

Experience of deployment of the CERNbox+SWAN system on the local resources of the SPbSU

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LUHEP is one of the laboratories at SPbSU



SPbSU

Saint Petersburg University Today

- 30,000 students
- 6000 academic staff
- 398 main educational programmes

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**Laboratory of Ultra-High
Energy Physics**

About 30 people (~10 students)

First experience with SWAN+CERNbox for LUHEP, plans for full-site deployment.

Current setup of CERNBox and SWAN at SPbSU

One EOS file server and one MGM server - local fuse mount + access by CERNBox (the web interface)

3 worker nodes for SWAN: Kubernetes as Docker orchestrator, JupiterHub as end-user interface and EOS as storage system for users files (see our report on SC3 workshop <http://cs3.cyfronet.pl/>)

Authentication by local Kerberos and OpenLDAP

<https://cernbox.cc.spbu.ru/>

It is the minimum that is needed for a small laboratory. Some members of LUHEP have CERN accounts, and can use CERNBox at CERN. Local service is needed for students and for a short list of local tasks.

Structure of LUHEP CERNbox service

Box-in-the-box setup: self-contained, containerized demo for the next-generation cloud storage and computing services for scientific and general-purpose use

<https://github.com/cernbox/uboxed>.

We take cernbox and nginx containers form “box-in-the-box” with some changes:

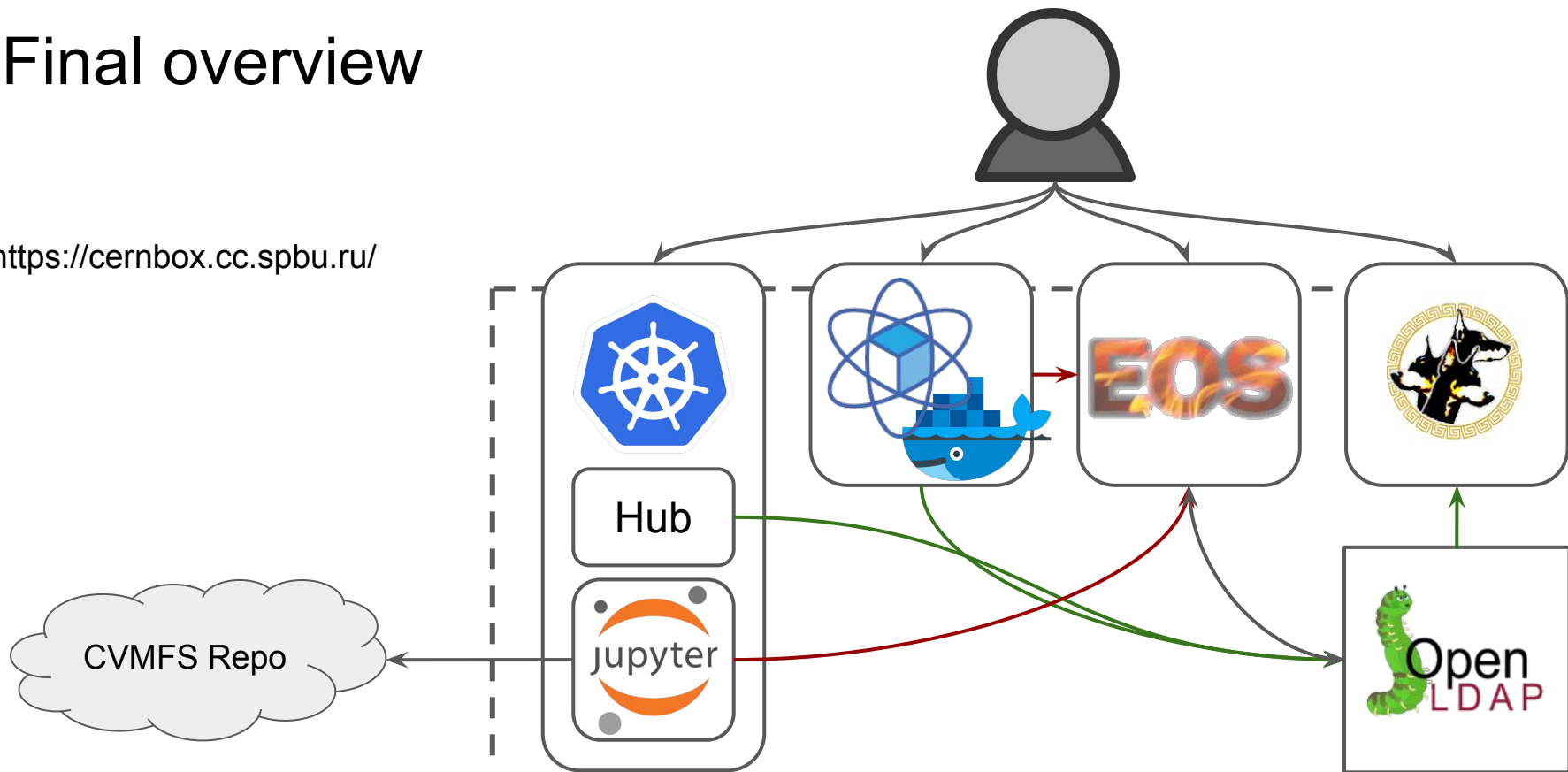
- SSS auth between components (UNIX auth is the default)
- Authorisation by local LDAP(+saslauthd)+Kerberos
- eos component replaced by an instrument for local dedicated EOS.

Structure of (Service for Web based ANalysis) LUHEP service

- One node with public IP — master node
- A few nodes with private IPs
- Cluster configured with **kubeadm**:
 - Easy to use
 - Secure: enforces **RBAC**, secures communication between Kubernetes components
- **Canal** pod network
 - LUHEPLDAPAuthenticator = LDAPAuthenticator + loading CPU/MEM limits from OpenLDAP
 - LUHEPKubeSpawner = KubeSpawner + dynamic **/spawn** page generation to let user choose CPU/MEM limits
 - **cernphsft/systemuser** Docker image with Jupyter Notebook: ROOT C++ & Python & R kernels from **cvmfs**; user's home from **EOS**

Final overview

<https://cernbox.cc.spbu.ru/>



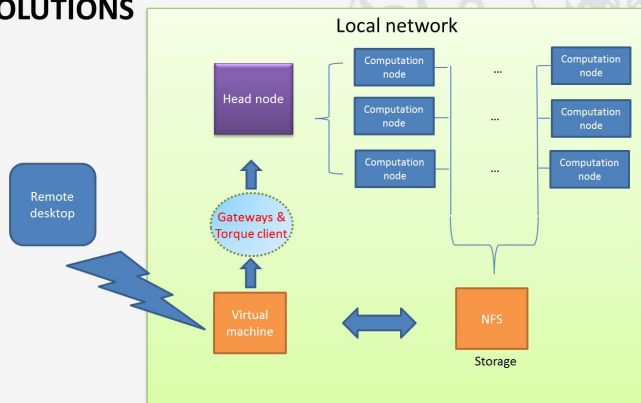
IT structure of SPbSU now

SPbSU have a structure of IT services for scientific and administrative tasks:

Virtual machines on VMWare VSphere as work space and as gateway to HP resources, Moab+Torque as scheduler for accessing HP resources, NFS as storage for scientific tasks and DropBox as file storage for administrative tasks.



SOLUTIONS



<http://researchpark.spbu.ru/en/cc-eng>



INFRASTRUCTURE

Intel Xeon X5650 @ 2.66GHz, 12 cores + 3 NVIDIA Tesla M2050 (16 nodes)



Intel Xeon X5650 @ 2.66GHz, 12 cores + 8 NVIDIA Tesla M2050 (8 nodes)

DL980 8x Intel Xeon X7560 2.266GHz, max 266GHz, 64 cores (3 nodes)



E5335 @ 2.0 GHz, 4 cores (40 nodes)

Intel Xeon E5-2680v3, 2.5 GHz, 24 cores + nVidia Tesla K40M (10 nodes)



Intel Xeon E5-2680v3, 2.5 GHz, 24 cores (20 nodes)

Tecal RH5885V3 4x Intel Xeon E7-4880v2, 2.5 GHz, max 1 GHz, 60 cores (2 nodes)



RESEARCH SUPPORT

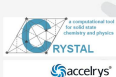
Physics:



Math & statistics:



Chemistry:



Compilers:



<http://researchpark.spbu.ru/en/cc-eng>

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Why SPbSU is interested in CERNBOX and SWAN?

SPbSU have plans for step by step technology evolution:

- VMware -> Docker (free software, standard type of images) - SWAN as an option
- NFS and DropBox -> another solution - EOS as an option

The IT department of SPbSU is considering today the CERNBox+SWAN as a pilot project for SPbSU

Thanks!

Questions?