



Joint Institute for Nuclear Research

IT Services of the Laboratory of Information Technologies for the Collaboration

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8th Collaboration Meeting of the BM@N Experiment at the NICA Facility

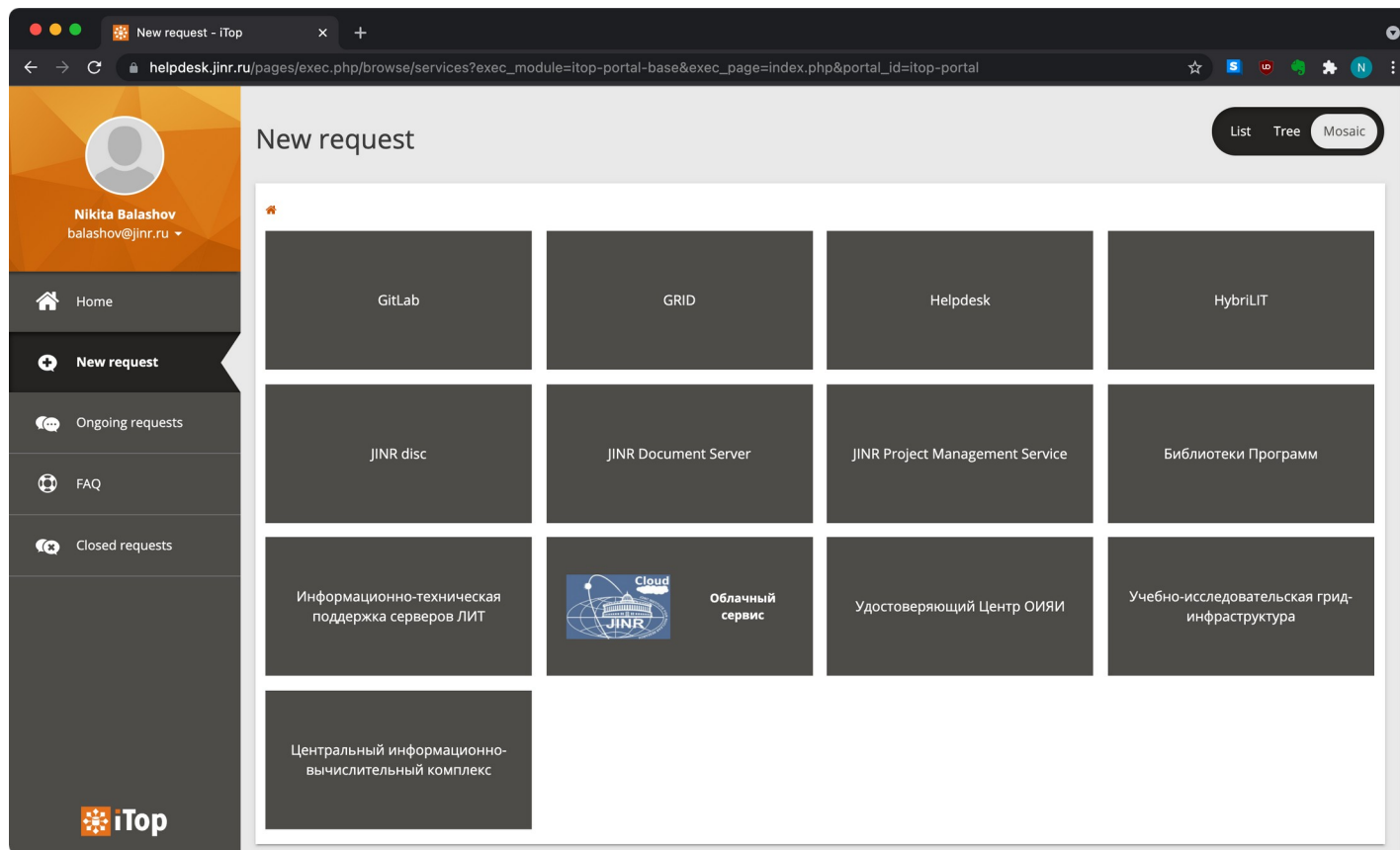
06 October 2021

Outline

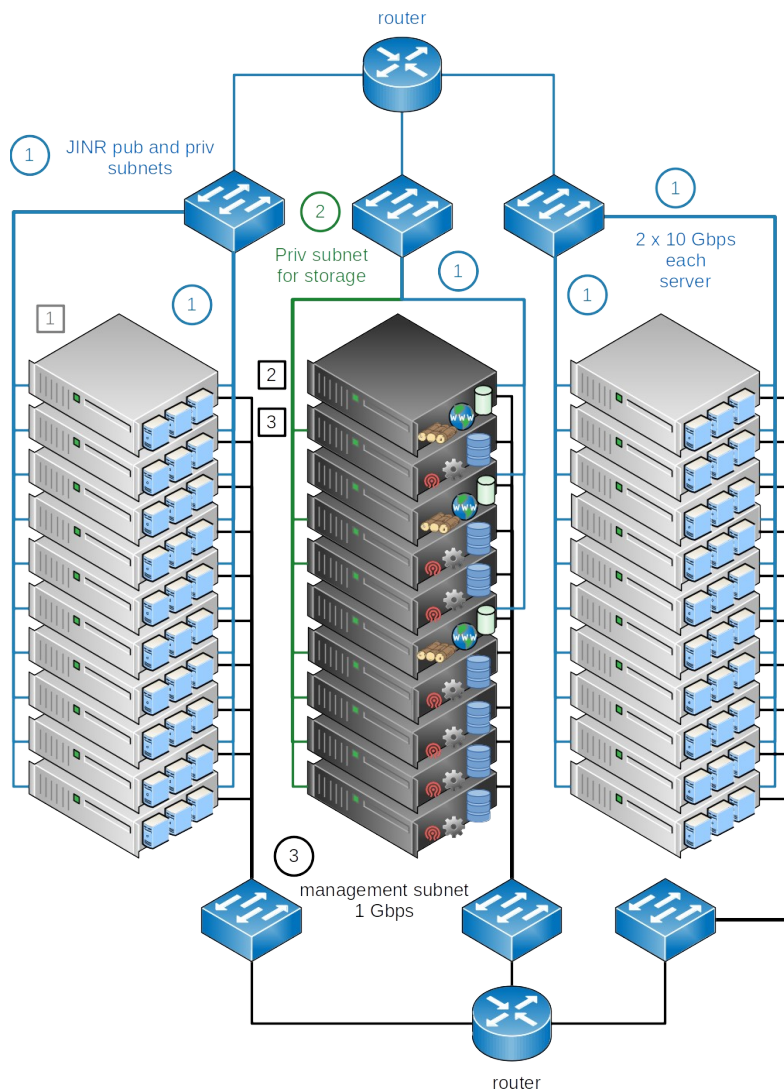
- Virtual infrastructure – **cloud.jinr.ru**
- Personal cloud storage – **disk.jinr.ru**
- Project management for software – **git.jinr.ru**
- Interactive computing – **jupyter.jinr.ru**
- User support – **helpdesk.jinr.ru**

HelpDesk

- We provide support for all of our services at helpdesk.jinr.ru



What is JINR Cloud



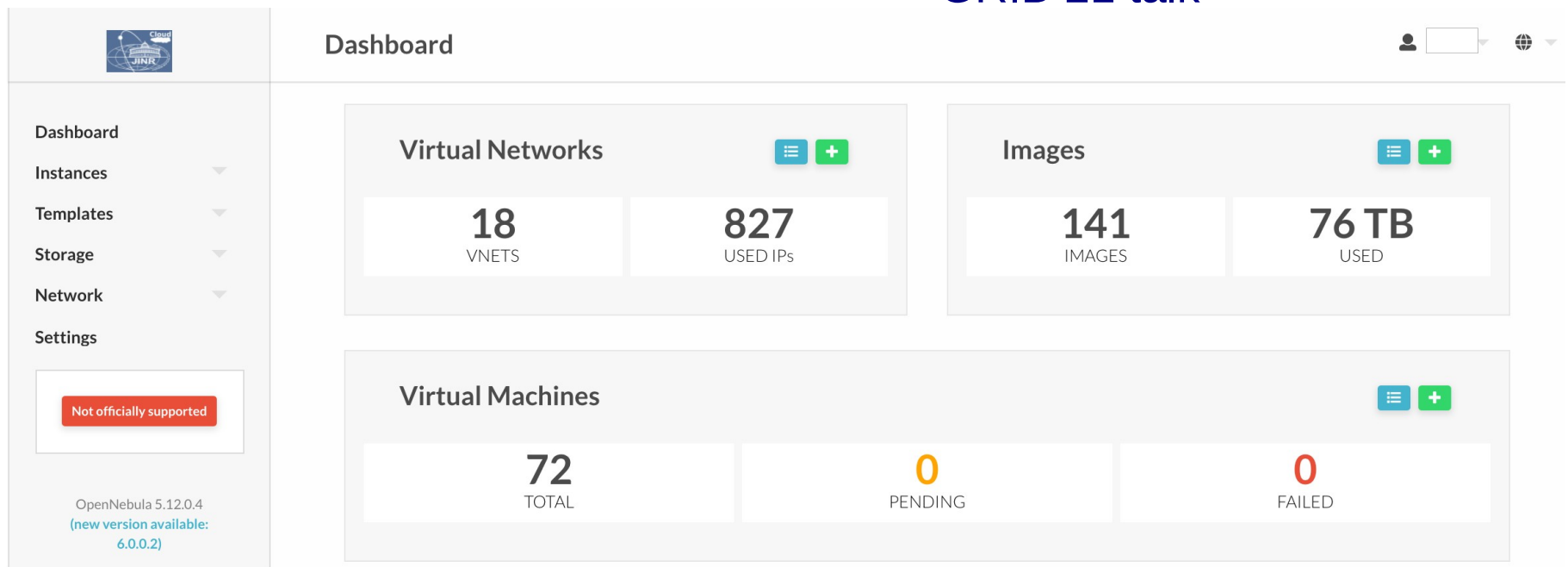
- Provides virtual machines on-demand
- Powered by OpenNebula platform
- Distributed storage based on Ceph for VM disks
- Public network interfaces for Internet access and private for JINR local network only
- 176 servers for VMs
 - Over 5000 non-HT CPU cores (20 to 32 cores per server)
 - Over 60 TB of RAM (5 to 16 GB per CPU core)
- 21 servers for Ceph storages with 3 PB of raw disk capacity (~1 PB with 3x replication)

JINR Cloud Use-cases

- Software developers
 - Develop, test and debug apps in various environments
- System administrators
 - Host IT systems and virtual computing environments
 - Test and study specifics of installation and operation of new apps or updates
- PC-style users
 - Use as personal remote machines for anything
- Automated systems
 - Provision VMs from external systems, e.g. worker-nodes form DIRAC or runners for CI jobs from GitLab

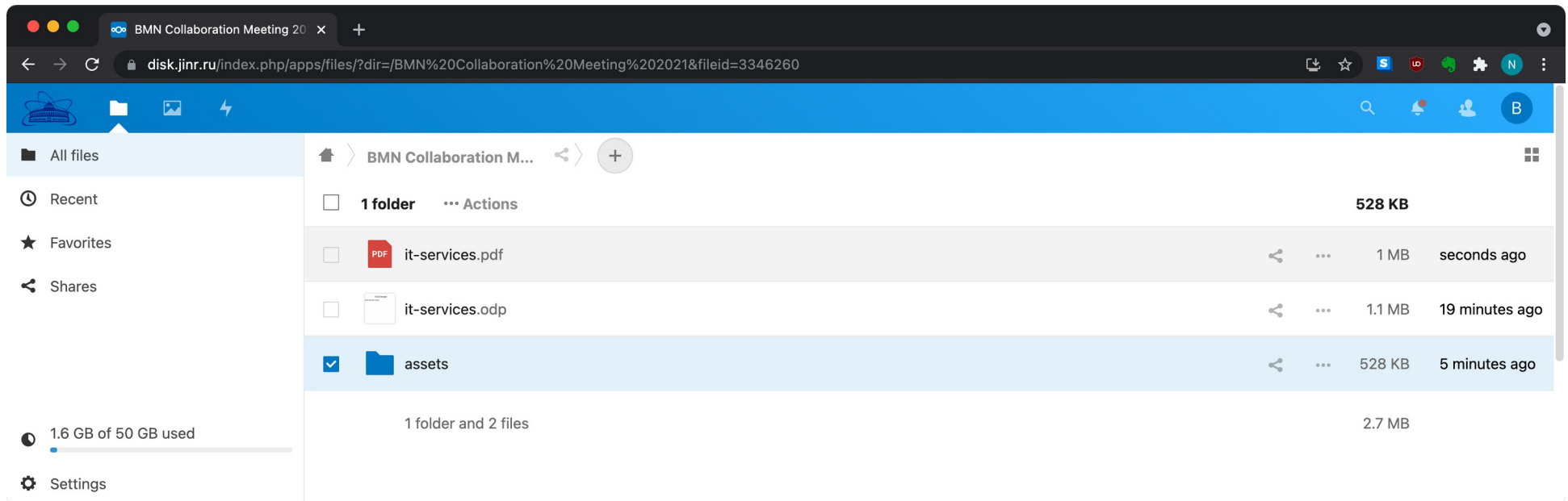
JINR Cloud Access

- Web-interface is at cloud.jinr.ru
- CLI over SSH is available on request
- Login with standard JINR computing account
- Support and information:
 - helpdesk.jinr.ru
 - cloud-info@jinr.ru
 - [MICC portal](#)
 - OpenNebula [documentation](#)
 - Internals insight in [GRID'21 talk](#)



Cloud Storage at disk.jinr.ru

- Dropbox alternative based on NextCloud
- Store and share any files
- Clients for Windows, Mac OS X, Linux, Android or iOS
- 50 GB of storage by default, but can be increased on request
- Collabora integration for online collaborative documents editing
- Support at helpdesk.jinr.ru



GitLab at git.jinr.ru

- Feature-rich DevOps platform:
 - Issue tracking
 - Git version control system
 - Code Review
 - CI/CD tools for automating operations
 - Registry for packages and containers
- More on GitLab and BMNRoot project in my previous talks:
 - [Incorporating Docker into BM@N software development process](#)
 - [Software development workflow in BM@N: tools and features](#)
- UPDATE on BMNROOT pipeline:
 - new job that builds user container with all the software preinstalled

JupyterHub

- Web-based interactive programming environment via Jupyter notebooks (similar to [CERN SWAN](#))
- Has support for a large [list of programming languages](#), including ROOT
- All of the major issues resolved:
 - JINR SSO account for web access
 - Kerberos tickets can be generated via command-line to get access to EOS
 - Shared home directories between user servers (CephFS)
 - Has CVMFS mounted
 - Has EOS mounted (do **kinit** manually to get authenticated)
 - A set of [Jupyter Docker Stacks](#) containers of three sizes available (**negotiable**)
- Power is limited to the size of a cloud server, but clusters can be potentially connected for distributed computing

JupyterHub Example

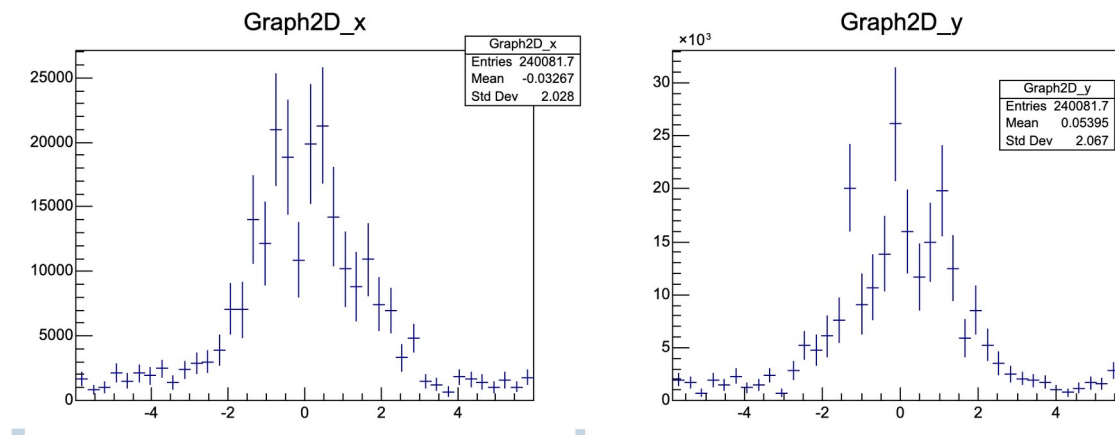
- Convenient interactive plotting and user tutorials are the two obvious use-cases
- Some examples of tutorials from CERN [available](#)
- Help from enthusiasts needed to verify bmnroot kernel and to work out more specific use-cases for the collaboration

Make the x and y projections.

```
[6]: gStyle->SetPalette(kBird);  
TCanvas c_p("ProjCan", "The Projections", 1000, 400);  
c_p.Divide(2,1);  
c_p.cd(1);  
dte.Project("x")->Draw();  
c_p.cd(2);  
dte.Project("y")->Draw();
```

Activate the JavaScript visualisation mode and display the projections in the notebook.

```
[7]: %jsroot on  
c_p.Draw();
```



Thanks!

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