

Status of the offline computing system

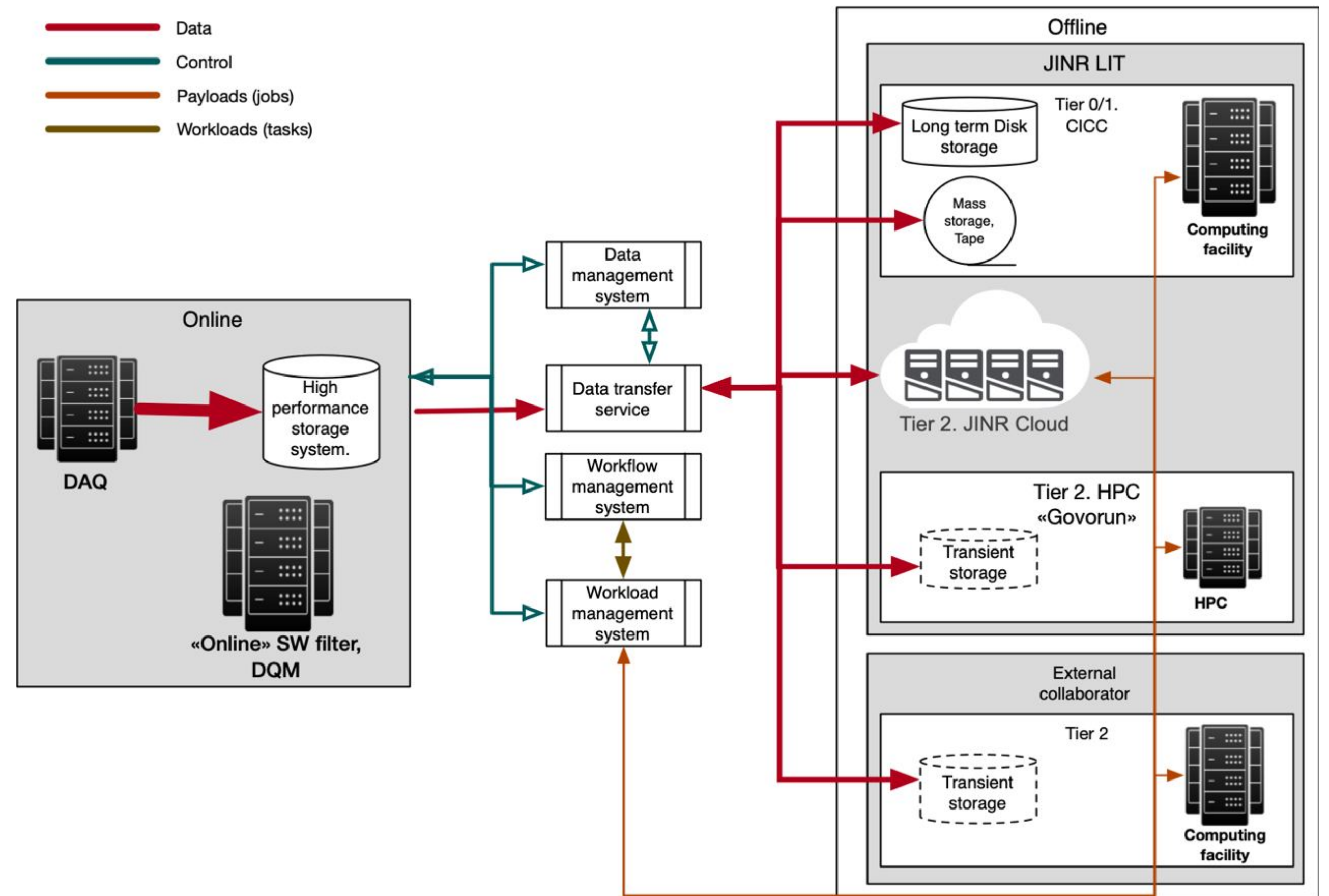
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Duties of the offline computing system

- Store data being produced by the community on the available storage resources
 - Data taken from the experimental facility
 - MC gen and reco data
- Organize data processing on the available computing resources

System components 1/2

- Key components:
 - Information system – the main integration component of the system: gathers info about all computing and storage resources, access protocols, entry points, and many other things in one place and distributes this info via API to all other components mentioned below
 - WFMS – manages data processing at the highest level of tasks and datasets or periods and campaigns
 - WMS – responsible for finding the best computing resource for job to be executed on, manages individual jobs (usually 1 job means 1 input file) processing
 - DMS – responsible for data management, including data catalog, data integrity and data lifetime management strategies
 - DTS – allows to organize massive data transfers



System components 2/2

- Information system — CRIC (Computing Resources Information Catalog)
- Workflow management system — Apache Airflow
- Workload management system — PanDA (Production and Distributed Analysis system)
- Data management system — Rucio
- File transfer service — FTS

Work process organization

- We invited 3 bachelors of the Dubna University and distributed the work as follows
 - Information system deployment and development
 - Workload management system (WMS) deployment and fixes in case of problems
 - Workflow systems comparison, deployment, integration with WMS, proof of concept tests that job can pass through all systems and run on some computing node on one of available computing sites
- All the activities to organize and support these studies (IT infrastructure, certificates, troubleshooting, Git, etc.) were on me and Danila
- All students successfully defended their master's papers and received diplomas in 2022



Results of 2022 1/3

- We have an instance of the Information system with all necessary interfaces to fill in sites, queues, storages, protocols, other data, and API

```
"JINR_SPD_DL_PROD": {
  "accesscontrol": "",
  "acopytools": {
    "pr": [
      "xrscp"
    ],
    "pw": [
      "xrscp"
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      "setup": ""
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  "gstat": "JINR-SPD",
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  "is_cvmfs": false,
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  "jobseed": "std",
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  "localqueue": "",
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  "nodes": 0,
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      "ce_name": "JINR-NICA-CE",
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      "site_state": "ACTIVE",
      "siteid": "JINR_SPD_DL_PROD",
      "special_par": "",
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      "stageoutretry": 2,
      "state": "ACTIVE",
      "state_comment": "Object was cloned from SPD_JINR_PROD via WebUI",
      "state_update": "2022-01-14T15:27:21.300536",
      "status": "online",
      "system": "",
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      "wansinklimit": null,
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      "wntmpdir": "",
      "workflow": null,
      "zip_time_gap": 600
    }
  ]
}
```

Results of 2022 2/3

- Workload management system was deployed, tuned, integration with the information system was performed, several fixes were pushed to the master PanDA Git repo
- Recently we migrated from MySQL backend to Postgres because it has much better support in the code of WMS, including functions, procedures and even tables partitioning and follows the latest version of code without any lags

..		
 0.0.12.patch.sql	ATLASPANDA-657: Schema and upgrade script management	3 months ago
 0.0.13.patch.sql	Fixes for ATLASPANDA-774: Also increase version for SERVER and JEDI (...)	2 weeks ago

- There are several very positive changes in the PanDA Git repo: finally! very good documentation with detailed administrator and developer guides, releases, consistency check on PanDA server start to ensure that database version is the same as version of server, etc.

Results of 2022 3/3

- Workflow management system was deployed, integration with WMS was developed
- In PanDA Pilot some development was done in order to support SPDRoot MC gen jobs processing in the container
- We have tested chain of a MC gen job which was defined in the WFMS and passed through all components of the system and successfully ran in the container, results were delivered from the remote computing node and written to the JINR EOS instance

Computing resources landscape

- JINR MICC farms (so called Tier 1 and Tier 2), NICA farm in the LHEP
- HPC at Samara University
- Joined in 2022
 - Farms at PNPI and SPbSU
 - Farm at INP BSU in Minsk
- So far JINR EOS is our primary and the only storage system

Plans for 2023

- We need to start implementing workflows in the WFMS, each chain requires some time but once it's done we get several benefits:
 - With every chain we cover more and more use-cases and each next one will be implemented quicker;
 - Less wait in the queue because production account will have higher priority on the JINR resources and, actually, you'll not need to wait till other jobs of SPD, MPD and BM@N and others finish — your jobs will have an option to be executed at the collaboration resources, to which MPD and BM@N will not have access ;-)
- IAM — the idea is to isolate all authentication processes so that they can be done without leaving our security perimeter:
 - User of the JINR network infrastructure and IT services receives a record in the JINR SSO (Single Sign On), with this record, which confirms identity of the person, we allow members of SPD collaboration (which is just a record in the user card) to get access to the computing resources of JINR and collaboration
 - In case of any incident user can be blocked immediately
- Run several tasks over the datasets containing at least 10000 individual files
- Find at least 3 students to 1) continue workflows development, deploy and tune 2) data management and 3) data transfer services
- Extend our computing resources by finding and adding new external participants