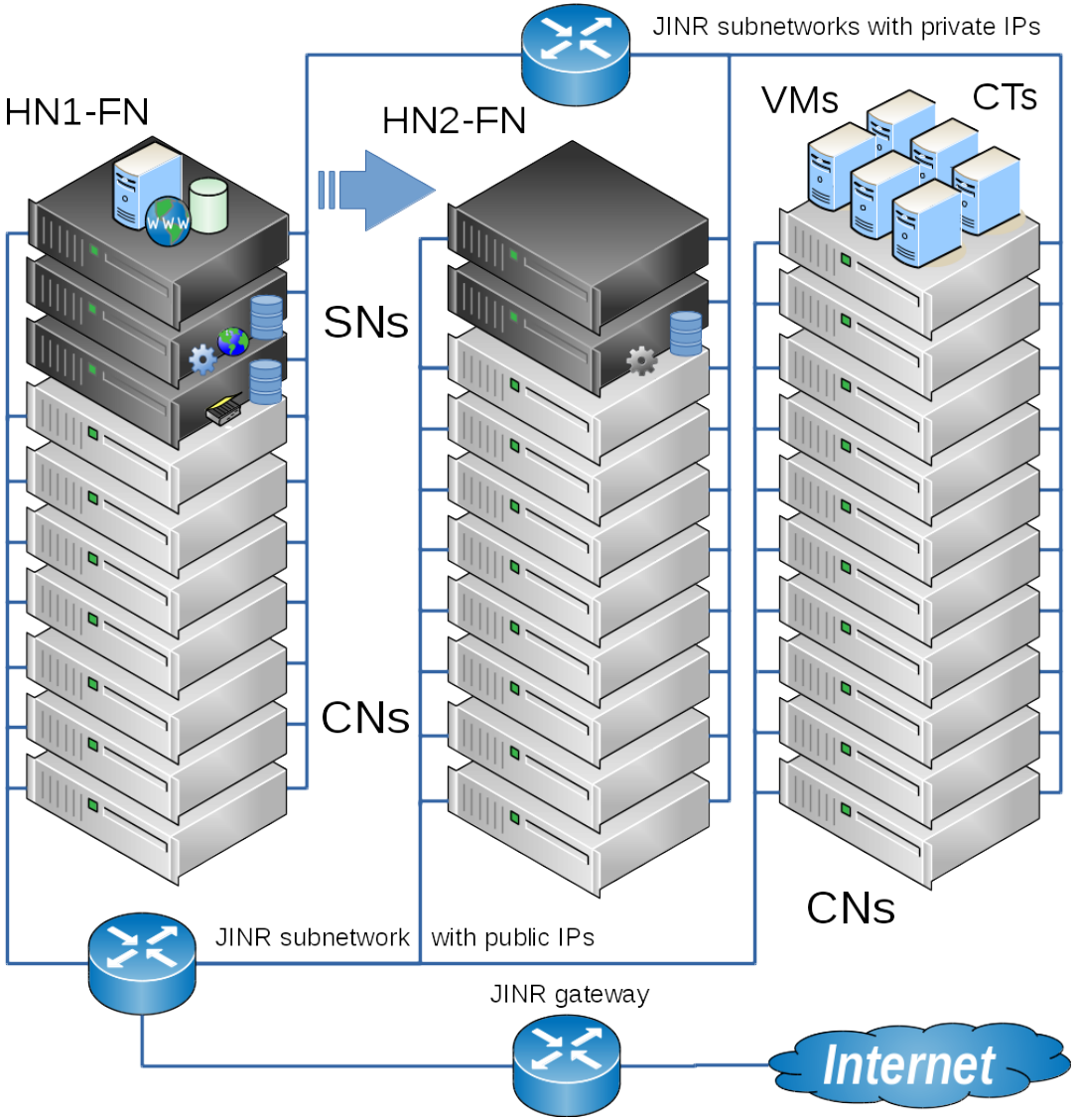
JINR Member States cloud infrastructure

N. A. Balashov[1], A. V. Baranov[1], N. A. Kutovskiy[1], Ye. Mazhitova[1], R. N. Semenov[1,2]

[1] Laboratory of Information Technologies, Joint Institute for Nuclear Research
[2] Plekhanov Russian University of Economics

The 26th International Symposium on Nuclear Electronics & Computing (NEC'2017)
25-29 September 2017, Budva, Becici, Montenegro

JINR cloud architecture: current

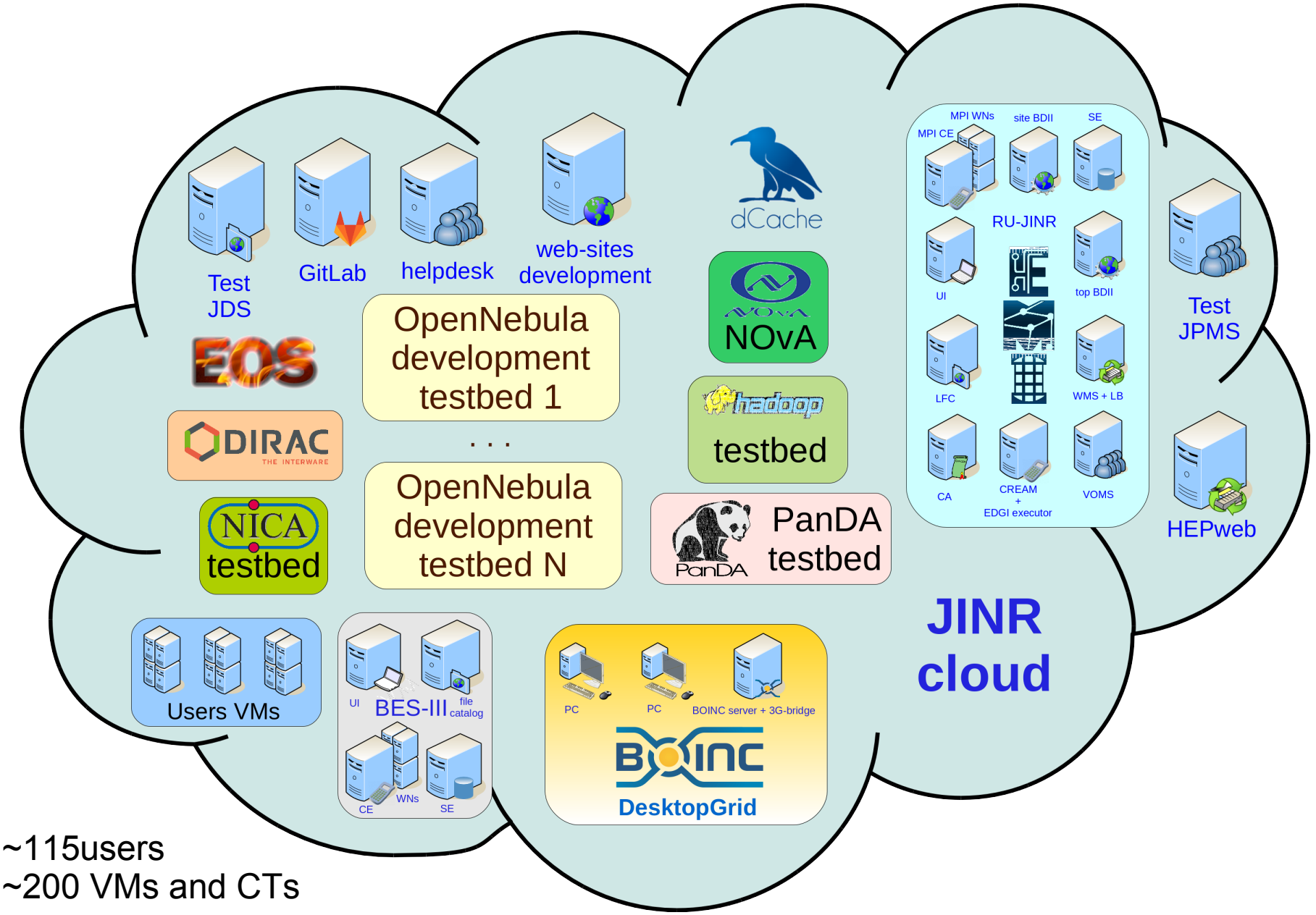


- OpenNebula (v4.12)
  - Core
  - Scheduler
  - MySQL Database
  - Interfaces (web-GUI, CLI, API)
  - OneGate
  - OneFlow
- High availibility&reliability
  - DRDB
  - Heartbeat
  - HN1-FN and HN2-FN are connected to two different UPS
  - DNFS based on LirazdFS

Our users

- Software developers
  - development, testing and debugging applications in different environments
- System administrators
  - Testing and evaluating new systems and updates
- General users
  - Mostly physicists
- Automated systems
  - Batch-systems and Grid schedulers: BES-III, NOvA

Usage

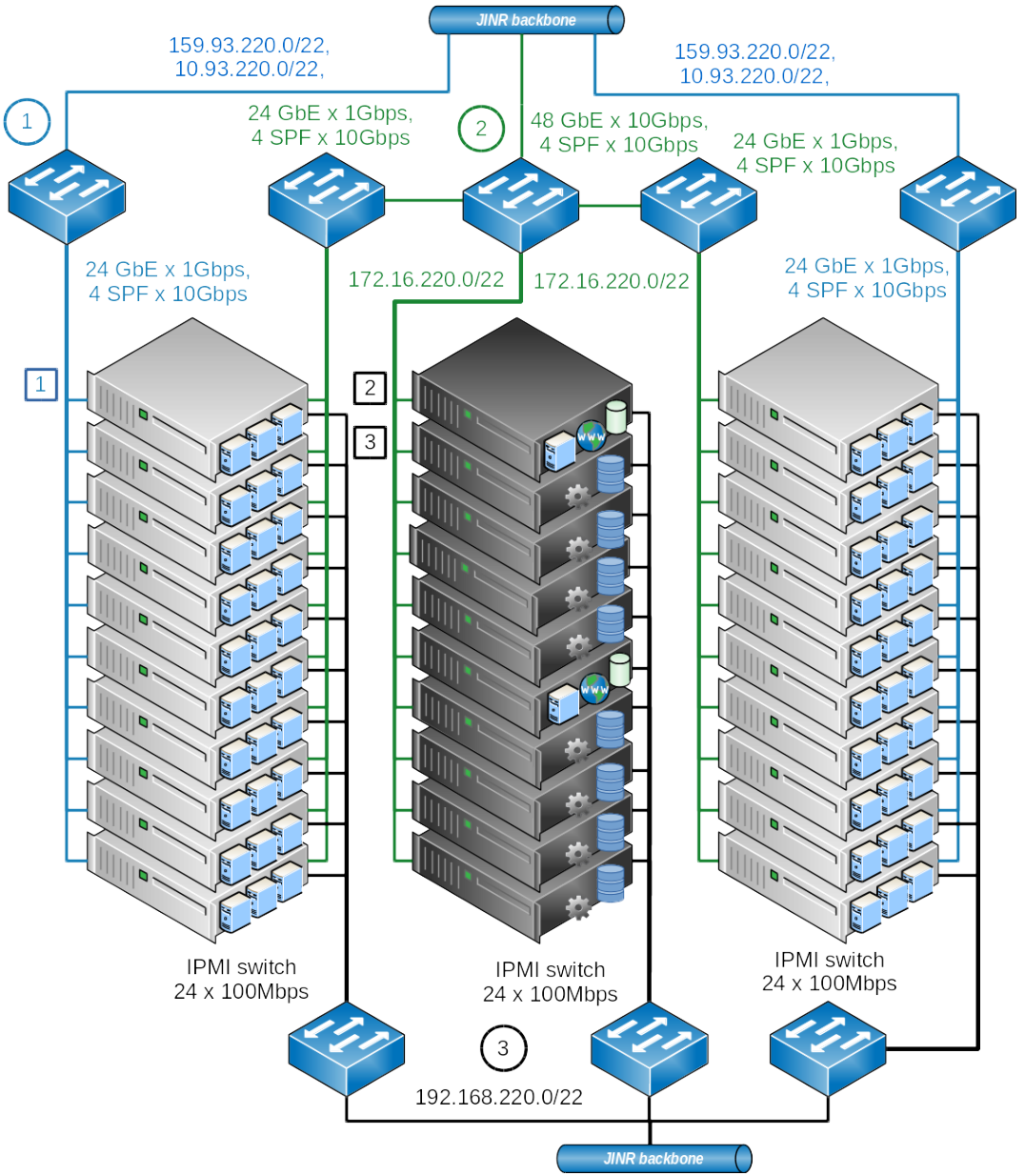


~115users
~200 VMs and CTs

User and admin trainings

Organization	Organization location	Training dates	Number of trainees	Training type
Bulgarian scientific organizations	BG	29.06-02.06.2017	3	use/admin
Nazarbayev University	Astana, KZ	29.06-02.06.2017	2	use/admin
Institute for Nuclear Problems of Belarusian State University	Minsk, BY	31.10-03.11.2016	3	use/admin
GRID'2016 school		05.07.16	5	use
Institute of Experimental and Applied Physics, Czech Technical University	Prague, CZ	07-10.07.15	2	use
Egyptian scientific organizations	EG	05-09.06.15	3	use
JINR	Dubna, RU	26-27.01.15	11	use

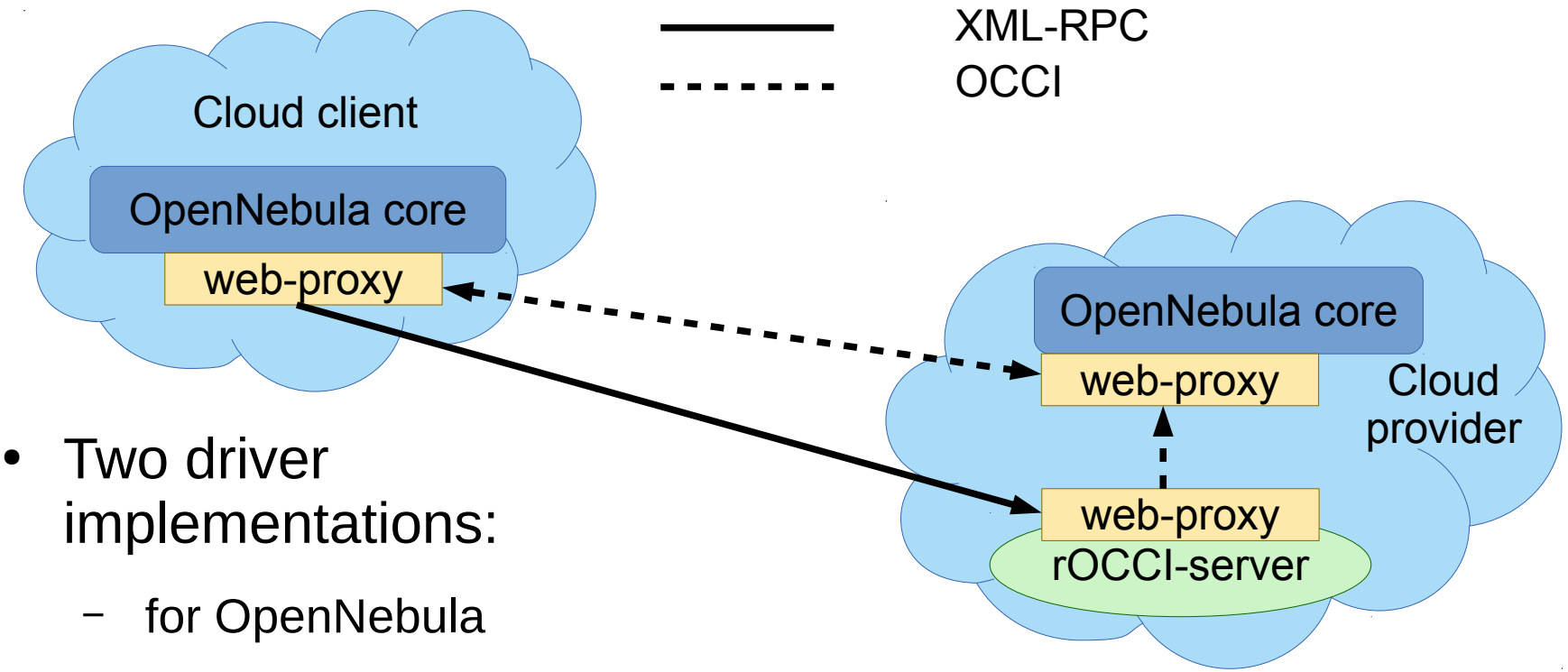
JINR cloud architecture: upcoming



- OpenNebula (v5.4)
  - Core
  - Scheduler
  - MySQL Database
  - Interfaces (web-GUI, CLI, API)
  - OneGate
  - OneFlow
- High availibility&reliability
  - Raft algorithm for fault-tolerance
  - Ceph for VMs/CTs disks

Clouds integration: cloud bursting driver

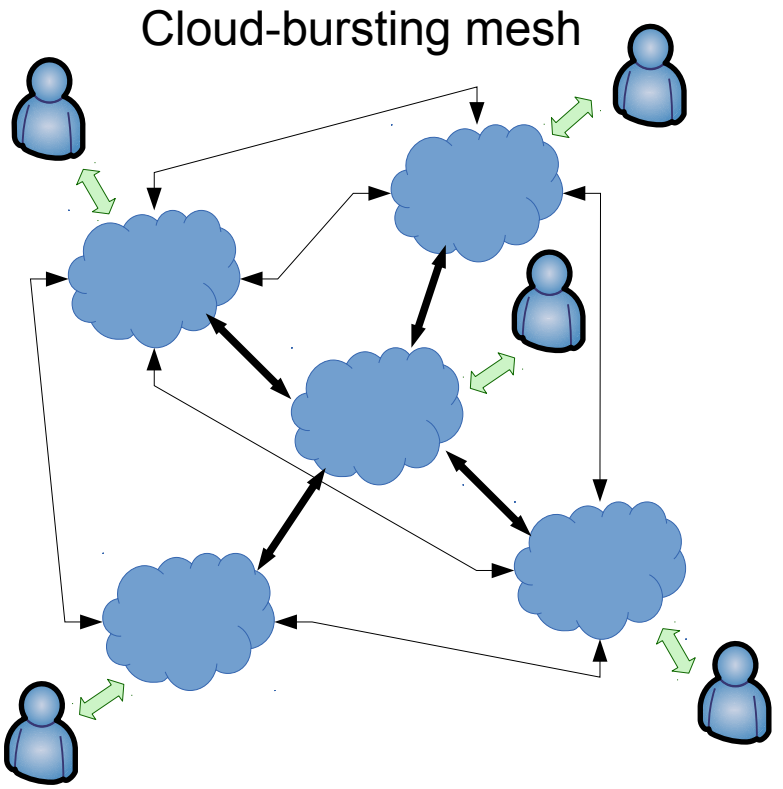
- To join resources for solving common scientific tasks as well as to distribute peak loads across resources of partner organizations
- Cloud bursting model (cloud-2-cloud = “peer”-2-“peer”)



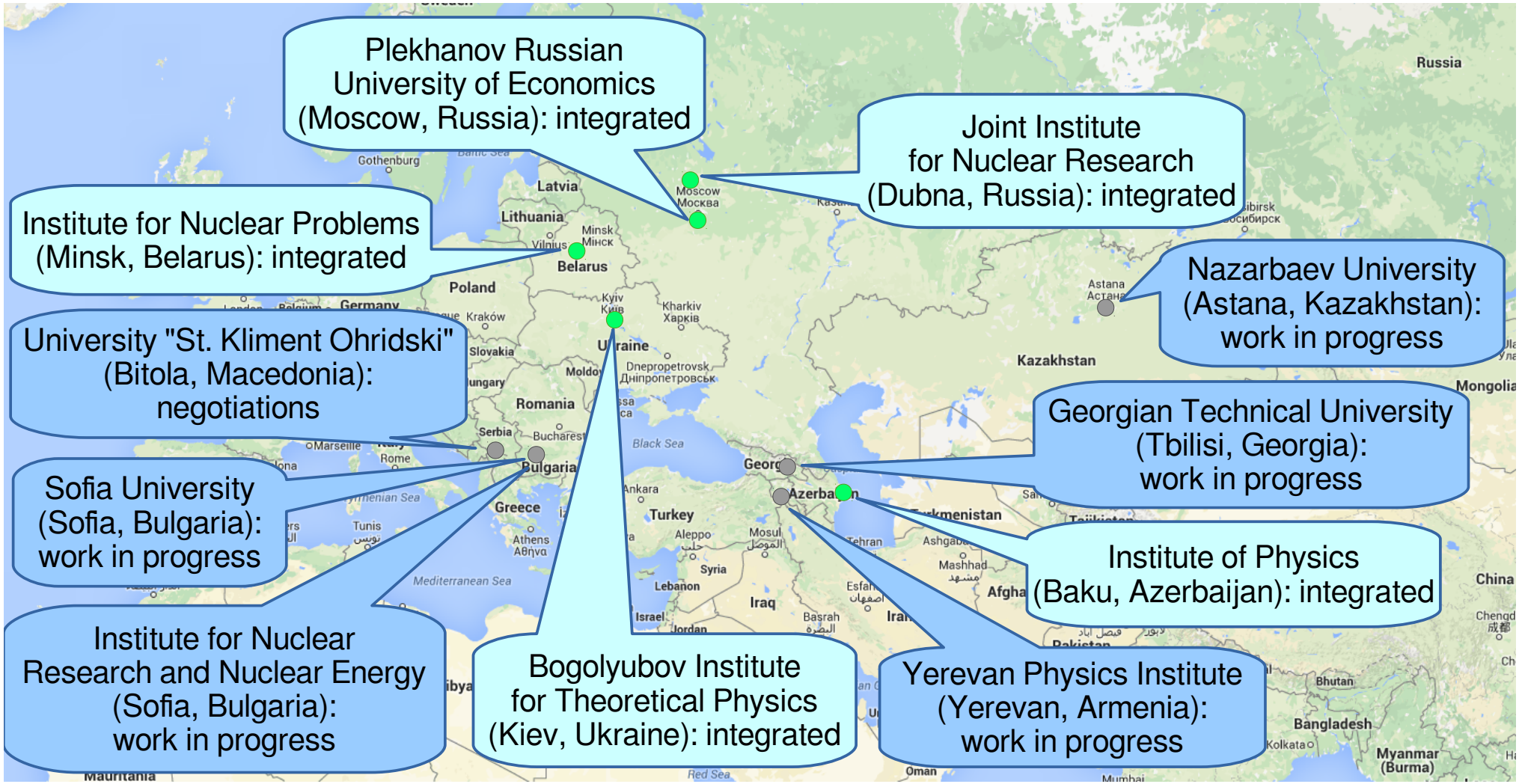
- Two driver implementations:
  - for OpenNebula
  - for OpenStack

CB clouds integration

- The most universal way of integrating clouds
- Any degree of complexity
- Cloud providers keep control of their own clouds



Clouds integration: partner organizations

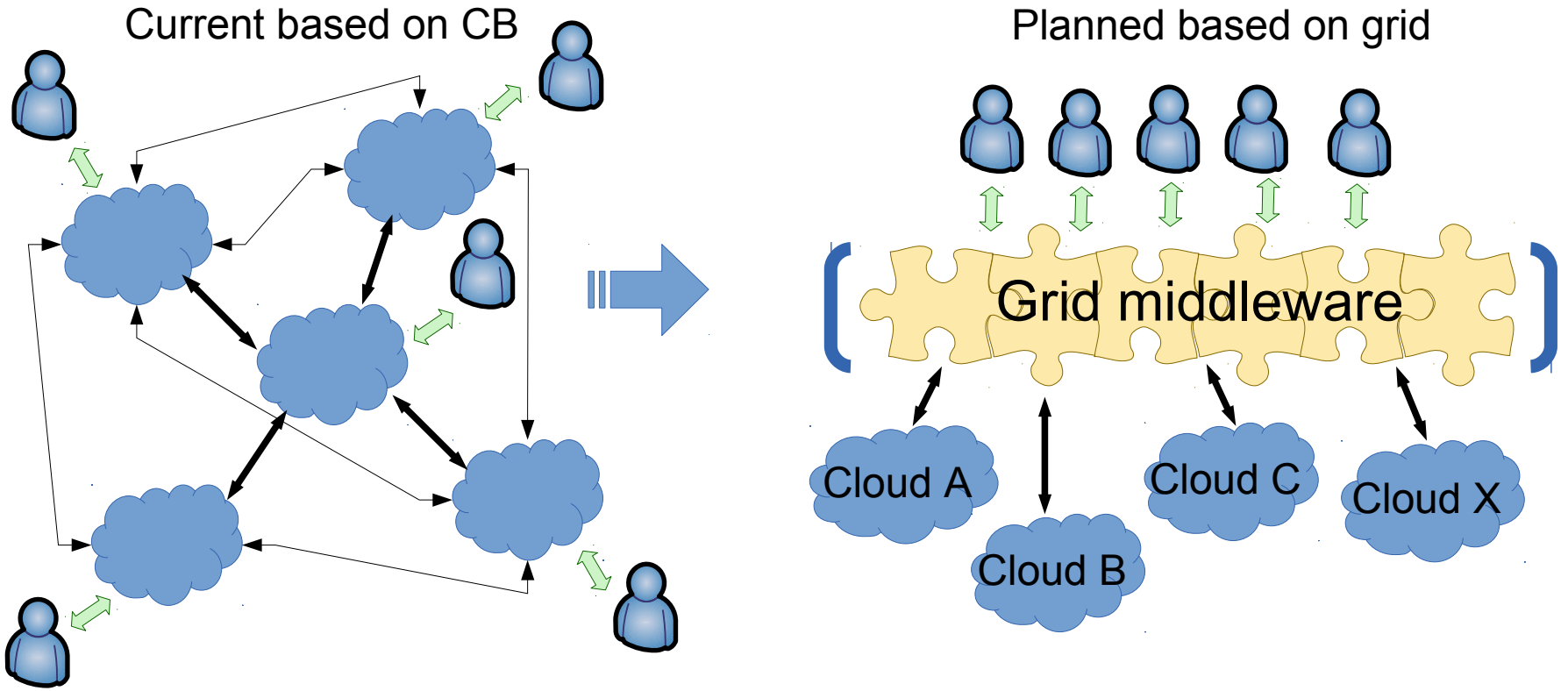


Resources of integrated clouds

Organization	Location	CPU	RAM, GB	Disk, TB
JINR	Dubna, Russia	~600	~2000	14
Plekhanov Russian University of Economics	Moscow, Russia	10	20	5
Institute of Physics	Baku, Azerbaijan	24	256	16
Bogolyubov Institute for Theoretical Physics	Kiev, Ukraine	10	20	4
Institute for Nuclear Problems	Minsk, Belarus	10	20	10

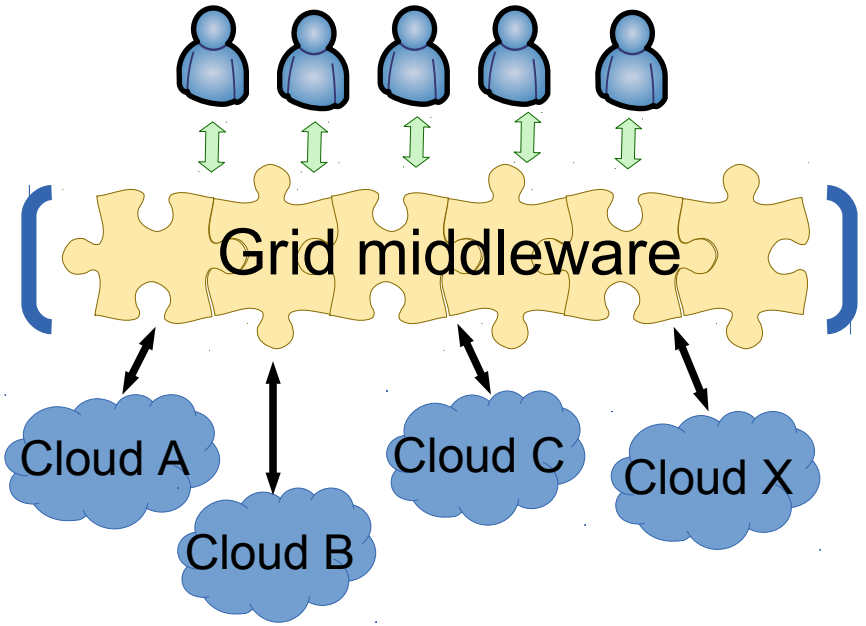
Cloud integration based on Grid

- The majority of computing load is in form of batch jobs
- Supporting and deploying the grid-site may be difficult for small institutions



Cloud integration based on Grid

- The goal is to make Grid infrastructure as a service
- Unified interface for users
- Easy to join the pool of resources for cloud providers
- We are in R’n’D stage
- Possible WMSs: Panda, Dirac
- Vac/vcycle, VCondor



JINR cloud team

- Nikita Balashov
  - Custom components for OpenNebula development and support
  - User support and trainings
- Aleksandr Baranov
  - Cloud administration, new components evaluation and testing
  - Cloud users and admins support and trainings
- Nikolay Kutovskiy
  - Coordinator
  - administration
  - user and admin support
- Roman Semenov
  - Admin, R&D in cloud storages
  - Users support
- Yelena Mazhitova
  - Lectures, demo

References

- Web-GUI: http://cloud.jinr.ru (authentication is required, accessible from JINR, CERN and Dubna local ISP only)
- Cloud servers, services, VMs and CTs are monitored with help of Nagios:
  - http://cloud-mon.jinr.ru/nagios (authentication is required)
- Web-portal about JINR cloud infrastructure
  - http://miccom.jinr.ru → Cloud service
  - JINR cloud description, quick user and admin guides, contacts, publications, etc
- OpenNebula: http://opennebula.org
- Cloud bursting driver code: https://github.com/JINR-LIT/ONE-cloudbursting-driver
- Virtualization systems:
  - OpenVZ: http://openvz.org
  - KVM: http://linux-kvm.org
- LizardFS: http://lizardfs.com

Summary

- We continue developing local JINR Cloud infrastructure
- Integrating with partner clouds is in progress
- R’n’D in cloud integrations based on grid
- Optimizing cloud resources utilization – see my next talk
- Build HPC segment in the JINR cloud

Thanks!