The Management of Distributed MC Production for the SPD Experiment

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Introduction

- The SPD (Spin Physics Detector) experiment at the NICA collider at JINR is evolving as an international collaboration of physicists from various institutes working together to achieve their stated goals in the field of studying the spin structure of nucleons

- From the IT point of view, during the facility construction stage, we repeat similarly looking calculations over and over again, testing our software and developing our production environment, and, in common, we're focusing on the automation of the ongoing Monte Carlo productions

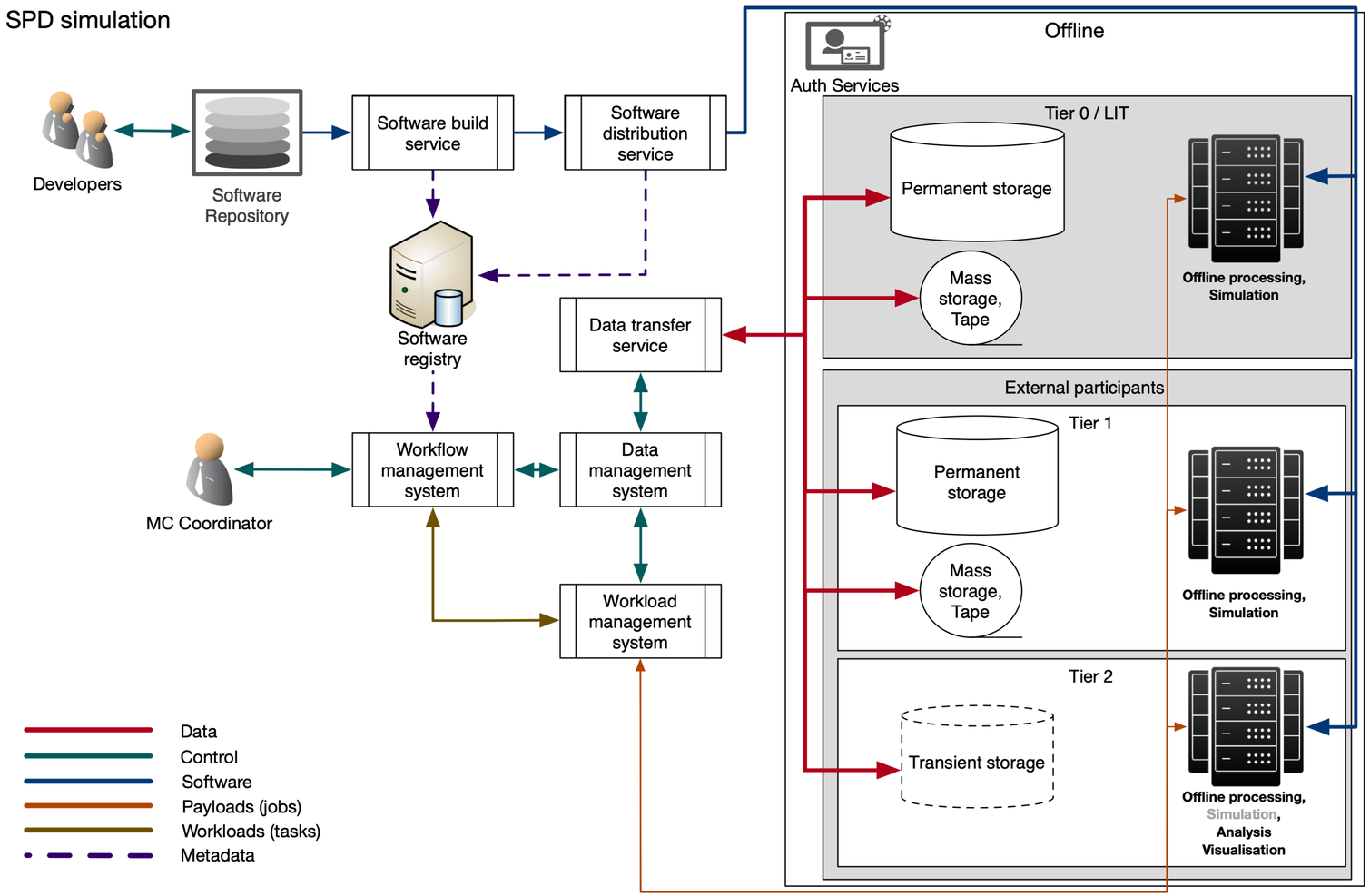
- In order to provide the participants of the experiment, both inside and outside JINR, equal opportunities in the field of working with data and computing, it is necessary to create a distributed computing environment of the experiment with the following characteristics: a single entry point for users, data management mechanisms, equitable distribution of available computing resources, security, scalability

Model of collaboration participant

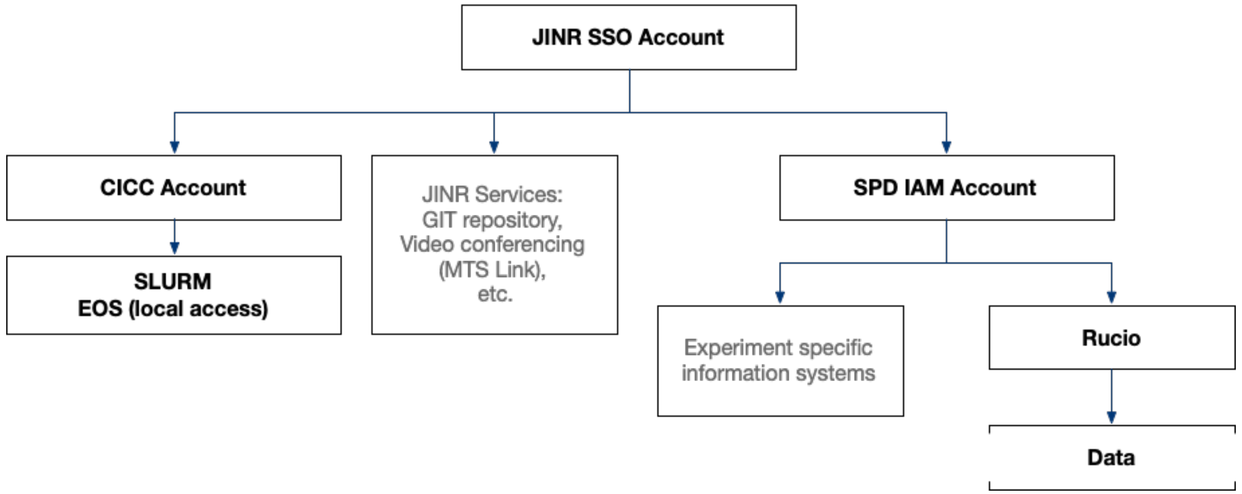
- Physics group
  - Without computing site
    - Not going to setup any computing site
    - Need resources for physics analysis
      - We provide assistance in connection to the JINR computing infrastructure
    - Would like to setup a computing site
      - We provide connection methodology, assistance in documents preparation, consultations with suppliers, etc.
  - With computing site
    - Not going to participate in the SPD computing
    - Would like to participate in the SPD computing
      - Without experience in grid computing and would like to start using grid
        - We help to setup a grid site
      - With experience in grid computing
        - We provide assistance in connection of the existing site to our computing environment
- Computing site
  - We provide instructions how to connect to our computing environment

How we foresee an offline computing environment services for the SPD

- Authentication system: JINR SSO
- Authorization system: IAM
- Information system: CRIC
- Software distribution service: CVMFS
- Data management system: Rucio
- Data transfer service: FTS
- Workload management system: PanDA
- Workflow management system: PanDA/Control Panel



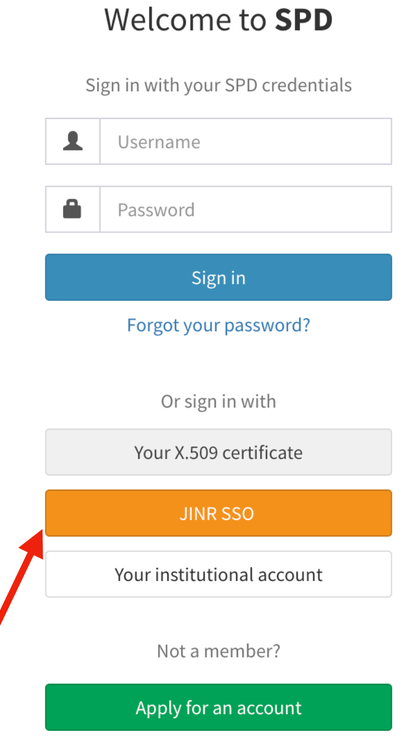
Authentication services

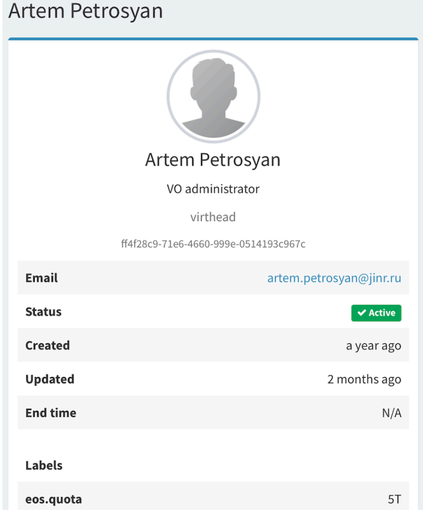


- At the moment we have ~150 users from the JINR and expecting to have at least the same amount of external participants from different institutions
- All users have to have a SSO account (authentication backend for collaboration members) in order to use CICC services
  - Internal have it basing on their user contracts, also have to be in the SPD group in the LDAP
  - External have to become an associate member (sign an MoU, send a letter to the Director of the JINR with a list of persons who is going to use JINR's digital services)
- To start using VO services of the SPD users have to apply for account in the SPD IAM (authorization system only for collaboration members)
- We do not store passwords and any other sensitive information in the db of our identity and access management service, we fully rely on the JINR's SSO which we access via API of Keycloak

Identity and access management

- Address: spd-iam.jinr.ru
- We moved all internal operations between middleware services based on X.509 proxy from the VOMS service to the SPD IAM service
- lxui.jinr.ru, CICC computing and storage resources were configured to work with the SPD IAM as VOMS provider
- A rpm which helps adding IAM VOMS configuration to any computing site was prepared
- An integration between SSO and IAM is now finished, users can log in to IAM (and all underlying services) using JINR SSO account (use JINR SSO button at the SPD IAM login page)
- We have finished transition from VOMS to IAM and we have one entry point for all our computing services — the SPD IAM
- IAM is a single source of info about users and their rights in the distributed computing environment of the SPD experiment including personal quotas in Rucio and EOS

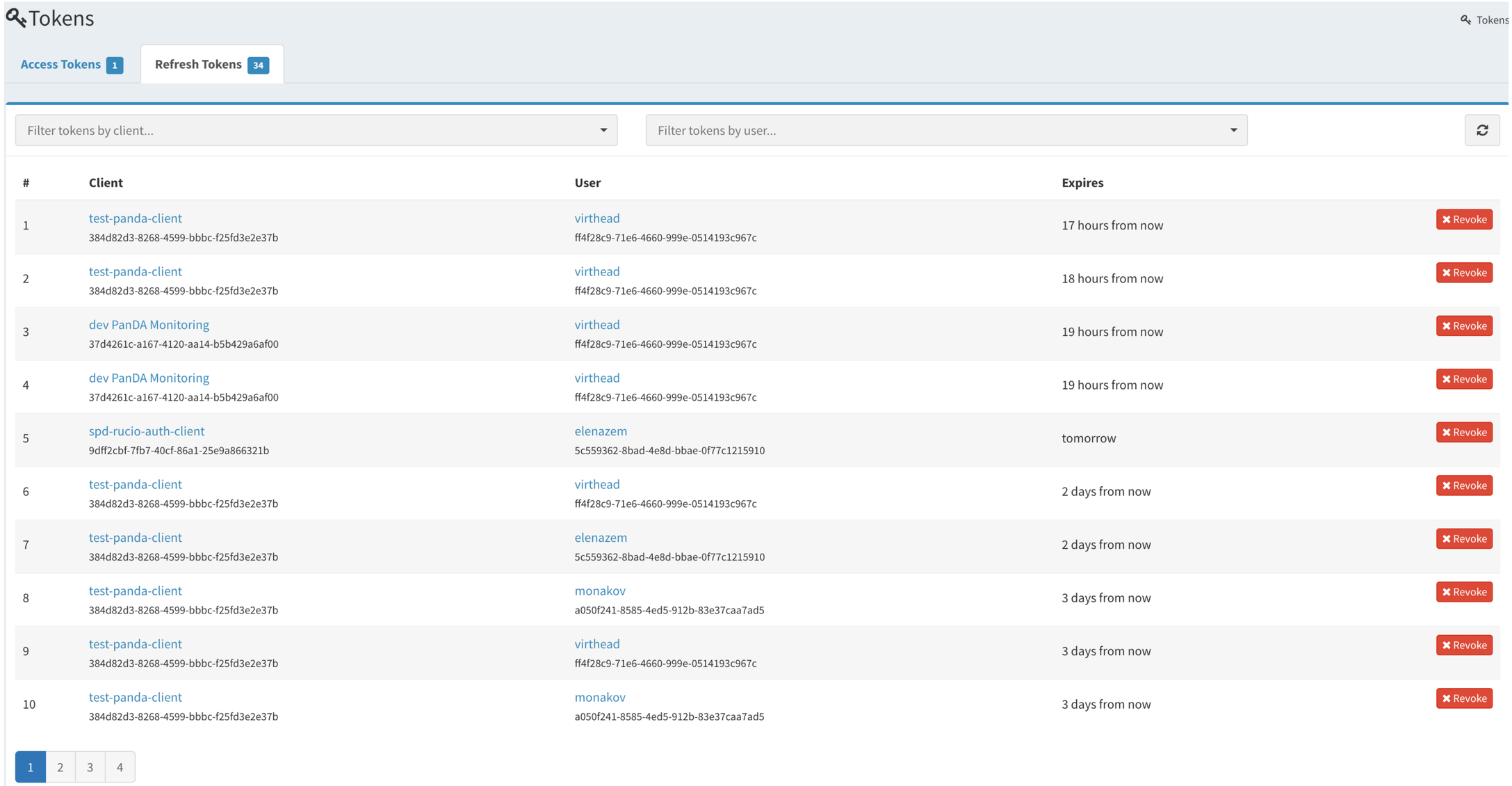




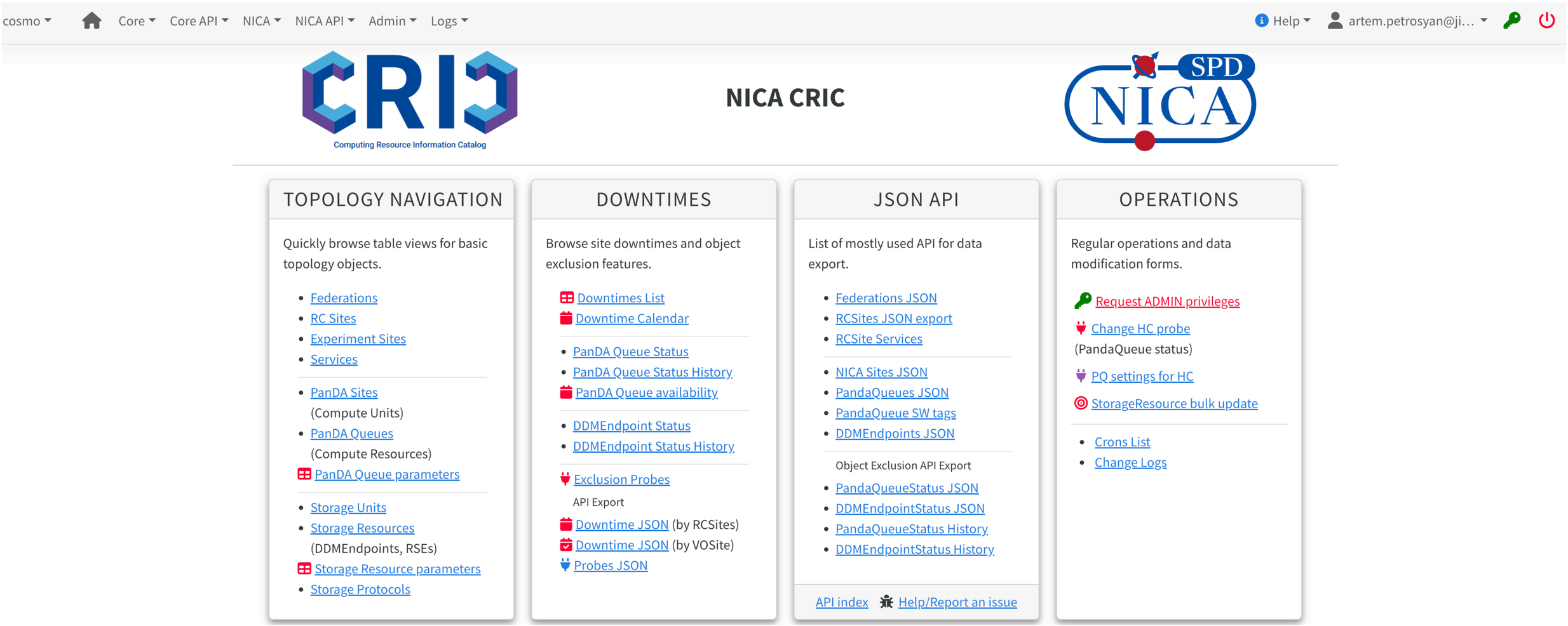
Clients/services in the IAM

Application		
rucio-auth-client-c1 more information openid profile offline_access	*Authorized:* July 23, 2024 *Last accessed:* November 22, 2024 *Expires:* Never	Revoke
spd-rucio-auth-client more information openid profile	*Authorized:* August 12, 2024 *Last accessed:* 25 days ago *Expires:* Never	Revoke
prodsysv1 more information phone openid profile offline_access rucio email wlcg wlcg.groups	*Authorized:* October 28, 2024 *Last accessed:* 5 months ago *Expires:* Never	Revoke
spd-rucio-auth-client more information openid profile offline_access	*Authorized:* December 6, 2024 *Last accessed:* 25 days ago *Expires:* Never	Revoke
cric-sso more information openid email profile	*Authorized:* December 17, 2024 *Last accessed:* 7 hours ago *Expires:* Never	Revoke
test-panda-client more information scim iam phone openid profile offline_access groups rucio email wlcg wlcg.groups	*Authorized:* 5 months ago *Last accessed:* 22 days ago *Expires:* Never	Revoke
dev PanDA Monitoring more information address phone openid email profile	*Authorized:* 2 months ago *Last accessed:* 2 months ago *Expires:* Never	Revoke
dev PanDA Monitoring more information address phone openid profile scim:read iam:admin.read email	*Authorized:* 2 months ago *Last accessed:* 2 months ago *Expires:* Never	Revoke
dev PanDA Monitoring more information address phone openid profile offline_access groups scim:read iam:admin.read email wlcg wlcg.groups	*Authorized:* a month ago *Last accessed:* a month ago *Expires:* Never	Revoke

User tokens in the IAM



Information system 1/2



- CRIC stores all info about CE, SE and their relations and exports data to all underlying systems

Information system 2/2

cosmo | Core | Core API | NICA | NICA API | Admin | Logs | Help | artem.petrosyan@ji…

Export | Columns 14/20 | Filter | Reload — NICA Site list — 200

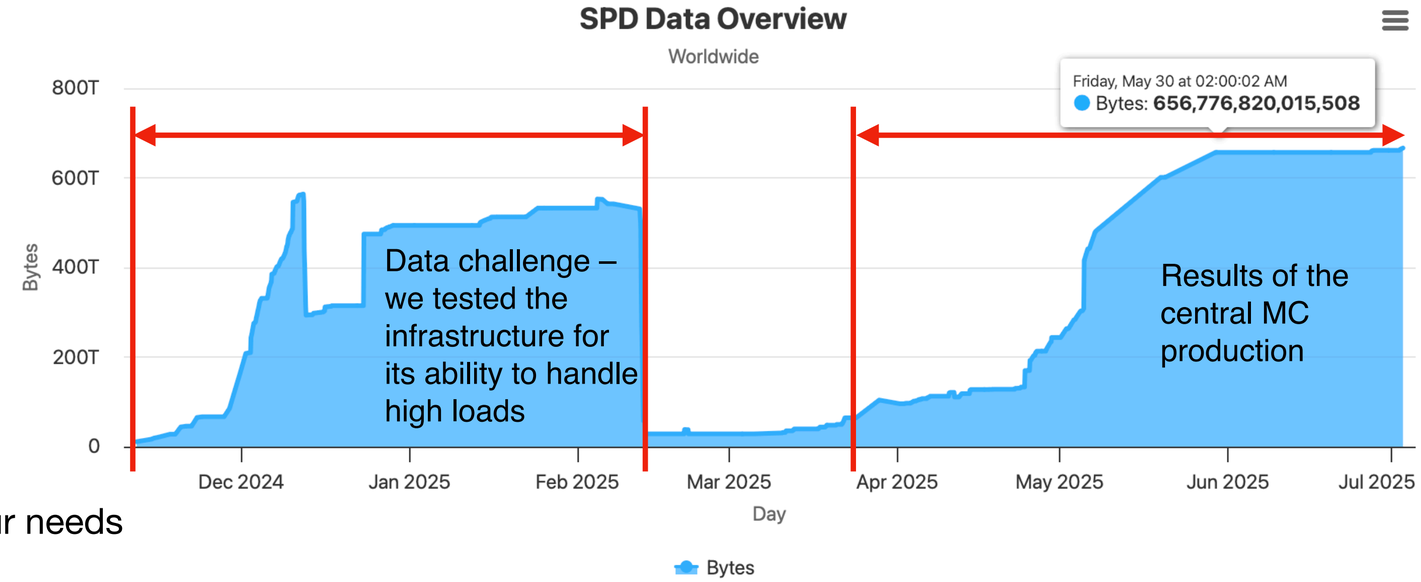
spd	filter by NICA Site	ACTIVE	filter	filter by Site	filter by Country	filter by Storage Units	filter by PanDA Sites	filter by	filter by	filter by	filter by c	filter by	filter by Data pc
VO	NICA Site	State	Tier	Site	Country	Storage Units	PanDA Sites	ADC notify	Auto proxy	core power	core energy	cloud	Data policy
spd	JINR-SPD	ACTIVE	T1	JINR	Russian Federation	SPD-JINR-DATA	JINR-SPD-PS	✓	✗	10	0	RU	
spd	PNPI-SPD	ACTIVE	T2	PNPI	Russian Federation	SPD-PNPI-DATA	PNPI-SPD-PS	✓	✗	6	0	RU	
spd	SPbSU-SPD	ACTIVE	T2	SPbSU	Russian Federation		SPbSU-SPD-PS	✗	✗	6	0	RU	
spd	SSAU-SPD	ACTIVE	T2	SSAU	Russian Federation		SSAU-SPD-PS	✗	✗	10	0	RU	
VO	NICA Site	State	Tier	Site	Country	Storage Units	PanDA Sites	ADC notify	Auto proxy	core power	core energy	cloud	Data policy

cosmo | Core | Core API | NICA | NICA API | Admin | Logs | Help | artem.petrosyan@ji…

Export | new RSE | Columns 13/18 | Filter | Reload — DDMEndpoint list — 200

filter by DDMEndpoint	filter by Experimer	filter by Storage Unit	filter	filter by Ty	filter by Endpoint	ACTIVE	filter by Resource	filter by	filter by d	filter b	filter by	filter by Space m
DDMEndpoint	Experiment site	Storage Unit	Tier	Type	Endpoint	State	Resource	cache	determ	volat	mkdir	Space method
JINR_EOS2_DATADISK	JINR-SPD	SPD-JINR-DATA	T1	DATADISK	production/	ACTIVE	SPDDATA@JINR_SPD_EOS	✗	✓	✗	✗	rucio
PNPI_SPD_DATADISK	PNPI-SPD	SPD-PNPI-DATA	T2	DATADISK	datadisk/rucio/	ACTIVE	SPDDATA@PNPI_EOS	✗	✓	✗	✗	rucio
DDMEndpoint	Experiment site	Storage Unit	Tier	Type	Endpoint	State	Resource	cache	determ	volat	mkdir	Space method

Distributed data management

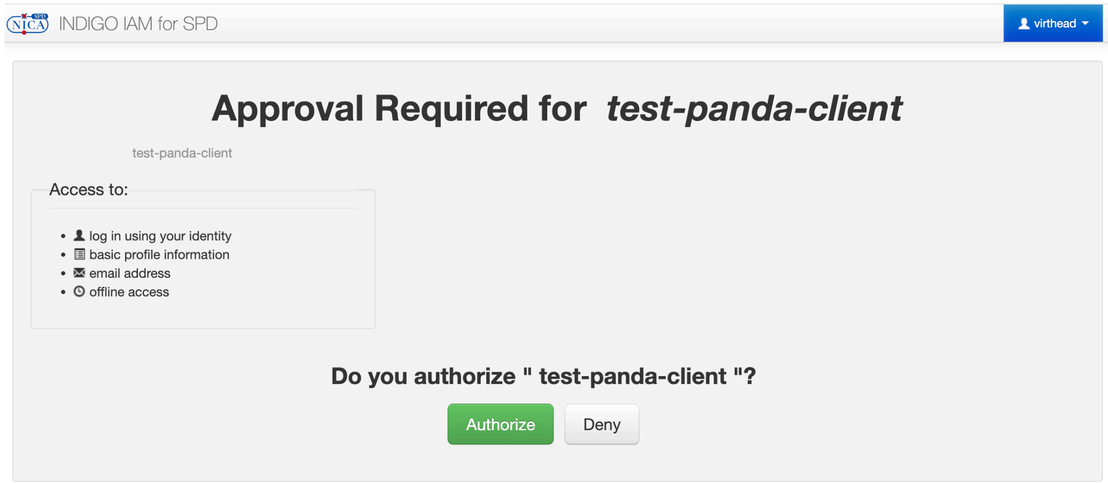


- Distributed data managed by Rucio
- Tested throughly to be sure that it can handle our needs
- Several daemons were developed to integrate Rucio with the SPD IAM (users, groups, quotas) and CRIC (storages configuration), an export module was developed to deliver storages usage info to PanDA
- Rucio clients installed at the CVMFS and available at lxui.jinr.ru
- Since this year, SPD has its own EOS in JINR, central production data were migrated, now there is ongoing migration of users directories
- An EOS instance in PNPI also used to store results of central MC productions
- We defined several logical partitions in Rucio to group data 2025_S1 for MC for the stage 1, 2025_S2 for MC for the stage 2, test for testing, lifetime and replication policies of data in each partition can be managed independently

PanDA IAM integration

- We use PanDA to manage workload
- A JWT based authentication was configured in PanDA
- Users can submit tasks via the command line client, or, preferable, via the Control Panel
- During task submission, in order to identify themselves, users being redirected to the SPD IAM
- The same identity is now used to log in to the Control Panel and to submit a task, it allows us to set up an end-to-end accounting
- PanDA supports auto user registration, so, unlike Rucio, there is no need to develop any identity import service
- PanDA system generates jobs for the tasks, defined via the control panel, and distributes them among the available computing resources, controls automatic retries of failed ones and handles errors

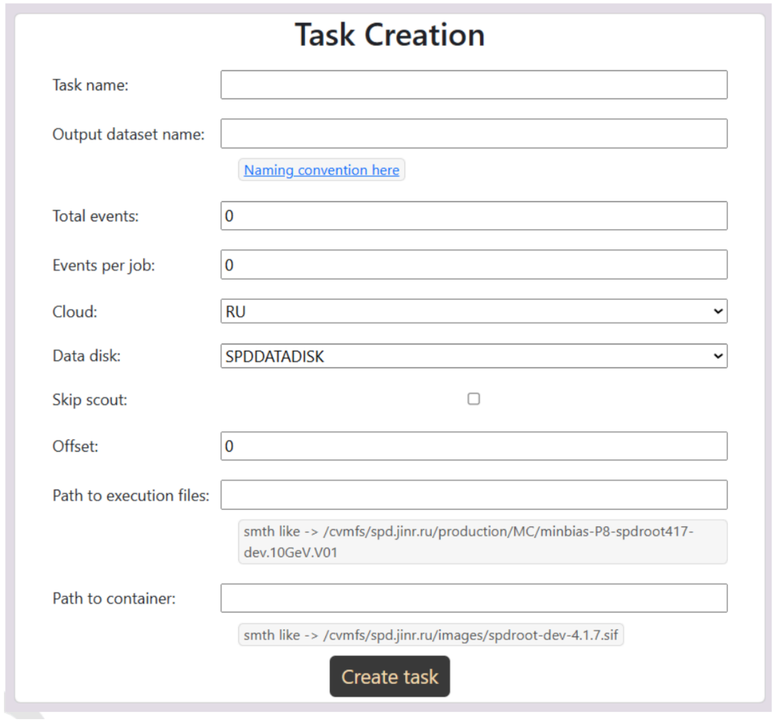
```
(test) [virthead@vm221-128 task]$ export PANDA_URL=http://vm221-128.jinr.ru:25080/server/panda
(test) [virthead@vm221-128 task]$ export PANDA_URL_SSL=https://vm221-128.jinr.ru:25443/server/panda
(test) [virthead@vm221-128 task]$ export PANDA_CONFIG_ROOT=/home/virthead/pandaclient
(test) [virthead@vm221-128 task]$ export PANDA_USE_NATIVE_HTTPLIB=1
(test) [virthead@vm221-128 task]$ export PANDA_AUTH=oidc
(test) [virthead@vm221-128 task]$ export PANDA_VERIFY_HOST=off
(test) [virthead@vm221-128 task]$ export SSL_CERT_DIR=/etc/grid-security/certificates/
(test) [virthead@vm221-128 task]$ export PANDA_AUTH_VO=spd.nica.jinr:production
(test) [virthead@vm221-128 task]$ python testOpenCharm_simu.py
INFO : Please go to https://spd-iam.jinr.ru/device?user_code=Y1XBDB and sign in. Waiting until authentication is completed
INFO : Ready to get ID token?
[y/n]
y
INFO : All set
(0, [True, 330, None])
```



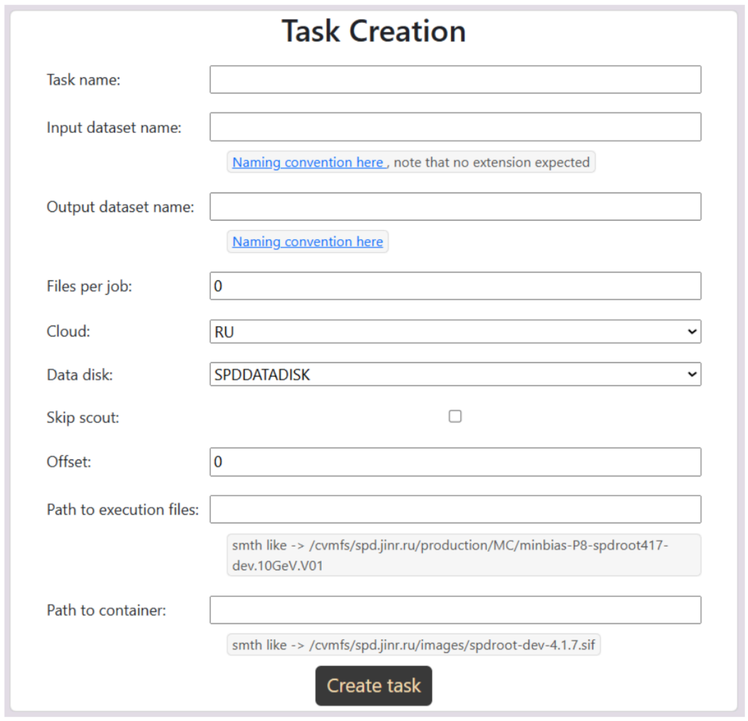
	jeditaskid [PK] bigint	taskname character varying (256)	status character varying (64)	username character varying (128)
266	346	PROD2025-009.SIM.1	done	Elena Zemlyanichkina
267	347	PROD2025-009.RECO.1	finished	Elena Zemlyanichkina
268	348	MC2025_S1-003-SIM.1	aborted	Artem Petrosyan
269	349	MC2025_S1-003-SIM.1	aborted	Artem Petrosyan
270	350	MC2025_S1-003-SIM.1	aborted	Artem Petrosyan
271	351	MC2025_S1-003-SIM.3	aborted	Artem Petrosyan
272	352	MC2025_S1-003-SIM.3	failed	Artem Petrosyan
273	353	MC2025_S1-003-SIM.4	done	Artem Petrosyan
274	354	PROD2025-010.SIM	done	Elena Zemlyanichkina
275	355	PROD2025-010.RECO	finished	Elena Zemlyanichkina

Control panel of the production manager 1/2

Simulation

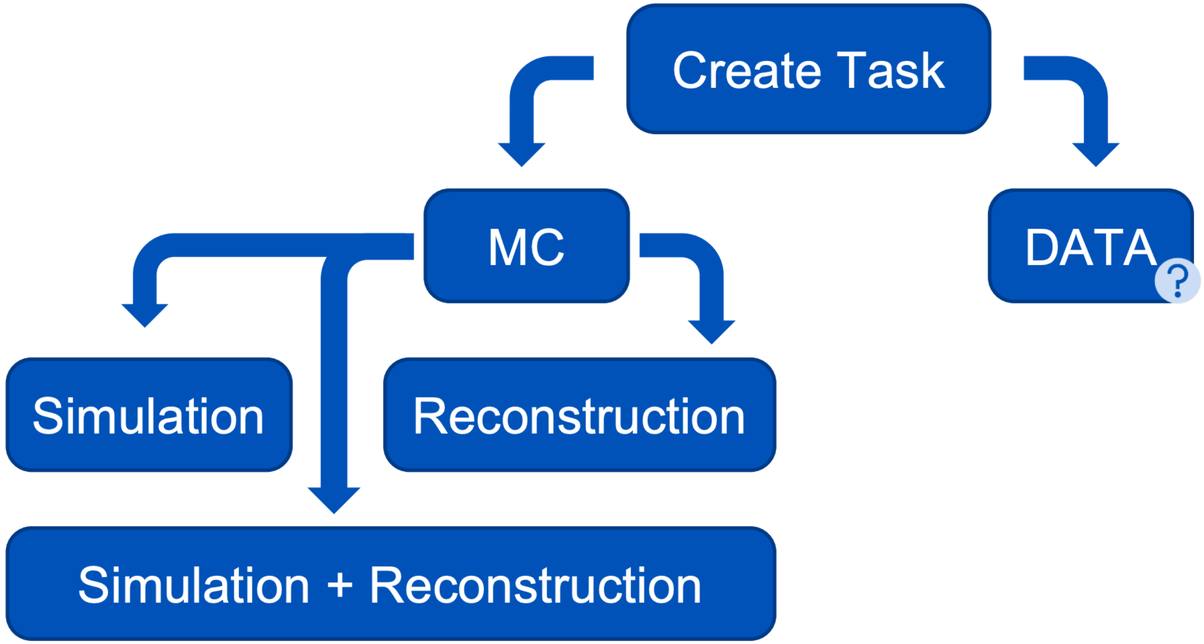


Reconstruction



- An application allowing users to easily define a MC chain processing via Web UI was put into pre-production in late 2024
- It is integrated with the SPD IAM, and, thus, allows to pass user information to PanDA

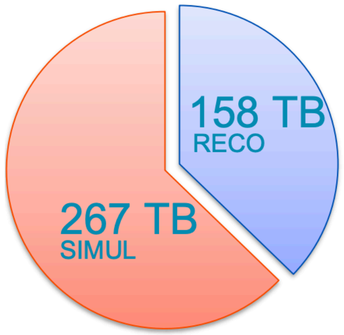
Control panel of the production manager 2/2

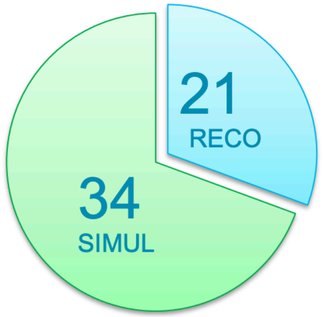


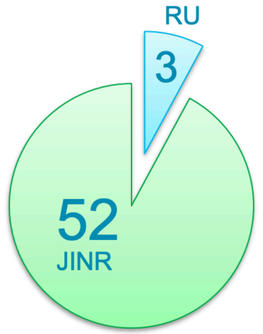
- The web ui allows one to define each processing step individually, as well as set the entire chain at once, task cloning mechanism is implemented
- During this year ~ 50 productions were processed basing on requests done by our production manager, Elena Zemlyanichkina

Central production stats

- Successfully processed about 300k jobs across 55 tasks







- Total output datasets volume – more than 425 TB

Task ID	Task name ↑ ↓	Status	Start date	End date	Walltime	Total events	Events per job	Total jobs	Out DS size, GB	Out Log size, GB
364	PROD2025-014.SIM	done	03 May 2025	04 May 2025	24612	40000000	4000	10000	18358.86	1.96
363	PROD2025-013.RECO	finished	02 May 2025	04 May 2025	20	None	None	9992	18536.20	5.06
362	PROD2025-013.SIM.2	done	30 Apr 2025	02 May 2025	24899	40000000	4000	10000	18357.95	1.93
359	PROD2025-012.RECO	finished	28 Apr 2025	29 Apr 2025	24	None	None	9993	18546.74	5.08
358	PROD2025-012.SIM	done	25 Apr 2025	26 Apr 2025	23316	40000000	4000	10000	18360.80	1.89
357	PROD2025-011.RECO	done	23 Apr 2025	24 Apr 2025	10	None	None	1250	2319.57	0.63
356	PROD2025-011.SIM	done	22 Apr 2025	23 Apr 2025	22496	5000000	4000	1250	2295.55	0.24
355	PROD2025-010.RECO	finished	18 Apr 2025	18 Apr 2025	37	None	None	1244	287.74	0.49
354	PROD2025-010.SIM	done	17 Apr 2025	17 Apr 2025	0	5000000	4000	1250	259.39	0.13
353	MC2025_S1-003-SIM.4	done	17 Apr 2025	17 Apr 2025	0	1000	100	10	0.21	0.00

Contents of the productions

- Modeling and reconstruction are made for p-p collisions with SpdRoot framework, which includes
  - geometric description of the SPD detector,
  - particle propagation with Geant4,
  - simplified simulation of detector response,
  - reconstruction algorithms.
- At the current stage of development, redundant information about particle interactions within the detector is still being retained; this will be subject to future event-size optimization as well as optimization during the modeling and reconstruction phases

Productions requests spreadsheet

Production name/ID	Status	Description					Software type/version	Short description (for datasets naming)	Number of events	Events per file	Initial seed	Processing type
		Stage	Collision type	Geometry type	Energy	Polarization						
PROD2025-010	Done	S1	dd	Micromegas, TS, ECal, RS, BBC, ZDC (sketch)	4 GeV	UU	spdroot-dev-4.1.7.1	dd-minbias-FTF-spdroot4171-dev	5 000 000	4000	1-1250	reco
PROD2025-011	Done	S2	pp	DSSD, TS, TOF, ECal, FARICH, RS, BBC, ZDC (sketch)	27 GeV	UU	spdroot-dev-4.1.7.2	minbias-P8-spdroot4172-dev test	5 000 000	4000	1-1250	simu reco
PROD2025-012	Done	S2	pp	DSSD, TS, TOF, ECal, FARICH, RS, BBC, ZDC (sketch)	27 GeV	UU	spdroot-dev-4.1.7.2	minbias-P8-spdroot4172-dev test	40 000 000	4000	1-10000	simu reco
PROD2025-013	Done	S2	pp	DSSD, TS, TOF, ECal, FARICH, RS, BBC, ZDC (sketch)	27 GeV	UU	spdroot-dev-4.1.7.2	minbias-P8-spdroot4172-dev test	40 000 000	4000	10001-20000	simu reco
PROD2025-014	Runnig	S2	pp	DSSD, TS, TOF, ECal, FARICH, RS, BBC, ZDC (sketch)	27 GeV	UU	spdroot-dev-4.1.7.2	minbias-P8-spdroot4172-dev test	40 000 000	4000	20001-30000	simu reco
PROD2025-015	Ready	S2	pp	DSSD, TS, TOF, ECal, FARICH, RS, BBC, ZDC (sketch)	27 GeV	UU	spdroot-dev-4.1.7.2	minbias-P8-spdroot4172-dev test	40 000 000	4000	30001-40000	simu reco
PROD2025-016	Ready	S2	pp	DSSD, TS, TOF, ECal, FARICH, RS, BBC, ZDC (sketch)	27 GeV	UU	spdroot-dev-4.1.7.2	minbias-P8-spdroot4172-dev test	40 000 000	4000	40001-50000	simu reco

- At the first we agreed to keep all production requests in the Google doc spreadsheet

Productions requests db 1/2

SPD Data processing

Requests Config API artem.petrosyan@ji…

Export Columns 17/23 Filter Reload Processing Request list 100

Request	campaign	status	# procs	swproject	version	stage	C	E	P	Events	EF	Tag	S	S	Geometry	description
17 PROD2025-001	SPD MC 2025	DONE	0	spdroot-dev	4.1.7.0	S1	pp	10	UU	5000000	4000	minbias-P8-spdroot417-dev test	1	1250	Micromegas, TS, ECal, RS, BBC, ZDC (sketch)	PRE-PRODUCTION obsolete
16 PROD2025-002	SPD MC 2025	DONE	0	spdroot-dev	4.1.7.0	S1	pp	10	UU	20000000	4000	minbias-P8-spdroot417-dev	1	5000	Micromegas, TS, ECal, RS, BBC, ZDC (sketch)	/eos/nica/spd/users/elenazem/productions/PROD2025-002_recofiles.txt PROD2025-002_paramfiles.txt
15 PROD2025-003	SPD MC 2025	DONE	0	spdroot-dev	4.1.7.0	S1	pp	10	UU	20000000	4000	minbias-P8-spdroot417-dev	5001	10000	Micromegas, TS, ECal, RS, BBC, ZDC (sketch)	/eos/nica/spd/users/elenazem/productions/PROD2025-003_recofiles.txt PROD2025-003_paramfiles.txt
14 PROD2025-004	SPD MC 2025	DONE	0	spdroot-dev	4.1.7.0	S1	pp	10	UU	40000000	4000	minbias-P8-spdroot417-dev	1	10000	Micromegas, TS, ECal, RS, BBC, ZDC (sketch)	/eos/nica/spd/users/elenazem/productions/PROD2025-004_recofiles.txt PROD2025-004_paramfiles.txt
13 PROD2025-005	SPD MC 2025	DONE	0	spdroot-dev	4.1.7.1	S1	pp	5	UU	5000000	4000	minbias-FTF-spdroot4171-dev	1	1250	Micromegas, TS, ECal, RS, BBC, ZDC (sketch)	/eos/nica/spd/users/elenazem/productions/PROD2025-005_recofiles.txt PROD2025-005_paramfiles.txt
12 PROD2025-006	SPD MC 2025	DONE	0	spdroot-dev	4.1.7.1	S1	pp	10	UU	5000000	4000	minbias-FTF-spdroot4171-dev	1	1250	Micromegas, TS, ECal, RS, BBC, ZDC (sketch)	/eos/nica/spd/users/elenazem/productions/PROD2025-006_recofiles.txt PROD2025-006_paramfiles.txt

- At the second we decided to create a special application to manage requests

Productions requests db 2/2

SPD Data processing

Requests Config API artem.petrosyan@ji…

Export Columns 8/10 Filter Reload Processing Request list 100

ID	Request	type	script	dsn_pattern	input_datasets	output_datasets	description
3	3 PROD2025-016	simu	/cvmfs/spd.jinr.ru/production/MC/minbias-P8-spdroot4172-dev.27GeV.V02/simu.C	MC2025_S2:minbias-P8-spdroot4172-dev.27GeV-UU.PROD2025-016.SIM*		MC2025_S1:MC2025_S1.minbias-P8-spdroot4172-dev.27GeV-UU.PROD2025-016.SIM.1.S, MC2025_S1:MC2025_S1.minbias-P8-spdroot4172-dev.27GeV-UU.PROD2025-016.SIM.1.P, MC2025_S1:MC2025_S1.minbias-P8-spdroot4172-dev.27GeV-UU.PROD2025-016.SIM.1.log	P8, FARICH PID for pi/K/p fixed, additional to PROD2025-012
4	4 PROD2025-016	reco	/cvmfs/spd.jinr.ru/production/MC/minbias-P8-spdroot4172-dev.27GeV.V02/reco.C	MC2025_S2:minbias-P8-spdroot4172-dev.27GeV-UU.PROD2025-016.RECO*		MC2025_S1:MC2025_S1.minbias-P8-spdroot4172-dev.27GeV-UU.PROD2025-016.RECO.1.log, MC2025_S1:MC2025_S1.minbias-P8-spdroot4172-dev.27GeV-UU.PROD2025-016.RECO.1.R	eos/nica/spd/users/elenazem/productions/PROD2025-016_recofiles.txt PROD2025-016_paramfiles.txt
1	1 PROD2025-017	reco	/cvmfs/spd.jinr.ru/production/MC/minbias-P8-spdroot4172-dev.27GeV.V02_D0sig/reco.C	MC2025_S2:minbias-P8-spdroot4172-dev.27GeV-UU.PROD2025-017.RECO*		MC2025_S1:MC2025_S1.minbias-P8-spdroot4172-dev.27GeV-UU.PROD2025-017.RECO.1.log, MC2025_S1:MC2025_S1.minbias-P8-spdroot4172-dev.27GeV-UU.PROD2025-017.RECO.1.R	/eos/nica/spd/users/elenazem/productions/PROD2025-017_recofiles.txt PROD2025-017_paramfiles.txt
2	2 PROD2025-017	simu	/cvmfs/spd.jinr.ru/production/MC/minbias-	MC2025_S2:minbias-		MC2025_S1:MC2025_S1.minbias-P8-	P8, FARICH PID for pi/K/p fixed, open-charm signal

- Since this is a database it can be used for some analysis, extended, integrated with other services, etc.

Processing monitoring

PanDA Dash Tasks Jobs Errors Users Sites Harvester My BigPanDA — Job by ID — Enter... — Help — Danila

Harvester workers, last 12 hours — 6d5c69db8ef4 | 06:26:44, Refresh

13263 workers in this selection

Harvester instance: SPD-221-126

Harvester ID	Owner	Hostname	SW version	Started	Last updated	Commit stamp	Description
SPD-221-126	Petrosyan Artem Shmavonovich	vm221-126.jinr.ru	0.5.15	2025-09-26 07:21:03	2025-09-29 06:22:16	14-01-2025 14:08:16 on flin (by mightqxc)	SPD Harvester @ vm221-126.jinr.ru

Harvester worker attributes summary

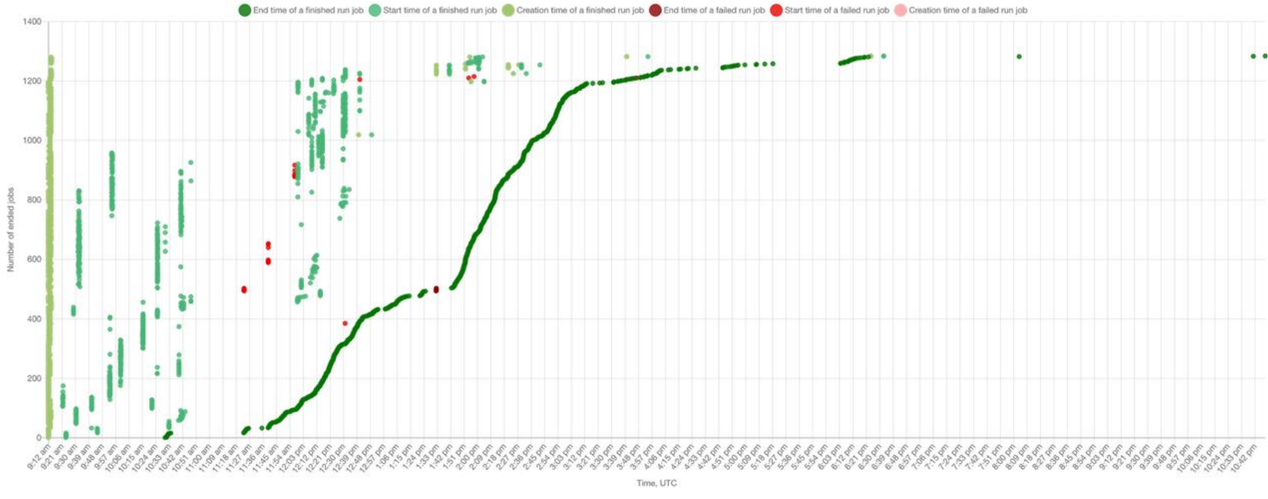
computingelement (5)	lcgce01.jinr.ru:443 (5002) ce03.jinr-t1.ru:443 (3612) gt2.pnpi.nw.ru:443 (4069) spd.ssau.ru:443 (290) alice30.grid.pu.ru:443 (290)
computingsite (5)	JINR_SPD_PROD (8310) PNPI_SPD_PROD (4069) SSAU_SPD_PROD (290) SPbSU_SPD_PROD (290) JINR_SPD_TEST (304)
harvesterid (1)	SPD-221-126 (13263)
jobtype (1)	ANY (13263)
nativestatus (4)	completed (12258) held (611) None (386) running (8)
resourcetype (1)	SCORE (13263)
status (5)	finished (12253) cancelled (571) idle (30) submitted (401) running (8)

Workers | Jobs | Worker Statistics | Diagnostic Messages

Show 10 entries — Search:

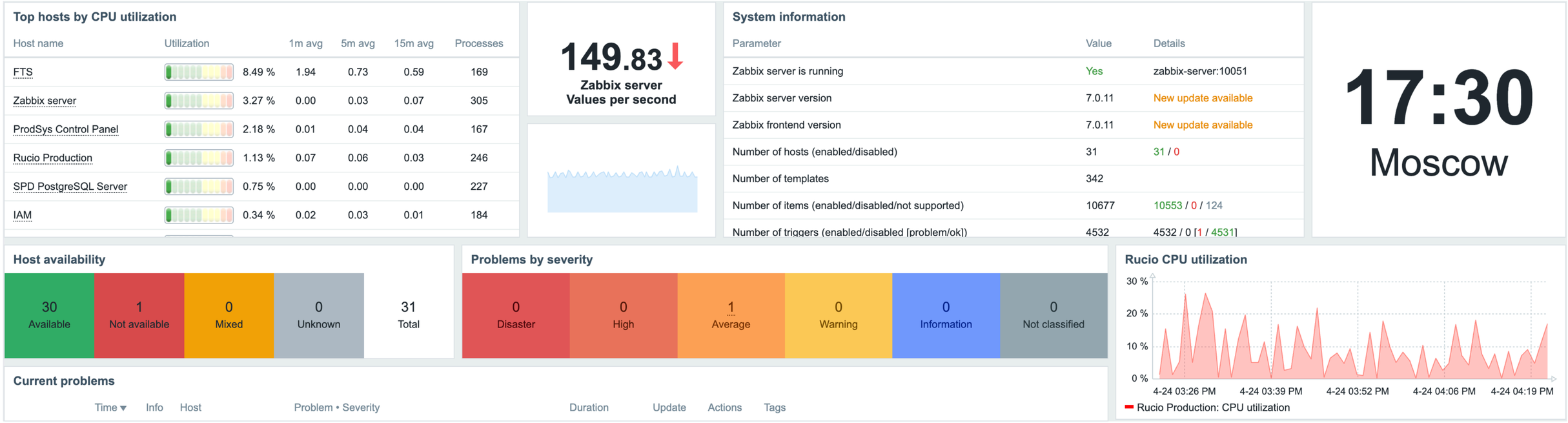
The table for realtime statistics of harvester workers

Harvester instance	Computing site	Resource type	Status	Number of workers	Last update
SPD-221-126	SPbSU_SPD_PROD	SCORE	to_submit	0	2025-09-29 06:27:26
SPD-221-126	SPbSU_SPD_PROD	SCORE	finished	570	2025-09-29 06:27:26
SPD-221-126	SPbSU_SPD_PROD	SCORE	submitted	10	2025-09-29 06:27:26
SPD-221-126	SPbSU_SPD_PROD	SCORE	running	0	2025-09-29 06:27:26
SPD-221-126	PNPI_SPD_PROD	SCORE	submitted	100	2025-09-29 06:27:26
SPD-221-126	PNPI_SPD_PROD	SCORE	to_submit	0	2025-09-29 06:27:26
SPD-221-126	PNPI_SPD_PROD	SCORE	running	9	2025-09-29 06:27:26
SPD-221-126	PNPI_SPD_PROD	SCORE	finished	7237	2025-09-29 06:27:26



PanDA monitoring covers almost all aspects of the calculations process, and also provides different types of plots

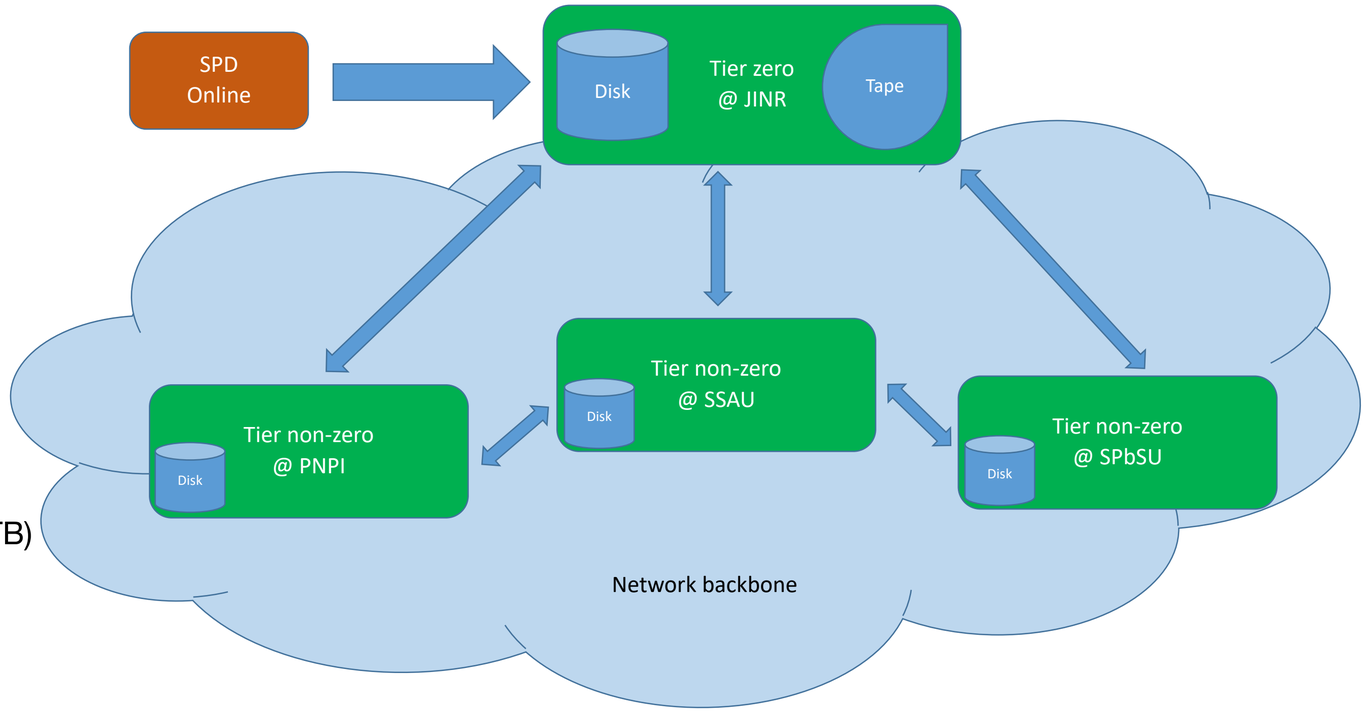
Services monitoring



- We deployed an instance of Zabbix in order to enable monitoring of our growing infrastructure
- At the moment it is very basic setup but we expect to have an integrated monitoring with panels from service-specific metrics, not only OS metrics like CPU utilization, etc.

What is currently deployed in total

- JINR
  - Production system services (prod and devel instances)
  - Computing (2200 cores), usually up to 1500
  - Storage (7.2 PB raw with 27% redundancy = 5.3 PB)
  - Monitoring (somewhat)
- PNPI
  - Computing (288 cores)
  - Storage (190 TB redundant)
  - Monitoring
- SSAU
  - Computing (256 cores)
  - Storage is on the way (240 TB raw with 17% redundancy = 200 TB)
- SPbSU
  - Computing (272 cores)
  - Storage is being configured
- MEPhI
  - Ongoing negotiations



What is yet missing

- Monitoring coverage for core services
  - Zabbix configuration is ongoing
  - We need to monitor health of services, not just servers
  - Visualization (dashboards, etc.)
- Periodic infrastructure tests
  - PerfSONAR dashboard
  - Job submission tests
  - Worker node health tests
  - Data transfer tests
- Full transition to tokens
  - EOS-side configuration
  - ARC CE-side configuration

Conclusions

- Data processing based on the prepared computing environment goes well, Monte Carlo data is being prepared pretty quickly with the help of the following computing centers: JINR, PNPI, Samara and SPbSU
- Two systems were developed pretty quickly in order to add more automation into process of tasks management: requests and control panel
- Data processing is done almost automatically: PanDA splits the tasks into jobs and finds the most suitable computing nodes for them
- Transfers between storages are done in the automatic way with help of FTS
- Data management provides not only automatic replication, but also allows to manage data lifetime: datasets in “test” partition have shorter lifetime than datasets in “2025_S1” and “2025_S2”
- One point of entry allows to manage users and their access rights, as well as applications which are allowed to work in the environment
- The results are stored at the common storages and available to all users
- The system copes well with the load

Next steps

- User interfaces development
  - UI/UX improvement of the Control panel
  - New features like tasks cloning mechanism in the Control Panel
  - Monitoring and analysis tools
- Integration with the new applied software framework Sampo, transition from SPDRoot to Sampo
- More operation activity along with improvement of the system
  - Finish transition to tokens at services level
- Add more automation for the routine procedures
  - Import users from the SSO database to the IAM automatically basing on LDAP groups
- Users support
  - Finish users data migration from the central JINR EOS to the dedicated one
- Documentation

Thank you!