

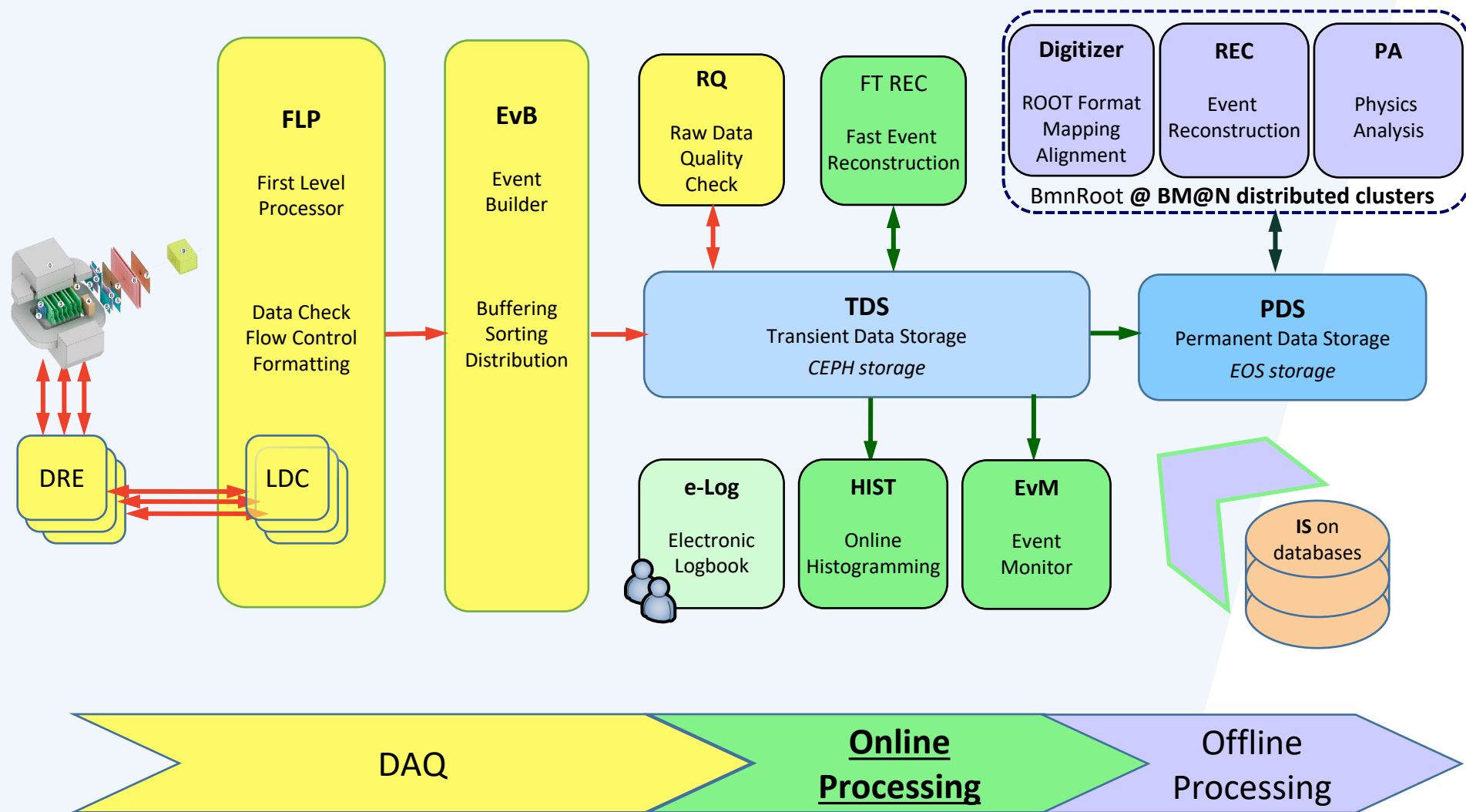
# BM@N Software Architecture Present and Future

Konstantin Gertsenberger

V. Veksler and A. Baldin Laboratory of High Energy Physics  
Joint Institute for Nuclear Research

on behalf of the BM@N collaboration

# BM@N Data Processing Pipeline



# Electronic Logbook

*funded by the RFBR Grant No.18-02-40125*

**0.25 FTE<sub>min</sub> (Full-Time Equivalent) required for support**

# Current version of the e-Log Platform

Diagram illustrating the current version of the e-Log Platform interface, showing navigation elements and a data table.

**Navigation Elements:**

- Create a new run
- Advanced search
- Current day records
- User Cabinet
- Work with dictionaries
- Number of records per page
- Username
- Page number
- Fast search
- Logged in as shift

**BM@N Electronic Logbook**

Home New Find Last day Account Reference Book

Page: 1 of 282

Number of items per page: 10 Logout

**Table Headers:**

Date	Shift Leader	Type	No Run	Trigger	DAQ Status	SP-41, A	SP-57, A	VKM2, A	Beam	Energy, GeV	Target	Comment	Attachment
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**Table Data:**

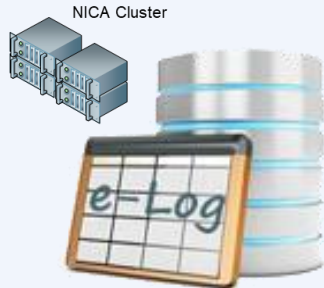
2018-04-05 11:47:06	Rumyantsev	Inform All	5185 per.7	Special Trigger	All	0	0	0	Kr	2.94	Cu (2 mm)	End of the RUN7	
2018-04-05 11:09:20	Rumyantsev	New Run	5184 per.7	Beam Trigger + Si >3	All	1250	50	125	Kr	2.94	Cu (2 mm)	Cu target; Tr.= BC1 & BC2 & VC & Si>3 VKM2: I=125A, SP-57=50A, SP41=1250A; 100 k	
2018-04-05 08:12:35	Rumyantsev	New Run	5183 per.7	Beam Trigger + Si >3	All	1250	50	125	Kr	2.94	Cu (2 mm)	Cu target; Tr.= BC1 & BC2 & VC & Si>2 VKM2: I=125A, SP-57=50A, SP41=1250A; 120 k	
2018-04-05 07:46:35	Babkin	New Run	5182 per.7	Beam Trigger + Si >3	All	1250	50	125	Kr	2.94	Cu (2 mm)	Cu target; Tr.= BC1 & BC2 & VC & Si>3 VKM2: I=125A, SP-57=50A, SP41=1250A; 208 kev	
2018-04-05 07:41:29	Babkin	New Run	5180 per.7	Beam Trigger + Si >3	All	1250	50	125	Kr	2.94	Cu (2 mm)	Cu target; Tr.= BC1 & BC2 & VC & Si>3; VKM2: I=125A, SP-57=50A, SP41=1250A; 201 kev	
2018-04-05 07:25:08	Babkin	New Run	5179 per.7	Beam Trigger + Si >3	All	1250	50	125	Kr	2.94	Cu (2 mm)	Cu target; Tr.= BC1 & BC2 & VC & Si>3; VKM2: I=125A, SP-57=50A, SP41=1250A; 201 kev	
2018-04-05 06:01:07	Babkin	New Run	5178 per.7	Beam Trigger + Si >3	All	1250	50	125	Kr	2.94	Cu (2 mm)	Cu target; Tr.= BC1 & BC2 & VC & Si>3; VKM2: I=125A, SP-57=50A, SP41=1250A; 201 kev	
2018-04-05 05:27:39	Babkin	New Run	5177 per.7	Beam Trigger + Si >3	All	1250	50	125	Kr	2.94	Cu (2 mm)	Cu target; Tr.= BC1 & BC2 & VC & Si>3; VKM2: I=125A, SP-57=50A, SP41=1250A; 204 kev	
2018-04-05 05:27:06	Babkin	New Run	5176 per.7	Beam Trigger + BD>3	All	1250	50	125	Kr	2.94	Cu (2 mm)	Cu target; Tr.= BC1 & BC2 & VC & BD>3; VKM2: I=125A, SP-57=50A, SP41=1250A; 150 kev	
2018-04-05 04:47:27	Babkin	New Run	5174 per.7	Beam Trigger + BD>3	All	1250	50	125	Kr	2.94	Cu (2 mm)	Cu target; Tr.= BC1 & BC2 & VC & BD>3; VKM2: I=125A, SP-57=50A, SP41=1250A; 213 kev	

2020 - software team (contact e-mail: gertsen@jinr.ru)



## e-Log Platform: *Notification Service*

## e-mail notifications



M20 Commanding Page 1 of 20

Logged in as [User]

123456789101112131415161718192021222324252627282930313233343536373839404142434445464748495051525354555657585960616263646566676869707172737475767778798081828384858687888990919293949596979899100

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123456789101112131415161718192021222324252627282930313233343536373839404142434445464748495051525354555657585960616263646566676869707172737475767778798081828384858687888990919293949596979899100

different types of events:

- “shift started”
- “problem report”
- “configuration”
- “new run”
- ...

record type 1

record type 2

record type 3

record type 3

shift  
group 1

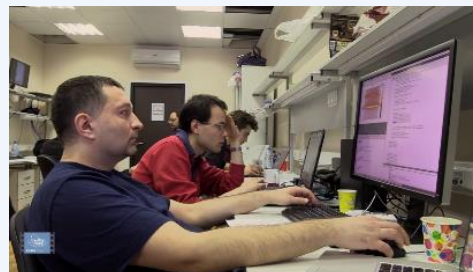
shift  
group 2

shift  
group 3

shift  
group 4

## User Cabinet

Event	Subscription
New record of the 'Configuration' type.	<input type="checkbox"/>
New record of the 'Inform All' type.	<input type="checkbox"/>
New record of the 'New Run' type.	<input type="checkbox"/>
New record of the 'Other' type.	<input type="checkbox"/>
New record of the 'Problem Fixed' type.	<input type="checkbox"/>
New record of the 'Problem report' type.	<input type="checkbox"/>
New record of the 'Routine' type.	<input type="checkbox"/>
New record of the 'Shift started' type.	<input type="checkbox"/>
New record of the 'Shift summary' type.	<input type="checkbox"/>
New record of the 'Software Installation' type.	<input type="checkbox"/>



# Application Programming Interface (C++ API)

**Autogenerated class wrappers for the logbook objects allow to access and manage the data without SQL statements in the BmnRoot framework**

ElogDbRecord – records written by a shift crew during the experiment runs which describe operating modes of various systems and detectors and different types of events

ElogDbType – record types: ‘Shift started’, ‘Problem report’, ‘Configuration’, ‘New Run’, etc.

ElogDbPerson – a list of the experiment staff

ElogDbTrigger – dictionary of all possible trigger types

ElogDbBeam – dictionary of all possible beam particles

ElogDbTarget – dictionary of all possible targets

ElogDbAttachment – files attached to a record for detailed description of the run

UniConnection – serves to open and close connections to the databases including e-Log

UniSearchCondition – forms criteria for selection of necessary records

The main functions of the e-Log interface:

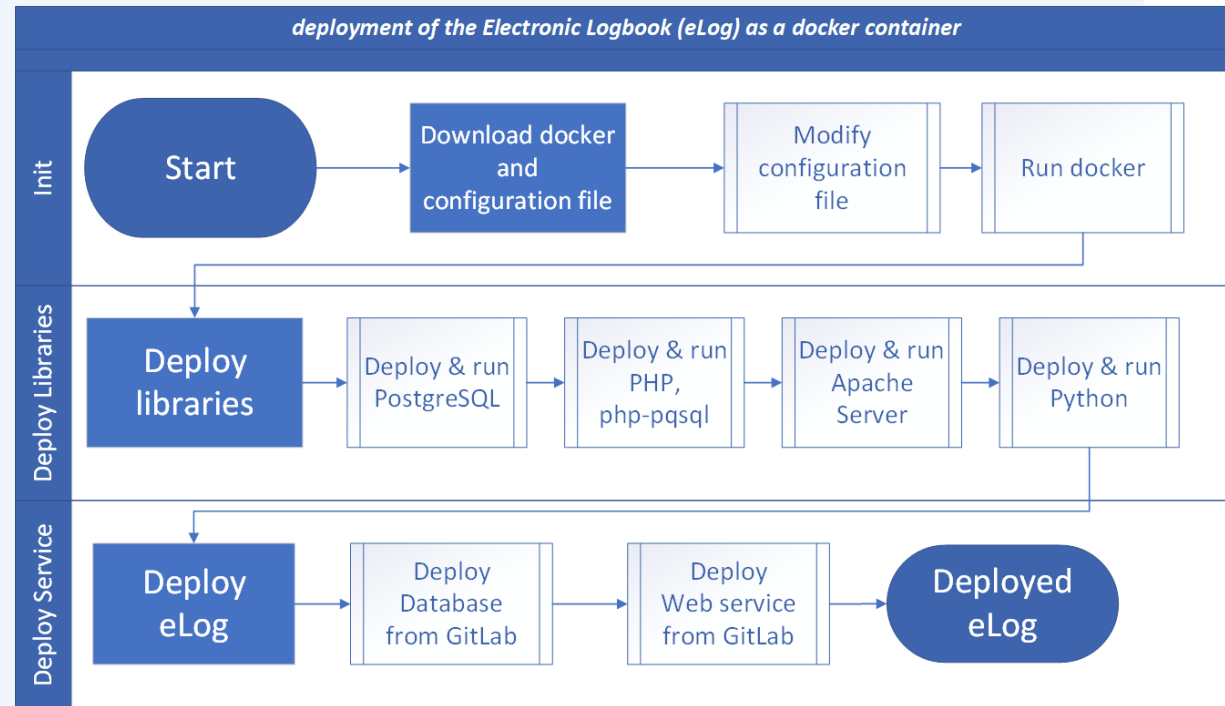
for data objects (static): *Create*, *Delete*, *Get*, ***Search***, *PrintAll*.

for attributes (non-static): *Getters* and *Setters* functions, *Print*.

# e-Log Platform: *Configuration and Deployment*

## Configuration File

```
{"remoteHost": "db_host.jinr.ru", // e-Log database host
"remoteUser": "remote_user",    // remote host user
"dbname": "elog_db",           // e-Log database name
"dbPort": "5432",              // e-Log database port
"dbAuth": true,                // authorization type
// custom (additional, specific to experiment) column names
"colName": { "sp_41": "SP-41, A",
"sp_57": "SP-57, A",
"vkm2": "VKM2, A"},
"colDef": [
"columns": [ {"column": "sp_41 int null"},
{"column": "sp_57 int null"},
{"column": "vkm2 int null"}],
"expName": "BM@N",           // experiment name
"expLogo": "logo.png",       // experiment logo image
"expUrl": "https://bmn.jinr.ru", // URL to official experiment site
"notifySend": true,          // activate notification system
....
```



## Deployment Scheme

The Common Deployment System is based on Docker containers and shell scripts

It allows to install the Electronic Logbook System for all the experiments of the NICA project taking into account some specifics of the experiments

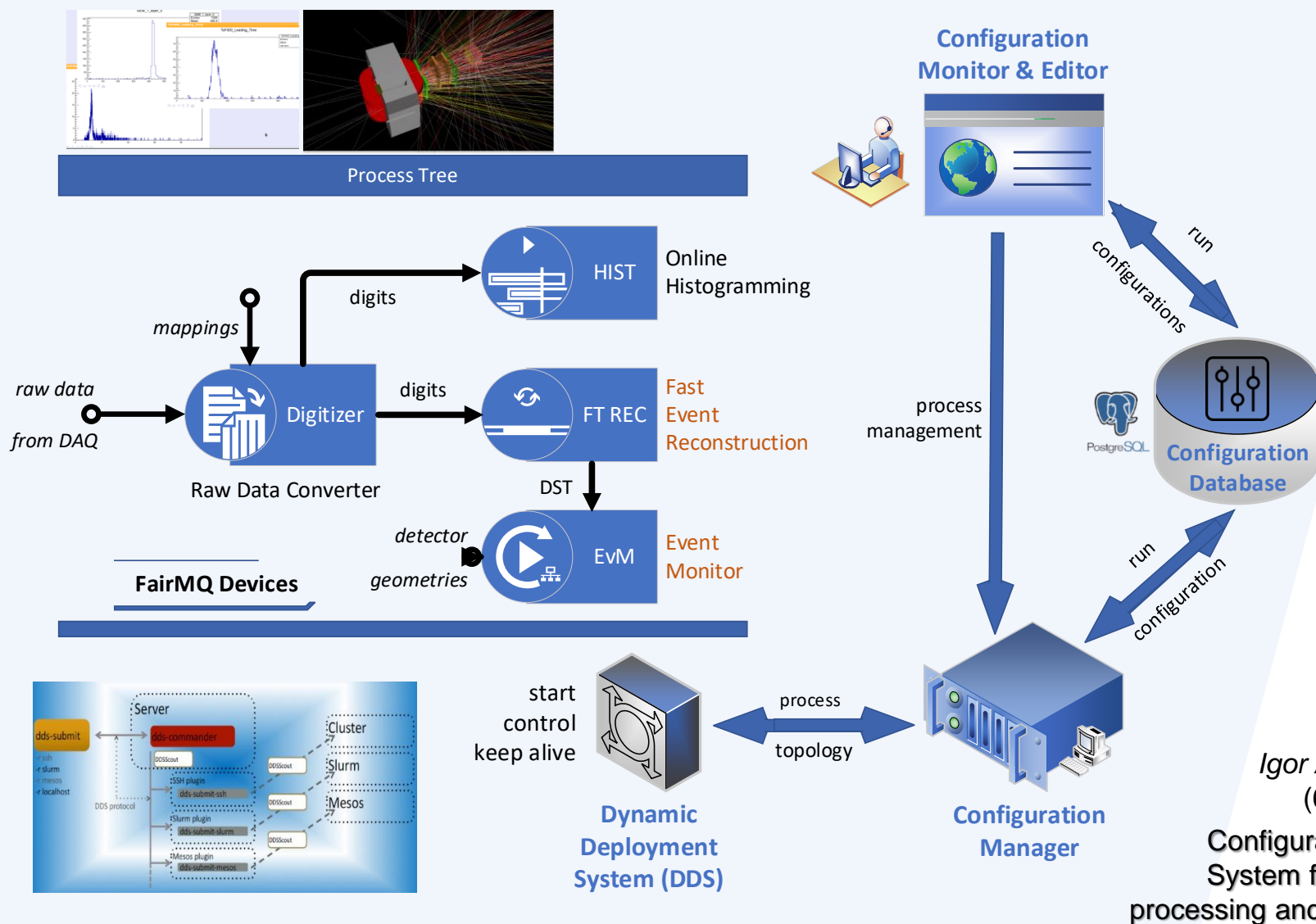
# Online Configuration System

*funded by the RFBR Grant No.18-02-40125*

**0.25 FTE<sub>min</sub> for support**

# Configuration Information System for BM@N

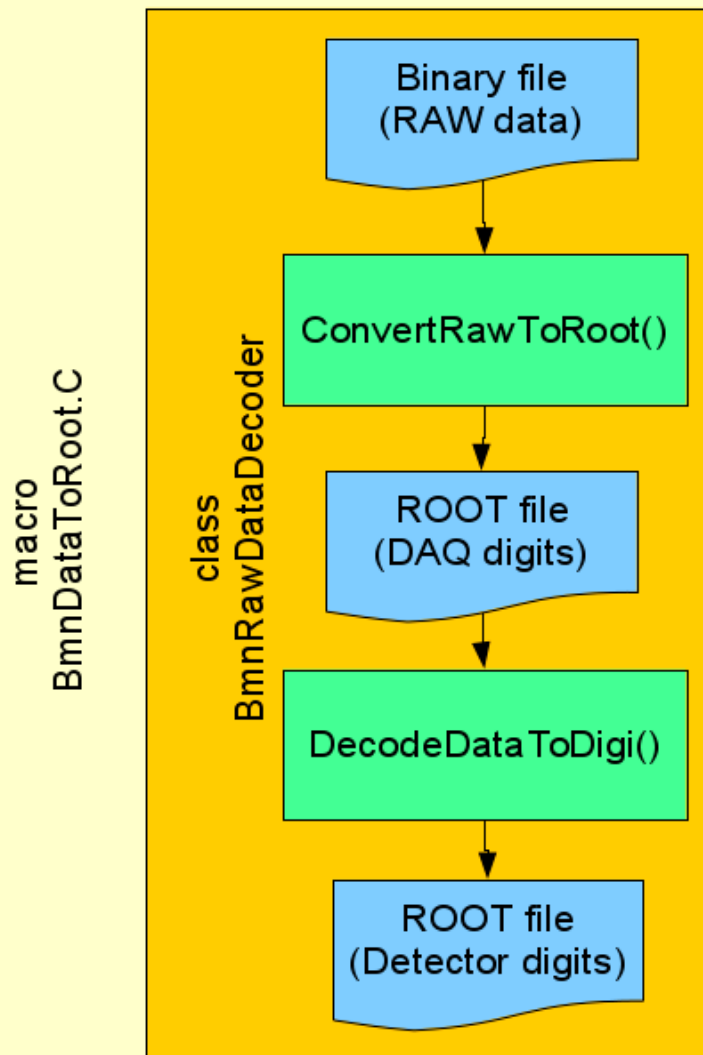
0.5 FTE<sub>min</sub> for development



Igor ALEKSANDROV  
(6 October 15:35)

Configuration Information  
System for BM@N online  
processing and data monitoring

# Raw Data Converter



## First step (Data Converter):

- Read a binary data file with RAW-data
- Create DAQ-digits (TDC, ADC, HRB, SYNC, etc.) and write them to a tree
- Read common parameters (event number, run number, event type, etc.) and put them into the Unified Database on fly
- Write the tree with «DAQ-digits» to a ROOT-file accordingly DAQ-data-format

## Second step (Data Decoder):

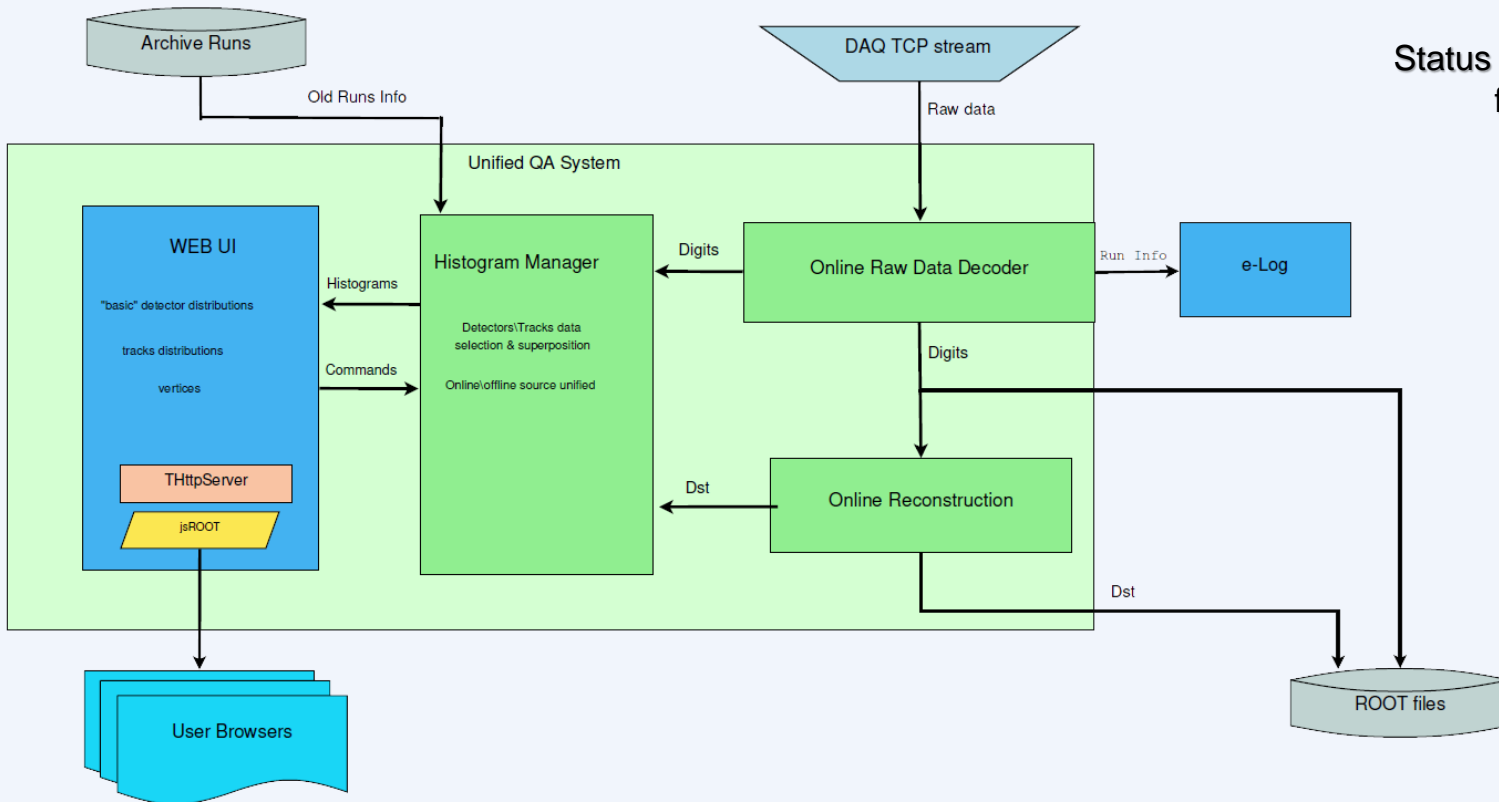
- Read the ROOT-file with DAQ-digits
- Read detector mappings (channel-to-strip) from the Unified Database
- Calculate pedestals and common modes of channels
- Clear noisy channels
- Decode DAQ-digits into Detector-digits (BmnGemDigit, BmnTofDigit, etc.)
- Write the tree with «Detector-digits» to a ROOT-file



# Status of the Online Histogramming

Ilnur Gabdrakhmanov  
(6 October 15:20)

Status of the Online QA system  
for the experiment



```
{
  "Name": "GEMS",
  "Title": "GEM Canvas",
  "DivX": "2",
  "DivY": "1",
  "Pads": [
    {
      "Class": "TH2I",
      "Name": "GEM-hits0",
      "Title": "GEM hits",
      "Options": "colz",
      "Dimensions": [
        200,
        0,
        400,
        400,
        -200,
        200
      ]
    }
  ],
  {
    "Class": "TH1F",
    "Name": "GEM0",
    "Title": "Gem Strip",
    "Dimensions": [
      200,
      0,
      400
    ]
  }
}
```

- Make addition of DQ histograms simple and flexible (not require code rebuild)
- Move configuration of online histogramming outside of the code
- Detector groups add histograms as simple configurations in json files

# Online Histogramming: Web application

jsROOT server provides processed histograms via the Web

Welcome to the BM@N Experiment   Triggers   GEM   Silicon   ToF400   ToF700   DCH   MWPC   ZDC   ECAL   SRC Triggers   LAND   MSC

Run: 4147

Event: 20000

Run Type: beam

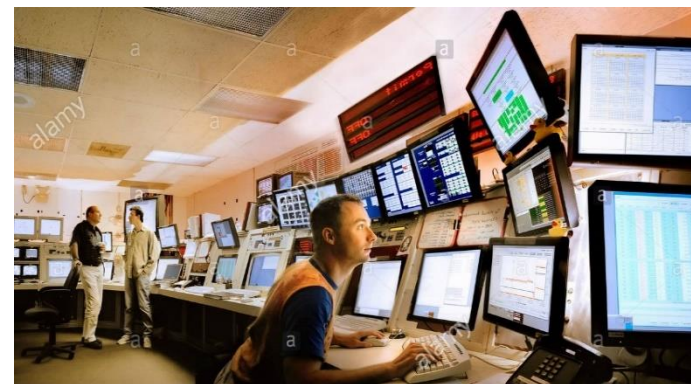
BM@N Silicons

Energy: 3.20

Beam: Ar

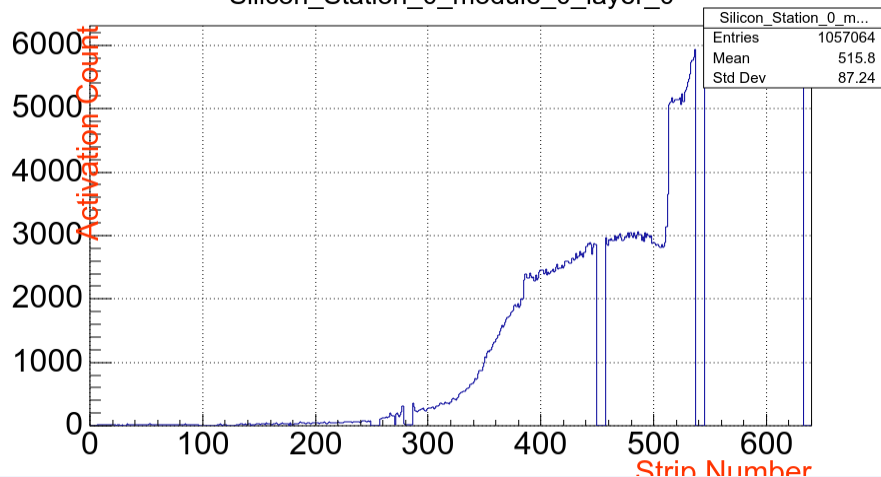
Target: C

Field Voltage: 77.60

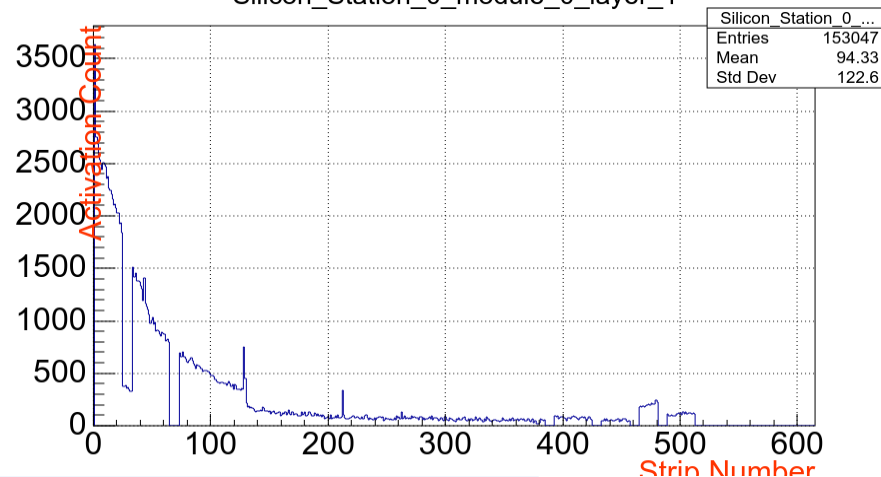


Reset  Select Reference Run Run 3946, beam Ar, energy 3.2, target C, Voltage 77.597222 ▼

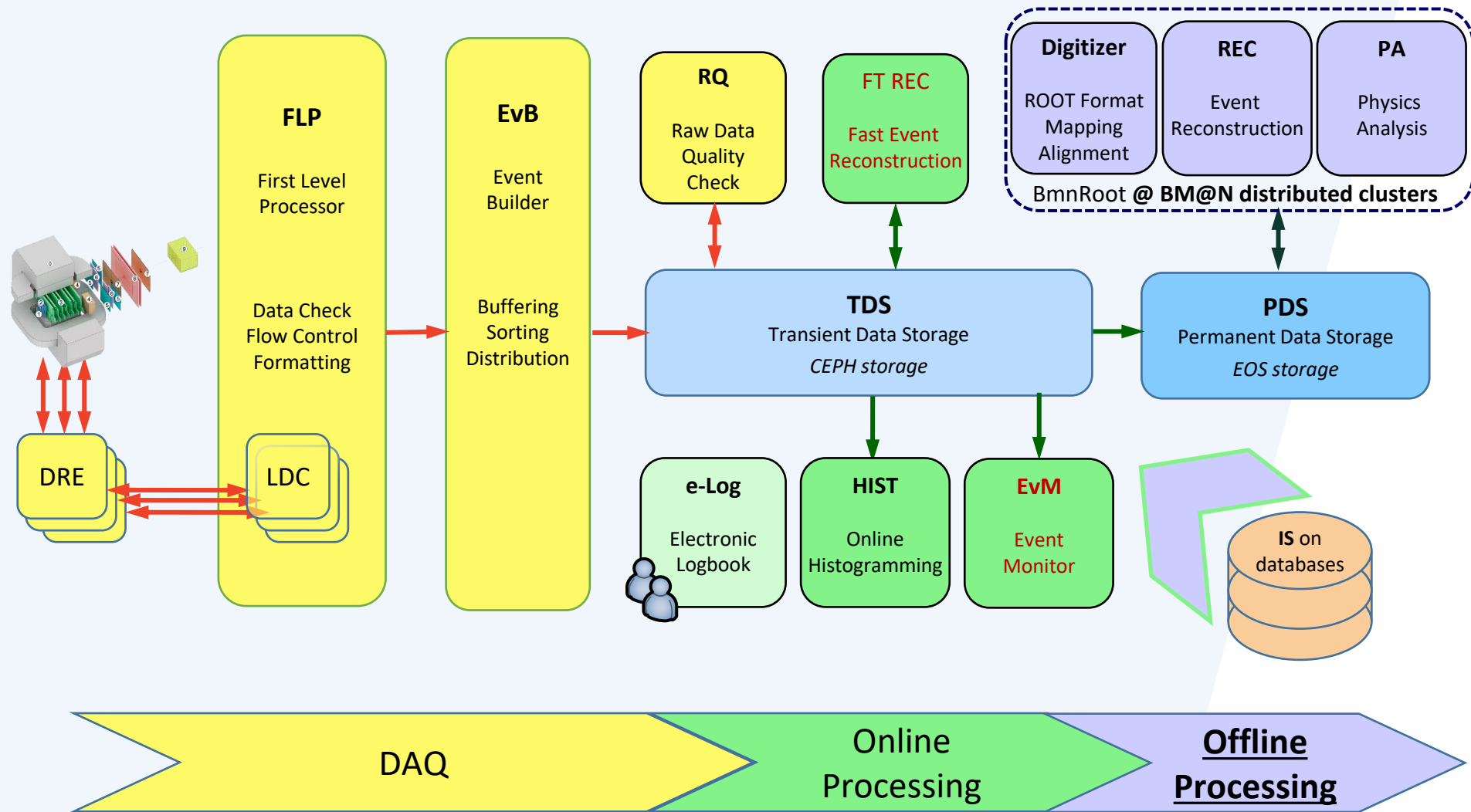
Silicon\_Station\_0\_module\_0\_layer\_0



Silicon\_Station\_0\_module\_0\_layer\_1



# BM@N Data Processing Pipeline



# BmnRoot Framework

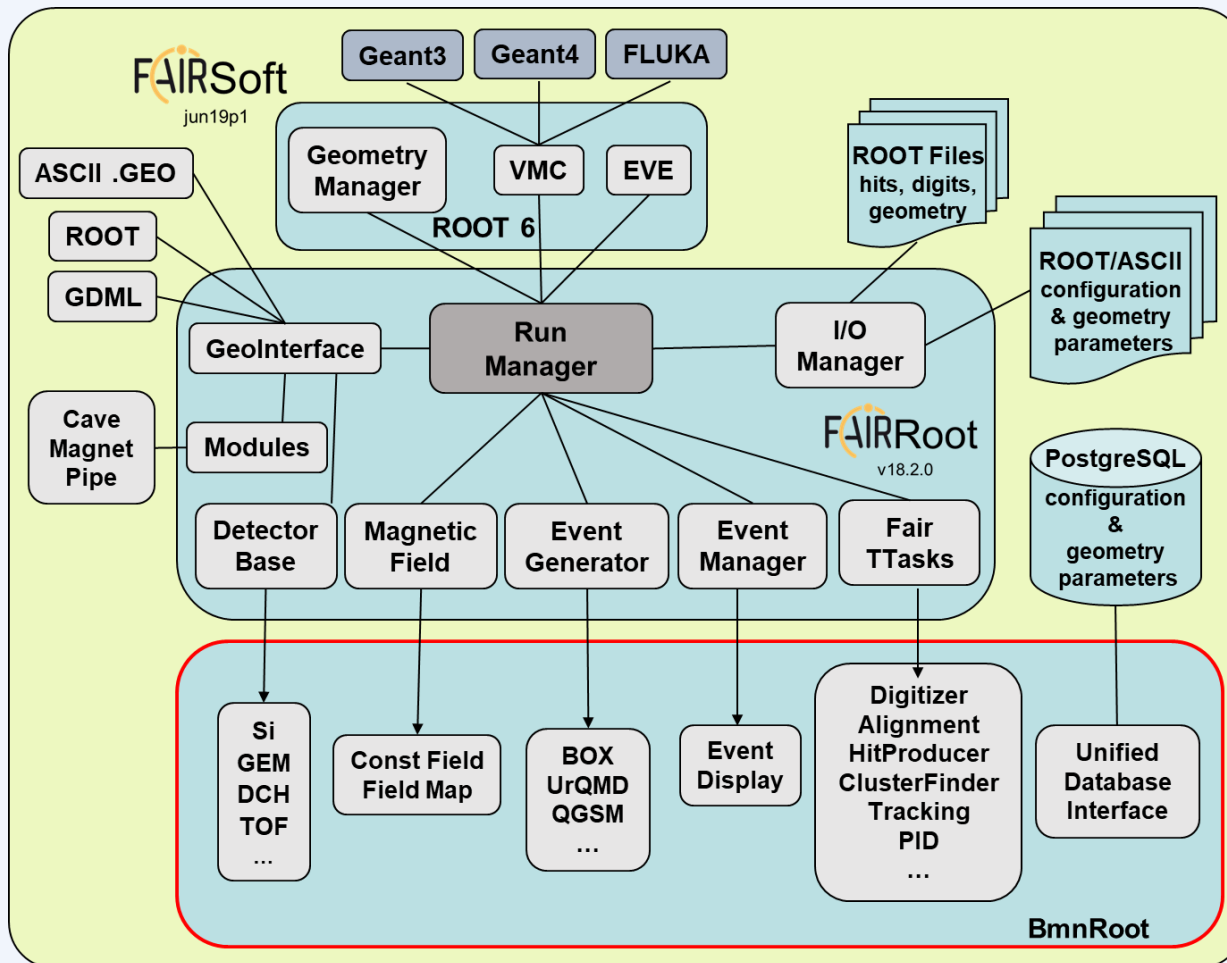
0.5 FTE<sub>min</sub> for support

# BmnRoot Release Issue: 21.08.0

FAIRSoft  
apr21p1

FAIRRoot  
v18.6.4

cannot be updated because of the **NCX-cluster** (LIT MICC & HybriLIT are ready)



- Huge efforts have been expended to correct a lot of problems before Release including memory problems
- Simulation (with Geant3) and reconstruction results have been checked carefully
- The pre-release had been tested on distributed clusters before the issue
- All improvements and new features are described at <https://git.jinr.ru/nica/bmnroot/-/tags/21.08.0>

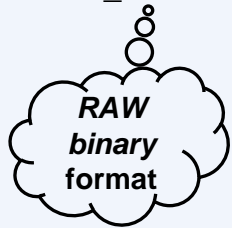
***The mass production of the BM@N digits and reco data for Run 7 is in progress***

# Event Data Processing in BmnRoot

## DAQ Storage

raw data in binary format

*raw\_run.data*



Condition  
(Unified)  
Database

digitizer

BmnDataToRoot.C

*digi\_run.root*



reconstruction

run\_reco\_bmn.C  
run\_reco\_src.C

*bmn\_dst.root*

physics  
analysis

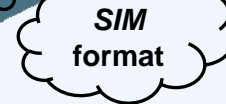
macro/physics/

Geant 3/4, Fluka

simulation

run\_sim\_bmn.C  
run\_sim\_src.C

*bmn\_sim.root*



## Event Generators

DCM-QGSM, DCM-SMM, UrQMD...

*generator.dat*



Geometry  
Database



Event  
Catalogue

miniDST:  
summary data  
format for PA

0.25 FTE<sub>min</sub> for dev

Dmitriy BARANOV  
(6 October 15:50)

Simulation of FwdSi, GEM and CSC  
tracking detectors for heavy ion setup

Sergei NEMNYUGIN  
(6 October 16:50)

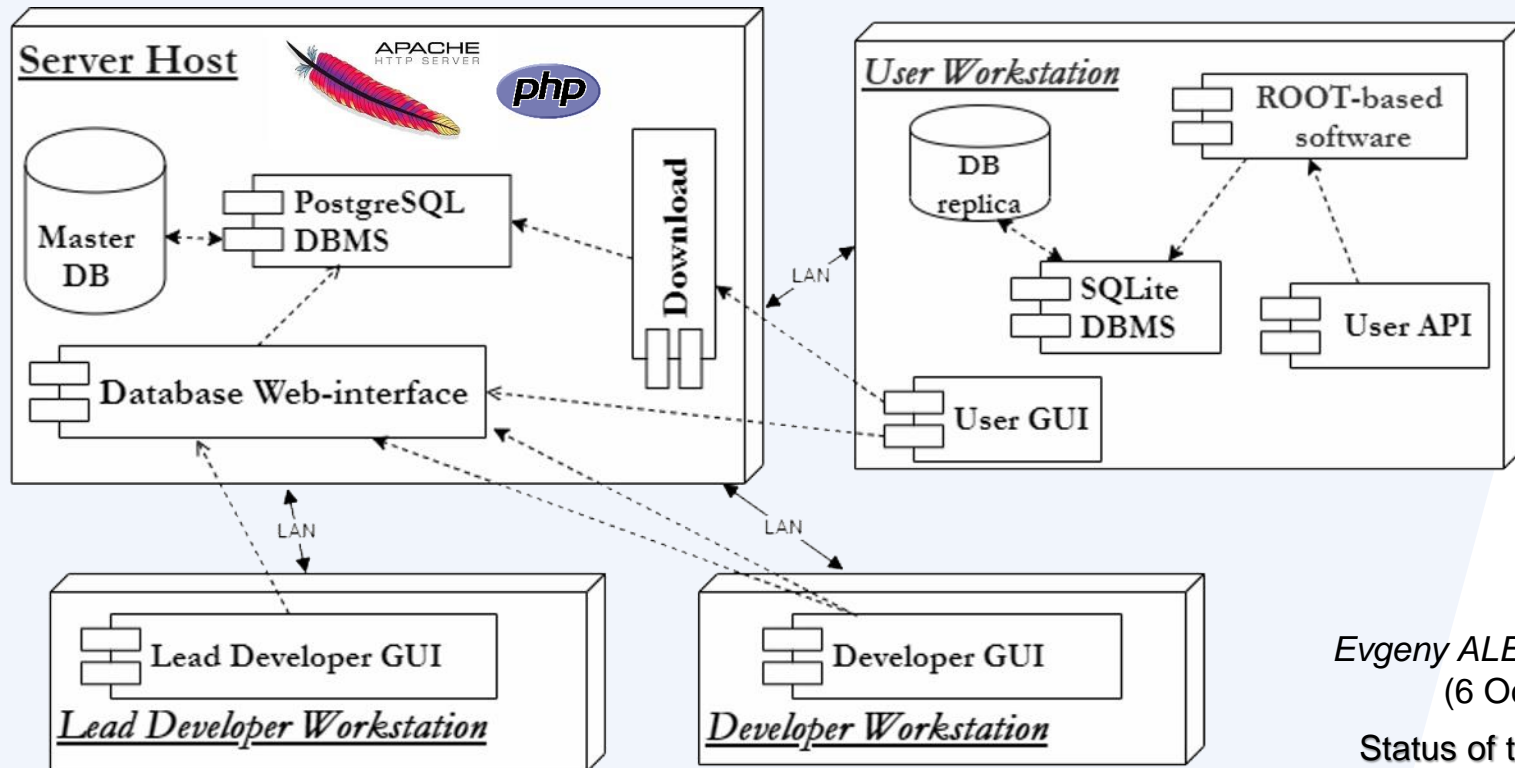
Contribution of Saint-  
Petersburg University group  
in development of BmnRoot



# Geometry Database

*funded by the RFBR Grant No.18-02-40125*

# Geometry Information System Architecture



Evgeny ALEKSANDROV  
(6 October 16:05)

Status of the Geometry  
Database for using in the  
BM@N experiment

Three user roles:  
Lead Developer | Developer | User (Reader)



# Status of the Geometry Web Platform



Baryonic Matter  
at Nuclotron

## Menu

HOME

VIEW GEOMETRY ^

VIEW.SETUPS

VIEW.SETUP MODULES

VIEW.FILES

VIEW.MATERIALS

VIEW.MAGNETIC.FIELDS

EDIT GEOMETRY v

## Get in touch

✉ Konstantin Gertsenberger



BM@N Geometry DataBase



[bm-n-geodb.jinr.ru](http://bm-n-geodb.jinr.ru)

User:: gertsen

[CONFIGURE WEBACCESS](#)

[LOGOUT](#)

## Setup Modules

- simple authorization
- or FreelPA access



Module	Name (Tag)	Date	File	Transformation				Description	Author	ParFile	Download
BD	bd_v1_0	2018-07-26	v1	1.000	0.000	0.000	0.000	bd_v1_0	aleksand		<a href="#">Download</a>
				0.000	1.000	0.000	0.000				
				0.000	0.000	1.000	0.000				
BD	geom_BD_det_v2	2020-04-19	geom_BD_det_v2	1.000	0.000	0.000	0.000	geom_BD_det_v2	aleksand		<a href="#">Download</a>
				0.000	1.000	0.000	0.000				
				0.000	0.000	1.000	0.000				
BD	bd_v1_run6	2019-12-24	bd_v1_run6	1.000	0.000	0.000	0.000	bd_v1_run6.geo	aleksand		<a href="#">Download</a>
				0.000	1.000	0.000	0.000				
				0.000	0.000	1.000	0.000				
CSC	CSC_RunSpring2018	2020-04-19	CSC_RunSpring2018	1.000	0.000	0.000	0.000	CSC_RunSpring2018	aleksand		<a href="#">Download</a>
				0.000	1.000	0.000	0.000				
				0.000	0.000	1.000	0.000				
DCH	DCH_RunWinter2016	2018-07-26	DCH_RunWinter2016	1.000	0.000	0.000	0.000	DCH_RunWinter2016	aleksand		<a href="#">Download</a>
				0.000	1.000	0.000	0.000				
				0.000	0.000	1.000	0.000				
DCH	DCH_RunSpring2018	2019-12-24	DCH_RunSpring2018	1.000	0.000	0.000	0.000	DCH_RunSpring2018.ro	aleksand		<a href="#">Download</a>
				0.000	1.000	0.000	0.000				
				0.000	0.000	1.000	0.000				

BM@N Geometry Database has filled with the setup geometries for Run 7 and 6 (all releases + dev)

Graphical User Interface Functions:

View

Edit

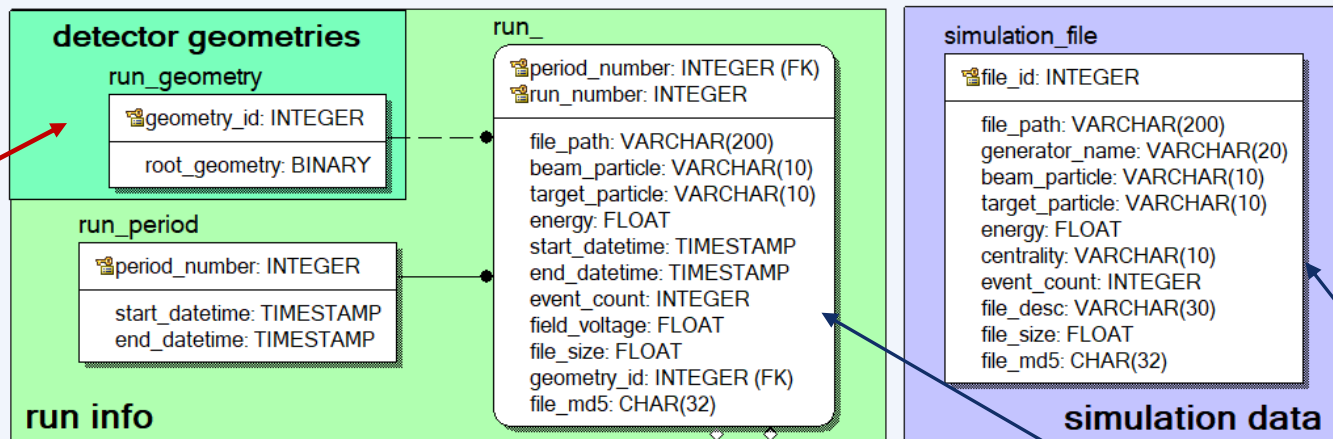
Download

# Condition|Unified Database

*funded by the RFBR Grant No.18-02-40125*

**0.25 FTE<sub>min</sub> for support**

# { Unified → Condition } Database Diagram

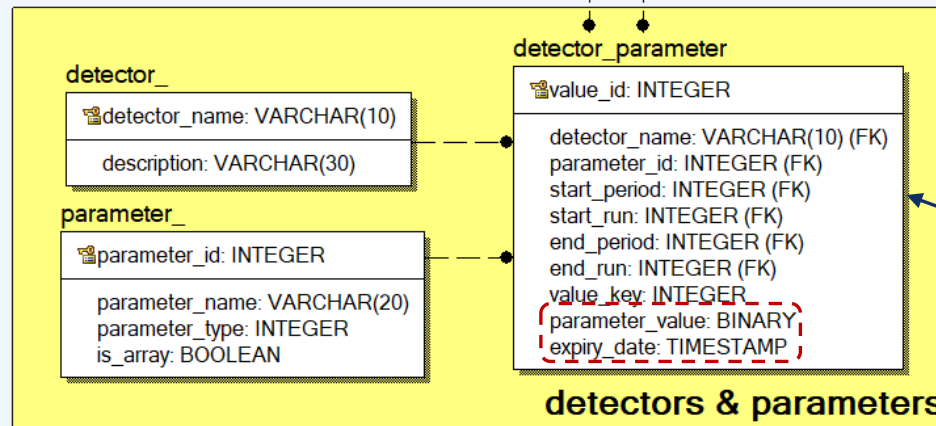
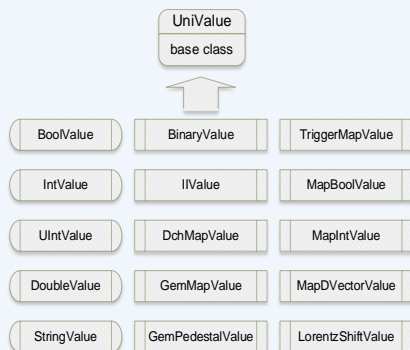


pointer to  
Geometry Storage  
(will be removed after  
Geometry Database  
integration)

pointer to  
SIM storage level

pointer to  
EXP storage level

pointer to  
Parameter Storage

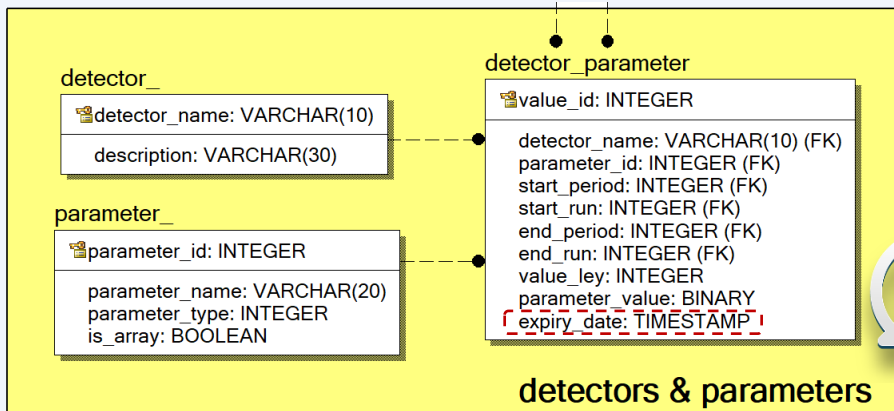


The following solutions were considered  
to replace old packed structures:  
ZeroMQ, MessagePack, BOOST,  
Protobuf, FlatBuffers, ROOT/TStreamer,  
C++ manual serialization

storing information on  
experiment sessions and runs,  
setup geometries, detectors,  
parameters and parameter values,  
and generated simulation files

# Unified Database: *new features*

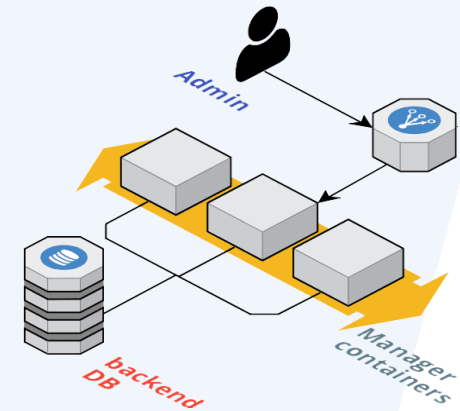
## Historical Preservation of Parameter Values



Parameter values need to be retained in case of updating. When parameter values are updated, the database saves the replaced data with the current expiry date.

**It allows one to repeat event data processing with outdated parameters used in the past**

## Common Configuration and Deployment System (under development)



The common Configuration and Deployment System is based on Docker containers and shell scripts

**It will allow conveniently deploying the Condition Database and its services for all the experiments of the NICA project taking into account some specifics of the experiments**



# Application Programming Interface (C++ API)

**Autogenerated class wrappers for database tables with specific functions allow to access and manage data without SQL statements in experiment software**

UniDbRunPeriod – describes run periods (a set of runs) of the experiment

UniDbRun – run parameters (number, time, energy, beam, target, magnet field, file path, etc.)

UniDbDetector – detectors of the experiment (detector dictionary)

UniDbParameter – common information about detectors' parameters presented on the previous slides and stored in the database (parameter dictionary)

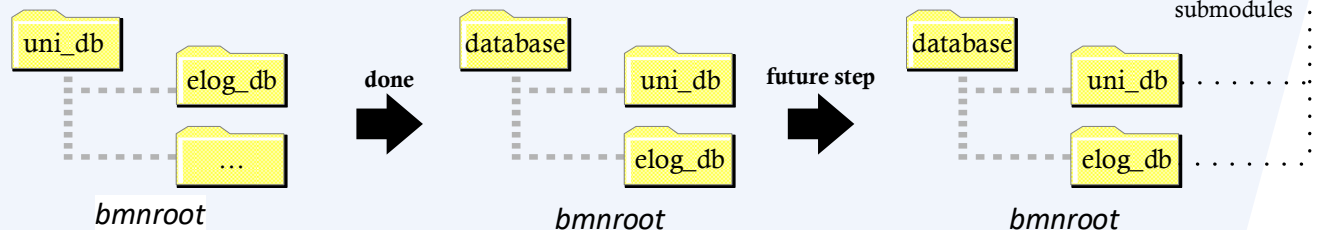
UniDbDetectorParameter – values of detector parameters for experiment runs

UniDbSimulationFile – describes a set of generated simulation files

The main functions of the database interface:

for data objects (static): *Create, Delete, Get, **Search**, PrintAll.*

for attributes (non-static): *Getters and Setters functions, Print.*

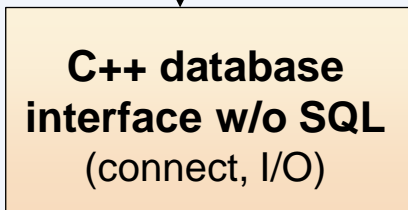


# Unified Database Architecture



detector simulation  
raw data processing  
event reconstruction  
physics analysis

BmnRoot  
framework

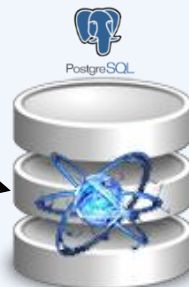
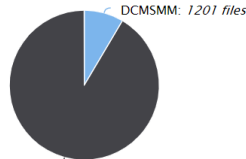


Local Condition Database as a local  
replica of the central database and  
mirroring are under closer consideration

python script for auto  
update of simulation file list

Simulation Data

Distribution of simulation files by generators



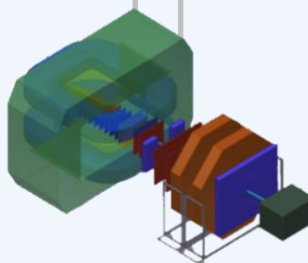
**Unified  
Database**

ROOT

Node.JS

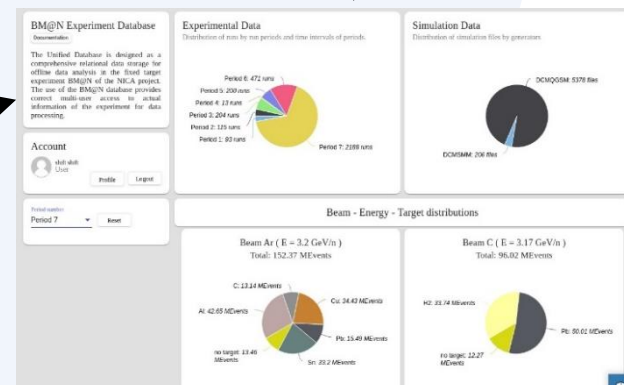
configuration  
calibration

parameter and  
algorithm data



users

FreelIPA authentication



Web Service

ANGULAR



HIGHCHARTS

nodeJS



# Status of the web service for Unified Database

Menu

Sign Out

## BM@N Experiment Database

### Documentation

The Unified Database is designed as a comprehensive relational data storage for offline data analysis in the fixed target experiment BM@N of the NICA project. The use of the BM@N database provides correct multi-user access to actual information of the experiment for data processing.

## Account



Konstantin Gertsenberger  
Admin

Profile

Logout

Period number

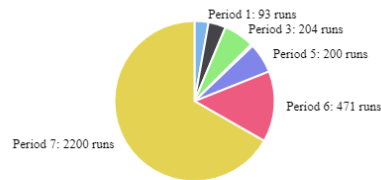
Period 6

Show

Reset

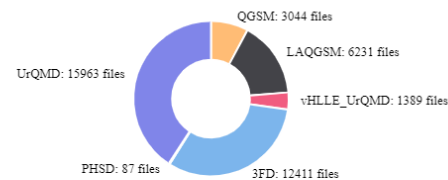
## Experimental Data

Distribution of runs by run periods (show time of all periods)



## Simulation Data

Distribution of simulation files by generators



## Beam - Energy - Target distributions

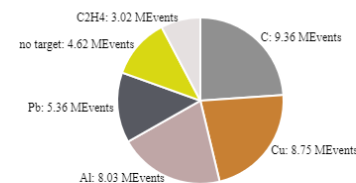
### Beam C ( E = 5.14 GeV/n )

Total: 0.41 MEEvents



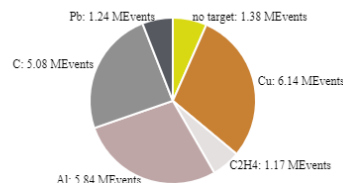
### Beam C ( E = 4.5 GeV/n )

Total: 39.14 MEEvents



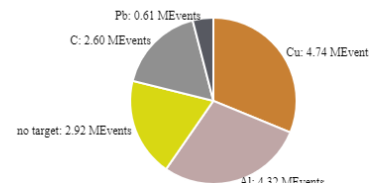
### Beam C ( E = 4 GeV/n )

Total: 20.85 MEEvents



### Beam C ( E = 3.5 GeV/n )

Total: 15.19 MEEvents



- visualization of summary data in the form of diagrams and charts
- convenient viewing, managing and searching for up-to-date information on the BM@N experiment in tabular view by collaboration members

Alexander CHEBOTOV  
(6 October 16:20)

BM@N Condition Database  
and related web services

# Tabular View of the BM@N database

BM@N Experiment Runs

Run	Run Name	Start Time	End Time	Beam	Beam Energy (GeV)	Target	Target Material	Beam Cross	File Size (GB)	File Path	Description
7	5188	2016-04-05 11:16:24	2016-04-05 11:19:11	R	254	Cu	77.61608	107598	22.477	neoscabm@epgswan014726-6185_BM@N_experiment_run_5188.data	
7	5189	2016-01-05 13:56:30	2016-01-05 11:16:27	R	291	Cu	77.61608	121014	25.638	neoscabm@epgswan014726-6185_BM@N_experiment_run_5189.data	
7	5187	2016-04-05 13:47:30	2016-04-05 13:59:35	R	254	Cu	77.61608	709469	45.880	neoscabm@epgswan014726-6185_BM@N_experiment_run_5187.data	
7	5190	2016-04-05 19:20:10	2016-04-05 19:41:14	R	254	Cu	77.61608	201031	42.638	neoscabm@epgswan014726-6185_BM@N_experiment_run_5190.data	
7	5179	2016-01-05 09:21:30	2016-01-05 19:21:12	R	291	Cu	77.62245	201036	42.638	neoscabm@epgswan014726-6185_BM@N_experiment_run_5179.data	
7	5175	2016-04-05 09:36:38	2016-04-05 09:36:38	R	254	Cu	77.61610	701054	47.497	neoscabm@epgswan014726-6185_BM@N_experiment_run_5175.data	
7	5177	2016-04-05 09:20:31	2016-04-05 09:20:27	R	291	Cu	77.61601	204780	42.940	neoscabm@epgswan014726-6185_BM@N_experiment_run_5177.data	
7	5178	2016-04-05 09:13:12	2016-04-05 09:25:50	R	291	Cu	77.61602	101049	31.802	neoscabm@epgswan014726-6185_BM@N_experiment_run_5178.data	
7	5174	2016-04-05 07:37:47	2016-04-05 08:11:05	R	254	Cu	77.61609	719131	46.801	neoscabm@epgswan014726-6185_BM@N_experiment_run_5174.data	
7	5173	2016-01-05 07:10:30	2016-01-05 07:37:11	R	291	Cu	77.61712	211029	61.690	neoscabm@epgswan014726-6185_BM@N_experiment_run_5173.data	
7	5170	2016-04-05 09:36:38	2016-04-05 09:36:38	R	254	Cu	77.61610	701054	47.497	neoscabm@epgswan014726-6185_BM@N_experiment_run_5170.data	
7	5190	2016-04-05 09:10:31	2016-04-05 09:30:10	R	254	Cu	77.60673	203884	42.380	neoscabm@epgswan014726-6185_BM@N_experiment_run_5190.data	
7	5187	2016-01-05 09:10:31	2016-01-05 09:30:10	R	254	Cu	77.60605	303911	7.280	neoscabm@epgswan014726-6185_BM@N_experiment_run_5187.data	
7	5190	2016-04-05 09:10:31	2016-04-05 09:30:10	R	254	Cu	77.60605	60708	11.285	neoscabm@epgswan014726-6185_BM@N_experiment_run_5190.data	
7	5190	2016-04-05 09:10:31	2016-04-05 09:30:10	R	254	Cu	77.60672	50802	11.262	neoscabm@epgswan014726-6185_BM@N_experiment_run_5190.data	

## Experiment Runs

Parameter Values of the BM@N experiment

Detector Name	Parameter Name	Run period	Start run	End run	Run period	Detector	Channel	Parameter value
DCM1	on	1	12	688	3			True
TOF1	on	1	12	688	3	2367930	1	1.02852 1.7854 ...
TOF1	on	1	12	688	3	2367930	2	-0.04014 0.02067 ...
TOF1	on	1	12	688	3	2367930	3	0.63805 1.3105 ...
TOF1	on	1	12	688	3	2367930	4	-8.16519 3.1662 ...
TOF1	on	1	12	688	3	2367930	5	0.79191 1.65017 ...
TOF1	on	1	12	688	3	2367930	6	0.022261 1.0706 ...
TOF1	on	1	12	688	3	2367930	7	-4.1177 1.8577 ...
TOF1	on	1	12	688	3	2367930	8	0.88179 1.5203 ...
TOF1	on	1	12	688	3	2367930	9	0.31056 1.30109 ...
TOF1	on	1	12	688	3	2367930	10	0.221916 1.5908 ...
TOF1	on	1	12	688	3	2367930	11	1.10140 1.24716 ...
TOF1	on	1	12	688	3	2367930	12	1.15151 1.80575 ...
TOF1	on	1	12	688	3	2367930	13	1.07190 0.95008 ...
TOF1	on	1	12	688	3	2367930	14	-0.087134 0.79048 ...

## Parameter Values

Simulation Files of the BM@N experiment

Simulation File	Beam	Energy (GeV)	Target	Channel	Beam Cross	File Size (GB)	File Path	Description
DCM1	Ar	3.2	Ar	ne	8048	0.231	neoscabm@epgswan014726-6185_BM@N_simulation_file_1012	
DCM1	Ar	3.2	Ar	ne	8050	0.229	neoscabm@epgswan014726-6185_BM@N_simulation_file_1012	
DCM1	Ar	3.2	Ar	ne	8054	0.730	neoscabm@epgswan014726-6185_BM@N_simulation_file_1012	
DCM1	Ar	3.2	Ar	ne	8051	0.230	neoscabm@epgswan014726-6185_BM@N_simulation_file_1012	
DCM1	Ar	3.2	Ar	ne	8059	0.230	neoscabm@epgswan014726-6185_BM@N_simulation_file_1012	
DCM1	Ar	3.2	Ar	ne	8056	0.730	neoscabm@epgswan014726-6185_BM@N_simulation_file_1012	
DCM1	Ar	3.2	Ar	ne	8041	0.230	neoscabm@epgswan014726-6185_BM@N_simulation_file_1012	
DCM1	Ar	3.2	Ar	ne	8037	0.230	neoscabm@epgswan014726-6185_BM@N_simulation_file_1012	
DCM1	Ar	3.2	Ar	ne	8051	0.730	neoscabm@epgswan014726-6185_BM@N_simulation_file_1012	
DCM1	Ar	3.2	Ar	ne	8050	0.229	neoscabm@epgswan014726-6185_BM@N_simulation_file_1012	
DCM1	Ar	3.2	Ar	ne	8053	0.231	neoscabm@epgswan014726-6185_BM@N_simulation_file_1012	
DCM1	Ar	3.2	Ar	ne	8073	0.739	neoscabm@epgswan014726-6185_BM@N_simulation_file_1012	
DCM1	Ar	3.2	Ar	ne	8073	0.230	neoscabm@epgswan014726-6185_BM@N_simulation_file_1012	
DCM1	Ar	3.2	Ar	ne	8058	0.231	neoscabm@epgswan014726-6185_BM@N_simulation_file_1012	

## Simulation Files

Detector List of the BM@N experiment

Detector Name	Description
BC1	
BC2	
TO	
VETO	
ZDC	Zero Degree Calorimeter
TOF1	Time-of-Flight near 400cm
TOF2	Time-of-Flight near 700cm
DCM1	First Drift Chamber
DCM2	Second Drift Chamber
BD	Barrel Detector
GM1	Gas Electron Multiplier
magnet	BM@N magnet
BM@N	whole BM@N detector

Parameter List of the BM@N experiment

Parameter Name	Parameter Type
BC1_gloss_mapping	trigger mapping
BC2_gloss_mapping	trigger mapping
BC_gloss_mapping	trigger mapping
DCM_mapping	DCM-mapping
GEN_N_ch_X0_sig_1	integer
GEN_N_ch_X0_sig_2	integer
GEN_N_ch_X0_sig_3	integer
GEN_N_ch_X1_sig_1	integer
GEN_N_ch_X1_sig_2	integer
GEN_N_ch_X1_sig_3	integer
GEN_N_ch_X1_sig_4	integer
GEN_N_ch_X1_sig_5	integer
GEN_N_ch_X1_sig_6	integer
GEN_N_ch_X1_sig_7	integer
GEN_N_ch_X1_sig_8	integer
GEN_N_ch_X1_sig_9	integer
GEN_N_ch_X1_sig_10	integer
GEN_N_ch_X1_sig_11	integer
GEN_N_ch_X1_sig_12	integer
GEN_N_ch_X1_sig_13	integer
GEN_N_ch_X1_sig_14	integer
GEN_N_ch_X1_sig_15	integer
GEN_N_ch_X1_sig_16	integer
GEN_N_ch_X1_sig_17	integer
GEN_N_ch_X1_sig_18	integer
GEN_N_ch_X1_sig_19	integer
GEN_N_ch_X1_sig_20	integer
GEN_N_ch_X1_sig_21	integer
GEN_N_ch_X1_sig_22	integer
GEN_N_ch_X1_sig_23	integer
GEN_N_ch_X1_sig_24	integer
GEN_N_ch_X1_sig_25	integer
GEN_N_ch_X1_sig_26	integer
GEN_N_ch_X1_sig_27	integer
GEN_N_ch_X1_sig_28	integer
GEN_N_ch_X1_sig_29	integer
GEN_N_ch_X1_sig_30	integer
GEN_N_ch_X1_sig_31	integer
GEN_N_ch_X1_sig_32	integer
GEN_N_ch_X1_sig_33	integer
GEN_N_ch_X1_sig_34	integer
GEN_N_ch_X1_sig_35	integer
GEN_N_ch_X1_sig_36	integer
GEN_N_ch_X1_sig_37	integer
GEN_N_ch_X1_sig_38	integer
GEN_N_ch_X1_sig_39	integer
GEN_N_ch_X1_sig_40	integer
GEN_N_ch_X1_sig_41	integer
GEN_N_ch_X1_sig_42	integer
GEN_N_ch_X1_sig_43	integer
GEN_N_ch_X1_sig_44	integer
GEN_N_ch_X1_sig_45	integer
GEN_N_ch_X1_sig_46	integer
GEN_N_ch_X1_sig_47	integer
GEN_N_ch_X1_sig_48	integer
GEN_N_ch_X1_sig_49	integer
GEN_N_ch_X1_sig_50	integer
GEN_N_ch_X1_sig_51	integer
GEN_N_ch_X1_sig_52	integer
GEN_N_ch_X1_sig_53	integer
GEN_N_ch_X1_sig_54	integer
GEN_N_ch_X1_sig_55	integer
GEN_N_ch_X1_sig_56	integer
GEN_N_ch_X1_sig_57	integer
GEN_N_ch_X1_sig_58	integer
GEN_N_ch_X1_sig_59	integer
GEN_N_ch_X1_sig_60	integer
GEN_N_ch_X1_sig_61	integer
GEN_N_ch_X1_sig_62	integer
GEN_N_ch_X1_sig_63	integer
GEN_N_ch_X1_sig_64	integer
GEN_N_ch_X1_sig_65	integer
GEN_N_ch_X1_sig_66	integer
GEN_N_ch_X1_sig_67	integer
GEN_N_ch_X1_sig_68	integer
GEN_N_ch_X1_sig_69	integer
GEN_N_ch_X1_sig_70	integer
GEN_N_ch_X1_sig_71	integer
GEN_N_ch_X1_sig_72	integer
GEN_N_ch_X1_sig_73	integer
GEN_N_ch_X1_sig_74	integer
GEN_N_ch_X1_sig_75	integer
GEN_N_ch_X1_sig_76	integer
GEN_N_ch_X1_sig_77	integer
GEN_N_ch_X1_sig_78	integer
GEN_N_ch_X1_sig_79	integer
GEN_N_ch_X1_sig_80	integer
GEN_N_ch_X1_sig_81	integer
GEN_N_ch_X1_sig_82	integer
GEN_N_ch_X1_sig_83	integer
GEN_N_ch_X1_sig_84	integer
GEN_N_ch_X1_sig_85	integer
GEN_N_ch_X1_sig_86	integer
GEN_N_ch_X1_sig_87	integer
GEN_N_ch_X1_sig_88	integer
GEN_N_ch_X1_sig_89	integer
GEN_N_ch_X1_sig_90	integer
GEN_N_ch_X1_sig_91	integer
GEN_N_ch_X1_sig_92	integer
GEN_N_ch_X1_sig_93	integer
GEN_N_ch_X1_sig_94	integer
GEN_N_ch_X1_sig_95	integer
GEN_N_ch_X1_sig_96	integer
GEN_N_ch_X1_sig_97	integer
GEN_N_ch_X1_sig_98	integer
GEN_N_ch_X1_sig_99	integer
GEN_N_ch_X1_sig_100	integer

## Detector & Parameters

# Unified Database: *File Inspection Service*

## Report Selector

Type name	Storage name	check date	file count
Simulation data	NCX	2021-09-12 00:00	13118
Experimental data	NCX	2021-09-12 00:00	3284
Simulation data	NCX	2021-09-06 14:10	13118
Experimental data	NCX	2021-09-06 14:10	3284
Simulation data	NCX	2021-08-31 16:08	12122

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## Error Graph



## Data Inspector

Error name	File Path	Error Details
File read error	/eos/nica/bmn/sim/gen/DCMQGSM/DCMQGSM_CC_3.5_mb_20k/DCMQGSM_CC_3.5_mb_20k_11.r12	[Erno 5] Input/output error
File read error	/eos/nica/bmn/sim/gen/DQGSM/CPb_4.5AGeV_mb/CPb_4.5AGeV_mb_44.r12	[Erno 13] Permission denied: 'file_path'
File read error	/eos/nica/bmn/sim/gen/DQGSM/CPb_4.5AGeV_mb/CPb_4.5AGeV_mb_1.r12	[Erno 13] Permission denied: 'file_path'
File read error	/eos/nica/bmn/sim/gen/DQGSM/CPb_4.5AGeV_mb/CPb_4.5AGeV_mb_10.r12	[Erno 13] Permission denied: 'file_path'
File read error	/eos/nica/bmn/sim/gen/DQGSM/CPb_4.5AGeV_mb/CPb_4.5AGeV_mb_100.r12	[Erno 13] Permission denied: 'file_path'
File read error	/eos/nica/bmn/sim/gen/DQGSM/CPb_4.5AGeV_mb/CPb_4.5AGeV_mb_11.r12	[Erno 13] Permission denied: 'file_path'
File read error	/eos/nica/bmn/sim/gen/DQGSM/CPb_4.5AGeV_mb/CPb_4.5AGeV_mb_12.r12	[Erno 13] Permission denied: 'file_path'
File read error	/eos/nica/bmn/sim/gen/DQGSM/CPb_4.5AGeV_mb/CPb_4.5AGeV_mb_13.r12	[Erno 13] Permission denied: 'file_path'
File read error	/eos/nica/bmn/sim/gen/DQGSM/CPb_4.5AGeV_mb/CPb_4.5AGeV_mb_14.r12	[Erno 13] Permission denied: 'file_path'
File read error	/eos/nica/bmn/sim/gen/DQGSM/CPb_4.5AGeV_mb/CPb_4.5AGeV_mb_15.r12	[Erno 13] Permission denied: 'file_path'
File read error	/eos/nica/bmn/sim/gen/DQGSM/CPb_4.5AGeV_mb/CPb_4.5AGeV_mb_16.r12	[Erno 13] Permission denied: 'file_path'
File read error	/eos/nica/bmn/sim/gen/DQGSM/CPb_4.5AGeV_mb/CPb_4.5AGeV_mb_17.r12	[Erno 13] Permission denied: 'file_path'
File read error	/eos/nica/bmn/sim/gen/DQGSM/CPb_4.5AGeV_mb/CPb_4.5AGeV_mb_18.r12	[Erno 13] Permission denied: 'file_path'
File read error	/eos/nica/bmn/sim/gen/DQGSM/CPb_4.5AGeV_mb/CPb_4.5AGeV_mb_19.r12	[Erno 13] Permission denied: 'file_path'
File read error	/eos/nica/bmn/sim/gen/DQGSM/CPb_4.5AGeV_mb/CPb_4.5AGeV_mb_2.r12	[Erno 13] Permission denied: 'file_path'

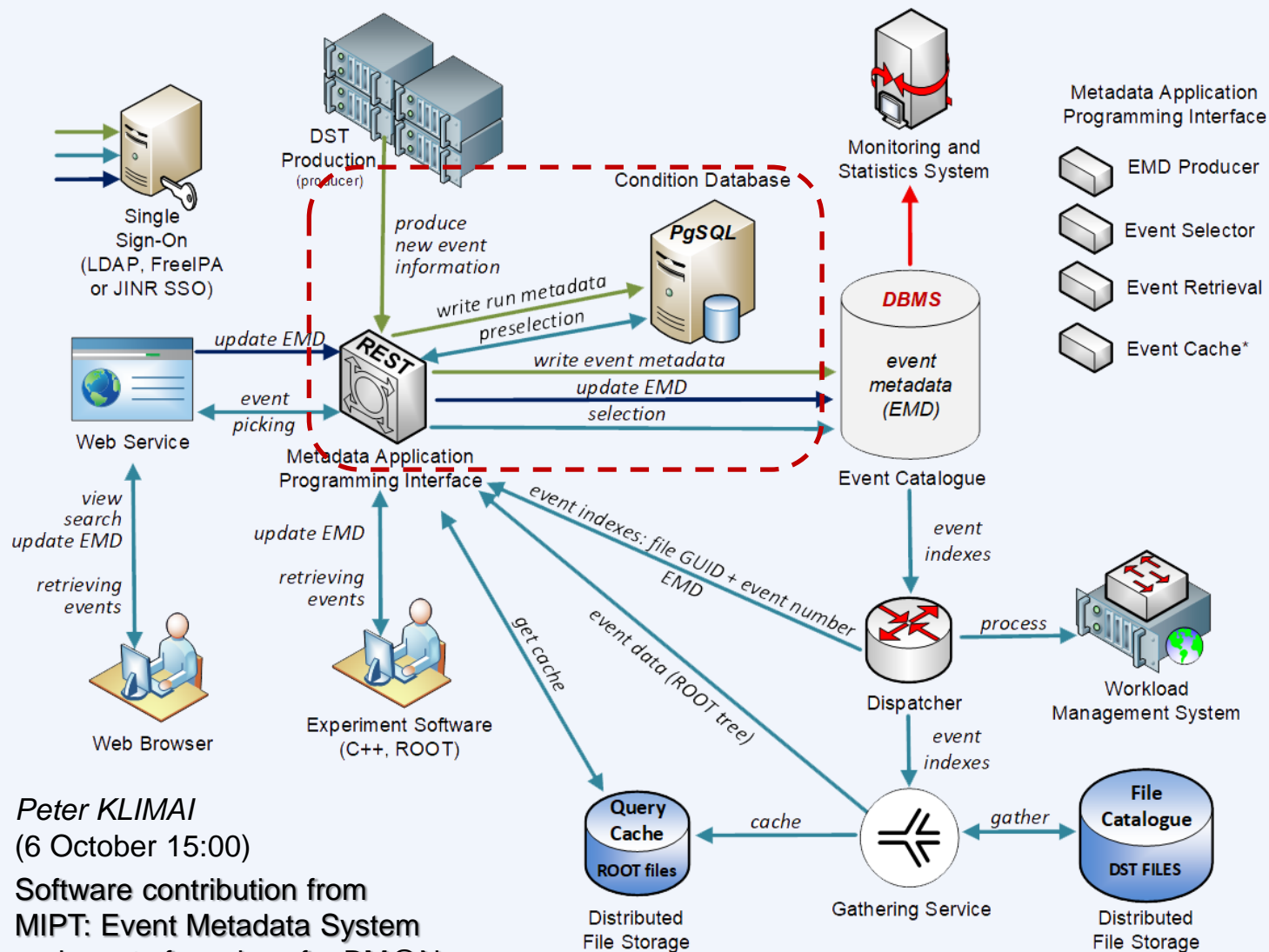
# Event Metadata System

*funded by the RFBR Grant No.18-02-40125*

**0.25 FTE<sub>min</sub> for support**



# Architecture of the Event Metadata System



Web interface  
for viewing and searching for event metadata stored in the Event Catalogue and retrieving events which satisfy given user parameters

Metadata API  
for writing new metadata to the Event Catalogue while data processing and requesting events selected by criteria for physics analysis in BmnRoot

Peter KLIMA  
(6 October 15:00)  
Software contribution from  
MIPT: Event Metadata System  
and a set of services for BM@N

# Event Metadata Structure

*write event metadata only  
if primary vertex was  
found in the event*

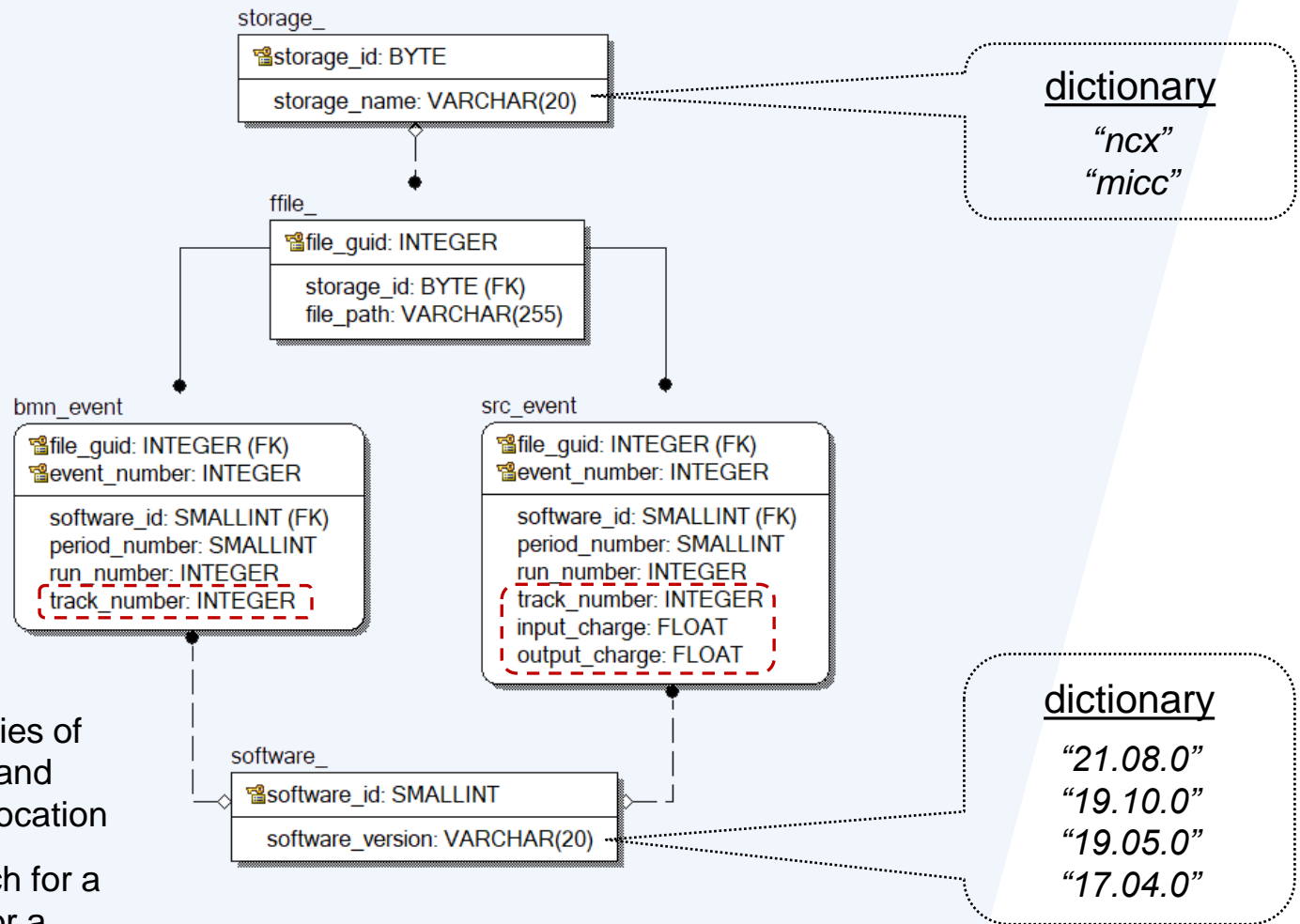
## **BM@N program**

- **file pointer (GUID) (4 byte)**
- **event number (4 byte)**
- period and run number (4+4 bytes)
- software version (2 bytes)
- number of all reconstructed tracks (4 byte)

## **SRC program**

- **file pointer (GUID) (4 byte)**
- **event number (4 byte)**
- period and run number (4+4 bytes)
- software version (2 bytes)
- number of all reconstructed tracks (4 byte)
- total input charge in the event (4 byte)
- total output charge in the event (4 byte)

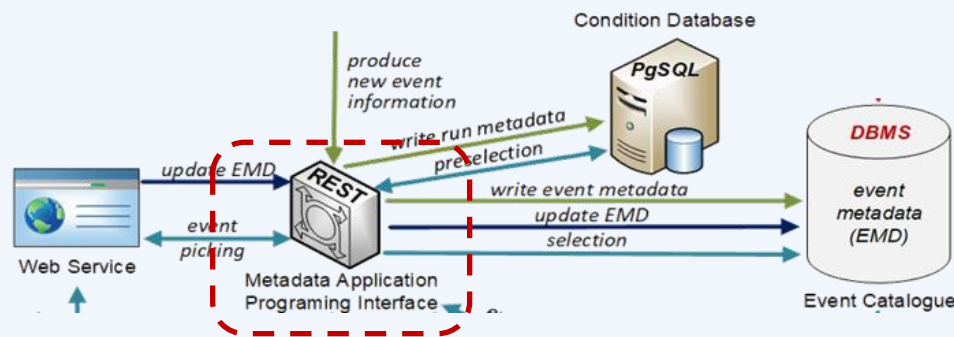
# Database Scheme of the Event Catalogue



contains summary properties of particle collision events and references to their storage location

allows user to quickly search for a set of events required for a particular physics analysis by various parameters

# REST API service for the access



**Event JSON scheme**

```
{
  "reference": {
    "storage_name": "data1",
    "file_path": "/tmp/file1",
    "event_number": 1
  },
  "software_version": "19.1",
  "period_number": 7,
  "run_number": 5000,
  "parameters": {
    "track_number": 20
  }
}
```

- ✦ HTTP API using JSON formatting
- ✦ POST /emd to create event metadata in the Event Catalogue
- ✦ DELETE /emd to delete event metadata from the Event Catalogue
- ✦ GET command to obtain event records by given criteria

```
GET /emd?period_number=7&run_number=5000+&software_version=20.08.0&track_number=10-15
```

```
GET /count[?parameter1=value1[&parameter2=value2[...]]]
```

```
GET /eventsFileRef[?parameters]
```

```
GET /eventsFileDownload[?parameters]
```

# Web UI Main Page (Test Prototype)

## Event Index Main Page

### BM@N Events

REST API

[API - get all events](#)

WebUI

[Search Form](#)

### BM@N SRC Events

REST API

[API - get all events](#)

WebUI

[Search Form](#)

### Auxiliary data

[Dictionaries](#)

## BM@N Events

Enter search criteria for events

Period Number

Run Number

Software Version

Selection based on  
standard parameters

Beam Particle

Target Particle

Energy, GeV

Preselection based on  
Condition DB

Total track number

Selection based on  
configured parameters

Events found:

storage_name	file_path	event_number	software_version	period_number	run_number	track_number
data1	/tmp/file1	100	19.1	7	5000	20
data1	/tmp/file1	101	19.1	7	5000	20
data1	/tmp/file1	102	19.1	7	5000	21

```
event_db: # condition_db - similar
host: ***
port: ***
db_name: ***
user: ***
password: ***
```

```
title: "Event Index Main Page"
```

```
pages:
- name: "BM@N Events"
  api_url: "/event_api/v1/bmn"
  web_url: "/event_web/bmn"
  db_table_name: "bmn_event"
  parameters:
  - name: track_number
    type: int
    intervals: true
    web_name: "Total track number"
```

```
[...]
```

- packed in Docker
- selection criteria as in REST API
- configuration YAML file →
- auto provisioning

 Kotlin

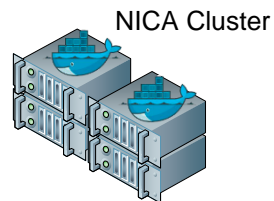
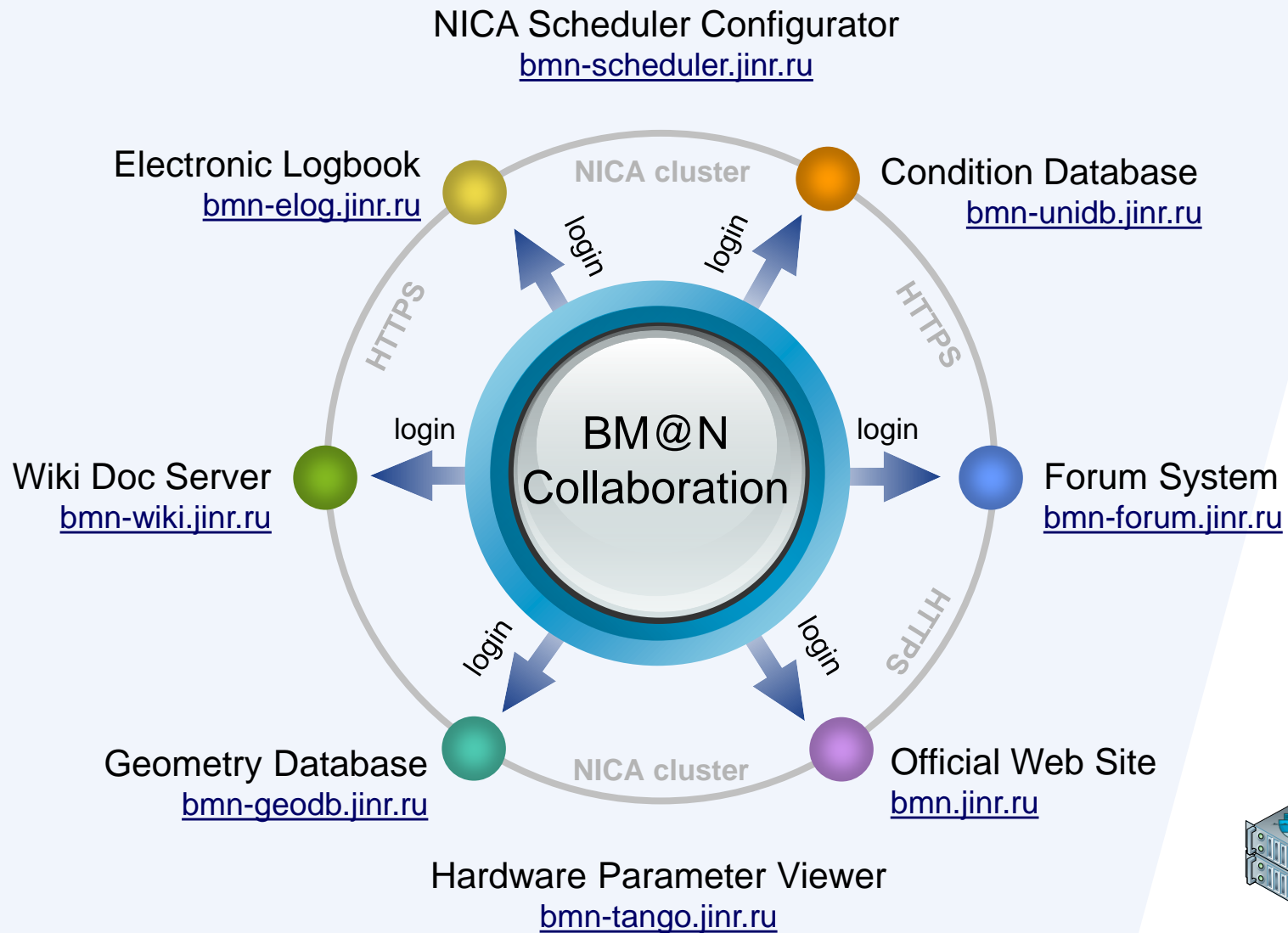
 Ktor

# Collaboration IT Services

*funded by the RFBR Grant No.18-02-40125*

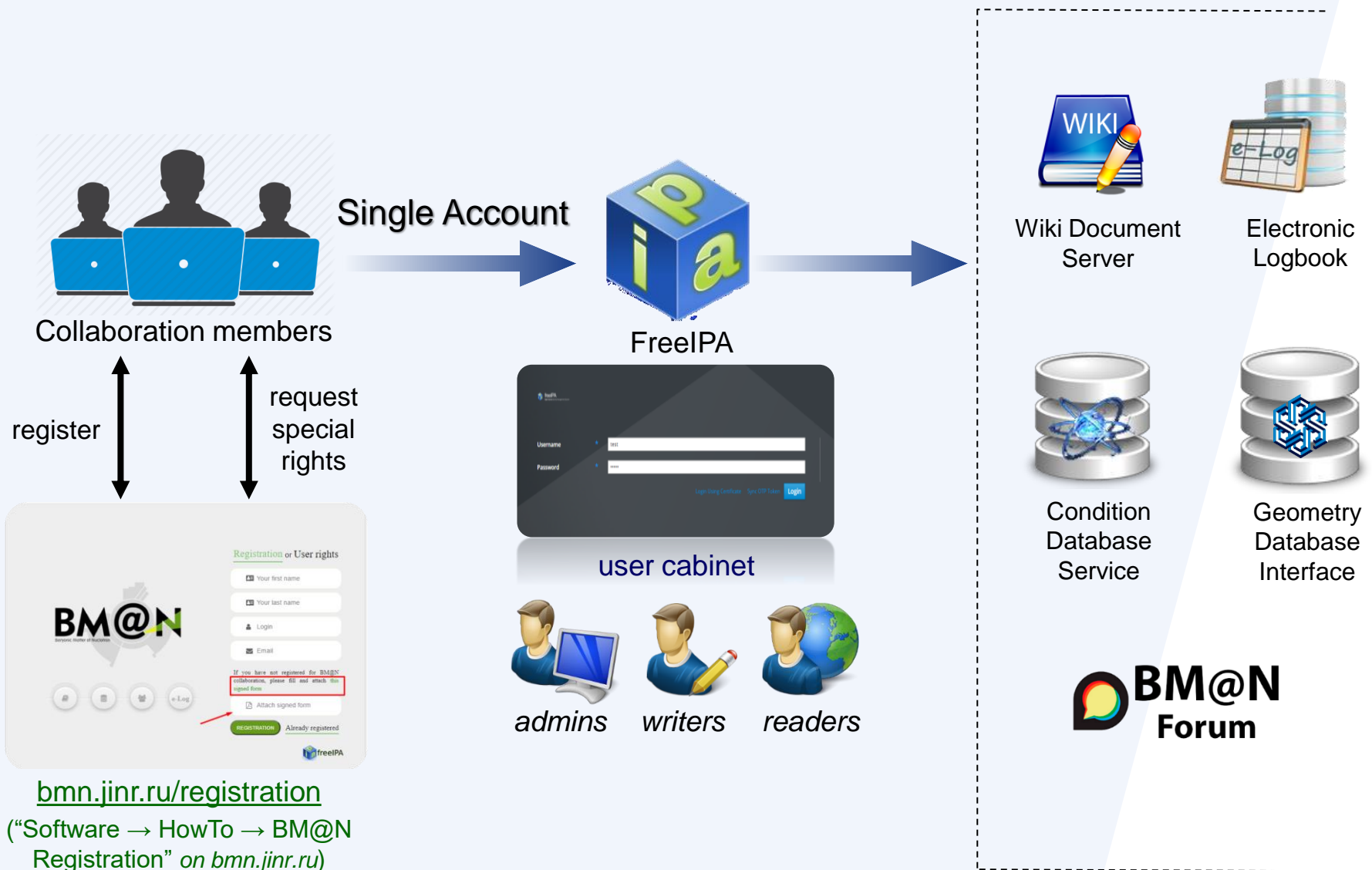
**0.25 FTE<sub>min</sub> for support**

# Status of the BM@N Services

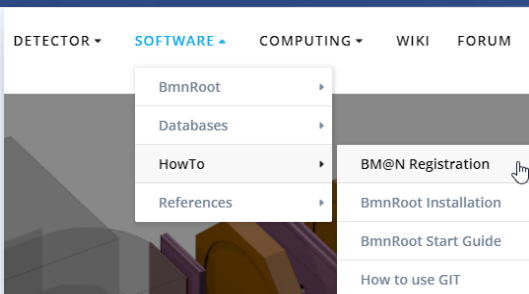




# FreeIPA: Single Authentication & Authorization



# BM@N User Registration Form



[bm.n.jinr.ru/registration](http://bm.n.jinr.ru/registration)

The required fields are filled in and the request is sent by e-mail to the software coordinator  
It is impossible to register yourself on the resources only via sending this request  
You must specify the mail, select resources and specify the necessary rights

## Registration or User rights

Your first name

Your last name

Login

Email

If you have not registered for BM@N collaboration, please fill and attach [this signed form](#)

Attach signed form

REGISTRATION

Already registered



## BM@N REGISTRATION FORM



Please complete all sections and send the signed form to the BM@N official person

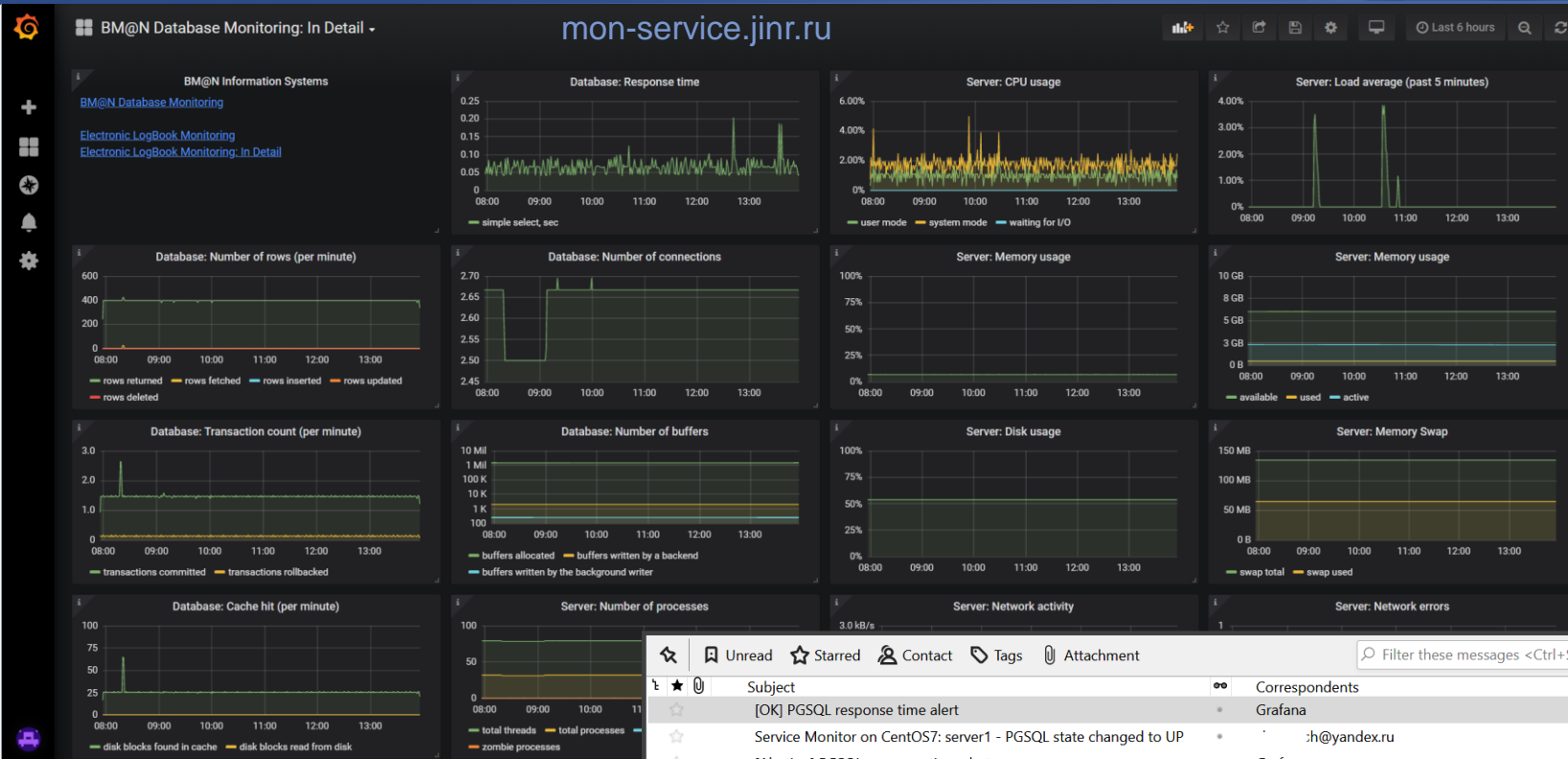
<input type="checkbox"/> new JINR user <input type="checkbox"/> new external user <input type="checkbox"/> change of status		JINR department .....
Family name .....		JINR office .....
First name (s) .....		JINR phone number .....
Second name (if exists) .....		JINR email .....
Date of Birth (Day.Month.Year): .....		<i>if not JINR employee</i> Home Institute name .....
Contact email .....		
Contact phone number .....		
Preferred login .....		
Contract period (or association with BM@N) (Day.Month.Year): from ..... to .....		
Average presence at JINR: ..... %		
Status: <input type="checkbox"/> Prof. <input type="checkbox"/> PhD <input type="checkbox"/> Scientist/Specialist <input type="checkbox"/> PhD student <input type="checkbox"/> Summer Student <input type="checkbox"/> Student Nature of activity: <input type="checkbox"/> Scientific <input type="checkbox"/> Engineering <input type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> Other:		
Team Leader: .....		
Work area at BM@N (briefly) .....		
Participation in other experiments .....		

I understand and certify that, for the entire duration of my association with BM@N:

- All BM@N users are expected to participate in Collaboration activities, scientific and technical, in a collegial manner respecting the cultural and ethnic diversity within the Collaboration.
- All BM@N users are expected to abide by the BM@N Bylaws and other adopted policies. They are also expected to abide by the JINR rules and procedures while present at the host premises.
- The scientific results obtained in course of the experiment shall be published only with the consent of all authors. The paper to be published and report to be presented shall be cleared by a Convener of the corresponding Working Group before submission.
- BM@N computing facilities, services and software are intended for the attainment of the experiment's aims. Their use must come within the professional duties of the user and work on the BM@N experiment. The use of the computing facilities and software must cause no material or moral damage to the experiment or any computing facilities, nor disrupt their operation.
- BM@N computing facilities must be used in conformity with their rules of use. The rules for the NICA (NCX) cluster, HybriLIT platform with Govorun and JINR CICC are listed on the official web sites, currently at <https://webncx.jinr.ru/start>, [http://hybriLit.jinr.ru/en/for\\_users](http://hybriLit.jinr.ru/en/for_users) and <http://lxs-s03.jinr.ru/cicc/index.php/en/home/>.
- I am aware of the prohibition on divulging given passwords, the use of unlicensed software, the inadmissibility of attempts of unauthorized access to the services, computer and network resources of the BM@N experiment.
- Although the Collaboration endeavours to maintain and protect its computing facilities and software, it cannot

# Monitoring Information Systems

## Grafana View



- BM@N Database + detailed
- Electronic Logbook + detailed

## Email Notifications

Unread Starred Contact Tags Attachment Filter these messages <Ctrl+Shift+K>

Subject	Correspondents	Date
[OK] PGSQL response time alert	Grafana	2:41 PM
Service Monitor on CentOS7: server1 - PGSQL state changed to UP	h@yandex.ru	2:40 PM
[Alerting] PGSQL response time alert	Grafana	2:01 PM
Service Monitor on CentOS7: server1 - PGSQL state changed to ***	h@yandex.ru	1:54 PM

From Grafana <h@yandex.ru> ☆

Subject [OK] PGSQL response time alert

To Me ☆

**[OK] PGSQL response time alert**

Grafana: Database monitoring warning!

PGSQL response time

0.12

# Tango (Slow Control) Viewer

BM@N Slow Control Viewer



Tango Parameter

Dictionary ☐ Custom ☒

Parameter (Alias)

hall sensor

Run Selector

Run ☐ Time ☒

BM@N Period

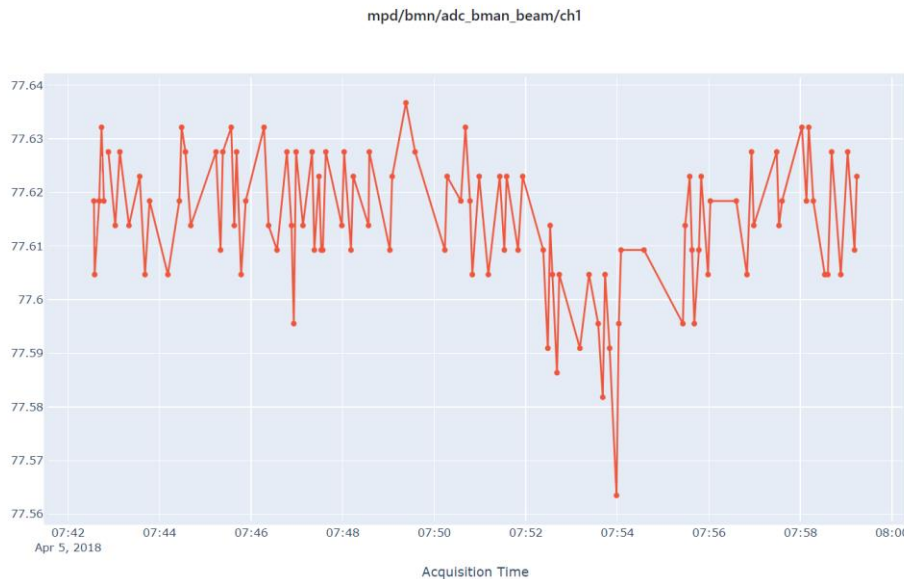
7

Run Number

5182

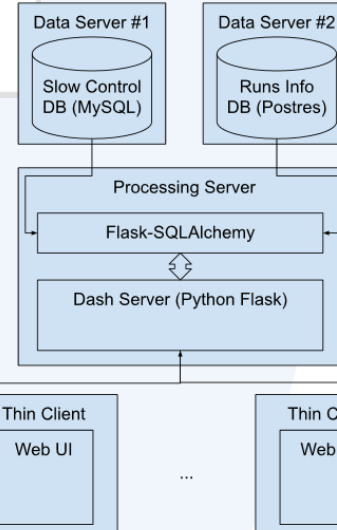
RESET

SHOW



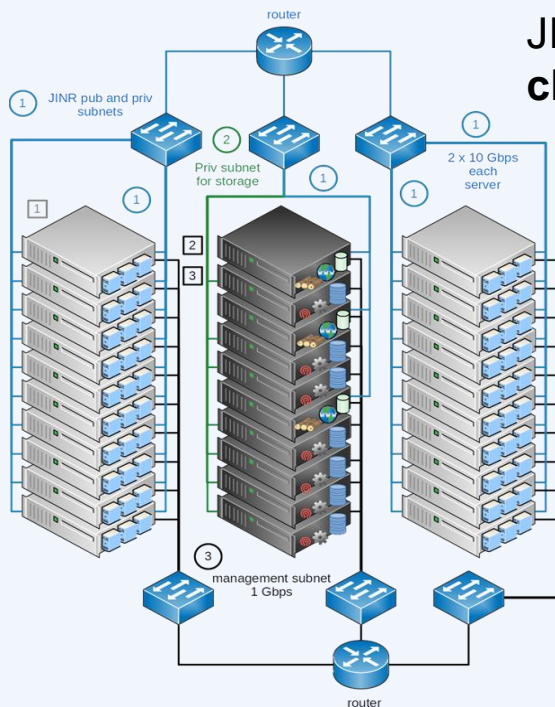
SC data

Run data



- Web service for BM@N slow control hardware parameters
- Shows sensor data graph based on run number or time interval, and parameter name (dictionary or custom set)
- If a parameter is 1D array, in this case a multigraph is displayed
- Uses Dash framework and packed in Docker container

# MLIT Services for the Collaboration



JINR Cloud  
**cloud.jinr.ru**

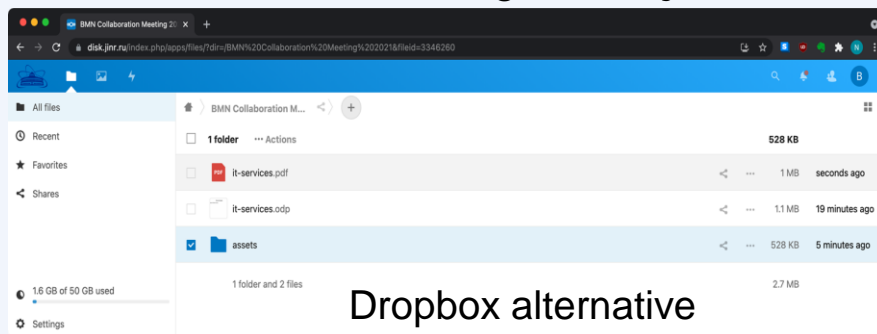
Jupyter notebooks  
**jupyter.jinr.ru**



GitLab  
**git.jinr.ru**

HelpDesk support  
**helpdesk.jinr.ru**

Personal Cloud Storage: **disk.jinr.ru**



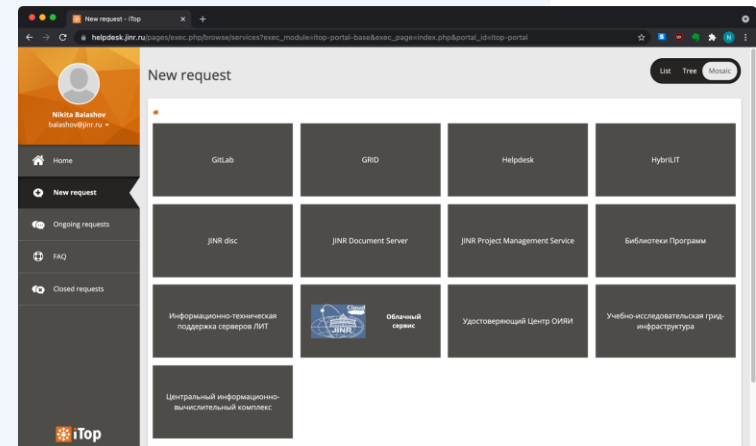
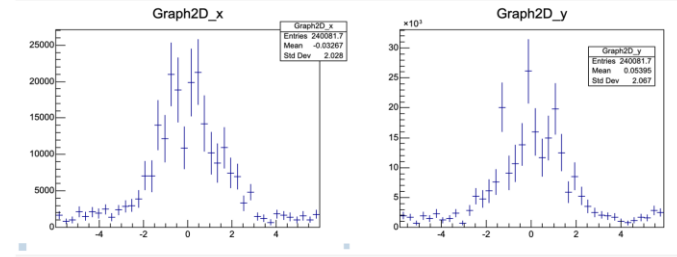
Dropbox alternative

Make the x and y projections.

```
[6]: gStyle->SetPalette(kBird);  
TCanvas c_p("ProjCan", "The Projections", 1000, 400);  
c_p.Divide(2,1);  
c_p.cd(1);  
dte.Project("x")->Draw();  
c_p.cd(2);  
dte.Project("y")->Draw();
```

Activate the JavaScript visualisation mode and display the projections in the notebook.

```
[7]: %jsroot on  
c_p.Draw();
```



Nikita BALASHOV (6 October 17:45)

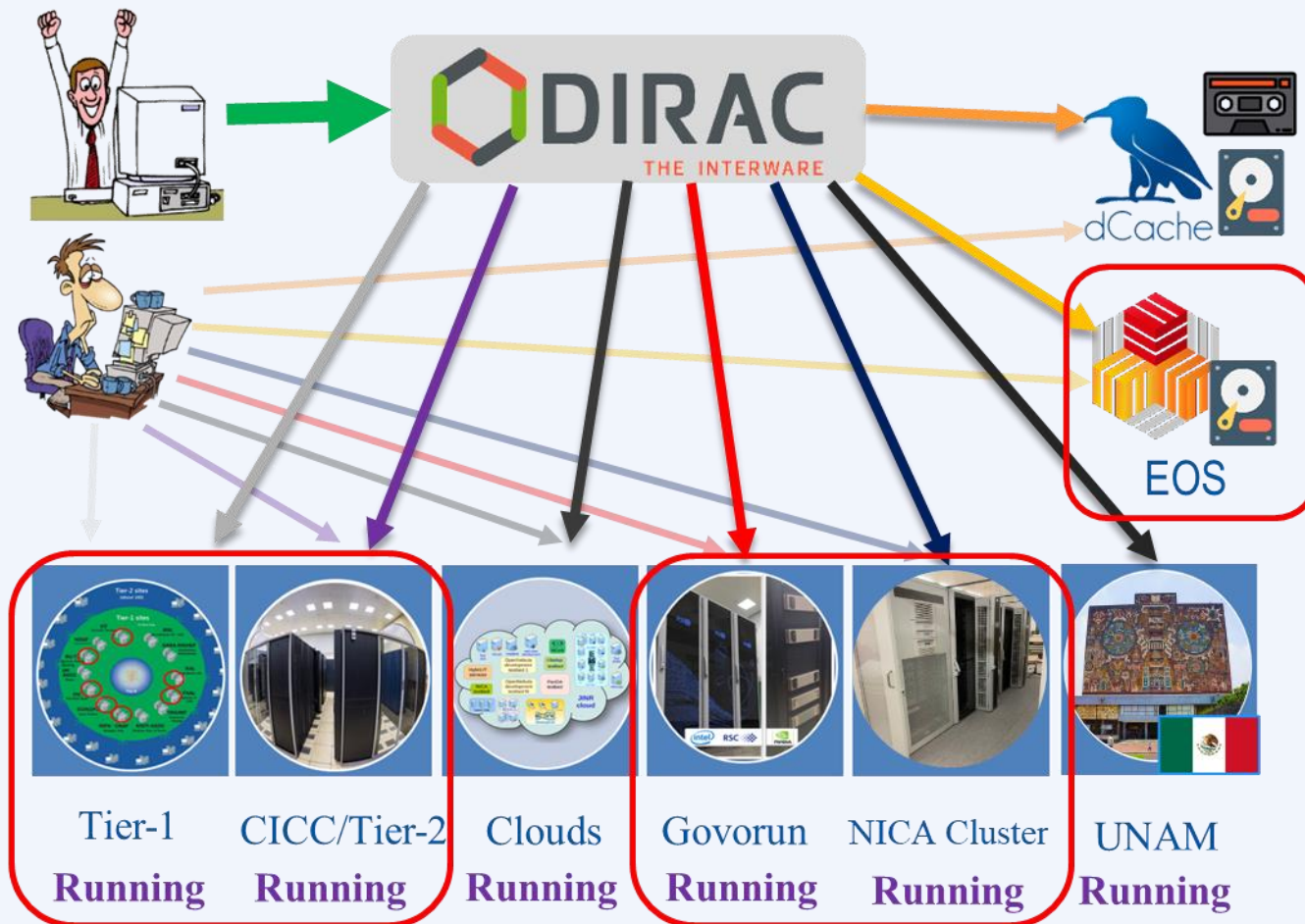
IT Services of the Laboratory of Information  
Technologies for the Collaboration

# DIRAC Interware Integration

0.25 FTE<sub>min</sub> for BM@N data processing



# BM@N WorkFlow Services via DIRAC



Workload  
management

Data  
management

Metadata  
management

File Catalog

Accounting

User Interface

API

Igor PELEVANYUK  
(6 October 17:25)

DIRAC use for BM@N tasks: status and perspectives

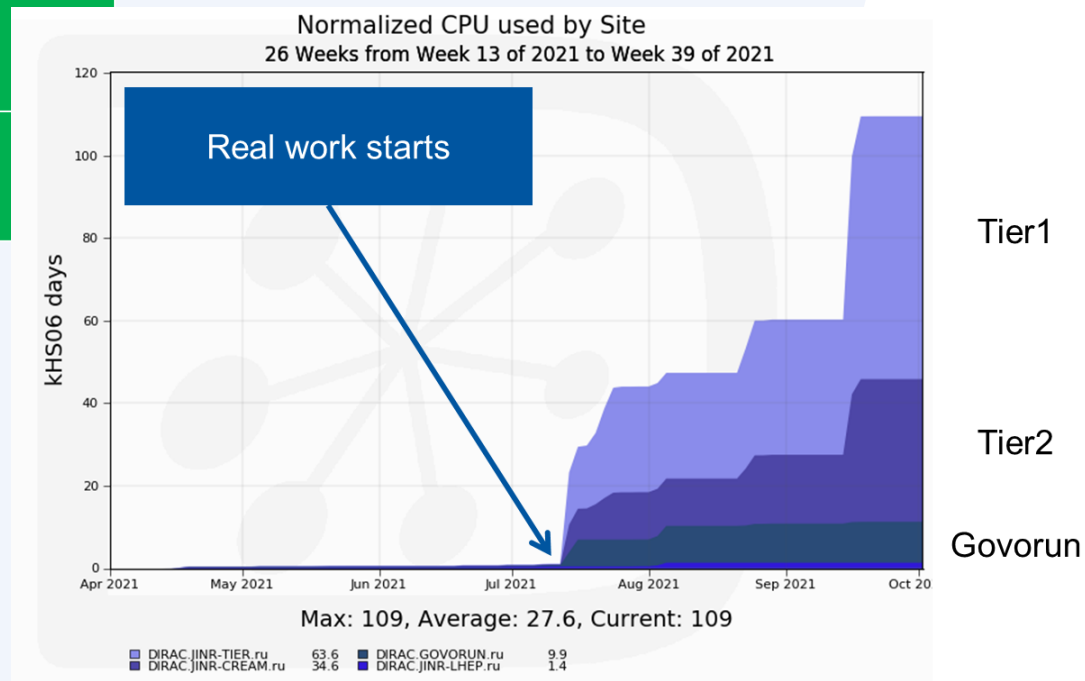
0.5 FTE<sub>min</sub> for integration



# BM@N event processing via DIRAC

	Tier-1	CICC/Tier-2	Clouds	Govorun	NICA Cluster
RawToDigit			not tested		
DigitToDst			not tested		
GenToSim			not tested		
SimToDst			not tested		

Total number of simulation jobs: 14000  
 Total wall time: 19 years      Average duration: 12 hours



Quotas (cores):  
 Tier1: 920 (for NICA)  
 Tier2: 1000 (for NICA)  
 Govorun: 192 (BM@N)  
 NICA cluster: 275 (for NICA)  
 JINR Cloud: 90 (for JINR)  
 Members-states clouds: ~500 (for JINR)

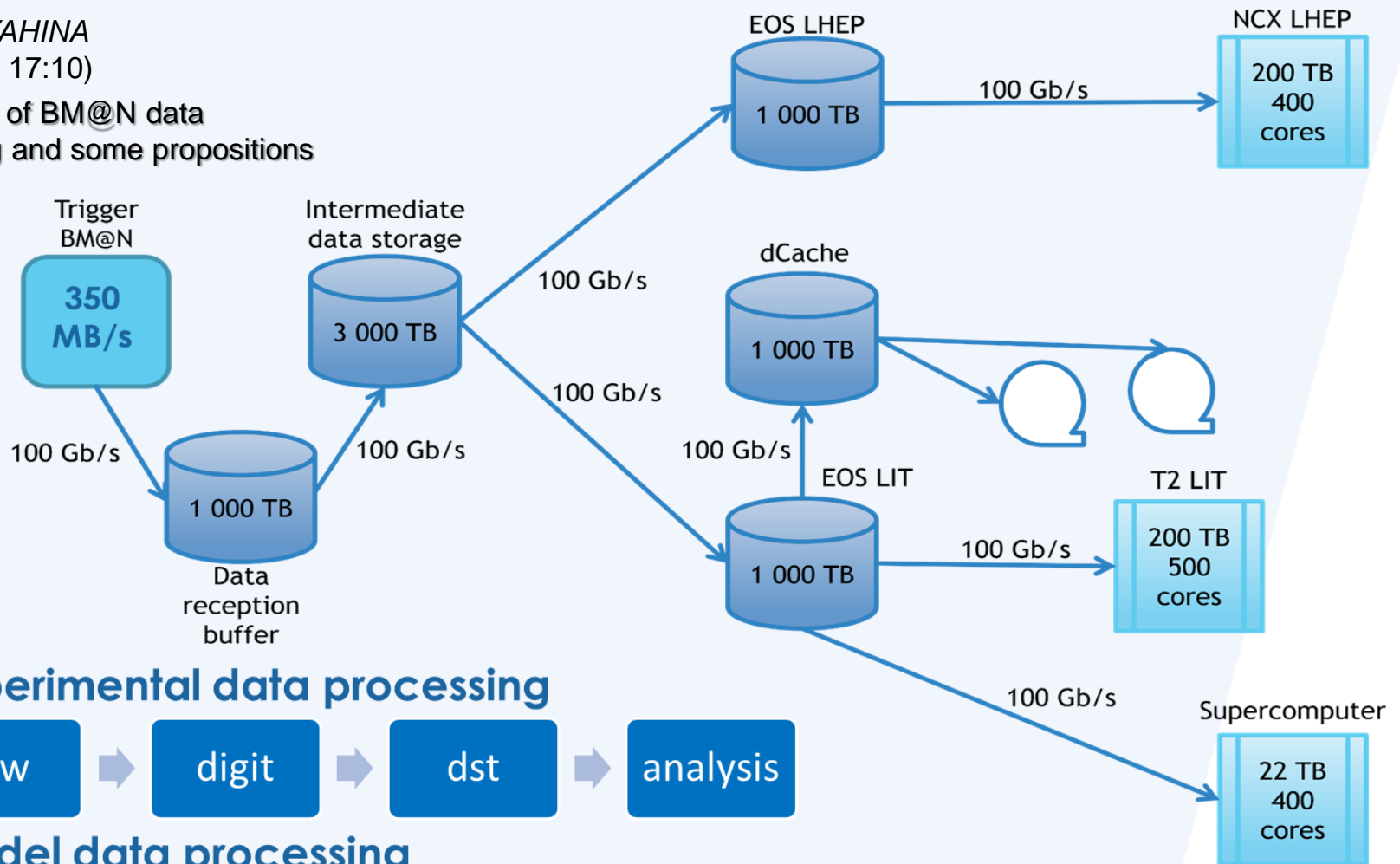
number of running jobs exceeded 1600

# Data-Processing Simulation for BM@N

Daria PRYAHINA

(6 October 17:10)

Simulation of BM@N data processing and some propositions



Run duration – 30 days  
run file duration – 2 min  
time between run files – 1 min

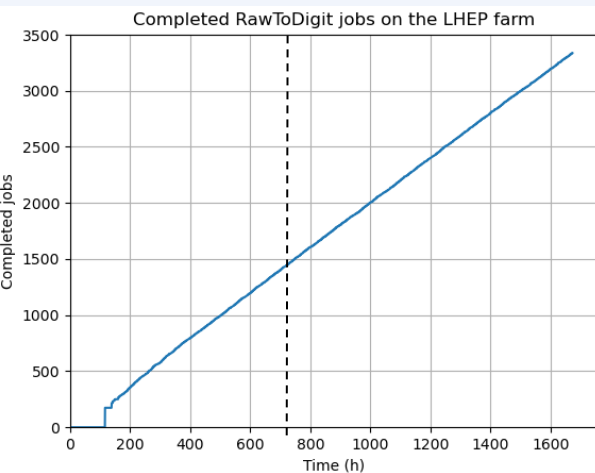
# Simulation Results (Scenario 1)

**Total number (RawToDigit): 15 552**

LHEP farm: 400 slots

50% jobs – **7 776**

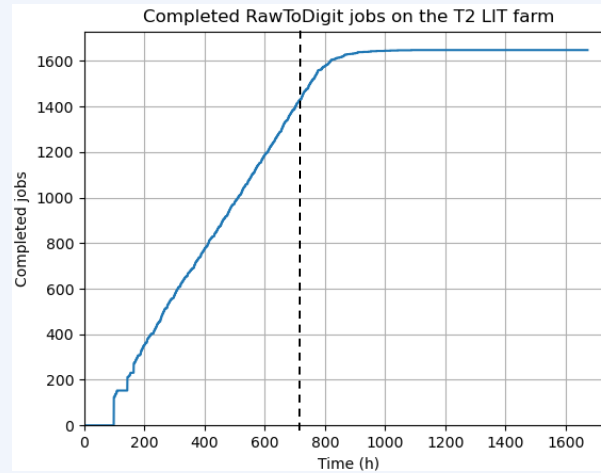
Execut. time – **175 000 s**



T2 LIT farm: 500 slots

15% jobs – **2 333**

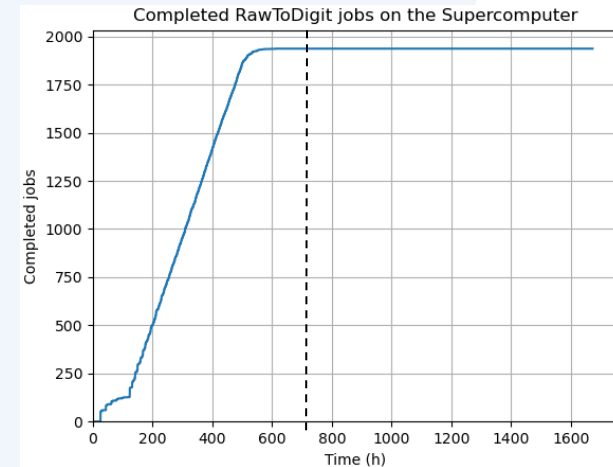
Execut. time – **175 000 s**



Supercomputer: 200 slots

35% jobs – **5 443**

Execut. time – **61 250 s**



- Completed  $\approx 1\,500$  jobs by 720 h

- Completed  $\approx 1\,400$  jobs by 720 h

- Completed  $\approx 1\,900$  jobs by 720 h

**Only 30% of all jobs session can be processed by 30 days**

- We will have to wait several more months until the end of processing all the raw data after the end of the session
- There are not enough resources for data analysis

# Simulation Results (Scenario 2 & 3)

The results obtained were similar to the results of the first scenario.

## Scenario 2

**10%**

of all jobs session can be processed by 720 h

**1.5%**

of raw data will be converted to reconstruction data by 720 h

**100%**

of simulation data will be converted to reconstruction data

**LHEP farm & T2 LIT farm**

**LHEP farm & Supercomputer**

all slots are occupied

## Scenario 3

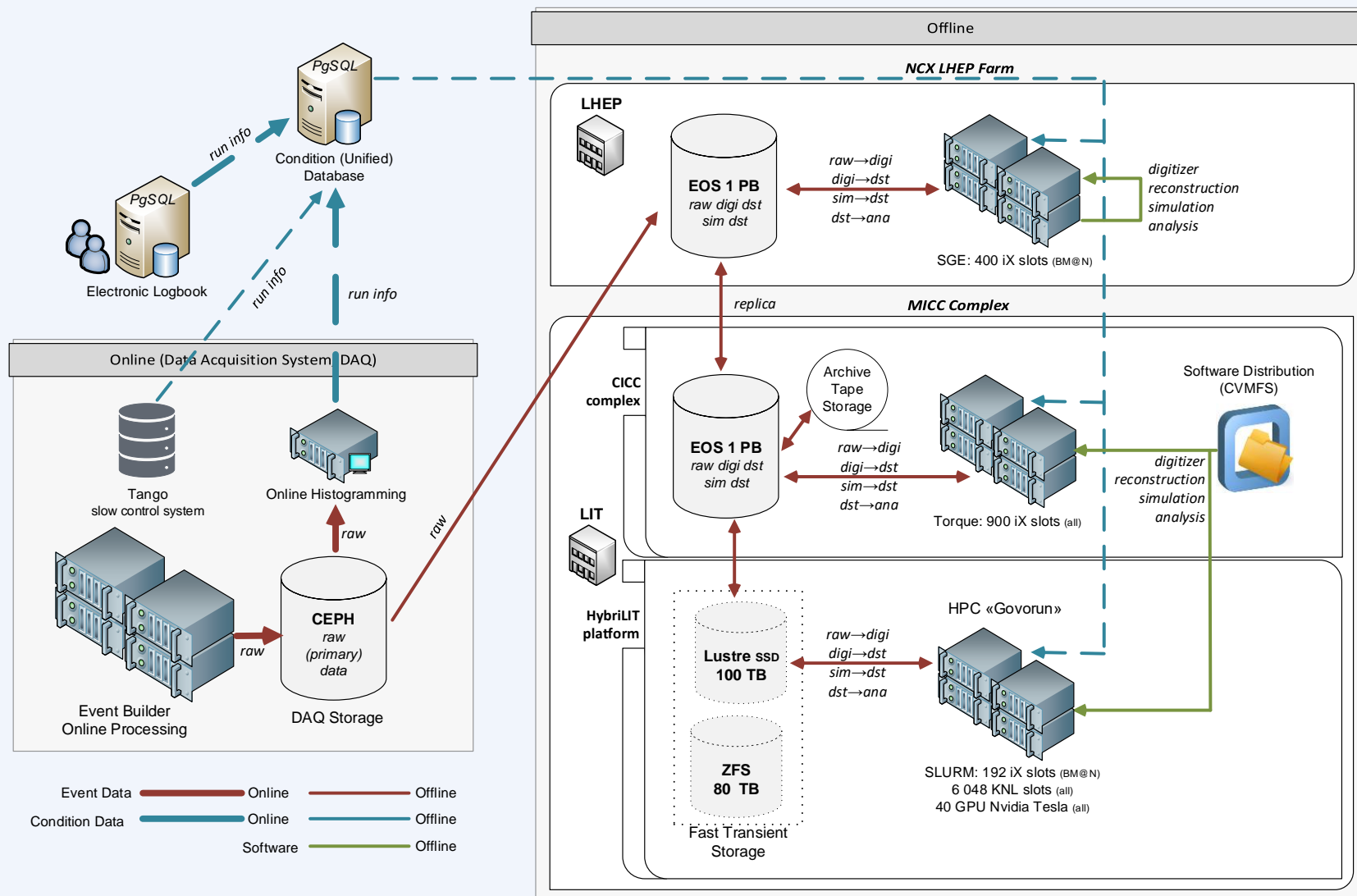
**15%**

**1%**

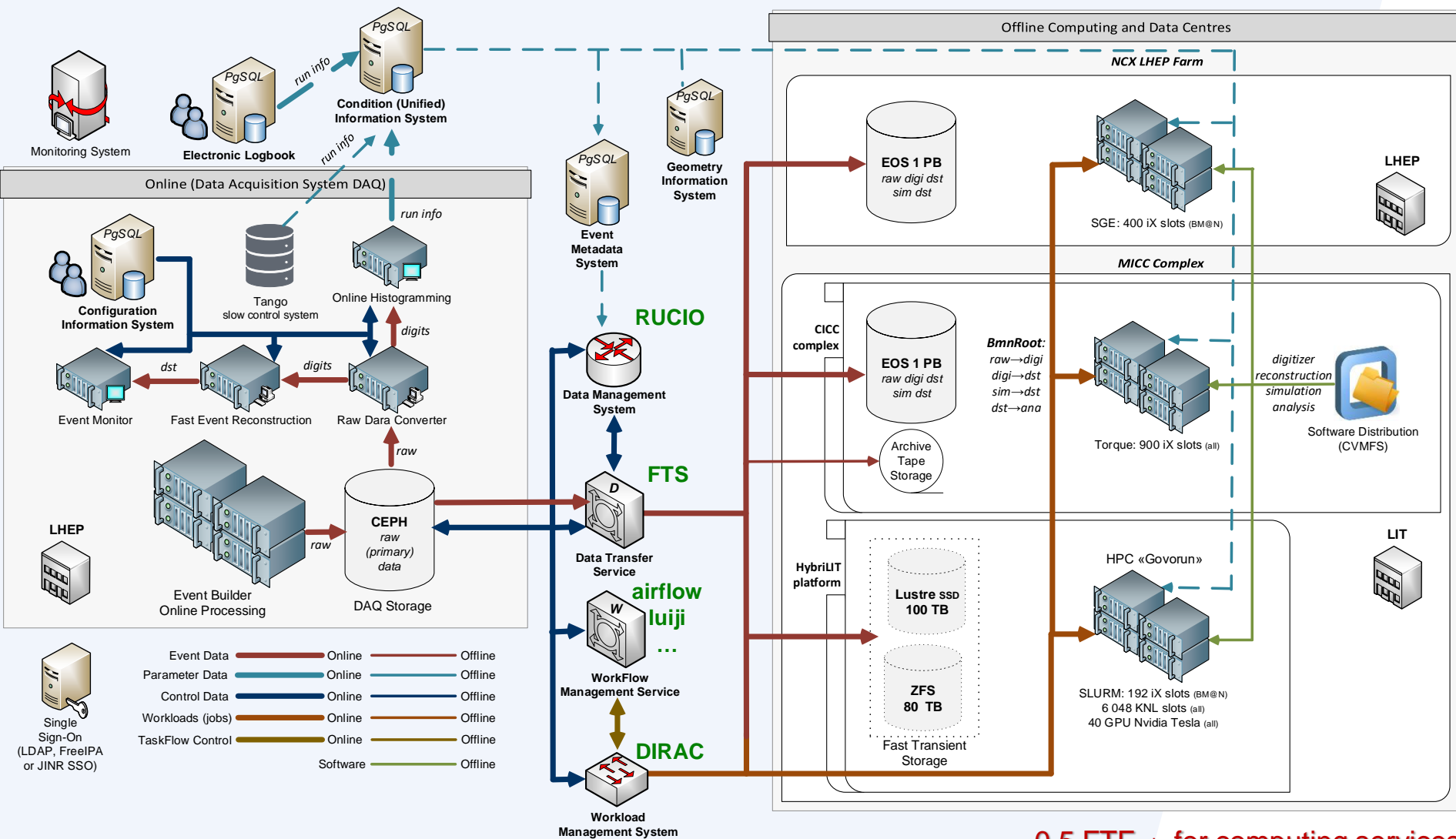
**100%**

**The resources are not enough for the BM@N experiment**

# Status of the BM@N Software

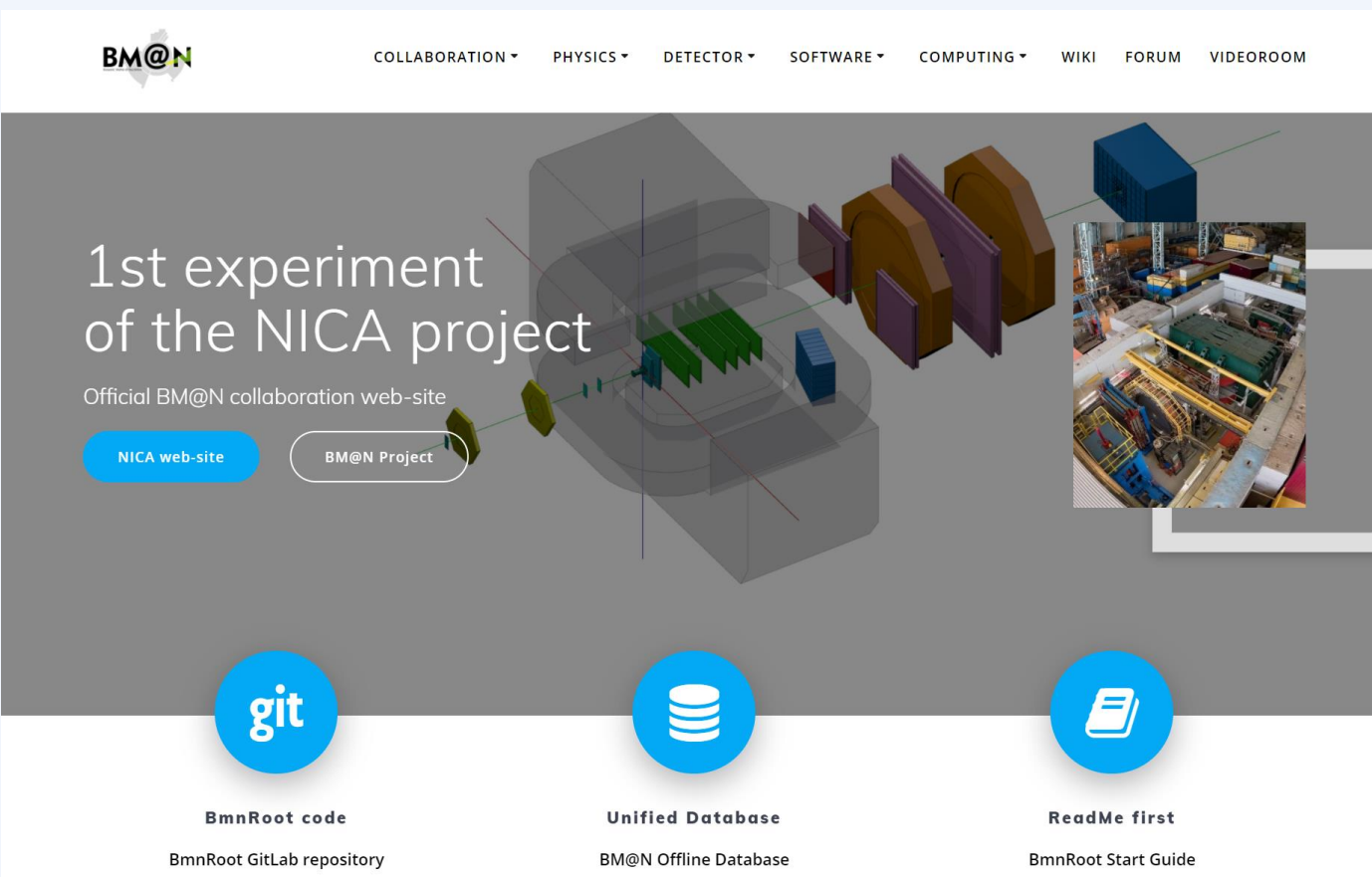


# Design of the BM@N Software Architecture



0.5 FTE<sub>min</sub> for computing services

# Official BM@N Web-site: *bmn.jinr.ru*



- ✓ **Collaboration**
- ✓ **Information**
- ✓ **Documents**
- ✓ **Software**
- ✓ **Databases**
- ✓ **Computing Section**  
(NICA Cluster, MICC Complex, HybriLIT & Govorun)
- ✓ **Guides, Manuals**
- ✓ **Wiki**
- ✓ **Forum**
- ✓ **Webex rooms**
- ✓ **BM@N Mail-lists**
- ✓ **etc.**



# BM@N Software Contribution



*Peter KLIMAI* (6 October 15:00)  
Software contribution from MIPT: Event Metadata System and a set of services for BM@N

**MIPT (NPM) group (Head: Tagir AUSHEV)**



*Sergei NEMNYUGIN* (6 October 16:50)  
Contribution of Saint-Petersburg University group in development of BmnRoot

**SPbU group (Head: Sergei NEMNYUGIN)**



**JINR LIT (Director: Vladimir KORENKOV)**



*Irina FILOZOVA, Igor ALEXANDROV, Evgeniy ALEXANDROV and staff:  
Development of Information Systems in frame of the RFBR grant*

**JINR LHEP (Spokesperson: Mikhail KAPISHIN)**



*Konstantin GERTSENBERGER  
Alexander CHEBOTOV*

**BM@N Software Group  
(2 FTE)**

**BM@N  
Software  
Contribution**

*(RFBR grant till  
begin of 2022  
+ in-kind  
contribution)*

# BM@N Computing and Technical Contribution

## JINR LHEP (Computing Leader: Andrey DOLBILOV)



*Ivan SLEPOV:*

*Deployment of the information services for BM@N on the NICA cluster*

## JINR LIT (Director: Vladimir KORENKOV)



*Nikita BALASHOV: CVMFS Deployment, GitLab Services, Docker Containers*

*Dmitriy PODGAYNY, Oksana STRELTSOVA, Maksim ZUEV: HybriLIT and SC Govorun support*

*Igor PELEVANYUK: DIRAC workload management system*

*Vladimir TROFIMOV, Daria PRIAKHINA, et. al: Simulation of BM@N data and processing centers*

**BM@N  
Computing &  
Technical  
Contribution**  
(no financial support,  
own motivation)

# Conclusions

- ✦ The big work has been done to develop **online and offline software systems** for the experiment, but a lot of efforts still should be invested to develop necessary software and improve BM@N data processing to seriously reduce the time of obtaining physics results.
- ✦ **RFBR support** with the NICA grant (ending in February, 2022) enables to significantly improve and develop information systems for BM@N event processing.
- ✦ The Electronic Logbook and Condition Database with their related services are actively employed by the collaboration members. The Geometry Database is under integration in BmnRoot. The Event Metadata and Configuration Systems are scheduled to be completed and deployed till February, 2022.
- ✦ **BmnRoot Release 21.08.0** has been issued with the latest BM@N and SRC simulation, reconstruction, analysis and software improvements.
- ✦ The designed software architecture of the BM@N data processing is under development. The work with the **DIRAC** workload manager has started.
- ✦ **The lack of manpower** to support existing BM@N software is **2 FTE**, but to improve the systems or solve new software tasks it is required even much more staff for the software group.



# *Thank you for your attention!*

More information: [bmn.jinr.ru](http://bmn.jinr.ru)  
[nica.jinr.ru](http://nica.jinr.ru)

Email: [gertsen@jinr.ru](mailto:gertsen@jinr.ru)



*We are open for cooperation!*

# Backup

# BM@N Wiki Document Server

❖ WIKI

Registration BM@N Logbook BM@N Forum BM@N Database

## Menu

- > 1. BM@N Subsystems
- > 2. Run Control
- > 3. SRC @ BM@N
- > 4. Documents
- > 5. Reports
- > 6. Meetings
- > 7. Software
- > 8. Computing

/ Document Server for the BM@N experiment

## Document Server for the BM@N experiment

Last modified by Adminko on 2020/12/06 15:33

Documentation of data is essential for best research practice and ensures scientific transparency and data integrity. BM@N WIKI Document Server is where you can find the Library catalogue (books, ebooks, e-journals, standards) and the scientific output (articles, documents, Reports, etc.)

### Subjects

Documents Reports Meetings

BM@N SRC Run Control

Software Computing

Tags: [-]

Created by chebotov on 2019/12/11 11:20

Attachments (0) History

No attachments for this page

Attach files to this page

Выбрать файлы | Файл не выбран

XWiki 12.5.1



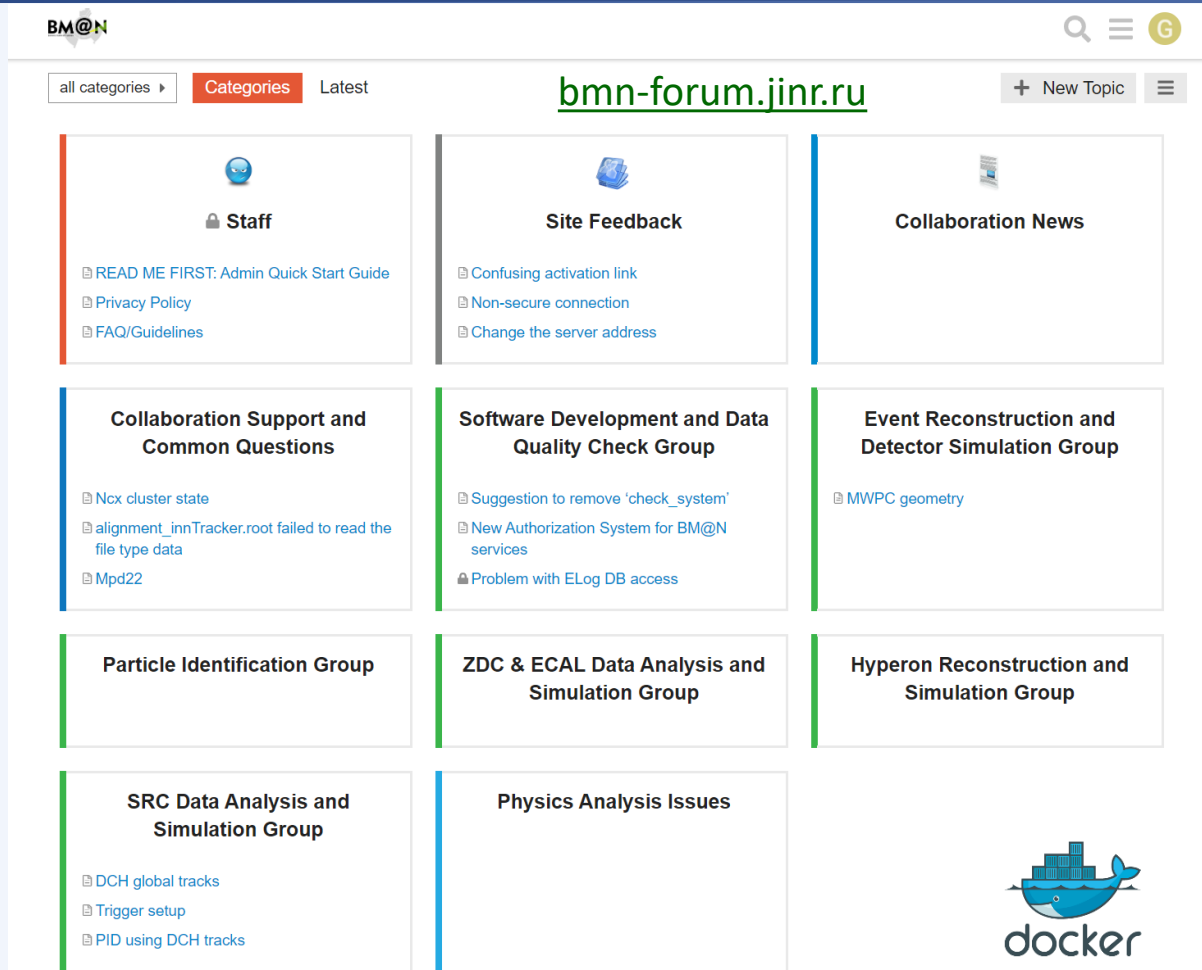
## Sections

- BM@N Subsystems
- Run Control
- SRC program
- Common documents
- Reports
- Software
- Computing
- Archive



- Contains all documents of the BM@N experiment
- Located in the Docker at the NICA cluster
- FreeIPA Authentication (Single Account)

# BM@N Collaboration Forum



Platform: Discourse

Architecture:

Redis + sidekiq + Nginx + PostgreSQL

Forum Topics:

- News
- Support and Questions
- Sections for Working Groups
- Physics Analysis Issues

Moved to the Docker at NICA cluster

Switched to FreeIPA Authentication  
(Single Account)

**BM@N Forum & News system for a quick communication and discussions  
between collaboration members and groups:**  
various topics for different groups, subscriptions, comments...