Joint Institute for Nuclear Research

SCIENCE BRINGING NATIONS TOGETHER

Center for Advanced Studies of Cuba

Laboratory of Information Technologies

Advanced computing technologies (Grid, Cloud, HPC). Practical usage of EMI, OpenNebula middleware and key parallel programming technologies

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Aims of the Project

1. Basic grid and cloud concepts, use cases and benefits of both technologies for science.

2. Theoretical knowledge on grid and cloud infrastructures, middlewares' architectures and services (mostly focusing on EMI and OpenNebula).

3. Practical skills to start unassisted work with OpenNebula, ones of the most widespread cloud middleware in the world.

Cloud Benefits

Cloud infrastructure is one of the most used solutions for hardware resources mangement and software development based on the following considerations:

•To increase the efficiency of the use of server hardware, ease of maintenance and management of the equipment, as well as to reduce the total cost of ownership of resources.

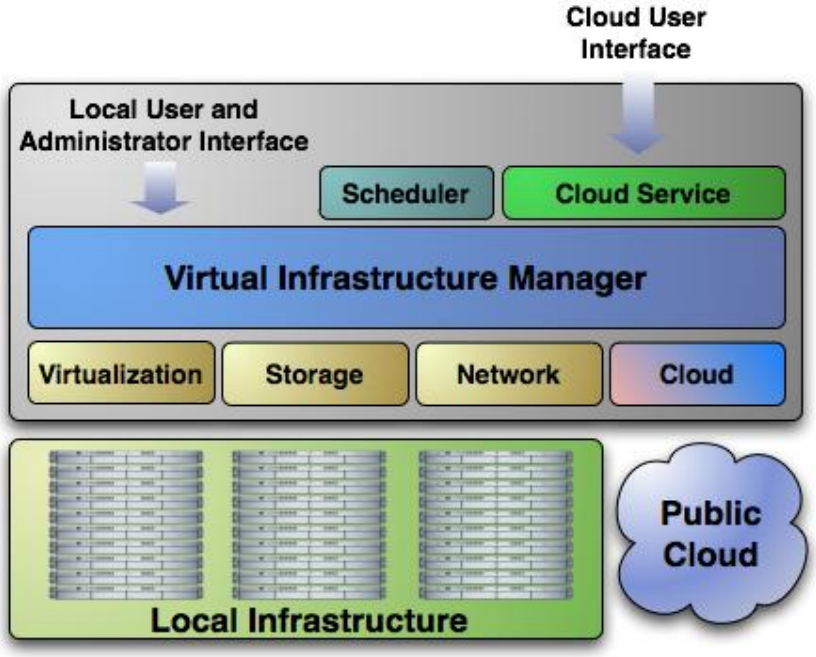
•To perform the main activities of an organization in the various national and international research projects related to the use of information technology.

•To provide a modern computer room for experimentation and dinamicly provide an access to resources upon neccesity.

OpenNebula Overview

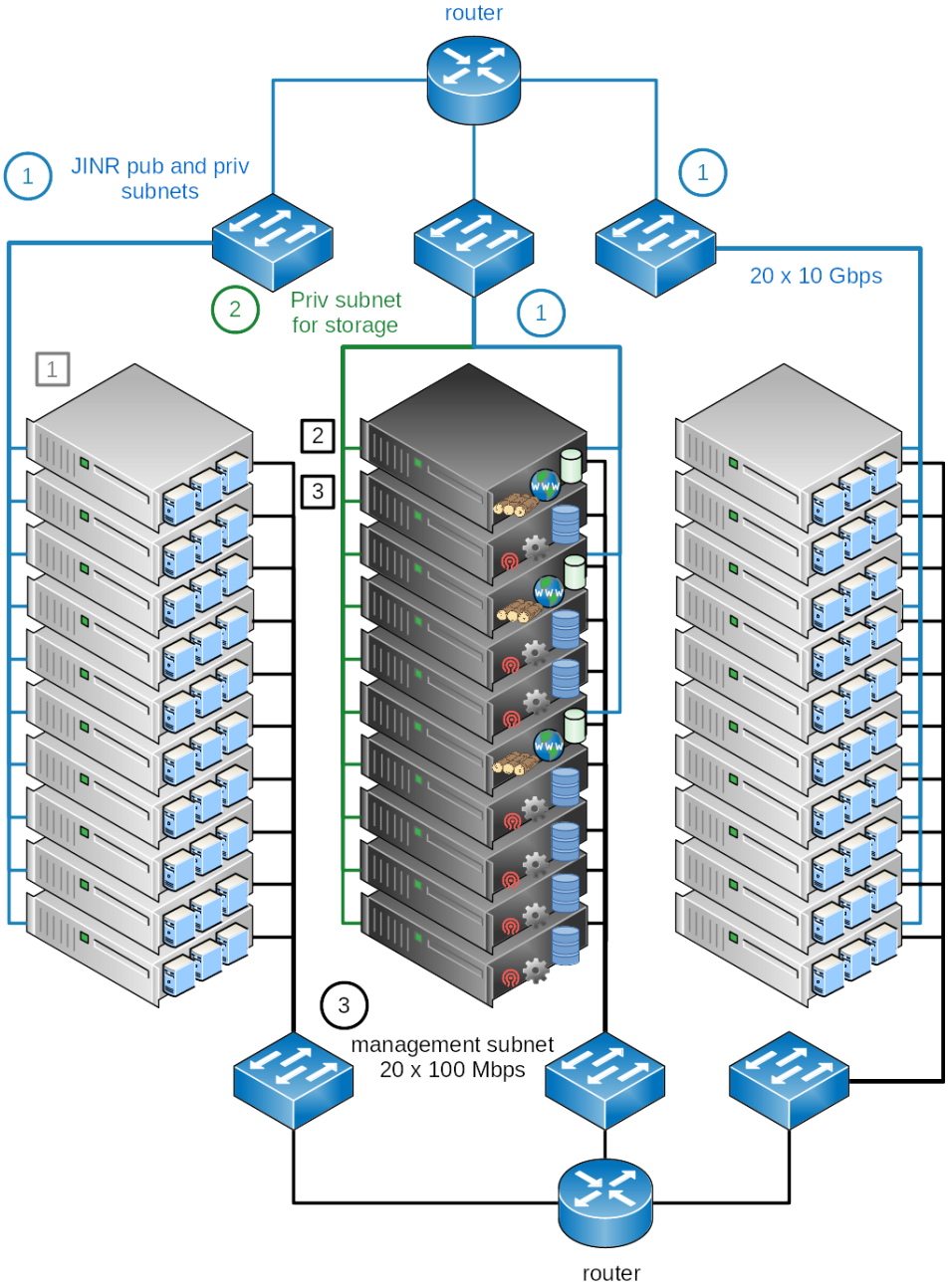
Open-Source Toolkit for Building Cloud Infrastructures

- Orchestrates storage, network and virtualization technologies to enable the dynamic placement of multi-tier services on distributed infrastructures, combining both data center resources and remote cloud resources, according to allocation policies.
- Provides internal and Cloud administration and user interfaces for the full management of the IaaS Cloud platform.



- Private Cloud: Management of virtual infrastructure in the data-center or cluster.
- Hybrid Cloud : Combination of private with Cloud resources.
- Public Cloud: Cloud interfaces for the full management of services.

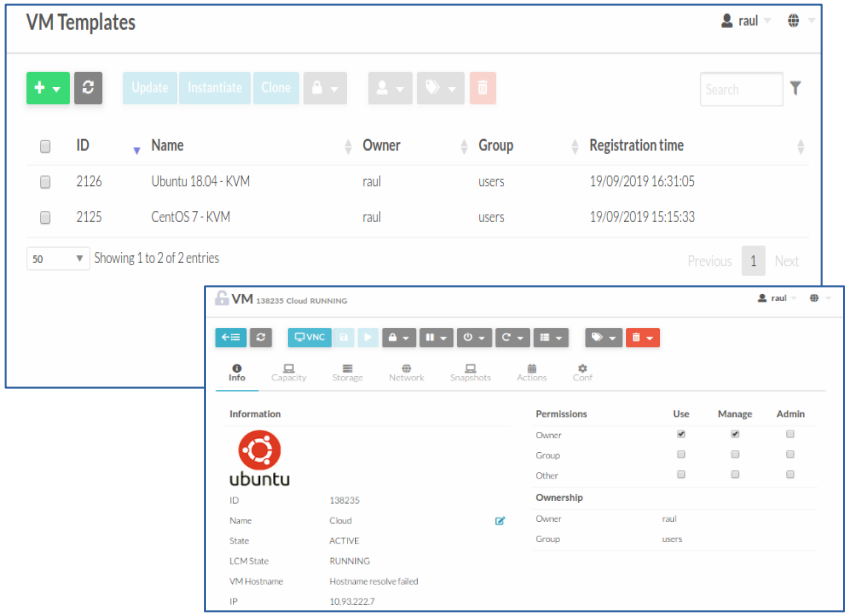
Testbed Resources



Project Steps

1. Start to study basic grid and cloud concepts, use cases and benefits of both technologies for science.

2. Become familiar with the OpenNebula web interface and possibilities.



3. Get training in the deployment of new virtual machines and their customization using the web interface.

4. Experience a minimum OpenNebula deployment using its miniOne version on GitHub.

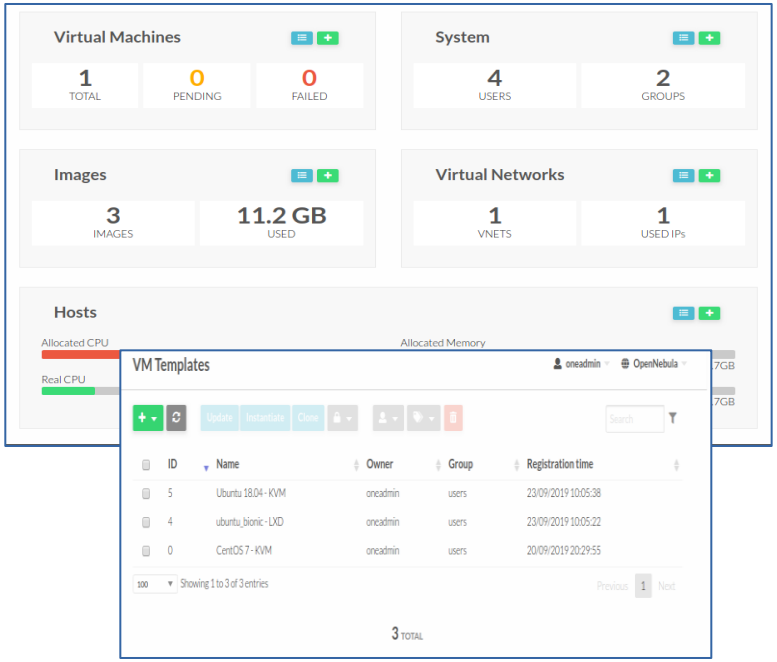
OpenNebula

GitHub

Results (1-3)

1. General concepts and knowledge of Grid and Cloud technologies were acquired.

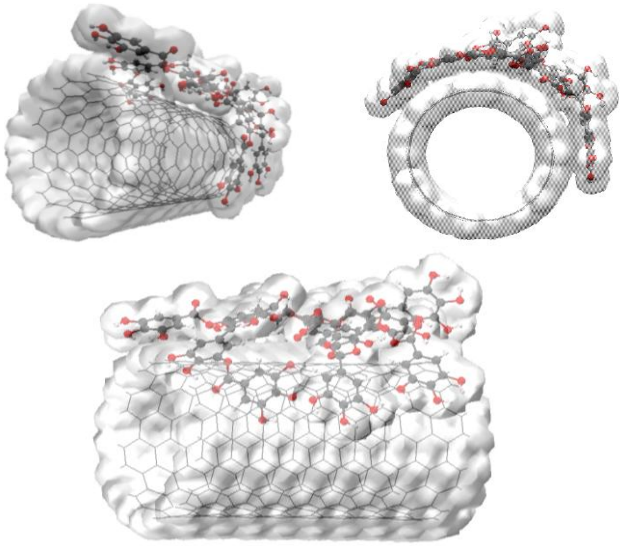
2. Practical skills in the use and exploitation of the advantages and benefits that OpenNebula offers were obtained.

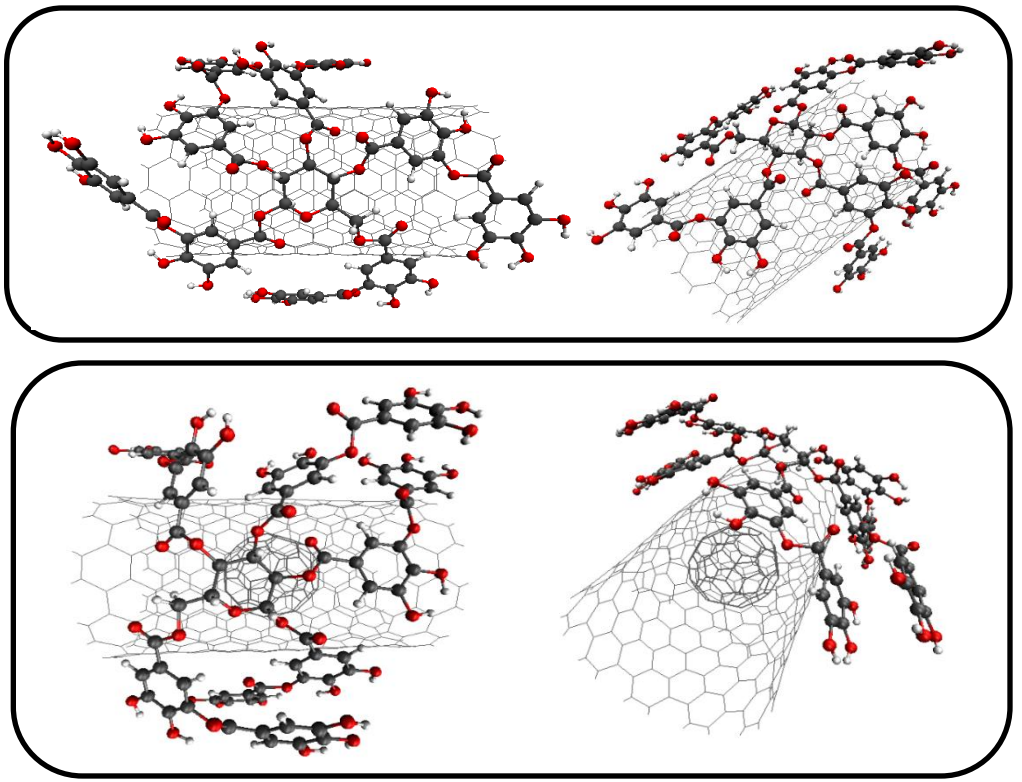


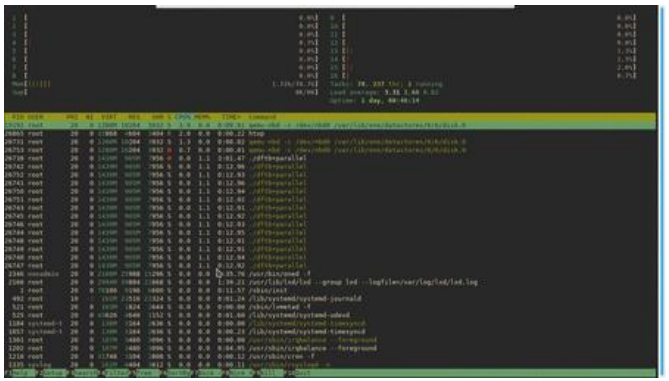
3. A minimum version of OpenNebula was deployed to understand its operation and management.

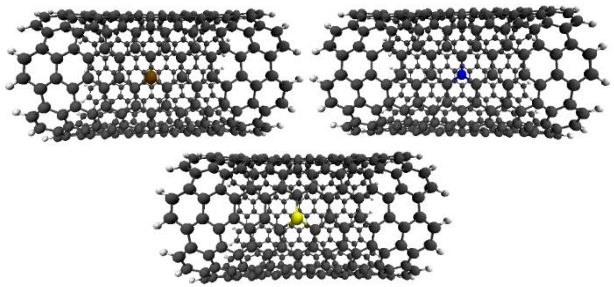
Results (4)

Density Functional
based Tight Binding



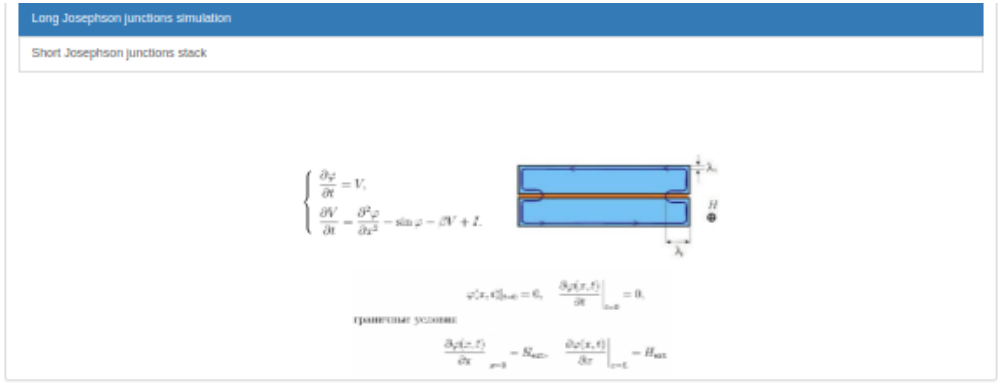


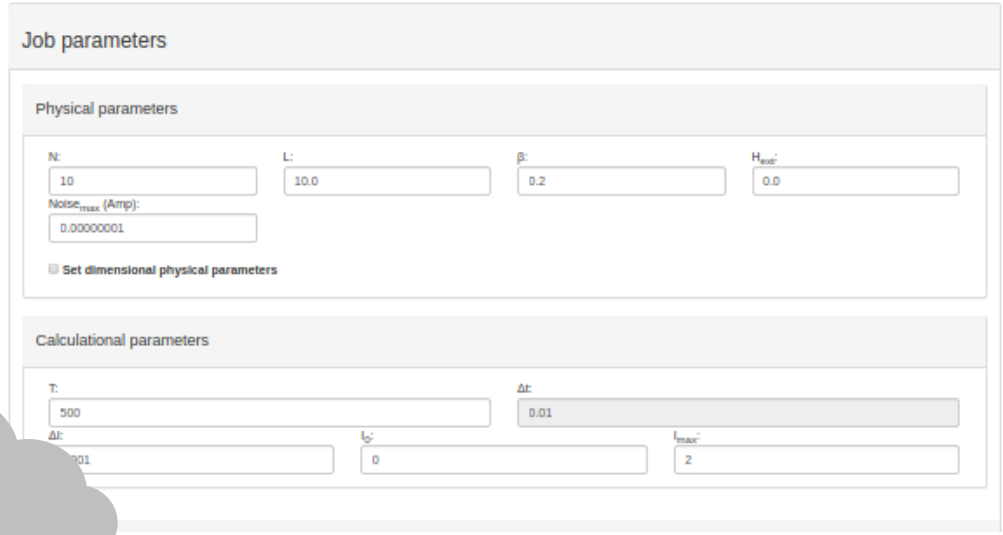




Further Steps

- Deploy Cloud Infrastructure at CEA.
- Deploy Scientific Aplications in CEA Cloud.
- Deploy additional components and services to run SaaS Platform at CEA.





Thanks for your attention!!