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Vagrant Web User Guide

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Chapter 1: What is Vagrant Web?

1.1 Introduction

Vagrant Web is an open source web application aimed to manage physical and virtual infrastructures that uses Vagrant and the plugin Vagrant-Node as the wrapper for native virtual tools like VirtualBox or VMWare.

1.1.1 Vagrant-Node

This plugin allows a computer, configured with Vagrant, to be controlled and managed remotely.

With this plugin, the Vagrant environment can perform requests commanded by remote computers. This service is provided through a REST API that this plugin exposes.

1.2 What can I do with Vagrant Web?

Vagrant Web represents a centralized place to manage and configure all systems that run Vagrant and Vagrant-Node. Among other features, the web application includes the following:

1. CHAPTER 1: WHAT IS VAGRANT WEB?

- **Nodes and Virtual Machines.** Nodes represent each physical machine that acts as the virtualization server. Each node can hold virtual machines. With Vagrant Web you can:
 - add and remove nodes dynamically
 - add and remove virtual machines
 - change node and virtual machine configuration
 - run, pause and stop virtual machines remotely
- **Roles and Users.** Vagrant Web implements a customizable fine grain Role Based Access Control (RBAC) that allows you to configure a fully privilege user access environment. Among other functionalities, you can:
 - Create/Delete roles
 - Assign page access and operations to role
 - Role inheritance
 - Create/Delete users
 - Assign roles to users
- **Virtual Machine Groups.** In this terminology, a *Group* is a set of virtual machines that can be manage as a whole. This feature will be discussed in a later section, but you will be able to:
 - Create/Delete groups
 - Assign virtual machines to groups
 - Assign users to groups
 - Set an order or priority in each virtual machine of the group to perform operations in order.

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Chapter 2: Installation

2.1 Dependencies

Vagrant Web depends on the following libraries:

- Apache
- MySql
- PHP (version ≥ 5.4)
- CURL
- PHP libraries for MySql and Curl

2.2 Installation on Ubuntu 14.04

To perform the installation on an Ubuntu distro, just execute the following command:

```
sudo apt-get install mysql-server libmysqld-dev apache2  
php5 php5-mysql php5-curl curl
```

Once installed, you have to configure the next folder rights (It is supposed that the Apache user is 'www-data'. If not, change the user):

2. CHAPTER 2: INSTALLATION

```
chgrp -R www-data /var/www/html/vagrantweb/  
chmod -R g+w /var/www/html/vagrantweb/assets/  
chmod -R g+w /var/www/html/vagrantweb/protected/runtime/  
chmod -R g+w /var/www/html/vagrantweb/protected/config/
```

After the previous steps you can access with your browser to <http://127.0.0.1/vagrantweb/>. If this is your first installation, the browser will redirect you to the installation page to set the database.

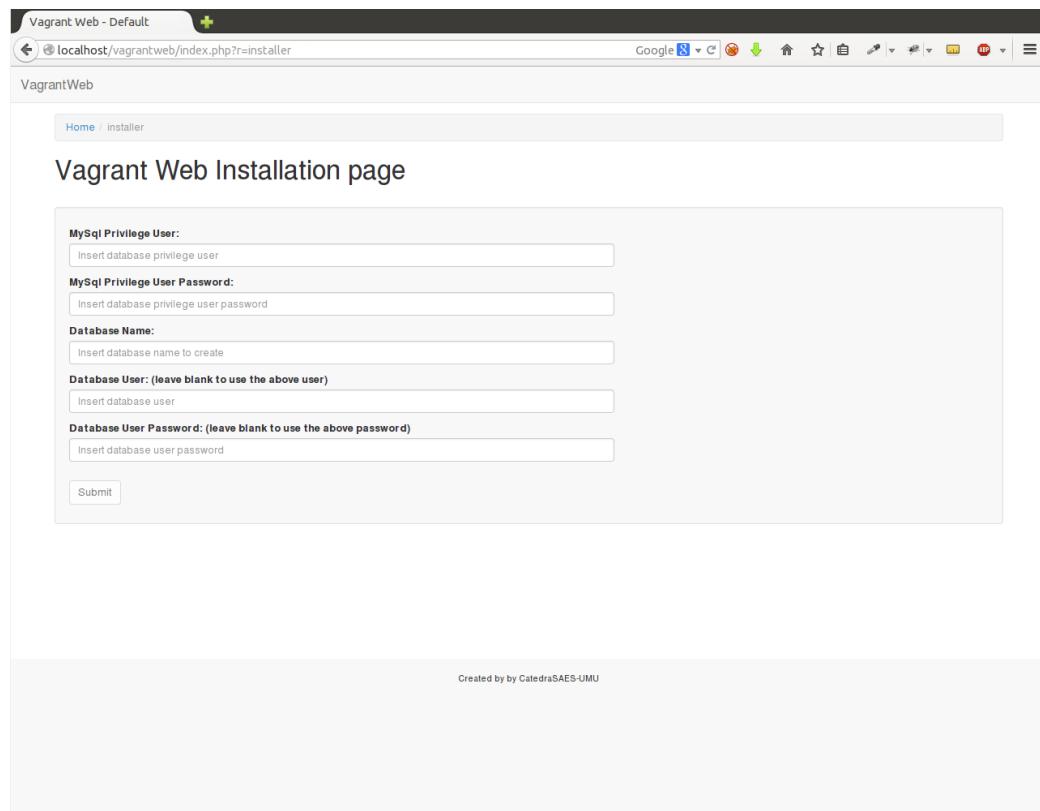


Figura 2.1: Vagrant Web. Installation Page

There is no need to create the database first. This page will set all the database requirements for you. You have to set these fields:

- **Privileged user.** This is the super user of MySql. Because the installation will create and populate the database, and also may create a restricted user for that database, this user is required.
- **Privileged User Password.** Password of the previous user.

2. CHAPTER 2: INSTALLATION

- *Database Name*. Name of the database that you want to assign. There is no restriction about the name.
- *Database User (optional)*. If you don't want to access the database with the super user, the installation can create a user with granted privileges to that database.
- *Database User Password (optional)*. Password for the previous user.

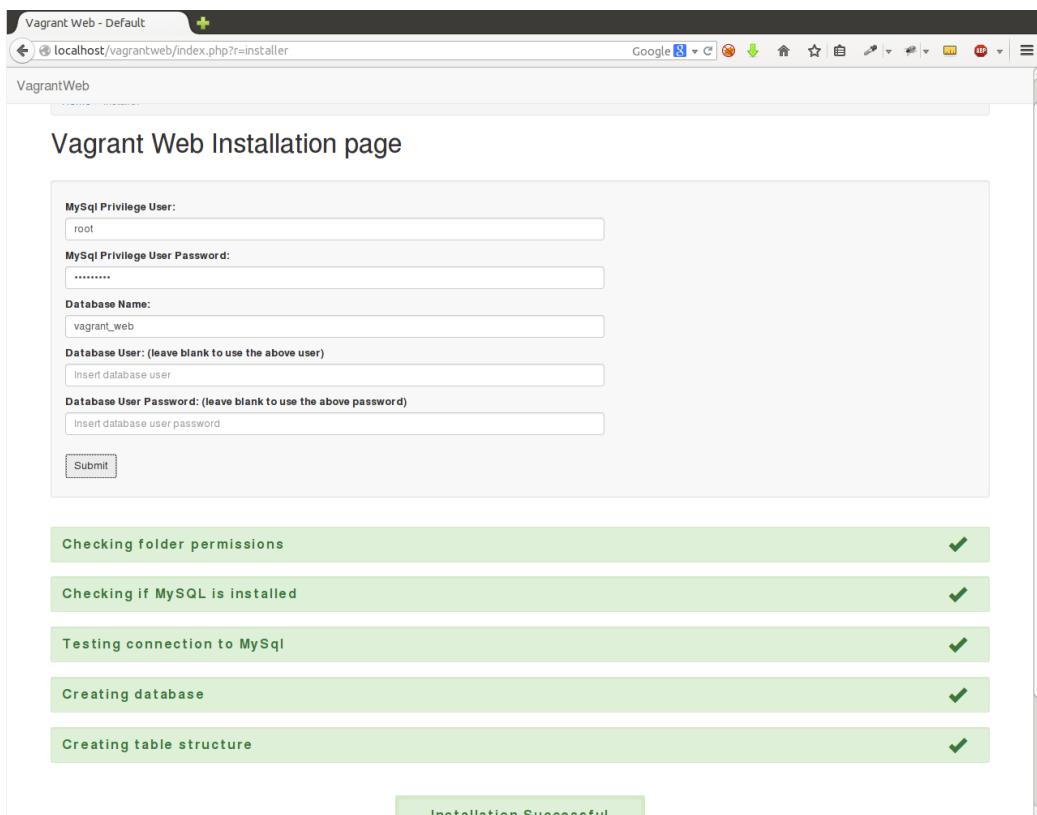


Figura 2.2: Vagrant Web. Installation Finished

After the database creation, the browser will redirect you to the login page. The default credentials are:

- User: **admin**
- Password: **catedrasae\$**

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Chapter 3: Dashboard

TODO

4

Chapter 4: Nodes and Virtual Machines

As mention above, a node represent a physical machine that acts as the virtualization server. Each node can host several virtual machines, depending on its hardware configuration. An interesting benefit that provides *Vagrant* is that the node can use different virtualization tools at the same time to manage virtual machines, ie *Virtualbox*, *VmWare*. This is done at the configuration file and can be changed online.

Through this web application you will be able to perform any usual operation on the virtual machines like run, pause, shutdown, take and restore snapshots and so on. Also, you can choose/change the virtual machine hardware configuration, display the node hardware configuration and watch online performance of the node and its resources, like memory or cpu usage.

4.1 Managing Nodes

The main management actions related to nodes can be done throught the *Manage Nodes Page*. You can access this page by clicking on **Nodes** option in the side menu and the clicking on the **Manage Nodes** submenu (Figure 4.1 and Figure 4.2).

In Figure 4.2 there is a numbered list of graphical elements that represents the following:

4. CHAPTER 4: NODES AND VIRTUAL MACHINES

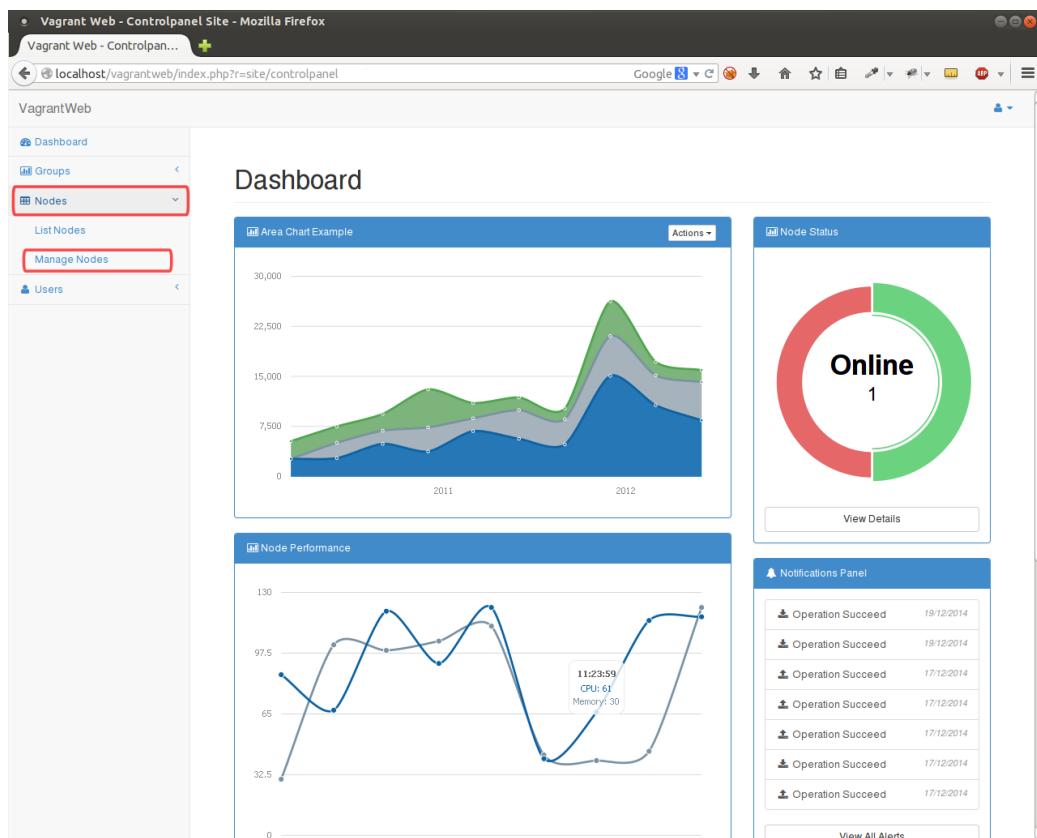


Figura 4.1: Vagrant Web. Accessing the Manage Nodes Page

4. CHAPTER 4: NODES AND VIRTUAL MACHINES

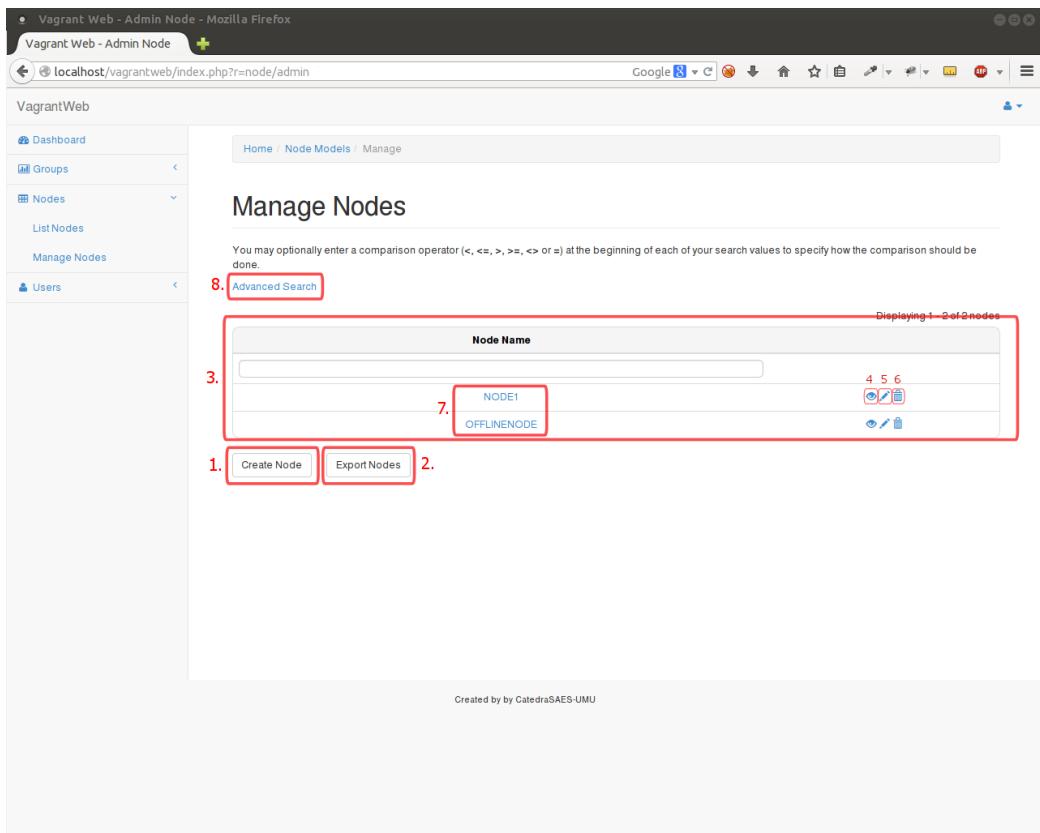


Figura 4.2: Vagrant Web. Manage Nodes Page

4. CHAPTER 4: NODES AND VIRTUAL MACHINES

1. *Create Node.* After clicking this button, the web application will redirect you to a form to fill some information about the node in order to add it to the set of nodes (Section 4.1.1).
2. *Export Nodes.* After clicking this button you will download all the set of nodes in a comma separated text file. This functionality can be very useful if you combine it with the *vagrant node import* command available in the *vagrant-nodemaster* plugin.
3. This table contains a list with all the nodes already configured
4. *View Image.* After clicking this button you will access the *Node View Page* (Clicking on the node name will have the same effect too).
5. *Update Image.* After clicking this button the web application will redirect you to the node network information form.
6. *Delete Button.* If you click this button the node will be deleted.
7. These are the configured nodes. If you click this link the web application will redirect you to the *Node View Page*.
8. *Advance search button.* If your node list is long this button will help you to filter them. After clicking this button the web application will display a search form to configure the search criteria.

4.1.1 Creating Nodes

When you click the *Create Node* button the node creation form is shown (Figure 4.3). The required information to add a node to the set of nodes is:

- **Node Name.** Significant name that helps you to identify the node.
- **Node Address.** Fill this field with the ip or dns address of the node.
- **Node Port.** This port must be the same port configure when you start the server at the node with the command *vagrant nodeserver start* provided by the *vagrant-node* plugin. The default port in this plugin is 3333 that is why it is filled automatically when this form is displayed. If you use a different port just change it.
- **Node Password.** This field represents the password that you set at the node with the *vagrant nodeserver passwd* command provided by the *vagrant-node* plugin.

4. CHAPTER 4: NODES AND VIRTUAL MACHINES

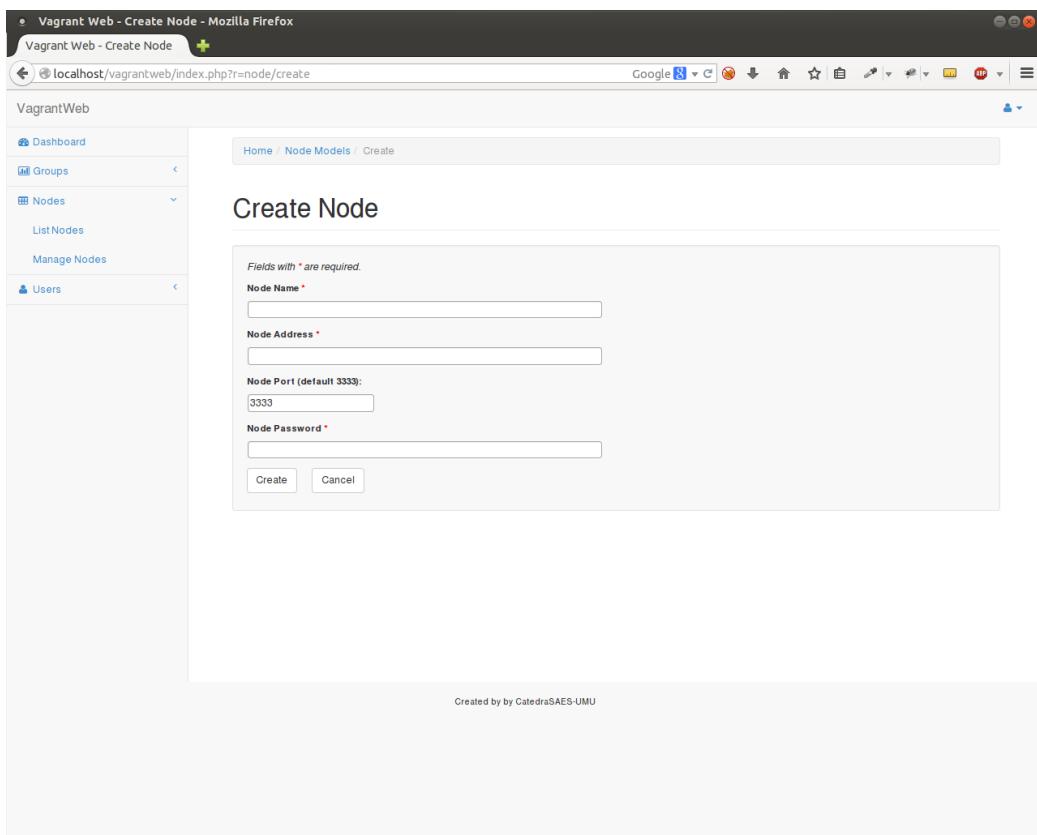


Figura 4.3: Vagrant Web. Node Creation Page

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4.1.2 Working with Nodes

Once you have a node configured, access the *Node View Page*. Remember, you can access this page by clicking on the *View Image Icon* or the node name in the node list table (Figure 4.2). This page displays a lot of information and there is a lot of functionality available, so we will take our time to explain the page (Figures 4.4 and 4.5).

The screenshot shows a Mozilla Firefox browser window titled "Vagrant Web - View Node". The address bar displays "localhost/vagrantweb/index.php?r=node/view&id=NODE1". The main content area is titled "Node: NODE1". It contains the following information:

Node Name	NODE1
Node Address	[REDACTED]
Node Port	3333
Operating System	Ubuntu 12.04.3 LTS
Processor Count	2
Core Count	16
Architecture	amd64
CPU Average	0.19% (1 Minute) 0.1% (5 Minutes) 0.07% (15 Minutes)
Interfaces	eth0: [REDACTED] lo: 127.0.0.1 vmnet8: 192.168.35.1 vmnet8: 172.16.22.1
Memory	5.83 GB (4.71 GB)
Disk Usage	425.32 GB

Below this, there are two buttons: "Change Password" and "Vagrant Config". At the bottom, a table lists three virtual machines:

Virtual Machine	Provider	Status	Actions	Backup	Options
webvm	virtualbox	poweroff	[Icons]	[Icons]	[Icons]
testvm	virtualbox	poweroff	[Icons]	[Icons]	[Icons]
centos	virtualbox	poweroff	[Icons]	[Icons]	[Icons]

A message at the bottom right of the table says "Displaying 1-3 of 3 results." A "Add Virtual Machine" button is located at the bottom left of the table.

Figura 4.4: Vagrant Web. Node View Page (Part I)

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The screenshot shows the Vagrant Web interface for managing nodes. On the left, a sidebar navigation includes Dashboard, Groups, Nodes (selected), Manage Nodes, and Users. The main content area has tabs for Overview, Virtual Machines, and VirtualBox. A prominent 'Add Virtual Machine' button is at the top. Below it is the 'Operation Notification Panel' showing seven successful operations from 17/12/2014. A 'View All Operations' link is available. The 'Displaying 1-5 of 5 results' message is shown above a table of boxes. The table has columns for Box Name, Provider, and Actions. It lists five boxes: centos6.4x32 (virtualbox), precise32 (virtualbox), precise64vmx (vmx), prueba (virtualbox), and prueba1 (virtualbox). An 'Upload Box' button is below the table. At the bottom, there's an 'Upload Progress' section with a table for Source Url, Upload Progress, and Time Remaining, stating 'No results found.'

Box Name	Provider	Actions
centos6.4x32	virtualbox	[actions]
precise32	virtualbox	[actions]
precise64vmx	vmx	[actions]
prueba	virtualbox	[actions]
prueba1	virtualbox	[actions]

Figura 4.5: Vagrant Web. Node View Page (Part II)

4. CHAPTER 4: NODES AND VIRTUAL MACHINES

Node Information

At the top most of the page, the node network information is displayed. This information correspond to the data that you filled when creating the node. Below the node network information, there is a brief description about the node's hardware and its current status. Among other things, you can watch the following:

- *Operating System*
- *Processor Count*
- *Processor's Core Count*
- *Processor's Architecture*
- *CPU Average*. This information changes dynamically and shows the used cpu percentage of use in different periods of time.
- *Network Interfaces*
- *Total and Free Memory*. These values are also dynamic and changes depending on the node status.
- *Total and Free Disk Space*. These dynamic values represent the total amount of disk space available and the free one.

4. CHAPTER 4: NODES AND VIRTUAL MACHINES

The screenshot shows the Vagrant Web interface for viewing a node. The main content area displays the following details for 'Node: NODE1':

Node Name	NODE1
Node Address	[REDACTED]
Node Port	3333

Below this, a large red box highlights the system configuration:

Operating System	Ubuntu 12.04.3 LTS
Processor Count	2
Core Count	16
Architecture	amd64
CPU Average	0.19% (1 Minute) 0.1% (5 Minutes) 0.07% (15 Minutes)
Interfaces	eth0: [REDACTED] lo: 127.0.0.1 vmnet1: 192.168.35.1 vmnet8: 172.16.22.1
Memory	5.83 GB (4.71 GB)
Disk Usage	425.32 GB

At the bottom of this section are two buttons: 'Change Password' and 'Vagrant Config'.

Below the system configuration, a message says 'Displaying 1-3 of 3 results.' followed by a table of virtual machines:

Virtual Machine	Provider	Status	Actions	Backup	Options
webvm	virtualbox	poweroff			
testvm	virtualbox	poweroff			
centos	virtualbox	poweroff			

At the bottom left is a button labeled 'Add Virtual Machine'.

Figura 4.6: Vagrant Web. Node View Page (Node Information)

4. CHAPTER 4: NODES AND VIRTUAL MACHINES

Node Password

From the web application, and once the node is correctly configured, you can change the remote node password and update the current, saved at the web application. To perform this, you have to click on the *Change Node Password* button showed after the node information (Figure 4.7).

The screenshot shows the Vagrant Web interface in Mozilla Firefox. The URL is `localhost/vagrantweb/index.php?r=node/view&id=NODE1`. The main content area displays details for 'Node: NODE1', including its name (NODE1), address (redacted), and port (3333). Below this, system specifications like operating system (Ubuntu 12.04.3 LTS), processor count (2), and memory (5.83 GB) are listed. At the bottom of the node details section, there are two buttons: 'Change Password' (highlighted with a red box) and 'Vagrant Config'. Below this, a table lists three virtual machines: 'webvm' (Provider: virtualbox, Status: poweroff), 'testvm' (Provider: virtualbox, Status: poweroff), and 'centos' (Provider: virtualbox, Status: poweroff). Each VM has a row of icons for actions like power on, backup, and delete.

Figura 4.7: Vagrant Web. Change Node Password Button

After the button is clicked, the web application will redirect you to a form to insert the new password (Figure 4.8).

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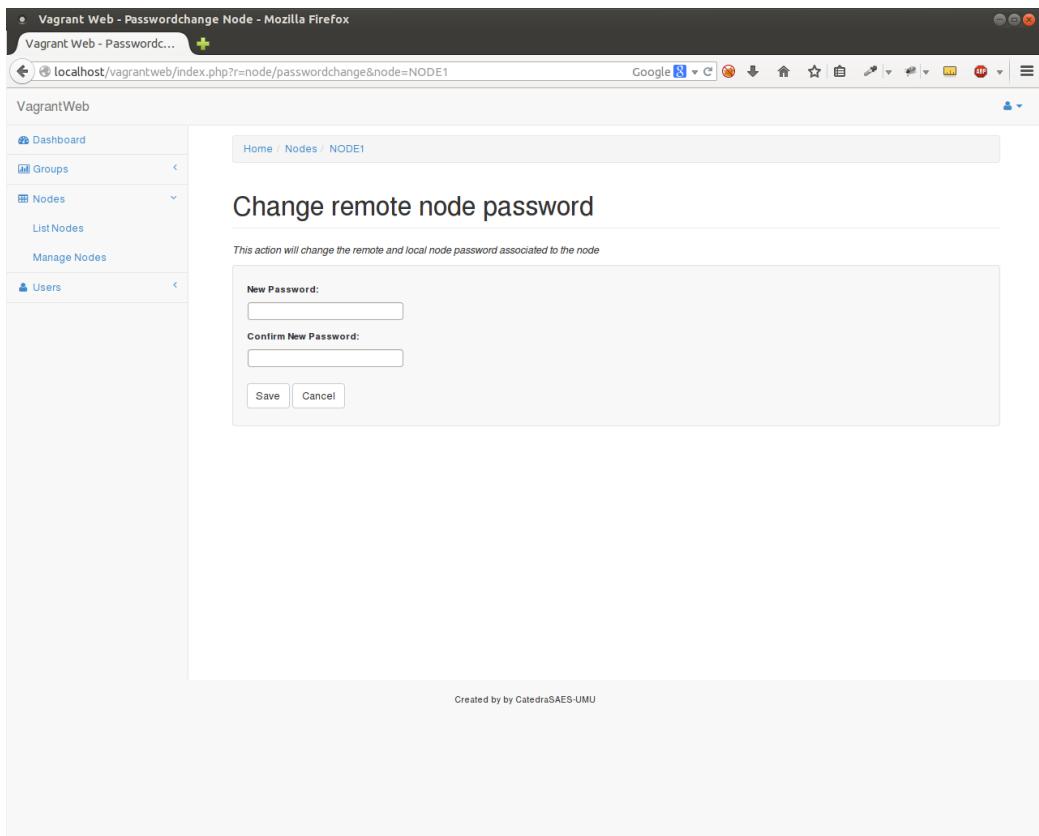


Figura 4.8: Vagrant Web. Updating local and remote node password

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Node configuration file

The next functionality to review is the possibility to display and change the remote config file (native *Vagrant* config file). First of all, in order to view the config file, click on the *Vagrant Config* button (Figure 4.9).

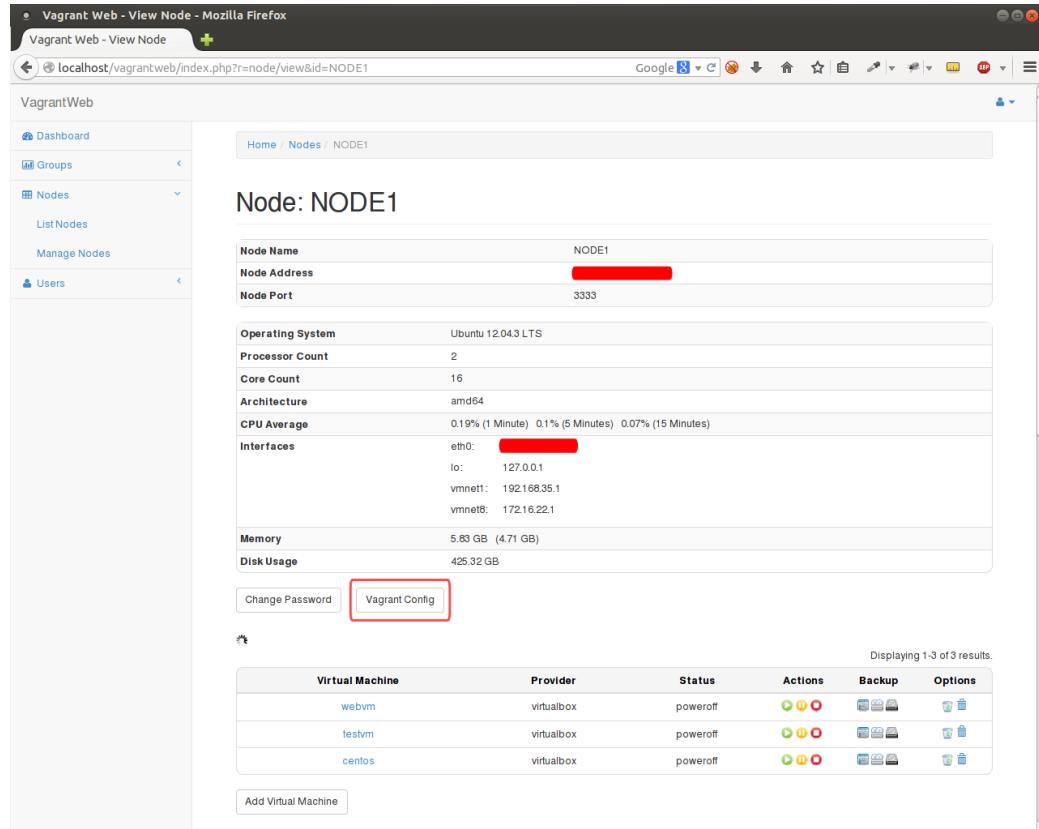


Figura 4.9: Vagrant Web. Displaying Node's Vagrant configuration file

Right now, the web application should show you the remote config file (Figure 4.10). This file is highlighted according to Ruby syntax (programming language used by *Vagrant*). From here you are also able to edit this config and add, delete or modify virtual machines (don't worry there is a guided procedure to achieve this. You won't have to access this file if you don't want to but you should familiarize with Ruby and Vagrant syntax to have a complete knowledge about this technology).

The procedure to access the config file is very simple, just click on the *Edit Config* button to tell the web application to show you an editable text box (Figure 4.11). When you are finished click on the *Save* button in the same

4. CHAPTER 4: NODES AND VIRTUAL MACHINES

page of the editable text box.

The screenshot shows a web browser window titled "Vagrant Web - Showconfig Node - Mozilla Firefox". The URL is "localhost/vagrant/web/index.php?r=node/showconfig&node=NODE1". The page displays the "Node1 Configuration File" with the following Vagrant configuration code:

```
1. Vagrant.configure("2") do |config|
2.   config.vm.define(:web) do |web_config|
3.     web_config.vm.box = "precise32"
4.     web_config.vm.hostname = "precise"
5.     web_config.vm.network(:public_network, :bridge => "eth0")
6.   end
7.   config.vm.define(:testvm) do |nueva_config|
8.     nueva_config.vm.box = "precise32"
9.     nueva_config.vm.hostname = "nuevabrunco"
10.    nueva_config.vm.network(:public_network, :bridge => "eth0")
11.  end
12.  config.vm.define(:centos) do |nueva_config|
13.    nueva_config.vm.box = "centos6.4x32"
14.    nueva_config.vm.hostname = "nueva"
15.    nueva_config.vm.network(:public_network, :bridge => "eth0")
16.  end
17. end
18.
```

At the bottom of the configuration area, there are two buttons: "Edit Config" and "Cancel".

Figura 4.10: Vagrant Web. Displaying Node's Vagrant configuration file

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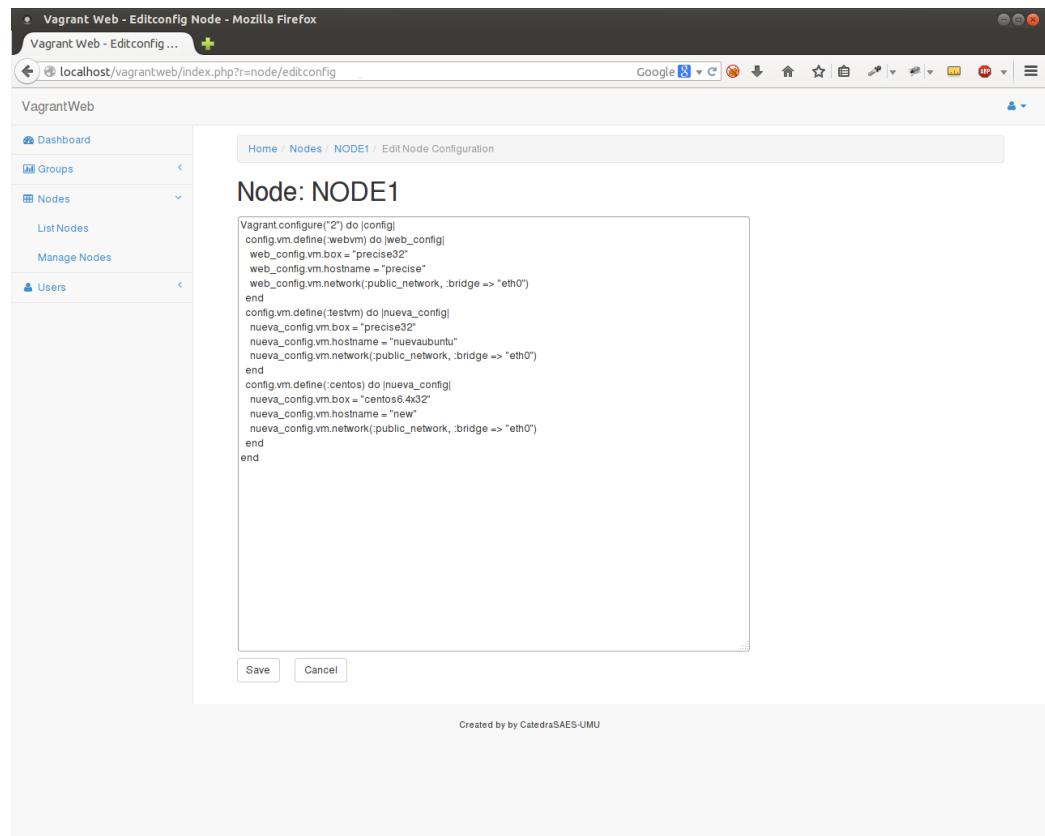


Figura 4.11: Vagrant Web. Modifying Node's Vagrant configuration file

4.1.3 Working with Virtual Machines

At this point, all the information and functionality shown is focused mainly to interact and configure the node. From now, you will read how to manage virtual machines at the node and work with them.

Boxes

Before writing about virtual machines there is a very important concept that must be clear to you. *Vagrant* uses a resource called **Box**. A **Box** is the foundation of every virtual machine and represents a base image of an operating system. Each virtual machine will use a box to construct itself. If you want to know more about **Vagrant Boxes** access the official *Vagrant* guide.

The *Boxes list* is located at the bottom of the Node View Page (Figure 4.12). This list displays a brief description of each box resource **stored at the remote node**.

- *Box Name*. The significant name of the box. It should be as representative as possible to help you identify it.
- *Box Provider*. Each box is built to work with a virtualization tool. This field shows the selected one.
- *Delete Icon*. If this icon is clicked the box will be removed from the list and also from the hard disk.

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The screenshot shows a Mozilla Firefox browser window titled "Vagrant Web - View Node". The address bar displays "localhost/vagrantweb/index.php?r=node/view&id=NODE1". The page content is organized into several sections:

- Left Sidebar:** A navigation menu with options like Dashboard, Groups, Nodes (selected), Manage Nodes, and Users.
- Header:** Buttons for "Add Virtual Machine", "Operation Notification Panel", and "View All Operations".
- Operation Notification Panel:** A table listing successful operations from 17/12/2014 to 19/12/2014.
- Box List:** A table titled "Displaying 1-5 of 5 results." showing five virtual machine configurations. The first four rows are highlighted with a red border.

Box Name	Provider	Actions
centos6.4x32	virtualbox	[Edit]
precise32	virtualbox	[Edit]
precise4vmx	vmx	[Edit]
prueba	virtualbox	[Edit]
pruebat	virtualbox	[Edit]
- Upload Box:** A button to upload a new virtual machine configuration.
- Upload Progress:** A table showing the status of uploaded boxes, indicating "No results found."

Figura 4.12: Vagrant Web. Boxes display at Node View Page

4. CHAPTER 4: NODES AND VIRTUAL MACHINES

But, how can you upload a box to the node?. In the current release of the web application, in order to upload a box to a remote node it must be accessible using a web server or shared by SMB. In order to start the upload, click the *Upload* button placed below the box list to show the upload dialog (Figure 4.13).

The fields to filled in this dialog are the following:

- *Box Name.* Significant Name that you want to assign to the box.
- *HTTP URL.* If the box is accessible through a web server, insert here the URL.
- *Shared folder.* If the box is inside a shared folder, insert here the whole SMB route.

There are two **important** things that you must keep in mind:

- The route chosen must lead to a **.box** file
- The route chosen is sent to the node. Then, the node uses that route to download the box file. Be careful using **localhost** routes because it could point to different places.

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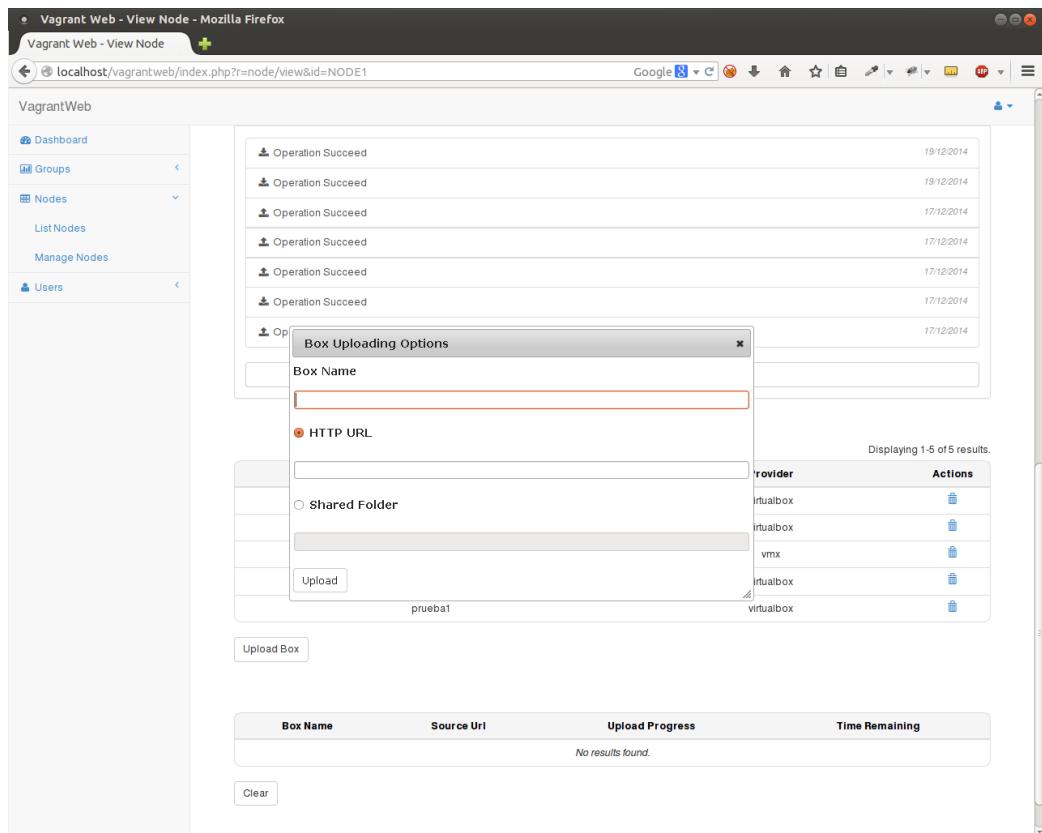


Figura 4.13: Vagrant Web. Upload box dialog

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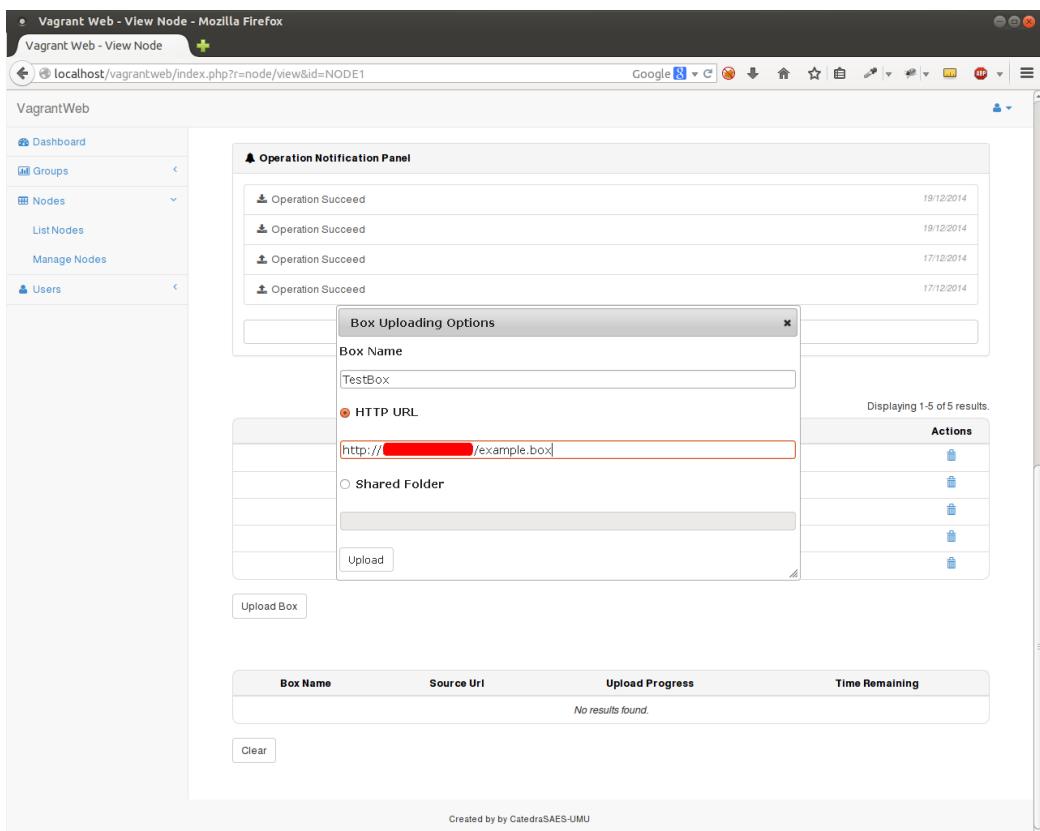


Figura 4.14: Vagrant Web. Filling Upload box dialog

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As you can see in Figure 4.15 when the upload process starts, the web application shows, at the bottom of the current page, a dynamic progress indicator. If the upload process succeed the row will be removed from the table and an entry will be added to the *Boxes list*, otherwise the row will remain and change its status to *Error*.

The screenshot shows the Vagrant Web interface in Mozilla Firefox. The left sidebar has links for Dashboard, Groups, Nodes (selected), List Nodes, Manage Nodes, and Users. The main area displays a table of operations:

Operation	Date
Operation Succeed	19/12/2014
Operation Succeed	17/12/2014

A "View All Operations" button is below the table. Below the operations table is a table of existing boxes:

Box Name	Provider	Actions
centos6.4x32	virtualbox	[Edit]
precise32	virtualbox	[Edit]
precise64vmx	vmx	[Edit]
prueba	virtualbox	[Edit]
prueba1	virtualbox	[Edit]

An "Upload Box" button is located below the box table. At the bottom, a progress bar indicates the upload of a box named "TestBox" from "http://[REDACTED]/example.box". The progress is 35% complete with 0:00:17 remaining.

Figura 4.15: Vagrant Web. Upload box progress

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The screenshot shows the Vagrant Web interface in Mozilla Firefox. The title bar reads "Vagrant Web - View Node - Mozilla Firefox". The address bar shows "localhost/vagrantweb/index.php?r=node/view&id=NODE1". The main content area has a sidebar with "Dashboard", "Groups", "Nodes" (selected), "List Nodes", "Manage Nodes", and "Users". A central panel displays an "Operation Notification Panel" with three "Operation Succeed" entries from 19/12/2014, 19/12/2014, and 17/12/2014. Below it is a "View All Operations" button. The main table lists boxes with columns: Box Name, Provider, and Actions. The first two rows, "TestBox" and "centos6.4x32", are highlighted with a red rectangle. The table shows 6 results. At the bottom, there's an "Upload Box" button and a section for uploaded boxes with a "Clear" button.

Box Name	Provider	Actions
TestBox	virtualbox	[Edit]
centos6.4x32	virtualbox	[Edit]
precise32	virtualbox	[Edit]
precise64vmx	vmx	[Edit]
prueba	virtualbox	[Edit]
prueba1	virtualbox	[Edit]

Figura 4.16: Vagrant Web. Box Uploaded Successfully

4. CHAPTER 4: NODES AND VIRTUAL MACHINES

Configuring Virtual Machines

In this section you will read how to create and delete virtual machines to the remote node and how this changes affect the *Vagrant configuration file*. In the *Node View Page*, right below the node information and above the *Boxes List* you can find the *Virtual Machine table* (Figure 4.17). Each table row represents a configured virtual machine (we are not going to deepen in the information displayed right now, you will see in a latter section).

The screenshot shows the Vagrant Web interface in Mozilla Firefox. The title bar says "Vagrant Web - View Node - Mozilla Firefox". The URL in the address bar is "localhost/vagrantweb/index.php?n=node/view&id=NODE1". On the left, there's a sidebar with "Dashboard", "Groups", "Nodes" (selected), "List Nodes", "Manage Nodes", and "Users". The main content area has sections for "Core Count" (16), "Architecture" (amd64), "CPU Average" (0.04% (1 Minute) 0.03% (5 Minutes) 0.05% (15 Minutes)), and "Interfaces" (eth0: 127.0.0.1, lo: 127.0.0.1, vmnet1: 192.168.35.1, vmnet8: 172.16.22.1). Below that are "Memory" (5.83 GB (3.77 GB)) and "Disk Usage" (425.49 GB). At the bottom of this section are "Change Password" and "Vagrant Config" buttons. A red box highlights the "Virtual Machine" table. The table has columns: Virtual Machine, Provider, Status, Actions, Backup, and Options. It lists three rows: "webvm" (Provider: virtualbox, Status: poweroff), "testvm" (Provider: virtualbox, Status: poweroff), and "centos" (Provider: virtualbox, Status: poweroff). Each row has a set of icons for actions like power on, snapshot, and delete. Below the table is a button "Add Virtual Machine". To the right of the table, it says "Displaying 1-3 of 3 results.". At the bottom, there's an "Operation Notification Panel" with three entries: "Operation Succeed" (19/12/2014), "Operation Succeed" (19/12/2014), and "Operation Succeed" (17/12/2014). A "View All Operations" button is at the bottom of this panel. At the very bottom right, it says "Displaying 1-6 of 6 results."

Figura 4.17: Vagrant Web. Virtual Machine Table

Let's start creating a new virtual machine. Click on the *Add Virtual Machine* button (Figure 4.18) to open the creation dialog. The first screen of this dialog (Figure 4.19) has the following information:

- *Name*. This name will be used to identify the virtual machine in the web application.

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- *Box*. This component shows a list of available boxes that have been previously uploaded to the remote node.
- *Hostname*. This data will be used to change the hostname in the virtual machine operating system.
- *Network Type*. Select the network interface and the type of network to configure.
- *GUI*. If you check this option the virtual machine will open a window when the virtual machine boots.

The screenshot shows the Vagrant Web interface running in Mozilla Firefox. The URL is `localhost/vagrant/web/index.php?r=node/view&id=NODE1`. The interface has a sidebar with 'Dashboard', 'Groups', 'Nodes' (selected), 'List Nodes', 'Manage Nodes', and 'Users'. The main content area shows a summary for 'NODE1':
- IP: 172.16.22.1
- Memory: 5.63 GB (4.02 GB)
- Disk Usage: 425.53 GB
Buttons: Change Password, Vagrant Config.
A table titled 'Virtual Machine' lists three entries:

Virtual Machine	Provider	Status	Actions	Backup	Options
webvm	virtualbox	poweroff	[Icons]	[Icons]	[Icons]
testvm	virtualbox	poweroff	[Icons]	[Icons]	[Icons]
centos	virtualbox	poweroff	[Icons]	[Icons]	[Icons]

A red box highlights the 'Add Virtual Machine' button.
Below this is an 'Operation Notification Panel' showing three successful operations:

Operation Succeed	19/12/2014
Operation Succeed	19/12/2014
Operation Succeed	17/12/2014

A second table titled 'Box Name' lists three boxes:

Box Name	Provider	Actions
TestBox	virtualbox	[Icons]
centos6.4x32	virtualbox	[Icons]
precise32	virtualbox	[Icons]

Figura 4.18: Vagrant Web. Virtual Machine creation

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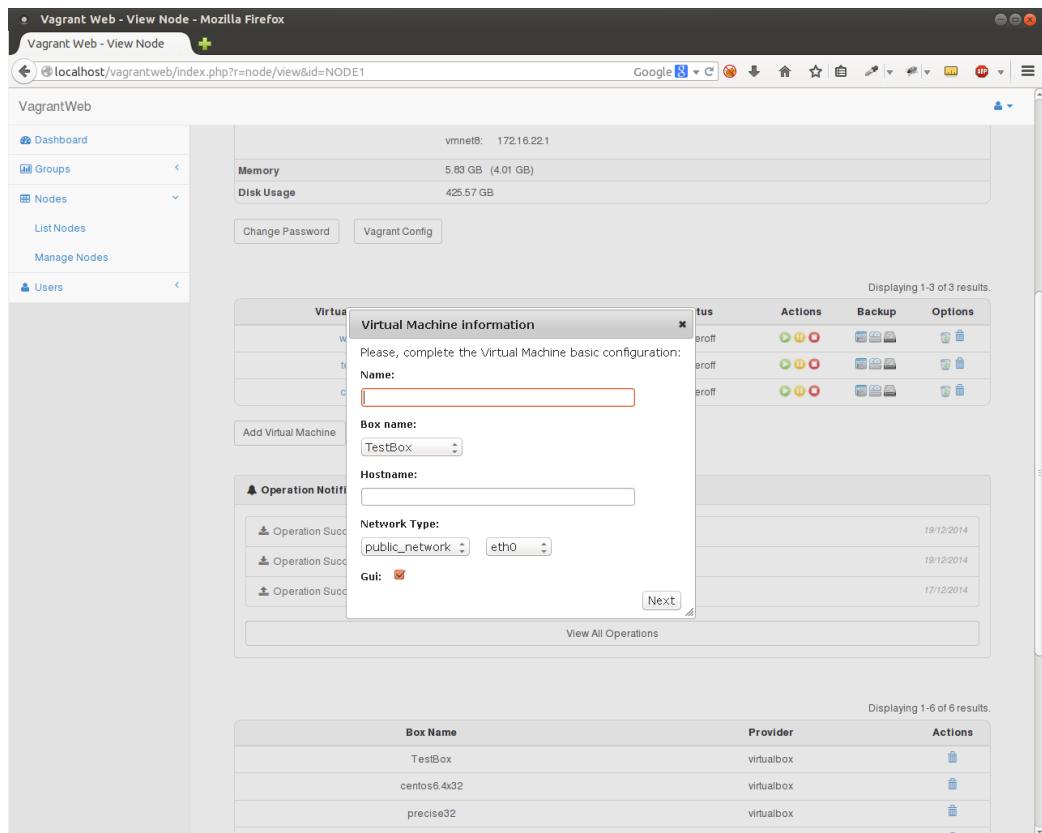


Figura 4.19: Vagrant Web. Virtual Machine creation. Step One

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When this information is filled, click the *Next* button. The second screen of this dialog, Figure 4.20, shows the piece of code that will be inserted into the node configuration file. You can also change this code to add any option that the creation dialog doesn't support yet. When you are finished click the *Finish* button to send the modification to the node.

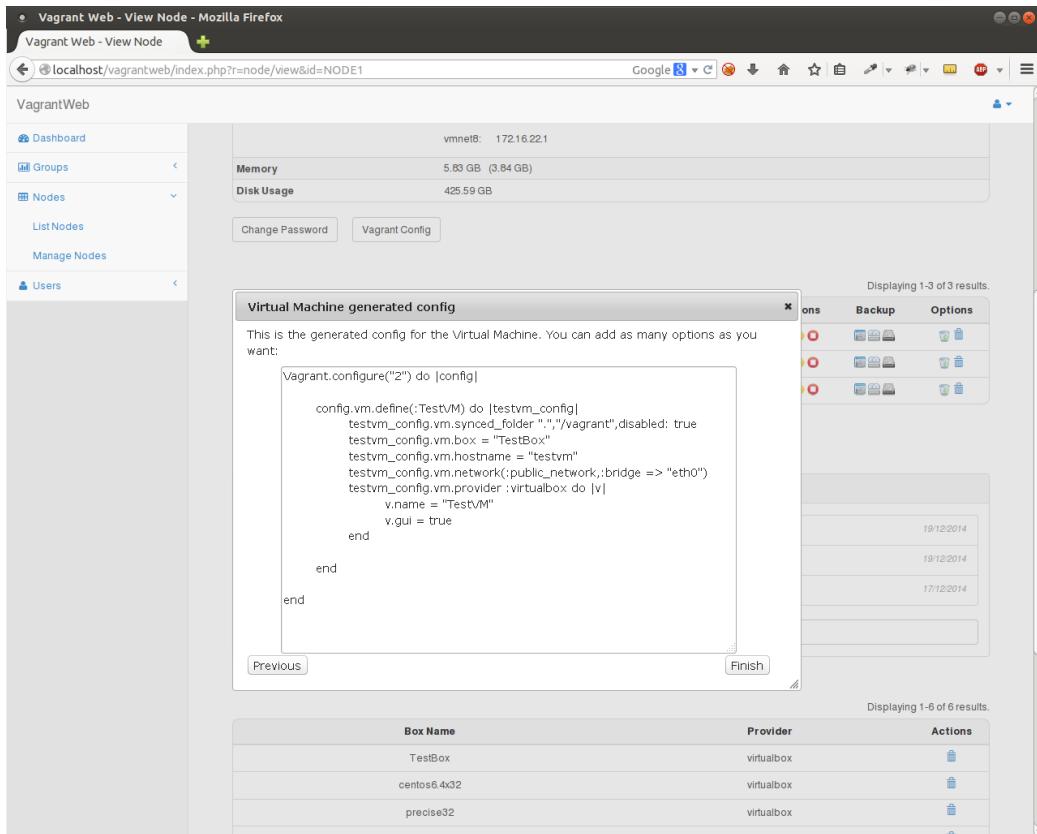


Figura 4.20: Vagrant Web. Virtual Machine creation. Step Two

If you look now to the *Virtual Machine table* there is a new entry that represents the new machine that has been created (Figure 4.21). Let's take a look at the node config file, Section 4.1.2, to see the changes (Figure 4.22).

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The screenshot shows the Vagrant Web interface in Mozilla Firefox. The URL is `localhost/vagrantweb/index.php?r=node/view&id=NODE1`. The main content area displays a summary of the node's resources: Memory (5.83 GB / 3.8 GB) and Disk Usage (425.59 GB). Below this is a table of existing virtual machines:

Virtual Machine	Provider	Status	Actions	Backup	Options
wevnm	virtualbox	poweroff			
testvm	virtualbox	poweroff			
centos	virtualbox	poweroff			
TestVM	virtualbox	not created			

A red box highlights the 'TestVM' row. Below the table is a button labeled 'Add Virtual Machine'. To the right, there is an 'Operation Notification Panel' showing three successful operations from 17/12/2014 to 19/12/2014. At the bottom, another table lists boxes and their providers:

Box Name	Provider	Actions
TestBox	virtualbox	
centos6.4x32	virtualbox	

Figura 4.21: Vagrant Web. New virtual machine created at the node

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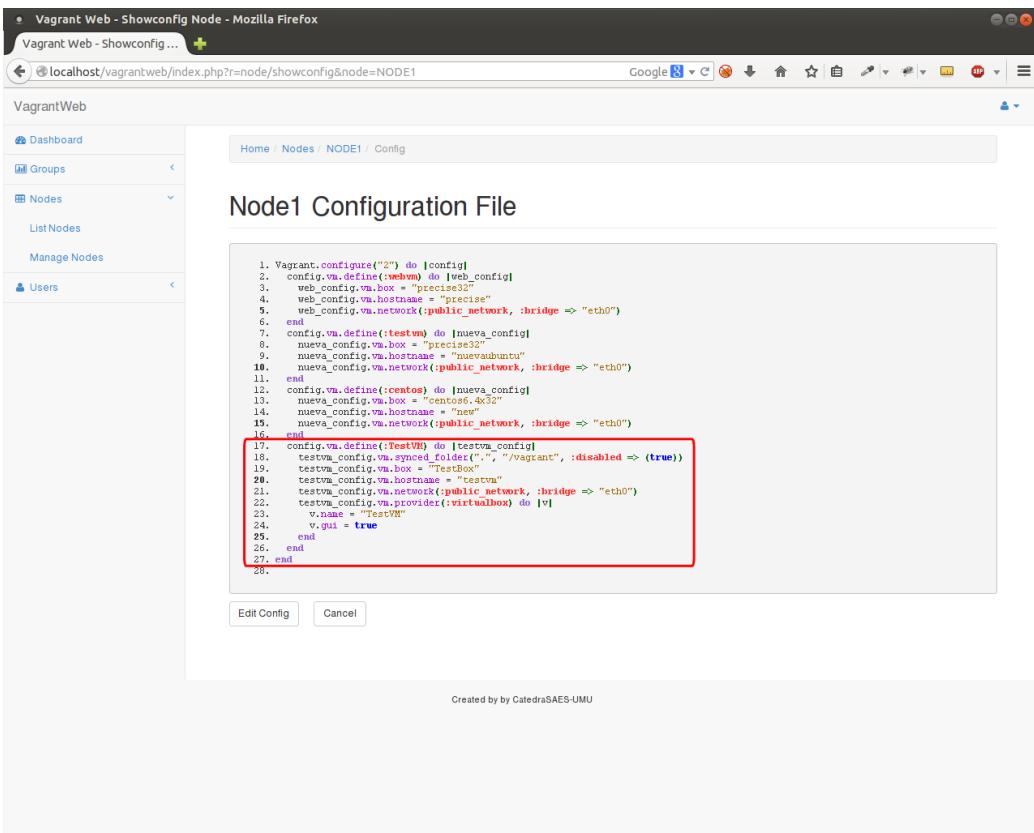


Figura 4.22: Vagrant Web. Node configuration file after creation

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As depicted in Figure 4.22, the code that the web application generated with the dialog, is inserted at the end of the node configuration file.

There is one important thing that you must notice. At Section 4.1.2 you viewed how the `vagrant config` file shows. In that file there isn't much information related to the virtual machine hardware configuration so, what is the default virtual machine configuration? The answer is that when you create a new virtual machine, the default configuration is based on its *Box file*. However, you can modify any parameter through the config file. If you want to learn more about how to modify the *Vagrant Config file*, in [this link](#) you can see how to modify these parameters when you run virtual machines over Virtual Box. Besides, if you want to display the complete virtual machine hardware configuration, click on the virtual machine name at the virtual machine table (Figure 4.23 and Figure 4.24).

The screenshot shows the Vagrant Web interface running in Mozilla Firefox. The URL is `localhost/vagrantweb/index.php?r=node/view&id=NODE1`. The interface has a sidebar with 'Dashboard', 'Groups', 'Nodes' (selected), 'List Nodes', 'Manage Nodes', and 'Users'. The main content area shows hardware details for 'wevbm':
- Network: vmnet8 - 172.16.22.1
- Memory: 5.83 GB (3.97 GB)
- Disk Usage: 425.72 GB
Below this are 'Change Password' and 'Vagrant Config' buttons. A table titled 'Virtual Machine' lists four entries:

Virtual Machine	Provider	Status	Actions	Backup	Options
wevbm	virtualbox	poweroff			
testvm	virtualbox	poweroff			
centos	virtualbox	poweroff			
TestVM	virtualbox	not created			

An 'Add Virtual Machine' button is below the table. Below the table is an 'Operation Notification Panel' showing three successful operations from 19/12/2014. A 'View All Operations' button is at the bottom. At the bottom of the page is another table titled 'Box Name' with two entries:

Box Name	Provider	Actions
TestBox	virtualbox	
centos6.4x32	virtualbox	

Figura 4.23: Vagrant Web. Displaying Virtual Machine Hardware information

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The screenshot shows a Mozilla Firefox browser window displaying the Vagrant Web interface. The URL in the address bar is `localhost/vagrantweb/index.php?r=vm/view&id=webvm&node=NODE1`. The main content area is titled "VagrantWeb" and contains a sidebar with links to Dashboard, Groups, Nodes, and Users. The main panel displays detailed hardware configuration for a virtual machine named "NODE1". A red box highlights the "Operating System" and "Interfaces" sections. The "Operating System" section lists:

Operating System	Ubuntu
Num. Cpus	1
CPU Limit	100
Memory	512MB
PAE	on
3D Acceleration	off
2D Acceleration	off
Clipboard	bidirectional
Remote Desktop	off
USB	off
Boot Order	disk none none none

The "Interfaces" section lists three network interfaces:

Network Interface	nic1
Network Type	nat
MAC Address	080027C9ACB5
Cable connected	on
Network Interface	nic2
Network Type	bridged
MAC Address	08002787592
Cable connected	on
Network Interface	nic3
Network Type	bridged
MAC Address	08002712B460
Cable connected	on

Below the main content, there are two user management sections: "Assigned Users" and "Available Users", each with a search input field labeled "User Name". A message at the bottom right indicates "Displaying 1-3 of 3 results."

Figura 4.24: Vagrant Web. Displaying Virtual Machine Hardware information

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Important, if the virtual machine status is *Not Created*, which means that it has not yet booted (don't worry about this term right now), you won't see any information.

The process to remove a virtual machine and all its data is very simple. Click on the *Delete icon* placed on the right most in the virtual machine row (Figure 4.25).

The screenshot shows the Vagrant Web interface in a Mozilla Firefox browser. The main content area displays node configuration details for 'NODE1'. Below this is a table of virtual machines:

Virtual Machine	Provider	Status	Actions	Backup	Options
webvm	virtualbox	poweroff			
testvm	virtualbox	poweroff			
centos	virtualbox	poweroff			
TestVM	virtualbox	not created			

At the bottom, there is an 'Operation Notification Panel' showing three 'Operation Succeed' entries from December 19, 2014, and a 'View All Operations' link.

Figura 4.25: Vagrant Web. Deleting Virtual Machine

That's all. The virtual machine row will be removed dynamically from the *Virtual Machine Table* and from the Node configuration file.

Performing commands to Virtual Machines

Before showing how to work with virtual machines, there is one more Vagrant concept that must be clear to you. Vagrant ships out with support for *VirtualBox* (though you can implement some code to manage other types). In

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this **Provider**, term used by *Vagrant* when it refers to virtualization tools, a virtual machine may have different states:

- **Not Created.** In this state, the machine has been added but it has not been booted yet. No information for this virtual machine has been created also. That is why, when you click on the virtual machine name link to access the *Virtual Machine View Page*, no hardware information is available, because nothing has been created yet.
- **Running.** If a machine is in this state means that it is powered up and running.
- **Poweroff.** When a virtual machines is this state means that it is powered off and not running.
- **Suspended.** In this state the virtual machine is running but paused.
- **BUSY.** This is not a proper state from *Vagrant* but a new defined one. This state appears when one of the last commands is executed and only while the command is in use.

Now that you are more familiarized with the *Vagrant* terminology, let's go into greater details. In the following Figures we are examining the *Virtual Machine table*. Columns on the left of the table are focused to display information. The ones on the right represent actions that you can perform on the virtual machine.

Displaying 1-4 of 4 results					
Virtual Machine	Provider	Status	Actions	Backup	Options
webvm	virtualbox	poweroff			
testvm	virtualbox	poweroff			
centos	virtualbox	poweroff			
TestVM	virtualbox	not created			

Figura 4.26: Vagrant Web. Virtual Machine Table

If you take a closer look at the right columns you can find:

- **Actions.** In this column you can find the more typical actions to change virtual machine's state. The possible commands are:
 - *Play*. This command powers on the virtual machine.

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- *Pause*. This command pauses the virtual machine when it is powered on.
 - *Stop*. This command shutdowns the virtual machine.
- **Backup**. These set of commands allows you to handle virtual machine data and status. The available options are:
- *Take Snapshot Icon* (Figure 4.27). The dialog that appears when you click this icon is very similar to the VirtualBox one. You only have to set the title and description and click the button to create a new snapshot of the current state from the virtual machine (Figure 4.28).

Displaying 1-4 of 4 results.						
Virtual Machine	Provider	Status	Actions	Backup	Options	
webvm	virtualbox	poweroff	▶ ⏪ ⏹	⬇️	⬇️	
testvm	virtualbox	poweroff	▶ ⏪ ⏹	⬇️	⬇️	
centos	virtualbox	poweroff	▶ ⏪ ⏹	⬇️	⬇️	
TestVM	virtualbox	not created	▶ ⏪ ⏹	⬇️	⬇️	

Figura 4.27: Vagrant Web. Take Snapshot Icon

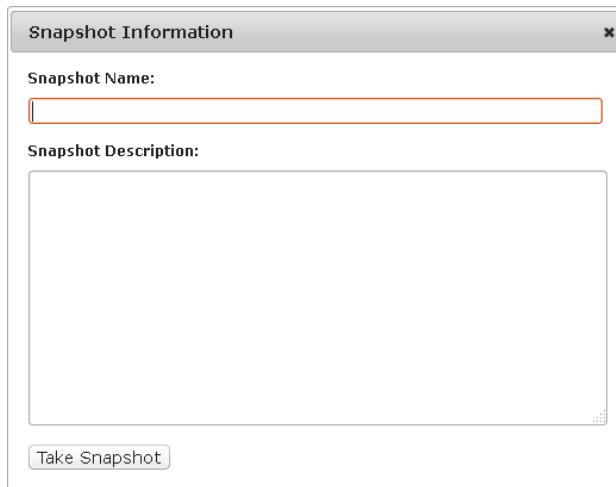


Figura 4.28: Vagrant Web. Take Snapshot Dialog

- *List and Restore Snapshots Icon* (Figure 4.29). When you click on this icon a new dialog appears. In this dialog, Figure 4.30, you

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can view hierarchically the snapshots created. If you click on a snapshot you can see some information about it and also restore and delete it.

Displaying 1-4 of 4 results.						
Virtual Machine	Provider	Status	Actions	Backup	Options	
webvm	virtualbox	poweroff	▶ ⏪ ⏹	⬇️	⬇️	⬇️
testvm	virtualbox	poweroff	▶ ⏪ ⏹	⬇️	⬇️	⬇️
centos	virtualbox	poweroff	▶ ⏪ ⏹	⬇️	⬇️	⬇️
TestVM	virtualbox	not created	▶ ⏪ ⏹	⬇️	⬇️	⬇️

Figura 4.29: Vagrant Web. List and Restore Snapshots Icon

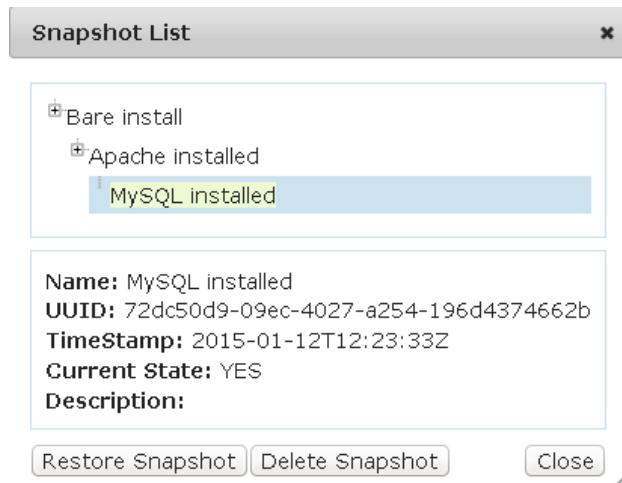


Figura 4.30: Vagrant Web. List and Restore Snapshots Dialog

- *Take Backup Icon* (Figure 4.31). This new feature is experimental. After clicking the button, the node will create a compressed file with the virtual machine data. This file is stored at the node.

■ Options

- *Destroy Current Machine Icon* (Figure 4.32). The *destroy machine* action involves the deletion of all the virtual machine data. The virtual machine will not be deleted from the node, just its data. After the deletion, the virtual machine state will change to **Not Created**.

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Displaying 1-4 of 4 results.						
Virtual Machine	Provider	Status	Actions	Backup	Options	
webvm	virtualbox	poweroff	▶ ⏪ ⏴	⬇️ ⏵ ⏴	⬇️ ⏵ ⏴	
testvm	virtualbox	poweroff	▶ ⏪ ⏴	⬇️ ⏵ ⏴	⬇️ ⏵ ⏴	
centos	virtualbox	poweroff	▶ ⏪ ⏴	⬇️ ⏵ ⏴	⬇️ ⏵ ⏴	
TestVM	virtualbox	not created	▶ ⏪ ⏴	⬇️ ⏵ ⏴	⬇️ ⏵ ⏴	

Figura 4.31: Vagrant Web. Take Backup Icon

Displaying 1-4 of 4 results.						
Virtual Machine	Provider	Status	Actions	Backup	Options	
webvm	virtualbox	poweroff	▶ ⏪ ⏴	⬇️ ⏵ ⏴	⬇️ ⏵ ⏴	
testvm	virtualbox	poweroff	▶ ⏪ ⏴	⬇️ ⏵ ⏴	⬇️ ⏵ ⏴	
centos	virtualbox	poweroff	▶ ⏪ ⏴	⬇️ ⏵ ⏴	⬇️ ⏵ ⏴	
TestVM	virtualbox	not created	▶ ⏪ ⏴	⬇️ ⏵ ⏴	⬇️ ⏵ ⏴	

Figura 4.32: Vagrant Web. Destroy Virtual Machine Icon

- *Delete Machine Icon* (Figure 4.33). As the document explained in a former section, the *delete action* involves de deletion of all the virtual machine data and also it will be remove from the node.

Displaying 1-4 of 4 results.						
Virtual Machine	Provider	Status	Actions	Backup	Options	
webvm	virtualbox	poweroff	▶ ⏪ ⏴	⬇️ ⏵ ⏴	⬇️ ⏵ ⏴	
testvm	virtualbox	poweroff	▶ ⏪ ⏴	⬇️ ⏵ ⏴	⬇️ ⏵ ⏴	
centos	virtualbox	poweroff	▶ ⏪ ⏴	⬇️ ⏵ ⏴	⬇️ ⏵ ⏴	
TestVM	virtualbox	not created	▶ ⏪ ⏴	⬇️ ⏵ ⏴	⬇️ ⏵ ⏴	

Figura 4.33: Vagrant Web. Delete Virtual Machine Icon

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There is one more component that must be described: the *Operation Notification Panel* (Figure 4.34). This widget is very important because it shows information about the operations performed and its result. By default, the information displayed is a briefing and means the following:

- *Icon Indicator*. This icon represents the operation result. It changes based on the result.
- *Operation Result*. This information shows if the operation succeeded or failed.
- *Timestamp Indicator*. The timestamp represents the time that the operation started or finished.

The screenshot shows the Vagrant Web interface for managing nodes. On the left, there's a sidebar with options like Dashboard, Groups, Nodes (selected), List Nodes, Manage Nodes, and Users. The main content area shows node details for 'NODE1': Memory (5.83 GB / 3.58 GB) and Disk Usage (425.89 GB). Below this is a table of virtual machines:

Virtual Machine	Provider	Status	Actions	Backup	Options
webvm	virtualbox	poweroff	Green circle (Success)	Backup icon	Snapshot icon
testvm	virtualbox	poweroff	Green circle (Success)	Backup icon	Snapshot icon
centos	virtualbox	poweroff	Green circle (Success)	Backup icon	Snapshot icon
TestVM	virtualbox	not created	Green circle (Success)	Backup icon	Snapshot icon

Below the VM table is a button 'Add Virtual Machine'. A red box highlights the 'Operation Notification Panel' section, which contains a table of recent operations:

Operation	Time
Operation Succeed	13:22
Operation Succeed	19/12/2014
Operation Succeed	19/12/2014

At the bottom of this panel is a link 'View All Operations'. Further down the page is another table titled 'Displaying 1-6 of 6 results.':

Box Name	Provider	Actions
TestBox	virtualbox	Snapshot icon
centos6.4x32	virtualbox	Snapshot icon
precise32	virtualbox	Snapshot icon
precise64vmx	vmx	Snapshot icon

Figura 4.34: Vagrant Web. Operation Notification Panel

However, this briefing is not enough. You don't see which virtual machine performed the command or an error message if the operation fails. But *Vagrant Web* has the solution. If you click on each operation row, more information will be displayed (Figure 4.35):

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- *Node*: node in which the command was performed.
- *Virtual Machine*: virtual machine that handle the command.
- *Command*: command that was sent to the virtual machine to perform.
- *User*: web user that sent the command.
- *Error Message*: if the command fails this field will show the error message. Otherwise, this field will be hidden.

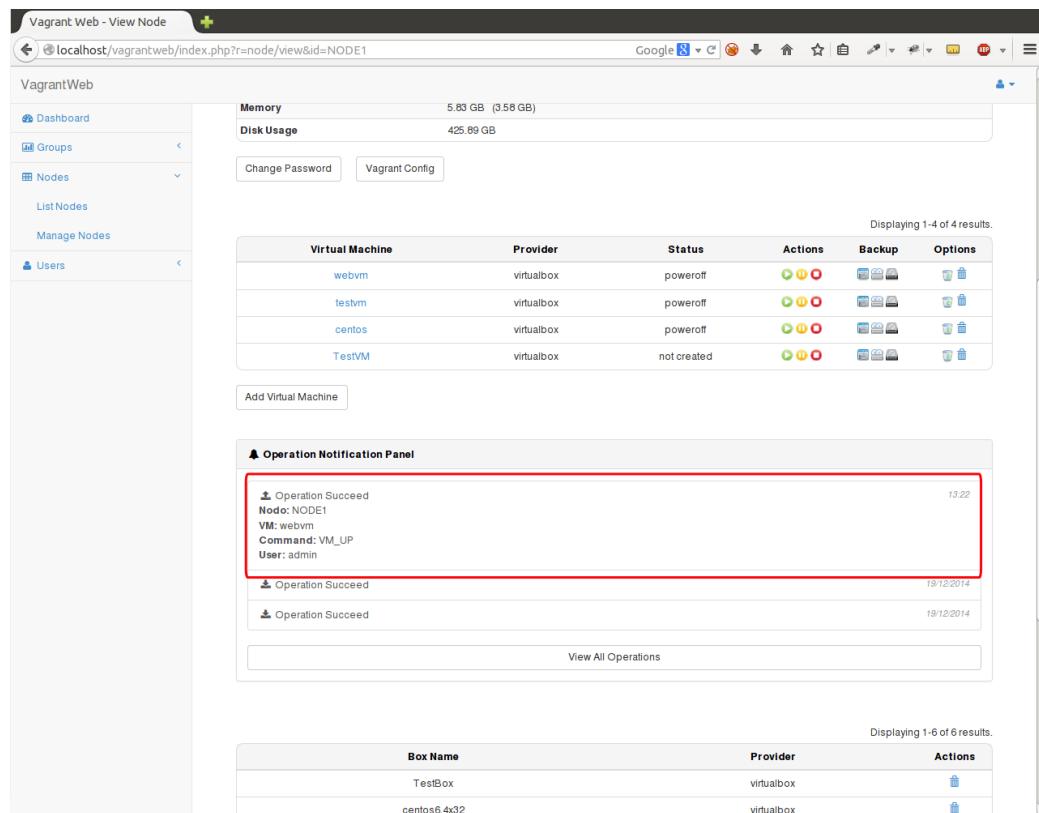


Figura 4.35: Vagrant Web. Operation Notification Panel

When you perform an action a new entry with the status *Operation Queued* is added to the list. Once the operation is finished, regardless of whether it succeed or not, the status string and the operation timestamp is updated.

By default, the *Operation Notification Panel* shows the result of the last seven operations. If you want to access the complete command list, click on the *View All Operations* button (Figure 4.36 and 4.37).

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The screenshot shows the Vagrant Web interface at localhost/vagrantweb/index.php?r=node/view&id=NODE1. The left sidebar includes links for Dashboard, Groups, Nodes (selected), List Nodes, Manage Nodes, and Users. The main content displays node statistics (Memory: 5.83 GB (3.58 GB), Disk Usage: 425.89 GB) and a table of virtual machines:

Virtual Machine	Provider	Status	Actions	Backup	Options
webvms	virtualbox	poweroff	[Icons]	[Icons]	[Icons]
testvm	virtualbox	poweroff	[Icons]	[Icons]	[Icons]
centos	virtualbox	poweroff	[Icons]	[Icons]	[Icons]
TestVM	virtualbox	not created	[Icons]	[Icons]	[Icons]

An "Add Virtual Machine" button is present. Below this is the "Operation Notification Panel" showing three "Operation Succeed" entries with timestamps (13.22, 19/12/2014, 19/12/2014). A red box highlights the "View All Operations" link. Another table below lists boxes:

Box Name	Provider	Actions
TestBox	virtualbox	[Icons]
centos6.4x32	virtualbox	[Icons]
precise32	virtualbox	[Icons]
precise64vmx	vmx	[Icons]

Figura 4.36: Vagrant Web. View All Operations button

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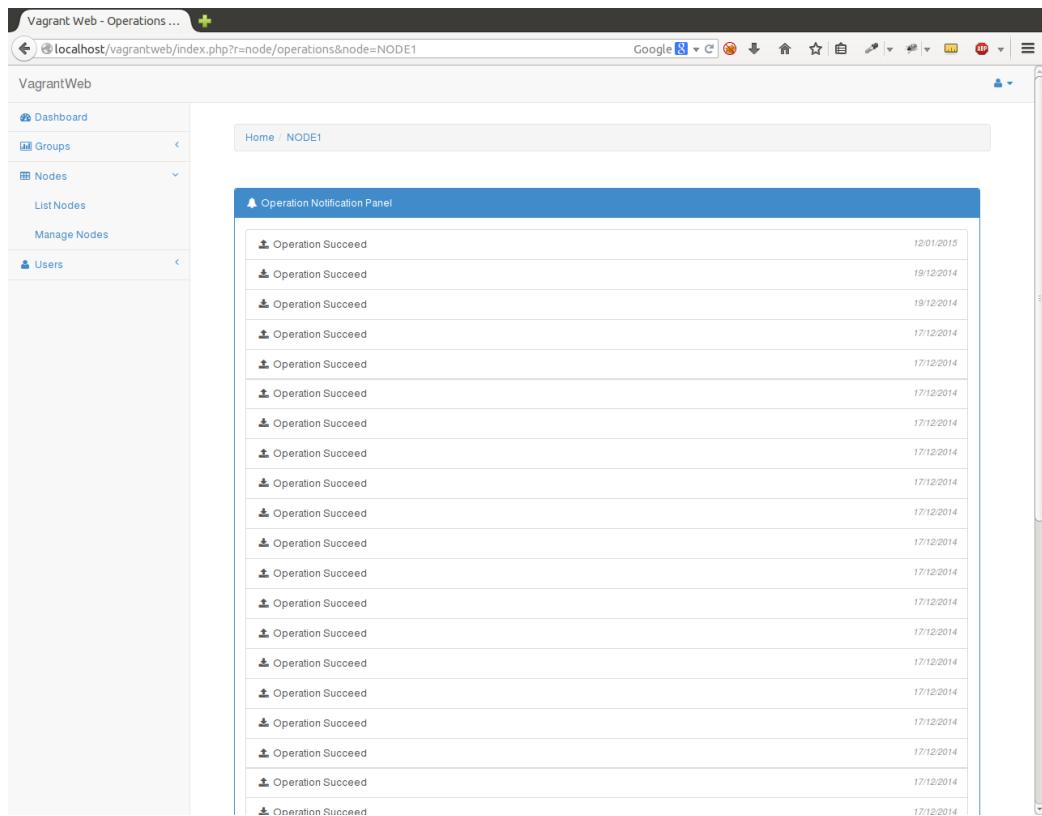


Figura 4.37: Vagrant Web. View All Operation Page

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Assigning Users to Virtual Machines

Vagrant Web implements a fine-grain rights environment. Due to this fact, you can assign which users will have access to the virtual machine and, as we will see later, which actions are they allowed to perform. To assign users, access to the *Virtual Machine View Page* as the document showed before (Figure 4.23).

At the bottom of the page, there are two tables (Figure 4.38). The one on the left shows current users assigned to the virtual machine, and the other list the available ones.

The screenshot shows the Vagrant Web interface for managing users of a virtual machine. At the top, there's a header bar with the title 'Vagrant Web - View Vm' and a URL 'localhost/vagrantweb/index.php?r=vm/view&id=webvm&node=NODE1'. Below the header is a sidebar with navigation links: Dashboard, Groups, Nodes, and Users. The main content area displays network configuration details for two interfaces:

Network Interface: nic2
Network Type: bridged
MAC Address: 08002787592
Cable connected: on
Network Interface: nic3
Network Type: bridged
MAC Address: 08002712B460
Cable connected: on

Below this, there are two tables:

- Assigned Users:** A table with a single row labeled 'User Name' and 'No results found.'
- Available Users:** A table with three rows: 'User Name' (demo, admin, demo1), each with a small user icon to its right. A note says 'Displaying 1-3 of 3 results.'

Further down, there are sections for 'Groups Assigned:' and 'Users Assigned By Groups:', each containing a single table with one row. The footer of the page includes the text 'Created by CatedraSAES-UMU'.

Figura 4.38: Vagrant Web. Virtual Machine User Management

To add a new user to the Virtual Machine, click on the add user icon placed on the right most of each row at the *Available Users Table* (Figure 4.39).

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The screenshot shows the Vagrant Web interface for managing a virtual machine. The top section displays network details for two interfaces:

Network Interface: nic2
Network Type: bridged
MAC Address: 080027787592
Cable connected: on
Network Interface: nic3
Network Type: bridged
MAC Address: 08002712B460
Cable connected: on

The interface includes sections for Assigned Users and Available Users. The Available Users section lists three users: demo, admin, and demo1, with the last two highlighted by a red rectangle.

User Name
demo
admin
demo1

The Groups Assigned section shows one group assigned: ExampleGroup.

Group Name
ExampleGroup

The Users Assigned By Groups section shows one user assigned to the ExampleGroup.

Users	Group Name
demo	ExampleGroup

At the bottom, it says "Created by CatedraSAES-UMU".

Figura 4.39: Vagrant Web. Assigning a virtual machine to a user

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To remove a user from a virtual machine, click on the trash icon placed on the right most of each row at the *Assigned Users Table* (Figure 4.40).

The screenshot shows the Vagrant Web interface for managing a virtual machine. The top navigation bar includes links for Dashboard, Groups, Nodes, and Users. The main content area displays network configuration details for a node named 'NODE1'.

Assigned Users: Displays a table with one result, 'demo'. A red box highlights the trash icon (an icon with a horizontal line through it) located to the right of the 'demo' entry.

User Name
demo

Available Users: Displays a table with two results, 'admin' and 'demo1'.

User Name
admin
demo1

Groups Assigned: Displays a table with one result, 'ExampleGroup'.

Group Name
ExampleGroup

Users Assigned By Groups: Displays a table with one result, 'demo' assigned to 'ExampleGroup'.

Users	Group Name
demo	ExampleGroup

At the bottom of the page, a footer note states: 'Created by CatedraSAES-UMU'.

Figura 4.40: Vagrant Web. Remove a user from a Virtual Machine

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4.2 Node Dashboard

In the former section 4.1, the document shows how to work with every node. But, when you have several nodes this procedure is quite annoying and unproductive. For that reason *Vagrant Web* implements a kind of node dashboard that shows a briefing of each virtual machine and action buttons to perform actions. To access the dashboard, click on the **List Nodes** submenu in the **Nodes** menu (Figure 4.41).

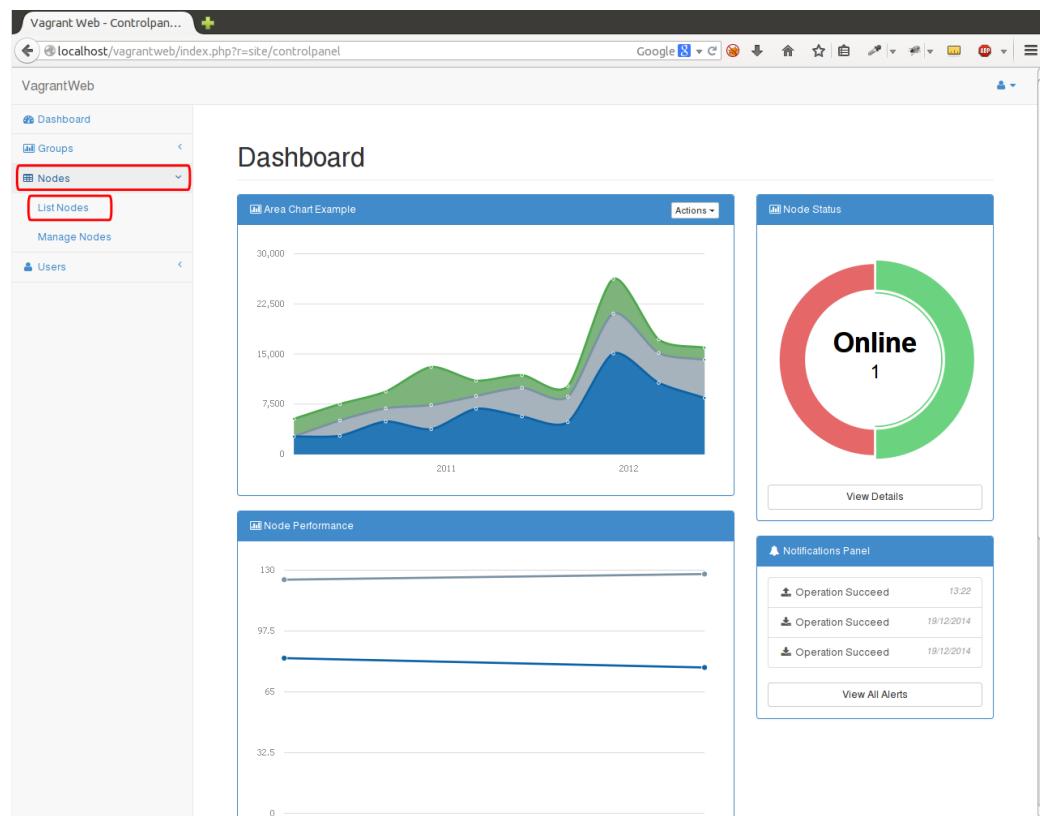


Figura 4.41: Vagrant Web. Accessing the Node Dashboard

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The screenshot shows the Vagrant Web Node interface. On the left is a sidebar with links: Dashboard, Groups, Nodes (selected), List Nodes, Manage Nodes, and Users. The main area has a header "List of Nodes:" and a "Global View" table. The table displays five nodes:

Node Name	Virtual Machine	Provider	Status	Actions	Backup
webvm	virtualbox	poweroff	Green Yellow Red	Run Pause Stop	Backup
testvm	virtualbox	poweroff	Green Yellow Red	Run Pause Stop	Backup
centos	virtualbox	poweroff	Green Yellow Red	Run Pause Stop	Backup
TestVM	virtualbox	not created	Green Yellow Red	Run Pause Stop	Backup

Below the table are three buttons: Run, Pause, and Stop. At the bottom of the dashboard is an "Operation Notification Panel" showing three successful operations:

Operation Succeed	13.22
Operation Succeed	19/12/2014
Operation Succeed	19/12/2014

At the very bottom of the dashboard, it says "Created by CatedraSAES-UMU".

Figura 4.42: Vagrant Web. Node Dashboard

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The dashboard shows two main graphical components: *Global View* and *Operation Notification Panel*. The *Operation Notification Panel* behaviour is similar as the panel showed in Section 4.1.3.

The *Global View* widget is very similar to the *Virtual Machine Table* at the *Node View Page*, but with one more column that shows the *Node Name*. The information of this widget is loaded dynamically when the information from the node arrives. It is also refreshed periodically.

To run any operation at any virtual machine you can click on the desired button like you saw in Section 4.1.3. But this dashboard adds one more new feature, you can perform commands over several virtual machines and nodes at the same time. To achieve this, click on any virtual machine row or in the check box component to select them and then click on the buttons located at the bottom of the table (Figure 4.43). If no row is selected these buttons will be disabled by default.

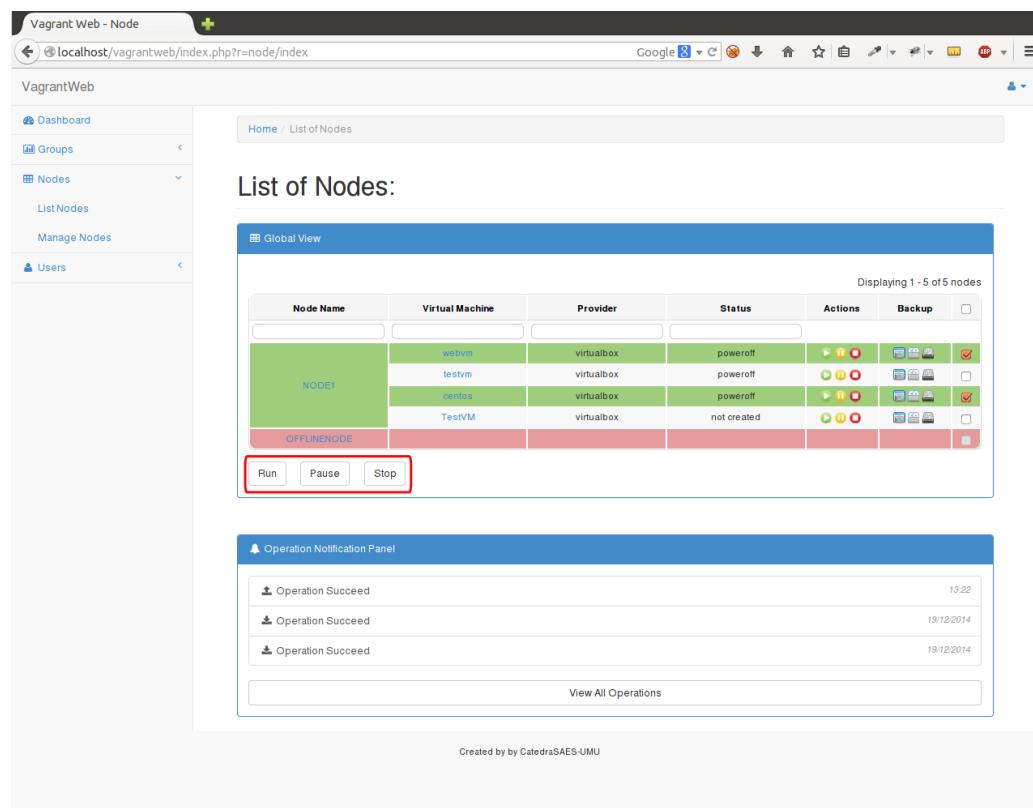


Figura 4.43: Vagrant Web. Selecting several Virtual Machines

5

Chapter 5: Roles and Users

Vagrant Web is founded in a flexible and customizable Role Based Access Control (RBAC) rights environment. Roughly this means that every user has one or many roles and the sum of all the permissions of each role are assigned to that user.

In *Vagrant Web* all the functionality related to user, roles and rights management is under the **User Menu** in the side bar.

5.1 Managing Roles

To access the *Manage Roles Page* click on the **Manage Roles** submenu in the **User** menu (Figures 5.1 and 5.2).

This new page shows the list of the current created roles. By default, *Vagrant Web* ships with two roles:

- *AdminRole*. This is the superuser role. It can't be deleted nor modified . This role has permissions to access and perform everything.
- *AuthenticatedRole*. This is the default role that is assigned to every users that logs into the web application. It has some basics permissions.

To add a new role you have to click on the *Create Role* button. The *Role Creation Page* is very simple, you have only to fill a representative name and description of the new role (Figure 5.3).

5. CHAPTER 5: ROLES AND USERS

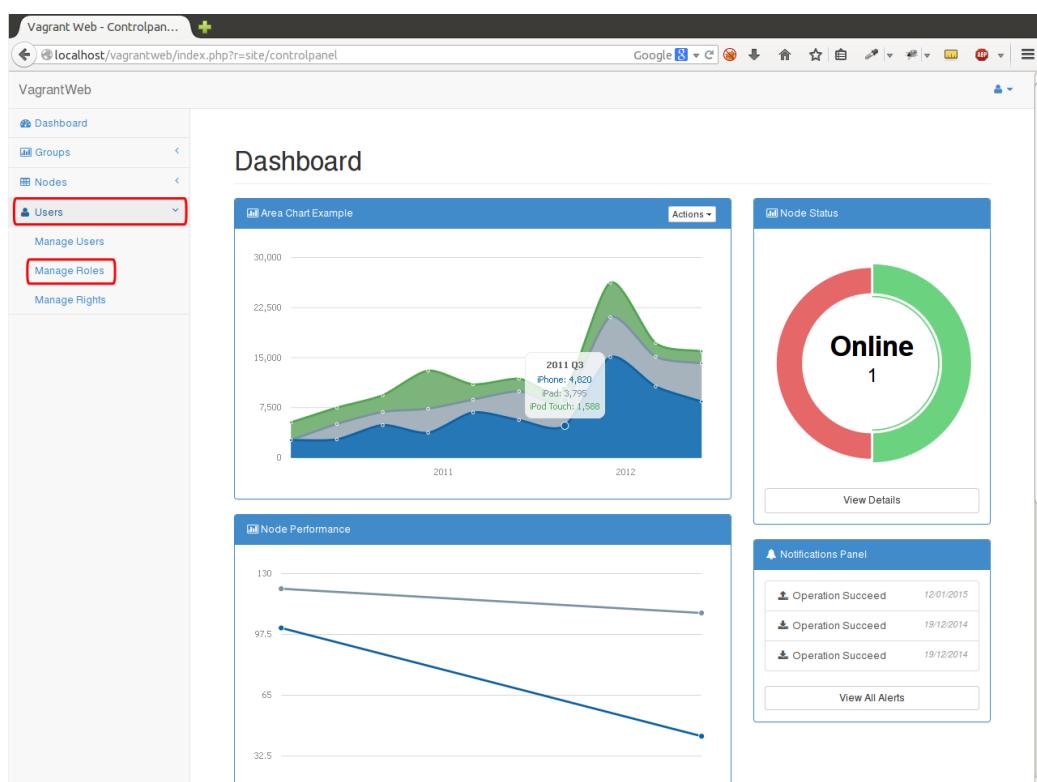


Figura 5.1: Vagrant Web. Access to the Manage Roles Page

5. CHAPTER 5: ROLES AND USERS

The screenshot shows a web browser window titled "Vagrant Web - Roles Authenti...". The address bar displays "localhost/vagrantweb/index.php?r=rights/authItem/roles". The page content is titled "Roles". On the left, there is a sidebar with navigation links: Dashboard, Groups, Nodes, and a expanded "Users" section containing "Manage Users", "Manage Roles", and "Manage Rights". The main area contains a table with the following data:

Name	Description	Options
AdminRole	Super User Role	
AuthenticatedRole	AuthenticatedRole	
DEMOROLE	demo role	
GroupManagerRole	Group Manager Role	
Guest	Guest User	

A "Create Role" button is located at the bottom left of the table. At the very bottom of the page, a small note says "Created by CatedraSAES-UMU".

Figura 5.2: Vagrant Web. Manage Roles Page

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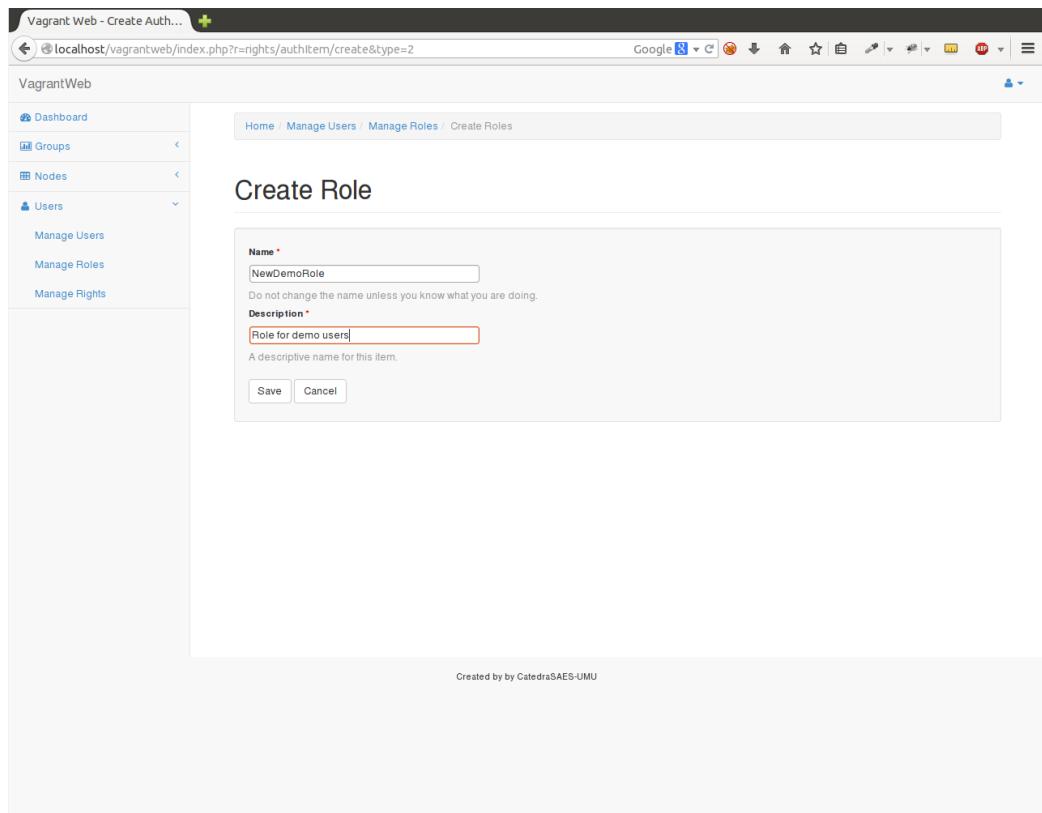


Figura 5.3: Vagrant Web. Role Creation Page

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Once the role has been created, the web application redirects you to the *Role Update Page* (Figure 5.5). Also, you can access this page by clicking on the Role Name link at the Role table the *Manage Roles Page*. In the *Role Update Page* you can manage every detail of the role. At this point we will see one feature related to roles that it is important that you knew.

The screenshot shows the 'Vagrant Web - Update Aut...' interface. The URL is `localhost/vagrantweb/index.php?r=rights/authitem/update&name=NewDemoRole`. The left sidebar has 'VagrantWeb' and 'Users' expanded, with 'Manage Roles' selected. The main content area shows the 'Update NewDemoRole' form. It includes fields for 'Name' (set to 'NewDemoRole') and 'Description' (set to 'Role for demo users'). Below the form are sections for 'Relations' (Parents and Children), 'Add Parent Role' (dropdown set to 'AuthenticatedRole' with an 'Add' button), 'Add Child Role' (dropdown set to 'AuthenticatedRole' with an 'Add' button), 'Operations Inherited by Parents Roles' (list: 'Node.DownloadInfo', 'Node.Index', 'Node.Operations'), and 'Operations Assigned' (empty list).

Figura 5.4: Vagrant Web. Role Update Page

A role is not an isolated entity. You can create relationships between them with inheritance. A role can have as many role parents or child as you want, and the resulting permissions of the role will be the sum of every parent role. In Figure 5.5 is highlighted the graphical components dedicated to this due.

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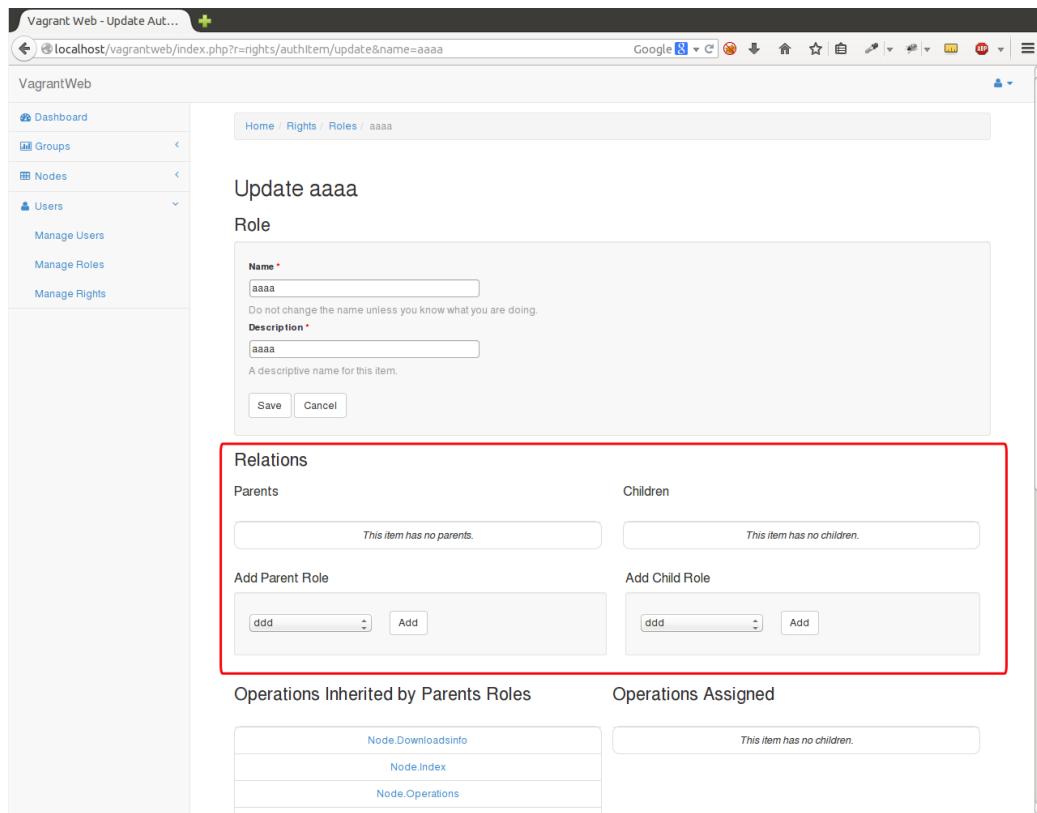


Figura 5.5: Vagrant Web. Role Update Page

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To add a new parent or child role, select first the desired list in the suitable dropdown list and click on it corresponding button (Figure 5.6).

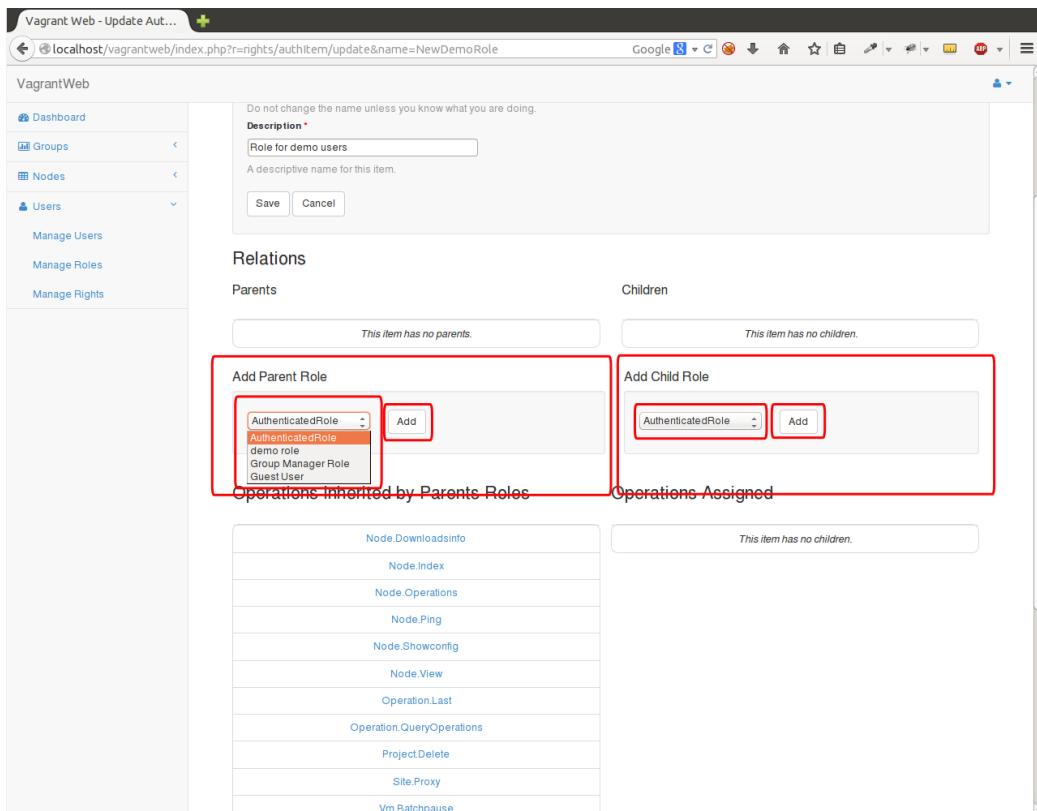


Figura 5.6: Vagrant Web. Adding new parent or child role

5. CHAPTER 5: ROLES AND USERS

In order to check out that a role inherits all rights from its roles parents, once a new role parent is established take a look at the table below the role relationships panels. In Figure 5.7 the table labeled *Operations Inherited by Parents Roles* shows all the rights inherited from *AuthenticatedRole Role*. If you add more parent roles, this table will change. The table labeled *Operations Assigned* will be explained in the next section (Section 5.2).

The screenshot shows the Vagrant Web interface for managing roles. On the left, there's a sidebar with links for Dashboard, Groups, Nodes, and Users (Manage Users, Manage Roles, Manage Rights). The main area has tabs for 'Parents' and 'Children'. Under 'Parents', 'AuthenticatedRole' is listed with a 'Remove' link. Under 'Children', 'demo role' is listed with a 'Remove' link. Below these tabs are sections for 'Add Parent Role' (with a dropdown for 'Group Manager Role' and an 'Add' button) and 'Add Child Role' (with a dropdown for 'Group Manager Role' and an 'Add' button). A large red box highlights the 'Operations Inherited by Parents Roles' table, which lists numerous permissions such as 'Allow users to view see node downloads's information', 'Allow users to list nodes and vms', and 'Allow users to delete projects'. To the right of this table is another table titled 'Operations Assigned' with the message 'This item has no children.'

Figura 5.7: Vagrant Web. Checking inherited roles

To delete any type of role inheritance, just click on the *Remove* link placed on the right of the desired role (Figure 5.8).

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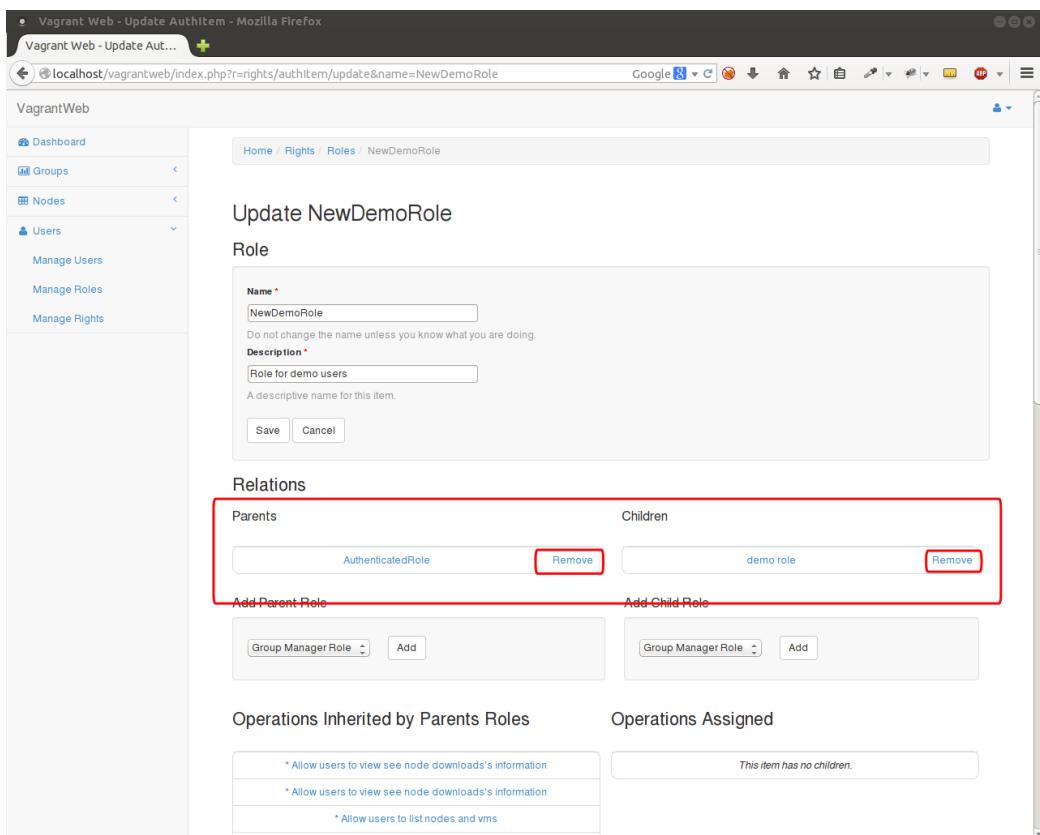
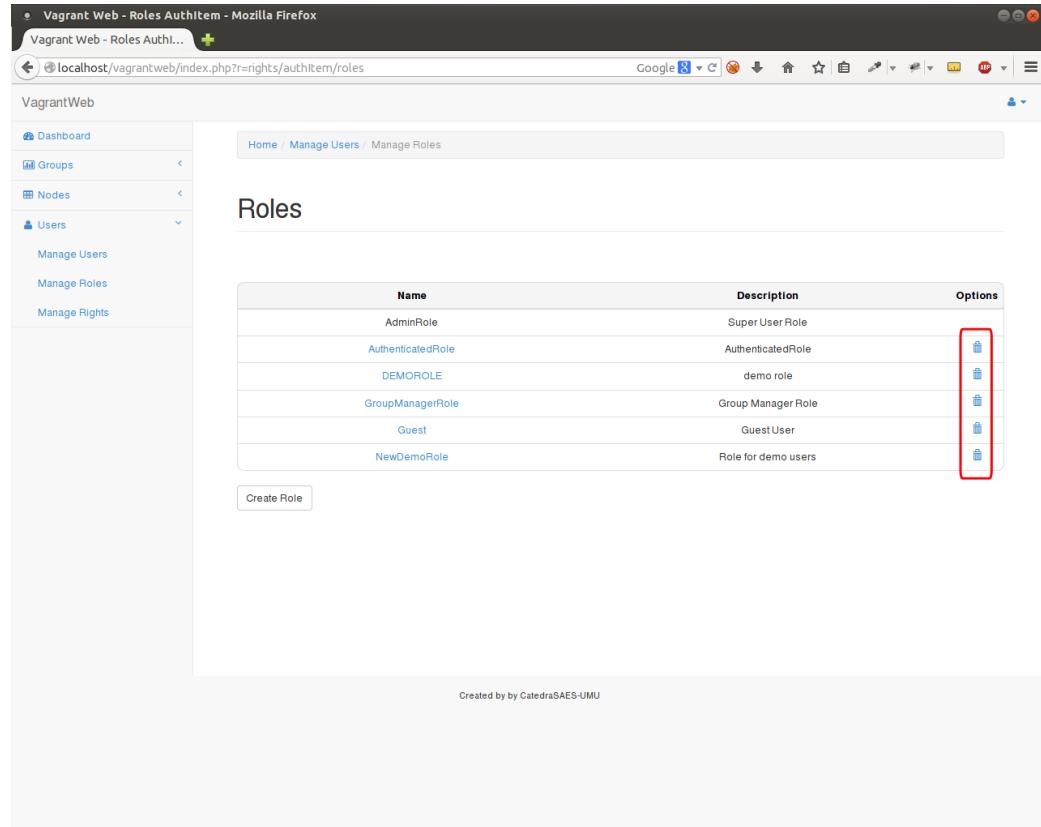


Figura 5.8: Vagrant Web. Deleting a parent or child role

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Finally, you can delete any role by clicking on the *Trash Icon* placed on the right most of every role row at the Role Table in the *Manage Roles Page* (Figure 5.9).



The screenshot shows a web browser window titled "Vagrant Web - Roles Authitem - Mozilla Firefox". The address bar displays "localhost/vagrantweb/index.php?rights/authitem/roles". The main content area is titled "Roles". On the left, there is a sidebar with navigation links: Dashboard, Groups, Nodes, and Users (with sub-links: Manage Users, Manage Roles, Manage Rights). The main content area shows a table with the following data:

Name	Description	Options
AdminRole	Super User Role	
AuthenticatedRole	AuthenticatedRole	
DEMOROLE	demo role	
GroupManagerRole	Group Manager Role	
Guest	Guest User	
NewDemoRole	Role for demo users	

A "Create Role" button is located at the bottom left of the table. The footer of the page says "Created by CatedraSAES-UMU".

Figura 5.9: Vagrant Web. Deleting a role

5.2 Managing Rights

Before going into detail about rights and how to manage them, it is necessary to explain what a right is. A *Right*, also called operation, is the minimal unit in the *Vagrant Web* permission mechanism. An operation can be the access to a page in *Vagrant Web*, a command over a virtual machine like run or shutdown, the submission of a form, etc. In other words, every action over *Vagrant Web*, *Nodes* and/or *Virtual Machines* is an operation and is susceptible of being managed by the permissions mechanism.

To access the *Manage Rights Page* click on the **Manage Rights** submenu in the **Users** menu (Figure 5.10).

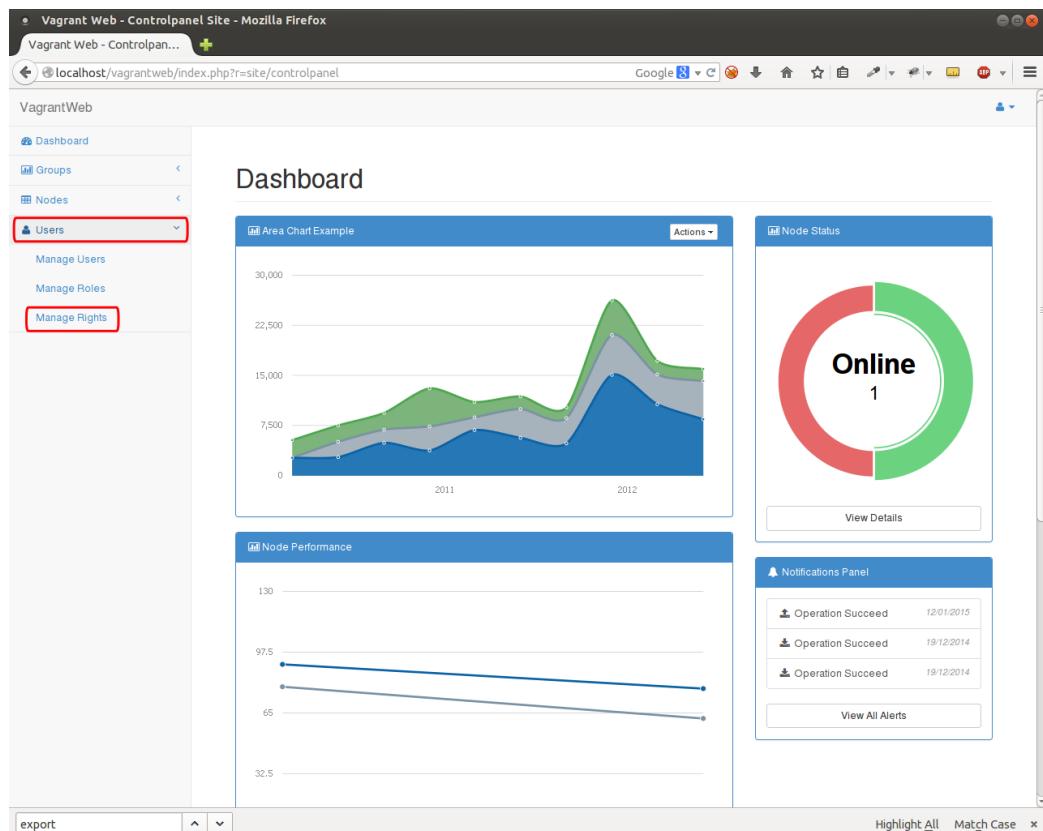


Figura 5.10: Vagrant Web. Access to the Manage Rights Page

Figure 5.11 shows the main page to manage rights. Each row of the left highlighted column, labeled *Item*, represents an operation. As you can see, these rows display the operation's description. The columns on the right

5. CHAPTER 5: ROLES AND USERS

represents each created role. For each role you can assign or revoke the operation.

The screenshot shows a web browser window titled "Vagrant Web - AuthItem - Mozilla Firefox". The URL is "localhost/vagrantweb/index.php?r=rights/authitem/permissions". The page has a sidebar on the left with "VagrantWeb" branding and links for "Dashboard", "Groups", "Nodes", and "Users" (with "Manage Rights" selected). The main content area is titled "Rights" and contains a table. A red box highlights the first column of the table, which lists various node-related permissions. The table has columns for "Item", "AuthenticatedRole" (set to "demo role"), "Group Manager Role", "Guest User", and "Role for demo users".

Item	AuthenticatedRole	Group Manager Role	Guest User	Role for demo users
Allow users to add boxes to nodes	Assign	Revoke	Assign	Assign
Allow users to delete node boxes	Assign	Assign	Assign	Assign
* Allow users to check project operation status	Assign	Assign	Revoke	Assign
* Allow users to execute project operations	Assign	Assign	Revoke	Assign
Allow users to manage nodes	Assign	Assign	Assign	Assign
Allow users to create new nodes	Assign	Assign	Assign	Assign
Allow user to delete nodes	Assign	Assign	Assign	Assign
Allow users to delete node downloads	Assign	Assign	Assign	Assign
* Allow users to view see node downloads's information	Revoke	Inherited *	Assign	Assign
Allow users to edit node configuration	Assign	Assign	Assign	Assign
Allow users to export all node information	Assign	Assign	Assign	Assign
* Allow users to list nodes and vms	Revoke	Inherited *	Revoke	Assign
Allow users to list node's operations	Revoke	Inherited *	Assign	Assign
Allow users to change node password	Assign	Assign	Assign	Assign
* Allow users to check if nodes are active	Revoke	Inherited *	Assign	Assign

Figura 5.11: Vagrant Web. Manage Rights Page

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Also, if you take a closer look, in some rows you can find the value *Inherited*. This means that due to the role relationships an operation has been assigned automatically. Besides, if you move the mouse over the *Inherited* field, a popup dialog appears showing the role from which that operation has been inherited (Figure 5.12).

The screenshot shows a web browser window titled "Vagrant Web - AuthItem - Mozilla Firefox". The address bar displays "localhost/vagrantweb/index.php?r=rights/authitem/permissions". The main content area is titled "Rights" and contains a table with columns: Item, AuthenticatedRole, demo role, Group Manager Role, Guest User, and Role for demo users. One row in the table, corresponding to the operation "Allow users to view see node download's information", has its "AuthenticatedRole" cell highlighted with a red box. Inside this box, a tooltip-like dialog is visible with the text "Inherited *" and "Source: AuthenticatedRole".

Item	AuthenticatedRole	demo role	Group Manager Role	Guest User	Role for demo users
Allow users to add boxes to nodes	Assign	Revoke	Assign	Assign	Assign
Allow users to delete node boxes	Assign	Assign	Assign	Assign	Assign
* Allow users to check project operation status	Assign	Assign	Revoke	Assign	Assign
* Allow users to execute project operations	Assign	Assign	Revoke	Assign	Assign
Allow users to manage nodes	Assign	Assign	Assign	Assign	Assign
Allow users to create new nodes	Assign	Assign	Assign	Assign	Assign
Allow user to delete nodes	Assign	Assign	Assign	Assign	Assign
Allow users to delete node downloads	Assign	Assign	Assign	Assign	Assign
* Allow users to view see node download's information	Revoke	Inherited *	Assign	Assign	Inherited *
Source: AuthenticatedRole					
Allow users to edit node configuration	Assign	Assign	Assign	Assign	Assign
Allow users to export all node information	Assign	Assign	Assign	Assign	Assign
* Allow users to list nodes and vms	Revoke	Inherited *	Revoke	Assign	Inherited *
Allow users to list node's operations	Revoke	Inherited *	Assign	Assign	Inherited *
Allow users to change node password	Assign	Assign	Assign	Assign	Assign
* Allow users to check if nodes are active	Revoke	Inherited *	Assign	Assign	Inherited *

Figura 5.12: Vagrant Web. Displaying inherited operation relationships

Finally, if you want to change the right's description, you can do it easily by updating the form that appears after clicking on the right name link (Figures 5.13 and 5.14).

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The screenshot shows a Mozilla Firefox browser window titled "Vagrant Web - AuthItem". The address bar displays "localhost/vagrantweb/index.php?r=rights/authitem/permissions". The main content area is titled "Rights" and contains a table showing permissions assigned to the "demo role". A red box highlights the first row of the table.

Item	AuthenticatedRole	demo role	Group Manager Role	Guest User	Role for demo users
Allow users to add boxes to nodes	Assign	Revoke	Assign	Assign	Assign
Allow users to delete node boxes	Assign	Assign	Assign	Assign	Assign
* Allow users to check project operation status	Assign	Assign	Revoke	Assign	Assign
* Allow users to execute project operations	Assign	Assign	Revoke	Assign	Assign
Allow users to manage nodes	Assign	Assign	Assign	Assign	Assign
Allow users to create new nodes	Assign	Assign	Assign	Assign	Assign
Allow user to delete nodes	Assign	Assign	Assign	Assign	Assign
Allow users to delete node downloads	Assign	Assign	Assign	Assign	Assign
* Allow users to view see node download's information	Revoke	Inherited *	Assign	Assign	Inherited *
Allow users to edit node configuration	Assign	Assign	Assign	Assign	Assign
Allow users to export all node information	Assign	Assign	Assign	Assign	Assign
* Allow users to list nodes and vms	Revoke	Inherited *	Revoke	Assign	Inherited *
Allow users to list node's operations	Revoke	Inherited *	Assign	Assign	Inherited *
Allow users to change node password	Assign	Assign	Assign	Assign	Assign
* Allow users to check if nodes are active	Revoke	Inherited *	Assign	Assign	Inherited *

Figura 5.13: Vagrant Web. Changing Right's description (Step I)

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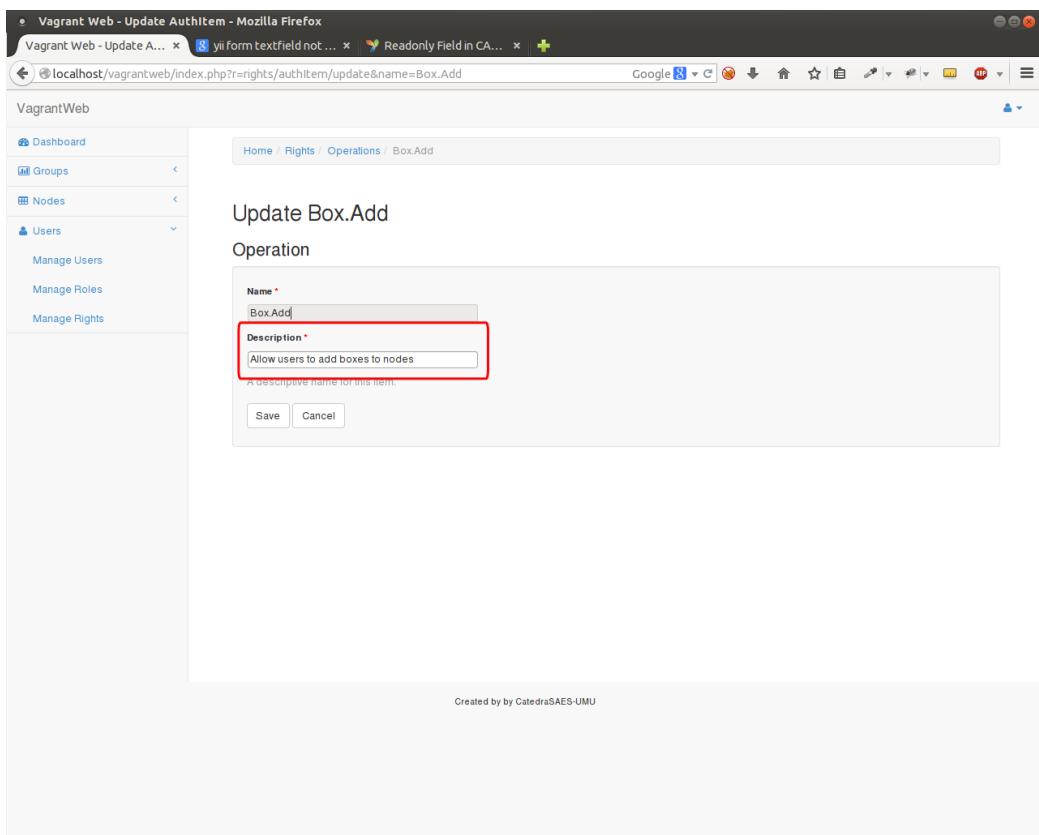


Figura 5.14: Vagrant Web. Changing Right's description (Step II)

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You can also perform the same task in other page. In the former section, Figure 5.7 showed that there were two columns related to operations in the *Role Update Page*. The document explained what the left column is used for, but it omitted the right one, until now. The *Operations Assigned* columns list all the rights that are directly assigned to the role (Figure 5.15).

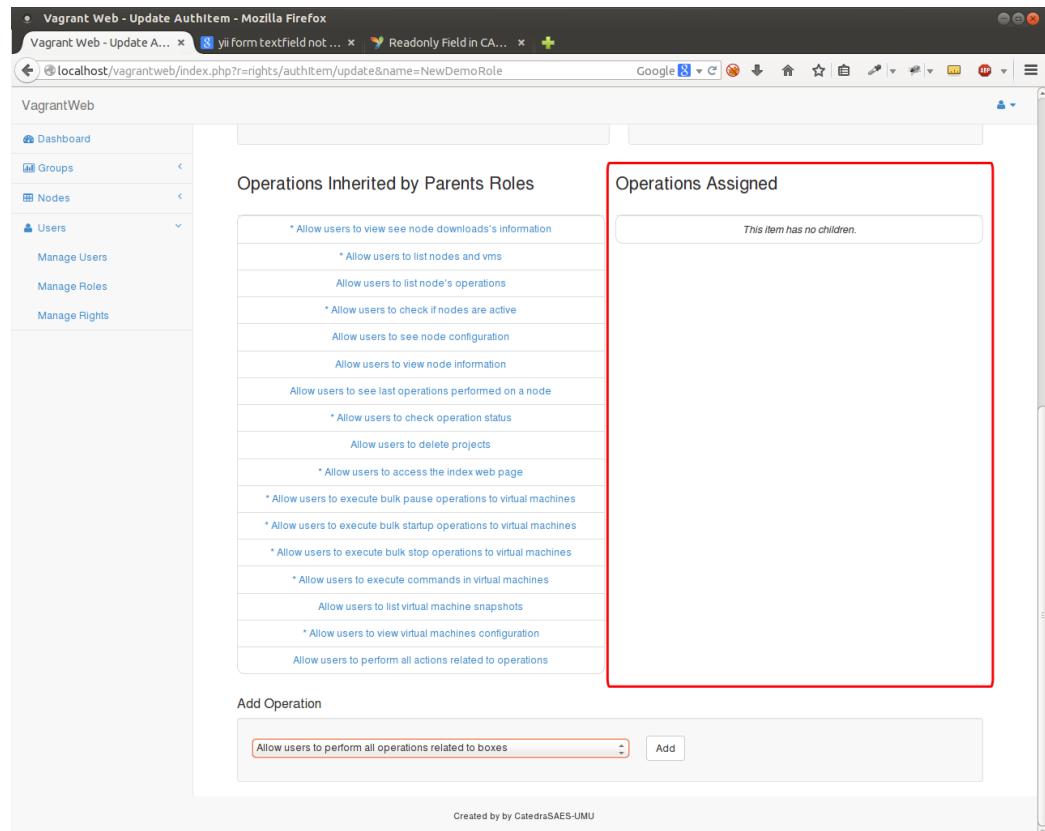


Figura 5.15: Vagrant Web. Role Update Page. Operations Assigned Column

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Let's see an example to figure out how this works. In current page (*Role Update Page*), we are assigning random operations to the role *NewDemoRole*, specifically:

- *Allow users to add boxes to nodes*
- *Allow users to delete node boxes*

In Figure 5.16, take a look to the *Manage Rights Page* to check its current status before the assignment. Both fields are ready to be assigned.

Item	AuthenticatedRole	demo role	Group Manager Role	Guest User	Role for demo users
Allow users to add boxes to nodes		Assign	Revoke	Assign	Assign
Allow users to delete node boxes		Assign	Assign	Assign	Assign
Allow users to check project operation status		Assign	Assign	Revoke	Assign
* Allow users to execute project operations		Assign	Assign	Revoke	Assign
Allow users to manage nodes		Assign	Assign	Assign	Assign
Allow users to create new nodes		Assign	Assign	Assign	Assign
Allow user to delete nodes		Assign	Assign	Assign	Assign
Allow users to delete node downloads		Assign	Assign	Assign	Assign
* Allow users to view see node downloads's information		Revoke	Inherited *	Assign	Assign
Allow users to edit node configuration		Assign	Assign	Assign	Assign
Allow users to export all node information		Assign	Assign	Assign	Assign
* Allow users to list nodes and vms		Revoke	Inherited *	Revoke	Assign
Allow users to list node's operations		Revoke	Inherited *	Assign	Assign
Allow users to change node password		Assign	Assign	Assign	Assign
* Allow users to check if nodes are active		Revoke	Inherited *	Assign	Assign

Figura 5.16: Vagrant Web. Current Management Rights Page

Now, access again to the *Role Update Page*. To perform the assignment, select the desired operation in the list box placed at the bottom of the page and click the *Add* button (Figures 5.17 and 5.18).

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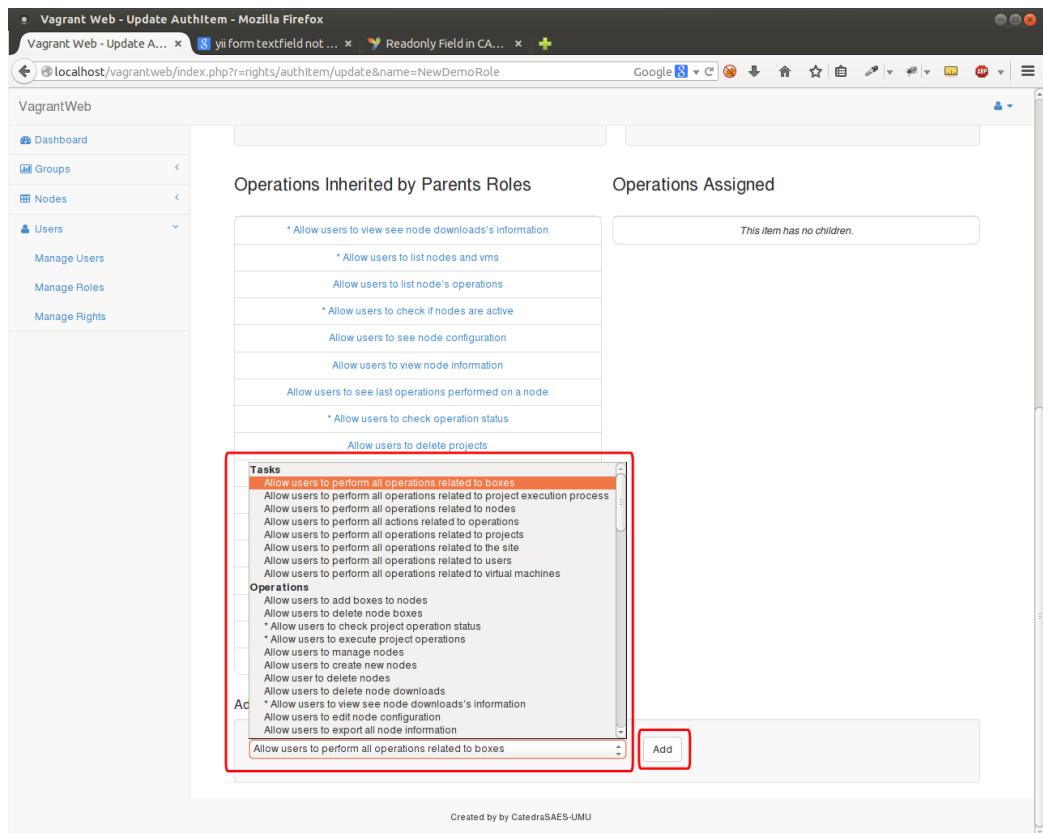


Figura 5.17: Vagrant Web. Assigning operations to the role

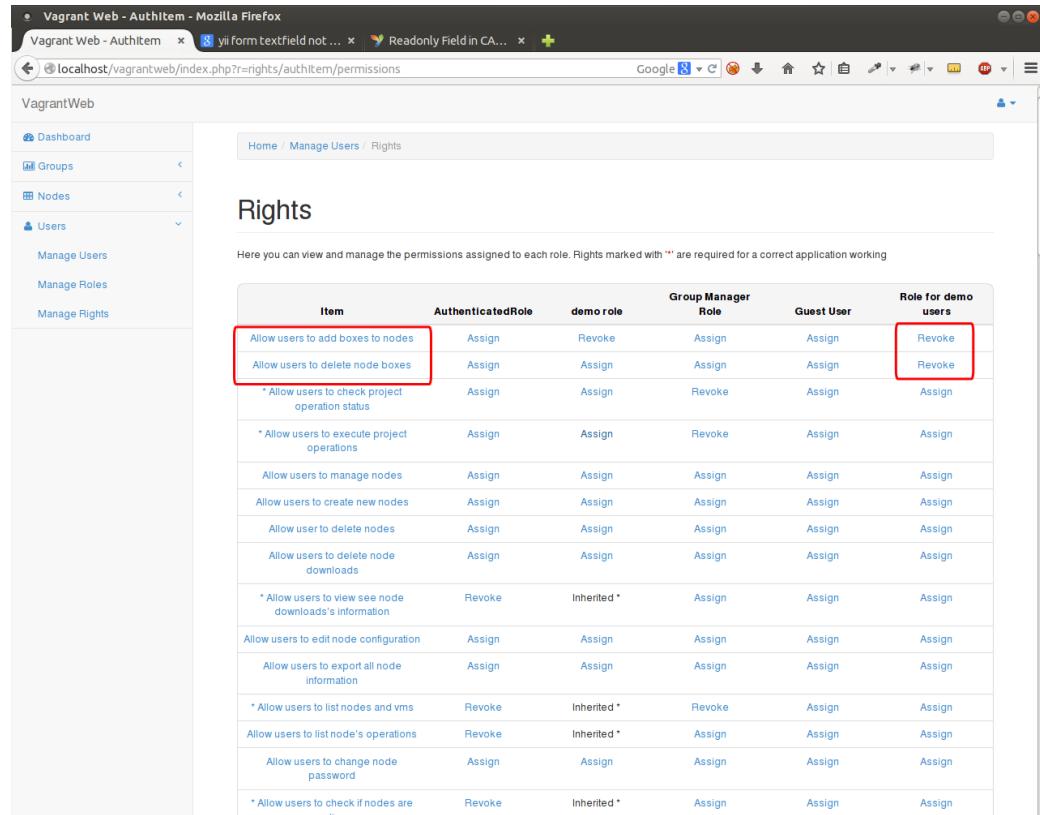
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The screenshot shows the Vagrant Web interface for managing roles. On the left, there's a sidebar with options like Dashboard, Groups, Nodes, and Users (with sub-options: Manage Users, Manage Roles, Manage Rights). The main area has two tabs at the top: 'AuthenticatedRole' and 'Add'. Below them, there are two sections: 'Operations Inherited by Parents Roles' and 'Operations Assigned'. The 'Operations Assigned' section is highlighted with a red box and contains two items: 'Allow users to add boxes to nodes' and 'Allow users to delete node boxes', each with a 'Remove' button. At the bottom, there's an 'Add Operation' section with a dropdown menu set to 'Allow users to perform all operations related to boxes' and an 'Add' button.

Figura 5.18: Vagrant Web. Assigned operations to the role

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If you access the *Manage Rights Page* again, you can see that previous changes has an effect in this page (Figure 5.19).



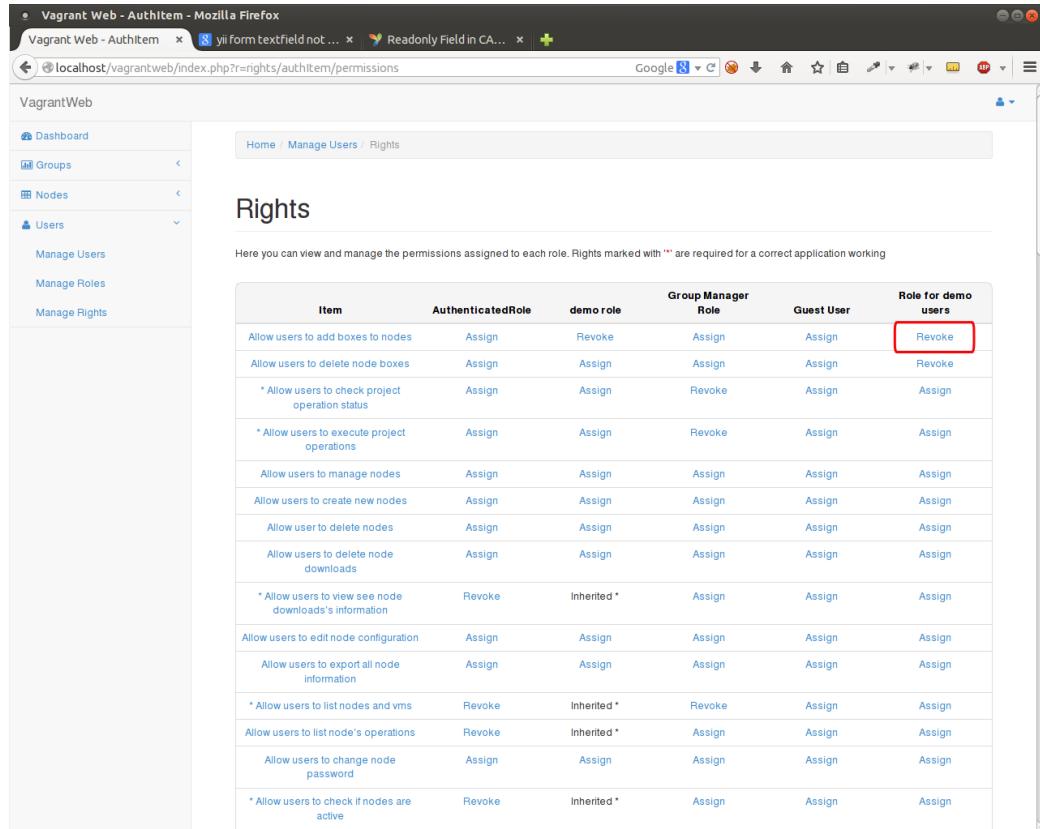
The screenshot shows a Mozilla Firefox browser window titled "Vagrant Web - AuthItem - Mozilla Firefox". The address bar displays "localhost/vagrantweb/index.php?r=rights/authitem/permissions". The main content area is titled "Rights" and contains a table showing permissions assigned to the "demo" role. The table has columns: Item, AuthenticatedRole, demo role, Group Manager Role, Guest User, and Role for demo users. Two rows are highlighted with red boxes: "Allow users to add boxes to nodes" and "Allow users to delete node boxes". Both of these rows have "Assign" under AuthenticatedRole and "Revoke" under Role for demo users.

Item	AuthenticatedRole	demo role	Group Manager Role	Guest User	Role for demo users
Allow users to add boxes to nodes	Assign	Revoke	Assign	Assign	Revoke
Allow users to delete node boxes	Assign	Assign	Assign	Assign	Revoke
* Allow users to check project operation status	Assign	Assign	Revoke	Assign	Assign
* Allow users to execute project operations	Assign	Assign	Revoke	Assign	Assign
Allow users to manage nodes	Assign	Assign	Assign	Assign	Assign
Allow users to create new nodes	Assign	Assign	Assign	Assign	Assign
Allow user to delete nodes	Assign	Assign	Assign	Assign	Assign
Allow users to delete node downloads	Assign	Assign	Assign	Assign	Assign
* Allow users to view see node download's information	Revoke	Inherited *	Assign	Assign	Assign
Allow users to edit node configuration	Assign	Assign	Assign	Assign	Assign
Allow users to export all node information	Assign	Assign	Assign	Assign	Assign
* Allow users to list nodes and vms	Revoke	Inherited *	Revoke	Assign	Assign
Allow users to list node's operations	Revoke	Inherited *	Assign	Assign	Assign
Allow users to change node password	Assign	Assign	Assign	Assign	Assign
* Allow users to check if nodes are	Revoke	Inherited *	Assign	Assign	Assign

Figura 5.19: Vagrant Web. Manage Rights Page after assignment

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From the *Manage Rights Page*, you are going to *Revoke* the operation *Allow users to add boxes to nodes*. To perform this, click on the corresponding *Revoke* button (Figures 5.20 and 5.21).



The screenshot shows a Mozilla Firefox browser window with the title "Vagrant Web - AuthItem - Mozilla Firefox". The address bar displays "localhost/vagrant/web/index.php?r=rights/authitem/permissions". The main content area is titled "Rights" and contains a table of permissions assigned to the "demo role". The table has columns for Item, AuthenticatedRole, demo role, Group Manager Role, Guest User, and Role for demo users. The "Role for demo users" column for the first row ("Allow users to add boxes to nodes") has a red box around the "Revoke" button.

ITEM	AuthenticatedRole	demo role	Group Manager Role	Guest User	Role for demo users
Allow users to add boxes to nodes	Assign	Revoke	Assign	Assign	Revoke
Allow users to delete node boxes	Assign	Assign	Assign	Assign	Revoke
* Allow users to check project operation status	Assign	Assign	Revoke	Assign	Assign
* Allow users to execute project operations	Assign	Assign	Revoke	Assign	Assign
Allow users to manage nodes	Assign	Assign	Assign	Assign	Assign
Allow users to create new nodes	Assign	Assign	Assign	Assign	Assign
Allow user to delete nodes	Assign	Assign	Assign	Assign	Assign
Allow users to delete node downloads	Assign	Assign	Assign	Assign	Assign
* Allow users to view see node downloads's information	Revoke	Inherited *	Assign	Assign	Assign
Allow users to edit node configuration	Assign	Assign	Assign	Assign	Assign
Allow users to export all node information	Assign	Assign	Assign	Assign	Assign
* Allow users to list nodes and vms	Revoke	Inherited *	Revoke	Assign	Assign
Allow users to list node's operations	Revoke	Inherited *	Assign	Assign	Assign
Allow users to change node password	Assign	Assign	Assign	Assign	Assign
* Allow users to check if nodes are active	Revoke	Inherited *	Assign	Assign	Assign

Figura 5.20: Vagrant Web. Revoking an operation

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The screenshot shows a web browser window titled "Vagrant Web - AuthItem - Mozilla Firefox". The URL is "localhost/vagrantweb/index.php?r=rights/authitem/permissions". The page has a sidebar on the left with "VagrantWeb" branding and links for Dashboard, Groups, Nodes, and Users (Manage Users, Manage Roles, Manage Rights). The main content area is titled "Rights" and contains a table of permissions. The table has columns: Item, AuthenticatedRole, demo role, Group Manager Role, Guest User, and Role for demo users. A red box highlights the "Assign" button under the "Role for demo users" column for the first row. The table lists various permissions such as "Allow users to add boxes to nodes", "Allow users to delete node boxes", and "Allow users to check project operation status". Most permissions are marked with an asterisk (*), indicating they are required.

Item	AuthenticatedRole	demo role	Group Manager Role	Guest User	Role for demo users
Allow users to add boxes to nodes	Assign	Revoke	Assign	Assign	Assign
Allow users to delete node boxes	Assign	Assign	Assign	Assign	Revoke
* Allow users to check project operation status	Assign	Assign	Revoke	Assign	Assign
* Allow users to execute project operations	Assign	Assign	Revoke	Assign	Assign
Allow users to manage nodes	Assign	Assign	Assign	Assign	Assign
Allow users to create new nodes	Assign	Assign	Assign	Assign	Assign
Allow user to delete nodes	Assign	Assign	Assign	Assign	Assign
Allow users to delete node downloads	Assign	Assign	Assign	Assign	Assign
* Allow users to view see node downloads's information	Revoke	Inherited *	Assign	Assign	Assign
Allow users to edit node configuration	Assign	Assign	Assign	Assign	Assign
Allow users to export all node information	Assign	Assign	Assign	Assign	Assign
* Allow users to list nodes and vms	Revoke	Inherited *	Revoke	Assign	Assign
Allow users to list node's operations	Revoke	Inherited *	Assign	Assign	Assign
Allow users to change node password	Assign	Assign	Assign	Assign	Assign
* Allow users to check if nodes are active	Revoke	Inherited *	Assign	Assign	Assign

Figura 5.21: Vagrant Web. Manage Rights Page after revocation

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Now, the *Role Update Page* the *Operations Assigned* table will display this change (Figure 5.22).

The screenshot shows a web browser window titled "Vagrant Web - Update AuthItem - Mozilla Firefox". The URL is "localhost/vagrantweb/index.php?r=rights/authitem/update&name=NewDemoRole". The page displays a list of operations assigned to a role, with one operation highlighted by a red box.

Operations Inherited by Parents Roles

- * Allow users to view see node downloads's information
- * Allow users to list nodes and vms
- Allow users to list node's operations
- * Allow users to check if nodes are active
- Allow users to see node configuration
- Allow users to view node information
- Allow users to see last operations performed on a node
 - * Allow users to check operation status
 - Allow users to delete projects
 - * Allow users to access the index web page
- * Allow users to execute bulk pause operations to virtual machines
- * Allow users to execute bulk startup operations to virtual machines
- * Allow users to execute bulk stop operations to virtual machines
 - * Allow users to execute commands in virtual machines
 - Allow users to list virtual machine snapshots
 - * Allow users to view virtual machines configuration
- Allow users to perform all actions related to operations

Operations Assigned

- Allow users to delete node boxes

Add Operation

- Allow users to perform all operations related to boxes

Figura 5.22: Vagrant Web. Assigned operations to the role

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5.3 Managing Users

In this last section of the current chapter, this document is going to explain how to manage users and assign roles and virtual machines to them.

The main page of this feature is the *Manage Users Page*. To access this page click on the **Manage Users** submenu in the **Users** menu (Figure 5.23).

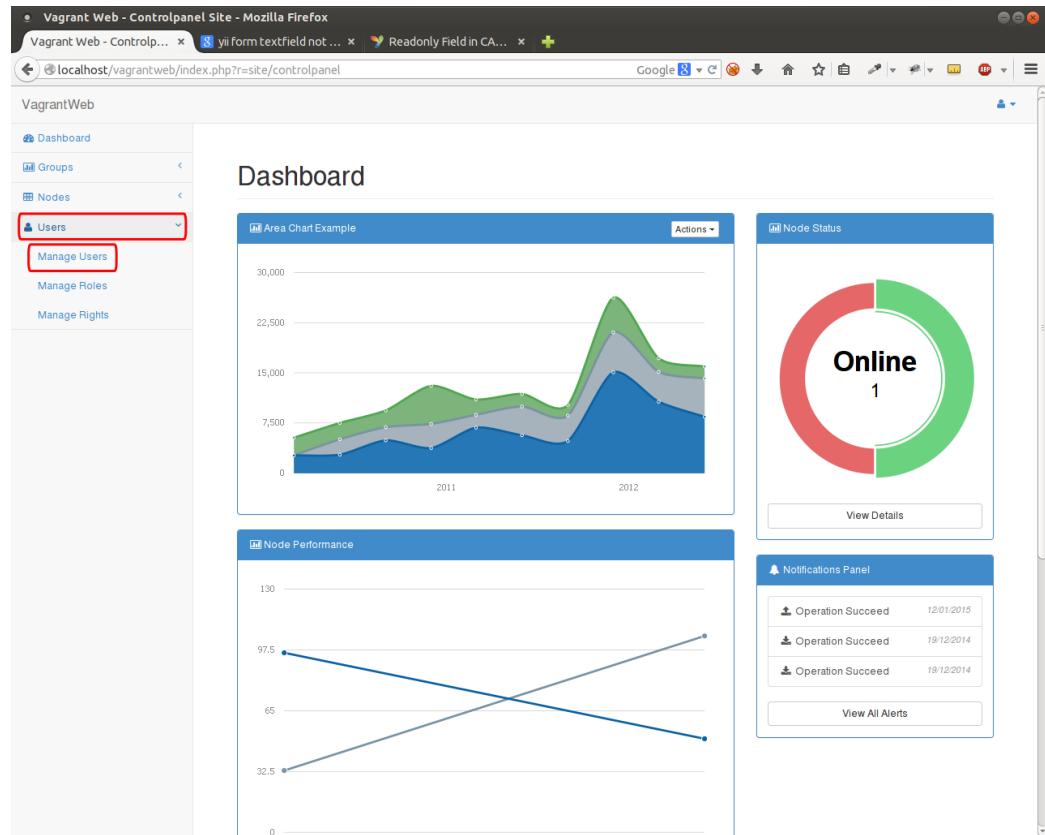


Figura 5.23: Vagrant Web. Accessing the Manage Users Page

The table showed in Figure 5.24 is very similar to others explained before. The main actions are:

1. This two columns displays information about the user. Besides, if the user name link is clicked, the web application will redirect you to the *User View Page*.
2. *View Icon*. When this icon is clicked the web application redirects to the *User View Page*.

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3. *Update Icon.* When this icon is clicked the web application redirects to the *User Update Page*.
4. *Trash Icon.* To remove an user from the web application, click on the corresponding icon.
5. *Create User.* When this button is clicked the *Vagrant Web* will display the *Create User Form*.

The screenshot shows a web browser window for 'Vagrant Web - Admin User - Mozilla Firefox'. The URL is 'localhost/vagrantweb/index.php?r=user/admin'. The page title is 'Manage Users'. On the left, there's a sidebar with 'Dashboard', 'Groups', 'Nodes', and 'Users' sections, with 'Manage Users' selected. The main content area has a heading 'Manage Users' and a note about search operators. It displays three users in a table:

Username	Email
demo	webmaster@example.com
admin	webmaster1@example.com
demo1	webmaster2@example.com

Below the table is a red box labeled '1' over the search bar. To the right of the table is a red box labeled '2 3 4' over the edit icons. At the bottom left is a red box labeled '5' over the 'Create User' button. The footer says 'Created by CatedraSAES-UMU'.

Figura 5.24: Vagrant Web. Manage Users Page

5.3.1 Creating Users

In order to create a new user just click on the *Create User* button. Once clicked, you will be redirected to the *Creation Form* (Figure 5.25). The information that you have to fill is the following:

- *Username*

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- *Password*

- *Email*

The screenshot shows a Mozilla Firefox browser window with the title bar "Vagrant Web - Create User - Mozilla Firefox". The address bar displays "localhost/vagrantweb/index.php?r=user/create". The page content is titled "Create User". On the left, there is a sidebar with navigation links: Dashboard, Groups, Nodes, and Users (with sub-links: Manage Users, Manage Roles, Manage Rights). The main form area has a note "Fields with * are required." and three input fields: "Username" (demo2), "Password" (*****), and "Email" (demo2@example.com). At the bottom of the form are "Create" and "Cancel" buttons. A footer note at the bottom right says "Created by CatedraSAES-UMU".

Figura 5.25: Vagrant Web. User Creation Form

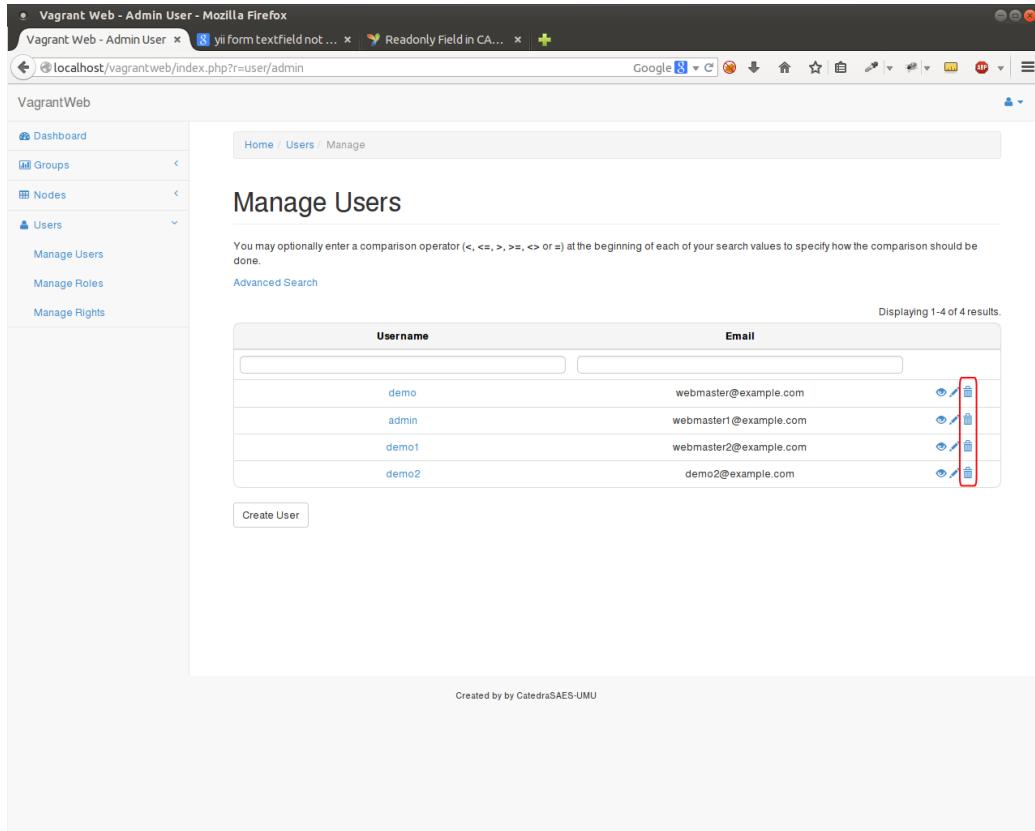
After the form submission, *Vagrant Web* redirects you to the *Update User Page*. In this page you can:

- Change user's information.
- Assign/Unassign roles to the user.
- Assign virtual machines to user.
- Check virtual machines assigned by groups (explained in Chapter 6).

5. CHAPTER 5: ROLES AND USERS

5.3.2 Deleting Users

The procedure to delete a user is even easier than the former. To delete it, you only have to click the *Trash Icon* of the desired users in the *User Table* at the *Manage Users Page* (Figure 5.26).



The screenshot shows a Firefox browser window titled "Vagrant Web - Admin User - Mozilla Firefox". The address bar displays "localhost/vagrant/web/index.php?r=user/admin". The main content area is titled "Manage Users". A table lists four users: demo, admin, demo1, and demo2. Each user row has three icons on the right: a magnifying glass, a pencil, and a trash can. The trash can icons for users demo1 and demo2 are highlighted with a red box. The table has two columns: "Username" and "Email". A message above the table says: "You may optionally enter a comparison operator (<, <=, >, >=, or =) at the beginning of each of your search values to specify how the comparison should be done." Below the table is a "Create User" button. The footer of the page says "Created by CatedraSAES-UMU".

Figura 5.26: Vagrant Web. Deleting a user

5.3.3 Managing User Roles

The assignment of roles can be done in the *User Update Page*. Remember, you can access this page by clicking on the *Update Icon* in the *User Table* at the *Manage Users Page* (Figure 5.27).

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The screenshot shows a Mozilla Firefox browser window titled "Vagrant Web - Admin User - Mozilla Firefox". The address bar displays "localhost/vagrantweb/index.php?r=user/admin". The main content area is titled "Manage Users". On the left, there is a sidebar with navigation links: Dashboard, Groups, Nodes, and a expanded "Users" section containing "Manage Users", "Manage Roles", and "Manage Rights". The main content area shows a table with four rows of user data:

Username	Email
demo	webmaster@example.com
admin	webmaster1@example.com
demo1	webmaster2@example.com
demo2	demo2@example.com

A red rectangular box highlights the edit icons (pencil and trash) for the last three users (admin, demo1, demo2). At the bottom of the table, there is a "Create User" button. A small note at the bottom of the page says "Created by CatedraSAES-UMU".

Figura 5.27: Vagrant Web. Accessing the User Update Page

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In the *User Update Page* there are two components dedicated to this functionality: *Assigned Roles* and *Available Roles*.

From the component *Assigned Roles* you can display the list of roles assigned to the current user. Also, from this component you can remove them. Remember that, by default, when you create a new user, the role *AuthenticatedRole*, which has all the basic permissions, is automatically assigned. From component *Available Roles* you can assign new roles to the user.

Let's see how this feature works. In a previous example we created a new role called *NewDemoRole*. This role is available in the *Available Role* list. To assign it, once selected, click on the *Add* button (Figures 5.28 and 5.29).

The screenshot shows the 'Update User demo2' page in the Vagrant Web interface. The 'Available Roles' dropdown menu is open, displaying several roles: AdminRole, AdminRole, AuthenticatedRole, DEMOROLE, GroupManagerRole, Guest, and NewDemoRole. The 'NewDemoRole' option is highlighted with a red box. An 'Assign' button is located next to the dropdown menu. Below the dropdown, there are sections for 'Assigned Roles', 'Assigned Virtual Machines', and 'Virtual machines assigned in Groups', each showing a table with no results found.

Figura 5.28: Vagrant Web. Assigning a role to the user

5. CHAPTER 5: ROLES AND USERS

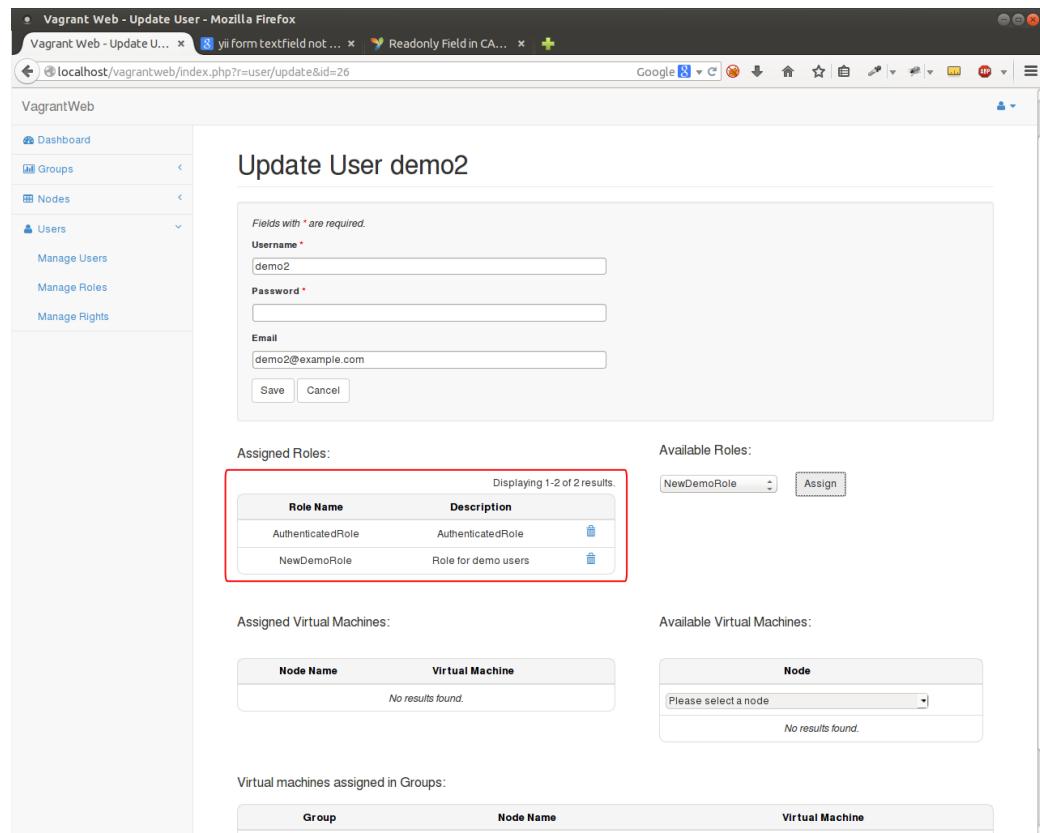


Figura 5.29: Vagrant Web. Checking the role assignment result

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Now, the role has been assigned, click on the corresponding *Trash Icon* to remove it (Figures 5.30 and 5.31).

The screenshot shows the 'Update User demo2' page in Vagrant Web. On the left, there's a sidebar with 'Dashboard', 'Groups', 'Nodes', and 'Users' sections, with 'Users' expanded to show 'Manage Users', 'Manage Roles', and 'Manage Rights'. The main area has a form for updating the user 'demo2' with fields for Username, Password, and Email. Below the form, under 'Assigned Roles', there's a table showing two roles: 'AuthenticatedRole' and 'NewDemoRole'. The 'NewDemoRole' row has a trash icon in the 'Description' column, which is highlighted with a red box. To the right of the table are buttons for 'NewDemoRole' and 'Assign'. There are also sections for 'Assigned Virtual Machines' and 'Available Virtual Machines', both currently empty. At the bottom, there's a section for 'Virtual machines assigned in Groups'.

Figura 5.30: Vagrant Web. Unassigning a role to the user

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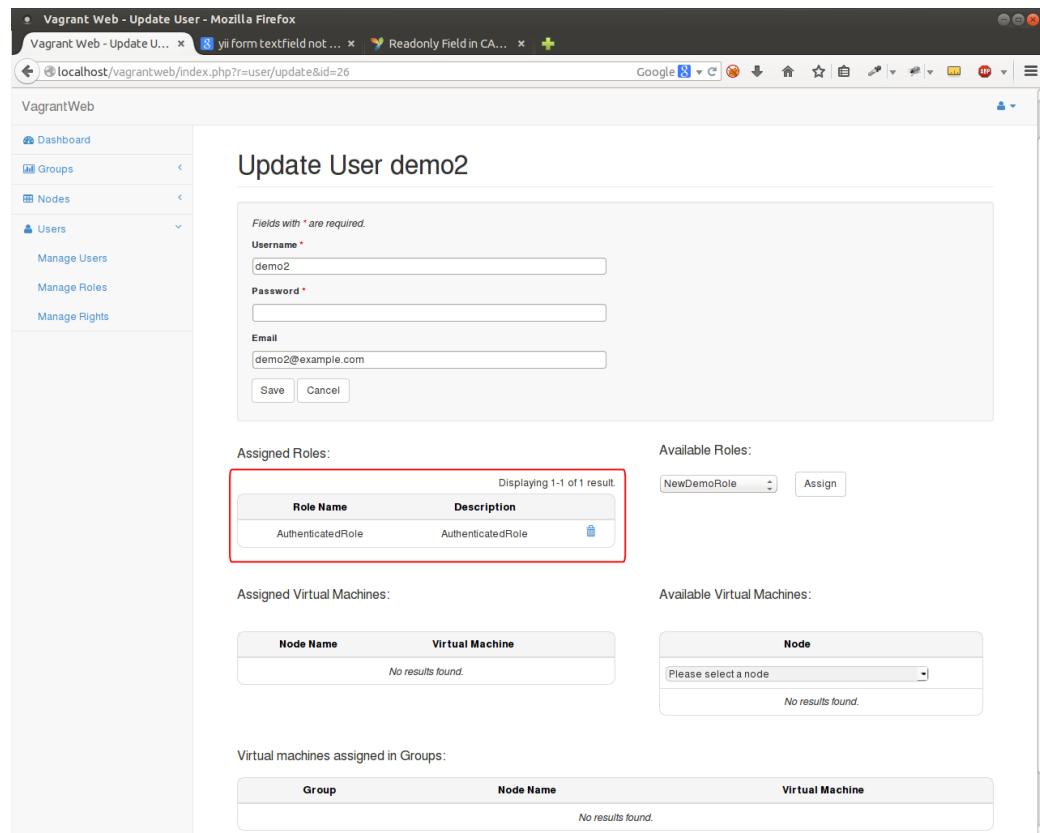


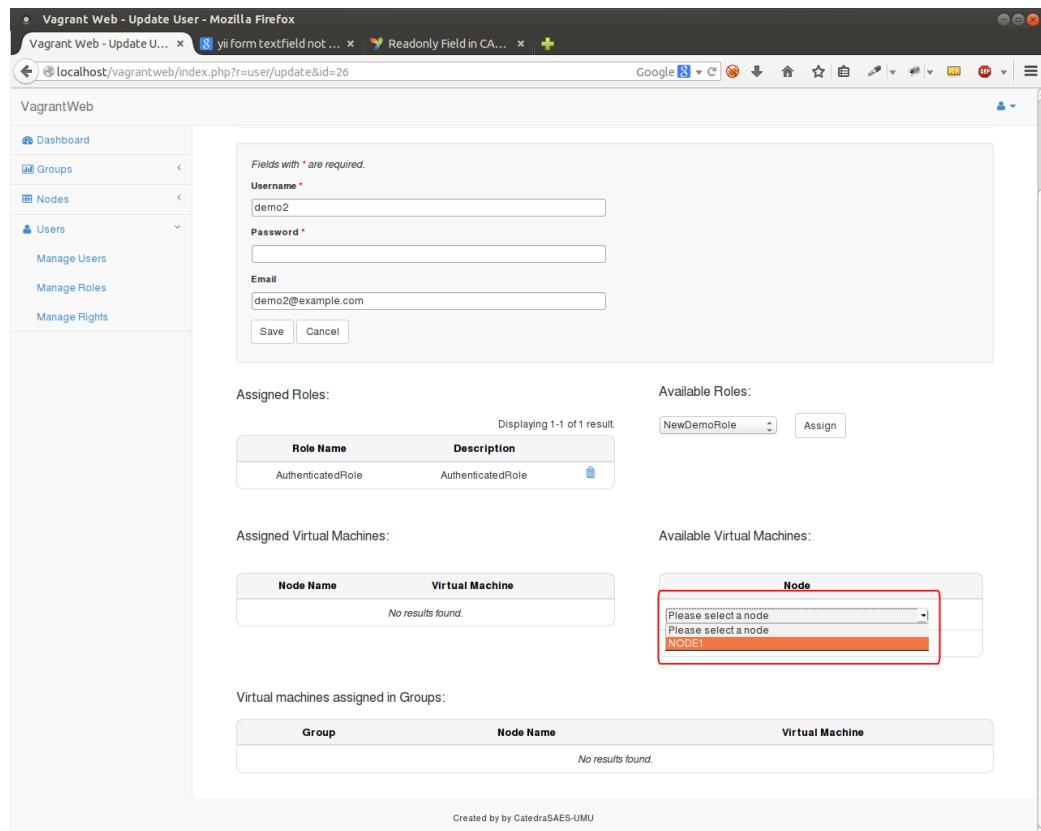
Figura 5.31: Vagrant Web. Checking the role unassignment result

5.3.4 Assigning Virtual Machines

In a former section (Section 4.1.3), the document showed how to perform this action but from a different perspective. Now, in this section, you will see how to do the same but from the *User Update Page*.

The component *Assigned Virtual Machines* list all the virtual machines that are currently assigned to the user. The component *Available Virtual Machines* list, by each node, the available virtual machines that can be assigned to the user.

To assign a new virtual machine to the user you have to select first, in the *Available Virtual Machines* component, the node to query for its virtual machines. After the response arrives, and the virtual machines are listed, you have to click on the corresponding *Add Icon* (Figures 5.32, 5.33 and 5.34). Notice that only online nodes will be available in the node list.



The screenshot shows the Vagrant Web application running in Mozilla Firefox. The URL is `localhost/vagrantweb/index.php?r=user/update&id=26`. The left sidebar shows navigation links for Dashboard, Groups, Nodes, and Users. Under Users, there are sub-links for Manage Users, Manage Roles, and Manage Rights. The main content area has a form for updating a user. It includes fields for Username (demo2), Password (redacted), and Email (demo2@example.com). Below the form, the 'Assigned Roles:' section shows a table with one result: Role Name: AuthenticatedRole, Description: AuthenticatedRole. The 'Available Roles:' section shows a dropdown menu set to 'NewDemoRole' and a 'Assign' button. The 'Assigned Virtual Machines:' section shows a table with the message 'No results found.' The 'Available Virtual Machines:' section shows a table with a dropdown menu for 'Node'. The dropdown menu contains three items: 'Please select a node', 'Please select a node', and 'NODE1', with 'NODE1' highlighted in red. At the bottom, there is a section for 'Virtual machines assigned in Groups:' with a table showing 'No results found.' A footer at the bottom of the page says 'Created by CatedraSAES-UMU'.

Figura 5.32: Vagrant Web. Displaying the nodes

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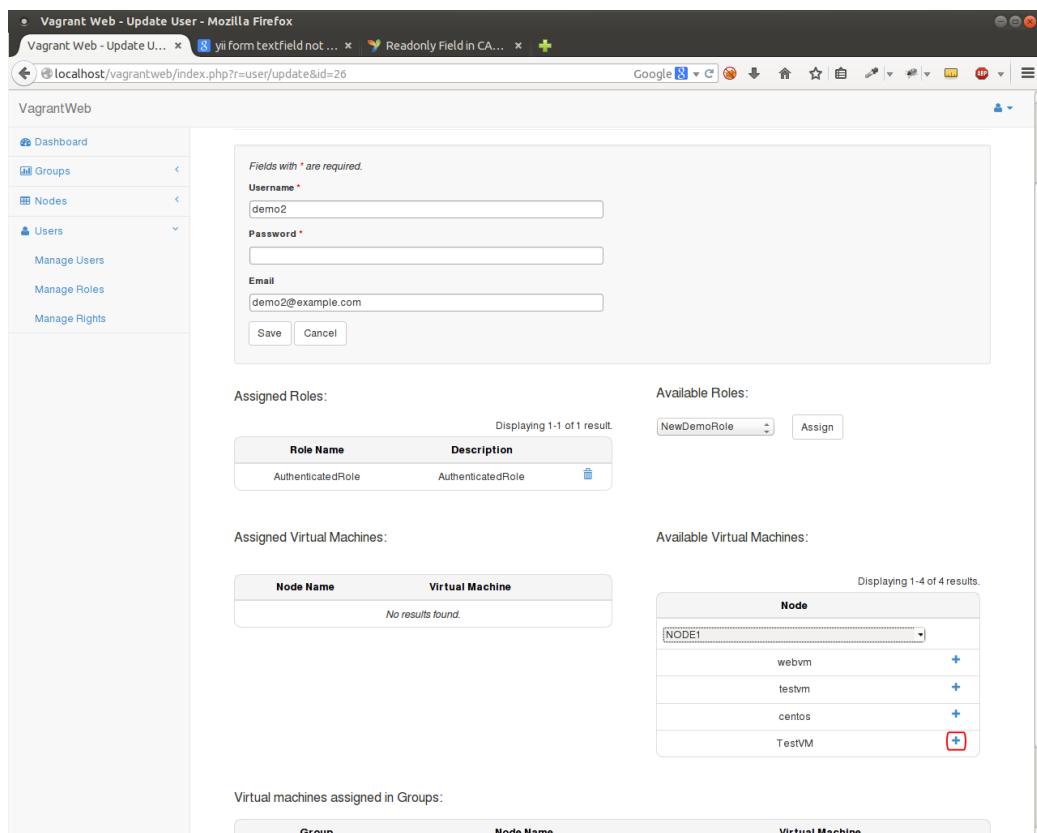


Figura 5.33: Vagrant Web. Adding virtual machines

5. CHAPTER 5: ROLES AND USERS

The screenshot shows the Vagrant Web application running in Mozilla Firefox. The URL is `localhost/vagrantweb/index.php?r=user/update&id=26`. The main content area displays the following information:

- Assigned Roles:** A table showing one result: `AuthenticatedRole` (Description: `AuthenticatedRole`)
- Available Roles:** A dropdown menu showing `NewDemoRole` and a button labeled `Assign`.
- Assigned Virtual Machines:** A table showing one result: `NODE1` (Virtual Machine: `TestVM`). This section is highlighted with a red rectangle.
- Available Virtual Machines:** A table with no results found.
- Virtual machines assigned in Groups:** An empty table with no results found.

Figura 5.34: Vagrant Web. Checking assignment result

5. CHAPTER 5: ROLES AND USERS

The procedure to remove an assigned virtual machine is performed clicking the corresponding *Trash Icon* in the *Assigned Virtual Machines* component (Figures 5.35, 5.36 and 5.37).

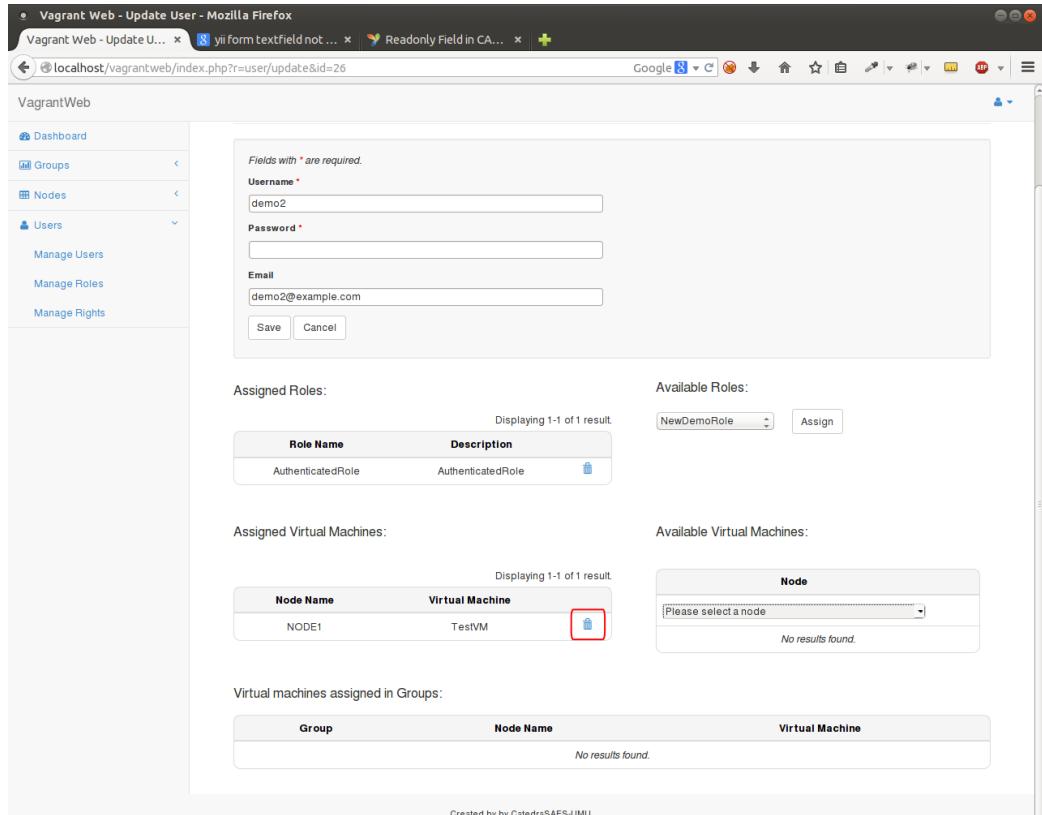


Figura 5.35: Vagrant Web. Removing an assigned virtual machine

5. CHAPTER 5: ROLES AND USERS

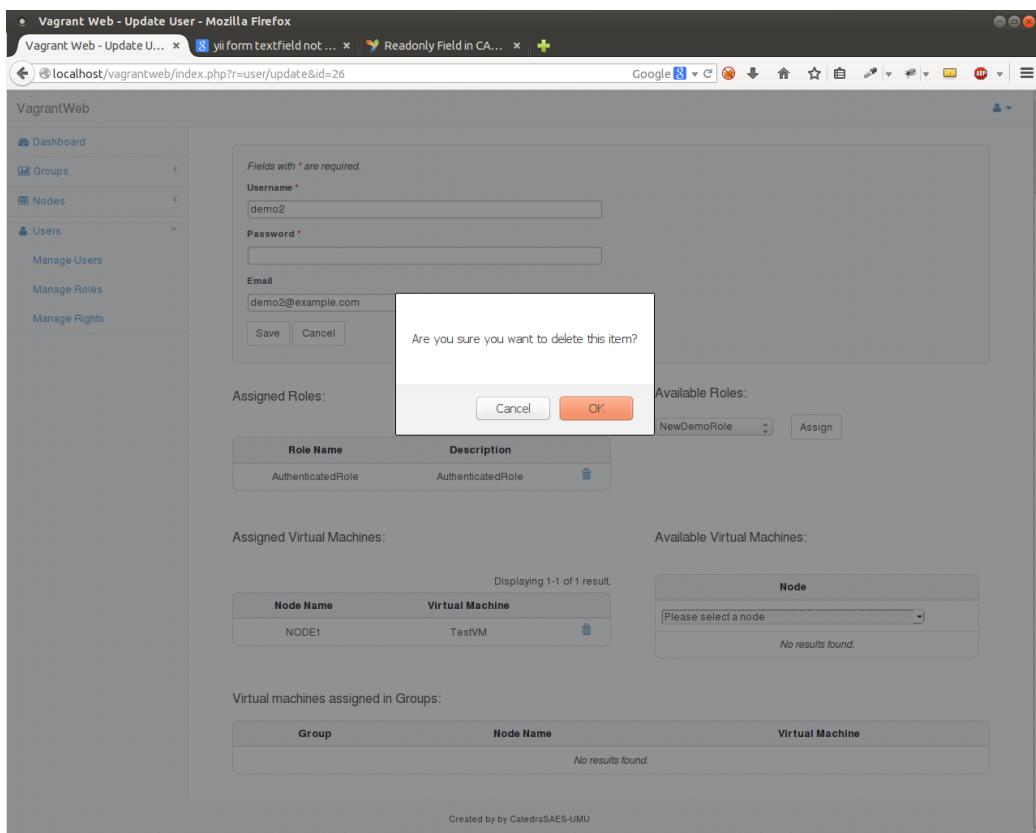


Figura 5.36: Vagrant Web. Confirm dialog

5. CHAPTER 5: ROLES AND USERS

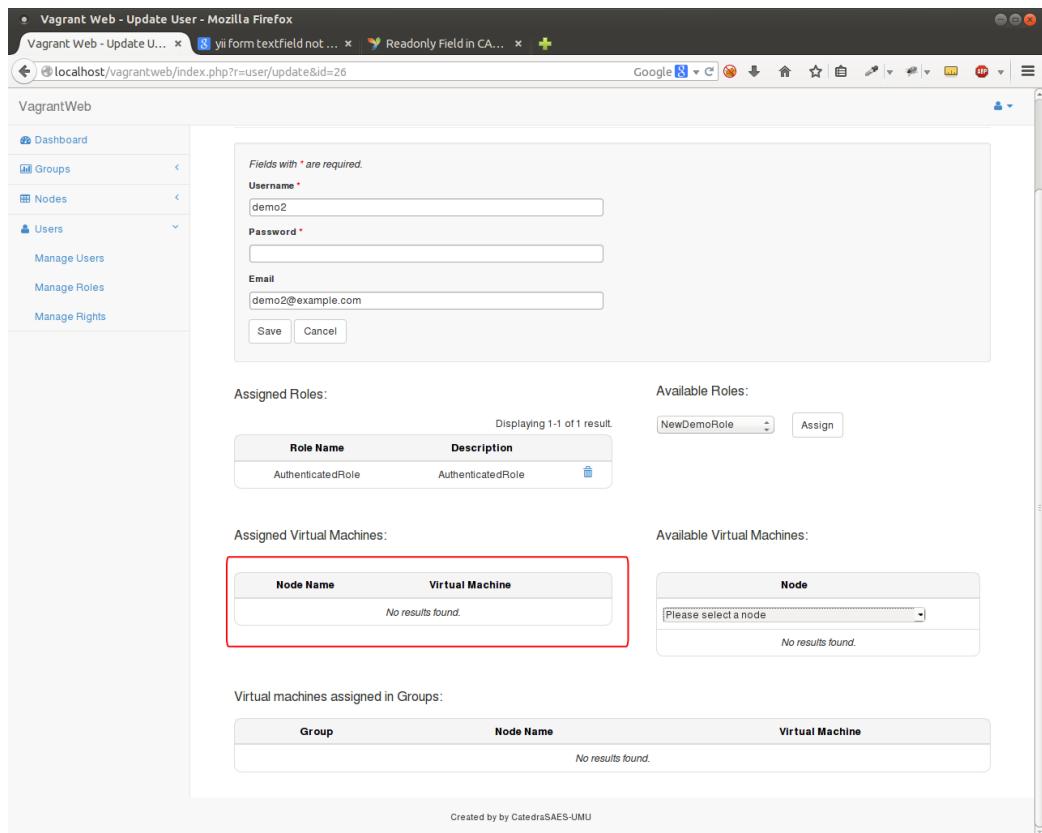


Figura 5.37: Vagrant Web. Checking unassignment result

6

Chapter 6: Groups

A *Group* define a set of virtual machines from one or more nodes, that can be managed and controlled as a whole. Let's see an example of usage:

- Suppose we have an environment with two Nodes: *Node1* and *Node2*
- Each node has three virtual machines: *Node1VM1* to *Node1VM3* and *Node2VM1* to *Node2VM3*
- There is a group called *ExampleGroup* composed by *Node1VM1*, *Node2VM1* and *Node2VM2*
- Once the group is configured, you can command actions like start up, shutdown or pause to the group. Automatically those commands will be performed to each virtual machine that composes the group

There is another interesting feature related to groups, *prioritization*. In the former example, the group *ExampleGroup* has two virtual machines that belongs to the node *Node2*. If an action, for example 'start up', is performed on both virtual machines at the same time, the physical server (the node), could have a lower throughput doing these operations. It could have been better to perform the operations on one virtual machine, and after it is completed, on the other. You can do this with the *prioritization* feature.

Other reason for prioritization assignments of virtual machines to the group is *orchestration*. With this feature you can arrange when and how the commands will be performed on each virtual machine.

The *Group* menu is divided into the sections:

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- **List Groups.** This page shows all the created groups. From this page you can perform operations, create new groups, update their config or delete them.
- **Manage Group Users.** In this page you can assign existing web users to each group.

In the following sections you will learn how to:

- Create, update and delete a group
- Assign virtual machines to groups
- Manage group users
- Perform commands both globally and specifically

6.1 Creating a group

In order to create a group, first click on the **Groups** menu and then in the **List Groups** submenu. From this page, click on the *Create Group* button (Figure 6.2).

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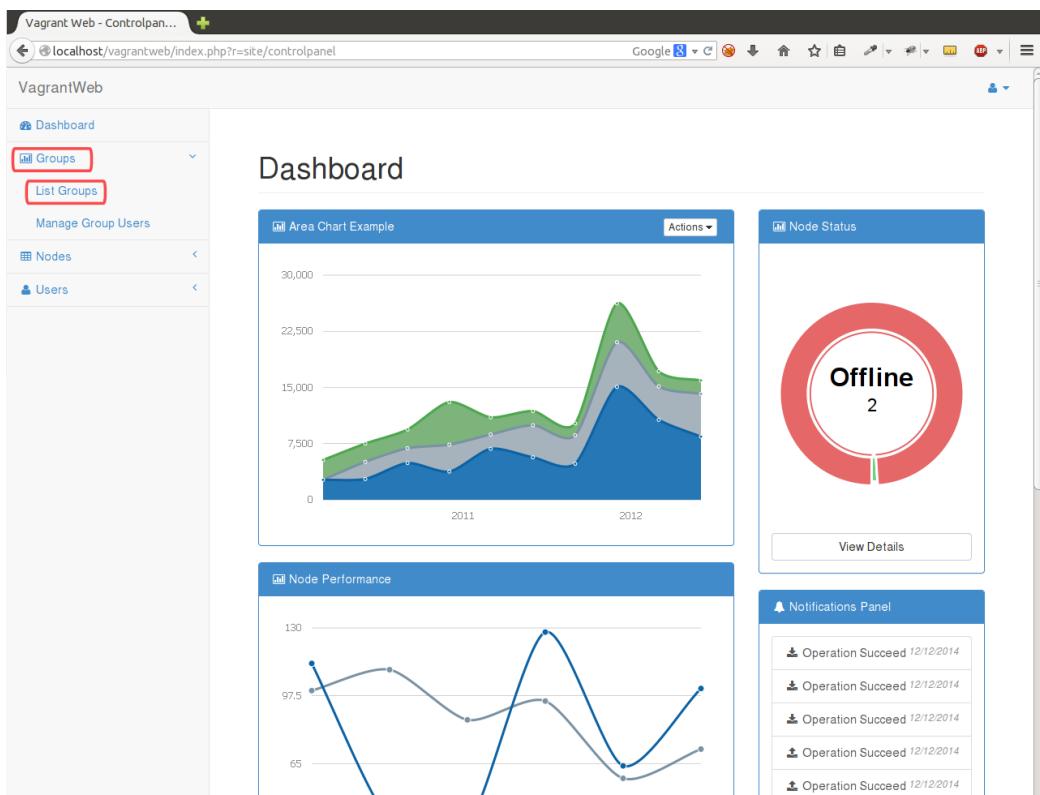


Figura 6.1: Vagrant Web. Creating new group

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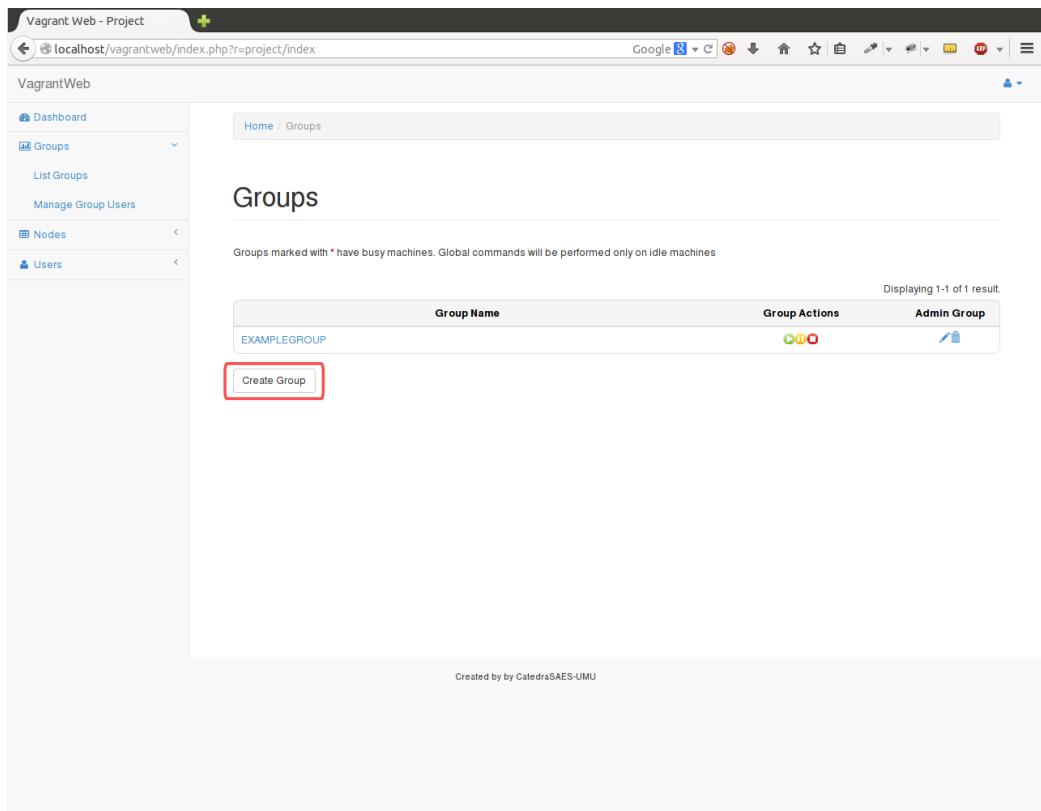


Figura 6.2: Vagrant Web. Creating new group

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In the creation page, Figure 6.3, the only thing you have to do in order to create the group is to fill the group name.

The screenshot shows a web browser window titled 'Vagrant Web - Create Proj...'. The address bar displays 'localhost/vagrantweb/index.php?r=project/create'. The page header says 'VagrantWeb'. On the left, there's a sidebar with navigation links: 'Dashboard', 'Groups' (selected), 'List Groups', 'Manage Group Users', 'Nodes', and 'Users'. The main content area is titled 'Create Group'. It contains a form with a required field 'Group Name *' containing the value 'ExampleGroup'. Below the form are 'Create' and 'Cancel' buttons. At the bottom of the page, a footer note reads 'Created by CatedraSAES-UMU'.

Figura 6.3: Vagrant Web. Creating the group

After the group has been created, the browser will redirect you to the group view page which will be explained in detail in the following sections.

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Just to see if the group is properly created, access to the group list page (Figure 6.4)

The screenshot shows the Vagrant Web interface for a project named 'VagrantWeb'. The left sidebar has a 'Groups' section with 'List Groups' selected, highlighted with a red box. The main content area is titled 'Group ExampleGroup'. It contains two tables: one for nodes and one for users. Both tables show 'No results found.' The bottom of the page includes buttons for 'Run', 'Pause', and 'Stop' under the nodes table, and buttons for 'Delete All Pending', 'Clear Completed', and 'Force Delete All' under the users table. The footer credits 'Created by CatedraSAES-UMU'.

Figura 6.4: Vagrant Web. Access to the Group List Page

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The group list page (Figure 6.5) is the main control panel of this feature. There will be one row per each group.

Vagrant Web - Project

localhost/vagrantweb/index.php?r=project/index

VagrantWeb

Dashboard

Groups

List Groups

Manage Group Users

Nodes

Users

Home / Groups

Groups

Groups marked with * have busy machines. Global commands will be performed only on idle machines

Displaying 1-1 of 1 result.

Group Name	Group Actions	Admin Group
1 EXAMPLEGROUP	2	3 4

Create Project

Created by CatedraSAES-UMU

Figura 6.5: Vagrant Web. Group List Page

There is a lot of information in this page so let's see in further detail:

1. In this column you will see the name of each group. The link will redirect you to the group view page. In that page you will be able to perform commands on each virtual machine assigned that you select.
2. In this column you can perform commands to the whole group of virtual machines. Commands available are:
 - *Start Up* command that runs the virtual machines
 - *Pause* command that pauses the virtual machines
 - *Halt* command that shutdowns the virtual machines
3. This button redirects you to the group config page. In the config page you will change the group name and assign virtual machines to it.

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4. This button deletes the group. (It doesn't removes virtual machines, just erase the assignments to the group).

6.2 Assigning Virtual Machines to Groups

Right now, a group is created but it has no virtual machine associated. Access to the Group Config Page by clicking in the update button of the group row to access this page (Figure 6.6 and 6.7).

The screenshot shows the Vagrant Web interface at localhost/vagrantweb/index.php?r=project/index. The left sidebar includes links for Dashboard, Groups (selected), List Groups, Manage Group Users, Nodes, and Users. The main content area is titled 'Groups' and displays a table with one result. The table has columns for 'Group Name', 'Group Actions', and 'Admin Group'. The single entry is 'EXAMPLEGROUP' with three small circular icons under 'Group Actions' and a blue edit icon under 'Admin Group'. A note at the top of the table states: 'Groups marked with * have busy machines. Global commands will be performed only on idle machines'. Below the table is a 'Create Project' button. At the bottom of the page, it says 'Created by CatedraSAES-UMU'.

Group Name	Group Actions	Admin Group
EXAMPLEGROUP	●●●	✎

Figura 6.6: Vagrant Web. Access to the Group Config Page

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The screenshot shows the Vagrant Web interface at localhost/vagrant/web/index.php?r=project/update&id=3. The main title is "Update Group ExampleGroup". A sidebar on the left includes links for Dashboard, Groups (selected), List Groups, Manage Group Users, Nodes, and Users. The main content area has tabs for Assigned Machines and Available Machines. Under Assigned Machines, there is a table with columns Node Name, Virtual Machine, and Priority, showing "No results found.". Under Available Machines, there is a table with column Node, showing a dropdown menu with "Please select a node" and "No results found.". Below these sections are tables for Assigned Users and Available Users. The Assigned Users table shows "No results found.". The Available Users table displays three users: demo, admin, and demo1, with icons next to them. The footer of the page says "Created by CatedraSAES-UMU".

Figura 6.7: Vagrant Web. Group Config Page

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As it has been explained before, in the group config page you will be able to change the group name and assign virtual machines to the group. This assignment is very easy, you just have to select the node to see its virtual machines and then click on the add button of the desired virtual machine. You can add as many virtual machines as you want, and from different nodes. **Please note that if there isn't any node configured or a node is not active, it won't be shown on the list.**

A step by step assignment of a virtual machine is shown below. The procedure is very easy:

- List the active nodes (Figure 6.8)
- List the virtual machines of the node once selected (Figure 6.9)
- Performing the assignment by clicking on the add icon (Figure 6.10)

The screenshot shows the 'Update Group ExampleGroup' page in the Vagrant Web interface. The left sidebar includes links for Dashboard, Groups (selected), List Groups, Manage Group Users, Nodes, and Users. The main content area has a title 'Update Group ExampleGroup'. It contains a form with a required field 'Group Name' set to 'ExampleGroup'. Below the form are two tables: 'Assigned Machines' (empty) and 'Available Machines' (NODE1). Another two tables show 'Assigned Users' (empty) and 'Available Users' (demo, admin, demo1). A footer note says 'Created by CatedraSAES-UMU'.

Figura 6.8: Vagrant Web. Listing active nodes available

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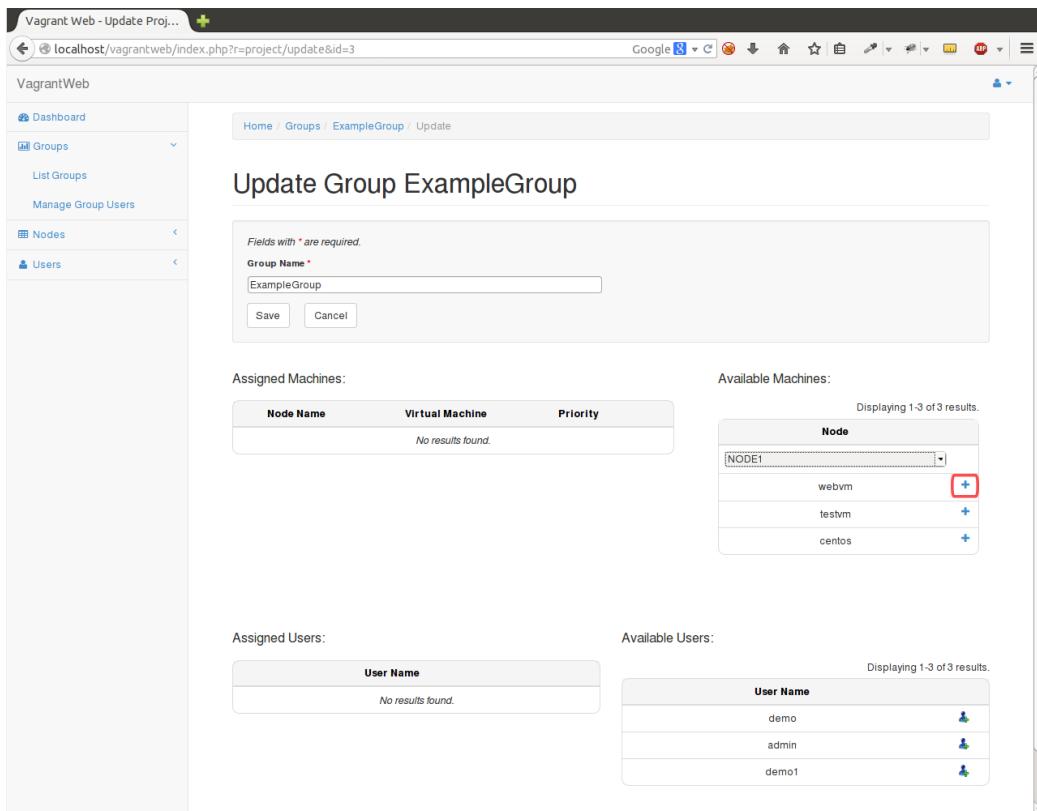


Figura 6.9: Vagrant Web. Assigning a Virtual Machine

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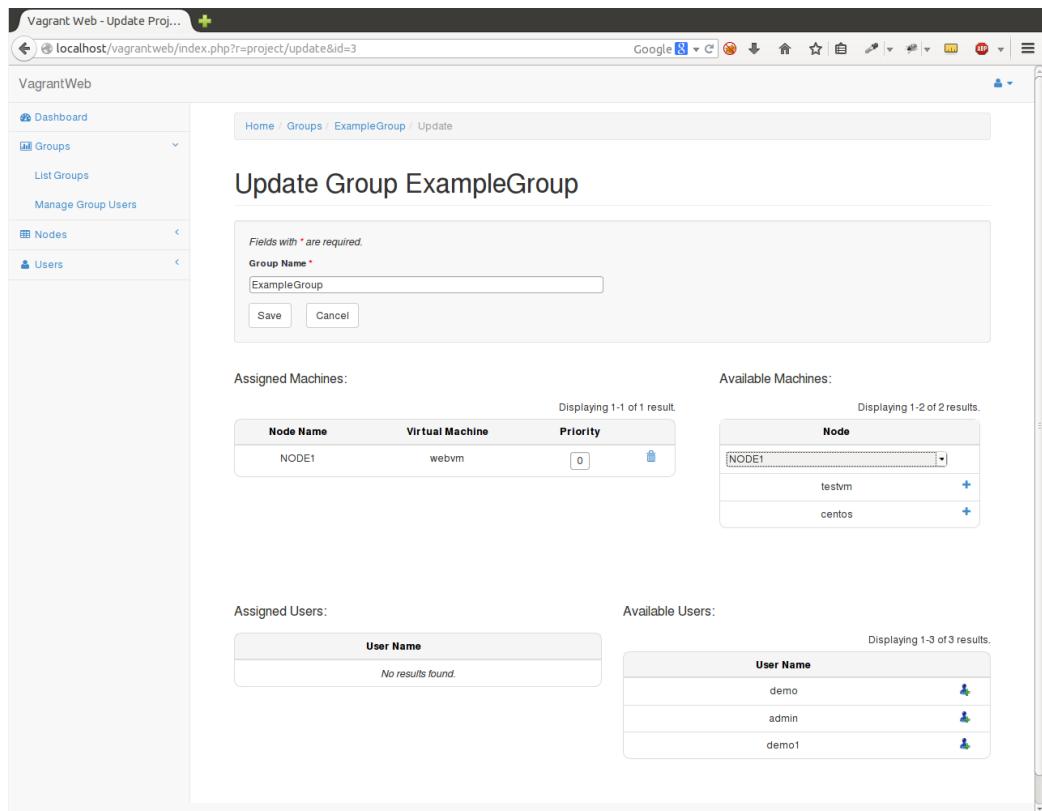


Figura 6.10: Vagrant Web. Virtual Machine assigned

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In the last Figure, 6.10, the assignment row has two new columns besides the virtual machine name and its node name: *priority* and a *delete icon*. We mentioned in the introduction of the chapter what the *priority* is used for, but it will be explained in detailed in a latter section, just remember where it is. If you click in the *delete icon* the assignment will be removed.

Now, if you access the group view page by click on the group's name in the group list page (Figure 6.11) you will see the new assigned virtual machine (Figure 6.12).

The screenshot shows the Vagrant Web interface for a project named "VagrantWeb". The left sidebar includes links for Dashboard, Groups (selected), List Groups, Manage Group Users, Nodes, and Users. The main content area is titled "Groups" and displays a single result: "EXAMPLEGROUP". A table header with columns "Group Name", "Group Actions", and "Admin Group" is shown above the data row. The "Group Name" column contains "EXAMPLEGROUP", which is highlighted with a red border. The "Group Actions" column contains three icons: a green circle with a white checkmark, a yellow circle with a white question mark, and a red circle with a white minus sign. The "Admin Group" column contains a blue edit icon. Below the table is a "Create Project" button. At the bottom of the page, it says "Created by by CatedraSAES-UMU".

Figura 6.11: Vagrant Web. Access to the Group View Page

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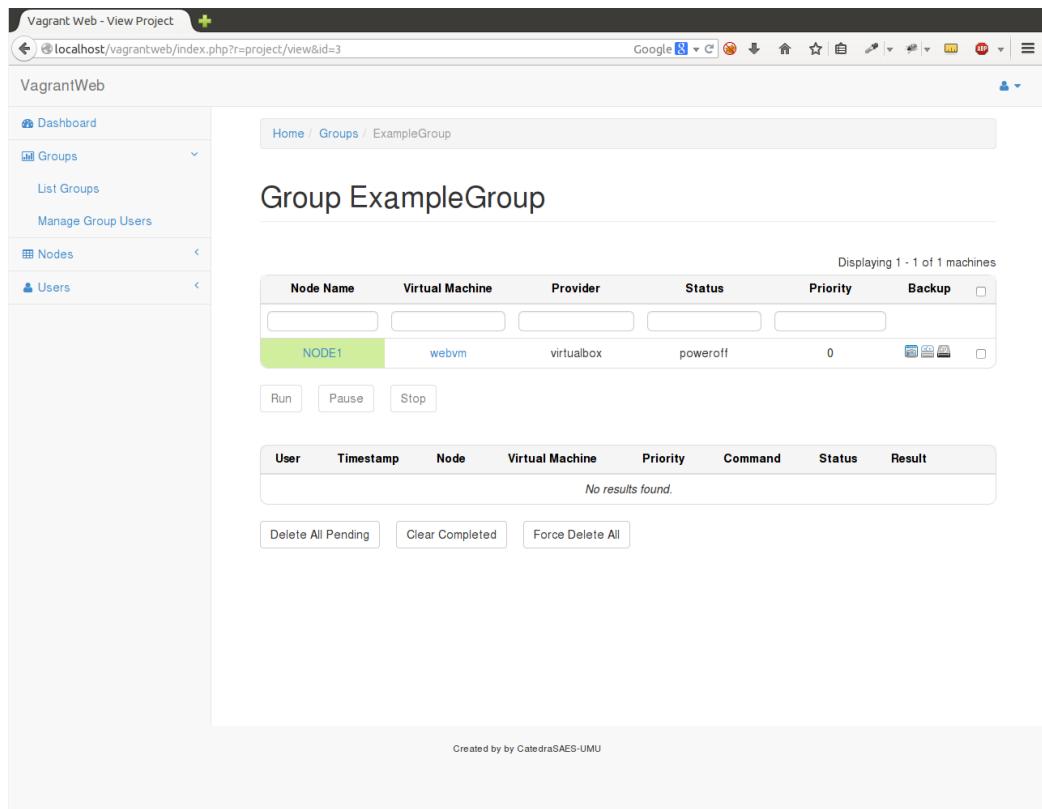
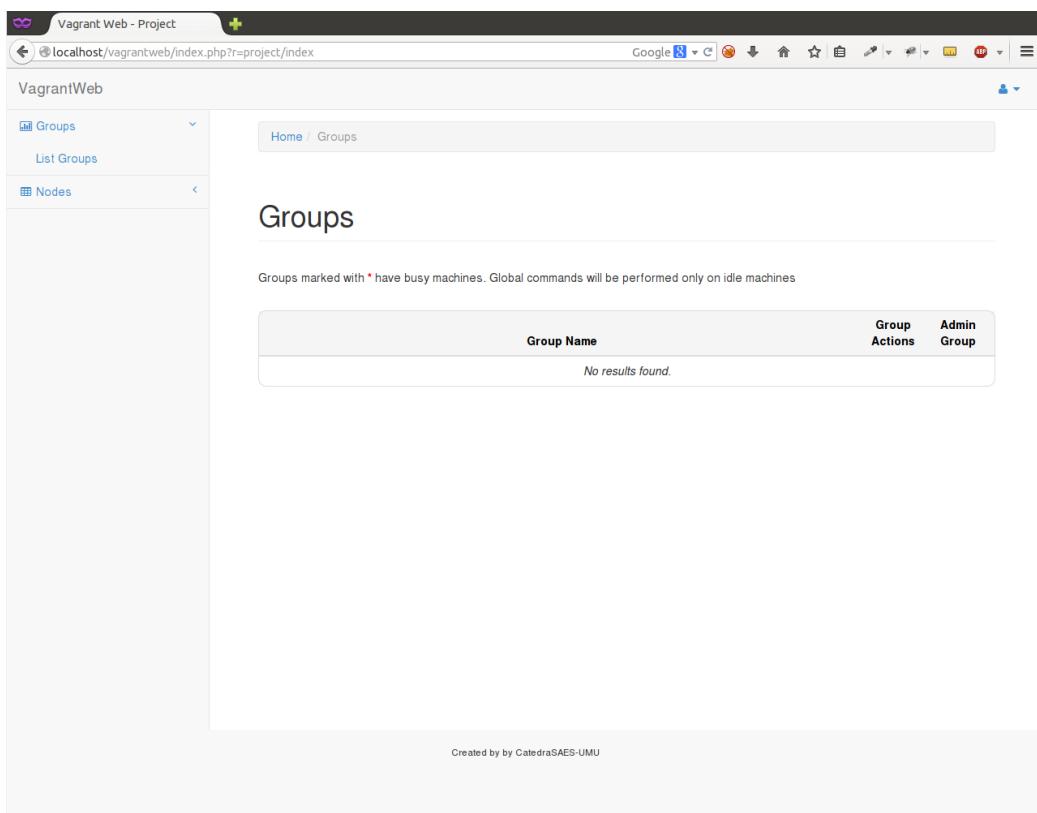


Figura 6.12: Vagrant Web. Listing group's virtual machines

6.3 Managing Group Users

By default, groups can only be managed by the *admin* user, users that have *Admin Role* and for those whose role allow them to perform actions on groups. Admin users have all the privileges so they could interact with every group, but for the last case, regardless of the role of the user, if he/she hasn't been assigned to a group it won't be able to do anything on it. Let's see an example.

In the example scenario there is a user *demo* which has a *Group User Role*, that means that the user can start/pause/stop virtual machines in a group. In the Figure 6.13 you can see what this user see when he/she access the group list page.



The screenshot shows a web browser window titled "Vagrant Web - Project". The address bar displays "localhost/vagrantweb/index.php?r=project/index". The main content area is titled "Groups" and shows a message: "Groups marked with * have busy machines. Global commands will be performed only on idle machines". Below this, a table is displayed with the following columns: "Group Name", "Group Actions", and "Admin Group". A single row is present with the message "No results found." at the bottom. The left sidebar contains navigation links for "Groups" (which is selected) and "Nodes". The footer of the page includes the text "Created by CatedraSAES-UMU".

Figura 6.13: Vagrant Web. List of groups of a user without any group assigned

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Even though there is a group called *ExampleGroup* created, the user can't see it. So, in order to allow the user to have access to that group, you have to give privileges to him/her.

You can assign new users in a couple of ways attending if we want to do this to a single group or a bunch of them. The first way to assign new users is through the *Group Config Page* (Figure 6.6 and 6.7). At the bottom of this page, there are two panels that shows information related to group users. The one on the left lists the current assigned users in the group. The other panel shows the available users. In order to assign a new user, just click the button on the right of the user name in the right panel (Figure 6.14).

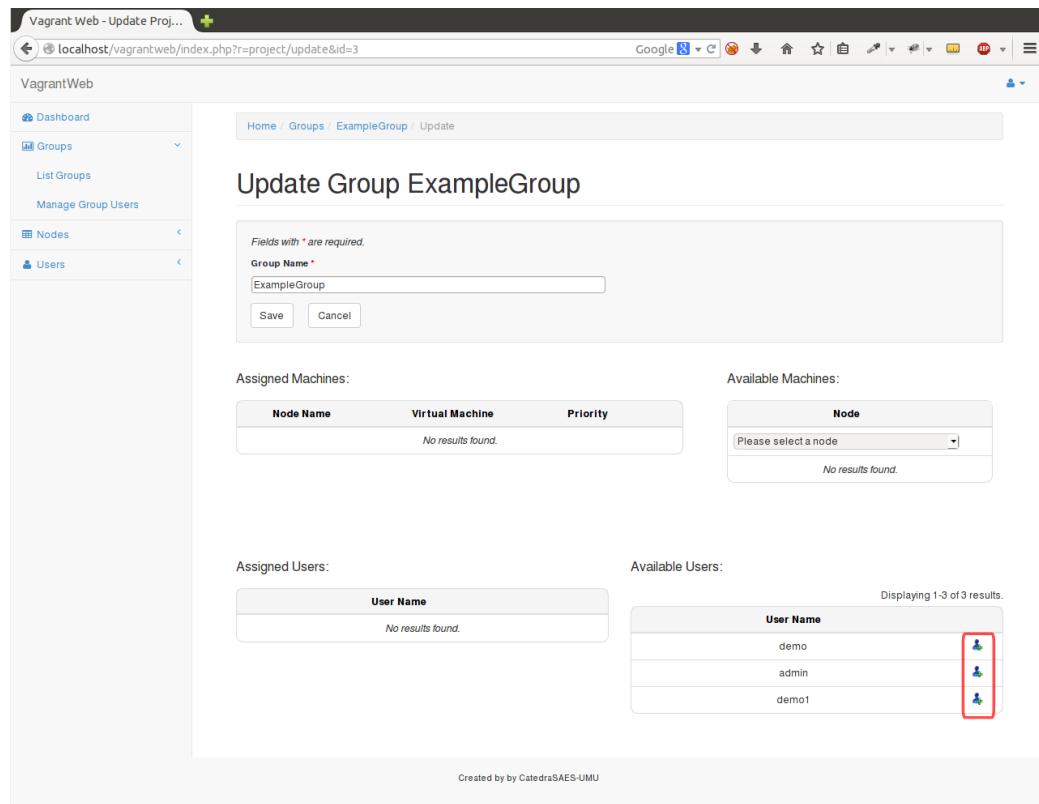


Figura 6.14: Vagrant Web. Adding a new user to a single group

If you want to remove the user from the group, just click on the trash icon on the right of the user name (Figure 6.15).

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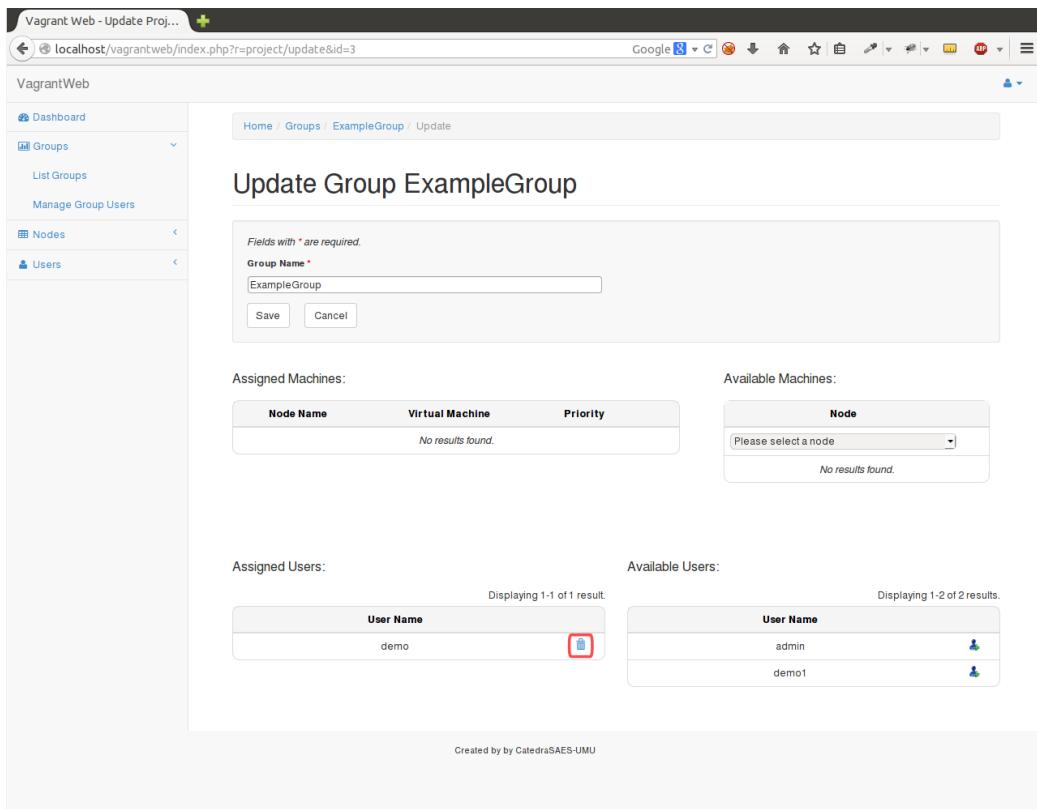


Figura 6.15: Vagrant Web. Adding a new user to a single group

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The other way to add users to groups is through the *Manage Group Users Page* (Figure 6.16)

The screenshot shows a web browser window titled "Vagrant Web - Project". The address bar displays "localhost/vagrantweb/index.php?r=project/index". The main content area is titled "Groups" and contains the following information:

Groups marked with * have busy machines. Global commands will be performed only on idle machines.

Displaying 1-1 of 1 result.

Group Name	Group Actions	Admin Group
EXAMPLEGROUP		

Below the table is a "Create Project" button. The left sidebar includes links for Dashboard, Groups (which is currently selected and highlighted with a red box), Nodes, and Users.

Figura 6.16: Vagrant Web. Access to the Manage Group Users Page

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The procedure to assign an user to a group by this way is very simple and it is pretty similar to assign a virtual machine to a group. Just follow this steps:

- Display the list of available groups and select the desired one (Figure 6.17).
- After the selection of the group, the list of available users will be filled. Just click on the icon on the right of the user name (Figure 6.18).
- If you want to remove the user from the group, just click on the trash icon on the right of the user name (Figure 6.19).

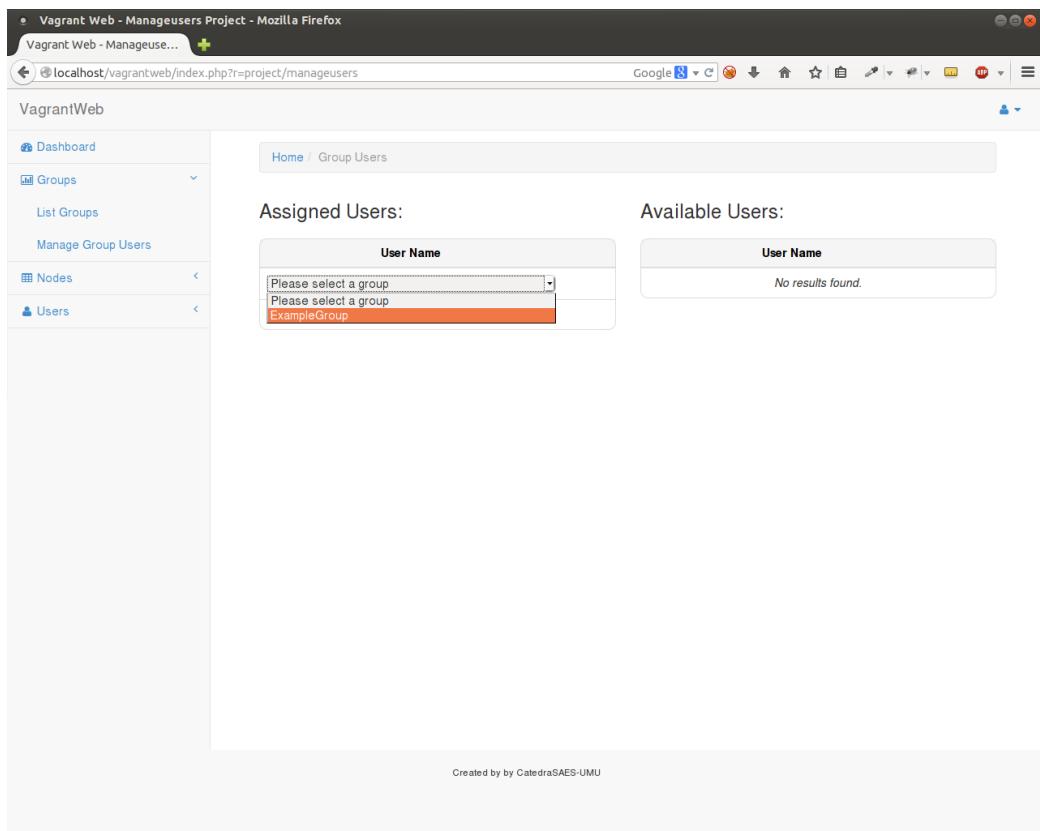


Figura 6.17: Vagrant Web. Selecting the group

Once the user is assigned, you can see on Figure 6.20 that the user *demo* from the example above can see the new group on the Group List Page.

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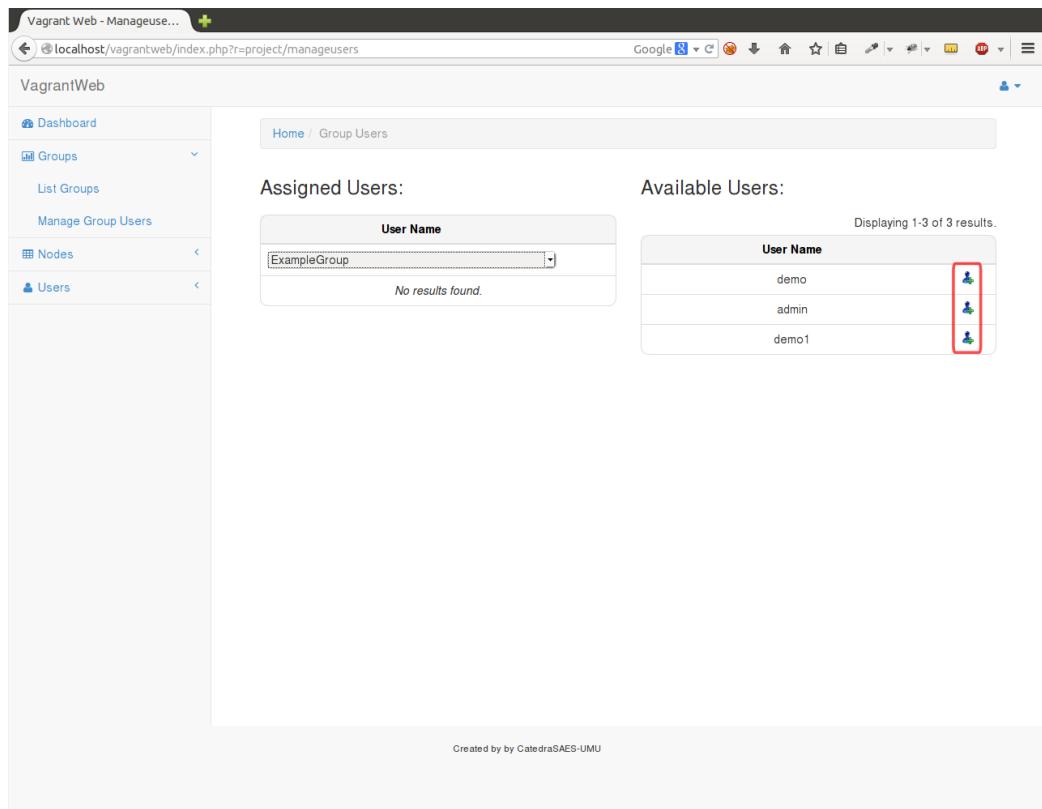


Figura 6.18: Vagrant Web. Assigning an user to a selected group

6. CHAPTER 6: GROUPS

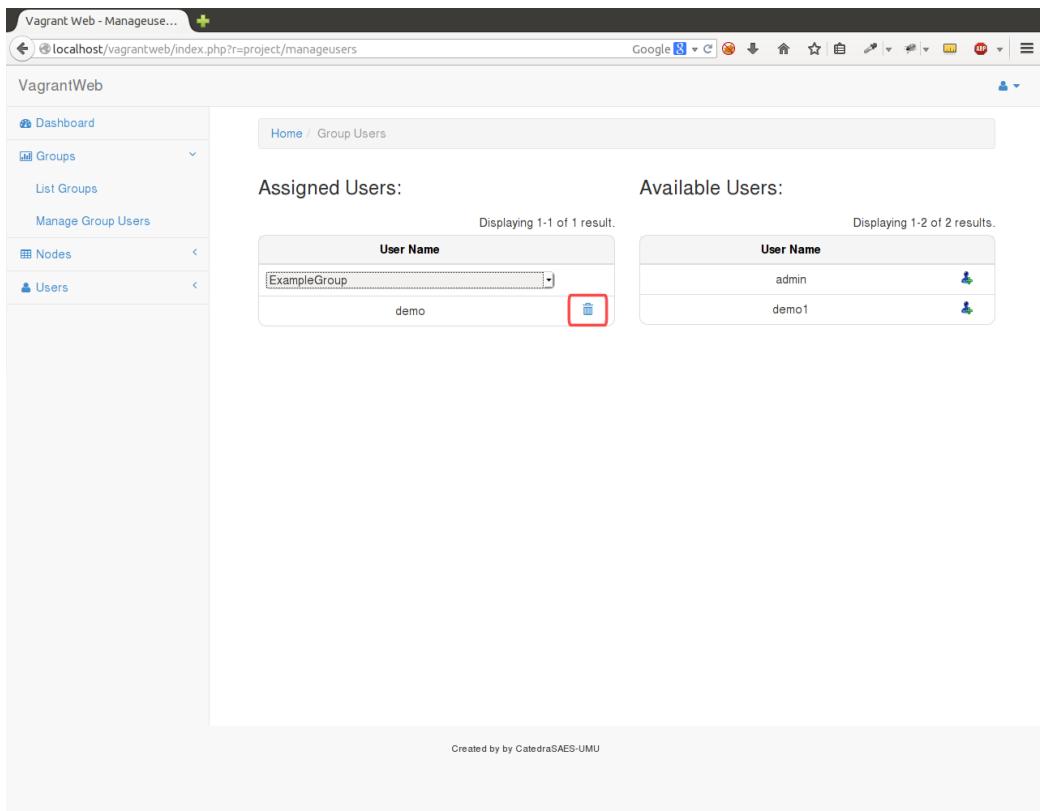


Figura 6.19: Vagrant Web. Removing an user from a group

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The screenshot shows a web browser window titled "Vagrant Web - Project". The address bar displays "localhost/vagrantweb/index.php?r=project/index". The main content area is titled "Groups" and shows a single entry: "EXAMPLEGROUP". The interface includes navigation links for "Groups" and "Nodes", and a breadcrumb trail "Home / Groups". A note at the top states: "Groups marked with * have busy machines. Global commands will be performed only on idle machines". Below this, it says "Displaying 1-1 of 1 result." and shows a table with columns "Group Name", "Group Actions", and "Admin Group". The "Group Name" column contains "EXAMPLEGROUP". The "Group Actions" column contains three icons: a green circle with a white checkmark, a yellow circle with a white question mark, and a red circle with a white exclamation mark. The "Admin Group" column contains a blue pencil icon and a blue trash bin icon. At the bottom of the page, it says "Created by CatedraSAES-UMU".

Figura 6.20: Vagrant Web. Group list page after user assignment

6.4 Performing commands to groups

In this section you will learn how to command actions to group both globally or specifically to a single or a set of virtual machines of the group.

6.4.1 Performing commands globally

In section 6.1, Figure 6.5 shows that there is a column in the group grid panel that is focused to command actions to the whole group. The actions available are:

- *Start Up* command that runs the virtual machines
- *Pause* command that pauses the virtual machines
- *Halt* command that shutdowns the virtual machines

If you click on any of those actions buttons, the command will be send to every virtual machine that the group have assigned. To show this feature in action, we show a scenario where there is a group called *ExampleGroup* with three virtual machines assigned from a node called *Node1* (Figure 6.21).

In this example we are commanding a *Start Up* operation to the group. To do that, just click on the **Play** icon placed in the *ExampleGroup* group row (Figure 6.22).

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The screenshot shows the Vagrant Web interface at localhost/vagrantweb/index.php?r=project/view&id=3. The left sidebar shows 'Groups' selected, with 'List Groups' and 'Manage Group Users' options. The main content area is titled 'Group ExampleGroup' and displays a table of three virtual machines:

Node Name	Virtual Machine	Provider	Status	Priority	Backup
NODE1	webvm	virtualbox	poweroff	0	[Icons]
NODE1	testvm	virtualbox	poweroff	0	[Icons]
NODE1	centos	virtualbox	poweroff	0	[Icons]

Below the table are buttons for 'Run', 'Pause', and 'Stop'. A second table below shows command history with no results found. At the bottom are buttons for 'Delete All Pending', 'Clear Completed', and 'Force Delete All'. The footer credits 'Created by CatedraSAES-UMU'.

Figura 6.21: Vagrant Web. ExampleGroup's group virtual machines

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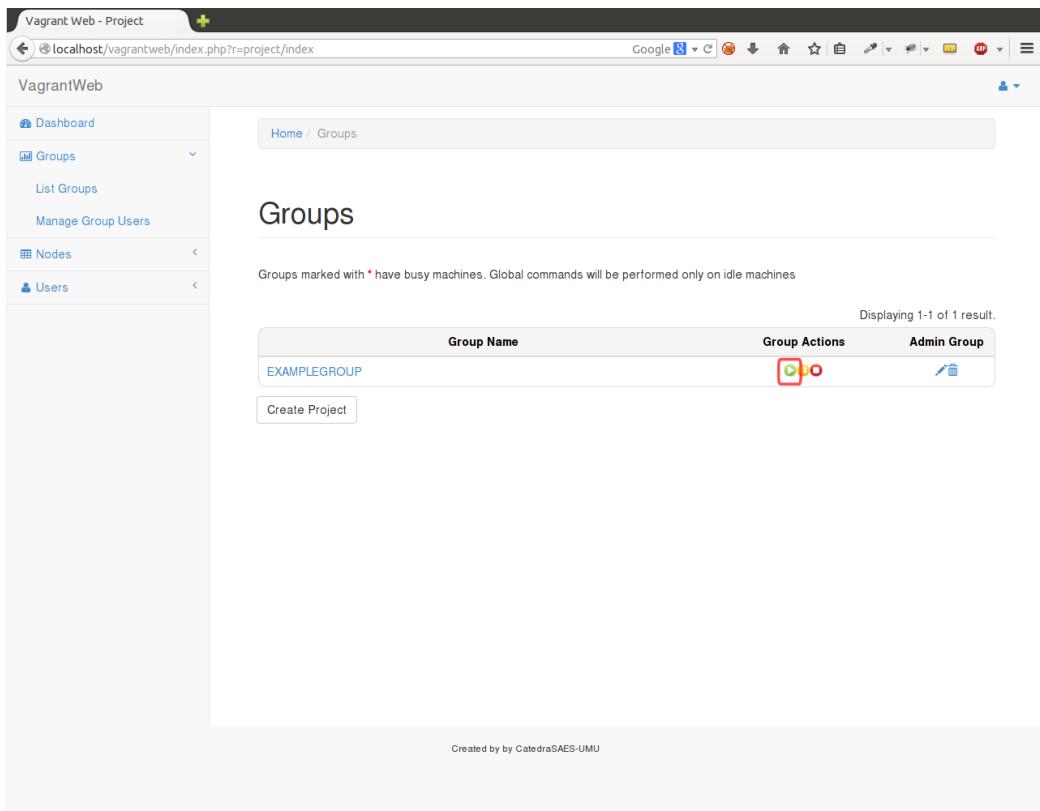


Figura 6.22: Vagrant Web. Commanding start up operation

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Automatically, when the operations has been sent, if you access the group view page (Figure 6.11 and Figure 6.12), you can see, Figure 6.23, that the operations has been queued and sent to the corresponding virtual machines.

The screenshot shows the Vagrant Web interface for managing groups. The main title is "Group ExampleGroup". The top section displays a table of three virtual machines assigned to different nodes:

Node Name	Virtual Machine	Provider	Status	Priority	Backup
NODE1	webvm	virtualbox	BUSY	0	[checkbox]
NODE1	testvm	virtualbox	BUSY	0	[checkbox]
NODE1	centos	virtualbox	BUSY	0	[checkbox]

Below this is a table of queued operations:

User	Timestamp	Node	Virtual Machine	Priority	Command	Status	Result
admin	2014-12-17 10:55:17	NODE1	webvm	0	run	IN PROGRESS	
admin	2014-12-17 10:55:17	NODE1	testvm	0	run	IN PROGRESS	
admin	2014-12-17 10:55:17	NODE1	centos	0	run	IN PROGRESS	

Buttons at the bottom include: Run, Pause, Stop, Delete All Pending, Clear Completed, and Force Delete All.

Figura 6.23: Vagrant Web. Group view page with queued operations

This figure shows two main panels, one on the top of the page for the virtual machines assigned and one below showing the operation's queue. The meaning of each column is the following:

- *User*. This column shows the web user that sent the operations.
- *Timestamp*. This column shows the date and time when the operation was sent to the virtual machines
- *Node* and *Virtual Machine*. These columns show the virtual machine and the node in which that virtual machine is configured, that received the operation.
- *Priority*. This column shows the priority of the virtual machine in the group.

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- *Command.* This column shows the type of operation that was sent to the virtual machine. In the current example the operation sent is of type *run* or *start up*.
- *Status.* This column shows the state of the operation. The result value is also associated with the row color. The possible values are:
 - *IN PROGRESS.* The operation is performing at the moment (yellow color).
 - *SUCCESS.* The operation finished successfully (green color).
 - *ERROR.* The operation failed (red color).
 - *PENDING.* The operation is waiting in the operation queue for its turn (blue color).
- *Result.* This column shows the result of the operation. This field is focused for error messages.

Once the operation is performed, successfully or not, the operation row change its information (and its color) to reflect the operation result.

In this scenario, all the operation result successfully. As depicted in Figure 6.24, notice that the operation *Status* column shows a *SUCCESS* result in each one.

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The screenshot shows the Vagrant Web interface at localhost/vagrantweb/index.php?r=project/view&id=3. The left sidebar has 'Groups' selected. The main content displays the 'Group ExampleGroup' with three nodes: NODE1 (running, webvm, virtualbox), NODE1 (running, testvm, virtualbox), and NODE1 (running, centos, virtualbox). Below the table are 'Run', 'Pause', and 'Stop' buttons. A second table shows completed operations: admin ran 'run' commands on NODE1 for webvm, testvm, and centos, all resulting in 'OK'. Buttons for 'Delete All Pending', 'Clear Completed', and 'Force Delete All' are at the bottom.

User	Timestamp	Node	Virtual Machine	Priority	Command	Status	Result
admin	2014-12-17 10:55:17	NODE1	webvm	0	run	SUCCESS	OK
admin	2014-12-17 10:55:17	NODE1	testvm	0	run	SUCCESS	OK
admin	2014-12-17 10:55:17	NODE1	centos	0	run	SUCCESS	OK

Figura 6.24: Vagrant Web. Group list page with finished operations

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Under the operations panel there are three button whose main function is cleaning this panel. Each functionality depends on the operation status:

- *Delete All Pending.* When you click this button all the operations whose status in the *Status* column is *PENDING* will be removed from the list and they won't be sent to the virtual machines.
- *Clear Completed.* When you click this button all the operations whose status in the *Status* column is *SUCCESS* or *ERROR* will be removed from the list.
- *Force Delete All.* When you click this button all the operations will be removed from the panel, including *IN PROGRESS* ones. **Important:** although you erase *IN PROGRESS* operations from the list they won't be cancelled at their corresponding virtual machines.

There is one more important thing that you must notice. When a virtual machine is performing an operation (*busy state*), regardless of how it was sent to it, if you send a global operation to the set of virtual machines of the group, it won't be performed by the busy virtual machine. You can easily notice if any of the set of virtual machines is busy when you access the group list page, a '*' char will be displayed on the right of the group's name (Figure 6.25).

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The screenshot shows the Vagrant Web interface for managing groups. The left sidebar has links for Dashboard, Groups (which is selected), List Groups, Manage Group Users, Nodes, and Users. The main content area is titled "Groups" and displays a table with one result. The table has columns for "Group Name", "Group Actions", and "Admin Group". The single row contains "EXAMPLEGROUP*" in the first column, and icons for edit, delete, and details in the second column. The third column is empty. A red arrow points to the asterisk in the "Group Name" cell. At the bottom of the table, there is a "Create Project" button. The footer of the page says "Created by CatedraSAES-UMU".

Figura 6.25: Vagrant Web. Group list page when a virtual machine of the group is busy

6.4.2 Performing commands specifically

At the moment, you know how to command operations to the whole group, but what if you just want to perform commands on a set of virtual machines assigned to the group. The procedure is quite similar to send commands global. First of all, you have to access to the group view page (Figure 6.11 and Figure 6.12). In the top panel the page shows the virtual machines that are inside the group and, under this panel, there are three buttons that are disabled when there is no virtual machine selected.

To command an operation just click on the virtual machine's row or on the checkbox on the rightmost side of the row. You can select as many virtual machines as you want, or if you want to select all the virtual machines, just click on the checkbox placed in the panel header. Once a virtual machine is selected, the buttons below the panel will get enabled and you will be able to send operations to the selected machines (Figure 6.26). The operation's panel behaviour is similar to performing commands globally.

User	Timestamp	Node	Virtual Machine	Priority	Command	Status	Result
admin	2014-12-17 12:53:52	NODE1	testvm	0	run	IN PROGRESS	

Figura 6.26: Vagrant Web. Selecting one virtual machine and starting up

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6.4.3 Commands with prioritized virtual machines

Right now, you have seen how to send commands to a group or to its virtual machines. In all the example shown above, when an operation is sent to virtual machines all of them are processed at the same time. This is due to the priority set for the virtual machine (in the examples it is zero). But, what if we want to arrange in sequence the actions to the virtual machines. This can be done very easily.

First, you have to change the priority assigned to the virtual machines. Access to the Group Config Page to achieve this action (Figure 6.6). Once the assigned virtual machines are displayed, change the priority values to the desired ones (the value is saved when you focus out the priority field). You can see an example in Figure 6.27. Priority range is from 0 to 99 and lower values are more prioritaries than higher ones, being 0 the most priority value.

The screenshot shows the Vagrant Web interface for managing groups. On the left, there's a sidebar with options like Dashboard, Groups, Nodes, and Users. The main area is titled 'Update Group ExampleGroup'. It has two sections: 'Assigned Machines:' and 'Available Machines:'. Under 'Assigned Machines:', there's a table with three rows. The first row has Node Name 'NODE1', Virtual Machine 'webvm', and Priority '0'. The second row has Node Name 'NODE1', Virtual Machine 'centos', and Priority '1'. The third row has Node Name 'NODE1', Virtual Machine 'testvm', and Priority '2'. A red box highlights the 'Priority' column. Under 'Available Machines:', there's a table with one row for 'NODE1' and a note 'No results found.' At the bottom, it says 'Created by CatedraSAES-UMU'.

Node Name	Virtual Machine	Priority
NODE1	webvm	0
NODE1	centos	1
NODE1	testvm	2

Figura 6.27: Vagrant Web. Setting virtual machines priority

That's all you have to do to configure this feature. Now, if you command operations globally or specifically to a set of virtual machines, the operations

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will be queued (Figure 6.28) in the operation list and they will be sent in order to the corresponding virtual machine.

The screenshot shows the Vagrant Web interface for a project named 'ExampleGroup'. The left sidebar includes links for Dashboard, Groups (selected), List Groups, Manage Group Users, Nodes, and Users. The main content area displays three nodes: NODE1 (webvm, virtualbox, poweroff, priority 0), NODE1 (centos, virtualbox, poweroff, priority 1), and NODE1 (testvm, virtualbox, poweroff, priority 2). Below this is a table of pending operations:

User	Timestamp	Node	Virtual Machine	Priority	Command	Status	Result
admin	2014-12-17 13:23:34	NODE1	webvm	0	run	IN PROGRESS	
admin	2014-12-17 13:23:35	NODE1	centos	1	run	PENDING	<input type="button" value="Delete"/>
admin	2014-12-17 13:23:35	NODE1	testvm	2	run	PENDING	<input type="button" value="Delete"/>

Buttons at the bottom include 'Delete All Pending', 'Clear Completed', and 'Force Delete All'. A footer note states 'Created by CatedraSAES-UMU'.

Figura 6.28: Vagrant Web. Performing operations in order

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The screenshot shows the Vagrant Web interface for a project named "VagrantWeb". The left sidebar includes links for Dashboard, Groups (selected), List Groups, Manage Group Users, Nodes, and Users. The main content area displays a group named "ExampleGroup".
Machine List: A table titled "Displaying 1 - 3 of 3 machines" lists three nodes:

Node Name	Virtual Machine	Provider	Status	Priority	Backup
NODE1	webvm	virtualbox	running	0	[Icons]
NODE1	centos	virtualbox	BUSY	1	[Icons]
NODE1	testvm	virtualbox	poweroff	2	[Icons]

Operations History: A table titled "Displaying 1-3 of 3 results." shows a log of recent operations:

User	Timestamp	Node	Virtual Machine	Priority	Command	Status	Result
admin	2014-12-17 13:23:34	NODE1	webvm	0	run	SUCCESS	OK
admin	2014-12-17 13:23:35	NODE1	centos	1	run	IN PROGRESS	
admin	2014-12-17 13:23:35	NODE1	testvm	2	run	PENDING	

Buttons: At the bottom of the operations table are buttons for "Delete All Pending", "Clear Completed", and "Force Delete All".
Created by CatedraSAES-UMU

Figura 6.29: Vagrant Web. Performing the next operation

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The screenshot shows the Vagrant Web interface at localhost/vagrantweb/index.php?r=project/view&id=3. The left sidebar includes 'Dashboard', 'Groups' (selected), 'List Groups', 'Manage Group Users', 'Nodes' (with a dropdown menu), and 'Users'. The main content displays 'Group ExampleGroup' with three machines:

Node Name	Virtual Machine	Provider	Status	Priority	Backup
NODE1	webvm	virtualbox	running	0	[icons]
NODE1	centos	virtualbox	running	1	[icons]
NODE1	testvm	virtualbox	BUSY	2	[icon]

Buttons below the table include 'Run', 'Pause', and 'Stop'. A second table below shows recent operations:

User	Timestamp	Node	Virtual Machine	Priority	Command	Status	Result
admin	2014-12-17 13:23:34	NODE1	webvm	0	run	SUCCESS	OK [trash]
admin	2014-12-17 13:23:35	NODE1	centos	1	run	SUCCESS	OK [trash]
admin	2014-12-17 13:23:35	NODE1	testvm	2	run	IN PROGRESS	

Buttons at the bottom of the operations table include 'Delete All Pending', 'Clear Completed', and 'Force Delete All'. The footer notes 'Created by CatedraSAES-UMU'.

Figura 6.30: Vagrant Web. Performing the last operation

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The screenshot shows the Vagrant Web interface at localhost/vagrantweb/index.php?r=project/view&id=3. The left sidebar shows 'Groups' selected. The main content displays 'Group ExampleGroup' with three nodes:

Node Name	Virtual Machine	Provider	Status	Priority	Backup
NODE1	webvm	virtualbox	running	0	[Icons]
NODE1	centos	virtualbox	running	1	[Icons]
NODE1	testvm	virtualbox	running	2	[Icons]

Buttons below the table: Run, Pause, Stop.

Below the table: Displaying 1-3 of 3 results.

User	Timestamp	Node	Virtual Machine	Priority	Command	Status	Result
admin	2014-12-17 13:23:34	NODE1	webvm	0	run	SUCCESS	OK [Icon]
admin	2014-12-17 13:23:35	NODE1	centos	1	run	SUCCESS	OK [Icon]
admin	2014-12-17 13:23:35	NODE1	testvm	2	run	SUCCESS	OK [Icon]

Buttons below the table: Delete All Pending, Clear Completed, Force Delete All.

Footer: Created by CatedraSAES-UMU

Figura 6.31: Vagrant Web. Final result of the in order execution