



## Software and hardware environment for JUNO, Daya Bay and BES-III experiments

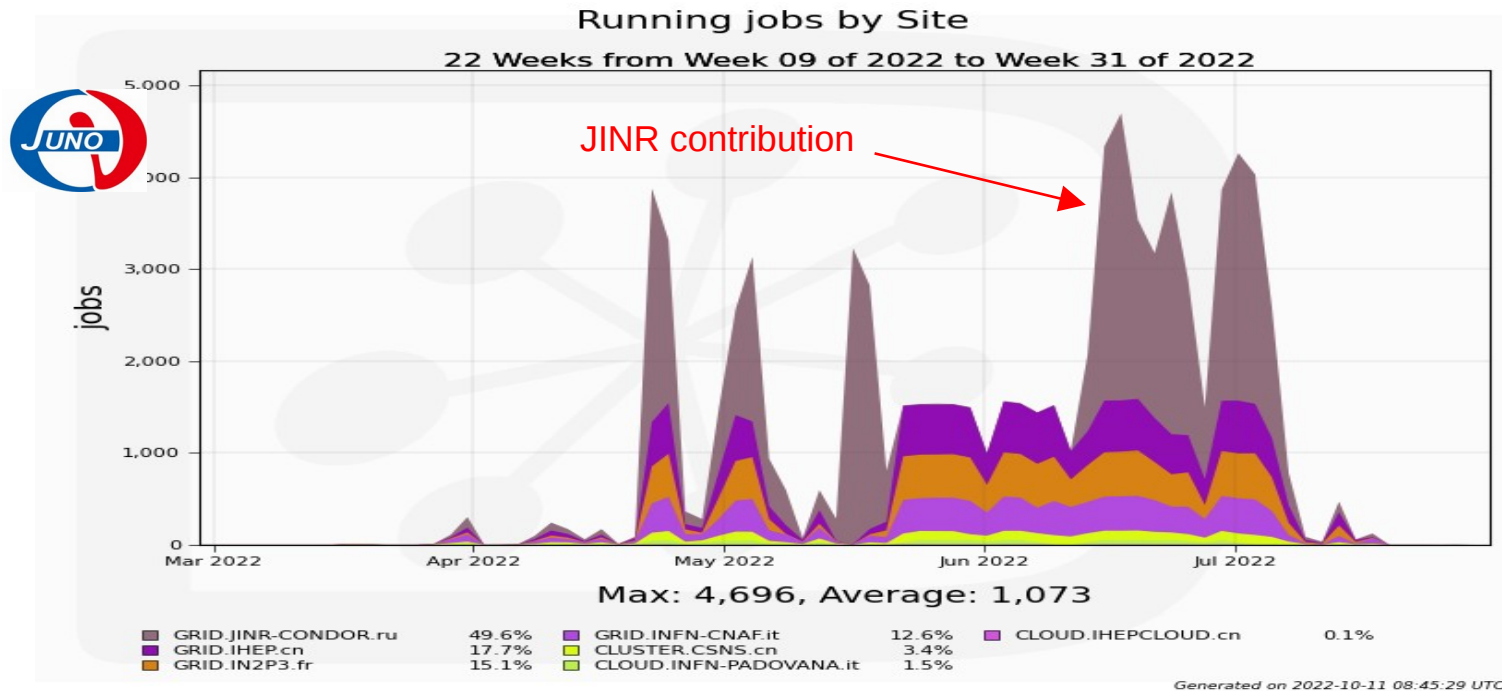
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# Neutrino computing platform (NCP)

- Part of the JINR cloud resources bought at the cost of DLNP is organized as a separate segment called Neutrino computing platform (NCP)
- HTCondor is used as batch system, its worker nodes are cloud VMs
- To increase an efficiency of NCP resources utilization a resources sharing across NCP participants was implemented:
  - Each experiment has its share as well as can use idle resources of others' experiments



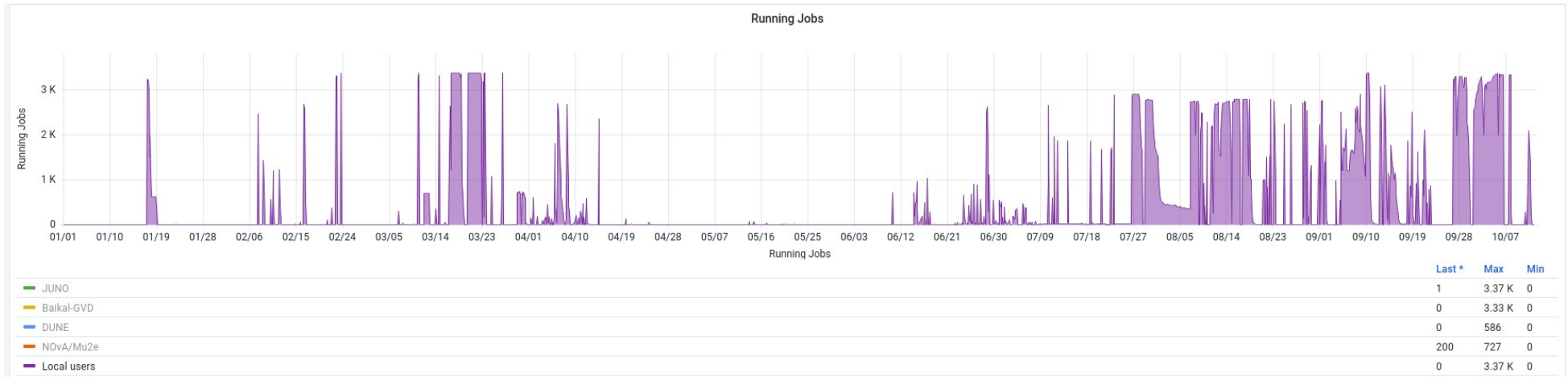
# NCP computational resources utilization by JUNO



- 15 GB of RAM per single CPU core
- The highest value among JUNO DCI data centers
- JINR is the only JUNO site for certain types of jobs

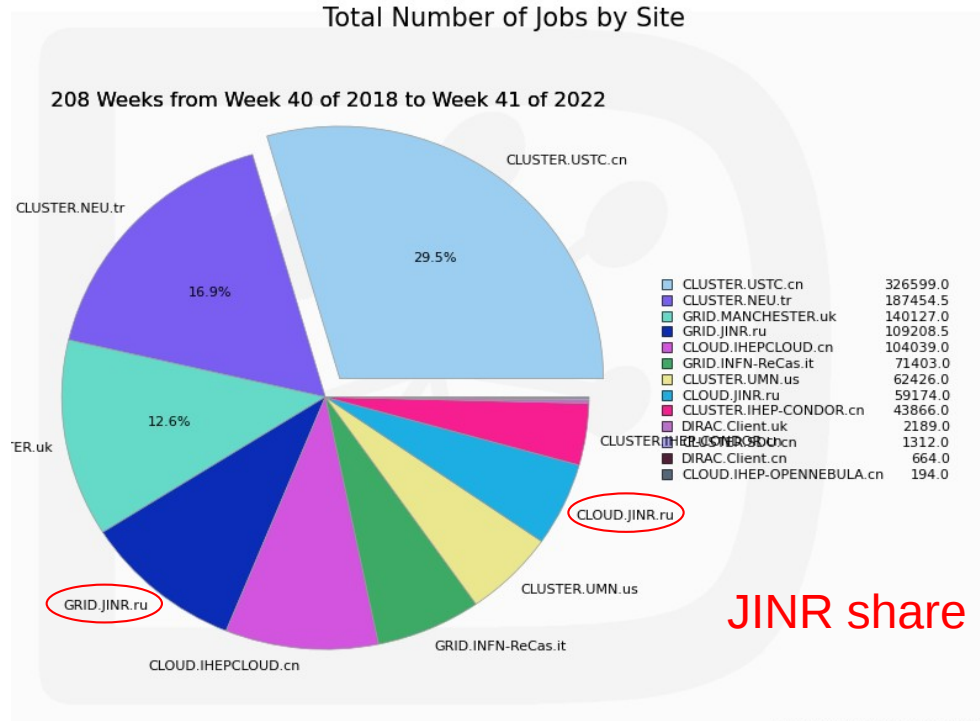
# NCP computational resources utilization by Daya Bay

- Daya Bay JINR group uses NCP resources, no visualization of separate statistics on each JINR user yet («Local users»)



# NCP computational resources utilization by BESIII

- BES-III «hasn't had production in recent years in DIRAC» but during last 4 years the JINR share is about 15%.



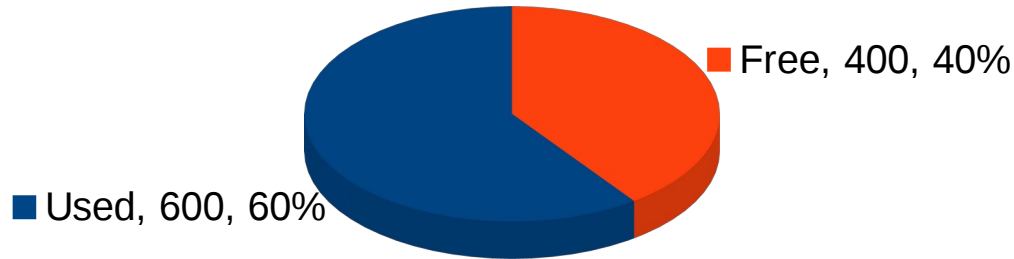
JINR share is ~15% in total

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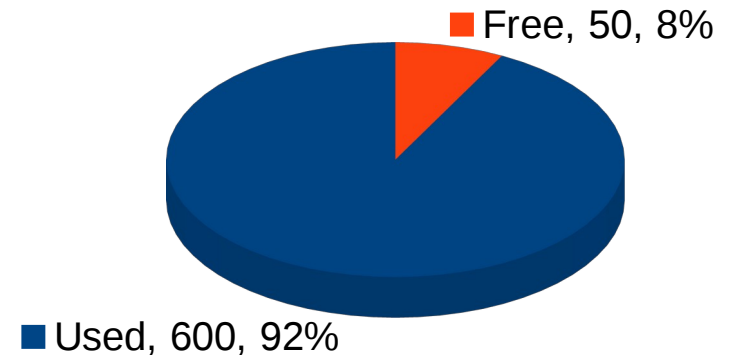
# Storage resources

- 1 PB (2 PB of raw disk space due to double replication) for JUNO (60% is used)
- 650 TB (1.3 PB of raw disk space due to double replication) for Daya Bay (92% is used)
- Not provided for BES-III

JUNO quota on JINR EOS, TB



Daya Bay quota on JINR EOS, TB



# JUNO MoU pledged JINR resources

	2023	2024	2025	2026	2027
Tape, PB	5	5	5	5	5
Disk, PB	5	5	5	5	5
CPU (kHS06)	36	36	30	20	10

Note 1: Each value is an annual addition

Note 2: «The computing resources pledged for a specific year shall be deployed by January 1st of that year» (source: JINR — IHEP MoU for JUNO)

# JUNO DCI services replication at JINR

- IHEP DIRAC redundancy service (WebApp&ConfigurationService):  
<https://dirac-ihep-replica.jinr.ru>
  - Running since 2020
  - JINR and IHEP DIRAC versions must be synchronized
  - Developed approach was chosen as an example for other computing centers.
  - Recently in 2022 the approach was reviewed and changed to correspond new version of DIRAC in IHEP.
- Secondary VOMS server for JUNO VO was deployed at JINR
- Full replica of JUNO CVMFS Stratum-1 repository (/cvmfs/juno.ihep.ac.cn) and /cvmfs/dcomputing.ihep.ac.cn
- Replica of JUNO offline Condition Database



# Possible JINR contribution

- Hardware resources
- Manpower for the following activities:
  - DIRAC-RUCIO integration for JUNO
  - Service Availability Monitoring (SAM) development and tuning for DIRAC@IHEP
  - JSUB (Job Submission Utility Bundle - Massive job submission and management tool) support