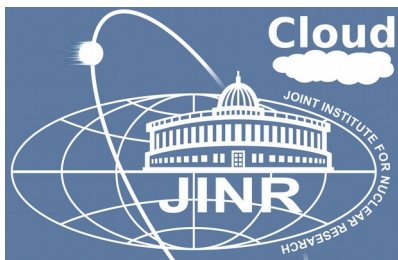# New features of the JINR cloud
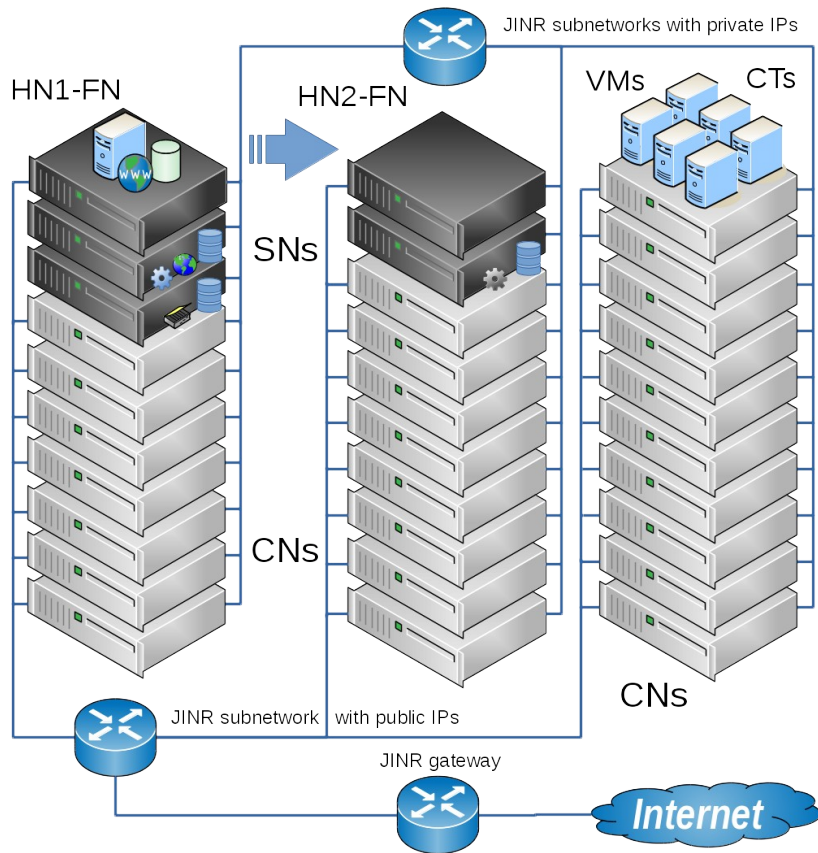
A. V. Baranov[1], N. A. Balashov[1],
N. A. Kutovskiy[1], A.N. Makhalkin[1],
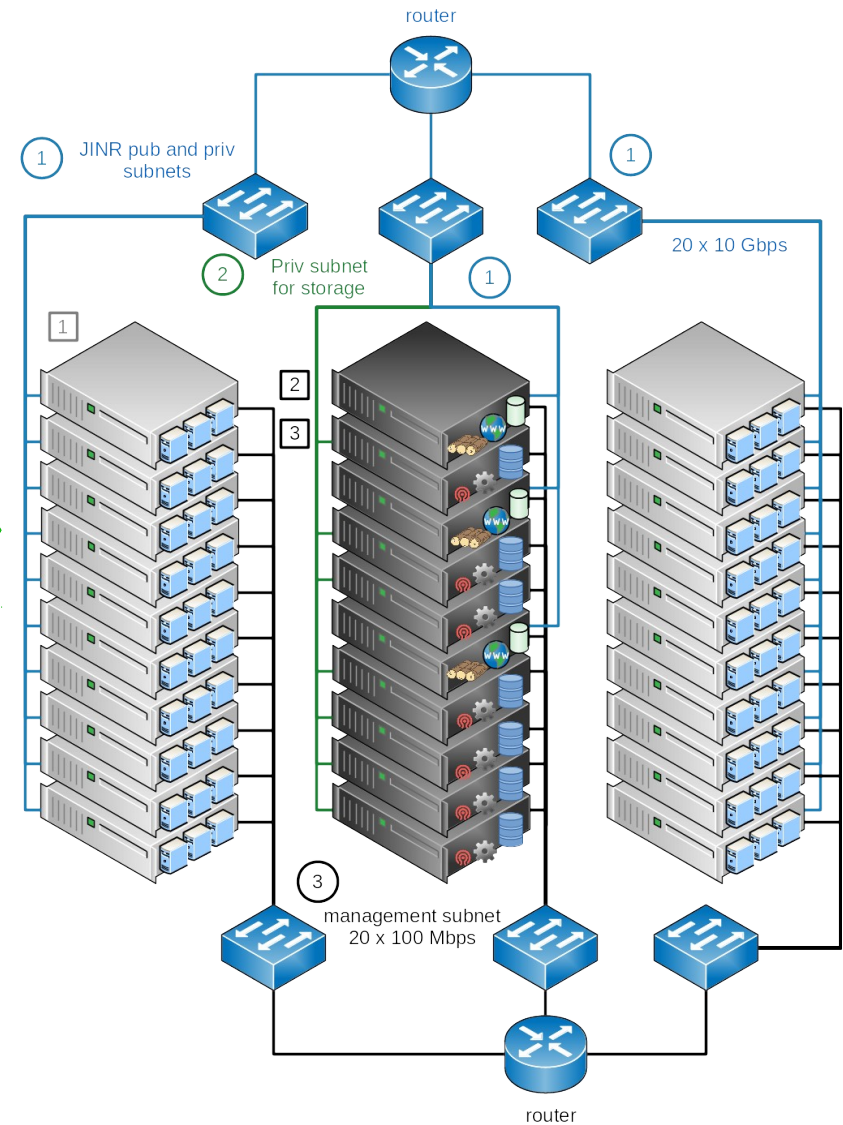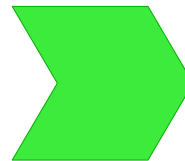Ye. Mazhitova[1,2], R. N. Semenov[1,3]

[1] Laboratory of Information Technologies, Joint Institute for Nuclear Research
[2] Institute of Nuclear Physics, Almaty, Kazakhstan
[3] Plekhanov Russian University of Economics, Moscow, Russia

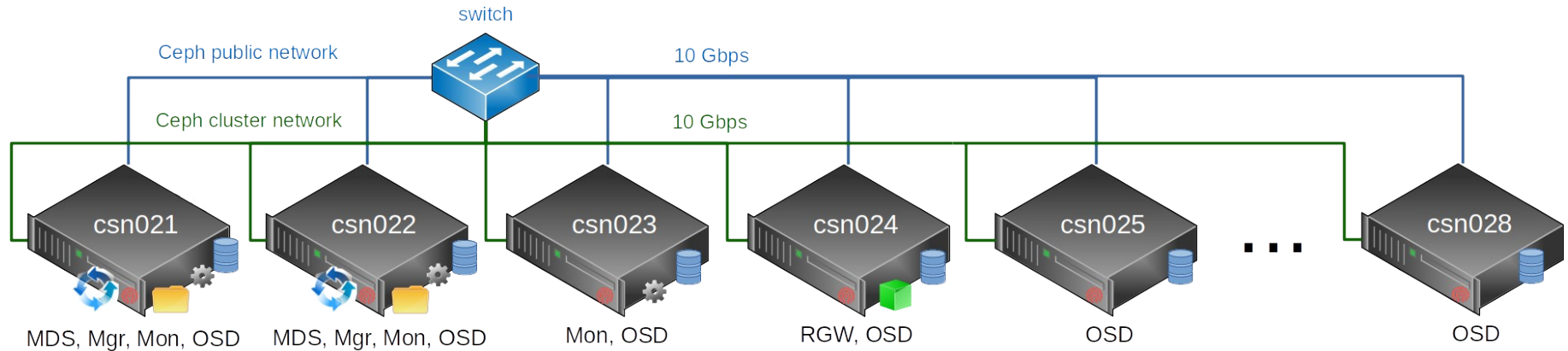# JINR cloud architecture changes

HA setup: 2 FNs, DRBD + Heartbeat
Distributed storage: LizardFS, 2x replicas

HA setup: 3 FNs, leader elections based
on raft consensus algorithm
Distributed storage: ceph, 3x replicas
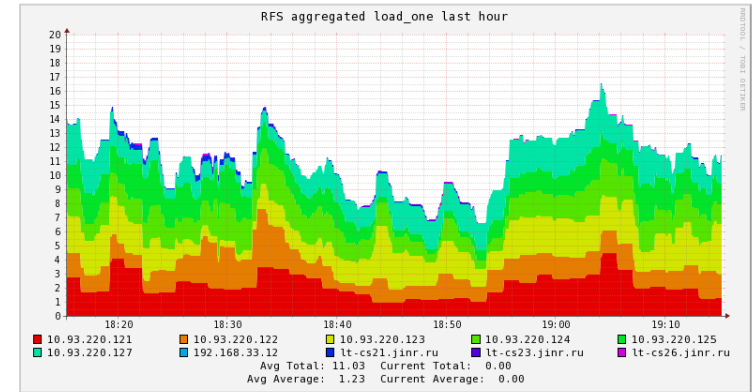
Ceph-based software defined storage

- 12.2.8 Luminous release

- HA setup: 3 MON, 2 MDS, 2 MGR

- Object storage: backups (git, discourse) over S3 protocol

- Block storage: KVM VM images, user data

- CephFS: user data, user software

- Ceph capacity:
  - Total raw disk space:~896 TB (+128 TB will be added soon, so ~ 1 PB expected)
  - effective ~300 TB (+40TB) due to 3x replication

JINR cloud service monitoring

Hardware resources

- Current hardware resources

    - ~80 servers

    - ~1600 CPU cores

    - ~8 TB of RAM

    - ~896 TB (+128 TB will be added soon) of ceph-based SDS raw disk space, effective ~300 TB (+40TB) due to 3x replication

Usage
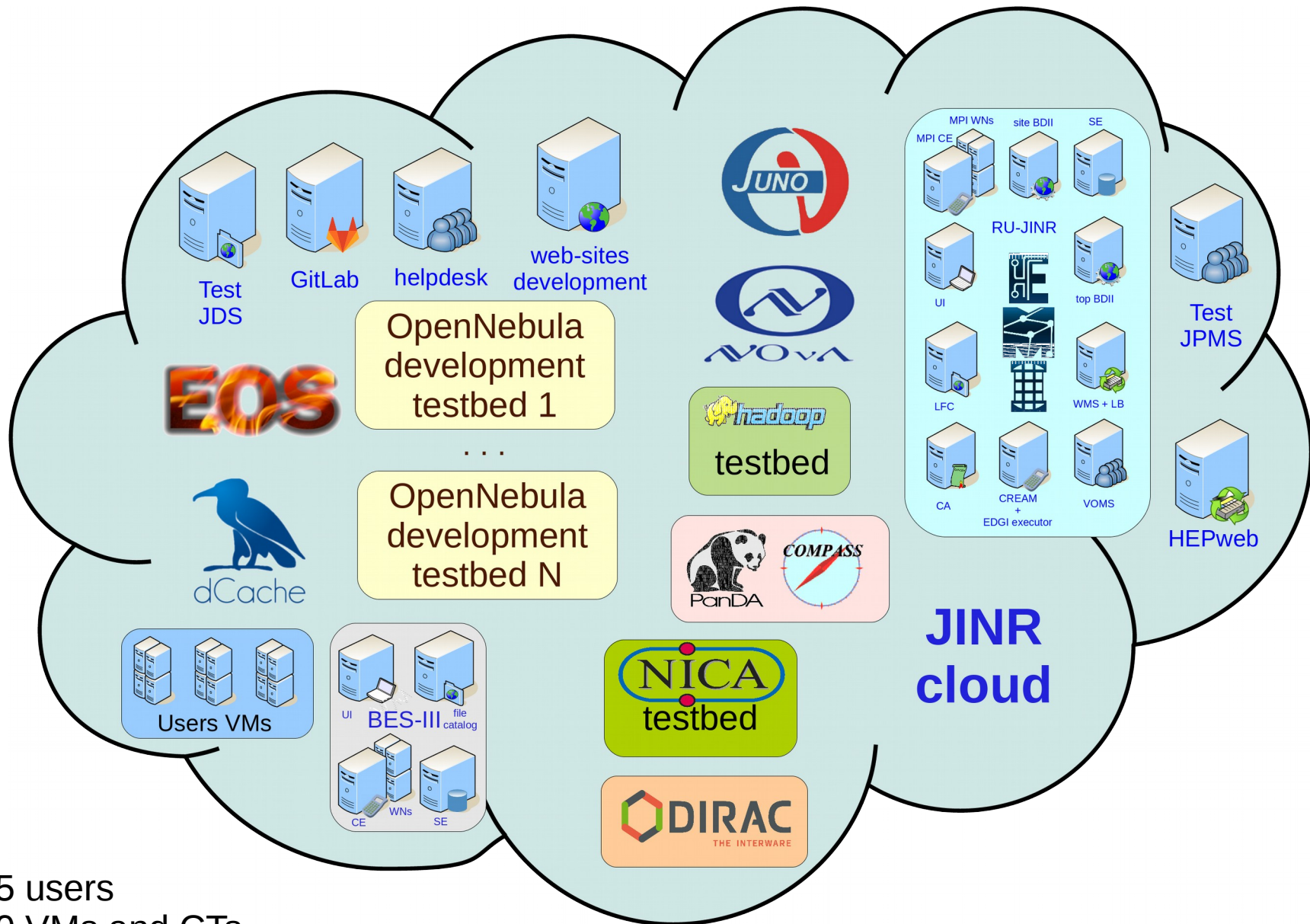
~115 users
~240 VMs and CTs

Clouds integration (1/2)
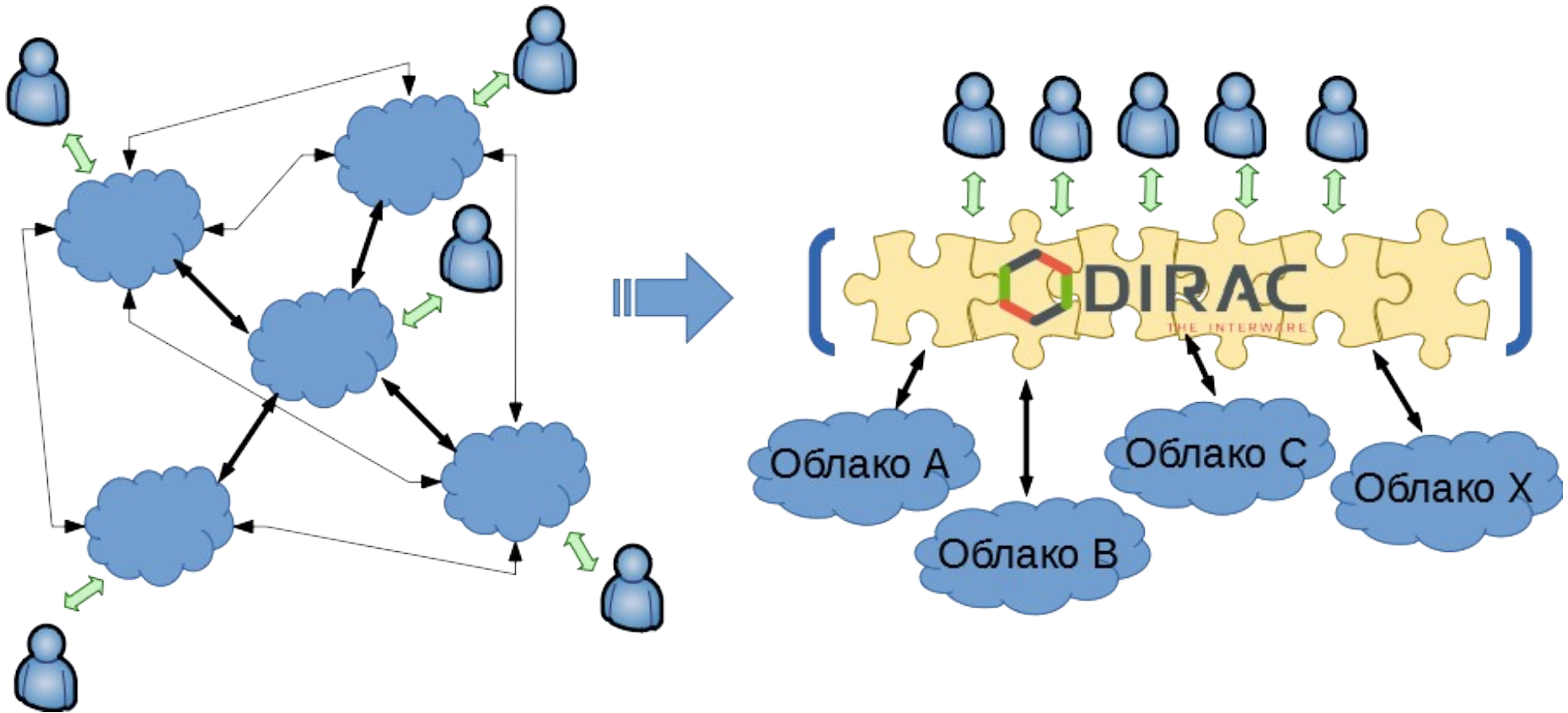
Cloud bursting approach:
- poor scalability
- hard to maintain

Grid middleware (interware) – DIRAC:
- good scalability
- easier to maintain
- DIRAC services are deployed at JINR cloud

Clouds integration (2/2)

- To join resources for solving common tasks as well as to distribute a peak load across resources of partner organizations

Plekhanov Russian University of Economics (Moscow, Russia): integrated

Joint Institute for Nuclear Research (Dubna, Russia): integrated

Institute of Nuclear Physics Astana branch - Private establishment «Nazarbayev University Library and IT services» (Astana, Kazakhstan):integrated

Institute for Nuclear Problems (Minsk, Belarus): integrated

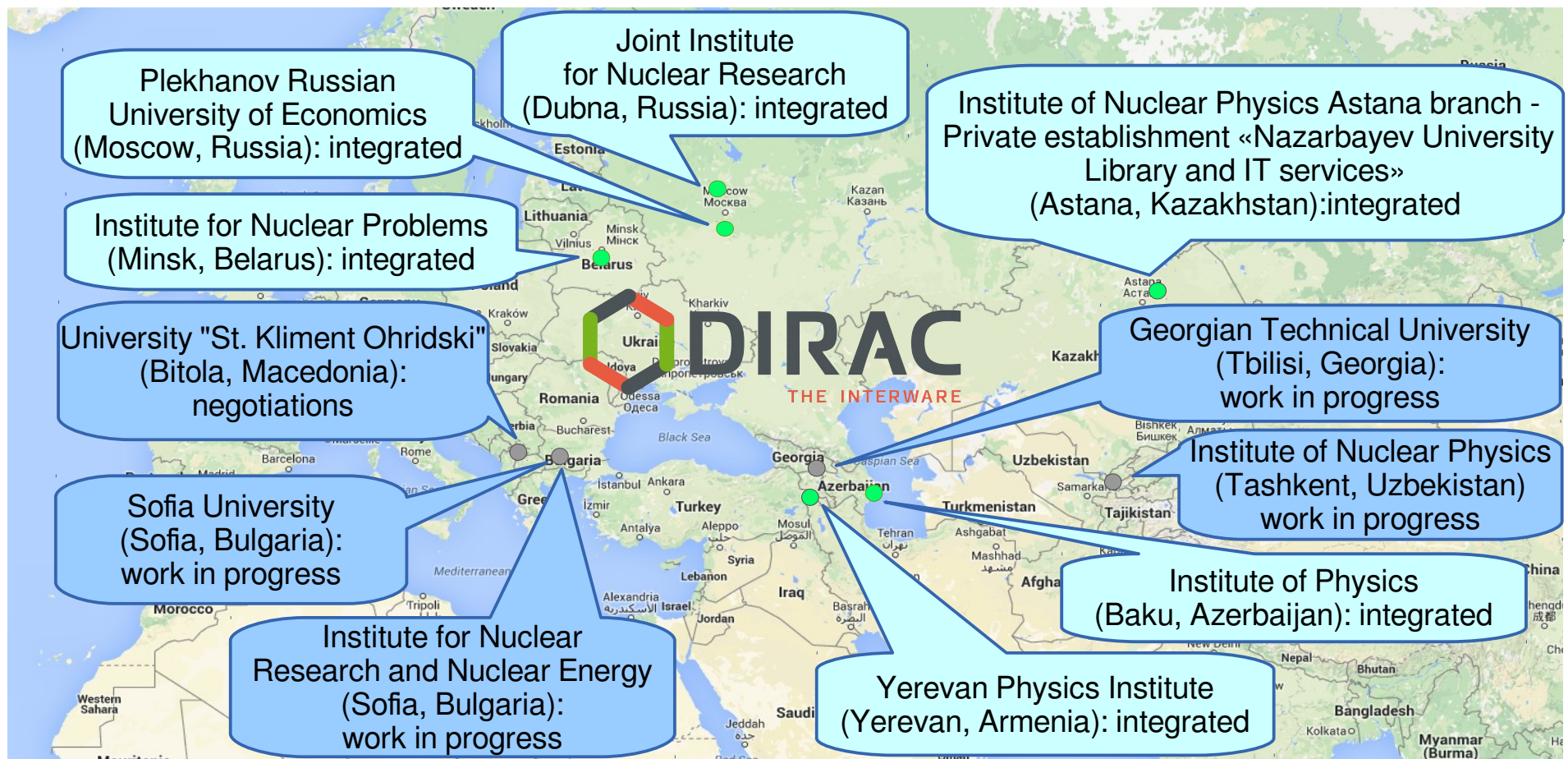University "St. Kliment Ohridski" (Bitola, Macedonia): negotiations

Georgian Technical University (Tbilisi, Georgia): work in progress

Institute of Nuclear Physics (Tashkent, Uzbekistan) work in progress

Sofia University (Sofia, Bulgaria): work in progress

Institute of Physics (Baku, Azerbaijan): integrated

Institute for Nuclear Research and Nuclear Energy (Sofia, Bulgaria): work in progress

Yerevan Physics Institute (Yerevan, Armenia): integrated

Migration from OCCI to Opennebula XML-RPC endpoint secured with SSL

Smart cloud scheduler

See Nikita's talk "Smart Cloud Scheduler"
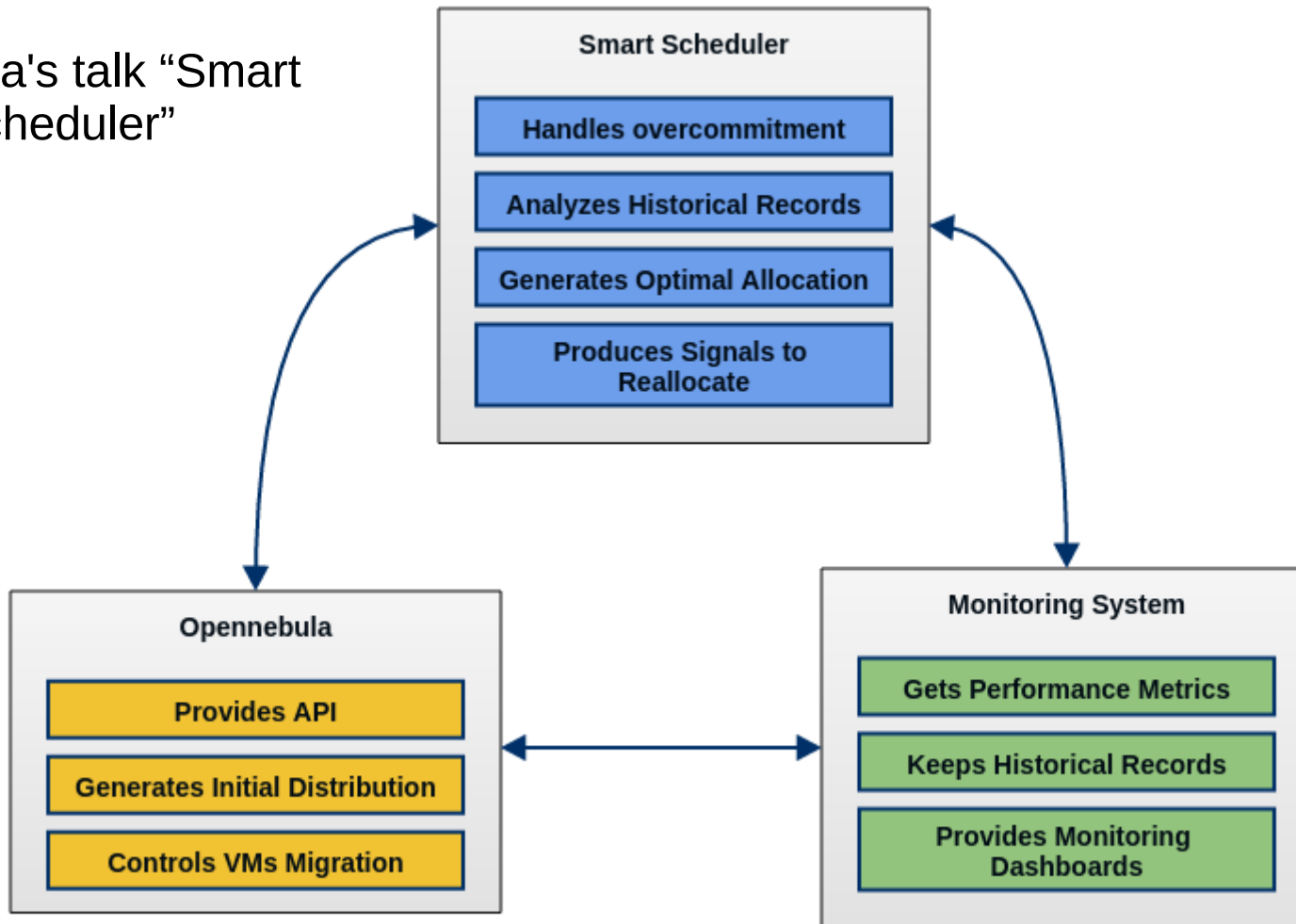
The work on the smart cloud scheduler is supported by RFBR grant #15-29-07027

Plans

- Migrate to OpenNebula 5.6

- Switch to Virtuozzo 7

- Put Smart Cloud Scheduler from pre-production into production in JINR cloud

- Adopt a set of experiments' workflow to run into distributed JINR Member State computational (cloud?) infrastructure (DJMSCI)

References

- Web-GUI: http://cloud.jinr.ru (authentication is required, accessible from JINR, CERN and Dubna local ISP only)

- 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

- Virtualization systems:

  - OpenVZ: http://openvz.org

  - KVM: http://linux-kvm.org

- Ceph: http://ceph.com