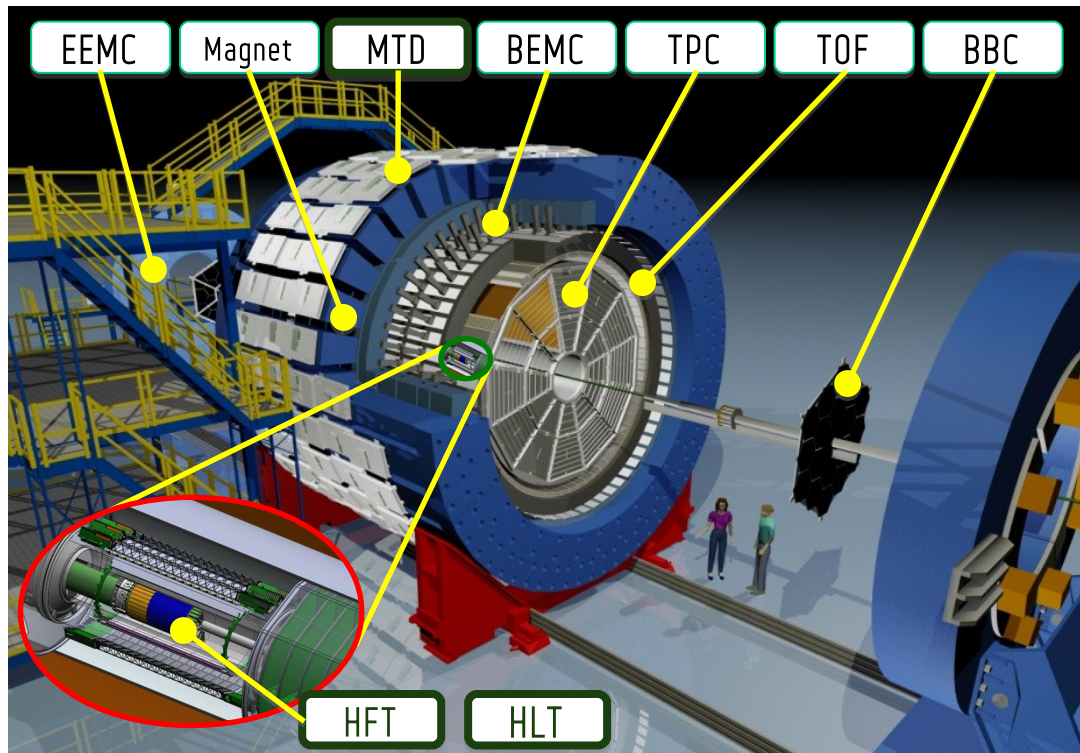


# Intro & STAR DBs Overview

Dmitry Arkhipkin  
NPPS group meeting  
2019-06-05





Solenoidal Tracker at RHIC

## STAR detector:

- Operating since 1999 (till 2025)
- 22 subsystems and growing
- Detector Control System is EPICS-based, having over 60k process variables
- Data taking rate: ~2kHz (started at 1Hz!)
- Colliding species: AuAu, CuCu, pp

## STAR Collaboration:

69 institutions from 14 countries, with a total of ~680 collaborators.

# My current responsibilities



- STAR Databases

- Online: Conditions, RTS, RunLog, Shifts
- Offline: Calibrations, Geometry (+API)
- FileCatalog
- Software Infrastructure

- STAR Services

- MIRA: SCADA Framework
- SKM: SSH Key Management
- PhoneBook: Collaboration Record Keeping
- Shift Signup & Accounting
- Experiment's RunLog
- Online Event Display

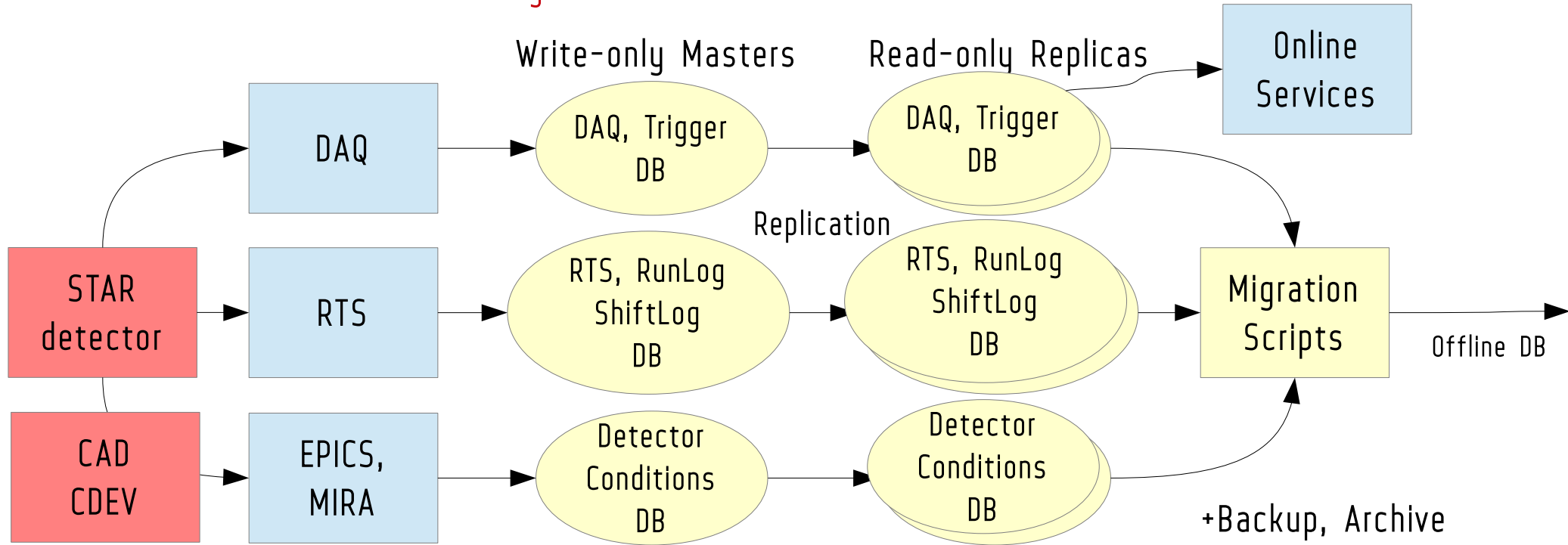
- Misc Tools and Interfaces

- DB Interfaces: Monitor, Browser, Explorer
- Author tools: author lists (LaTeX, Inspire)
- Online Service Aggregator
- jobStat: nightly tests UI
- dbPlots: Conditions DB archive viewer
- dbSlice: db readiness checker
- talkstats / simstats
- Online-to-Offline data migration scripts & monitoring tools
- Drupal modules: STAR papers, meeting, conference etc

# Online Databases



“Online” Databases: used during data taking, optimized for fast writes, not fully structured. MySQL: **two master servers containing four independent db instances, four slave servers**. Each replica contains all online databases. New RTS database is a **three-node MongoDB cluster**.

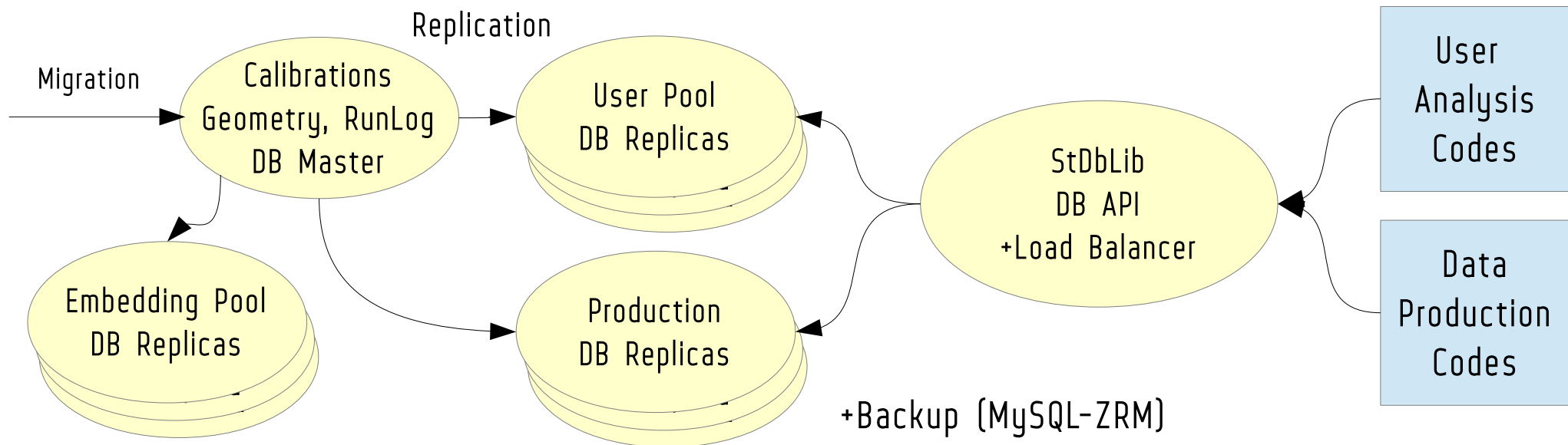




# Offline Databases



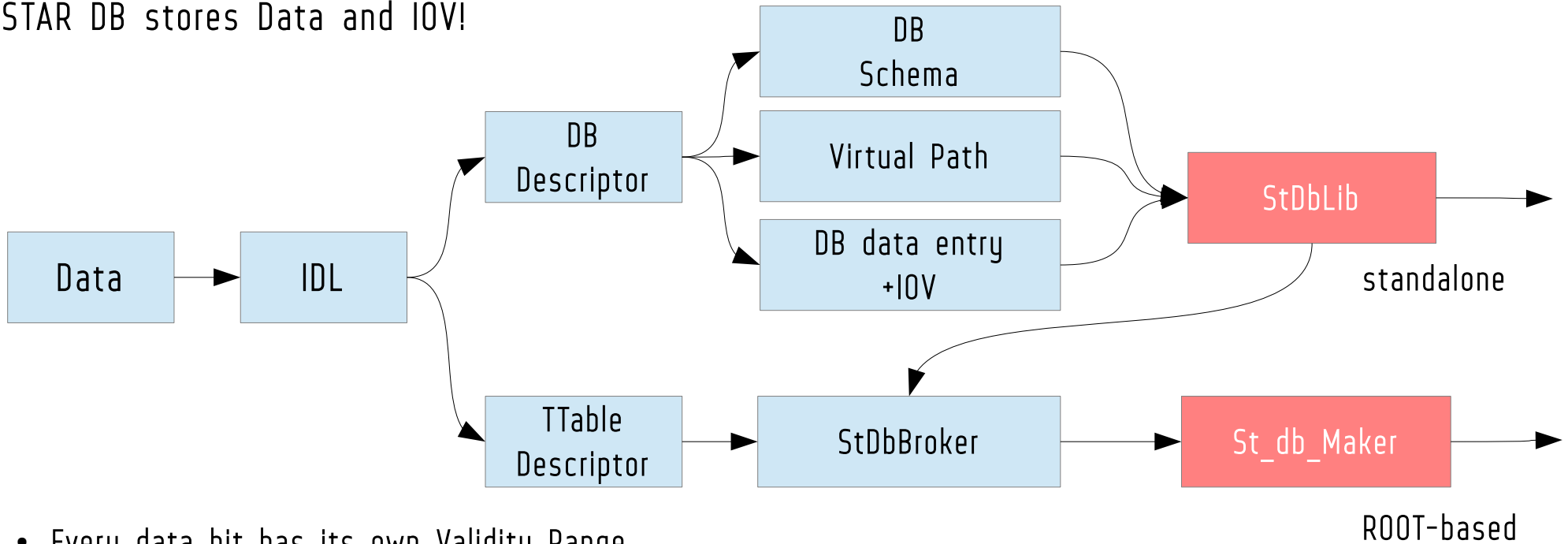
“Offline” Databases: Calibrations and Geometry Databases used during data production. Highly structured and optimized for fast reads. Replicated setup: **single MySQL master, 15 MySQL slaves** (three groups). Load Balancer is built into the client DB API (StDbLib, cpp). Database is not a file lookup service but data distribution service (+descriptors). Highly optimized for performance: peak load of 150k queries per second was handled without interruptions. Routine average load is ~20k queries per second.



# Offline Databases: format & API



STAR DB stores Data and IOV!



- Every data bit has its own Validity Range
- Data is requested via Event Timestamp + /full/path/to/the/entry
- Three time tags: beginTime, entryTime, deactiveTime
- Complete reproducibility: constrain entryTime and get db state as it was at time X

# Offline DB: clusters & clouds



- KEY FEATURES:

- Easy to maintain: just one service to maintain – MySQL master + N replicas. No separation between file servers and IOV servers. Maintainable by just one person bottom up (online to production).
- MySQL replication allows near-perfect horizontal scalability, so if performance is a bottleneck, just add more servers to the pool to accommodate for the increased load. Commodity hardware is fine, no need for a super-beefy servers.
- Client-based load balancing allows simple local LB configuration setups
- MySQL Query Cache is the only cache, and it is update-aware, no cache expiration time inconsistencies, ~95% efficiency

- CLUSTERS:

- MySQL is fairly easy to setup (incl. replication), so new cluster setup is not too complicated. Instant replication ensures 100% real-time data propagation across servers;
- Load is not an issue: add as many db replicas as needed in no time;

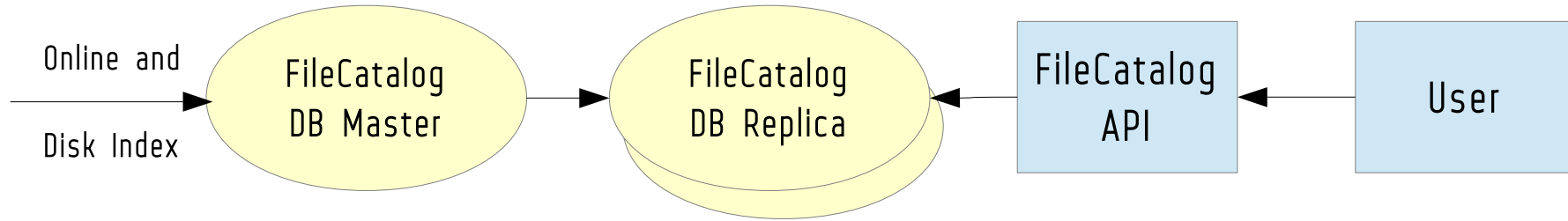
- CLOUDS:

- (from STAR experience) Bring DB server along with your jobs, use it as local server.. One year of STAR db data is ~5GB, no exascale-sized db needed if properly maintained ;)

# FileCatalog & SoFi databases



“FileCatalog” Databases: contain locations of all BNL-hosted files (HPSS, XROOTD, Distributed Disks) MySQL, **one master, two replicas**, optimized for frequent updates.



+Backup (MySQL-ZRM)

“SoFi” Databases: various Software Infrastructure databases. Loggers, monitoring, web services, SKM, file statistics, user activity stats etc. MySQL, several pairs of “one master, one replica” setups.



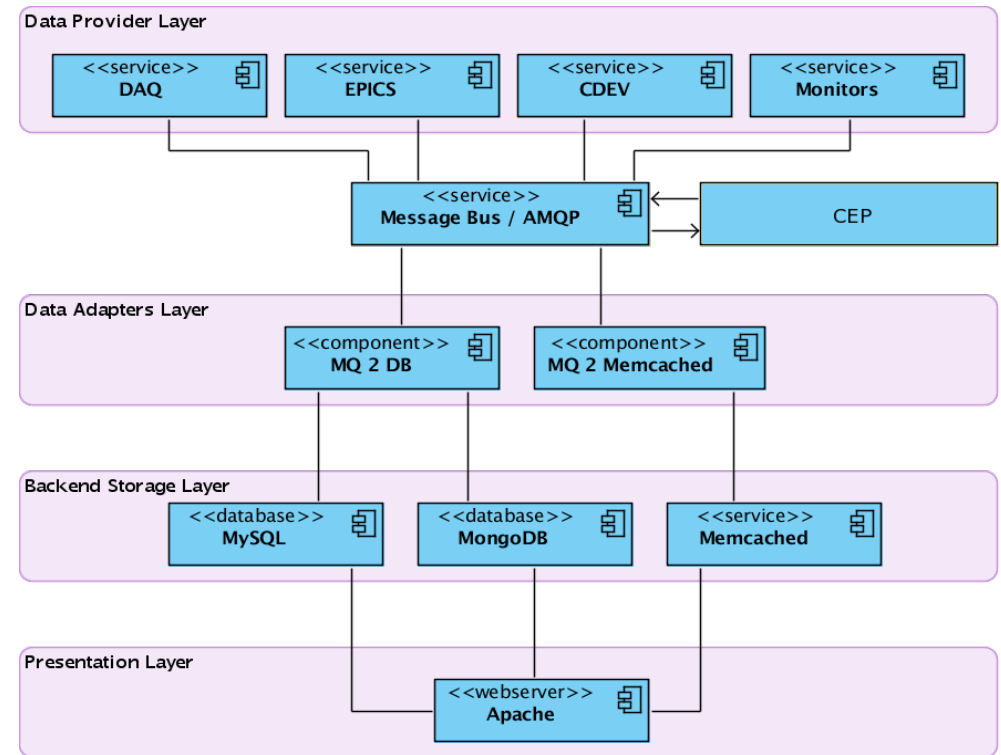


# MIRA: SCADA Framework

Messaging Interface and Reliable Architecture



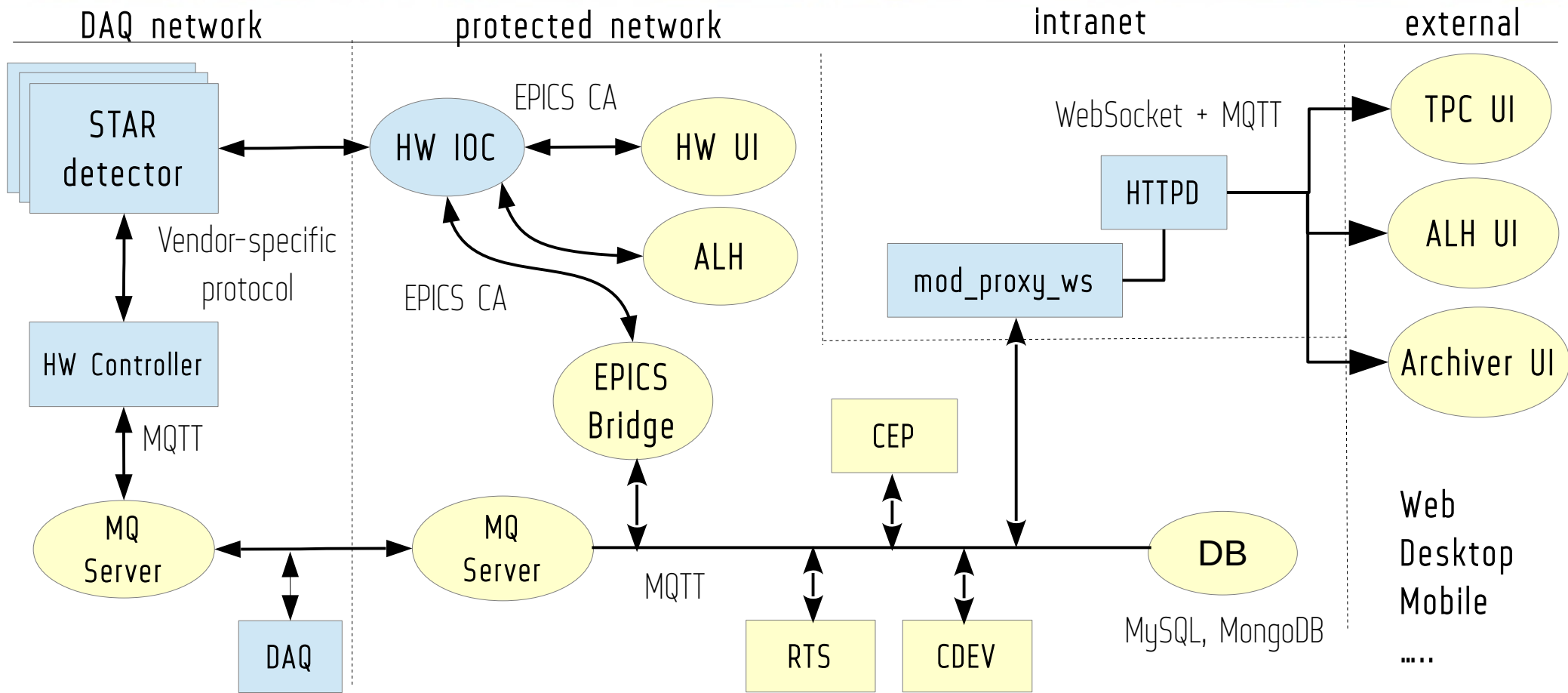
- Features:
  - Scalable architecture
  - Inter-operable, low-overhead protocol
  - Payload-agnostic messaging
  - Quality of Service regulation
- Originally designed to implement better meta-data collection (archiver) and provide basic service messaging bus
- Implemented using Message-Queuing service bus - AMQP, later MQTT
- Supports Complex Event Processing (CEP)
- With time, expanded to the Control System realm and Alarm Handling



MIRA: basic components overview

D Arkhipkin and J Lauret 2015 J. Phys.: Conf. Ser. 608 012036

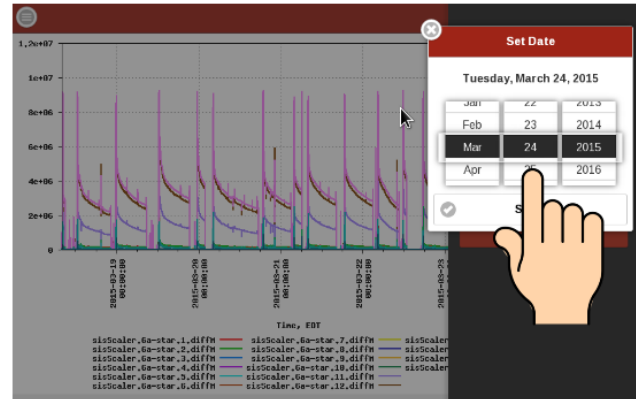
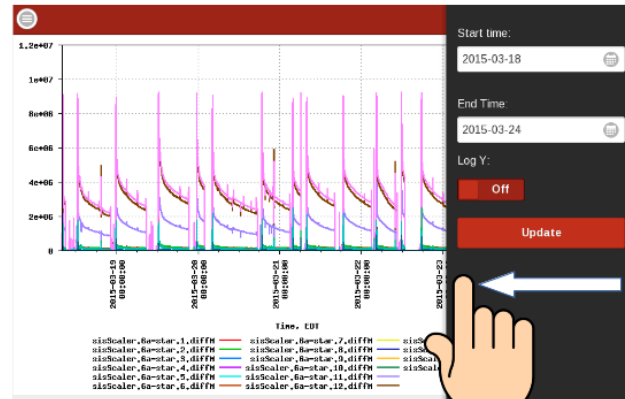
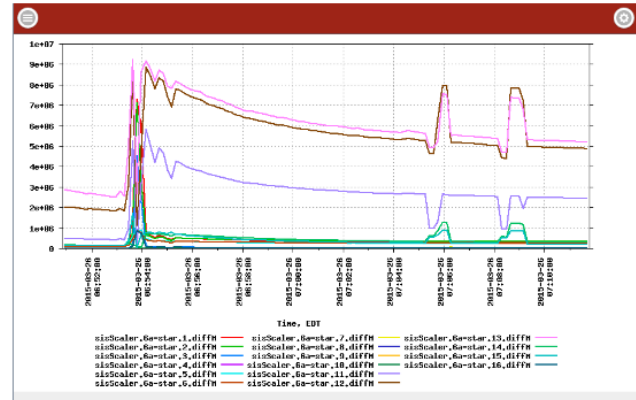
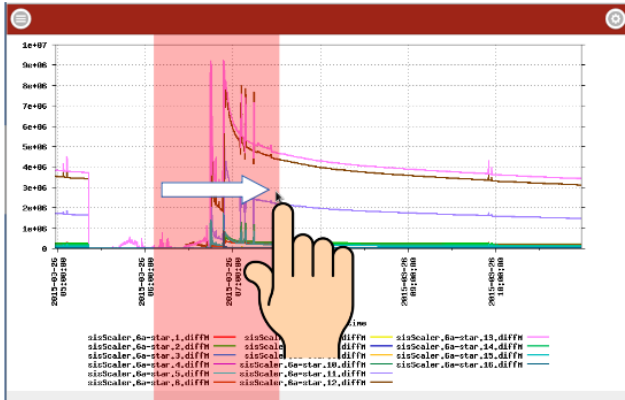
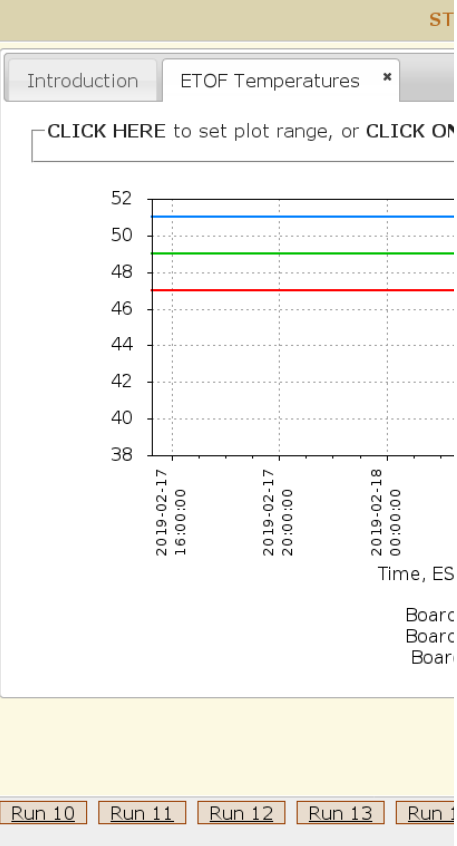
# MIRA: Scada Framework



# MIRA: Archive Viewer



- STAR ONLINE STATUS
- Conditions\_bbc
- Conditions\_daq
- Conditions\_epd
- Conditions\_etoF
- ETO F HV: Voltages
- ETO F HV: Currents
- ETO F Temperatures
- ETO F LV Arduino Voltages
- ETO F LV Arduino Currents
- Conditions\_fg t
- Conditions\_fps
- Conditions\_gmt
- Conditions\_ist
- Conditions\_mtd
- Conditions\_pp2pp
- Conditions\_pxl
- Conditions\_rhc
- Conditions\_rich
- Conditions\_sc
- Conditions\_tof
- Conditions\_tpc
- Conditions\_trg
- Conditions\_vpd



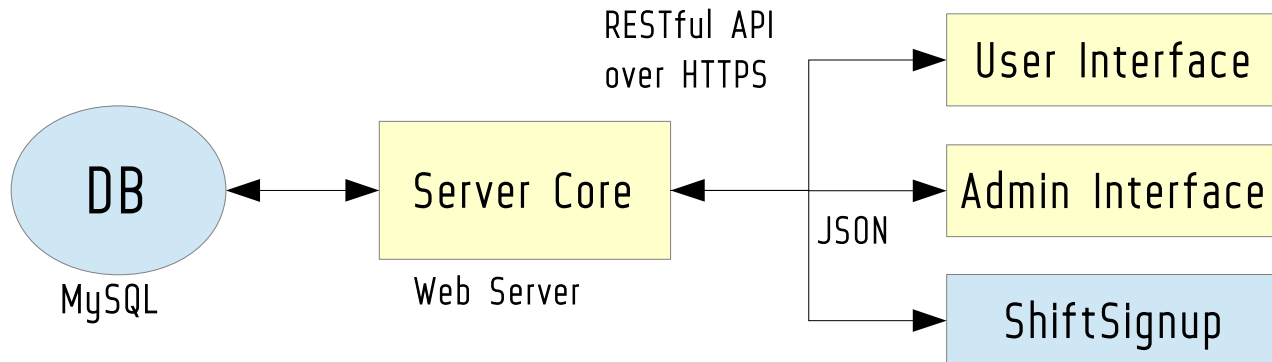


# Experiment's PhoneBook

<https://www.star.bnl.gov/pnb/client/>



- MySQL database backend (EAV model, schema-free) which has detailed historical information on every member of STAR collaboration, back to y1998. New fields could be configured on a fly without any interruption of service or database schema updates
- Modern user interface, which is more than just interface. Its HTML5 frontend is a client app, written in JavaScript
- Server core, exposing RESTful API (single source of data) for all possible clients: PhoneBook, ShiftSignup, Disk Space allocators etc..



Clients: cpp, php, js, python

[ to PUBLIC version ] ★ STAR PhoneBook 2.0 [close all tabs]

Intro **Manage: member fields \*** Manage: institution fields \*

[+ ADD FIELD](#) Search:

id	weight	Fixed name	Description	Group	is required?	is enabled?	Privacy mode
1	0	name_first	First name	user name	Yes	Yes	public
2	1	name_initials	Initials	user name	No	Yes	public
3	2	name_last	Last Name	user name	Yes	Yes	public
4	3	name_latex	Latex Last Name	user name	No	Yes	public
5	4	name_unicode	Unicode name	user name	No	Yes	public
6	5	inspire_id	Inspire ID	user name	No	Yes	public
7	6	gender	Gender	user name	No	Yes	public
10	0	address_line_1	Address line 1	user address	No	Yes	public
11	1	address_line_2	Address line 2	user address	No	Yes	public
12	2	address_line_3	Address line 3	user address	No	Yes	public
13	3	city	City	user address	No	Yes	public
14	4	state	State/Region	user address	No	Yes	public
15	5	country	Country	user address	No	Yes	public
16	6	postcode	Postcode/zipcode	user address	No	Yes	public
17	7	institution_id	Home institution	user address	Yes	Yes	public
89	8	extra_institution_id	Additional Home Institution(s)	user address	No	Yes	public

STAR S&C Group, BNL 2013

Mass Email Notifications

Mass Email: Representatives

Author List: APS

Author List: IOP

Author List: ARXIV

### Management

Institution Fields

Member Fields

Institution FieldGroups

Member FieldGroups

### External links

STAR WWW

# Shift Signup & Accounting

<https://online.star.bnl.gov/ShiftSignup/>



- Features:

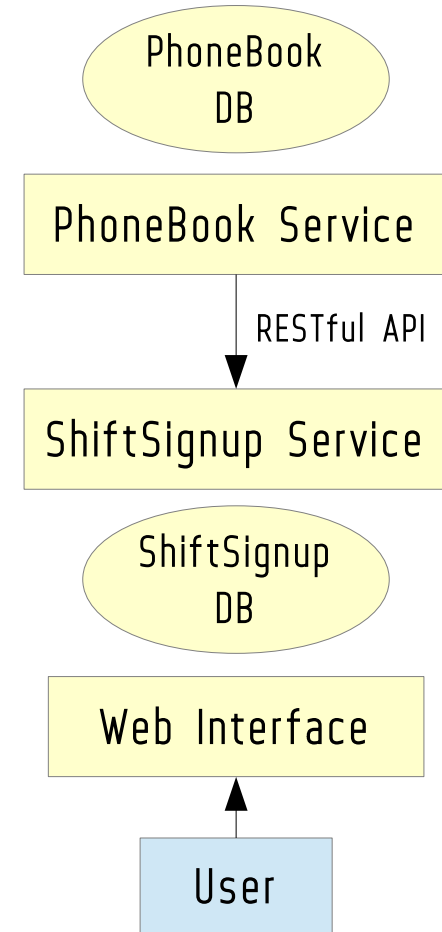
- Highly-configurable Shift Signup and Accounting tool. Integrated with STAR phonebook. Provides detailed overview of STAR shift crews and Online QA shifts, contains expert list.

- Administrative Features:

- Semi-automatic shift dues calculation per STAR institution for each RHIC Run. Manual override for shift assignments. Variety of summary tables.

- Accounting Features:

- Automatic checks for BNL mandatory shifter trainings, statistics of shift dues per institution, special shift dues calculations for experts





# Shift Signup & Accounting UI

<https://online.star.bnl.gov/ShiftSignup/>



Shift Signup Run 19

(1) To Signup: First select your Institution and Name, then choose a signup sheet  
 (2) To view schedules: choose a signup sheet

--- Institutions --- People ---

Print PDF Institutions Graphs Controls

Compact menu Sign-up Sheets: Experiment Operations Offline QA OR Shift Table: reduced view

Feb 26th - Mar 5th	Daniel Cebra University of California - Davis	0:30-7:30	Alexander Jentsch University of Texas at Austin	Jan Vanek Nuclear Physics Institute, The Czech Academy of Sciences	Lukas Kramarik Czech Technical University in Prague	Maria Stefaniak Warsaw University of Technology		
		7:30-16:30	Zilong Chang Brookhaven National Laboratory	Joel Mazer Rutgers University	Todd Kinghorn University of California - Davis	Xiaohai Jin Shanghai Institute of Applied Physics		
		16:30-0:30	David Kapukchyan University of California - Riverside	Dingwei Zhang Central China Normal University	Zhenzhen Yang Central China Normal University	Yue Liang Kent State University		

Week	Period Coord.	Shift	Shift Leader	Detector Opr.	Detector Opr.	Shift Crew	Leader Trainee	Det.Opr.Trainee
Mar 5th - Mar 12th	Daniel Cebra University of California - Davis	0:30-7:30		Bogdan Pawlik AGH University of Science and Technology	Susumu Sato University of Tsukuba	MIna Hatakeyama University of Tsukuba		Kosuke Okubo University of Tsukuba
		7:30-16:30	Shuai Yang Brookhaven National Laboratory	Joel Mazer Rutgers University	Declan Keane Kent State University	Xiaohai Jin Shanghai Institute of Applied Physics	Kenneth Barish University of California - Riverside	Audrey Francisco Yale University
		16:30-0:30	David Kapukchyan University of California - Riverside	Dingwei Zhang Central China Normal University	Anjali Attri Panjab University	Zhenzhen Yang Central China Normal University		

# Experiment's RunLog

<https://online.star.bnl.gov/RunLog/>



## • Features:

- Extensive web interface for all STAR runs, taken during RHIC data taking Runs.
- Provides run statistics (time, events, triggers, files etc) filtering, monitoring logs, conditions overview and other information
- Collects and organizes information from a variety of sources: Run-Time System, DAQ, Conditions, Slow Controls etc;
- Composed of a ~dozen services, three database instances and a web interface.
- Archived annually, to provide historical records for past Runs
- Web interface was fully re-written from scratch in 2010 as Model-View-Controller application

**STAR LOG**

RUN PERIOD: All TRG SETUP: all MAGNETIC FIELD: All

DAQ TYPE:  phys  ped  laser  pulser FILTER BAD RUNS:  Test Runs  RTS  Shi

DETECTORS:  I4  bsmd  eemc  emc  esmd  etof  gmt  itpc  mtd  stgc  t

JavaScript Tree Menu

STAR Run 19

- Feb, 18-Feb, 24
  - Tuesday, 19 50
    - 20050001, Physics
    - 20050002, Physics [B]
    - 20050003, Physics
    - 20050004, Physics
    - 20050005, Physics
    - 20050006, Physics
    - 20050007, Physics
    - 20050008, Physics
    - 20050009, Pedestal
    - 20050010, Pedestal
    - 20050011, Physics
    - 20050012, Physics
    - 20050013, Physics
    - 20050014, Physics
    - 20050015, Physics
    - 20050016, Physics
    - 20050017, Physics
    - 20050018, Physics
    - 20050019, Physics
    - 20050020, Physics
    - 20050021, Physics

RUN: 20050026

**RUN SUMMARY**

Run Number	20050026
RTS Start Time	Tue Feb 19 10:03:01 EST [ 2019-02-19
RTS Stop Time	Tue Feb 19 10:08:49 EST [ 2019-02-19
Completion Status	Successful
First Event Time	Tue Feb 19 10:03:01 EST [ Tue Feb 19
Last Event Time	Tue Feb 19 10:08:16 EST [ Tue Feb 19
GlbSetup / DaqRunType	laser_localclock / laser
Clock Source	Local Oscillator
Events	3001 = 3 K events
Files (DAQ)	16
Files (Scaler)	4
Files (Trigger)	0
Detectors	tpx itpc daq trg
STAR Magnet	-4,511.4 Amps Polarity B (Reverse
QA Info	No OLD Online QA Files found
QA Info Extended	20050026.shift.pdf
DAQ Info	Daq Log Messages DAO Rates
Shift Log	ShiftLog
dbPlots	TPC Inn. V avg TPC Out. V avg TPC Inn. Cur. RS1 TPC Out. Cur. RS1 TPC FC Inn. I W1 TPC FC Inn. I E1
TCIM Registers Data	PRESENT (1.TNK)

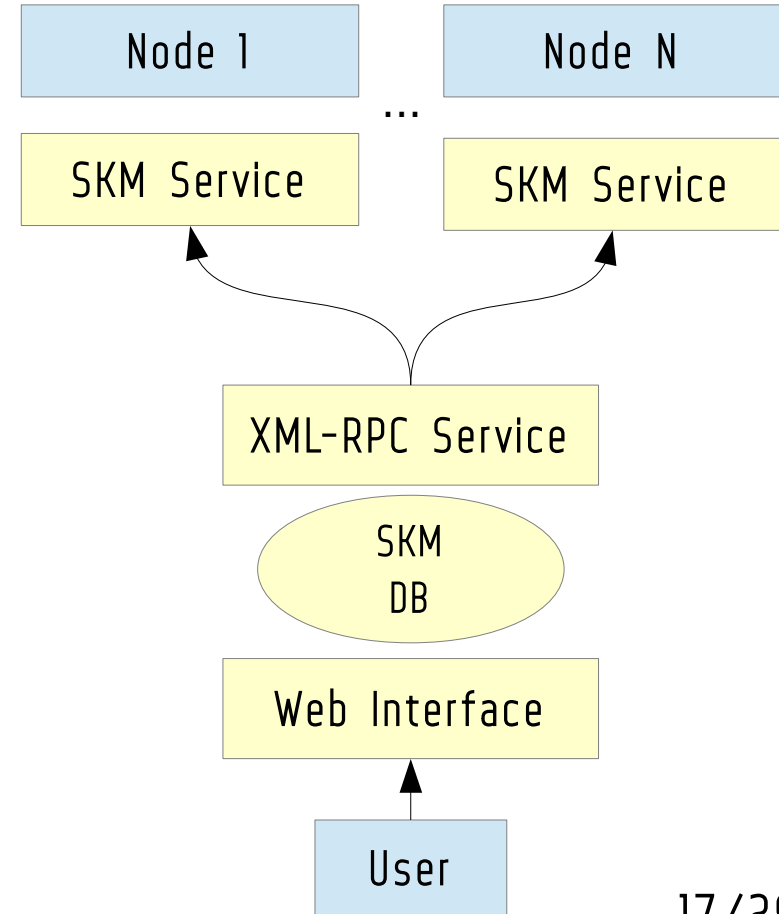
RunLog Archive Run 19

# SSH Key Management

<https://www.star.bnl.gov/starKeyw/>



- Features:
  - Completely automatic SSH key management across mid-sized Linux cluster (online domain).
  - Allows to satisfy CyberSecurity requirements for sensitive domain access.
  - Enables user fingerprinting via personal SSH keys.
  - Eliminates the need for password-protected shared accounts (aka sticky-note passwords)
- Administrative Features:
  - User, Host, Public Key or Public-Private Key management.
  - Assign user keys to accounts, enable/disable offending users or hosts, receive notifications of new requests, approve requests.





# SSH Key Management

<https://www.star.bnl.gov/starKeyw/>

STAR 

## SSH PUBLIC KEY MANAGEMENT CONSOLE : STAR

LOGGED AS: dmitry, ACCESS: Admin  
[X] LOGOUT

[HOME](#) :: [HELP](#)

ADMIN ACCESS : [show pending requests](#) :: [show pending priv-pub requests](#) :: [account and host management](#) :: [expired associations](#) :: [show hosts](#) :: [show host tags](#)  
:: [show users](#) :: [show admins](#) :: [show logs](#) :: [show config parameters](#) :: [account scan](#) :: [private/public key pair management](#) :: [show blacklisted keys](#)

### (Re)Upload Public Key

Current state : public key **OK**, **fingerprint: c7:55:a3:f3:75:5d:07:d2:e8:66:e9:2e:47:f4:06:48**

Public key file in OpenSSH format :

#### UPLOAD PUBLIC KEY FILE

This will *\*replace\** any previously uploaded key. Key replacement takes up to 10 minutes to propagate to the client nodes.

### Contact E-mail

Current E-mail : [arkhipkin@bnl.gov](mailto:arkhipkin@bnl.gov)

Change E-mail to :

### Request for account association

Host

Account

Host Restriction

Reason for this association:

#### REQUEST ACCOUNT @ HOST ASSOCIATION FOR YOUR KEY

This is *\*not\** instantaneous -- all associations must be approved by an administrator before becoming active.

Association status list

# SSH Key Management

<https://www.star.bnl.gov/starKeyw/>



## List of hosts

Show  entries

Search:

HOST	STATUS	DESCRIPTION	VERSION	ACCOUNTS	USERS	LAST HEARTBEAT	LAST UPDATE	TOGGLE STATUS	DELETE HOST
<a href="#">alh2.starp.bnl.gov (130.199.60.41)</a>	ACTIVE	alh2.starp.bnl.gov, SL6.x, Slow Controls Alarm Handler	2nd gen. / 2.0.5	24	16	2019-02-18 20:08:56	2019-02-15 17:18:31	<input type="checkbox"/>	<input type="checkbox"/>
<a href="#">astaire-run09.starp.bnl.gov (130.199.60.53)</a>	ACTIVE	astaire-run09.starp.bnl.gov, SL 6.x, 64-bit	2nd gen. / 2.0.5	4	3	2019-02-18 20:04:28	2018-09-25 18:52:16	<input type="checkbox"/>	<input type="checkbox"/>
<a href="#">barbados2.starp.bnl.gov (130.199.60.46)</a>	ACTIVE	barbados2.starp.bnl.gov (SL6, x86_64) (Slow Controls)	2nd gen. / 2.0.5	16	9	2019-02-18 20:05:50	2019-02-15 17:15:22	<input type="checkbox"/>	<input type="checkbox"/>
<a href="#">beatrice.starp.bnl.gov (130.199.60.19)</a>	ACTIVE	beatrice (BEMC node), SL6.x, i386	2nd gen. / 2.0.6	5	4	2018-06-19 18:10:01	2019-02-18 20:10:24	<input type="checkbox"/>	<input type="checkbox"/>
<a href="#">bermuda.starp.bnl.gov (130.199.60.55)</a>	ACTIVE	bermuda.starp.bnl.gov, Slow Controls PC in 2C6, SL 7.x, 64-bit	2nd gen. / 2.0.6	22	13	2019-02-18 20:03:20	2019-02-15 17:22:59	<input type="checkbox"/>	<input type="checkbox"/>
<a href="#">blanchett.starp.bnl.gov (130.199.60.133)</a>	ACTIVE	blanchett.starp.bnl.gov	2nd gen. / 2.0.5	12	8	2019-02-18 20:09:47	2018-09-25 18:58:50	<input type="checkbox"/>	<input type="checkbox"/>
<a href="#">burton.starp.bnl.gov (130.199.61.104)</a>	ACTIVE	burton.starp.bnl.gov	2nd gen. / 2.0.6	3	3	2019-02-18 20:08:04	2018-12-20 15:32:19	<input type="checkbox"/>	<input type="checkbox"/>
<a href="#">chaplin-run09.starp.bnl.gov (130.199.60.68)</a>	ACTIVE	chaplin-run09.starp.bnl.gov (SL6; x86_64)	2nd gen. / 2.0.5	4	3	2019-02-18 20:07:03	2018-09-25 18:54:19	<input type="checkbox"/>	<input type="checkbox"/>
<a href="#">daqboot.starp.bnl.gov (130.199.60.214)</a>	ACTIVE	daqboot.starp.bnl.gov (Sc.Linux 7.x, 64-bit)	2nd gen. / 2.0.6	4	3	2019-02-18 20:03:37	2019-02-13 17:42:57	<input type="checkbox"/>	<input type="checkbox"/>
<a href="#">daqman.starp.bnl.gov (130.199.60.86)</a>	ACTIVE	daqman.starp.bnl.gov (SL 6.x, 64-bit)	2nd gen. / 2.0.5	46	40	2019-02-18 20:06:27	2019-01-18 23:03:00	<input type="checkbox"/>	<input type="checkbox"/>
HOST	STATUS	DESCRIPTION	VERSION	ACCOUNTS	USERS	LAST HEARTBEAT	LAST UPDATE	TOGGLE STATUS	DELETE HOST

Showing 1 to 10 of 91 entries

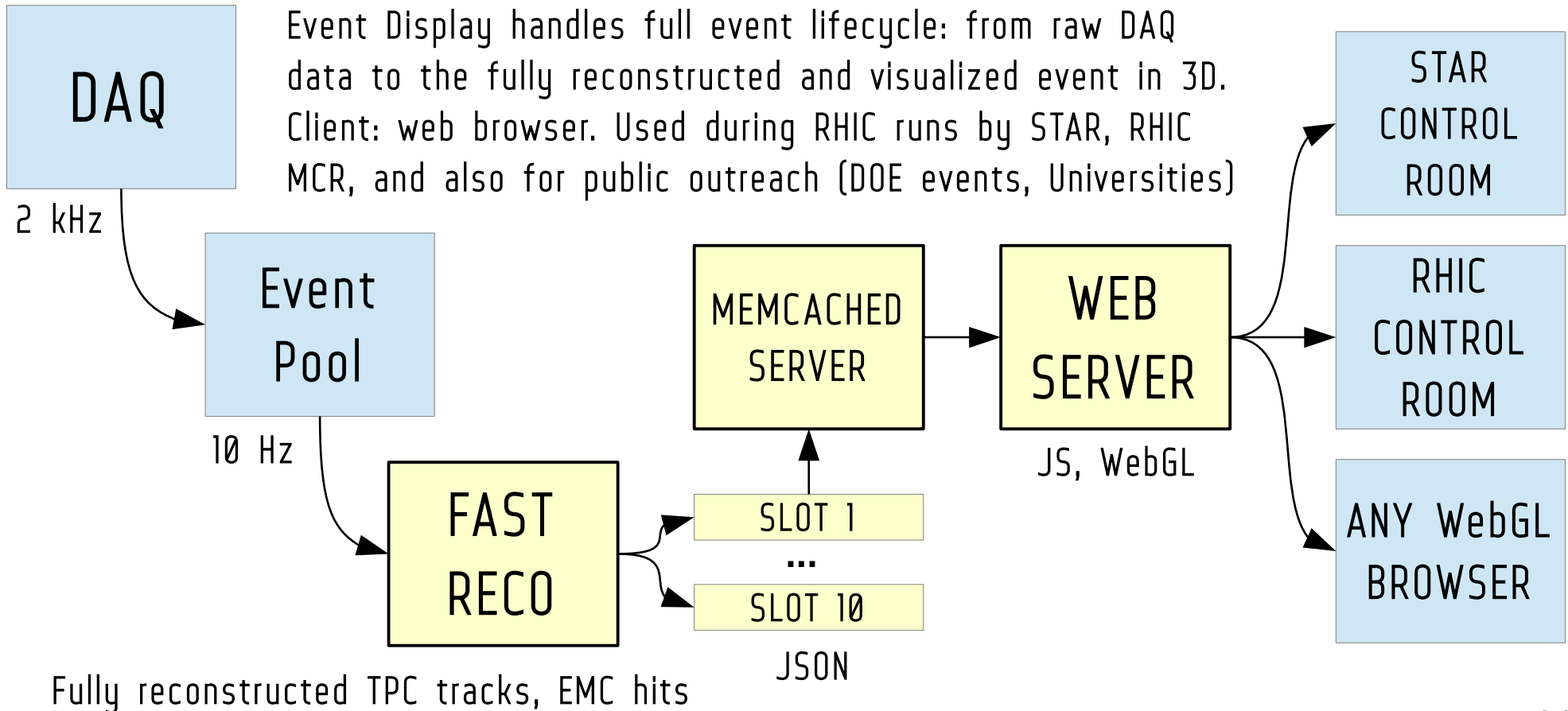
◀ Previous Next ▶

# Online Event Display: services

<https://online.star.bnl.gov/display/>



Event Display handles full event lifecycle: from raw DAQ data to the fully reconstructed and visualized event in 3D. Client: web browser. Used during RHIC runs by STAR, RHIC MCR, and also for public outreach (DOE events, Universities)



Fully reconstructed TPC tracks, EMC hits



# Online Event Display: track reco

<https://online.star.bnl.gov/display/>



1. Raw Hits import: 3D spacepoints from DAQ. Conversion from HW coordinates to x,y,z - T0 applied

2. Pattern Recognition / Seed Finding via triplets + fast KD tree search

3. Track Candidate Following & Fitting (circle fit, sz fit -> fully reco'd momentum)

4. Vertex Seed Finding  
Centroid found by projecting tracks to DCA(POC) to z-axis

C++11:

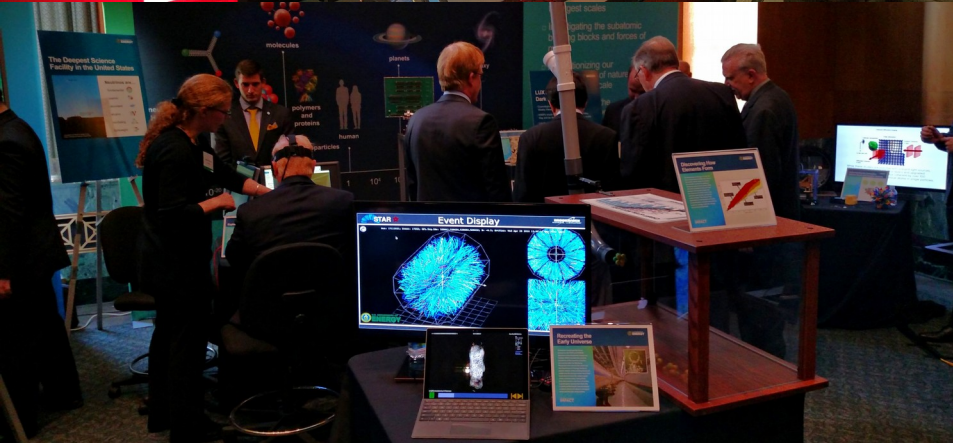
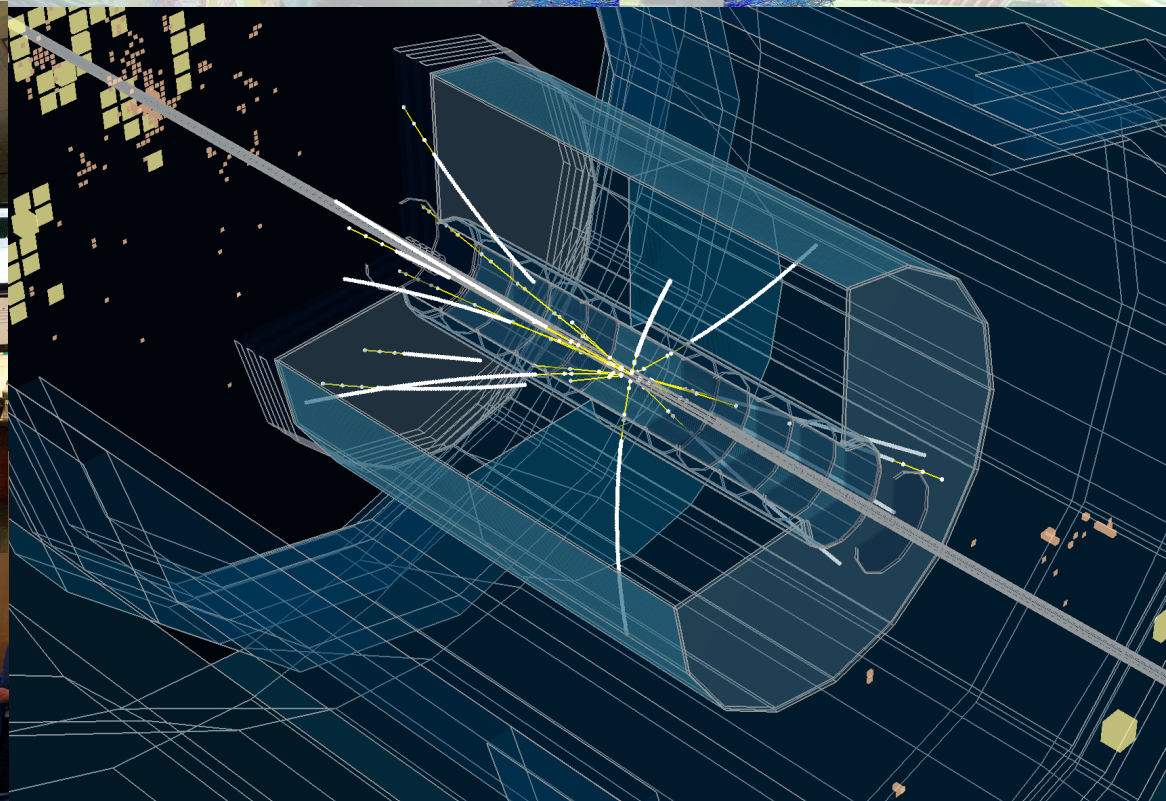
kdfinder.hpp

nanoflann.hpp

Performance:  
0.5s to reconstruct  
central event with  
~5000 tracks

# Online Event Display: Web UI v1

<https://online.star.bnl.gov/display/>



EVD: STAR Control Room, RHIC Control Room  
EIC Event Display, sPHENIX Event Display

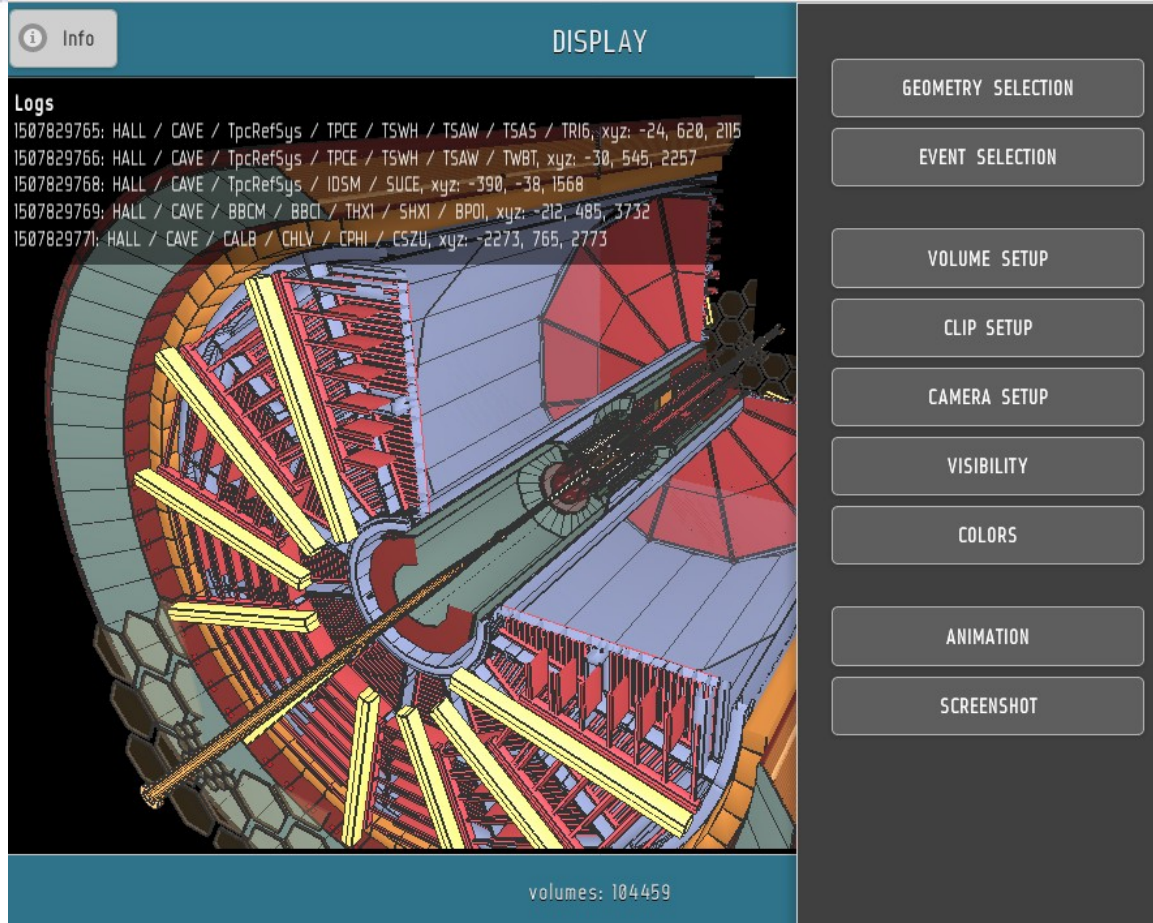


# Event Display Web UI v2

[https://www.star.bnl.gov/~dmitry/gide\\_new/](https://www.star.bnl.gov/~dmitry/gide_new/)



- Geometry Input Format:
  - latest **GDML** version supported
- Event Input Format: JSON
- Geometry Shapes:
  - 100% coverage of GDML/G4, TGeo, VecGeom
- Interactivity:
  - Subselection of volumes
  - Automatic volume positioning
- Physical Objects
  - Tracks: helix, set of points
  - Hits: 3d points a-la TPC, calorimetric hits
- Extensively used by **ITPC** experts: debugging!





# DB Monitor

<https://online.star.bnl.gov/Mon/>



Custom monitoring tool, specialized for large replicated MySQL setups. Monitors all STAR databases, Provides extensive automatic inventory, replication status and performance tuning hints.



# DB Browser

<https://www.star.bnl.gov/Browser/>



Custom database browsing tool. Provides generic database viewer capability, and specialized database viewing for EMC and EEMC subsystems.

## STAR Database Browser version 1.0

created and maintained by Dmitry Arkhipkin and Julia Zoulkarneeva, PPL-JINR 2004-2005

[Calibrations \(26\)](#)   [Geometry \(17\)](#)   [Conditions \(1\)](#)   [RunLog \(3\)](#)

**Useful links :** [BEMC browser](#) , [EEMC browser](#) | **STAR tools :** [RunLog browser](#) , [Electronic shiftLog 2005](#)

[HOW-TO] Start browsing with any domain available (upper tabs). Number in brackets tells how many databases do exist in domain at this moment. 'History' line allows fast access to previous queries. Note that you can sort almost any table by clicking on appropriate table header.

**History :** Index :: Calibrations :: tpc :: TpcDriftDistCorr :: ORDER BY beginTime DESC

### Table browse : TpcDriftDistCorr

Show :  row(s) starting from record #  [ Total records : 22 ]

Put the limit on the results using the 'beginTime' FROM  TO

Or, put the limit on the results using the 'entryTime' FROM  TO

(dateformat: YYYY-MM-DD HH:MM:SS, or click the calendar image)

Time	flavor	schemaID	deactive	a	npar	min	max
-01 00:00:00	ofl	2	0	[BLOB 47]	0	0.00000000	0.00000000
-01 00:00:00	ofl	2	0	[BLOB 101]	19	909.75512695	100000000.00000000
-01 00:00:00	ofl	2	0	[BLOB 47]	0	0.00000000	0.00000000
-01 00:00:00	ofl	2	0	[BLOB 101]	19	909.75512695	100000000.00000000
-01 00:00:00	ofl	2	0	[BLOB 47]	0	0.00000000	0.00000000
-01 00:00:00	ofl	2	0	[BLOB 101]	19	909.75512695	100000000.00000000
-01 00:00:00	ofl	2	0	[BLOB 47]	0	0.00000000	0.00000000
-01 00:00:00	ofl	2	0	[BLOB 101]	19	909.75512695	100000000.00000000

Auto-documentation system for STAR Offline Databases and API. Provides web-based interface for database schema and structure, provides samples for DB read and DB write for each table.

**STAR Offline DB Structure Explorer**

CALIBRATIONS | GEOMETRY | CONDITIONS | RUNLOG

STAR Offline DB : Calibrations  
/ tpc

- tpc : reconYuri
- tpc : default
- tpc : newTable
- tpc : reconVO
  - tpcDriftVelocity
  - tpcElectronics
  - tpcDedxPidAmpDb
  - tpcGainNorms
  - tpcTimeNorms
  - tpcPadResponse
  - tpcSlowControlSim
  - tpcEffectiveGeom
  - tpcChargeStepCalib
  - tpcGas
  - TpcTimeGain
  - asic\_thresholds
  - tpcHighVoltages
  - tpcGain
  - TpcDriftDistCorr
  - TpcSecRow
  - noiseElim
  - tpcHitErrors
- Sector\_01

DB descriptor for : Calibrations / tpc / tpcElectronics

This struct is NOT indexed

type	name	store type	timestamp	comment
int	numberOfTimeBins	ascii	1999-12-28 22:07:01	
double	nominalGain	ascii	1999-12-28 22:07:01	mV/fC
double	samplingFrequency	ascii	1999-12-28 22:07:01	MHz
double	tZero	ascii	1999-12-28 22:07:01	us (microseconds)
double	adcCharge	ascii	1999-12-28 22:07:01	fC/adc count
double	adcConversion	ascii	1999-12-28 22:07:01	mV/adc count
double	averagePedestal	ascii	1999-12-28 22:07:01	adc counts
double	shapingTime	ascii	1999-12-28 22:07:01	ns
double	tau	ascii	1999-12-28 22:07:01	ns

Sample IDL descriptor for Calibrations / tpc / tpcElectronics

This struct is NOT indexed

```
/* likely path: $STAR/StDb/idl/tpcElectronics.idl */
struct tpcElectronics
{
    long numberOfTimeBins; /* */
    double nominalGain; /* mV/fC */
    double samplingFrequency; /* MHz */
    double tZero; /* us (microseconds) */
    double adcCharge; /* fC/adc count */
    double adcConversion; /* mV/adc count */
    double averagePedestal; /* adc counts */
}
```

Created and maintained by [Dmitry Arkhipkin](#), BNL 2010

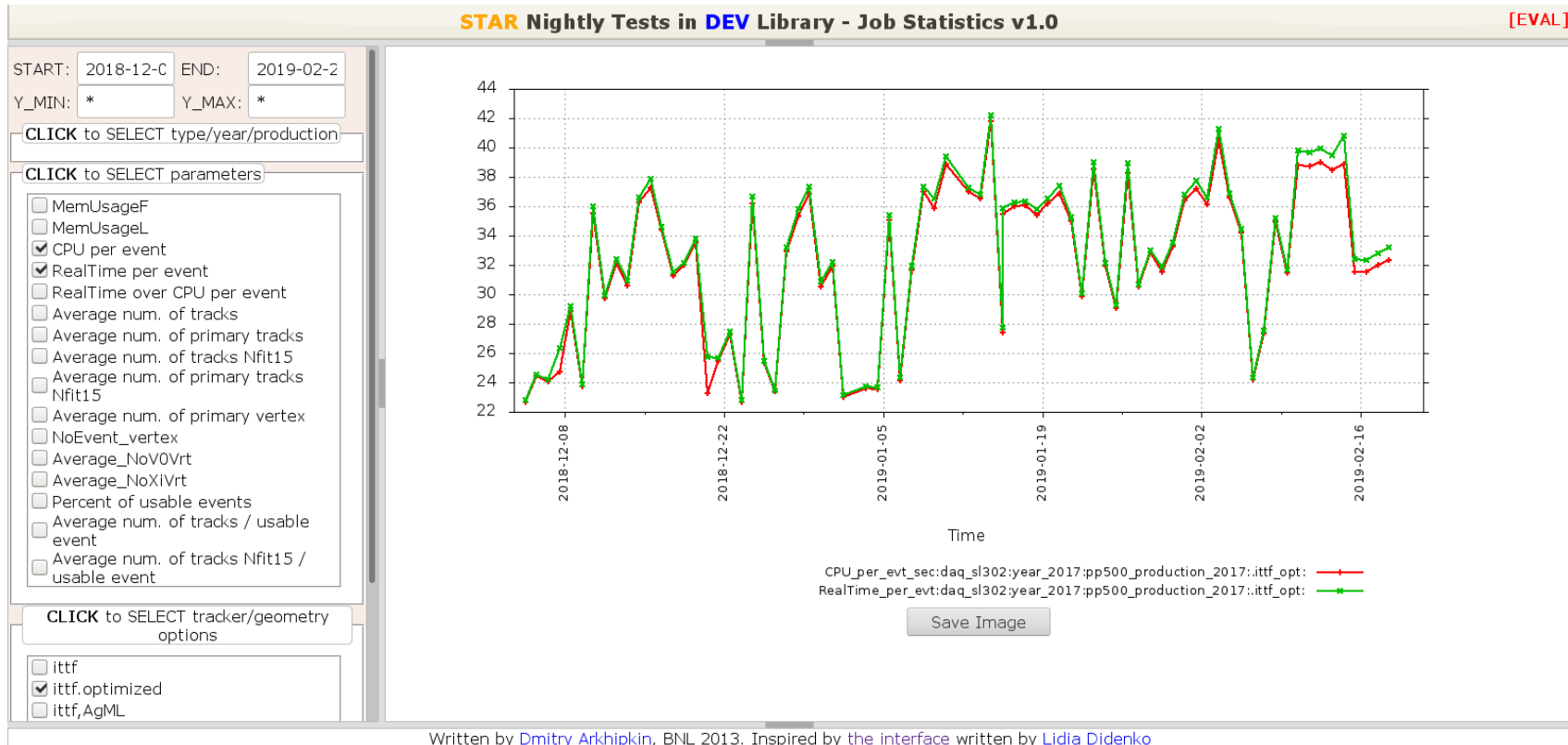


# jobStat: nightly tests

<https://online.star.bnl.gov/jobStat/>



Web interface to STAR nightly tests system. Provides fast plotting capabilities for all nightly tests.



Written by [Dmitry Arkhipkin](#), BNL 2013. Inspired by [the interface](#) written by [Lidia Didenko](#)

# Drupal Development



- Features:

- Drupal is modular, easy to extend content management system
- Provides STAR with web-based document management, blogs, calendar of events, conferences, STAR paper/note archive and many more since 2003.

- Custom modules:

- STAR conference and meeting
- STAR publications and notes
- STAR presentations and thesis
- STAR simulation requests
- STAR news and polls

The screenshot shows the STAR experiment website. The header includes the STAR logo, the text "The STAR experiment", and navigation links for "Blogs", "Events", "Help&FAQ", and "H". Below the header is a search bar and a "PWG Software & Computing Sub-systems" menu. The main content area is titled "Software & Computing" and contains a list of links: "General information", "Data readiness", "Grid and Cloud", "Infrastructure", "Machine Learning", "Offline Software", "Production", "S&C internal group meetings", and "Test tree". There is also a user profile section for "Dmitry" with links for "Groups", "My Unread", "My account", "Create content", "Recent posts", and "Log out". On the right side, there are sections for "Home", "Software & Computing" (with "View", "Edit", "Revisions", and "Grant" buttons), a date stamp "Updated on Sun, 2017-10-22 07:34 by testadmin. C 2005-11-16 14:48. Under: computing", "CVS Tools" (All, Offline, Online, Stl), "Code X-Ref" (Offline doc, Search co), "CAS monitor, Autobui", "Other Tools" (Bug Tracking Syster, Interface, Hy), "Quick Links" (Onlin), and "Software and Computin". At the bottom right, there is a "Getting a comp STAR" link and an "Account re-activat" link.

# Summary



- Current Duties:
  - All STAR databases – maintenance, support, backups, performance tuning, development for 30+ servers, 50+ MySQL instances, 3 MongoDB instances
- Major RHIC Run Tasks:
  - Online Databases, migration scripts, RunLog service, ShiftSignup service, MIRA services (data collectors), Event Display service
- Major Out-of-Run Tasks:
  - Offline Databases, StDbLib (DB API), FileCatalog databases, DB-related software upgrades, Drupal development and maintenance, R&D development (not mentioned here)
- Commonly-used Languages and Techs:
  - C++, JavaScript, PHP, shell, SQL, RPC, XML, JSON, HTML, CSS etc.