

OpenNebula: Service & Platform

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Introduction:

OpenNebula is a cloud platform which offers infrastructure for virtualization of data centers and cloud computing resources. It manages public, private and hybrid implementations of Data Centers. Primary use of OpenNebula is virtualization of Data Center and cloud infrastructure solutions.

Architecture:

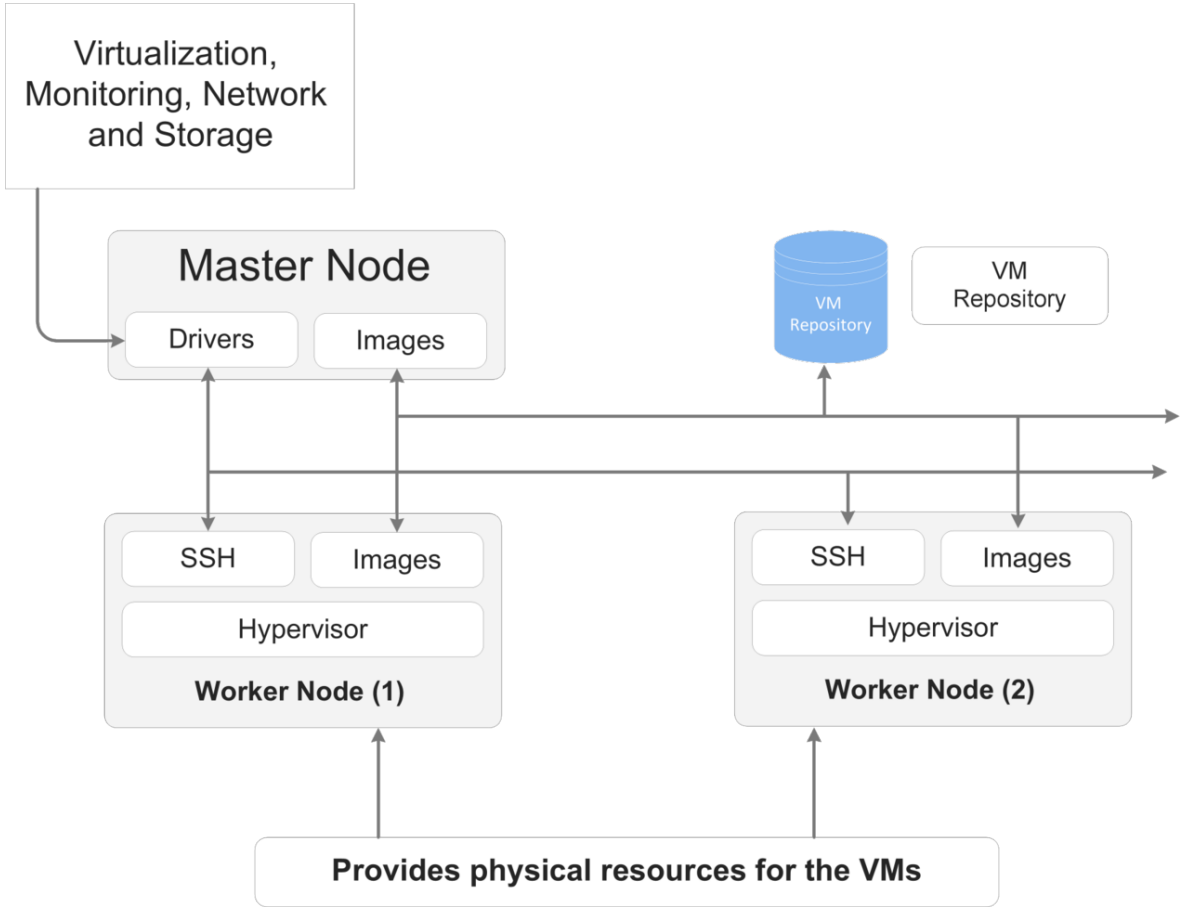


Figure 1: Deployment model of OpenNebula

Components:

1. Front-end machine: There is a master node which is also called front-end machine where the OpenNebula software is installed. It manages the queuing, scheduling and transferring jobs to other clusters. It also provides mechanism to control other host nodes.
2. Hypervisor enabled-hosts: The worker nodes are also called hypervisor hosts. OpenNebula enabled hypervisor uses a Virtualization Vmware or KVM. A virtualization subsystem is responsible for controlling these hosts.
3. Storage: The storage is for loading the image file or drivers for Virtual machine.

Three different datastore classes are included with OpenNebula including system datastores, image datastores, and file datastores. System datastores hold the images used for running the virtual machines. The images can be complete copies of an original image, deltas, or symbolic links depending on the storage technology used. The image datastores are used to store the disk image repository. Images from the image datastores are moved to or from the system datastore when virtual machines are deployed or manipulated. The file datastore is used for regular files and is often used for kernels, ram disks, or context files.

4. Physical network: This network service provides secure connection between hosts and the master nodes. The master node communicates with hosts using these network services.

Features:

1. Flexibility: OpenNebula platform is flexible because any enterprise can use existing data center infrastructure without knowing much detail about the backend services. It offers flexible installation process.
2. Openness: OpenNebula is Free and Open Source Software (FOSS). The software is free to use and the source code is also available in their website (OpenNebula.org).
3. Reliability: This cloud computing platform can be used for several years with little maintenance and error. Sometimes there are some little updates in the infrastructures but to the end users it always flexible.
4. Scalability: The size of the zones can be extended any time for storage or any other purposes.

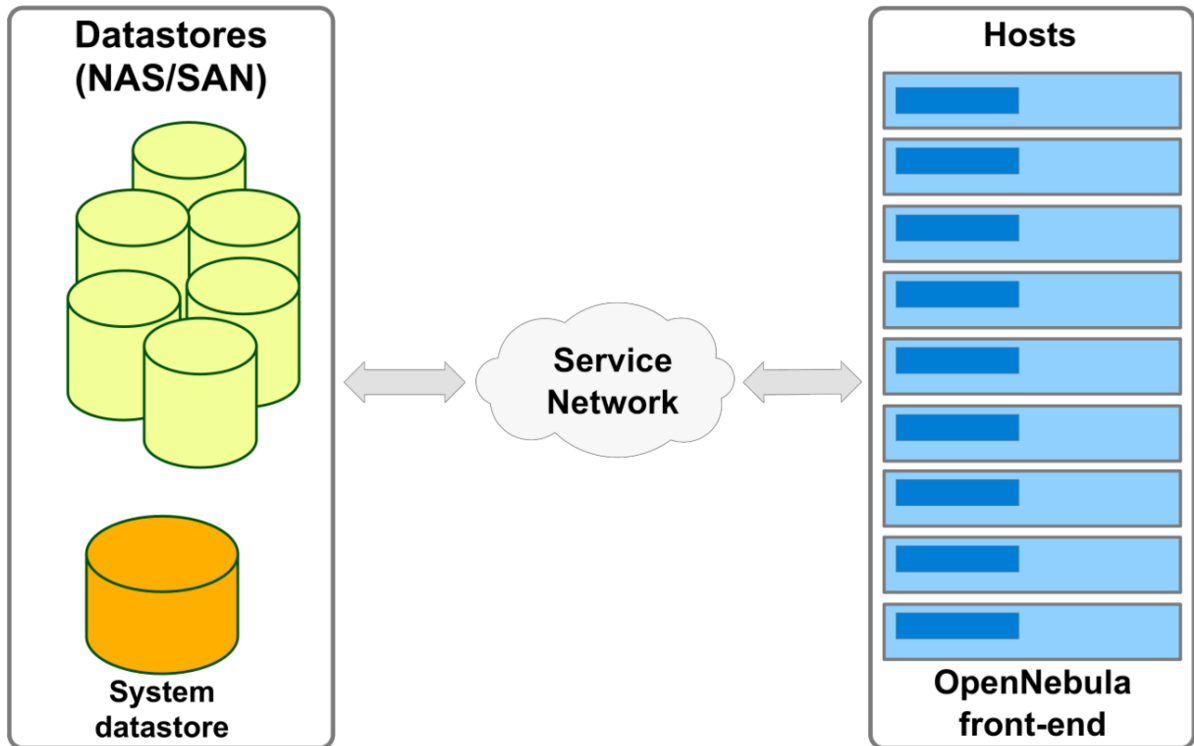


Figure 2: OpenNebula Storage

Benefits:

For the Infrastructure Manager

- **Faster respond to infrastructure needs for services** with dynamic resizing of the physical infrastructure by adding new hosts, and dynamic cluster partitioning to meet capacity requirements of services
- **Centralized management** of all the virtual and physical distributed infrastructure
- **Higher utilization of existing resources** with the creation of a infrastructure incorporating the heterogeneous resources in the data center, and infrastructure sharing between different departments managing their own production clusters, so removing application silos
- **Operational saving** with server consolidation to a reduced number of physical systems, so reducing space, administration effort, power and cooling requirements

- **Lower infrastructure expenses** with the combination of local and remote Cloud resources, so eliminating the over-purchase of systems to meet peaks demands

For the Infrastructure User

- **Faster delivery and scalability of services** to meet dynamic demands of service end-users
- **Support for heterogeneous execution environments** with multiple, even conflicting, software requirements on the same shared infrastructure
- **Full control** of the lifecycle of virtualized services management

For System Integrators

- **Fits into any existing data center** thanks to its open, flexible and extensible interfaces, architecture and components
- **Builds any type of Cloud deployment**
- **Open source software**, Apache license
- **Seamless integration with any product and service in the virtualization/cloud ecosystem and management tool in the data center**, such as cloud providers, VM managers, virtual image managers, service managers, management tools, scheduler.

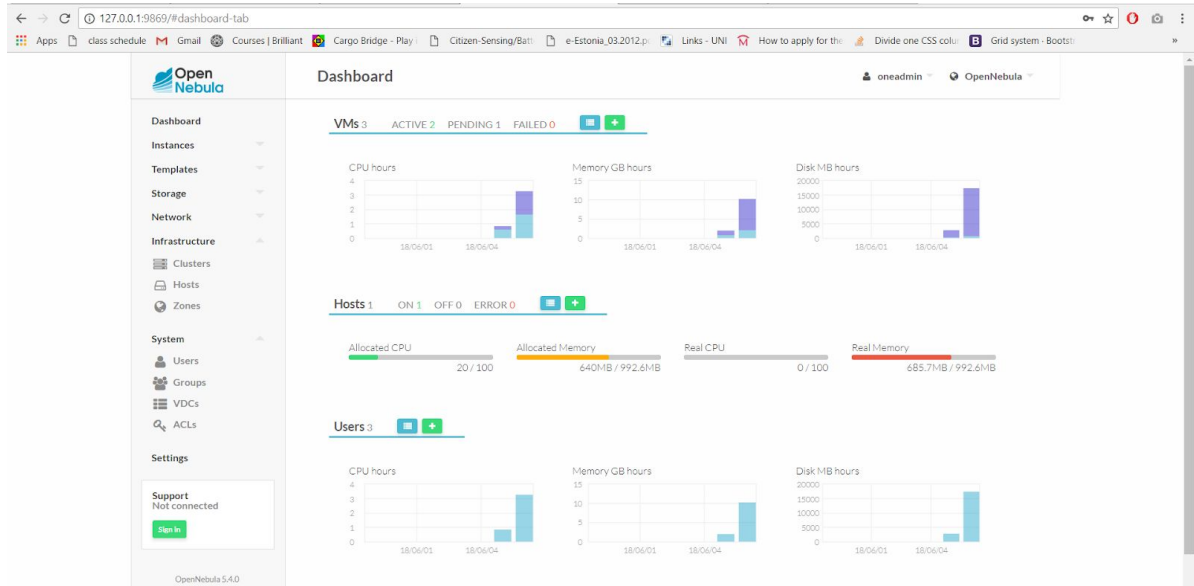
Deployment of OpenNebula:

Installation steps I followed:

1. Install Virtual Machine (VM) in my machine
2. Download the virtual appliance
3. Import Sandbox OVA file in VM
4. In browser, access the OpenNebula platform by <http://127.0.0.1:9869/>

Deployment steps:

1. Dashboard



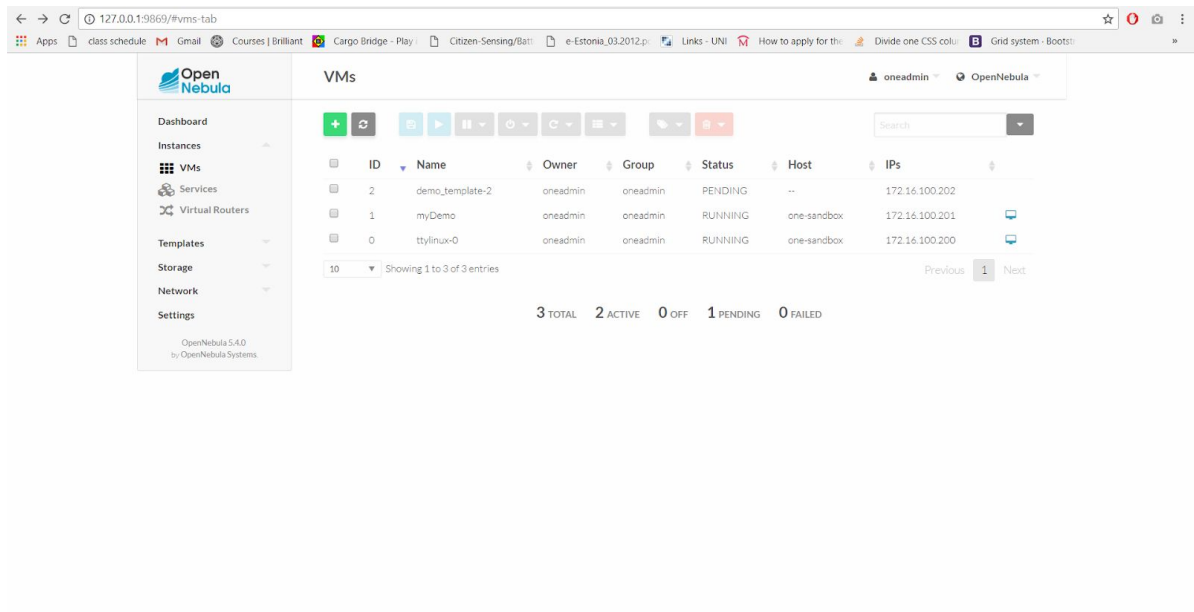
2. Create Virtual Machine (VM) in OpenNebula Platform:

The screenshot shows the 'Create VM Template' form in the OpenNebula platform. The form is divided into several tabs: General, Storage, Network, OS Booting, Input/Output, Context, Hybrid, VM Group, and Other. The 'General' tab is active, showing the following fields:

- Name:** demo_template
- Description:** It is a demo template for my project
- Memory @:** 512 MB
- Memory modification @:** any value
- CPU @:** 1
- CPU modification @:** any value
- Cost:** 0.00 user-hours
- VCPUs @:** 1
- VCPUs modification @:** any value
- Cost:** Total: 0.00 user-hours

The form also includes a 'Wizard' section with a 'Penguin' logo and a 'Create' button.

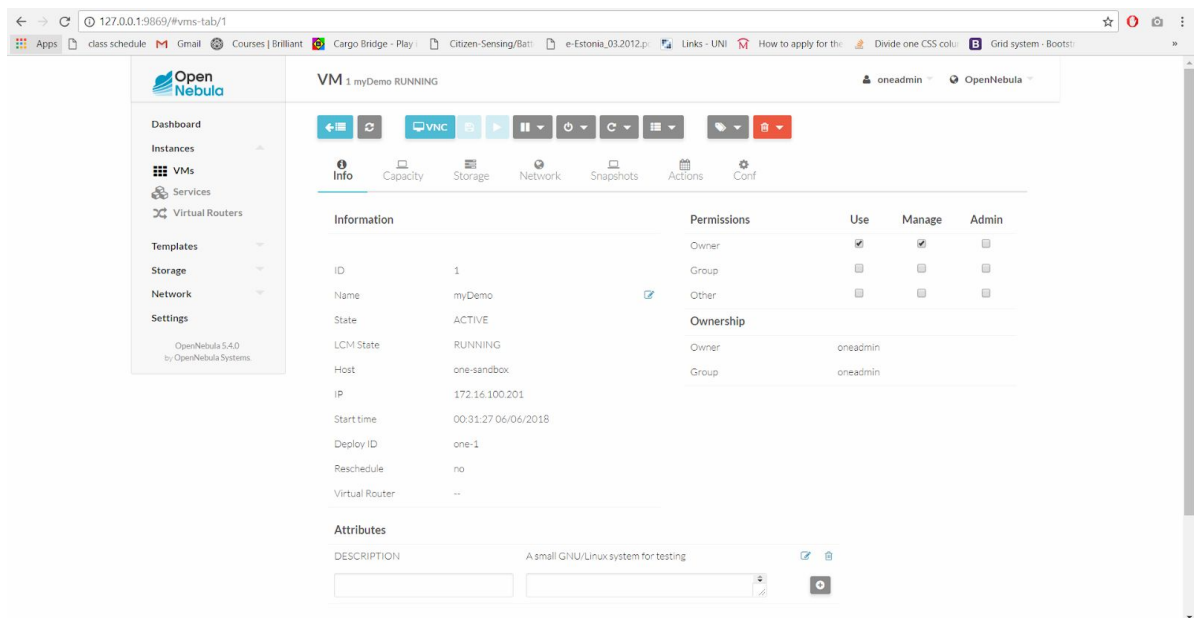
2.1. Create VM Template Infrastructure:



The screenshot shows the OpenNebula web interface. The left sidebar contains navigation options: Dashboard, Instances, VMs, Services, Virtual Routers, Templates, Storage, Network, and Settings. The main content area is titled 'VMs' and displays a table of VM instances. Below the table, there is a summary: 3 TOTAL, 2 ACTIVE, 0 OFF, 1 PENDING, 0 FAILED.

ID	Name	Owner	Group	Status	Host	IPs
2	demo_template-2	oneadmin	oneadmin	PENDING	--	172.16.100.202
1	myDemo	oneadmin	oneadmin	RUNNING	one-sandbox	172.16.100.201
0	ttylinux-0	oneadmin	oneadmin	RUNNING	one-sandbox	172.16.100.200

2.2 Setting up attributes for VM:



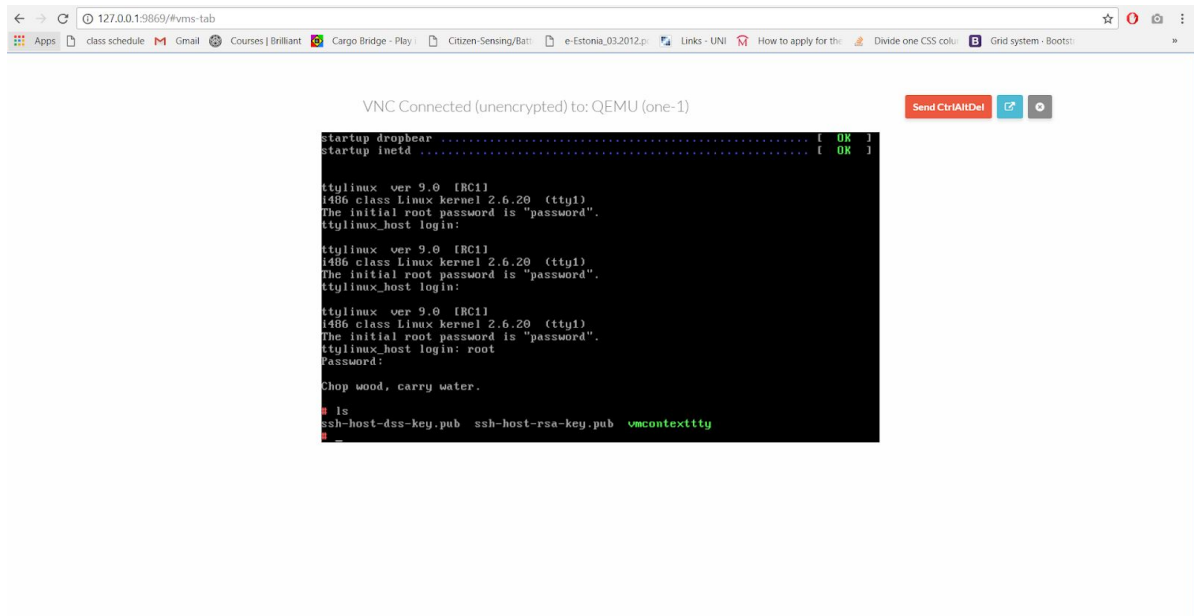
The screenshot shows the OpenNebula web interface for a specific VM instance named 'myDemo'. The page is titled 'VM 1 myDemo RUNNING'. It features a navigation bar with tabs for Info, Capacity, Storage, Network, Snapshots, Actions, and Conf. The 'Info' tab is selected, showing a table of VM information and a section for attributes.

Information	Permissions	Use	Manage	Admin
ID	Owner	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Name	Group	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
State	Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LCM.State	Ownership			
Host	Owner	oneadmin		
IP	Group	oneadmin		
Start time				
Deploy ID				
Reschedule				
Virtual Router				

Attributes

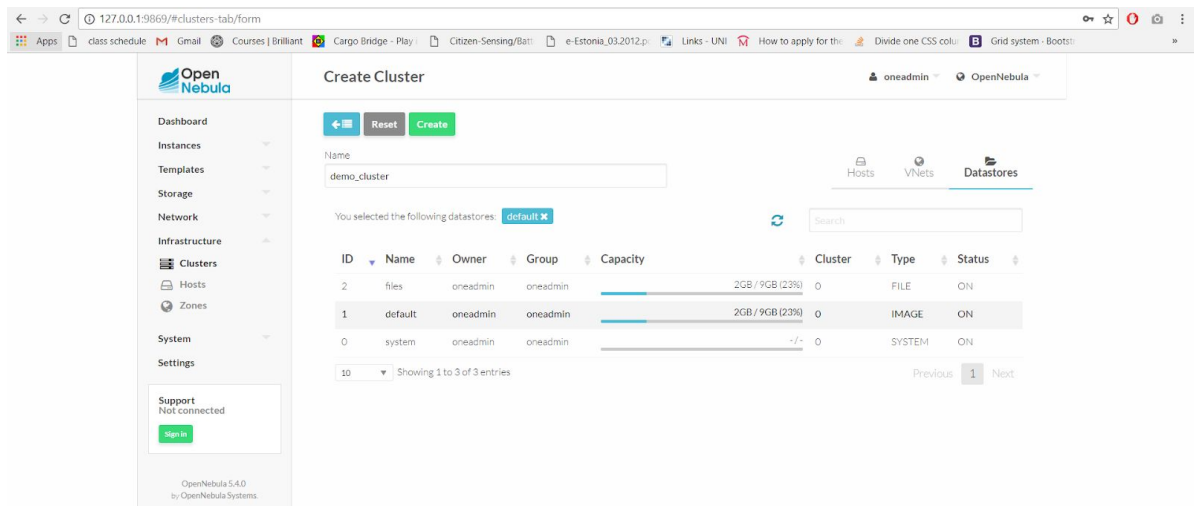
DESCRIPTION	Value
A small GNU/Linux system for testing	

2.3 Run the VM in CLI command:



The VM can also be run from the web interface.

3. Create Cluster:



4. Create Virtualized Data Center (VDC):

The screenshot shows the OpenNebula web interface for configuring a group. The browser address bar shows the URL `127.0.0.1:9869/#groups-tab/1`. The page title is "Group 1 users". The left sidebar contains navigation options: Dashboard, Instances, Templates, Storage, Network, Infrastructure (Clusters, Hosts, Zones), System (Users, Groups, VDCs, ACLs), and Settings. A "Support Not connected" notification is visible in the sidebar. The main content area has tabs for "Info", "Users", "Quotas", "Accounting", and "Showback". The "Users" tab is active, displaying a table with columns: ID, Name, Group, Auth driver, VMs, Memory, and CPU. A search bar and "Edit administrators" button are at the top right. The table contains one entry with ID 2, Name malha, Group users, and Auth driver core. The bottom of the page shows "OpenNebula 5.4.0 by OpenNebula Systems".

ID	Name	Group	Auth driver	VMs	Memory	CPU
2	malha	users	core		0/-	0KB/- 0/-

4.1 Setting up VDC attributes:

The screenshot shows the OpenNebula web interface for configuring a group. The browser address bar shows the URL `127.0.0.1:9869/#groups-tab/100`. The page title is "Group 100 demo_group". The left sidebar is identical to the previous screenshot. The main content area has tabs for "Info", "Users", "Quotas", "Accounting", and "Showback". The "Users" tab is active, displaying a table with columns: ID, Name, Group, Auth driver, VMs, Memory, and CPU. A search bar and "Edit administrators" button are at the top right. The table contains one entry with ID 2, Name malha, Group demo_group, and Auth driver core. The bottom of the page shows "Users marked with ★ are administrators".

ID	Name	Group	Auth driver	VMs	Memory	CPU
2	malha	demo_group	core		0/-	0KB/- 0/-