LoCloud

Local content in a Europeana cloud

# D3.1: Operational SaaS Test lab

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# Revision History

| Revision | Date | Author | Organisation | Description |
|---|---|---|---|---|
| 0.1 | 14/02/2014 | KochG | AIT | Draft |
| 1.0 | 27/02/2014 | BendaO, KochW, KochG | AIT | Version 1 |
| 2.0 | 03/03/2014 | KochG | AIT | Version 2<br>Integrating comments from coordination; Adding guidelines to build KVM image as annex-Published |
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View the LoCloud project deliverables

**Statement of originality:**

This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

# Contents

# 1. Introduction

The aim of task 3.1 of the LoCloud project is to establish a cloud-based collaborative testing environment for tools and services in order to develop and test a number of key cloud-based micro-services (SaaS[1]) useful to smaller institutions in enriching their metadata and improving data quality for the benefit of Europeana[2] users.

The various cloud-based software services (geolocation services, vocabulary enrichment, metadata enrichment services etc.) should enable local heritage institutions to render their content both more discoverable and interoperable.
The predominant (technical) aims are the investigation of the potential of cloud computing for aggregation, enrichment and re-use, and the trial of a cloud based architecture as a scalable platform for Europeana metadata aggregation and harvesting with higher efficiency and reduced maintenance costs.
The operational SaaS test lab will provide the basis for a continuing process of participative testing and validation of each of the services and applications.

## *Cloud Computing*

Cloud computing is a model for enabling ubiquitous, convenient, **on-demand network access** to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.[3]

The models marked in bold in the overview below are those that the LoCloud tests will focus on.

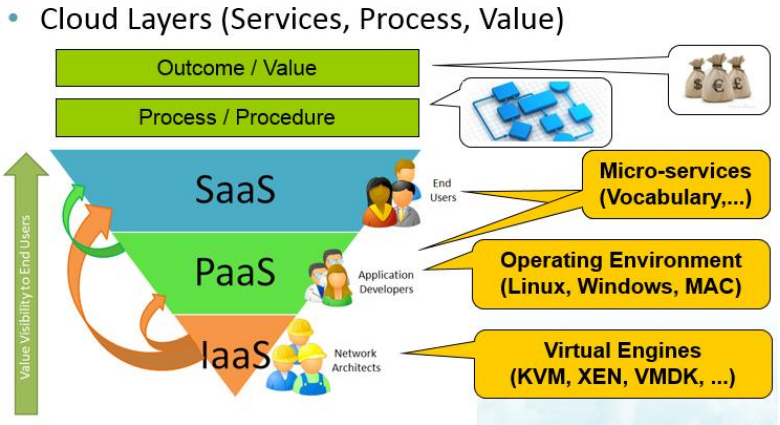


Figure 1 Cloud Layers

[1] Saas – Software as a Service http://en.wikipedia.org/wiki/Software_as_a_service , Feb 28, 2014.
[2] Europeana – http://www.europeana.eu , Feb 28, 2014.
[3] The NIST (US National Institute of Standards and Technology, http://www.nist.gov/ ) Definition of Cloud Computing, Feb 28, 2014.

1. Main characteristics are:
    - On demand self-service
    - Broad network access ▶ available over a network for mobile devices, laptops, work stations etc.
    - Resource pooling ▶ multi-tenancy, dynamic assignment of resources
    - Rapid elasticity ▶ capabilities are provided elastically, “unlimited”
    - Measured service ▶ monitoring

2. Frequent Service Models are:
    - **Software as a Service**
    - Platform as a Service
    - **Infrastructure as a Service**

3. Common Deployment Models are:
    - Private Cloud ▶ exclusive use by a single organization
    - **Community Cloud** ▶ exclusive use by a community
    - Public Cloud ▶ open use by the general public
    - Hybrid Cloud ▶ composition of two or more cloud infrastructures (private, community, or public)

# 2. The LoCloud Testlab

The LoCloud test lab will provide access to the various micro services for test purposes.

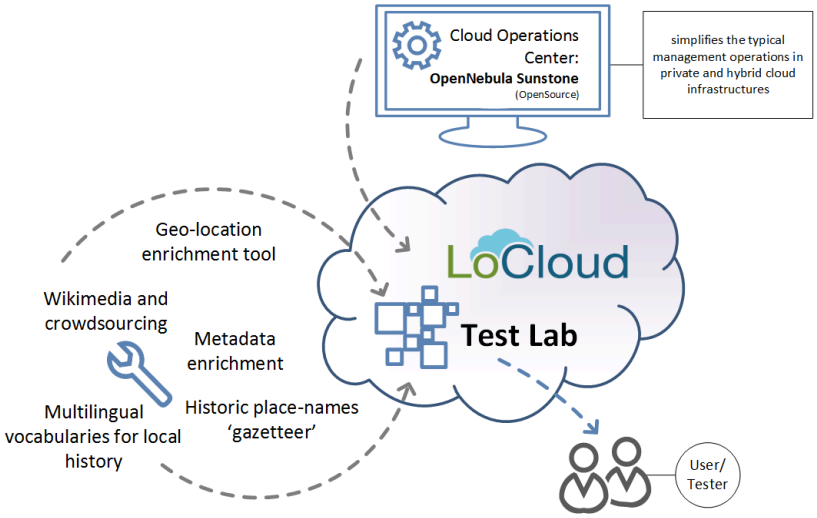


Figure 2 LoCloud Testlab

The OpenNebula Sunstone environment has been chosen as cloud operations center for the test lab. The operations centre simplifies the management operations in private and hybrid cloud infrastructures.

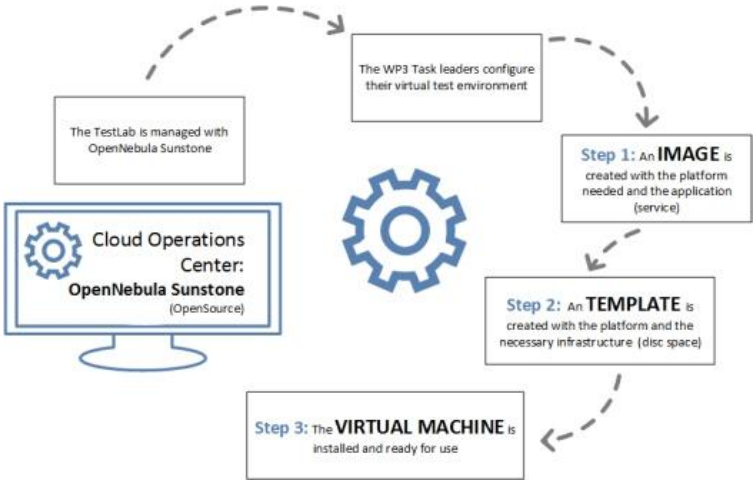


Figure 3 OpenNebula Operations Center


Figure 4 Enter the OpenNebula Operations Center

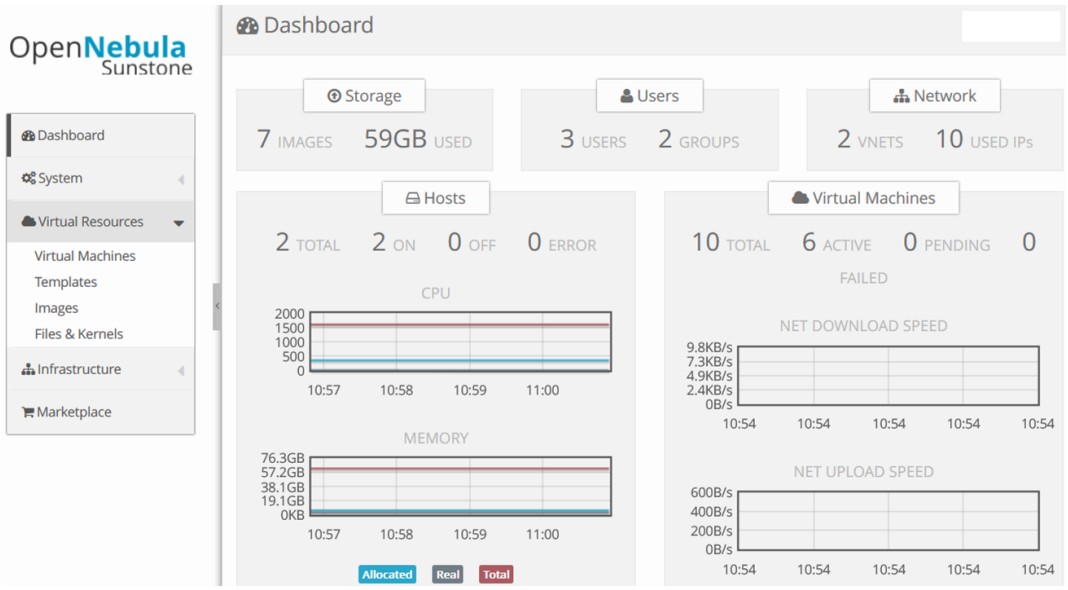


Figure 5 OpenNebula Dashbord

The OpenNebula resources are organized at three different levels:

1. **Images** are raw images of hard disks.
2. **Templates** are configuration profiles that specify the infrastructure resources and combine them with images into a bootable machine.
3. **Virtual Machines** are the running platforms and applications.

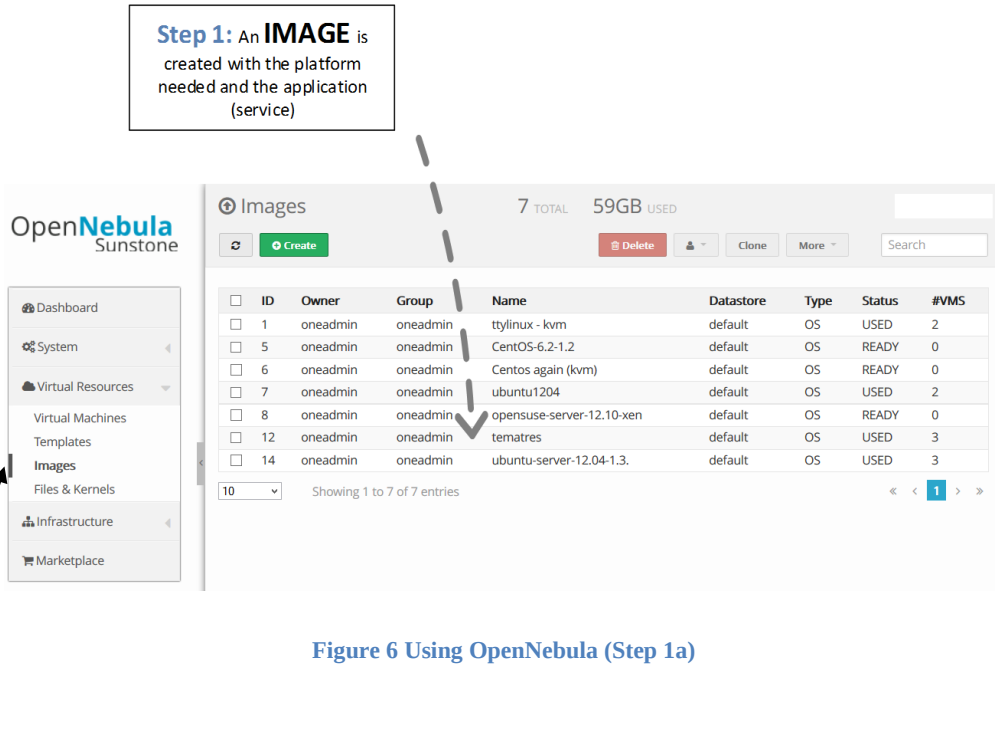


Figure 6 Using OpenNebula (Step 1a)

The **Images** tab contains a listing of all available hard disks that can be used for creating templates. These images can be in any format a hypervisor of the OpenNebula supports. The setup at locloud.ait.co.at prefers the KVM hypervisor. XEN is also possible. VMWare is not installed since OpenNebula did not work with the most recent free edition of ESX Server (5.1). Hence, the preferred image format is the thin provisioning qcow2 format. Preallocated raw images are also possible.

Permissions can be set on each image to restrict the access of users to certain images. Once an image is uploaded to OpenNebula it will not be changed but rather copied for each virtual machine.

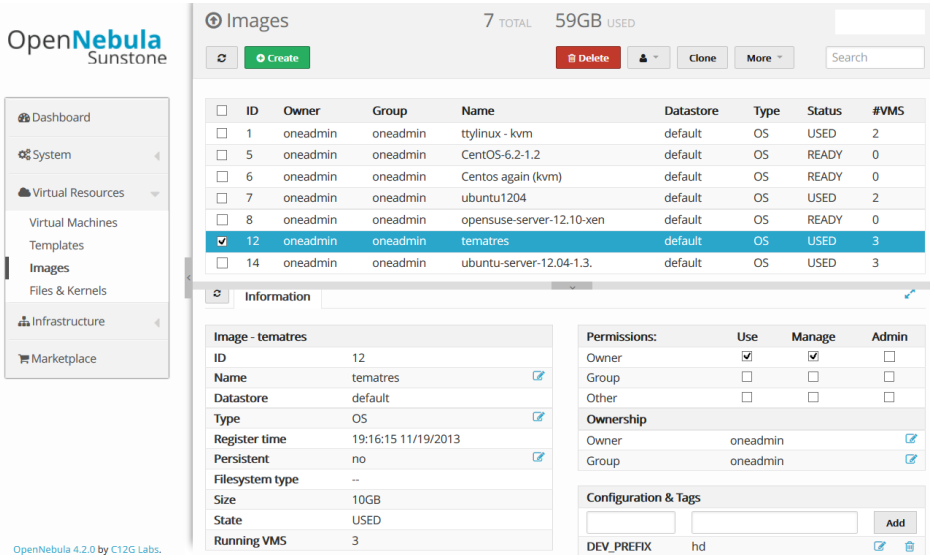


Figure 7 Using OpenNebula (Step 1b)

**Templates** are profiles that specify virtual hardware limits and initial hard disks for virtual machines. In order to start a virtual machine you first have to configure a template. An image alone cannot be booted.

The options that must be set in the template are:

- How much CPU and memory is allocated from the executing hypervisor. These resources are reserved once the machine is running.
- You can choose the image that will initially be copied when the machine is started.
- You can specify the network the machine is running on.

Permissions can be set on each template to restrict the access of users to certain templates.

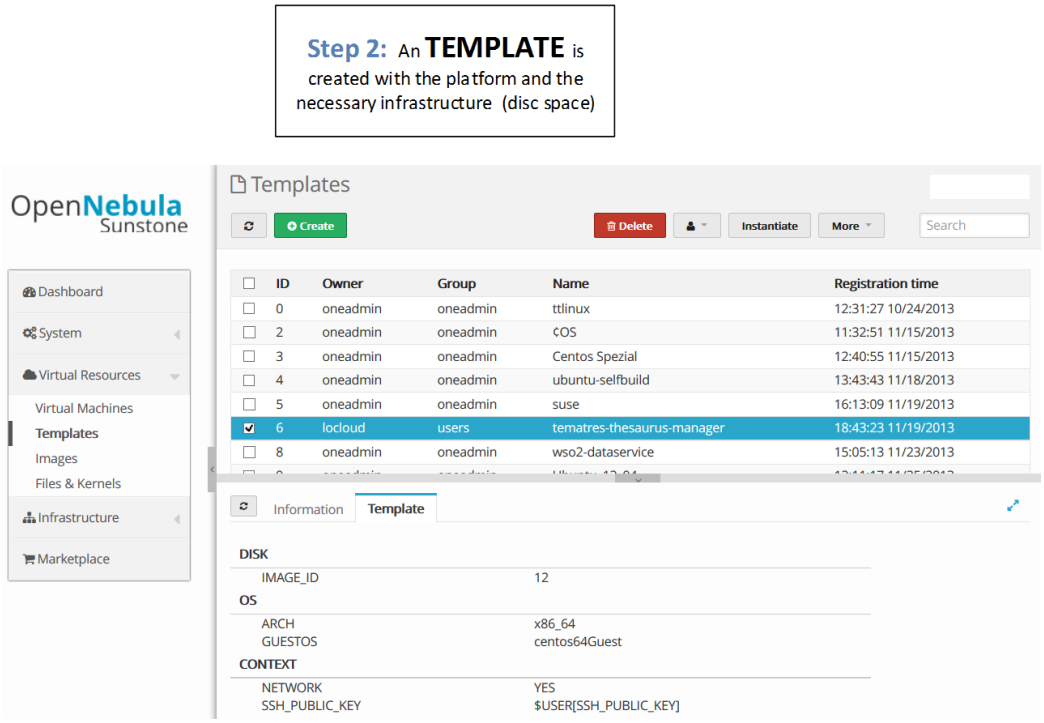


**Figure 8 Using OpenNebula (Step 2)**

The figure below shows the currently running cloud computers from the **Virtual machines** page. The machines can be paused/resumed/rebooted from this tab. The instances can be terminated and the hard disk can be reset to the original image's state. The VNC button allows users to see the console of machine.

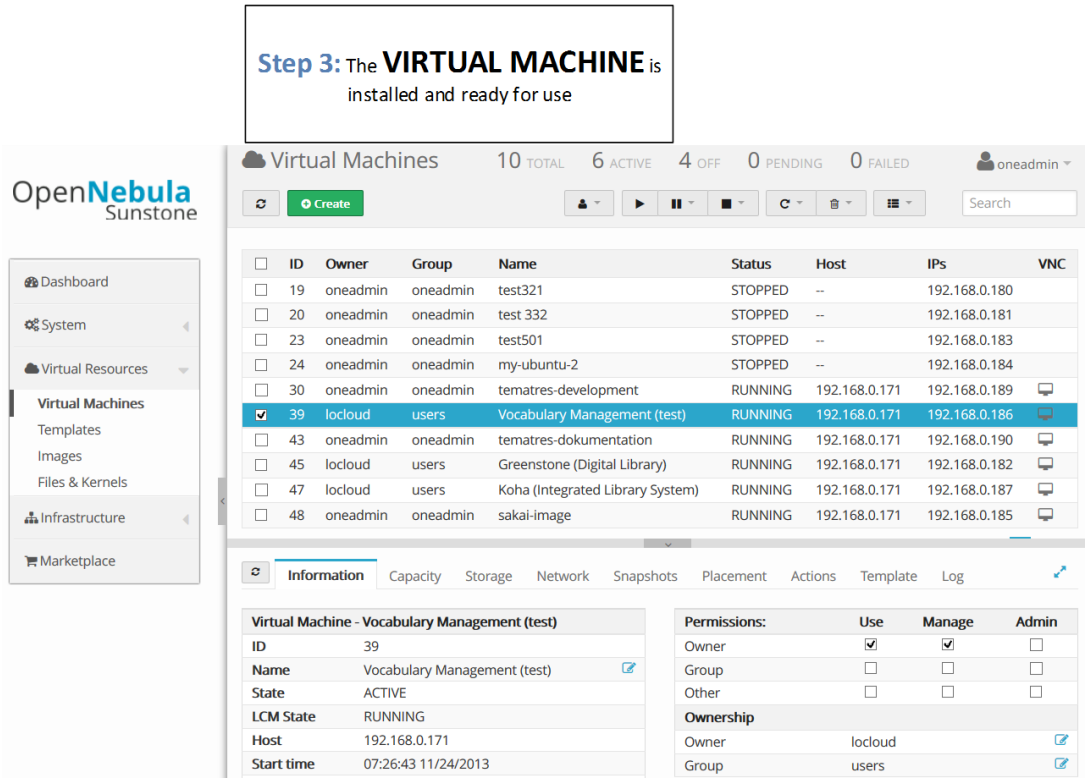


Figure 9 Using OpenNebula (Step 3)

## *Make your own Virtual Machine*

In order to start a virtual machine you have to press **Create** in the **Virtual Machines** tab. You have to give the machine a name and select a template from list. Depending on the size of the initial hard disk and the application that is running on the machine it will be ready within a minute or two.

To access the machine from a remote location you have to look at the IP address it has assigned. We assign internal addresses in the form 192.168.NNN.XXX. The http ports 80 and 8080 are accessible though a proxy when using the name lcXXX.ait.co.at.

The ssh port is available at locloud.ait.co.at:23XX where XX are the last two digits of the IP 192.168.129.XX.

The following figures provide screenshots from the process of creating the machine.

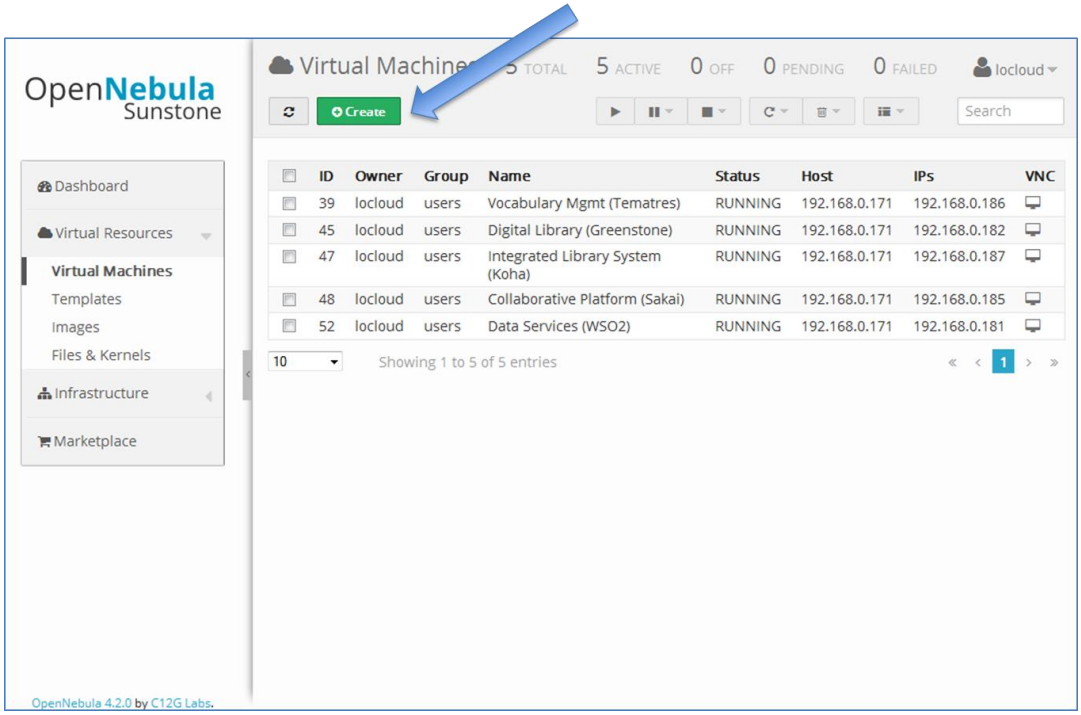


Figure 10 Creat your own VM

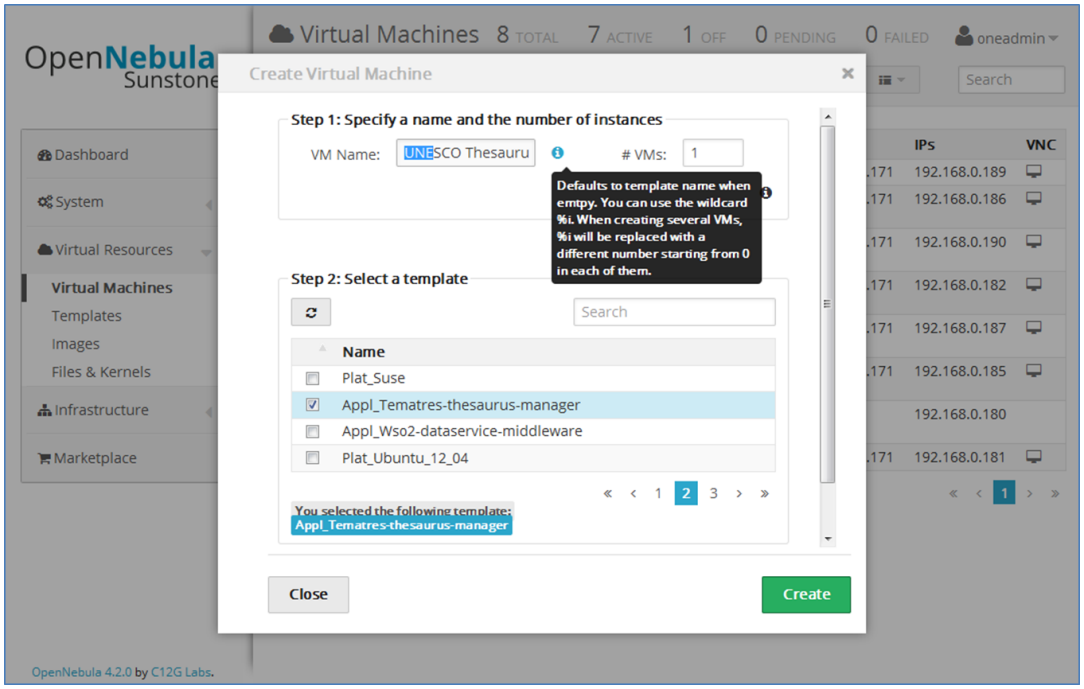


Figure 11 Creat your own VM (Steps 1 and 2)

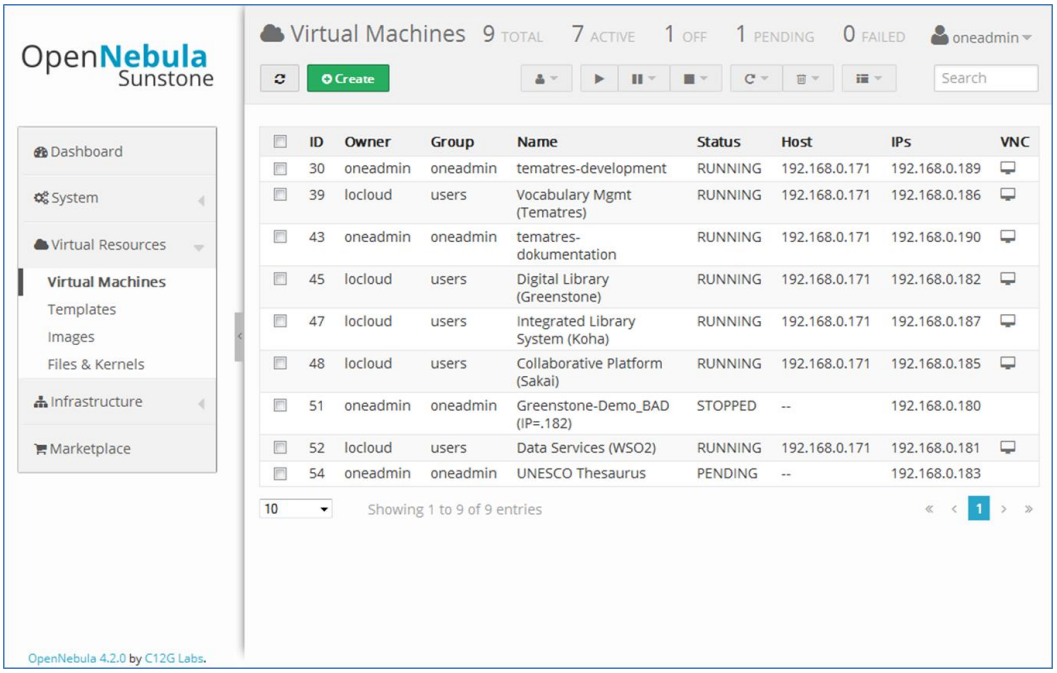


**Figure 12 Create your own VM (pending)**

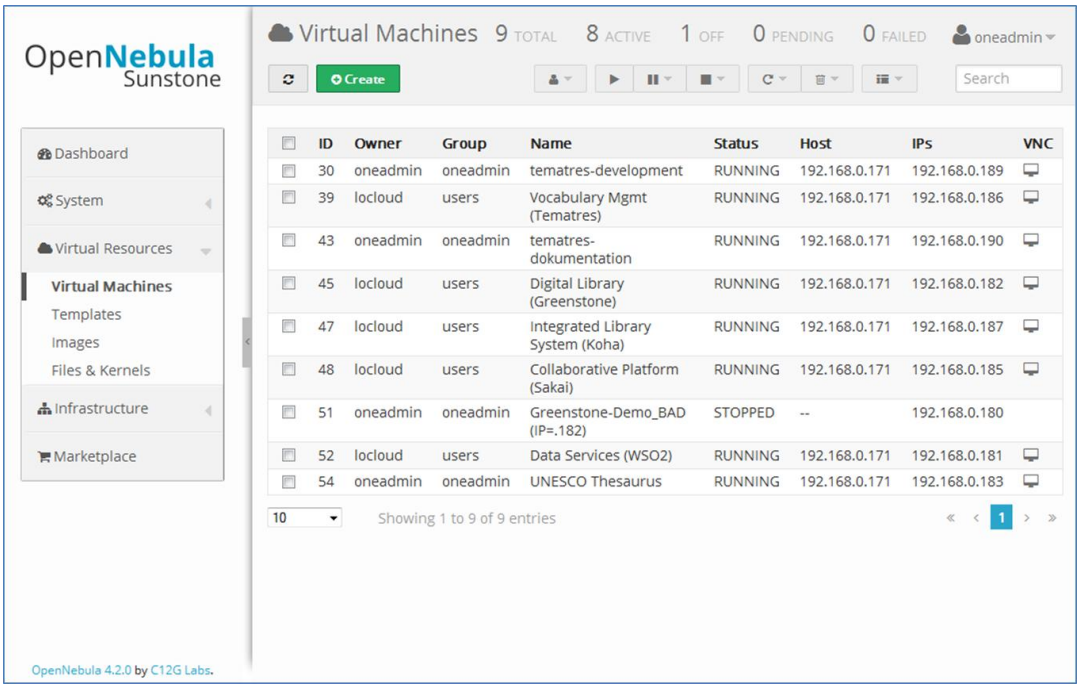


**Figure 13 Your own VM machine is running**

# 3. Access to the micro services

For coordinating the collaboration between technical partners within WP3 and in preparation to provide a common access point for all micro services during the test phase in the second project year, a platform was set up using the SAKAI[4] environment.

This platform can be reached through the test lab address:
http://lc004.ait.co.at:8080/portal/site/locloud

To date access to the platform is restricted to the WP3 technical partners and the project manager.

The platform includes currently three work spaces:

| | | |
|---|---|---|
| "My Workspace" | > | for personal data |
| "LoCloud WP3" | > | visible and accessible just for WP3 partners |
| "Micro services" | > | access point for all users and testers of the micro services |

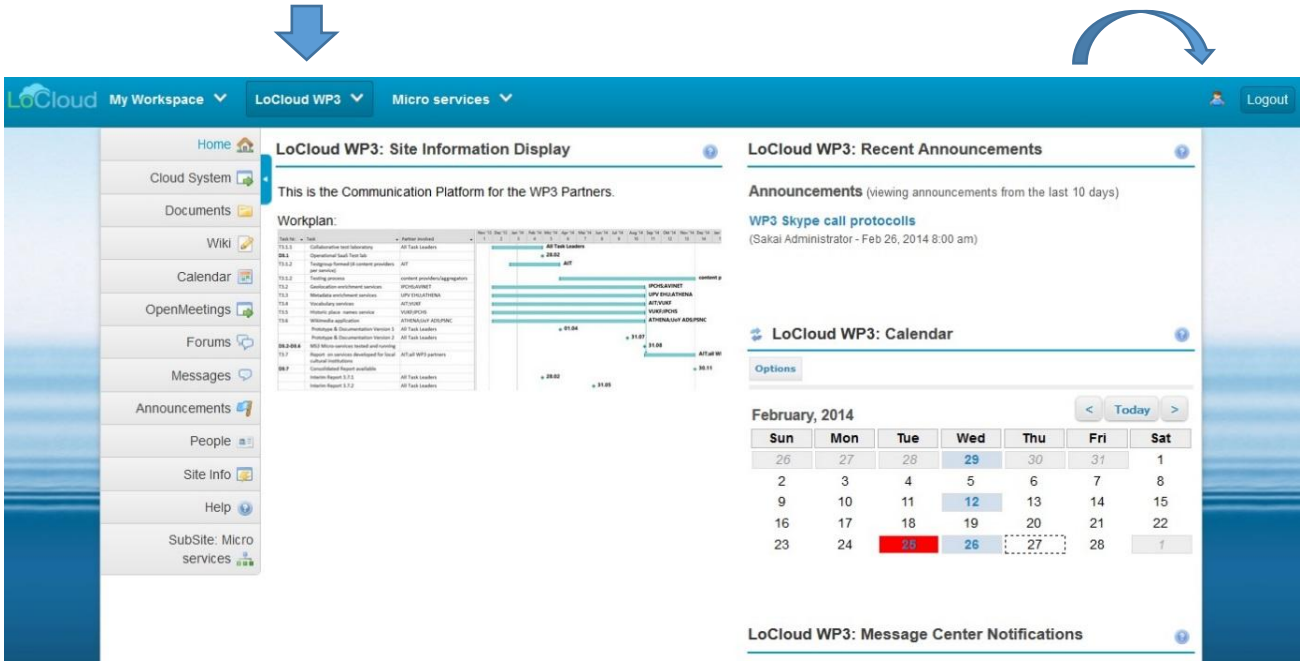


Figure 14 WP3 Collaborative plattform

[4] SAKAI Collaboration and Learning Environment (CLE) - http://en.wikipedia.org/wiki/Sakai_CLE Feb 28, 2014.

This work space is used for collaborating within WP3. It provides the following features:

| LoCloud WP3 | |
|---|---|
| Home | Message board with recent announcements, calendar and notifications |
| Cloud System | Access to the OpenNebula Test laboratory |
| Documents | WP3 document library |
| Wiki | WP3 Wiki |
| Calendar | Deadlines and Meeting schedules for WP3 |
| OpenMeetings | Conference Tool |
| Forums | Forum Tool |
| Announcements | View Announcements |
| People | Participants list for this work space |
| Site Info | General information about this site |
| Help | Access to help information |
| SubSite: Micro services | Link to the Micro services work space |

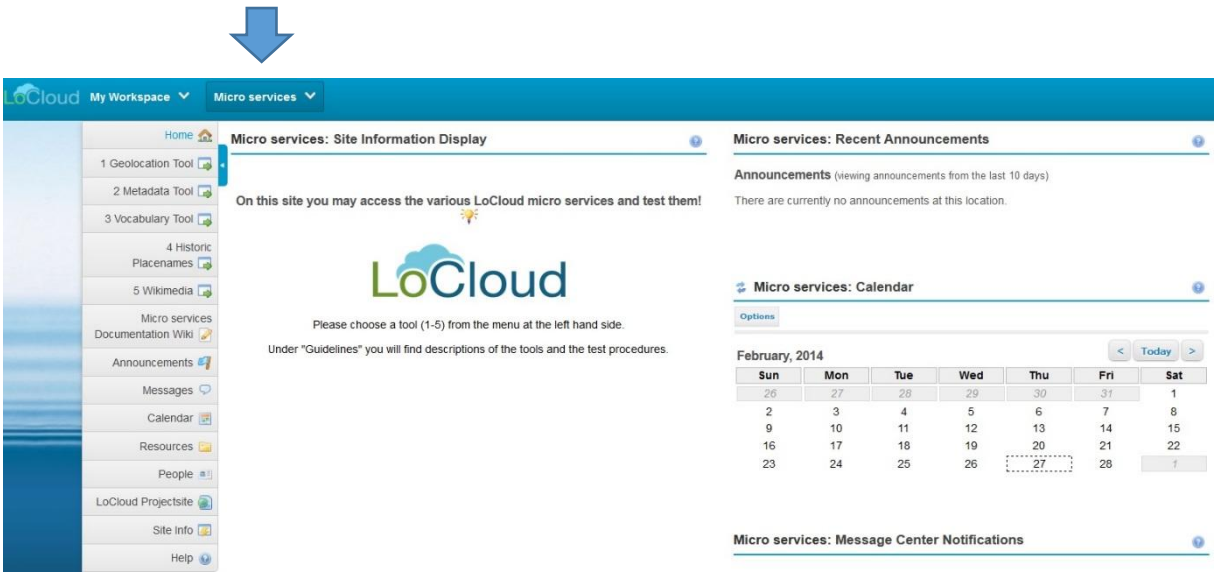


Figure 15 Entry page for testing the micro services

The Micro services work space will be used as entry point to the various micro services. To date it has the following features:

| Micro services | |
|---|---|
| Home | |
| 1 Geolocation Tool | Access to the Geolocation Tool |
| 2 Metadata Tool | Access to Metadata Tool |
| 3 Vocabulary Tool | Access to Vocabulary Tool |
| 4 Historic Placenames | Access to Historic Placenames |
| 5 Wikimedia | Access to Wikimedia Application |
| Micro services Documenation Wiki | Access/Download here the guidelines to the various tools |
| Announcements | View Announcements |
| Messages | Post Messages here |
| Calendar | Calendar |
| Resources | Documents Repository |
| People | People having access to this work space |
| LoCloud Projectsite | Link to the LoCloud official project website |
| Site Info | General information about this site |
| Help | Access to help information |

# 4. Conclusion

To date the various micro services are still under development and the prototype versions for testing shall be available and included in the test lab by end of March 2014.
However, some partners started to upload very first versions of their micro services' prototypes on virtual machines to the test lab: A first version of the metadata enrichment and the vocabulary micro services are already available at this stage.
In addition, the collaborative platform described in chapter 3 has been installed in the test lab.

Furthermore, a guideline was issued on how to build an image and integrate a virtual machine to the test lab. Annex 1 of this deliverable includes this document: LoCloud Image Builder guidelines

# 5. Glossary

| TERM | EXPLANATION |
|---|---|
| Cloud Computing | Cloud computing is a general term for anything that involves delivering hosted services over the Internet. These services are broadly divided into three categories: Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS). The name cloud computing was inspired by the cloud symbol that's often used to represent the Internet in flowcharts and diagrams.<br>A cloud service has three distinct characteristics that differentiate it from traditional hosting. It is sold on demand, typically by the minute or the hour; it is elastic -- a user can have as much or as little of a service as they want at any given time; and the service is fully managed by the provider (the consumer needs nothing but a personal computer and Internet access).<br>http://searchcloudcomputing.techtarget.com/definition/cloud-computing<br>http://en.wikipedia.org/wiki/Cloud_computing |
| ESX Server | VMware ESX is an enterprise-level computer virtualization product offered by VMware, Inc. ESX is a component of VMware's larger offering, VMware Infrastructure, which adds management and reliability services to the core server product. VMware is replacing the original ESX with ESXi.<br>http://en.wikipedia.org/wiki/ESX_Server |
| Hypervisor | A hypervisor or virtual machine monitor (VMM) is a piece of computer software, firmware or hardware that creates and runs virtual machines.<br>http://en.wikipedia.org/wiki/Hypervisor |
| KVM | KVM (Kernel-based Virtual Machine) is a virtualization infrastructure for the Linux kernel which turns it into a hypervisor. KVM requires a processor with hardware virtualization extension.<br>http://en.wikipedia.org/wiki/Kernel-based_Virtual_Machine |
| OpenNebula | OpenNebula is a cloud computing toolkit for managing heterogeneous distributed data center infrastructures. The OpenNebula toolkit manages a data center's virtual infrastructure to build private, public and hybrid implementations of infrastructure as a service. OpenNebula is free and open-source software, subject to the requirements of the Apache License version 2.<br>http://en.wikipedia.org/wiki/OpenNebula |
| port | In computer networking, a port is an application-specific or process-specific software construct serving as a communications endpoint in a |

| TERM | EXPLANATION |
|---|---|
| | computer's host operating system. A port is associated with an IP address of the host, as well as the type of protocol used for communication. The purpose of ports is to uniquely identify different applications or processes running on a single computer and thereby enable them to share a single physical connection to a packet-switched network like the Internet. https://en.wikipedia.org/wiki/Network_port |
| proxy | In computer networks, a proxy server is a server (a computer system or an application) that acts as an intermediary for requests from clients seeking resources from other servers. A client connects to the proxy server, requesting some service, such as a file, connection, web page, or other resource available from a different server and the proxy server evaluates the request as a way to simplify and control its complexity. Proxies were invented to add structure and encapsulation to distributed systems. https://en.wikipedia.org/wiki/Proxy_server |
| qcow | qcow is a file format for disk image files used by QEMU, a hosted virtual machine monitor. It stands for "QEMU Copy On Write" and uses a disk storage optimization strategy that delays allocation of storage until it is actually needed. Files in qcow format can contain a variety of disk images which are generally associated with specific guest operating systems. Two versions of the format exist: qcow, and qcow2, which use the .qcow and .qcow2 file extensions, respectively. http://en.wikipedia.org/wiki/Qcow2 |
| SAKAI Collaboration and Learning Environment (CLE) | Sakai is a community of academic institutions, commercial organizations and individuals who work together to develop a common Collaboration and Learning Environment (CLE). The Sakai CLE is a free, community source, educational software platform distributed under the Educational Community License (a type of open source license). The Sakai CLE is used for teaching, research and collaboration. http://en.wikipedia.org/wiki/Sakai_CLE |
| SSH | Secure Shell (SSH) is a cryptographic network protocol for secure data communication, remote command-line login, remote command execution, and other secure network services between two networked computers that connects, via a secure channel over an insecure network, a server and a client (running SSH server and SSH client programs, respectively). The protocol specification distinguishes between two major versions that are referred to as SSH-1 and SSH-2. http://en.wikipedia.org/wiki/Secure_Shell |
| VMware | VMware, Inc. is an American software company that provides cloud and virtualization software and services, and was the first to successfully virtualize the x86 architecture. |

| TERM | EXPLANATION |
|---|---|
| | http://en.wikipedia.org/wiki/VMware |
| VNC | In computing, Virtual Network Computing (VNC) is a graphical desktop sharing system that uses the Remote Frame Buffer protocol (RFB) to remotely control another computer. It transmits the keyboard and mouse events from one computer to another, relaying the graphical screen updates back in the other direction, over a network. http://en.wikipedia.org/wiki/VNC |
| XEN | Xen /ˈzɛn/ is a native (bare-metal) hypervisor providing services that allow multiple computer operating systems to execute on the same computer hardware concurrently. The University of Cambridge Computer Laboratory developed the first versions of Xen. The Xen community develops and maintains Xen as free and open-source software, subject to the requirements of the GNU General Public License (GPL), version 2. Xen is currently available for the IA-32, x86-64 and ARM instruction sets. http://en.wikipedia.org/wiki/Xen |

# 6. Figures

# Annex 1

## LoCloud Image Builder guidelines

# Guideline

**Project Acronym:** **LoCloud**

**Grant Agreement number:** **325099**

**Project Title:** **Local content in a Europeana cloud**

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## LoCloud Image Builder guidelines

**Revision: Version 1**

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**Authors:**

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Koch Walter AIT Forschungsgesellschaft mbH



| Project co-funded by the European Commission within the ICT Policy Support Programme | | |
|---|---|---|
| Dissemination Level | | |
| P | Public | x |
| C | Confidential, only for members of the consortium and the Commission Services | |



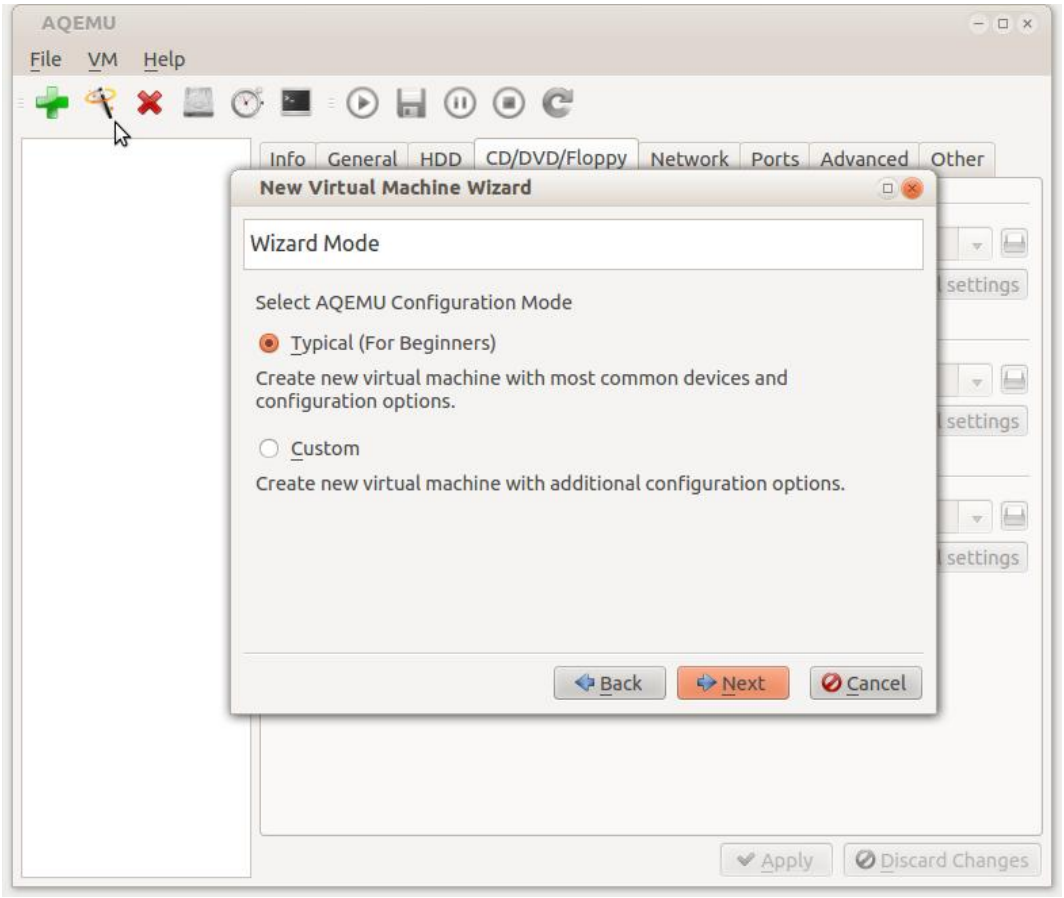
## Revision History

| Revision | Date | Author | Organisation | Description |
|---|---|---|---|---|
| 1.0 | 24/02/2014 | BendaO | AIT | Version 1 |
| | | | | |
| | | | | |

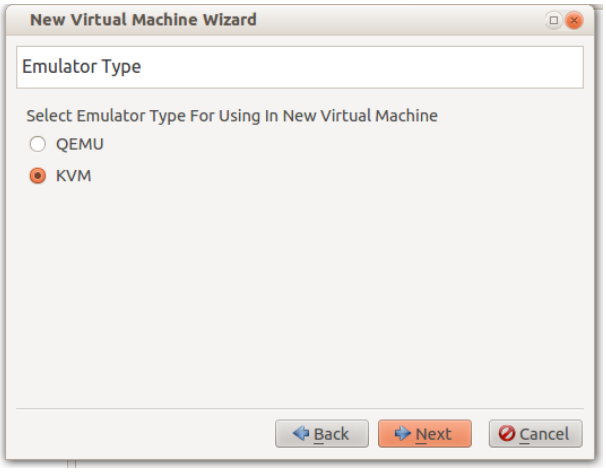
# Contents

# 1. Building your image locally

In order to integrate your virtual machine into the LoCloud Test lab a KVM disk image is needed.
You can use the „aqemu“ tool, included in a Linux package, to create such an image and run the machine.
The desired disk image format is qcow2.
It is recommended that you use the defaults from the aqemu wizard.
The disk image is stored in $HOME/.aqemu/<MyService>_HDA.img
Please do not use non-standard network configuration. We need to able to install the OpenNebula contextualization before running the image in the cloud.
Contact us (AIT: Odo Benda bendao@ait.co.at, Walter Koch kochw@ait.co.at ) once you are ready to upload the image.




Step 1

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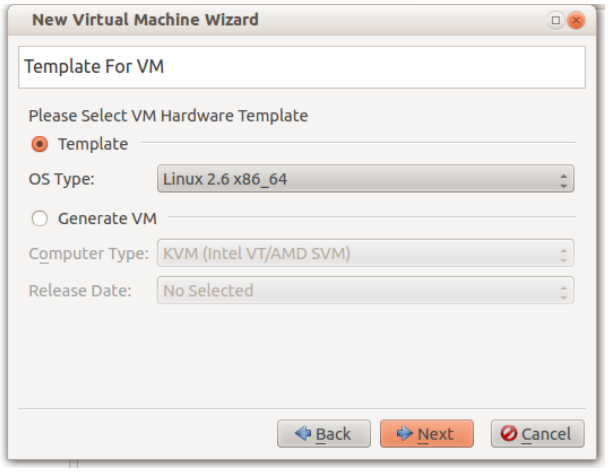


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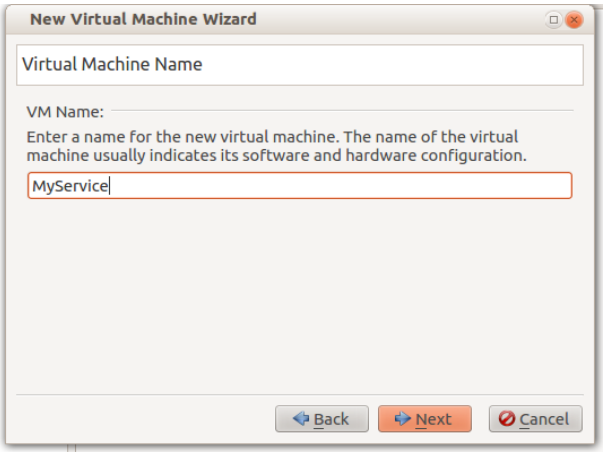


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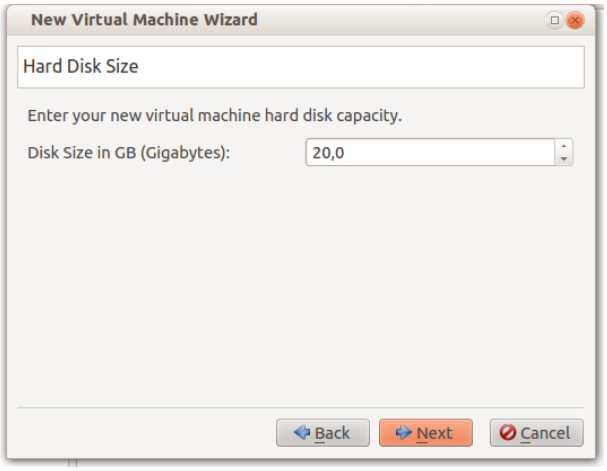


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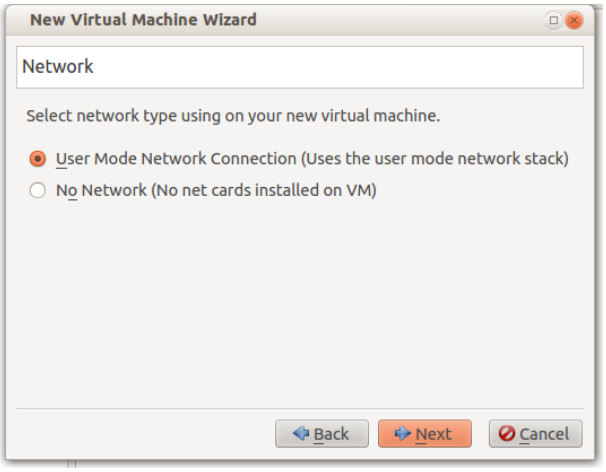


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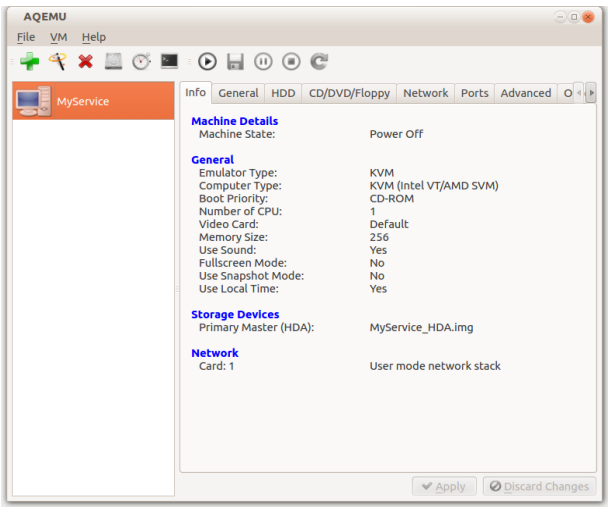


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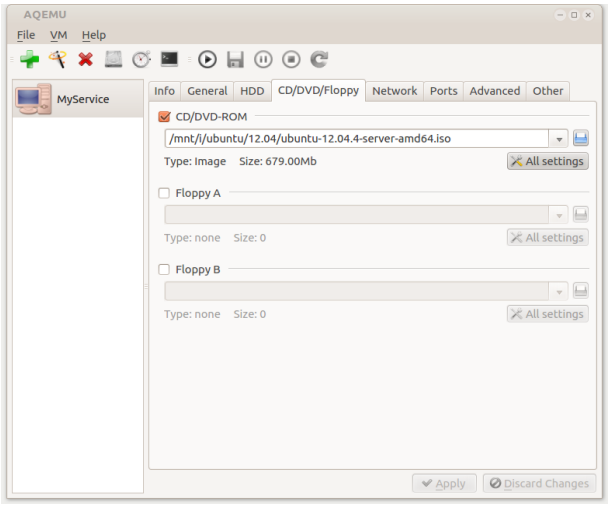
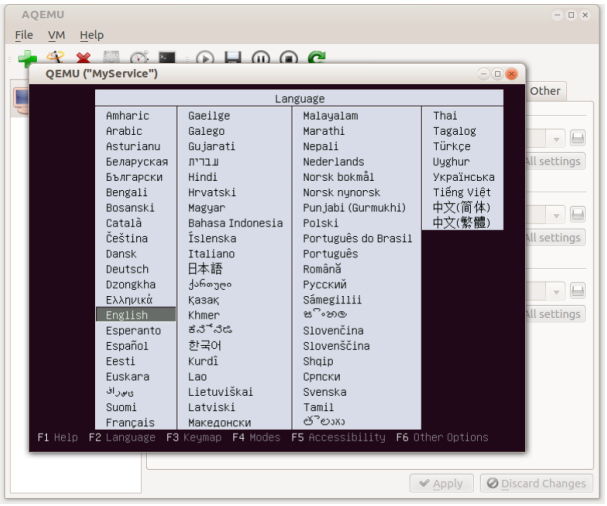



Step 8




Step 9

# 2. Building your image in the cloud

Go to http://locloud.ait.co.at .
Start your desired platform from the section from „Virtual Machines“. Select the desired platform from the „templates“.
The machine will be started and given an IP address within the range 192.168.129.1- 192.168.129.99
Please note that the virtual machine runs entirely in our private network.
The ports 80 and 8080 are exposed through a proxy. That is lc0XX.ait.co.at, where XX are last digits of the IP address. SSH access is available at locloud.ait.co.at port 23XX.
E.g. if the machine starts as 192.168.129.8 then you can access http://lc008.ait.co.at http://lc008.ait.co.at:8080 and ssh://locloud.ait.co.at:2308 .