation
    - Located in */dev/shm/scratch.shm/USERNAME/job_JOBID*
    - Boolean (true/false), reservation via the qsub parameter 'mem'

> *:scratch_local=100gb*
> *:scratch_ssd=100gb*
>
> *:mem=50gb:scratch_shm=true*

- scratch_shared

  :scratch_shared=100tb

  - Scratch shared by all the cluster's nodes, TBs, PBb
  - Currently only available on Bee (BeeGFS) and Galdor GPU clusters
  - No auto-delete policy
  - Different directory naming policy in /scratch.shared/USERNAME/some_folder_name, it must not start with 'job_'.
  - Suitable for tasks that process one large dataset/database
  - Initialisation job copying data, other purely computational

```
qsub -l select=1:ncpus=1:mem=4gb:scratch_local=10gb -l walltime=1:00:00
cp my_input_data.txt $SCRATCHDIR
cd $SCRATCHDIR
…
cp $SCRATCHDIR/my_results.txt /storage/city/home/user_name/
```

- Do not copy (move) large amounts of data (up to 10 GB) via the frontend servers

- Copy (move) the data directly onto the disk storage server

- It's faster, more stable, does not overload network and servers

- SFTP clients are available for Windows users (WinSCP, CyberDuck, FileZilla, etc.)

https://docs.metacentrum.cz/en/docs/data/large-data

Frontend server in Brno

Local PC in Prague

Disk storage in Pilsen
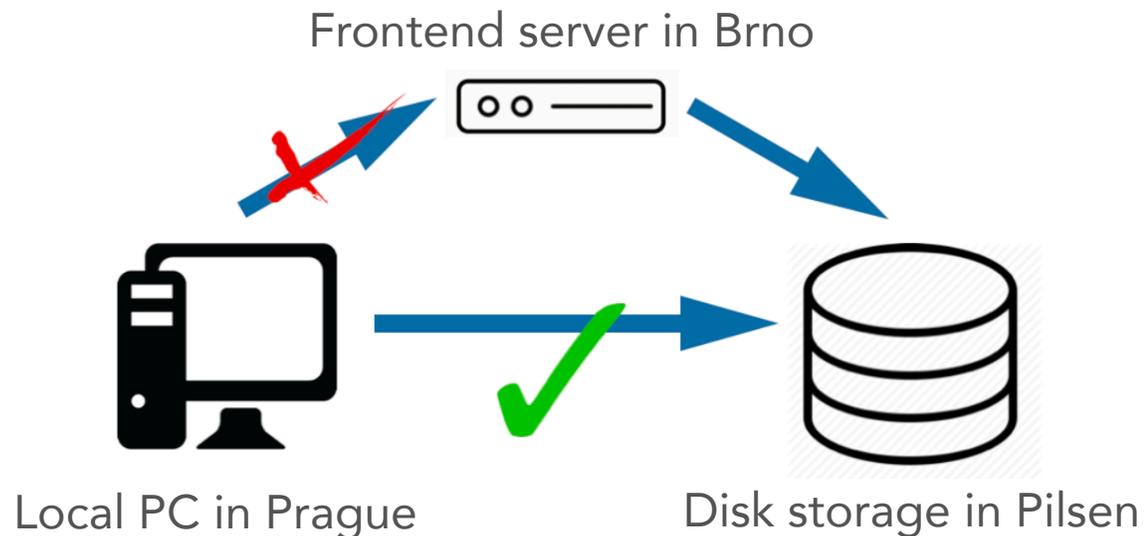
Users cannot browse disk storage interactively after logging in.
Only individual commands can be sent on them
$ ssh storage-brno2.metacentrum.cz 'ls'

- Do not cop... frontend se...
- Copy (move...
- It's faster, m...
- SFTP clients... FileZilla, etc...

https://docs.metacentrum.cz/en/...

Server	Directory	Backup Class	Note
storage-brno2.metacentrum.cz	/storage/brno2/	2	
storage-brno11-elixir.metacentrum.cz	/storage/brno11-elixir/	2	dedicated to ELIXIR-CZ
storage-brno12-cerit.metacentrum.cz	/storage/brno12-cerit/	2	
storage-plzen1.metacentrum.cz	/storage/plzen1/	2	
storage-plzen4-ntis.metacentrum.cz	/storage/plzen4-ntis/	3	dedicated to iti/kky groups
storage-praha2-natur.metacentrum.cz	/storage/praha2-natur/	0	
storage-praha6-fzu.metacentrum.cz	/storage/praha6-fzu/	0	
storage-praha5-elixir.metacentrum.cz	/storage/praha5-elixir/	3	
storage-budejovice1.metacentrum.cz	/storage/budejovice1/	3	
storage-liberec3-tul.metacentrum.cz	/storage/liberec3-tul/	0	
storage-pruhonice1-ibot.metacentrum.cz	/storage/pruhonice1-ibot/	3	
storage-vestec1-elixir.metacentrum.cz	/storage/vestec1-elixir/	2	also /storage/praha1/

Copying data

- ## localUSER@localPC$ scp data.gz username@skirit.metacentrum.cz:~

  - Copy the data from the local PC to the users' home on the frontend skirit (storage brno2) from the local PC. Small data sets

- ## localUSER@localPC$ scp data.gz username@storage-brno2.metacentrum.cz:~

  - Copy the data to the users' home on the brno2 storage server from the local PC. Suitable for large data sets

- ## $ mv $SCRATCHDIR/results.txt /storage/brno2/home/username/

  - Move the data from the scratch directory to the users' home on the brno2 storage (via the mounted path). Small data sets

- ## $ scp -r $SCRATCHDIR/results storage-brno2.metacentrum.cz:~

  - Copy folder recursively from the scratch directory to the users' home on the brno2 storage server. Large data sets

- ## $ scp -r storage-brno2.metacentrum.cz:~/input_data $SCRATCHDIR

  - Copy the data (folder, recursively) from the users' home on the brno2 storage server to the scratch directory. Large data sets

- ## $ scp storage-brno2.metacentrum.cz:~/text.txt storage-plzen1.metacentrum.cz:~

  - Copy the data from the users' home on the brno2 storage server to home on plzen1 storage server. Large data sets

Batch job script example

```bash
#!/bin/bash
#PBS -q default@pbs-m1.metacentrum.cz
#PBS -l walltime=24:0:0
#PBS -l select=1:ncpus=8:mem=100gb:scratch_ssd=50gb:mpiprocs=1:ompthreads=8
#PBS -N my_job_name
#PBS -M my_email@xyz
#PBS -m e

ulimit -s unlimited
trap "clean_scratch" TERM EXIT
export TMPDIR=$SCRATCHDIR

# test if a scratch directory exists
# variable SCRATCHDIR is set automatically
test -n "$SCRATCHDIR" || { echo >&2 "Variable SCRATCHDIR is not set!"; exit 1; }

# set a DATADIR variable
DATADIR="/storage/brno12-cerit/home/vorel/data/"

# copy input file "data.fa" to the scratch directory
cp $DATADIR/data.fa $SCRATCHDIR || { echo >&2 "Error while copying input file(s)!"; exit

# move into the scratch directory
cd $SCRATCHDIR

# load a module for your application
module add blast-plus/blast-plus-2.12.0-gcc-8.3.0-ohlv7t4

# run the calculation
# do not forgeto to use reserved CPUs by '-num_threads' flag
# variable PBS_NCPUS is a number of CPUs requested for the entire job
blastp -query data.fa <other_parameters> -num_threads $PBS_NCPUS -out results.txt

#copy results
cp results.txt $DATADIR || export CLEAN_SCRATCH=false
```
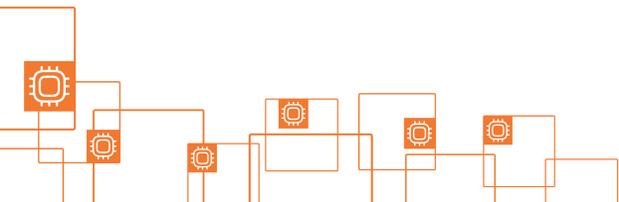
- Define HW resources (-l), queue (-q), and walltime (-l), set the job name (-N) and email alert (-m)
- You can define as many variables as you want
- Available modules can be listed by command module ava *key_word* on any frontend
- The scratch directory will be cleaned automatically

https://docs.metacentrum.cz/en/docs/computing/run-basic-job#batch-job

- The opposite of batch jobs (waiting for the user's input...)

- Best choice for test calculations (which should not be run directly on frontends)

- An interactive job is requested by the qsub command with the -I (uppercase "i") option

https://docs.metacentrum.cz/en/docs/computing/run-basic-job#interactive-job

```
(BUSTER)vorel@skirit:~$ qsub -I -l select=1:ncpus=4:mem=50gb:scratch_local=30gb -l walltime=1:00:00
qsub: waiting for job 11405230.meta-pbs.metacentrum.cz to start
qsub: job 11405230.meta-pbs.metacentrum.cz ready

vorel@zenon31:~$ cd $SCRATCHDIR
vorel@zenon31:/scratch.ssd/vorel/job_11405230.meta-pbs.metacentrum.cz$ module add orca/orca-5.0.1-intel-19.0.4-bnofsgq
vorel@zenon31:/scratch.ssd/vorel/job_11405230.meta-pbs.metacentrum.cz$ module list
Currently Loaded Modulefiles:
  1) metabase                        2) openmpi/openmpi-4.0.4-intel-19.0.4-gpu-xri6uan    3) orca/orca-5.0.1-intel-19.0.4-bnofsgq
vorel@zenon31:/scratch.ssd/vorel/job_11405230.meta-pbs.metacentrum.cz$
vorel@zenon31:/scratch.ssd/vorel/job_11405230.meta-pbs.metacentrum.cz$ ...time for coffee...
-bash: ...time: command not found
vorel@zenon31:/scratch.ssd/vorel/job_11405230.meta-pbs.metacentrum.cz$ orca < input > output
```

- **GPU acceleration for significant speedup of calculations**

- ~140 nodes, ~500 GPU cards (GTX 1080Ti - H100 100GB)

- Requires application with GPU support

- Maximum eight GPU cards on a single node, typically two or four

- Special DGX cluster with eight Nvidia H100 80GB GPU cards

  - Grant competition

- Specific parameters

  - *gpu_mem* (minimum amount of memory on the card)

  - *gpu_cap* (a minimal version of GPU architecture)

  - *cuda_version* (version of CUDA installed on the node)

https://docs.metacentrum.cz/en/docs/computing/gpu-comput/gpu-job
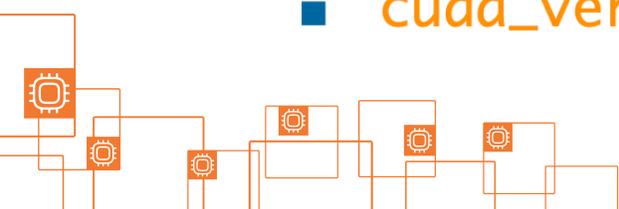
- **GP**
- ~14
- Red
- Ma
- Spe
  - ▪
- Spe
  - ▪
  - ▪
  - ▪

Cluster	Nodes	GPUs per node	Compute capability	Mem [GB]	CuDNN
alfrid.meta.czu.cz	afrid[1-4].meta.czu.cz	2x L40	8.9	46	YES
alfridII.meta.czu.cz	afrid[6-9].meta.czu.cz	4x L40s	8.9	48	YES
bee.cerit-sc.cz	bee[1-10].cerit-sc.cz	2x H100 NVL	9.0	96	YES
capy.cerit-sc.cz	capy.cerit-sc.cz	8x H100	9.0	82	YES
cha.natur.cuni.cz	cha.natur.cuni.cz	8x GeForce RTX 2080 Ti	7.5	12	YES
elbi1.hw.elixir-czech.cz	elbi1[1].hw.elixir-czech.cz	2x NVIDIA A100	8.0	40	YES
fau.natur.cuni.cz	fau[1-3].natur.cuni.cz	8x Quadro RTX 5000	7.5	16	YES
fer.natur.cuni.cz	fer[1-3].natur.cuni.cz	8x RTX A4000	8.6	16	YES
fobos.metacentrum.cz	fobos[1-20].metacentrum.cz	4x L40s	8.9	46	YES
galdor.metacentrum.cz	galdor[1-20].metacentrum.cz	4x A40	8.6	46	YES
glados.cerit-sc.cz	glados[1-2].cerit-sc.cz	2x GeForce RTX 2080	7.5	8	YES
grimbold.metacentrum.cz	grimbold.metacentrum.cz	2x Tesla P100	6.0	12	YES
konos.fav.zcu.cz	konos[1-8].fav.zcu.cz	4x GeForce GTX 1080 Ti	6.1	12	YES
luna2022.fzu.cz	luna[201-206].fzu.cz	1x A40	8.6	46	YES
zia.cerit-sc.cz	zia[1-5].cerit-sc.cz	4x A100	8.0	40	YES

https://docs.metacentrum.cz/en/docs/computing/gpu-comput/gpu-job

...leration

Cluster	Nodes	GPUs per node	Compute capability	Mem [GB]	CuDNN
alfrid.meta.czu.cz	afrid[1-4].meta.czu.cz	2x L40	8.9	46	YES
alfridII.meta.czu.cz	afrid[6-9].meta.czu.cz	4x L40s	8.9	48	YES

```bash
#!/bin/bash
#PBS -N run1_dorado_mod
#PBS -l select=1:ncpus=4:ngpus=1:mem=30gb:scratch_ssd=250gb:gpu_mem=20gb:gpu_cap=compute_80
#PBS -l walltime=8:0:0

cd $SCRATCHDIR

scp storage-brno12-cerit.metacentrum.cz:~/Metylace_hemonch/RUN_1_IRE/02_run1_IRE_reads.pod5 $SCRATCHDIR
scp -r storage-brno12-cerit.metacentrum.cz:~/Metylace_hemonch/SOFT/dorado_0.9.1/models/dna_r9.4.1_e8_sup@v3.3* $SCRATCHDIR
cp /storage/brno12-cerit/home/vorel/Metylace_hemonch/Haemonch_refer/haemonchus_contortus.PRJEB506.WBPS19.genomic.fa $SCRATCHDIR

export PATH=/storage/brno12-cerit/home/vorel/Metylace_hemonch/SOFT/dorado_0.9.1/bin/:$PATH
export LD_LIBRARY_PATH=/storage/brno12-cerit/home/vorel/Metylace_hemonch/SOFT/dorado_0.9.1/lin/:$LD_LIBRARY_PATH
module add minimap2/2.22

dorado basecaller dna_r9.4.1_e8_sup@v3.3 ./02_run1_IRE_reads.pod5 -v -x cuda:all --min-qscore 5 --trim all \
--reference haemonchus_contortus.PRJEB506.WBPS19.genomic.fa --modified-bases 5mCG_5hmCG > 03_dorado_run1_IRE.bam
```

konos.fav.zcu.cz	konos[1-8].fav.zcu.cz	4x GeForce GTX 1080 Ti	6.1	12	YES
luna2022.fzu.cz	luna[201-206].fzu.cz	1x A40	8.6	46	YES
zia.cerit-sc.cz	zia[1-5].cerit-sc.cz	4x A100	8.0	40	YES

https://docs.metacentrum.cz/en/docs/computing/gpu-comput/gpu-job

APPTAINER

- Apptainer (formerly Singularity) is an alternative to Docker, primarily used for HPC with non-root access
  - Apptainer can work with Docker images and offers GPU and MPI support
- MetaCentrum offers some pre-built (ready-to-use) Singularity images. For example, NGC (NVIDIA GPU Cloud, with Kaldi, PyTorch and TensorFlow), Trinity (an RNA-seq assembler) and OpenFOAM (a numerical solver)
  - NGC images are highly optimised for GPU-accelerated calculations
- Users can also build their own SIFs

https://docs.metacentrum.cz/en/docs/software/containers

- Prevents conflicts

☝️ *The most straightforward way to transfer highly optimised environments, complete with all dependencies and tuned libraries.*

- **There are so many different ways**
  - Binary distributions (precompiled form, download them and use them)
  - R, Python, Rust, Perl, Julia, Debian, etc. libraries
  - Package managers like Mamba (recommended, fully automated, easy to use)
  - Docker (Kubernetes, cloud) and Singularity/Apptainer images (grid, conversion Docker to Singularity)
  - Snapshots of entire VMs (cloud, OnDemand)
  - Local compilation (GCC, Intel compilers, BLAS/LAPACK math libraries, CUDA support and so on…)

☝️ *As users do not have root access, installations must be placed in their home directories or in the scratch directory.*
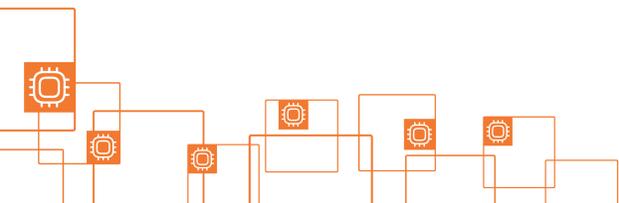
- **`go_to_scratch`** utility

  - Realtime monitoring of running jobs; redirection to computational node

    `go_to_scratch job_ID@PBS_server_full_name`

    https://docs.metacentrum.cz/en/docs/software/utilities#go-to-scratch

- **`qextend`** utility

  - Walltime, which could be reserved by PBS, is limited to 720 hours

  - Users are allowed to prolong their jobs in a limited number of cases

    `qextend job_ID@PBS_server_full_name additional_walltime_hh:mm:ss`

    https://docs.metacentrum.cz/en/docs/computing/jobs/extend-walltime

- **`pbs-get-job-history`** utility

  - Complex information about current or historical jobs

    `pbs-get-job-history job_ID@PBS_server_full_name`

    https://docs.metacentrum.cz/en/docs/computing/jobs/finished-jobs#older
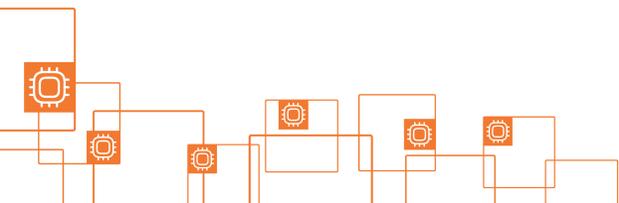
- HW resources (CPUs, GPUs, RAM, scratch, walltime,...) are reserved by PBS
- Detailed documentation: https://docs.metacentrum.cz/en/docs/computing/resources/qsub-compiler
- It requires some experience (keep some reserve)
- Helper tool for *qsub* command assembly

Go to metavo.metacentrum.cz - Current state - Personal view - **Qsub assembler**

(Stav zdrojů - Osobní pohled **Sestavovač qsub**)

Personal view

This page shows a personal view of the PBS system for the user **vorel**.

About MetaCentrum
Current affairs
Documentation and services
Getting an account
My account
Current state
Personal view
Qsub assembler
Physical machines

Jobs of user "vorel"

user	job count					CPU count				
	total	queued	running	completed	other	total	queued	running	completed	other
vorel	0	0	0	0	0	0	0	0	0	0

Links

- list of my jobs
- personal view of storages
- qsub assembler

Click on it...

cesnet
metacentrum

https://www.cesnet.cz/   https://www.metacentrum.cz/

https://www.e-infra.cz/   https://docs.metacentrum.cz/

- Is suitable for everyone and easy to use in the most cases

- Has user support   https://docs.metacentrum.cz/en/docs/support

- Has documentation   https://docs.metacentrum.cz/en/docs/welcome

- Has a blog with news   https://blog.e-infra.cz/

- Is a part of e-INFRA CZ   https://www.e-infra.cz/

- Is not just about CLI

- Please link your ORCID

  https://www.e-infra.cz/en/news/link-your-e-infra-cz-account-to-orcid-a-small-step-for-smarter-impact-reporting

- Requests to add acknowledgements in publications

  https://docs.metacentrum.cz/en/docs/access/terms#acknowledgements-and-publications
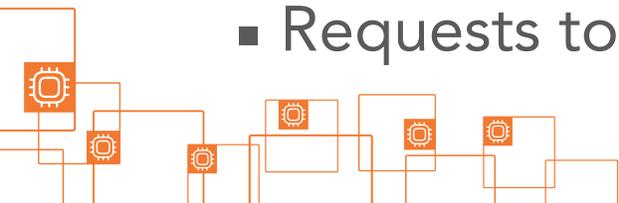
Thank you for your attention

https://github.com/CESNET/metacentrum-hands-on/blob/main/2026-02_NIMH.md

- Go to '*github.com*'

- In the search bar, type '*MetaCentrum Hands-on*'

- Select the first (and probably only) result

- Select today's hands-on session (*2026, National Institute of Mental Health, Prague, 9 February*)