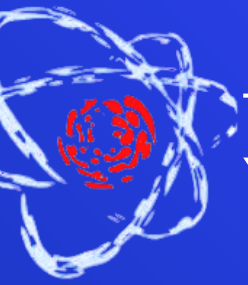


The XXVI International Scientific Conference of Young Scientists and Specialists

Information Systems for the BM@N experiment and Common Deployment Service

A. Chebotov
on behalf of the BM@N experiment
Veksler and Baldin Laboratory of High Energy Physics, JINR

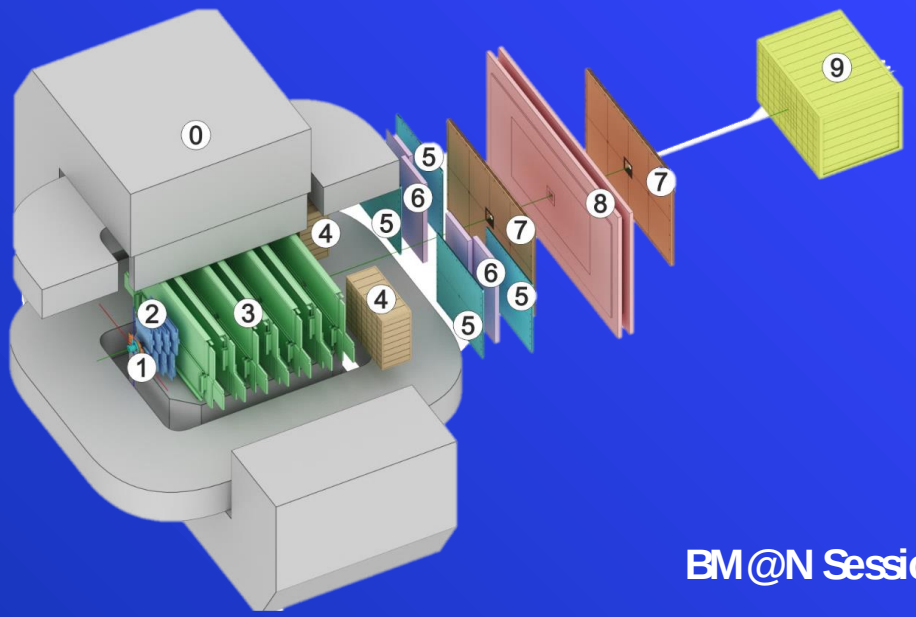
27.10.2022

Nuclotron-based Ion Collider fAcility

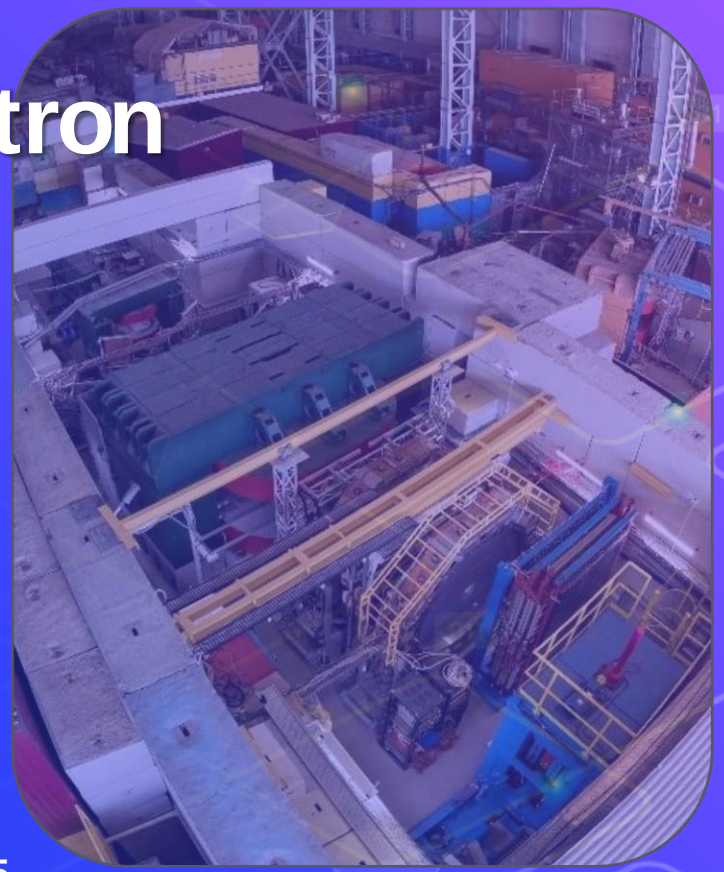
- Baryonic Matter at Nuclotron (BM@N)
- Multi-Purpose Detector (MPD)
- Spin Physics Detector (SPD)

- Official site: bmn.jinr.ru
- Official site: mpd.jinr.ru
- Official site: spd.jinr.ru

Baryonic Matter @ Nuclotron



- Magnet SP-41 (0)
- Triggers: BD + SiD (1
- Forward Silicon (2)
- GEM (3)
- ECAL (4)
- CSC 1x1 m^2 (5)
- TOF 400 (6)
- CSC 2x1.5 m^2 (7)
- TOF 700 (8)
- ZDC (9)



BM@N Sessions(2015 – 2022)

❖ Session №51 (d,C)	Feb. 22 – Mar. 15, 2015
❖ Session №52 (d)	June 29 – June 30, 2016
❖ Session №53 (d, $d^{\uparrow}$)	Dec. 9 – Dec. 23, 2016
❖ Session №54 (C)	Mar. 7 – Mar. 18, 2017
❖ Session №55 (C,Ar,Kr)	Mar. 3 – Apr. 05, 2018
❖ Session №57 (Xe)	Nov – Dec, 2022

e-Log platform

Event	Subscription
New record of the 'Configuration' type.	☐
New record of the 'Inform All' type.	☐
New record of the 'New Run' type.	☐
New record of the 'Other' type.	☐
New record of the 'Problem Fixed' type.	☐
New record of the 'Problem report' type.	☐
New record of the 'Routine' type.	☐

What is an e-Log and why is it needed?

- The online electronic logbook allows shift members to record information on current events, states of various systems, operation conditions of detectors., which are further used in processing and physics analysis of the particle collision events.
- The system provides collaboration members with tools for convenient viewing, managing and searching for the required information in the logbook.

Logbook

Account

Page: 1 of 318

	Shift Leader	Type	№ Run	Trigger	DAQ Status	SP-41, A	SP-57, A	VKM2, A	Beam	Energy, GeV	Target
2022-03-15 17:01:41	Ksenia Alishina	New Run	1546 per.8	ARM-OR + Laser	Without LAND and ToFCal ArmOr+Laser 10Hz on	1650	0	0	C	3.6	SRC Lead 3 (3 mm)
2022-03-15 16:57:14	Ksenia Alishina	New Run	1544 per.8	ARM-OR + Laser	Without LAND and ToFCal ArmOr+Laser 10Hz on	1650	0	0	C	3.6	SRC Lead 3 (3 mm)
2022-03-15 16:54:46	Ksenia Alishina	New Run	1543 per.8	ARM-OR + Laser	Without LAND and ToFCal ArmOr+Laser 10Hz on	1650	0	0	C	3.6	SRC Lead 3 (3 mm)
2022-03-15 16:54:28	Ksenia Alishina	New Run	1542 per.8	ARM-OR + Laser	Without LAND and ToFCal ArmOr+Laser 10Hz on	1650	0	0	C	3.6	SRC Lead 3 (3 mm)
2022-03-15 16:53:20	Ksenia Alishina	New Run	1541 per.8	ARM-OR + Laser	Without LAND and ToFCal ArmOr+Laser 10Hz on	1650	0	0	C	3.6	SRC Lead 3 (3 mm)
2022-03-15 16:52:01	Ksenia Alishina	New Run	1540 per.8	ARM-OR + Laser	Without LAND and ToFCal ArmOr+Laser 10Hz on	1650	0	0	C	3.6	SRC Lead 3 (3 mm)
2022-03-15 16:49:34	Ksenia Alishina	New Run	1538 per.8	ARM-OR + Laser	Without LAND and ToFCal ArmOr+Laser 10Hz on	1650	0	0	C	3.6	SRC Lead 3 (3 mm)
2022-03-15 16:49:16	Ksenia Alishina	New Run	1537 per.8	ARM-OR + Laser	Without LAND and ToFCal ArmOr+Laser 10Hz on	1650	0	0	C	3.6	SRC Lead 3 (3 mm)
2022-03-15 16:48:52	Ksenia Alishina	New Run	1536 per.8	ARM-OR + Laser	Without LAND and ToFCal ArmOr+Laser 10Hz on	1650	0	0	C	3.6	SRC Lead 3 (3 mm)
2022-03-15 16:48:35	Ksenia Alishina	New Run	1535 per.8	ARM-OR + Laser	Without LAND and ToFCal ArmOr+Laser 10Hz on	1650	0	0	C	3.6	SRC Lead 3 (3 mm)

2022 - software team (contact e-mail: gertsen@jinr.ru)

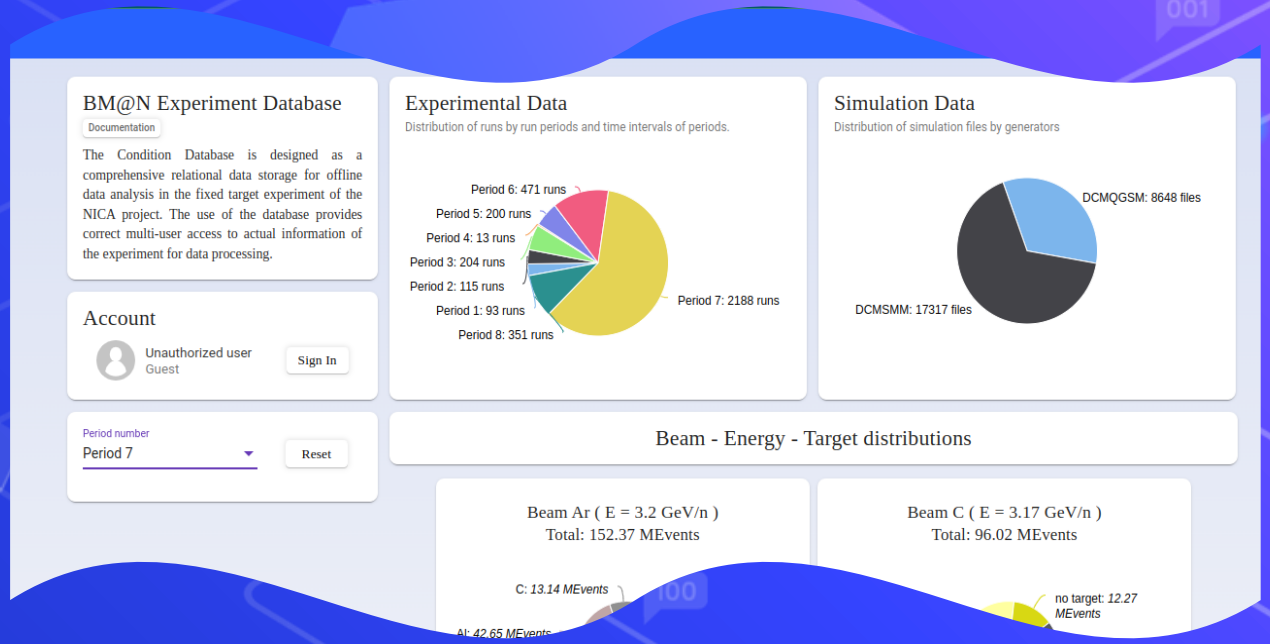
PostgreSQL

https://bmn-elog.jinr.ru

Condition Database

What is a Condition Database?

- This system is intended for storage, control, as well as search, selection and use of the necessary parameters and operating modes of detectors and experimental systems in processing experimental and simulated particle collision events.
- The main property of stored parametric data is that it changes over time and is used to process data collected only during the validity period of the corresponding parameter.



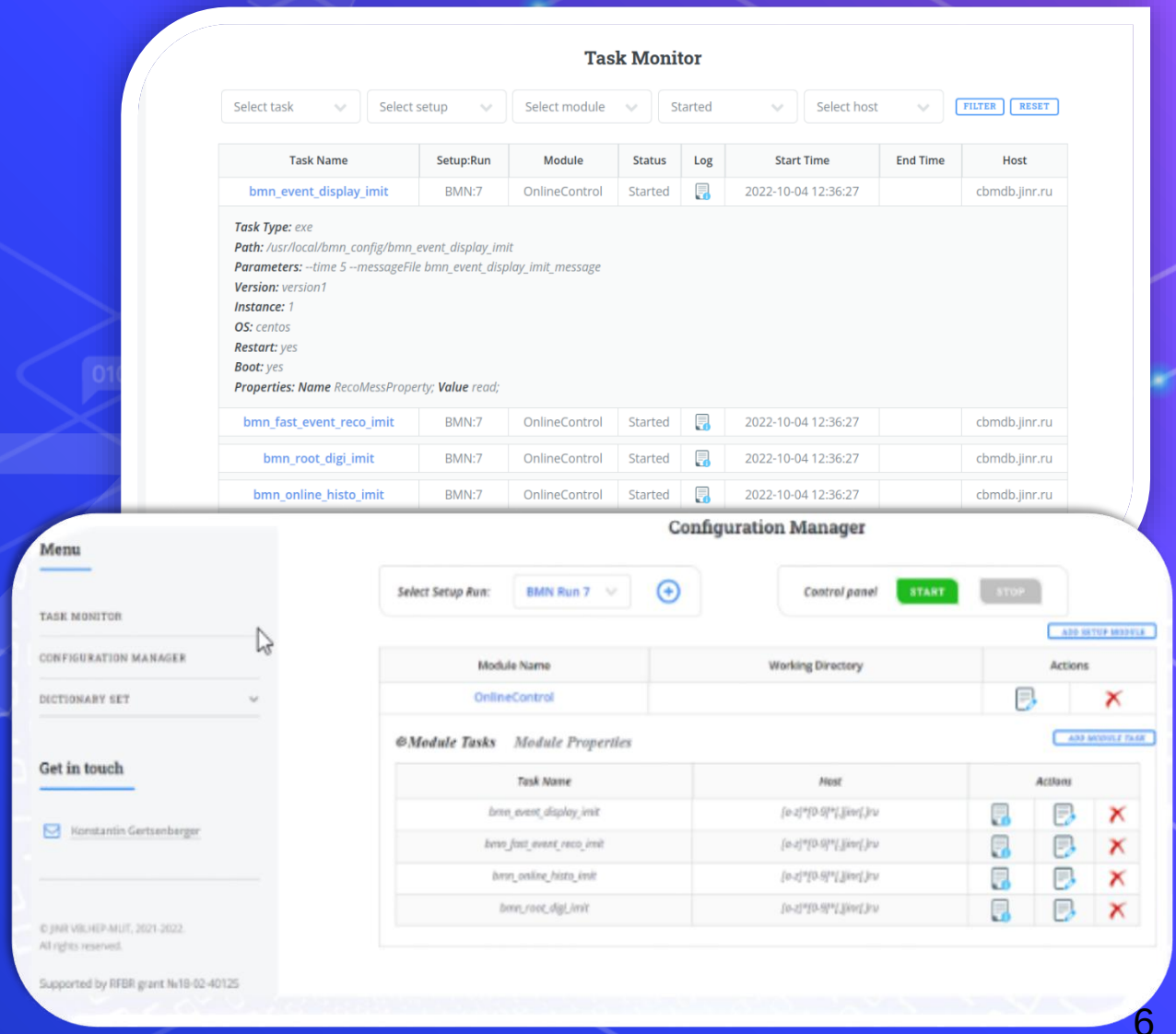
HIGHCHARTS ANGULAR node docker

https://bmn-unidb.jinr.ru

Configuration information system

What is a Configuration system?

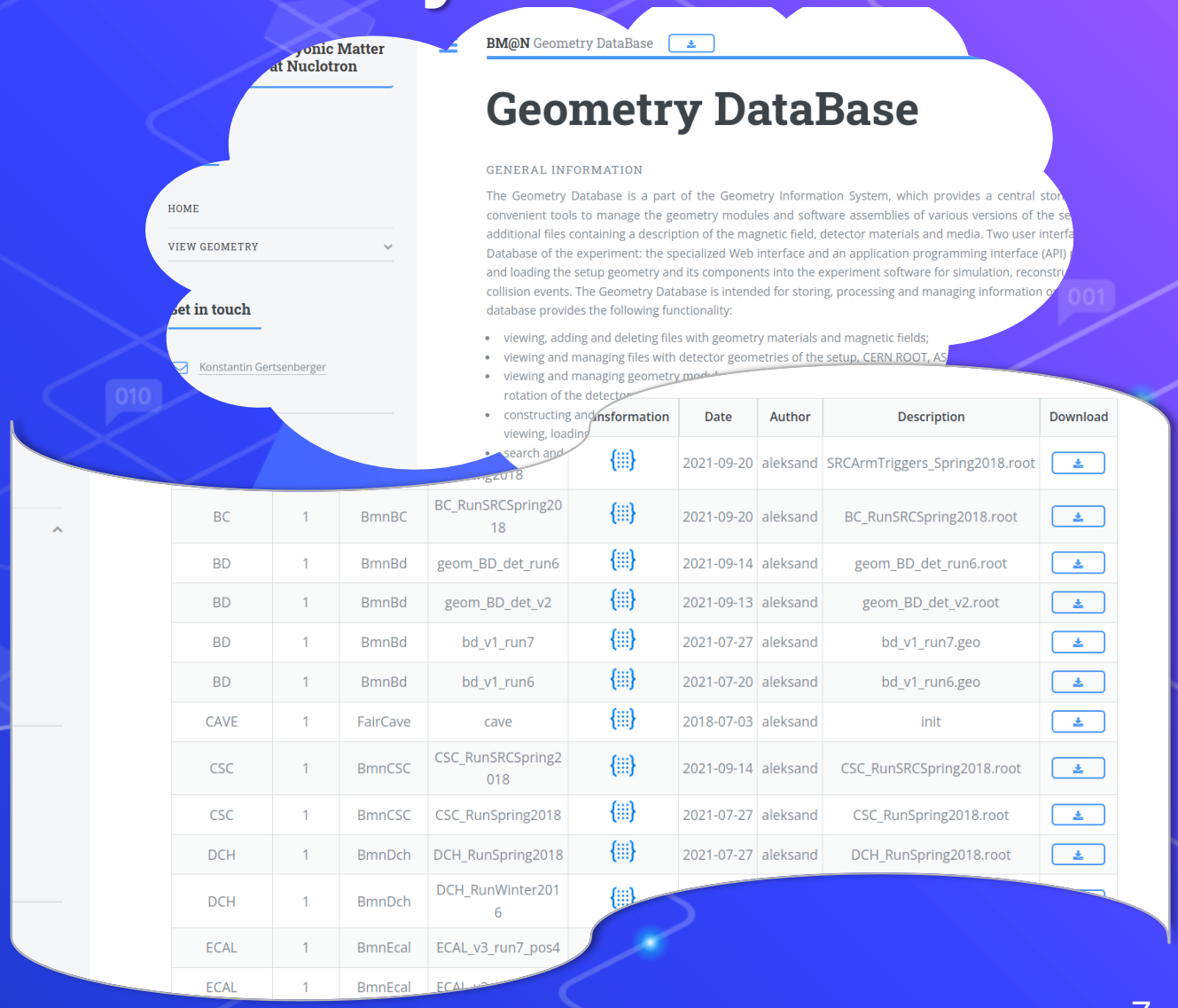
- The Configuration Information System stories a set of various configuration parameters, such as those required for setting the detectors into operation modes, for instance, working voltage, and descriptions of a sequence of software tasks to be started.
- System starts the described software tasks in the a required sequence and allows managing them during sessions, including the transmission of messages between tasks and the update of some properties.



Geometry information system

What is a Geometry system?

- The developed geometry information system provides a centralized repository of experimental setup geometries and a set of convenient tools for managing individual components and assemblies of various versions.
- Different versions of setup geometries and constituent components are used to process obtained particle collision events in simulation and physics data analysis

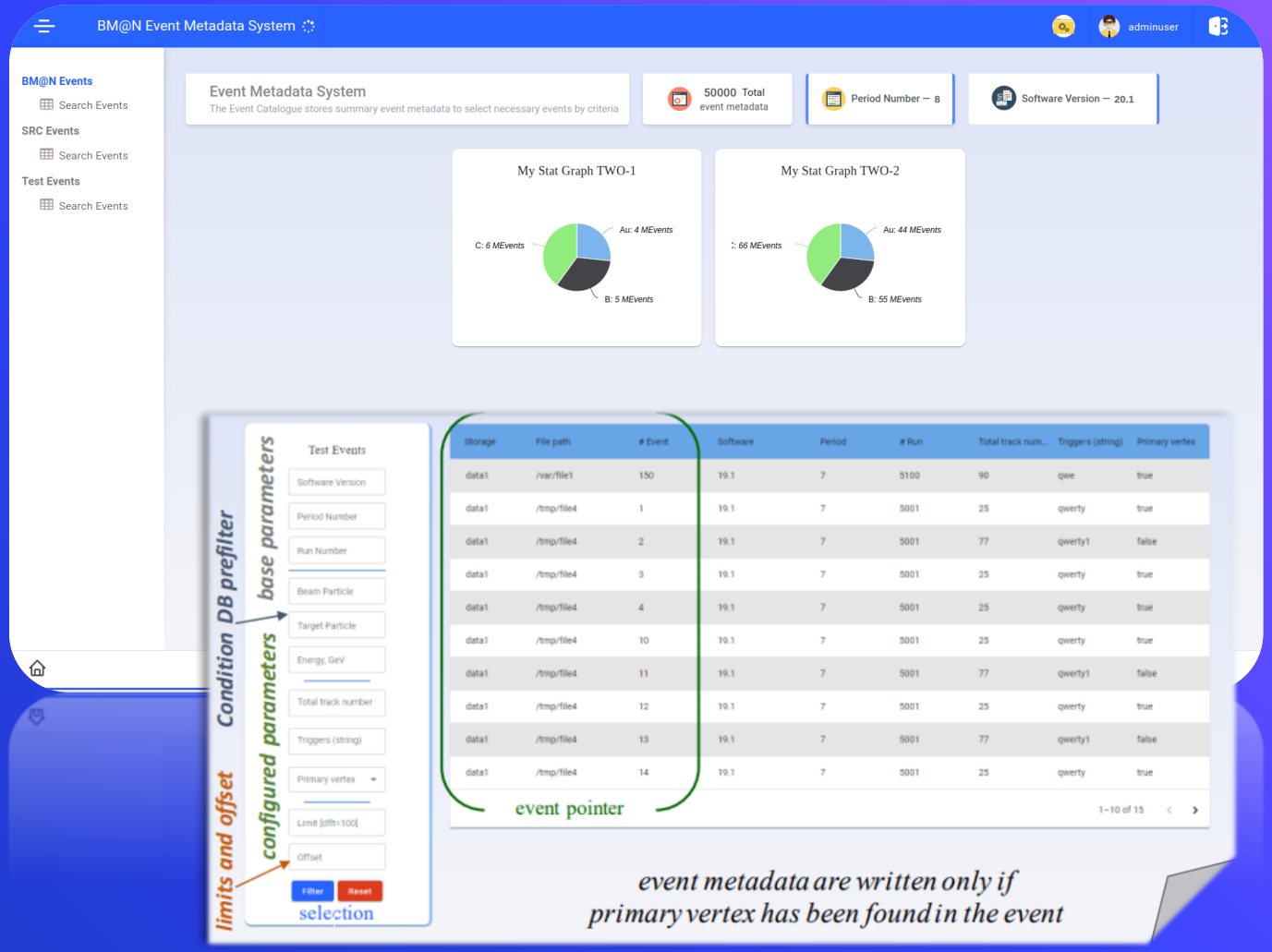


https://bmn-geodb.jinr.ru

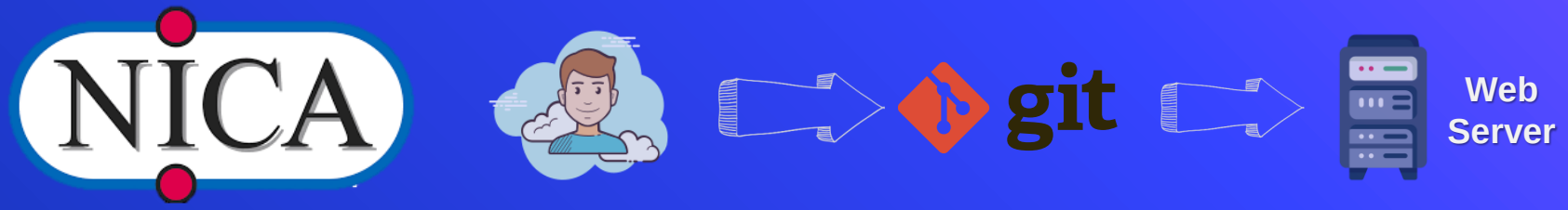
Event metadata system

What is Event metadata?

- The implemented information system is based on an event database called the Event Catalogue, which contains summary information about on particle collision events, allowing the user to quickly search for a set of events required for a particular physics analysis according to given criteria.



Common deployment services for e-Log platform




```
"addColumns" : [
    {"column" : "sp_41;int null;SP-41, A"},
    {"column" : "sp_57;int null;SP-57, A"},
    {"column" : "vkm2;int null;VKM2, A"}
],
```

Custom column for BM@N

Server for Database

```
{
  "administrator" : {
      "group": "elogadmin"
  },
  "writer" : {
      "group": "elogwriter"
  },
  "reader" : {
      "group": "elogreader"
  }
}
```

Accounts for IPA authorization

```
{
  "administrator" : {
      "login": "admin_user",
      "password": "admin_pass"
  },
  "writer" : {
      "login": "writer_user",
      "password": "writer_pass"
  },
  "reader" : {
      "login": "reader_user",
      "password": "reader_pass"
  }
}
```

Accounts for database authorization

```
{
  "dbHost"     : "db_host.jinr.ru",
  "dbHostUser" : "db_host_user",

  "dbName"   : "elog_db",
  "dbPort"   : 5432,
  "dbBackup" : "",

  "ipaAuth" : false,
  "ipaHost" : "",

  "addColumns" : [
      {"column" : "sql_column_name1;sql_column_type1 null;column_title1"},
      {"column" : "sql_column_name2;sql_column_type2 not null;column_title2"
  ],

  "expName" : "NICA",
  "expType" : 0,
  "expLogo" : "nica.png",
  "expUrl"  : "https://nica.jinr.ru",

  "notifySend"   : true,
  "notifyServer" : "mail.jinr.ru",
  "notifyLogin"  : "my_mail@jinr.ru",
  "notifyPass"   : "my_mail_password",

  "contactEmail" : "contact_person@jinr.ru",

  "useConditionDb"  : false,
  "conditionDbHost" : "uni_db_host.jinr.ru",
  "conditionDbPort" : 5432,
  "conditionDbName" : "uni_db",
  "conditionDbUser" : "writer_user",
  "conditionDbPass" : "writer_pass"
}
```

// host user for deployment of the Logbook database (remote or locally)

// e-Log database name // e-Log database port

// regular e-Log database backup, if needed (several storages are separated by semicolon)

// authentication/authorization type: false - as database roles; true - IPA/LDAP authentication/authorization

// custom (additional, specific to an experiment) columns defined in SQL-simular format, e.g. {"column" : "sp_41;int null;SP-41, A"}

// experiment type: 0 - fixed target experiment, 1 - collider experiment

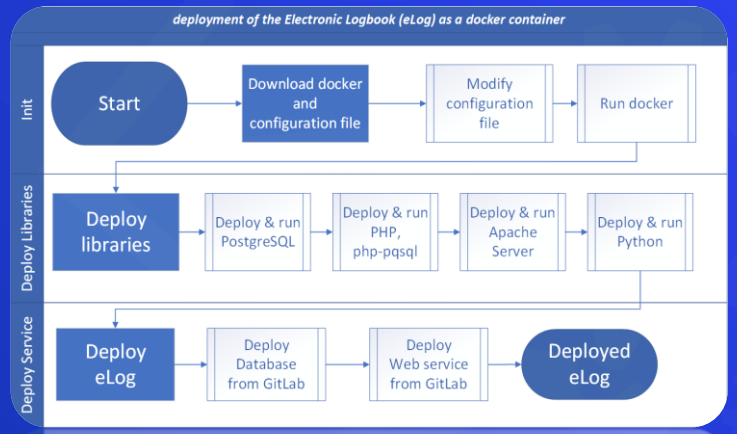
// whether activate notification system for various types of events (adding new run, editing run data, dictionary changes)

// transfer run information to the Condition Database of the NICA experiments

Configuration file for deployment

https://git.jinr.ru/nica_db/elog_platform

Common deployment services for e-Log platform



Base server (Web)

Base server (Web)

Run deploy script

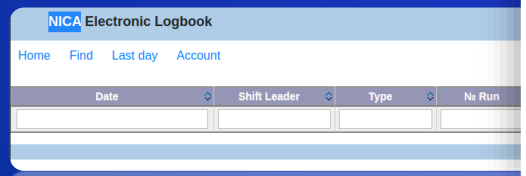
```
elog_platform]# docker ps -a
IMAGE     COMMAND                  CREATED             STATUS              PORTS                                   NAMES
nginx     "/docker-entrypoint.…"   About an hour ago   Up About an hour    0.0.0.0:80->80/tcp, :::80->80/tcp       elog_web
web_php   "/entry-elog-php.sh …"   About an hour ago   Up About an hour    9000/tcp                                elog_php
```

Server for Web

Copy SQL files

Server for Database

```
~]# docker ps -a
IMAGE             COMMAND                  CREATED         STATUS         PORTS                                       NAMES
postgres:12.4     "docker-entrypoint.s…"   2 hours ago     Up 2 hours     0.0.0.0:5432->5432/tcp, :::5432->5432/tcp   elog_db
```



https://git.jinr.ru/nica_db/elog_platform

Common deployment services for e-Log platform

"dbBackup" : "~/backup; backup_user@backup_server.jinr.ru:~/backup"

```
{
  "dbHost"     : "db_host.jinr.ru",
  "dbHostUser" : "db_host_user",

  "dbName"   : "elog_db",
  "dbPort"   : 5432,
  "dbBackup" : "",

  "ipaAuth" : false,
  "ipaHost" : "",

  "addColumns" : [
      {"column" : "sql_column_name1;sql_column_type1 null;column_title1"},
      {"column" : "sql_column_name2;sql_column_type2 not null;column_title2"
  ],

  "expName" : "NICA",
  "expType" : 0,
  "expLogo" : "nica.png",
  "expUrl"  : "https://nica.jinr.ru",

  "notifySend"   : true,
  "notifyServer" : "mail.jinr.ru",
  "notifyLogin"  : "my_mail@jinr.ru",
  "notifyPass"   : "my_mail_password",

  "contactEmail" : "contact_person@jinr.ru",

  "useConditionDb"  : false,
  "conditionDbHost" : "uni_db_host.jinr.ru",
  "conditionDbPort" : 5432,
  "conditionDbName" : "uni_db",
  "conditionDbUser" : "writer_user",
  "conditionDbPass" : "writer_pass"
}
```

// host user for deployment of the Logbook database (remote or locally)

// e-Log database name

// e-Log database port

// regular e-Log database backup, if needed (several storages are separated by semicolon)

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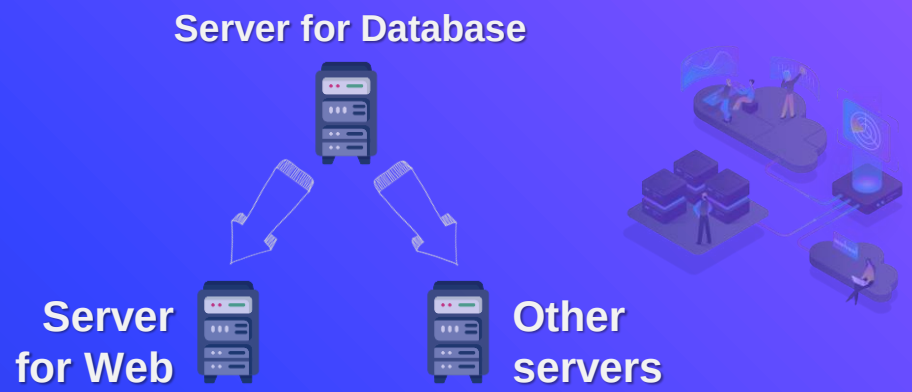
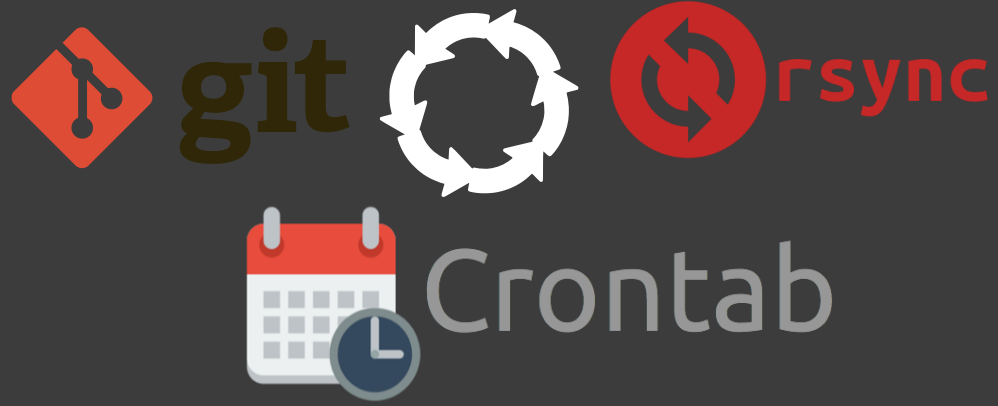


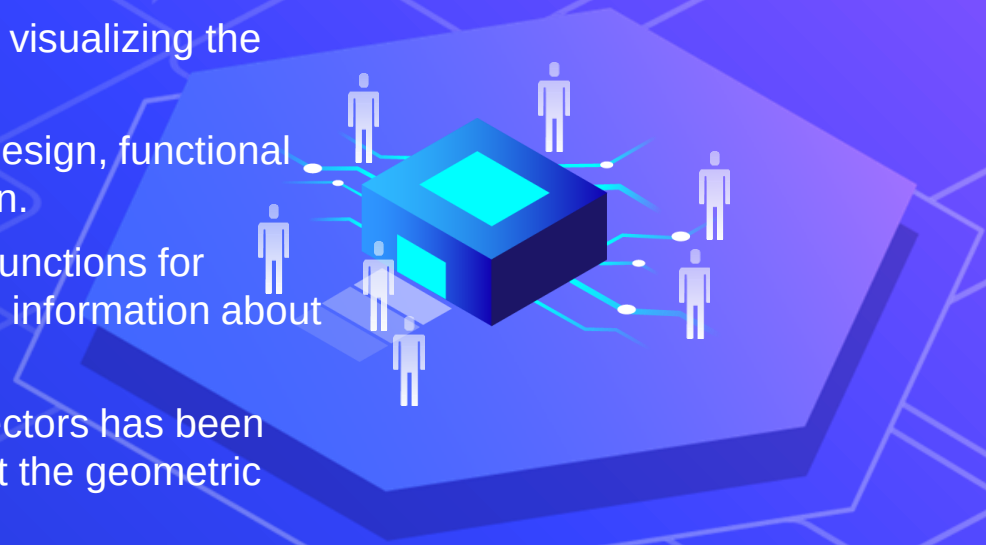


Tracking updates

https://git.jinr.ru/nica_db/elog_platform

Conclusions

- The complex of information systems have been developed that provides the collection, storage, organization of convenient, management of information necessary for processing and analyzing the data obtained throughout scientific research of the NICA megaproject.
- The e-Log platform is an information system for viewing, modifying and visualizing the information on the experiment sessions for shift crews.
- The Condition database system has been developed with an adaptive design, functional data selector and convenient tools for viewing and managing information.
- The Configuration system interface, which provides a set of necessary functions for monitoring active tasks, as well as for viewing, searching and managing information about the configuration of the experiment.
- The Geometry system for working with the geometry of experiment detectors has been implemented, designed to store, process and manage information about the geometric model of detectors.
- The Metadata system for particle collision events has been developed to automate the search and selection of only those events that are required to process the received data.
- A common installation system has been implemented for convenient deployment of the Electronic Logbook.



Thank you for your attention!