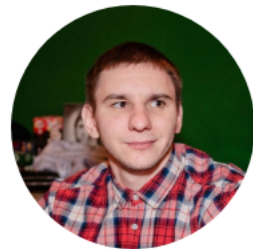




Cloud Service for Scientific Computations on MICC resources



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54th meeting of the PAC for Condensed Matter Physics

- Major time-eaters when entering a typical research project:
 - Learning the MICC usage
 - Setting up the software environment
- Some categories of users have tight time limits, e.g. summer students

The goal of the service is to give simple access to the MICC resources and software

- Provide a single entry point via web-access
- Hide complexity of MICC structure

Benefits

- Reduce time spent on technical issues
- Prevent malicious usage of resources
- Free up time to spend on the actual research

Main System Components



1. JINR SSO(Single Sign-On) as the authentication system

2. Web-interface

- Fixed number of applications available
- Individual application parameter sets
- Common compute resource parameters

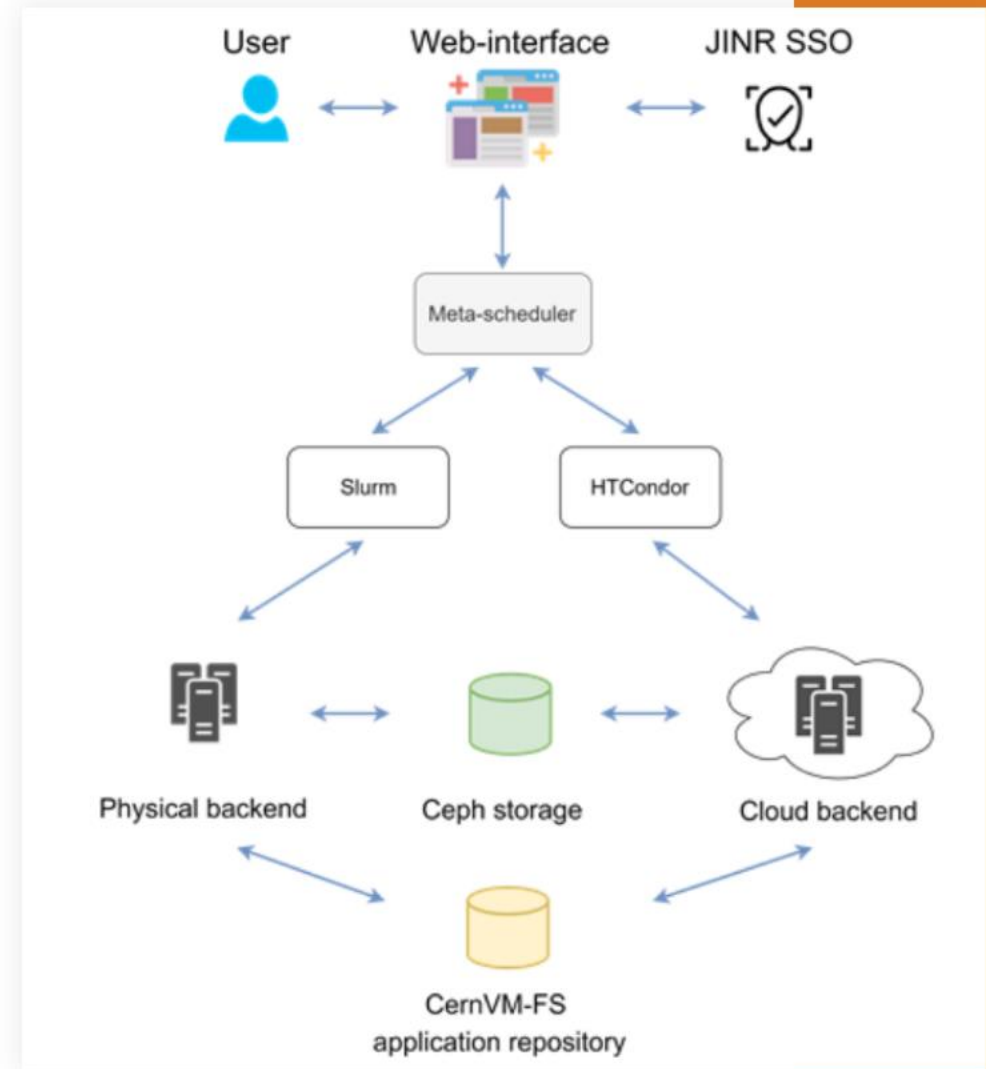
3. Meta-scheduler

- Handles job submission
- Currently supports the following resources
 - JINR Cloud via HTCondor
 - HybriLIT via Slurm

4. Data storage

- CephFS pool of the Cloud storage
- Simple web-access

5. CernVM-FS as application storage



App

Hello test

Long Josephson junctions stack simulation

Short Josephson junctions stack simulation

Superconductor-Ferromagnetic-Superconductor Josephson junction simulation

$$\begin{cases} \frac{\partial \varphi}{\partial t} = V, \\ \frac{\partial V}{\partial t} = \frac{\partial^2 \varphi}{\partial x^2} - \sin \varphi - \beta V + I. \end{cases}$$

граничные условия $\varphi(x, t)|_{x=0} = 0, \quad \frac{\partial \varphi(x, t)}{\partial t} \Big|_{x=0} = 0,$

$\frac{\partial \varphi(x, t)}{\partial x} \Big|_{x=0} = H_{\text{ext}}, \quad \frac{\partial \varphi(x, t)}{\partial x} \Big|_{x=L} = H_{\text{ext}}$

Job parameters

Physical parameters

N: β : α : Noise_{max} (Amp):

Nonperiodic boundary conditions

External electromagnetic radiation

ω (Hz): A (Amp):

Calculational parameters

T: Δt :

Δl : I_0 : I_{max} :

Calculate time dependencies

Jobs

List of jobs

Show entries Search:

Job ID	URL with job results	Storage time of result	Details	Status	
508	http://vm221-63.jinr.ru:8081/afdda7d714b044378a9580d1863b18c4	-		cancelled	
507	http://vm221-63.jinr.ru:8081/2ff7664328ae43cbb42a632a5e514fc1	Removed		done	
499	http://vm221-63.jinr.ru:8081/8465a4ab503c4e1bb4eb9bc975569f50	Removed		done	
38	http://vm221-63.jinr.ru:8081/6c339867d7784bfd9c1a59329fe481d0	-		pending	<input type="button" value="Cancel"/>
37	http://vm221-63.jinr.ru:8081/2451882b2880494f8095e1b953983e44	07/05/2021		done	
33	http://vm221-63.jinr.ru:8081/342c3f5e44ea474c951359da84d2cac6	-		cancelled	
22	http://vm221-63.jinr.ru:8081/9701d63916854c69a72c072b91881e01	Removed		done	
11	http://vm221-63.jinr.ru:8081/3a9a31cc3d7f4e7c91f5084b3780efd0	Removed		done	
1	http://vm221-63.jinr.ru:8081/a61e1de8b78441fb8fa1c01807732f4b	Removed		done	

Showing 1 to 9 of 9 entries

Resources

JINR cloud

HybriLIT cluster

Number of VMs: 1/5 CPU per VM: 1/5 RAM per VM (GB): 1/10

Available applications



- Hello test
- Long Josephson junctions stack simulation
- Short Josephson junctions stack simulation
- Superconductor-Ferromagnetic-Superconductor Josephson junction simulation

App

Hello test

Long Josephson junctions stack simulation

Short Josephson junctions stack simulation

Superconductor-Ferromagnetic-Superconductor Josephson junction simulation

Job parameters

Physical parameters

B_c :

50.0

G:

0.221

r:

0.1

α :

0.1

ω_F :

1.5

Parameters of external radiation:

A:

1.0

ω :

12.0

- Implement application developer interface
- Add groups and roles in the service
- Improve the user interface
- Finish web-portal re-engineering
- Add new applications

Publications

- N. Balashov, M. Bashashin, R. Kuchumov, N. Kutovskiy, I. Sokolov JINR Cloud service for scientific and engineering computations, Modern Information Technology and IT-education, Vol. 14, no. 1. 2018 ISSN2411-1473
- R. Kuchumov , V. Petrunin, V. Korkhov, N. Balashov, M. Bashashin,, N. Kutovskiy, I. Sokolov, Design and Implementation of a Service for Cloud HPC Computations, Computational Science and Its Applications – ICCSA 2018, Part IV, pp 103-112 (2018)
- N. Balashov, N. Kutovskiy, D. Proakhina, I. Sokolov Evolution and Perspectives of the Service for Parallel Applications Running at JINR Multifunctional Information and Computing Complex, EPJ Web Conf, Volume 226, 2020, Mathematical Modeling and Computational Physics 2019
- Balashov N., Kutovskiy N., Sokolov I. Data Visualization in Cloud Service for Scientific Computations, Modern Information Technology and IT-education, №1, 2021(publishing)