

# Microservices for Systematic Profiling and Monitoring of the Refactoring



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**LHCb Performance and Regression Tests (LHCbPR)** - systematize profiling that helps developers to evaluate how their recent **code changes** behave in provided test cases for **different setup environments**.

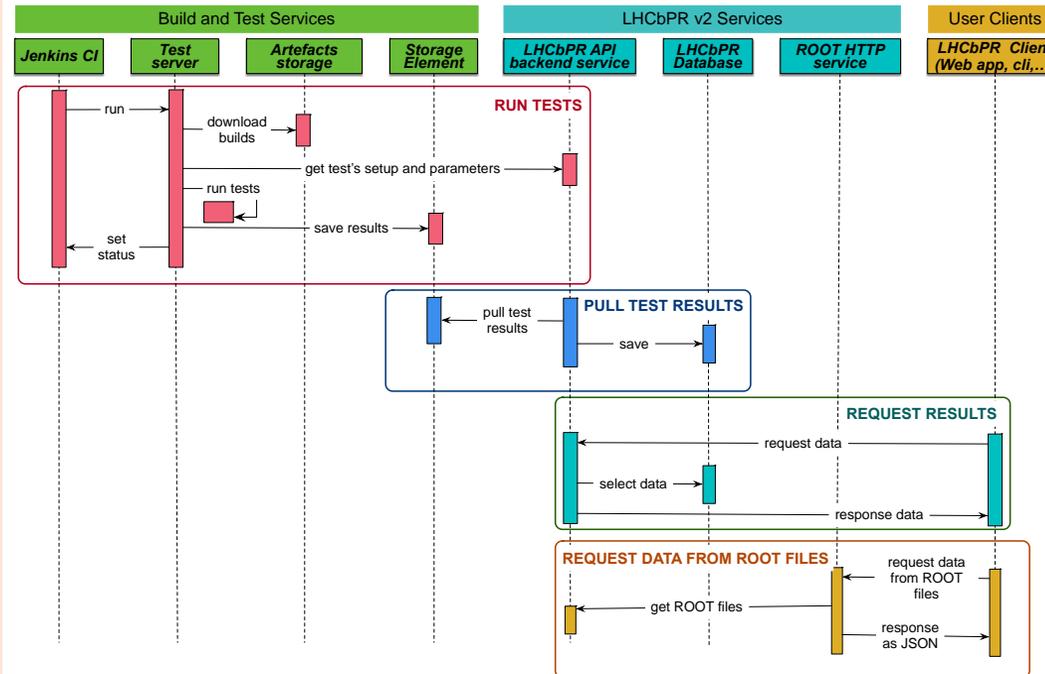
## Main use cases

- Physics performance
- Histogram comparison
- Trend analysis for selected attribute.
- Monitor regression in memory and CPU consumption

## Possible setup environments

- Versions of application
- Compiler versions
- Operating Systems (SLC6, CentOS7)
- Architecture (x86\_64, x86)
- Build system (CMT or CMake)

- **LHCbPR** not coupled to the LHCb software stack and can be **adapted for other experiments and projects**
- We are working on extending repository of **web components** and analysis modules for web frontend.
- Easy to develop **new clients** for API service.



## 1. Build and Test Services

- **Continuous Integration (CI) Service** – schedule and initiate test runs
- **Artifacts Storage**– store projects builds for different configurations
- **Test service** – read LHCbPR configuration for tests, download the corresponding builds, execute tests and transfer it to the Storage Element
- **Storage Element** – virtual storage for jobs output with the interface to quite diverse real storage systems like grid storage.

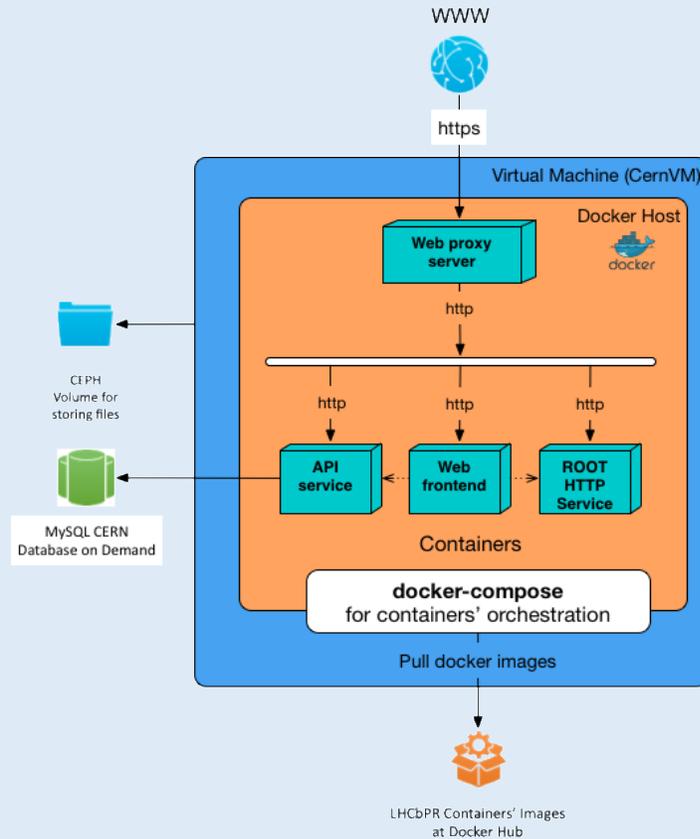
## 2. LHCbPR v2

- **Database** – relational database for job descriptions and job outputs. We use **MySQL**, but it can be any other.
- **REST API service** – provides REST access to the database and adds some business logic for special API requests. **Technologies: python, Django + REST Framework.**
- **ROOT HTTP service** – helper service for returning content of ROOT files in JSON format. Relies on ROOT TBufferJSON.ConvertToJSON functionality. **Technologies: Flask , ROOT.**

## 3. User Clients

- Users can create any data handling client that use LHCbPR REST API: web applications, scripts
- We created web frontend for visualizing regression tests' results. **Technologies: javascript, angular framework; nodejs and gulp** for development.

# Deployment



# API Service

Django REST framework v3.3.2  
lhcbrp  
Api Root  
Specify a format for the GET request  
OPTIONS GET  
json jsonp api  
API Entry Points  
Output formats  
HTTP 200 OK  
Allow: GET, HEAD, OPTIONS  
Content-Type: application/json  
Vary: Accept

```

{
  "executables": "https://lhcbrp2.cern.ch/api/executables/",
  "compare": "https://lhcbrp2.cern.ch/api/compare/",
  "jobs": "https://lhcbrp2.cern.ch/api/jobs/",
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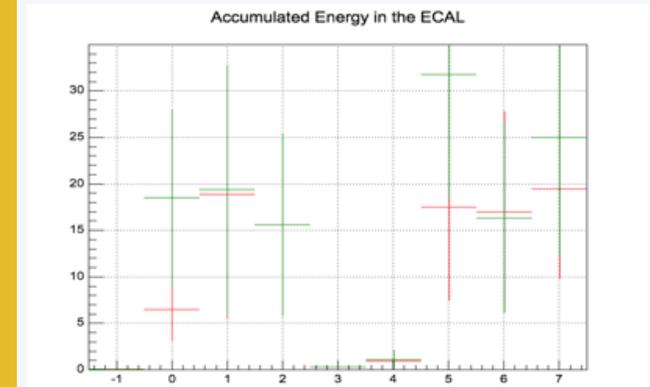
# Web Frontend

Jobs: LHCbPR  
Reusable web components  
Custom action on selected job results  
Search Results  
Search jobs  
Application  
ID  
Job description  
Host  
Start/End  
Options  
Filter Jobs  
Analyze

Application	ID	Job description	Host	Start/End
GEANT4 (41)	43	GEANT4 lhc-gauss-cmake.153, hadronic_tests	volhcb05.cern.ch, x86_64-slc6-gcc49-opt	2016-09-26 15:06:27 +0200 / 2016-09-26 15:07:11 +0200
Options	42	GEANT4 lhc-g4r102.134, hadronic_tests	volhcb05.cern.ch, x86_64-slc6-gcc49-opt	2016-09-26 14:46:24 +0200 / 2016-09-26 14:47:32 +0200
Executables	41	GEANT4 lhc-gauss-cmake.152, Calorimeter_test	volhcb05.cern.ch, x86_64-slc6-gcc48-opt	2016-09-25 22:49:12 +0200 / 2016-09-26 03:22:41 +0200
Platforms	40	GEANT4 lhc-gauss-cmake.152, Calorimeter_test	volhcb05.cern.ch, x86_64-slc6-gcc49-opt	2016-09-25 22:49:12 +0200 / 2016-09-26 03:21:14 +0200
Releases	38	GEANT4 lhc-gauss-cmake.152, hadronic_tests	volhcb05.cern.ch, x86_64-slc6-gcc48-opt	2016-09-25 15:06:24 +0200 / 2016-09-25 15:07:16 +0200
Versions	39	GEANT4 lhc-gauss-cmake.152, hadronic_tests	volhcb05.cern.ch, x86_64-slc6-gcc49-opt	2016-09-25 15:06:23 +0200 / 2016-09-25 15:07:10 +0200
Releases	37	GEANT4 lhc-g4r102.133, hadronic_tests	volhcb05.cern.ch, x86_64-slc6-gcc49-opt	2016-09-25 14:46:36 +0200 / 2016-09-25 14:47:46 +0200
Releases	36	GEANT4 lhc-gauss-cmake.151, volhcb05.cern.ch, x86_64-	volhcb05.cern.ch, x86_64-	2016-09-24 22:48:19 +0200 / 2016-09-25

Select item to plot  
Compare jobs:  
Job ID 2: GAUSS lhc-gauss-cmake.97 - x86\_64-slc6-gcc49-opt - 100Evts-GAUSS-2015  
Job ID 4: GAUSS lhc-gauss-cmake.95 - x86\_64-slc6-gcc49-opt - 100Evts-GAUSS-2015  
Job ID 5: GAUSS lhc-gauss-cmake.95 - x86\_64-slc6-gcc48-opt - 100Evts-GAUSS-2015  
Options  
Superimposed Separated

## Accumulated Energy in the ECAL



- Web frontend is a javascript single-page application that is composed of **analysis modules** for presenting specific logic and views for inspecting test results.
- Each analysis module is an **application extension** and can be simply added or removed without breaking the main application
- Common **web components** are provided for building modules. For example, search jobs and draw histograms.