UNIT 1.
ACTIVITY

Web Applications Deployment
CFGS DAW

Important: this activity is not mandatory and does not compute for the final grade, but it is necessary for coming activities.

Importante: esta actividad no es obligatoria y no cuenta para la nota final, pero es necesaria para actividades futuras.

Author: Carlos Cacho

Reviewed by: Lionel Tarazón
lionel.tarazon@ceedcv.es

License

Nomenclature

During this unit we are going to use special symbols to distinct some important elements.

This symbols are:

INDEX

UT01. INTRODUCTION TO WEB ARCHITECTURES ACTIVITY

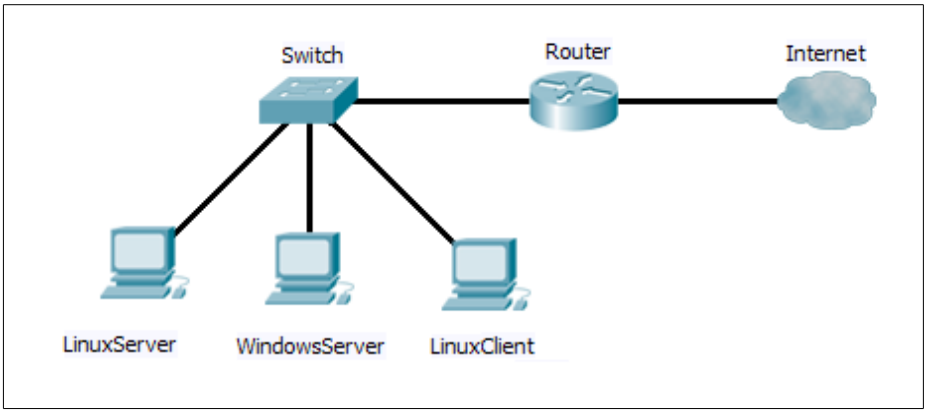
1. INTRODUCTION

In this first activity, we are going to prepare the virtual machines that we will use during the first term.

Thanks to the virtual machines we are able to install, manage and use different Operating Systems (OS) in our computer. There are many applications of virtualization but we are going to use Oracle VM VirtualBox because is free, cross-platform, easy to use and can do safety copies, among other features.

If you want to learn more about it you can read the official user manual: https://www.virtualbox.org/manual/UserManual.html

The aim of this activity is to get a scene with two servers (one with Linux and the other with Windows (in this activity we will install it but its configuration is optional, it will be done in the *to know more activities*) and one client (with Linux) and create the following network:



2. INSTALLING THE VIRTUAL MACHINES

First of all, we will download the program from the official web page (https://www.virtualbox.org/wiki/Downloads) where we should choose the OS we are using and install it in our computer.

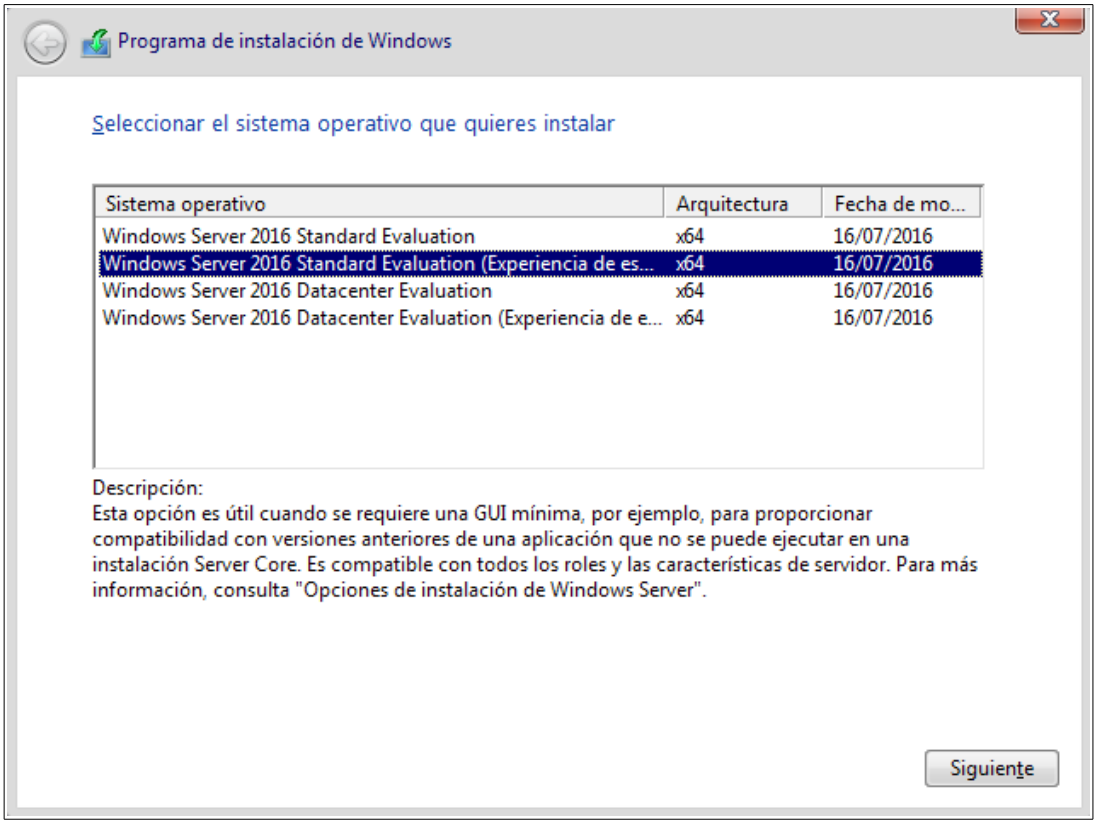
If you have any problem with the installation with VirtualBox or the creation of a virtual machine you can watch this video (https://www.youtube.com/watch?v=J4R2mDlIEKo) (You can activate the subtitles)

Once installed, we will install the OS (we need the ISO file):

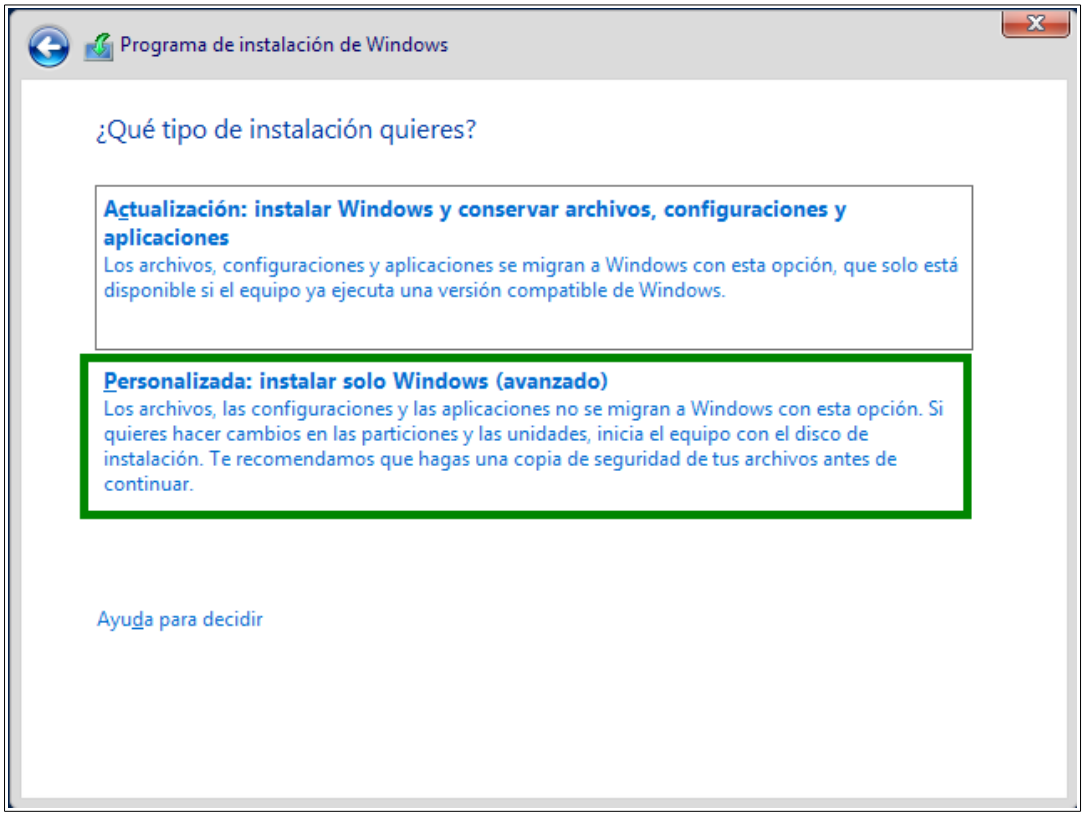
- Linux Ubuntu 32 or 64 bits (you can use 16.04 version or higher) (*LinuxServer* and *LinuxClient*): you can download it from the Ubuntu's official web (http://www.ubuntu.com/download/desktop or https://www.ubuntu.com/download/alternative-downloads). It is not the server version but we can download every packet we need. If you have problems with this distribution you can use others like *Lubuntu*.

- Windows Server 2016: (We will use this virtual machine only to do tests with Linuxserver but if you want to configure it you can do the *to know more activities* (volunteer activities in unit 2 and 3)) To download Windows Server, you have to go to *TechNet Evaluation Center* from Microsoft site (https://www.microsoft.com/es-es/evalcenter/evaluate-windows-server-2016), register and download the **ISO** file for Windows Server 2016 (64 bits). If you have problems with this version you can install Windows Server 2012 from the same page.

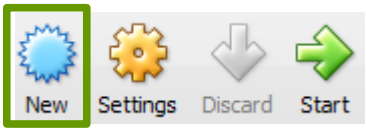
During the installation we will choose the ***Standard Evaluation(Experiencia de escritorio)***:



and choose the ***Custom*** option (you do not need create new partitions)

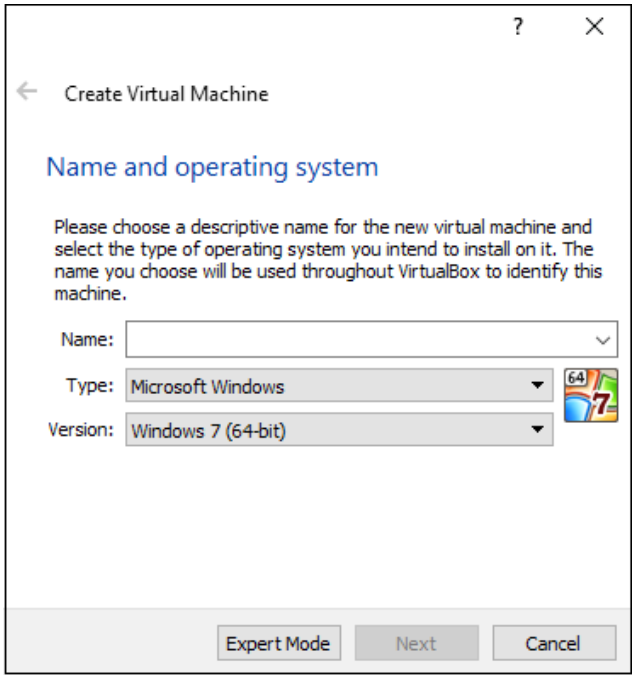


Now, we are going to create the virtual machine for each OS. For that, open the VirtualBox program, click in ***New*** and the process will start.

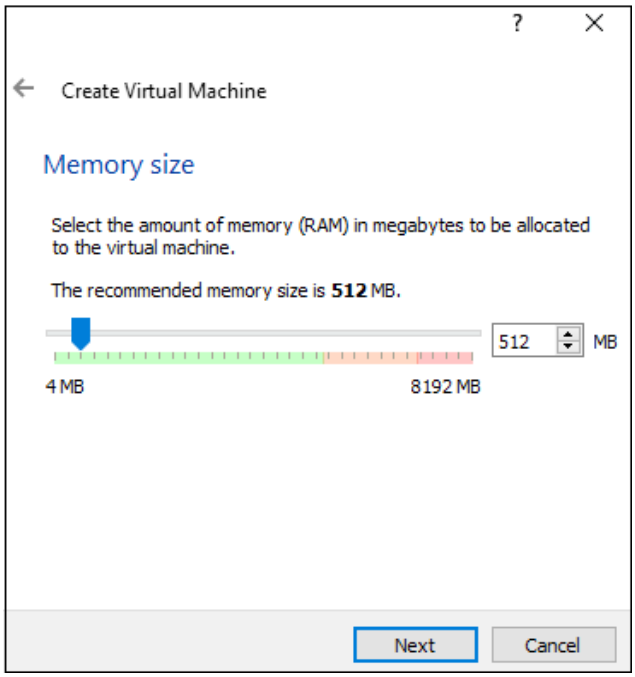


During the installation of any OS you will:

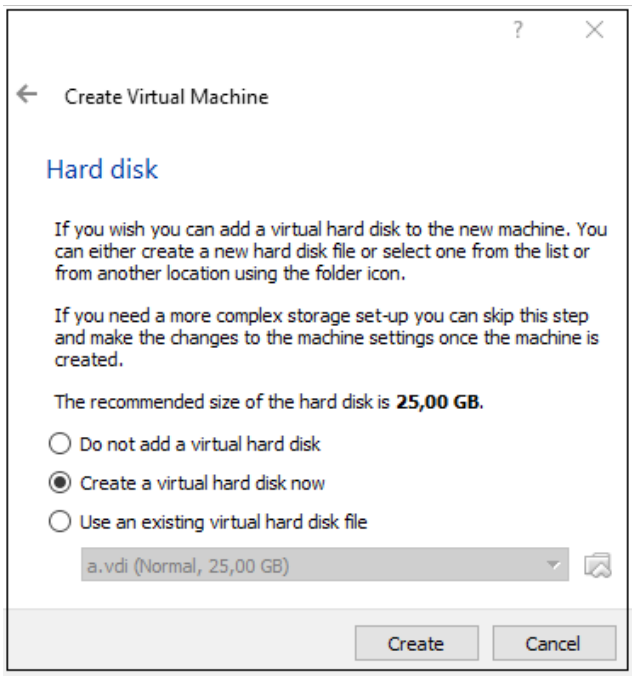
- give a name to your virtual machine ans choose the kind of OS (For instance, for Windows Server we have to choose *Type: Microsoft Windows* and *Version: Other Windows (64-bit)*)

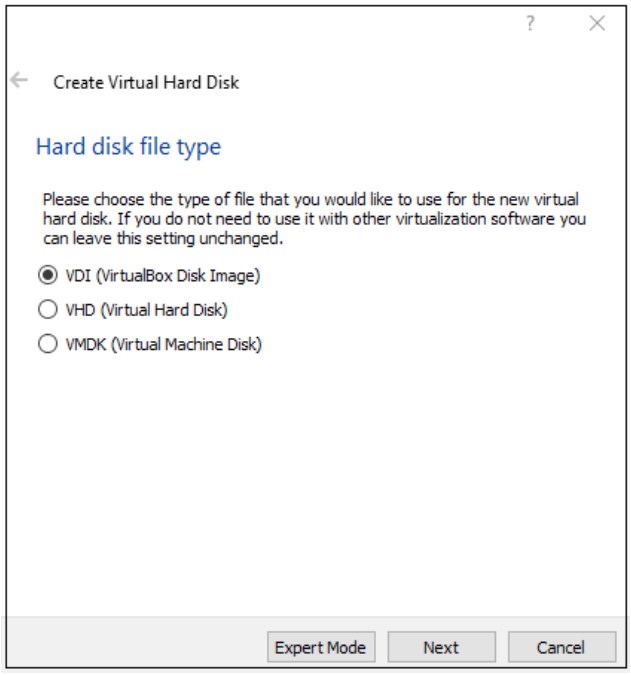


- select the amount of memory RAM. (Be careful in this point because during the activities we will load two virtual machines at the same time. So for example, if your computer has 4 GB you can choose 1GB for each virtual machine, but if your computer has 2GB you can not do it because the physical machine needs RAM too, so you should choose around 500MB for each virtual machine.)

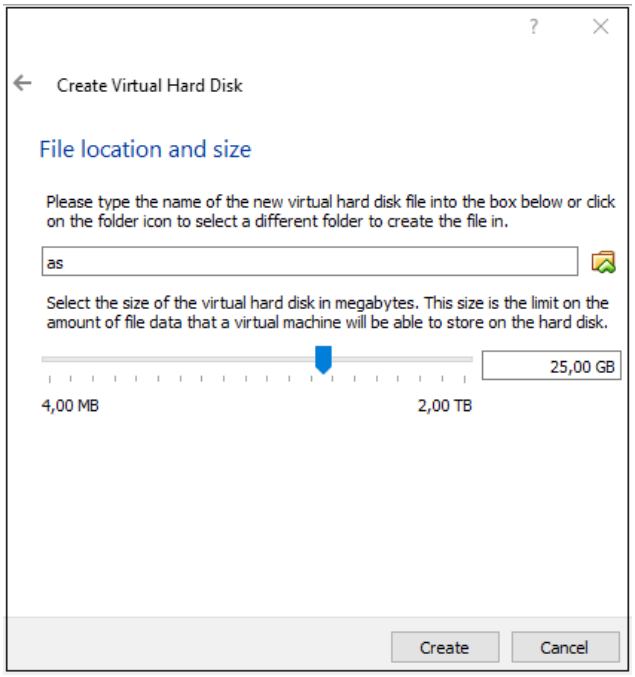


- create a virtual hard disk (the default option). It will be a VDI (VirtualBox Disk Image)

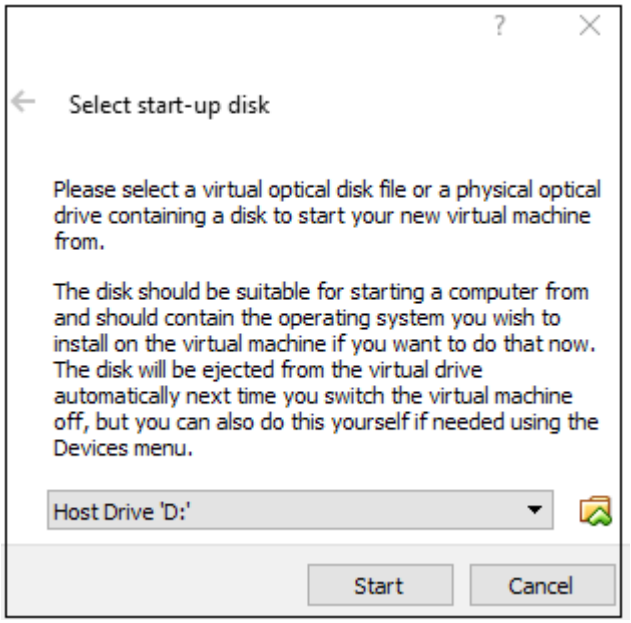




- select a dynamically allocated hard disk file



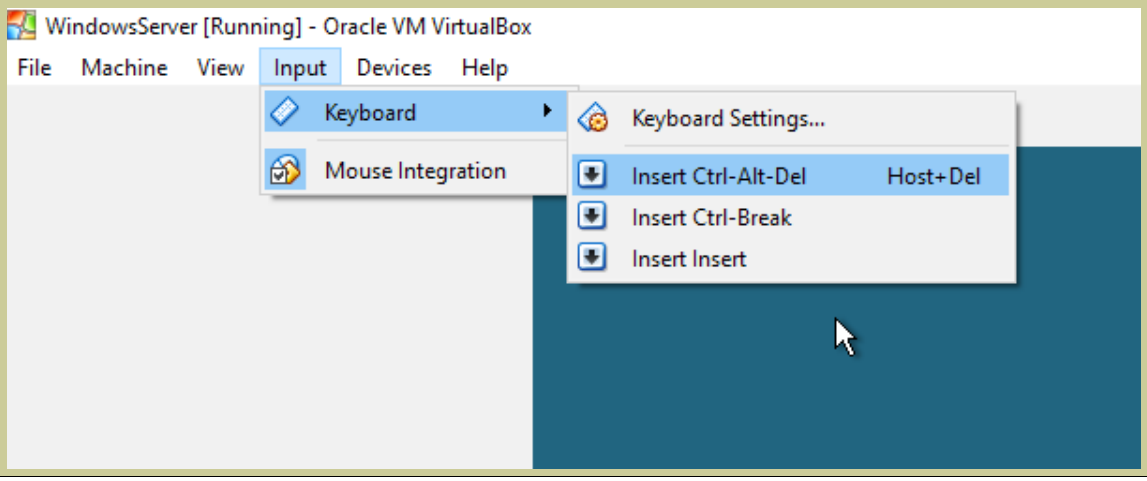
- and finally, choose the virtual hard disk location and its size (with 30 or 40 GB is enough)



With this, the virtual machine is created. Now we have to click on ***Start*** and choose where is the OS iso file in our computer. Then the OS installation will start.

You can see all the process in the same video: https://www.youtube.com/watch?v=J4R2mDlIEKo

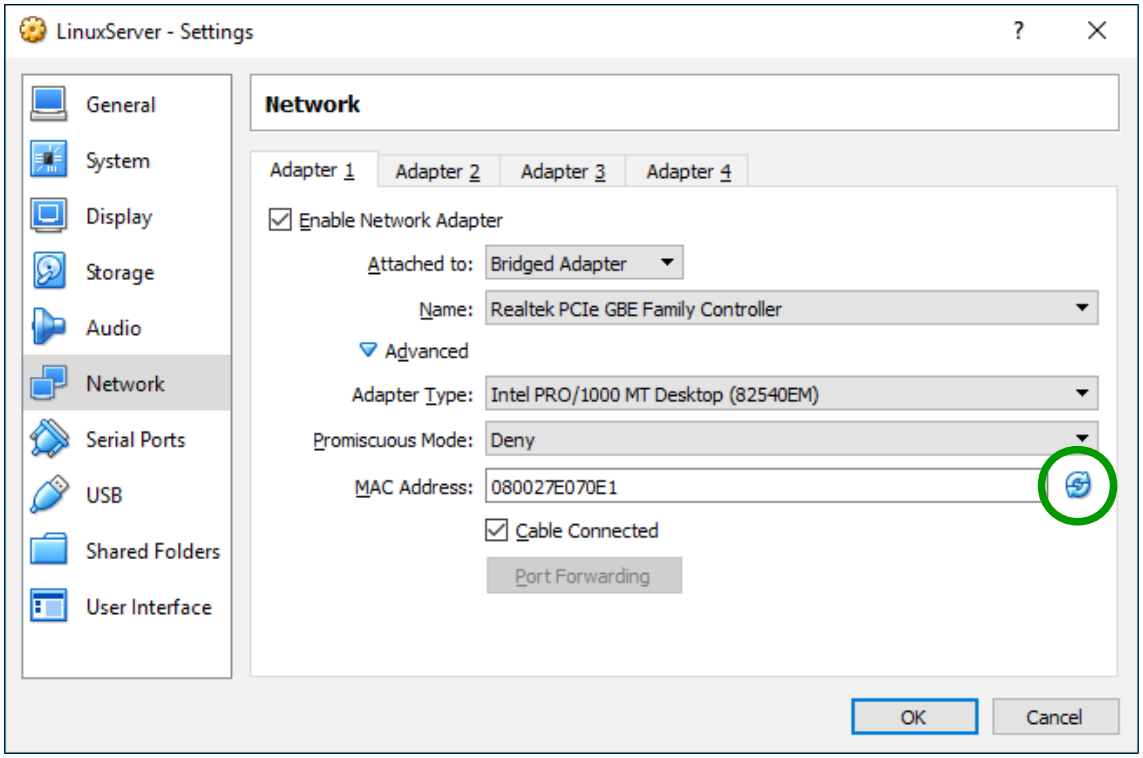
It is important to know that if we need to type Ctrl+Alt+Del inside the virtual machine (for example, in Windows Server 2016) we will have to select ***Input > Keyboard > Insert Ctrl-Alt-Del***



In each OS we will create a user with administrator privileges. Use an easily remember username and password.

Once the three OS are installed, let's go to configure them. In order that the virtual machine could accede to the router it must be bypassed (*bridged*).

Go to the menu **Settings > Network > Adapter 1**. We are going to indicate it that it is connected to a bridge adapter. Also we are going to change the MAC address of any virtual machine to avoid have MAC duplicate for that we will click on the refresh button:

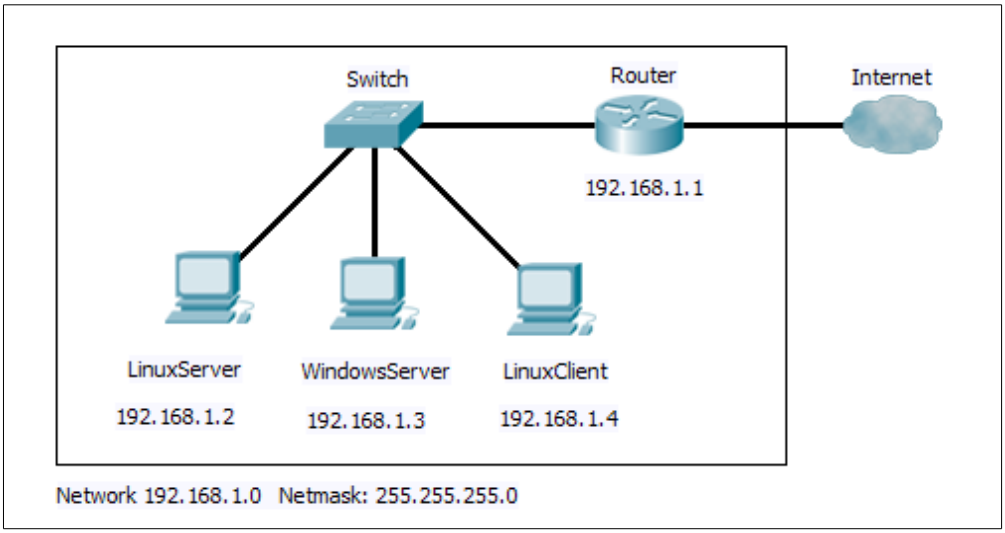


Do this for each virtual machine.

3. CONFIGURING THE VIRTUAL MACHINES

Now we are going to include the virtual machines into our network. For that we are going to assign an IP address to each virtual machine to allow the connexion between them and Internet.

We are going to assign an IP address that belongs to our **home network**.
For instance, if my home network IP address is 192.128.0.0 and the IP of my router is 192.168.0.1, I will change it in each virtual machine, I could use 192.168.0.X (2 <= X <= 254).
You have to **be careful** and not to assign an IP address used in your network, it means that if my physical machine has the IP address 192.168.0.10, I do not have to use it in any virtual machine.
To do the activity we will use the following network (the IP address of my physical machine is 192.168.1.10):



You can fill these tables to have a guide of the IP address you will use:

LinuxServer	IP address	Router	DNS
Me	192.168.1.2	192.168.1.1	192.168.1.1
You			

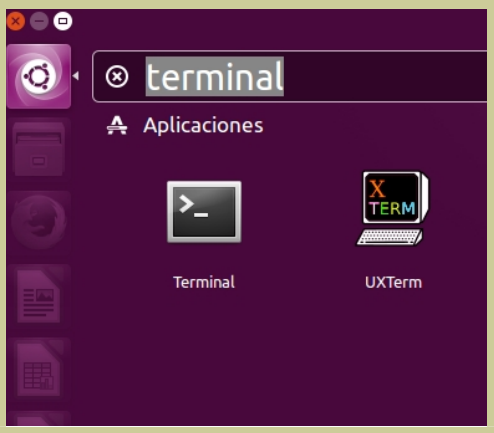
WindowsServer	IP address	Router	DNS
Me	192.168.1.3	192.168.1.1	192.168.1.1
You			

LinuxClient	IP address	Router	DNS
Me	192.168.1.4	192.168.1.1	192.168.1.1
You			

3.1 Configuring LinuxServer

Enter into the *LinuxServer* machine with the administrator user.

To open a terminal you can use ***Ctrl+Alt+T*** or click on the first button of the left bar, type "terminal" and click on the terminal icon:



First, we are going to work with the terminal. For that, open a terminal and follow the following steps:

1. Let's look for the name of the network device used by the system: ***ifconfig –a***

   We will have something like:

```
administrador@administrador-VirtualBox:~$ ifconfig -a
enp0s3    Link encap:Ethernet  direcciónHW 08:00:27:ab:62:5d
          Dirección inet6: fe80::e944:a084:437:42e3/64 Alcance:Enlace
          ACTIVO DIFUSIÓN FUNCIONANDO MULTICAST  MTU:1500  Métrica:1
          Paquetes RX:2582 errores:0 perdidos:0 overruns:0 frame:0
          Paquetes TX:1416 errores:0 perdidos:0 overruns:0 carrier:0
          colisiones:0 long.colaTX:1000
          Bytes RX:2019377 (2.0 MB)  TX bytes:106565 (106.5 KB)

lo        Link encap:Bucle local
          Direc. inet:127.0.0.1  Másc:255.0.0.0
          Dirección inet6: ::1/128 Alcance:Anfitrión
          ACTIVO BUCLE FUNCIONANDO  MTU:65536  Métrica:1
          Paquetes RX:269 errores:0 perdidos:0 overruns:0 frame:0
          Paquetes TX:269 errores:0 perdidos:0 overruns:0 carrier:0
          colisiones:0 long.colaTX:1
          Bytes RX:19430 (19.4 KB)  TX bytes:19430 (19.4 KB)
```

   Where ***enp0s3*** is our network interface and ***lo*** the loopback address.

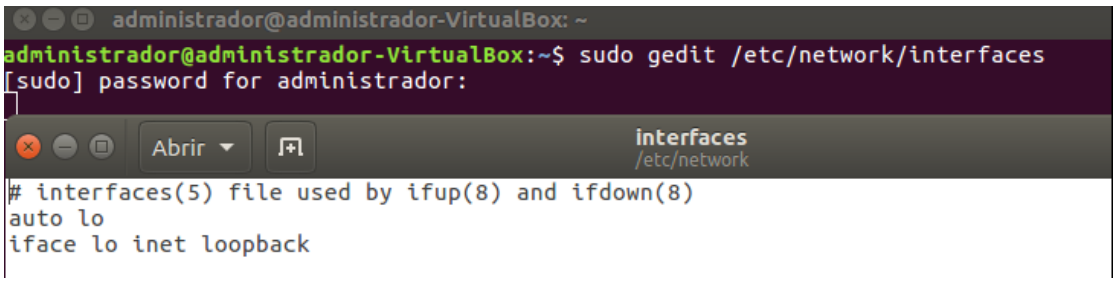
Loopback address is a special IP number (127.0.0.1) that is designated for the software loopback interface of a machine. The loopback interface has no hardware associated with it, and it is not physically connected to a network.

The loopback interface allows IT professionals to test IP software without worrying about broken or corrupted drivers or hardware.

2. Now we are going to configure a static IP address in the server.

   For that, open the network configuration file /etc/network/interfaces and modify it to adapt to the IPs we have indicated in the previous point.

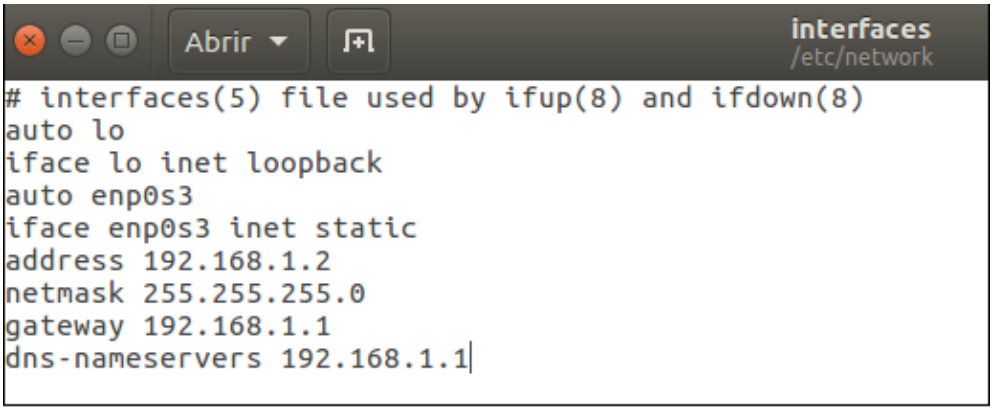
   To modify this file we have to be root, so we have to write sudo before the instruction:



gedit is the default text editor of the GNOME desktop environment. Ubuntu uses it. Also you can use nano or other text editor.

In this file we have to write what the name of the network interface is, if it has a static IP address, what that address is, its netmask, the IP address of the router(gateway) and the DNS (the same of the router or other public as 8.8.8.8 or similar).

The file will be like this:



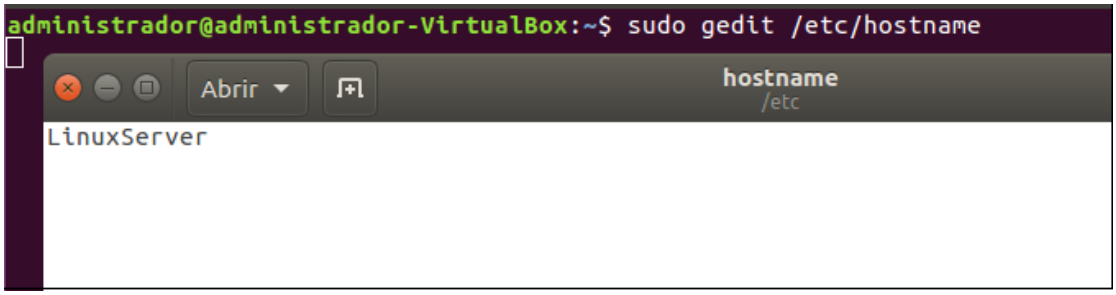
IMPORTANT:
If you are using Ubuntu 18 or newer, you will not be able to change the network configuration as explained above. Instead, use the settings interface as explained in this guide.

3. Restart the web service to apply the changes:
   sudo service networking restart or ***sudo /etc/init.d/networking restart***

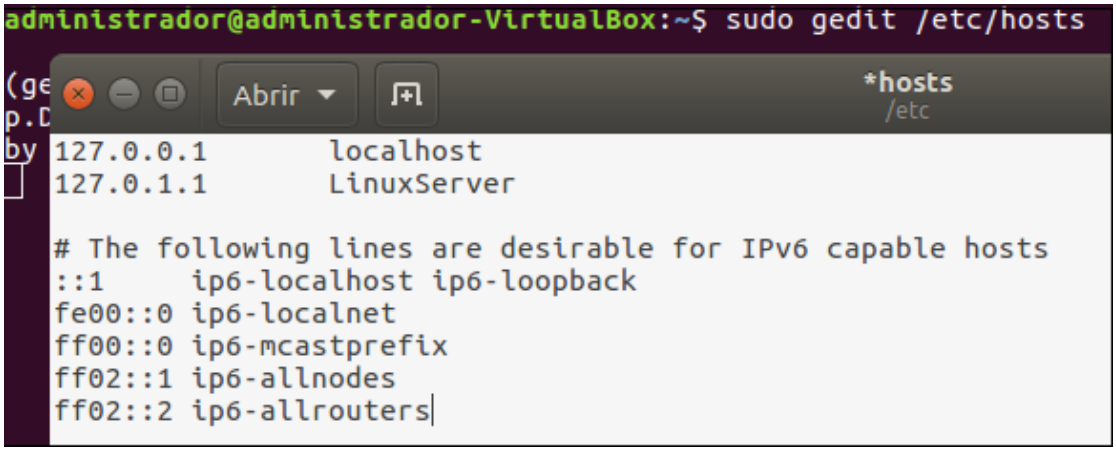
4. Check that the configuration is right**:**

```
administrador@LinuxServer:~$ ifconfig -a
enp0s3    Link encap:Ethernet  direcciónHW 08:00:27:ab:62:5d
          Direc. inet:192.168.1.2  Difus.:192.168.1.255  Másc:255.255.255.0
          Dirección inet6: fe80::a00:27ff:feab:625d/64 Alcance:Enlace
          ACTIVO DIFUSIÓN FUNCIONANDO MULTICAST  MTU:1500  Métrica:1
          Paquetes RX:26056 errores:0 perdidos:0 overruns:0 frame:0
          Paquetes TX:13650 errores:0 perdidos:0 overruns:0 carrier:0
          colisiones:0 long.colaTX:1000
          Bytes RX:38744599 (38.7 MB)  TX bytes:954234 (954.2 KB)

lo        Link encap:Bucle local
          Direc. inet:127.0.0.1  Másc:255.0.0.0
          Dirección inet6: ::1/128 Alcance:Anfitrión
          ACTIVO BUCLE FUNCIONANDO  MTU:65536  Métrica:1
          Paquetes RX:166 errores:0 perdidos:0 overruns:0 frame:0
          Paquetes TX:166 errores:0 perdidos:0 overruns:0 carrier:0
          colisiones:0 long.colaTX:1
          Bytes RX:12178 (12.1 KB)  TX bytes:12178 (12.1 KB)
```

5. Now we are going to change the name of the machine. Edit the configuration file ***/etc/hostname*** and change the name for LinuxServer:

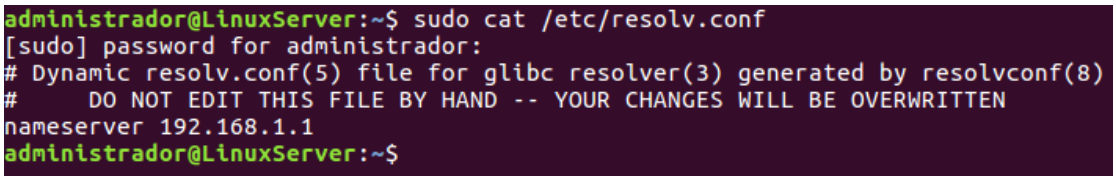


6. Now we can edit the file ***/etc/hosts*** and associate the name LinuxServer to the IP address 127.0.1.1 (loopback):



7. Next we restart the machine: ***sudo reboot***

8. Check that the hostname is changed and if the DNS address is correct in the configuration file ***/etc/resolv.conf***:

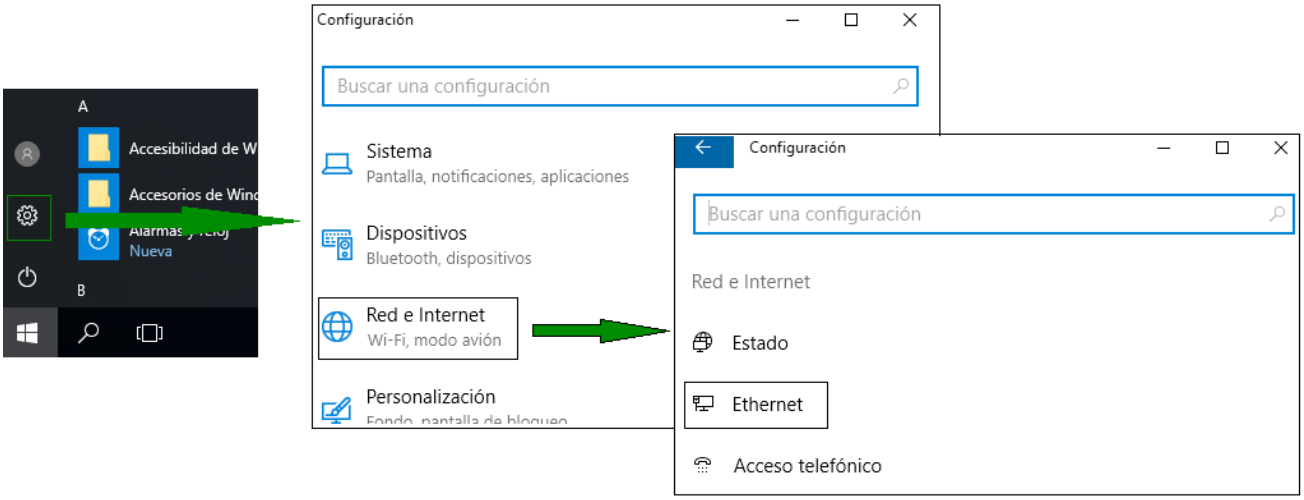


3.2 Configuring WindowsServer

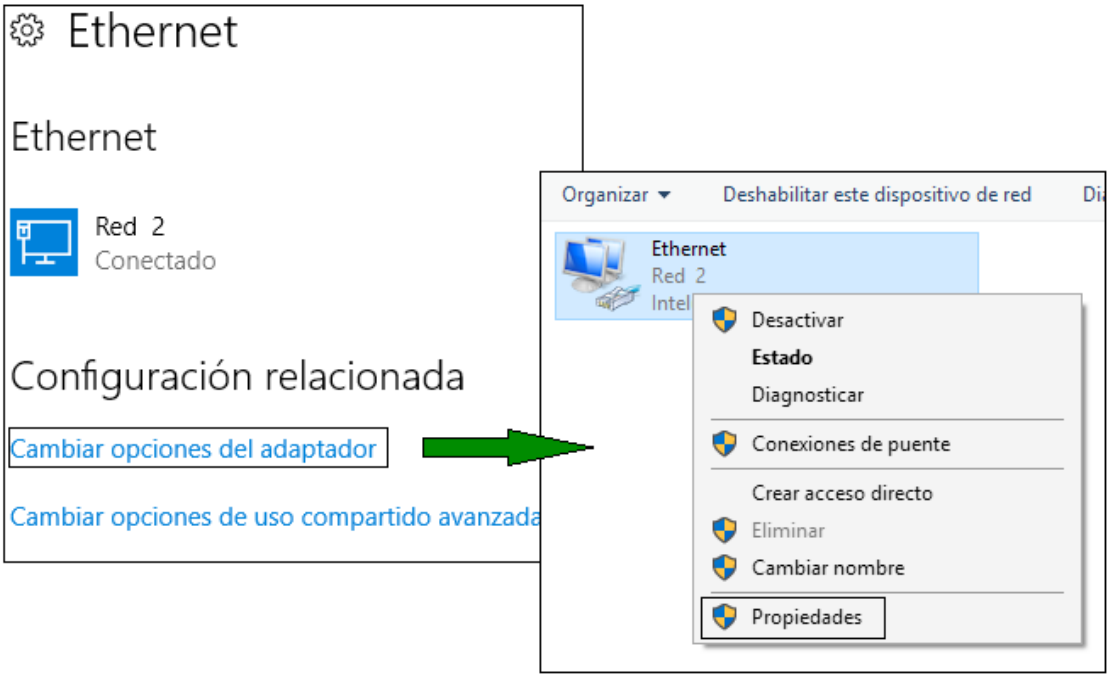
Enter into the *WindowsServer* machine with the administrator user.

First we are going to configure the static IP address, the netmask, the IP address of the router (gateway) and the DNS (the same of the router). To do that we have to go to

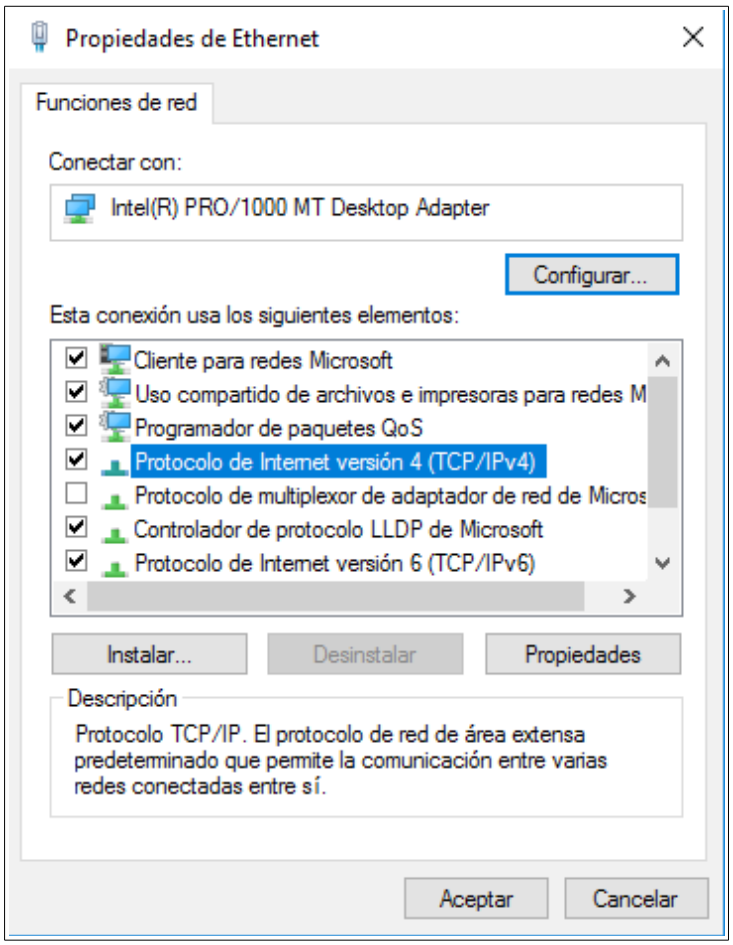
START MENU > CONFIGURATION > NETWORK AND INTERNET > ETHERNET



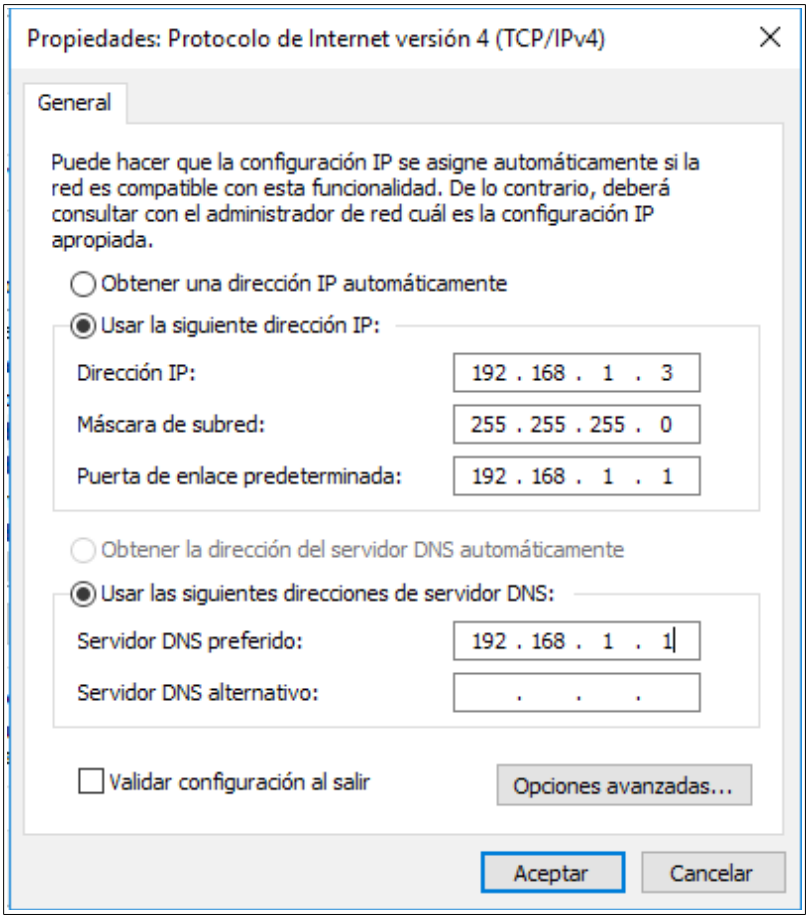
Now click on ***CHANGE ADAPTER OPTIONS*** and in the new windows click with the right button on ***ETHERNET*** and then click on ***PROPERTIES***.



Select ***Internet Protocol version 4*** in the new window and click on ***PROPERTIES*** again:



Finally we write the IP address, netmask, the default gateway and the DNS server:

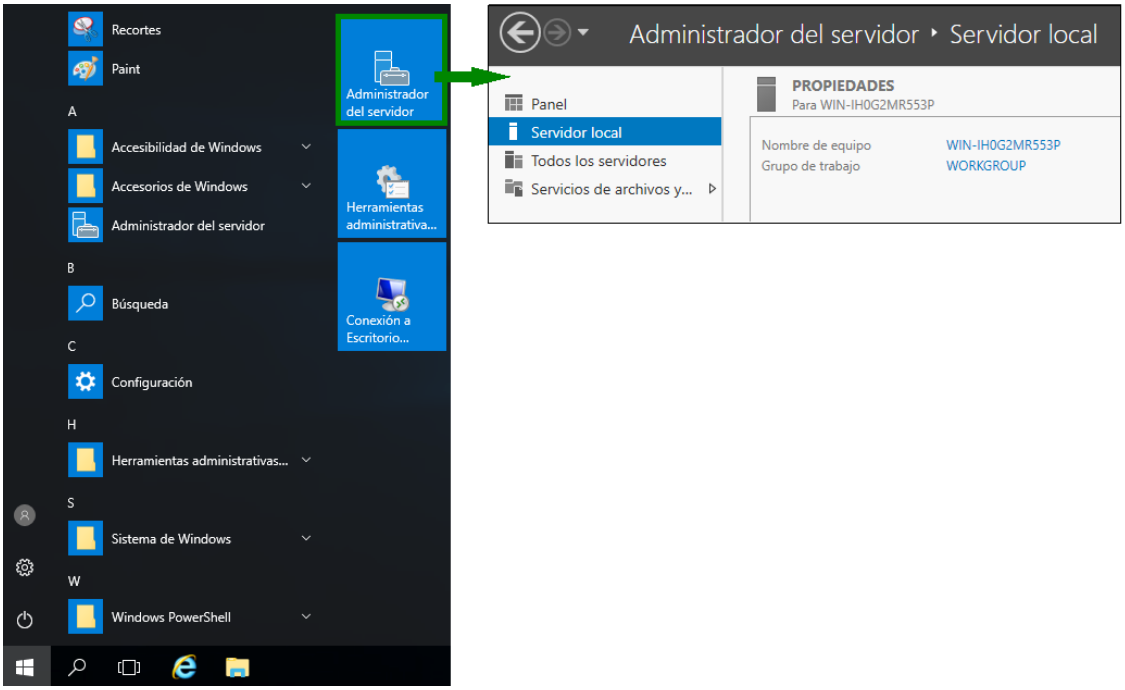


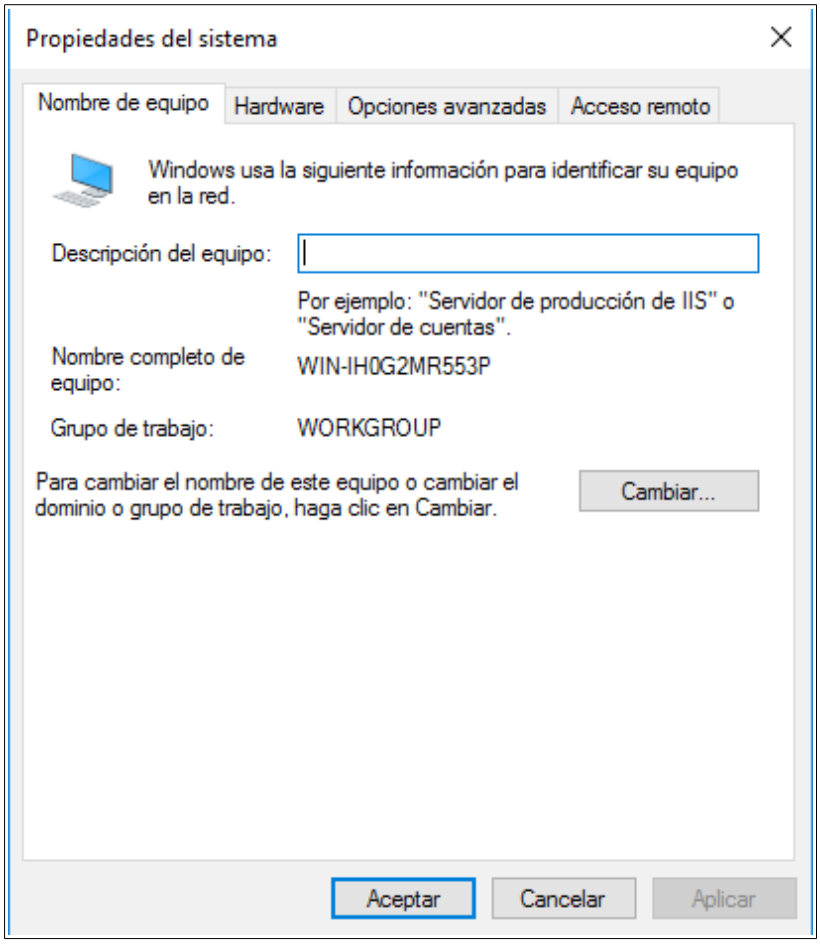
Click ***ACCEPT*** and the network configuration will be changed. To check it we will open a console and type ***ipconfig***:

```
C:\Windows\system32>ipconfig

Configuración IP de Windows


Adaptador de Ethernet Ethernet:

   Sufijo DNS específico para la conexión. . :
   Vínculo: dirección IPv6 local. . . : fe80::c03e:87d4:1753:757%14
   Dirección IPv4. . . . . . . . . . . . . . : 192.168.1.3
   Máscara de subred . . . . . . . . . . . . : 255.255.255.0
   Puerta de enlace predeterminada . . . . . : 192.168.1.1
```

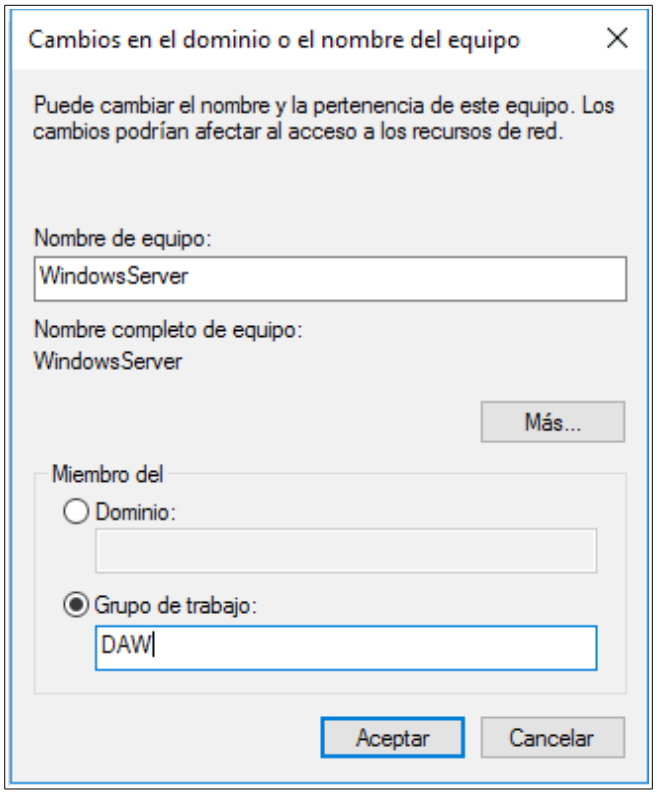
Finally, we are going to change the hostname to WindowServer. And the workgroup to DAW.

For it, go to ***START MENU > SERVER ADMINISTRATOR***. Then click on ***LOCAL SERVER*** and click on the hostname:


Recortes
Paint
A
Accesibilidad de Windows
Accesorios de Windows
Administrador del servidor
B
Búsqueda
C
Configuración
H
Herramientas administrativas...
S
Sistema de Windows
W
Windows PowerShell
Administrador del servidor
Herramientas administrativa...
Conexión a Escritorio...
Administrador del servidor ‣ Servidor local
Panel
Servidor local
Todos los servidores
Servicios de archivos y...
PROPIEDADES
Para WIN-IH0G2MR553P
Nombre de equipo
WIN-IH0G2MR553P
Grupo de trabajo
WORKGROUP


Propiedades del sistema
Nombre de equipo
Hardware
Opciones avanzadas
Acceso remoto
Windows usa la siguiente información para identificar su equipo en la red.
Descripción del equipo:
Por ejemplo: "Servidor de producción de IIS" o "Servidor de cuentas".
Nombre completo de equipo:
WIN-IH0G2MR553P
Grupo de trabajo:
WORKGROUP
Para cambiar el nombre de este equipo o cambiar el dominio o grupo de trabajo, haga clic en Cambiar.
Cambiar...
Aceptar
Cancelar
Aplicar

Click ***CHANGE*** and in the new window change the hostname and the workgroup:



Click ***ACCEPT*** and reboot the system.

3.3 Configuring LinuxClient

The process is the same as LinuxServer, but in this case the ip address of the machine is 192.168.1.4 and the hostname is LinuxClient.

4. CHECK THE CONFIGURATION

Let's check that the virtual machines can communicate among them. For it, we are going to start session in each one and to do a ***ping*** to the others. If you do not have enough RAM you will have to start only two machines at the same time.

> ***ping*** is a computer network administration software utility used to test the reachability of a host on an Internet Protocol (IP) network. It measures the round-trip time for messages sent from the originating host to a destination computer that are echoed back to the source.
>
> To stop a ***ping*** you have to type ***Ctrl+C***

Start session at LinuxServer and write in the terminal:

ping 192.168.1.1

ping 192.168.1.3

ping 192.168.1.4

Look at that you do not do a ping to 192.168.1.2 because is the same machine and it will always work.

Do it the same with the other virtual machines.

You will see that some pings fail because of Windows Firewall.

For example:

It works:

```
administrador@LinuxServer:~$ ping 192.168.1.1
PING 192.168.1.1 (192.168.1.1) 56(84) bytes of data.
64 bytes from 192.168.1.1: icmp_seq=1 ttl=64 time=3.89 ms
64 bytes from 192.168.1.1: icmp_seq=2 ttl=64 time=4.94 ms
64 bytes from 192.168.1.1: icmp_seq=3 ttl=64 time=3.09 ms
^C
--- 192.168.1.1 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2004ms
rtt min/avg/max/mdev = 3.091/3.975/4.942/0.761 ms
administrador@LinuxServer:~$
```

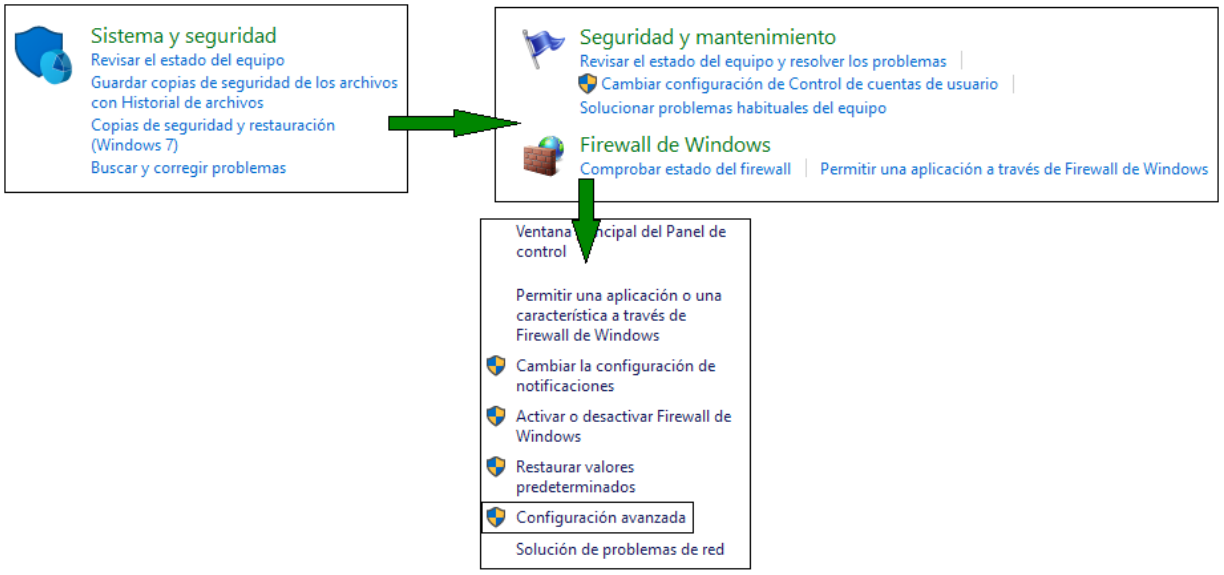
It does not work:

```
administrador@LinuxServer:~$ ping 192.168.1.3
PING 192.168.1.3 (192.168.1.3) 56(84) bytes of data.
^C
--- 192.168.1.3 ping statistics ---
3 packets transmitted, 0 received, 100% packet loss, time 2015ms

administrador@LinuxServer:~$
```

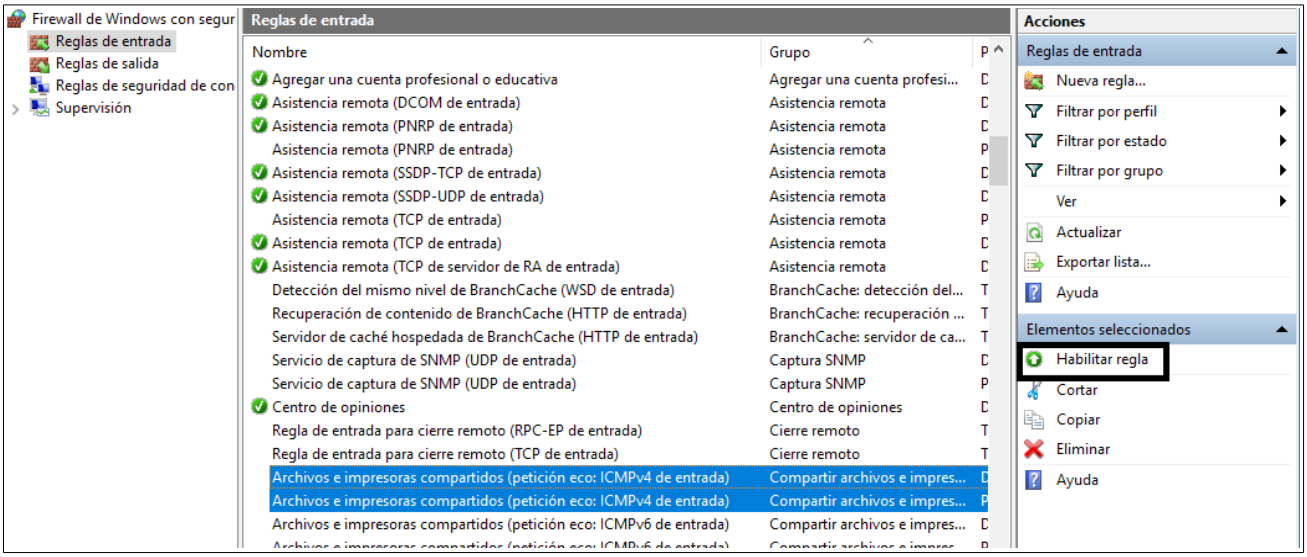
4.1 Activate the ping in the firewall of Windows

Linux allows to execute ping command without problems, but Windows have it disabled by the firewall. For that, you have to click with the right button of the mouse on ***START MENU*** and then ***CONTROL PANEL***.

Then you have to go to ***SYSTEM AND SECURITY > WINDOWS FIREWALL > ADVANCED CONFIGURATION***.



Finally you have to choose ***INPUT RULES***, select ***FILES AND PRINTS SHARED (ICMP4 INPUT)*** and click on ***ENABLE RULE***.



5. INSTALLING WEBMIN

As says the documentation of Webmin (http://www.webmin.com/deb.html), to install Webmin we can download the file from the download page (we do this in *LinuxServer*):

or run this command (the version can change):

wget http://prdownloads.sourceforge.net/webadmin/webmin_1.881_all.deb

and then: ***sudo dpkg --install webmin_1.881_all.deb***

> If you have problems with dpkg because it is blocked you have to run:
> ***sudo rm /var/lib/dpkg/lock*** and try again.

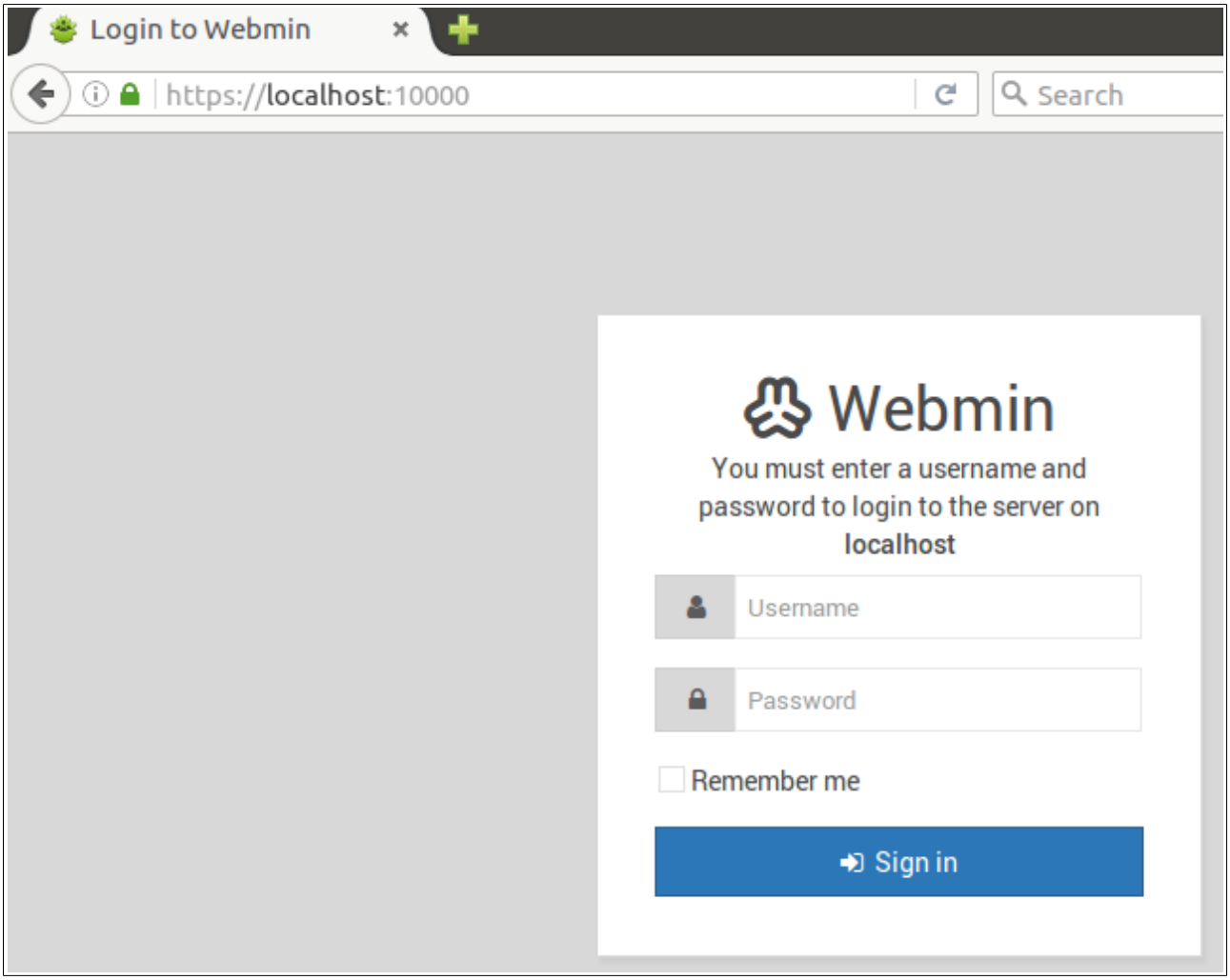
If you do not have all the needed dependencies installed you have to install them:

sudo apt-get install perl libnet-ssleay-perl openssl libauthen-pam-perl libpam-runtime libio-pty-perl apt-show-versions python

If you have problems with the installation maybe you have to run: ***sudo apt-get -f install*** to finish it.

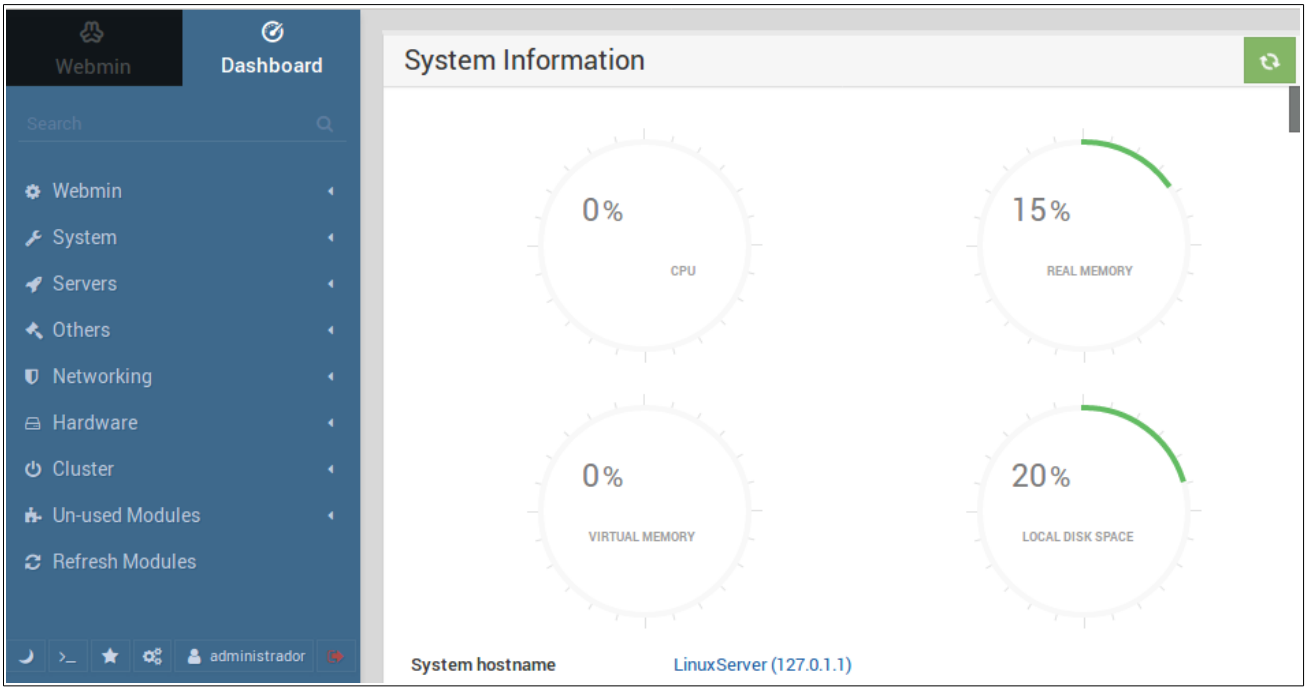
To run Webmin we have to go to de url https://localhost:10000 (we have to accept the certificate).

The username and the password are the same as in the machine. In my case, administrador/admindaw.

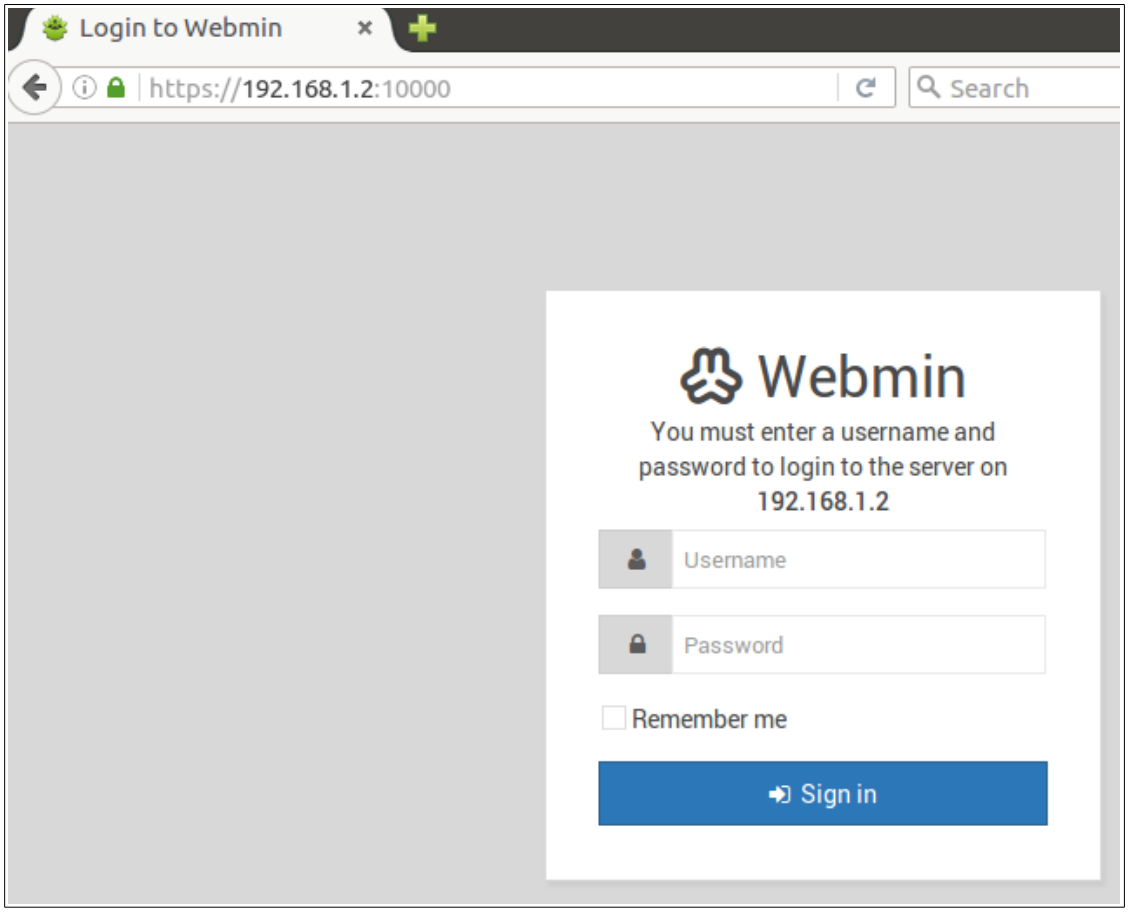


If the Webmin server doesn't respond, you might need to adjust firewall settings to allow port 10000. (http://doxfer.webmin.com/Webmin/Installation)

and we will be inside it:



If we want to connect it from other virtual machine, for instance from *LinuxClient*, we will have to write the URL: https://192.168.1.2:10000



5.1 Parts of Webmin

The main window gives us the system information about our machine: hostname, OS, version, processor, etc.

Webmin has more than 100 modules and all of them can be found in the left menu grouped as:

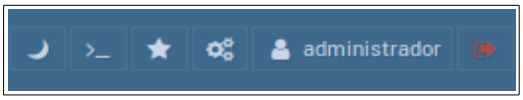
- Webmin
- System
- Servers
- Others
- Networking
- Hardware
- Cluster
- Un-used Modules: contains all the modules not installed.

We have all the modules explained in the official documentation: http://doxfer.webmin.com/Webmin/Webmin_Modules

In this unit we will learn about the first module: Webmin. It has 6 modules:

- Backup Configuration Files
- Change Language and Theme
- Webmin Actions Log
- Webmin Configuration
- Webmin Servers Index
- Webmin Users

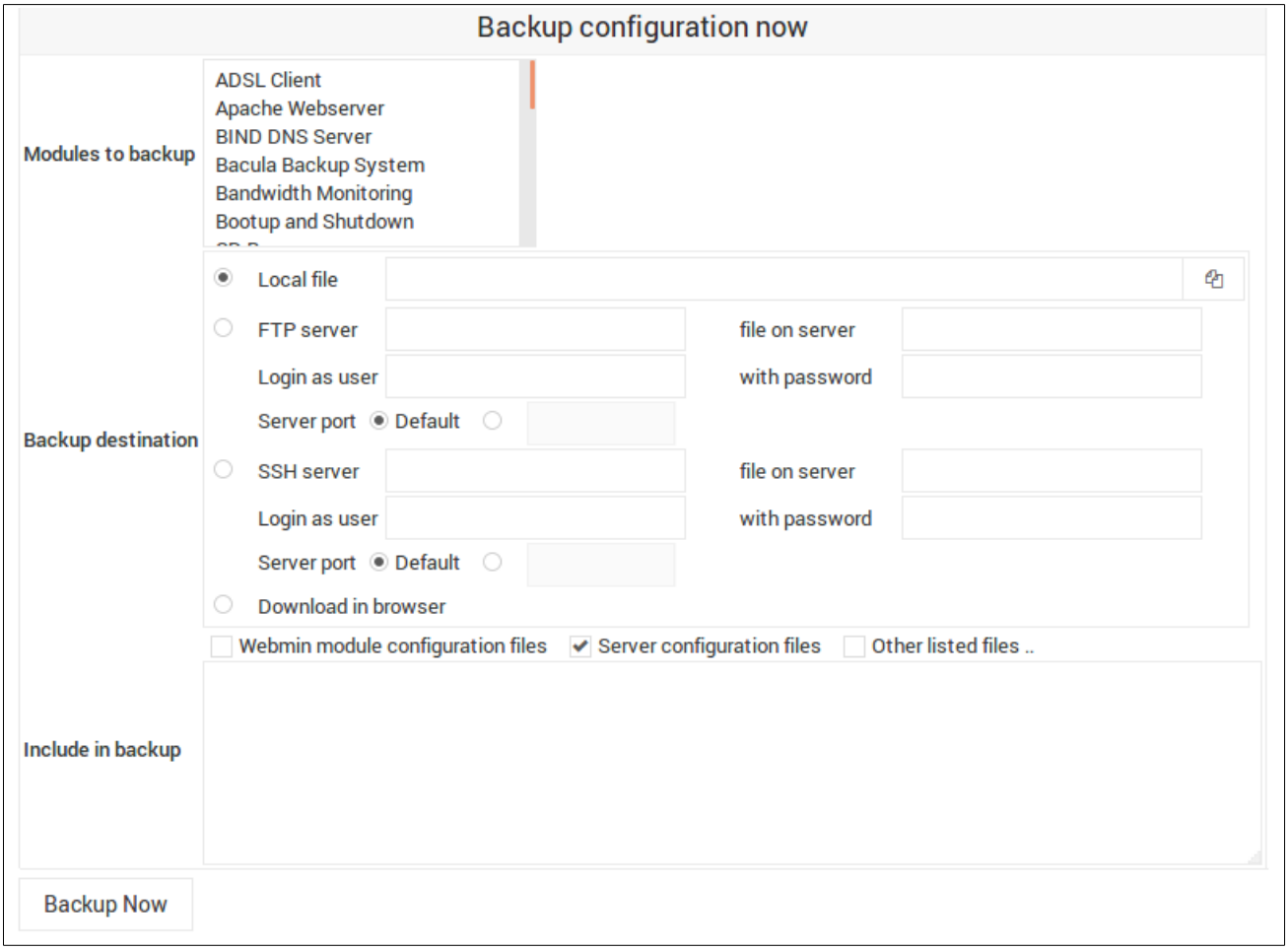
Also in the bottom of the menu we have several buttons:



From left to right: change the mode (day or night), open the terminal, add to favorites, theme configuration, edit user and sign out.

5.1.1 Backup Configuration Files

In this module we can do backups of any module installed in Webmin and restore them. Also, we can schedule a backup. Let's see how to do it.



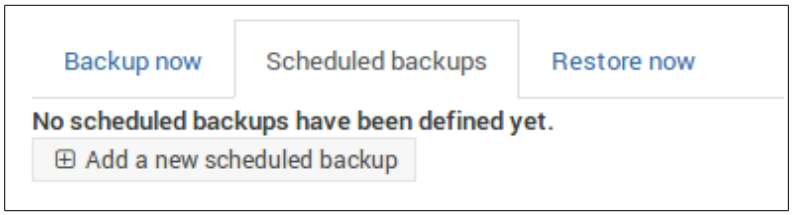
To do a backup we have to follow these steps:

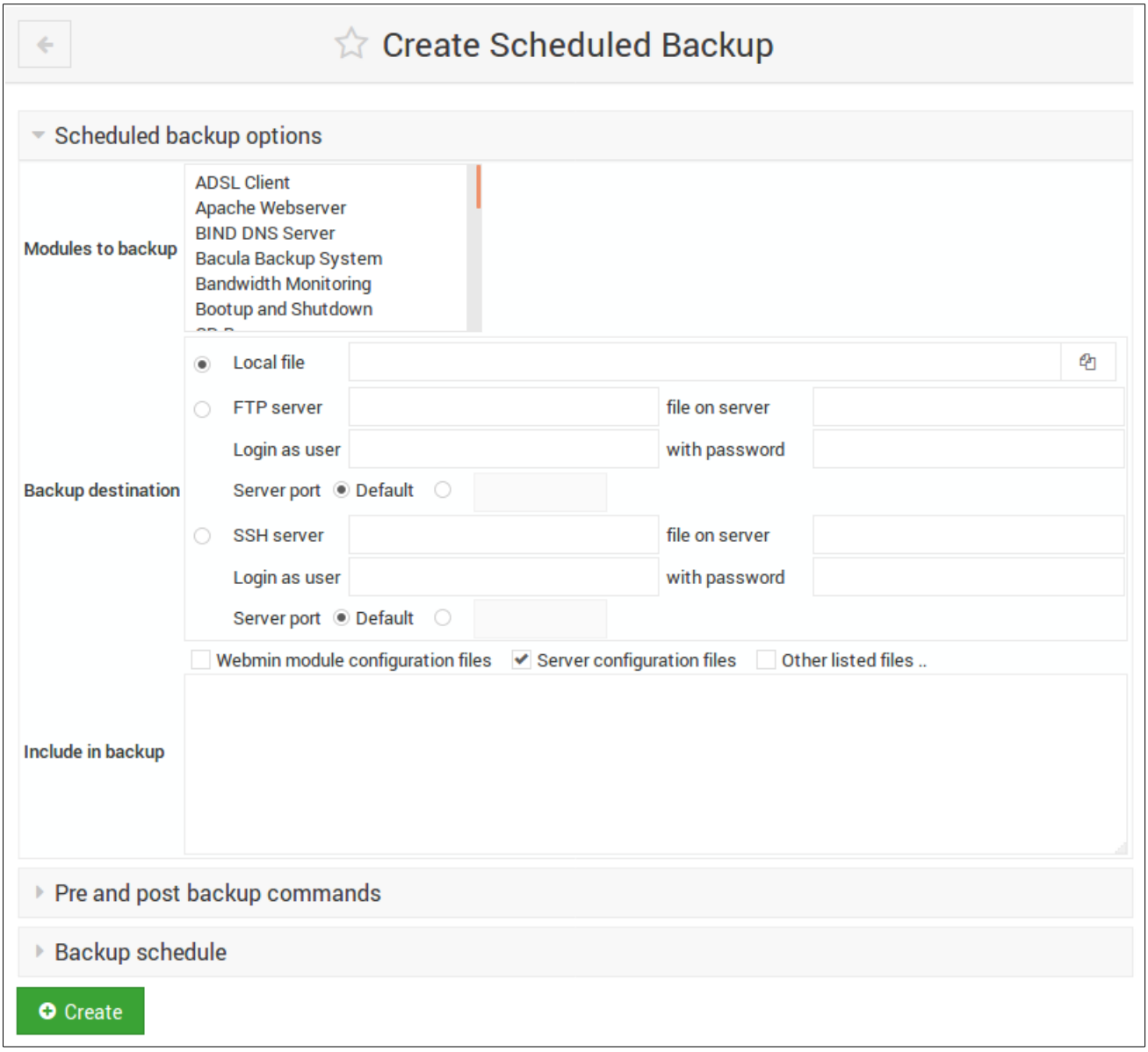
1. Click on the ***Backup now*** tab.
2. In the ***Modules to backup*** list, select the modules you want to backup config files for, such as *Users and Groups*. Multiple modules can be selected by ctrl-clicking.
3. In the ***Backup destination*** field, select ***Local file*** and enter a path to write the backup to. This should be given a *tar.gz* extension, as that is the file format used.
4. Click the ***Backup Now*** button.

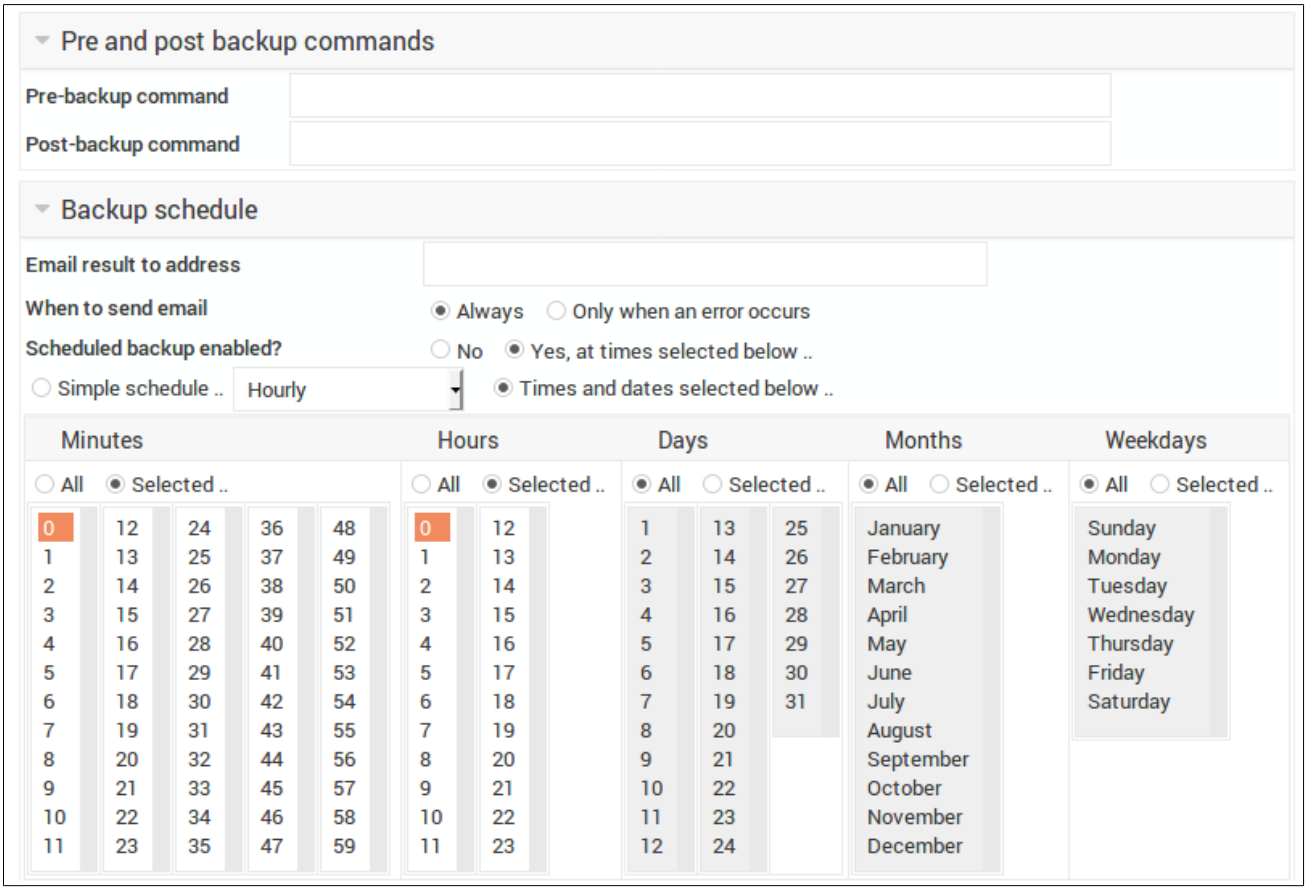
To do a scheduled backup we have to follow these steps:

1. Click on the ***Scheduled backups*** tab.
2. Click the ***Add a new scheduled backup*** link, which will open the form shown below.
3. Select the modules whose config files you want to include from the ***Modules to backup*** list.
4. Enter a local or remote file destination in the ***Backup destination*** section.
5. If you want to be notified about the status of this backup, enter your email address in the ***Email result to address*** field.
6. In the ***Scheduled backup enabled?*** field select ***Yes***, and choose the times and days for the backup to run from the Cron time selector below it.

7. Click the ***Create*** button.

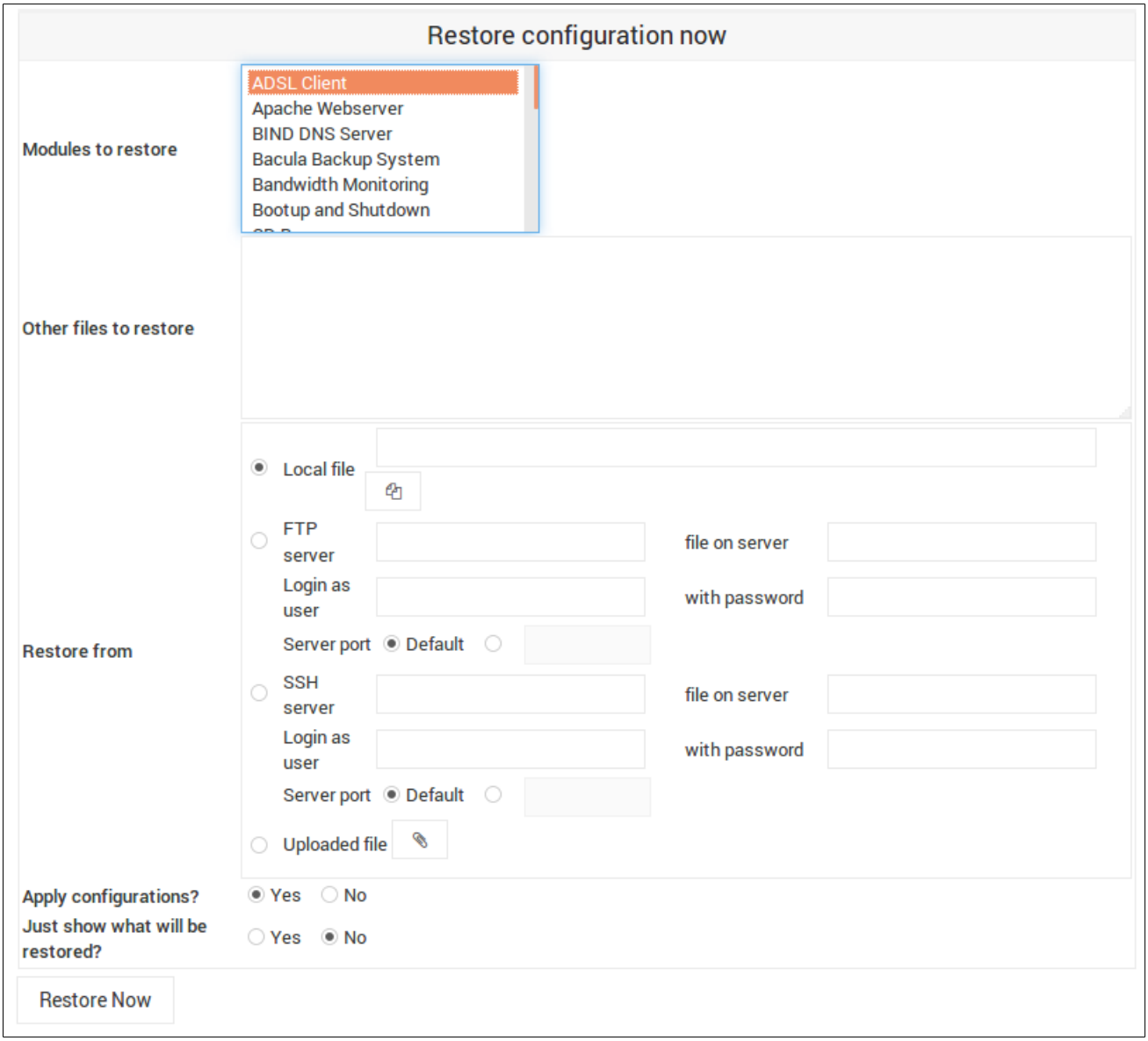






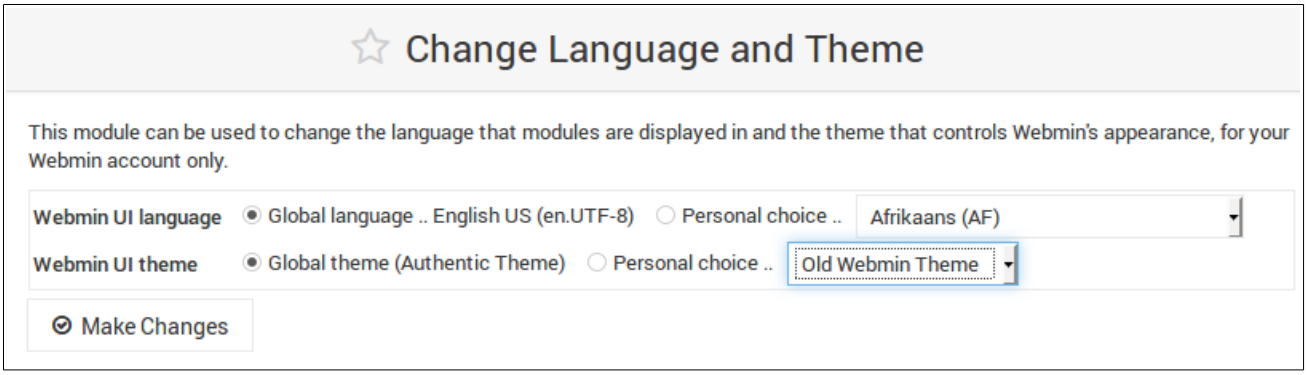
And to restore a backup we have to follow these steps:

1. Click on the ***Restore now*** tab.
2. Select the module or modules whose config files you want to restore from the ***Modules to restore*** menu.
3. In the ***Restore from*** section, enter the path to a local or remote file that was originally created by this module. To be useful, it must contain backups for the modules that you selected above.
4. Click the ***Restore Now*** button.



5.1.2 Change Language and Theme

In this module we can change the language and the theme.



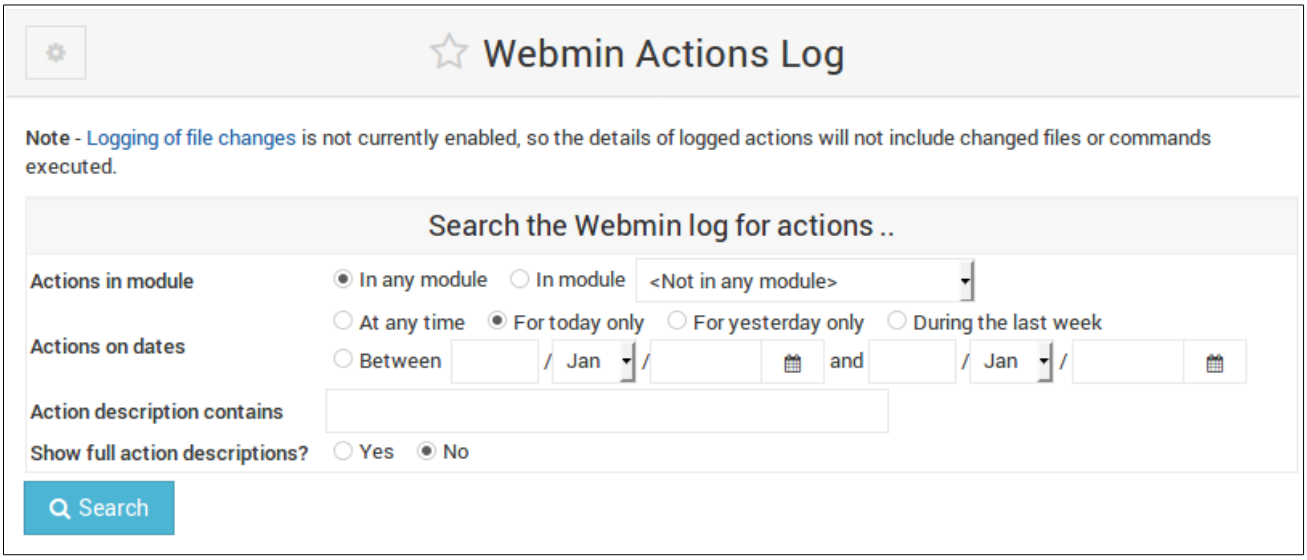
5.1.3 Webmin Actions Log

When logging is enabled, Webmin will record every action taken using it that has some effect on your system, such as the creation of a user or the changing of an Apache setting.

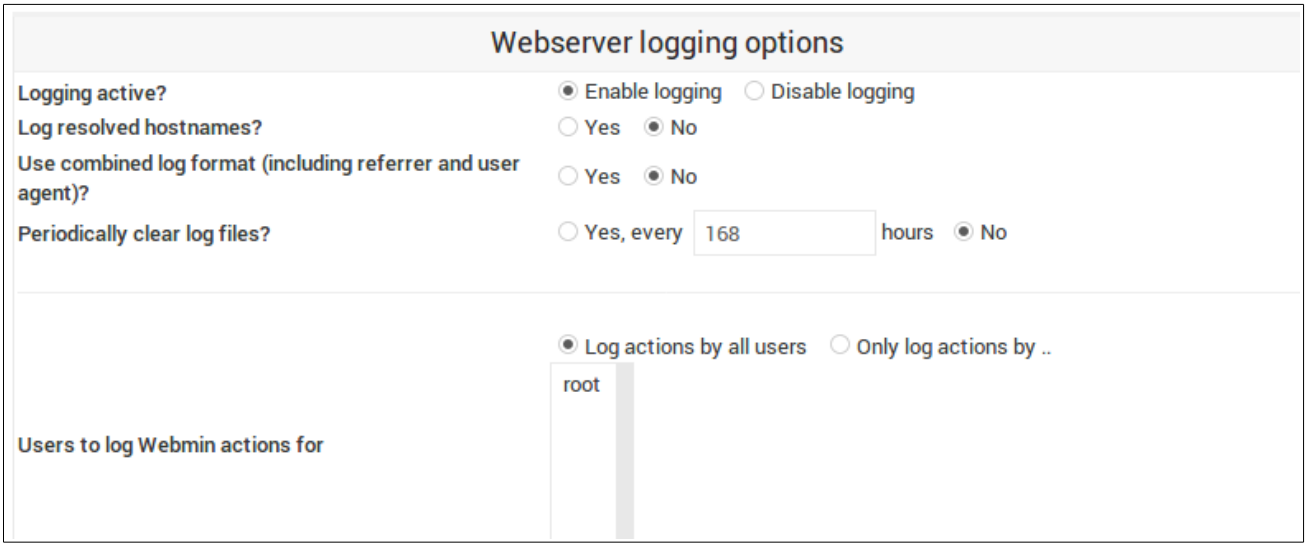
Pages that do not actually change anything on your system, such as those that just display icons, list users or show the current settings for some object will not write anything to the action log.

With this module we can get all of this modifications.

First of all, if we see a note warning that the logging is not enabled:



we have to click on it and enabled it. For that, check that the ***Enable logging*** radiobutton (the first one) is enabled and click on the button ***Save***.



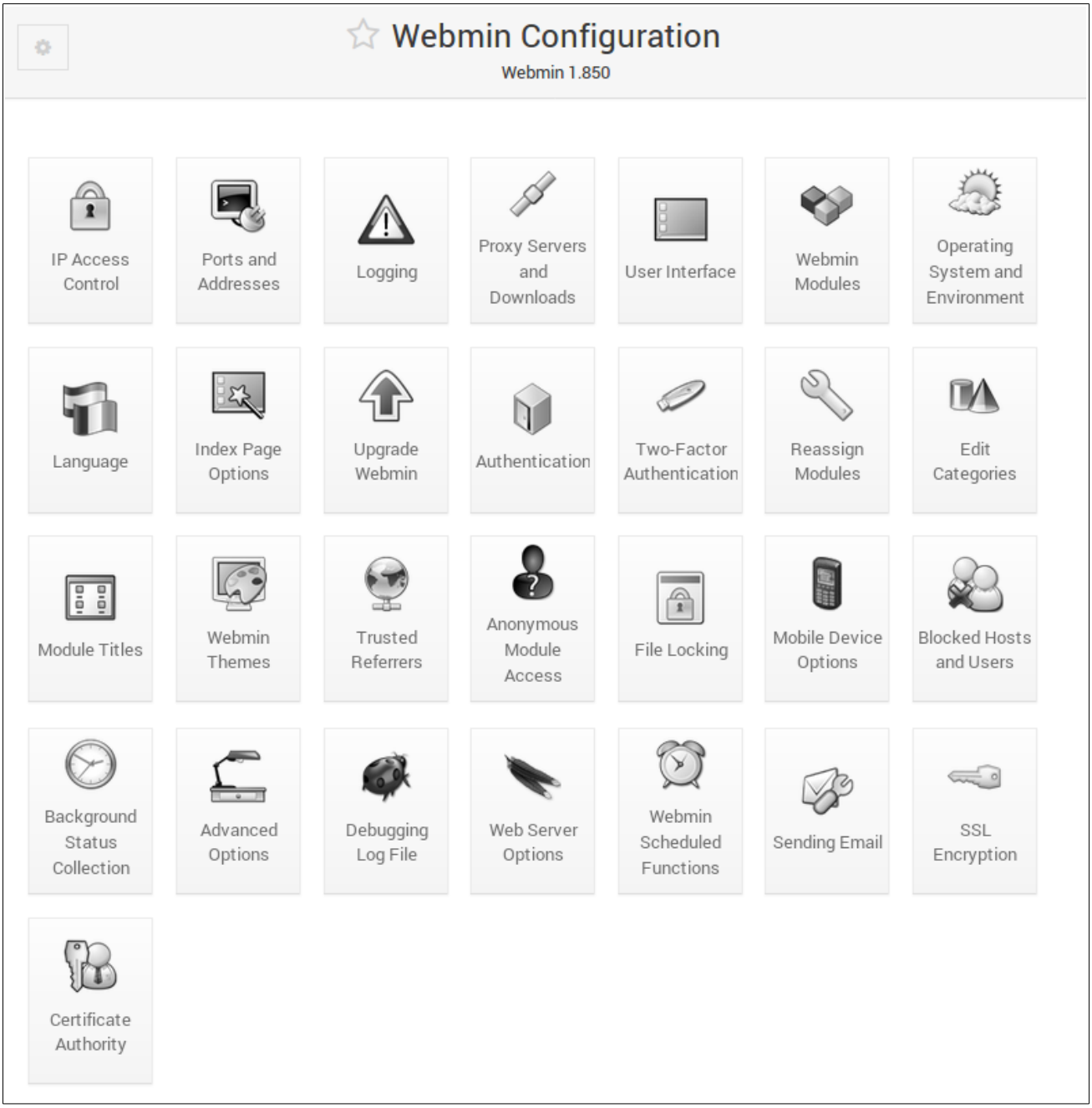
Now, we can search for any action made in Webmin.

5.1.4 Webmin Configuration

This is the module to configure all Webmin, in it we can block users, control the IP access, change the language, etc.

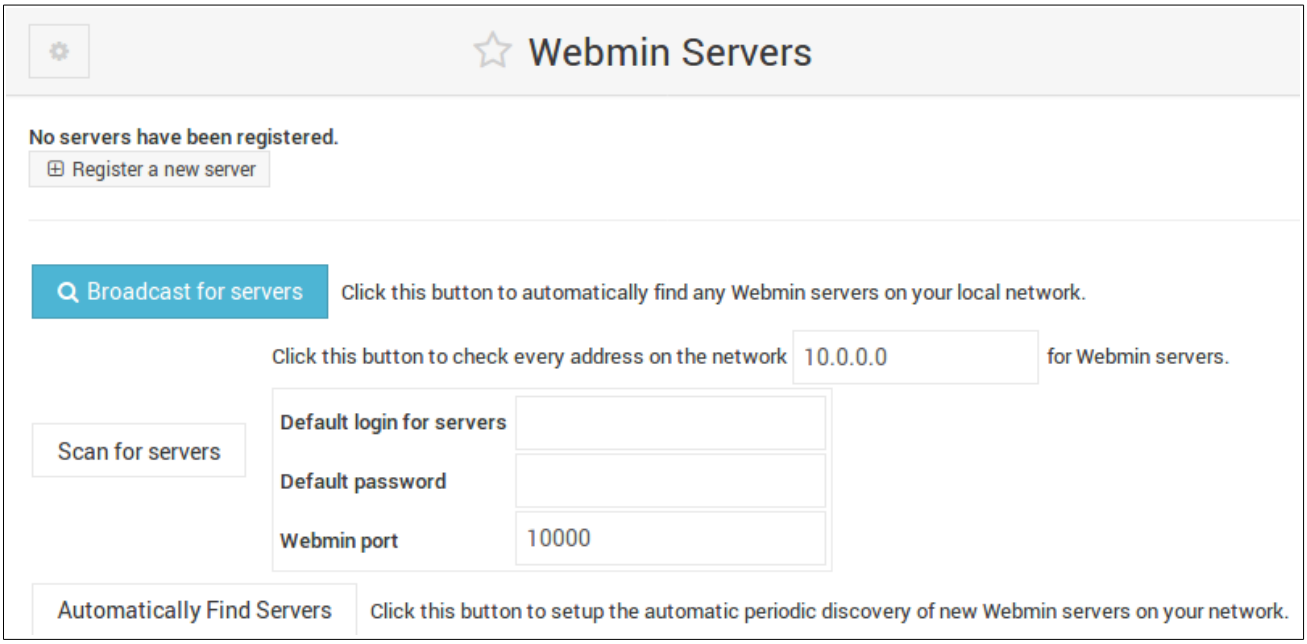
All of them are explained in http://doxfer.webmin.com/Webmin/Webmin_Configuration.

We will see them in next units.



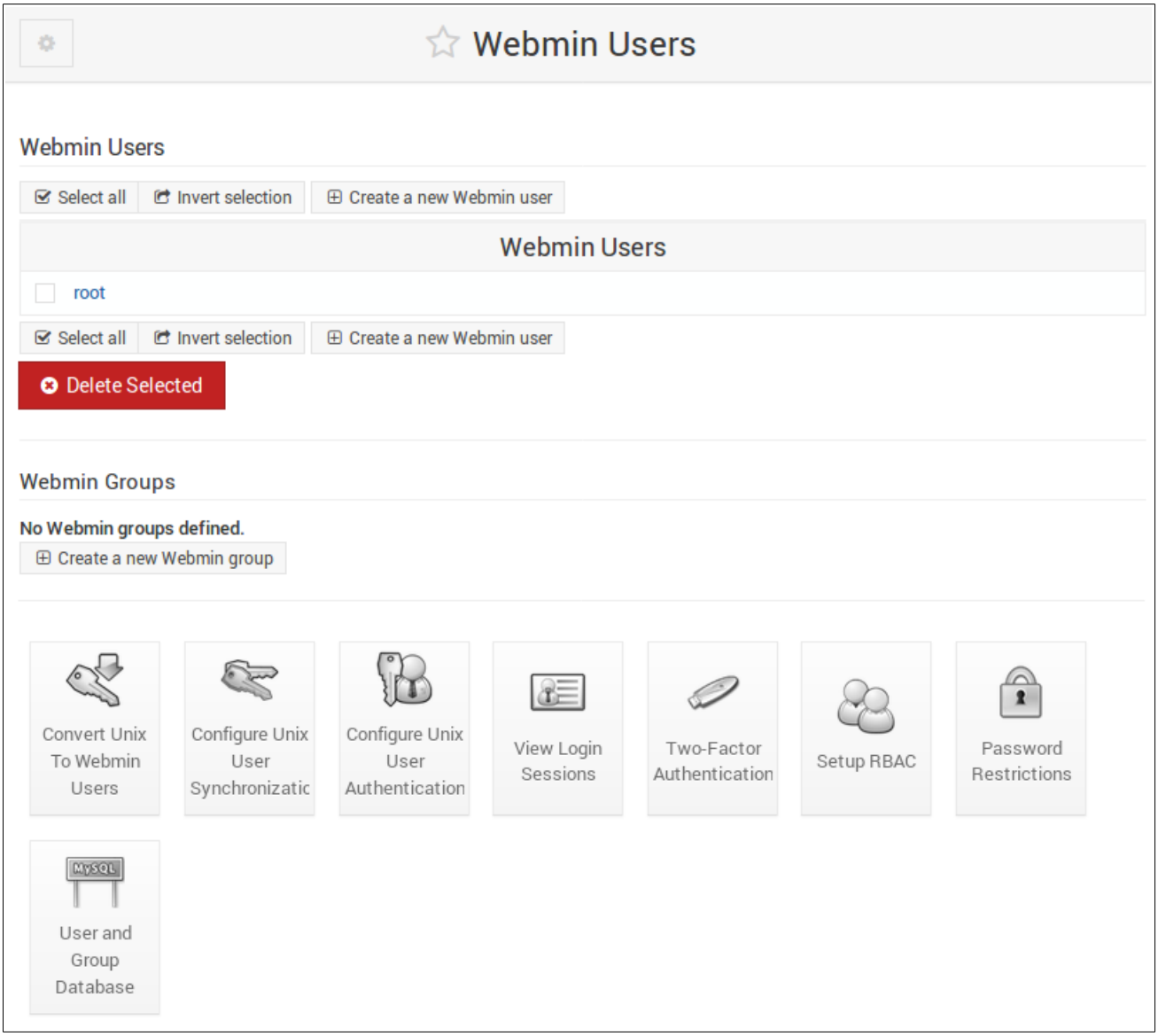
5.1.5 Webmin Servers Index

This module allows us to create a master index of other systems running Webmin on our network and define systems which can be controlled by a master Webmin server. We will not use it but you can read about it in http://doxfer.webmin.com/Webmin/Webmin_Servers_Index.

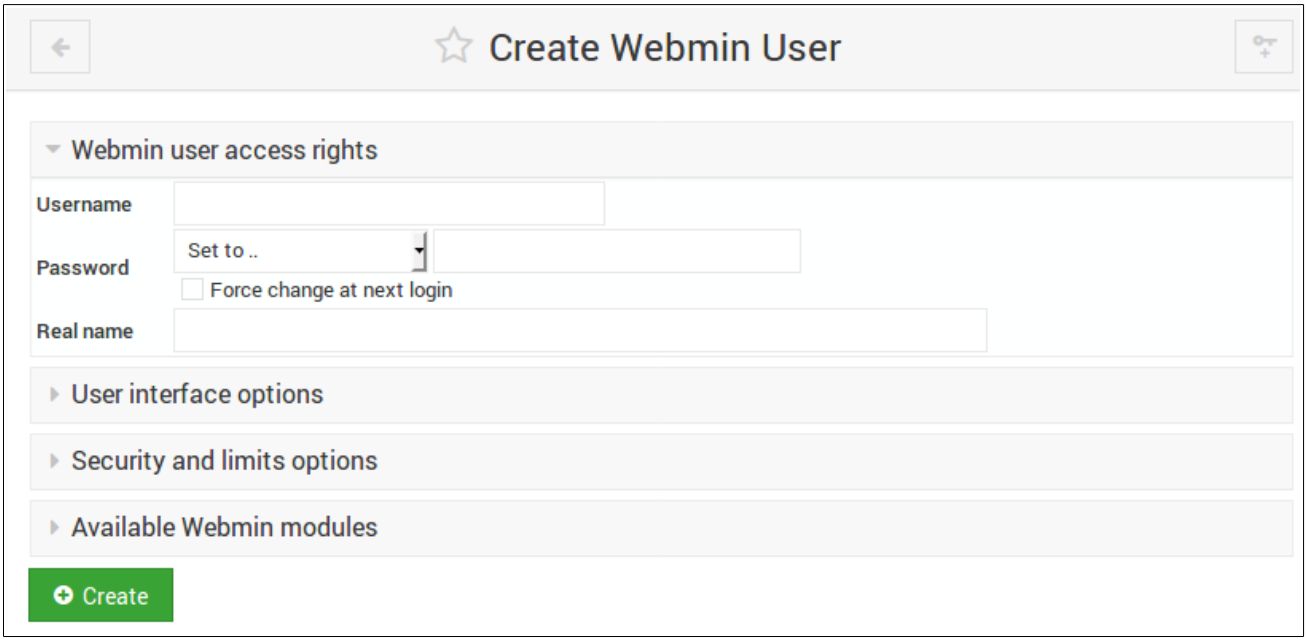


5.1.6 Webmin Users

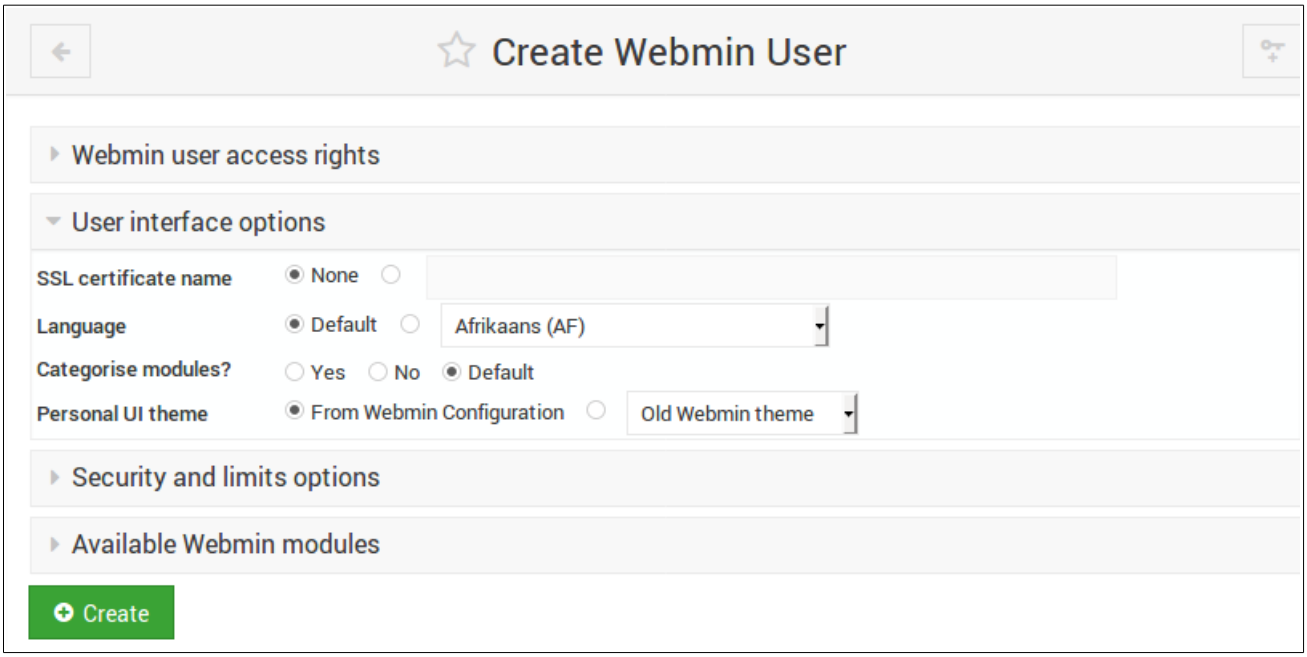
In this module we can work with the users and groups in Webmin (create new users,groups, manage them, etc.).



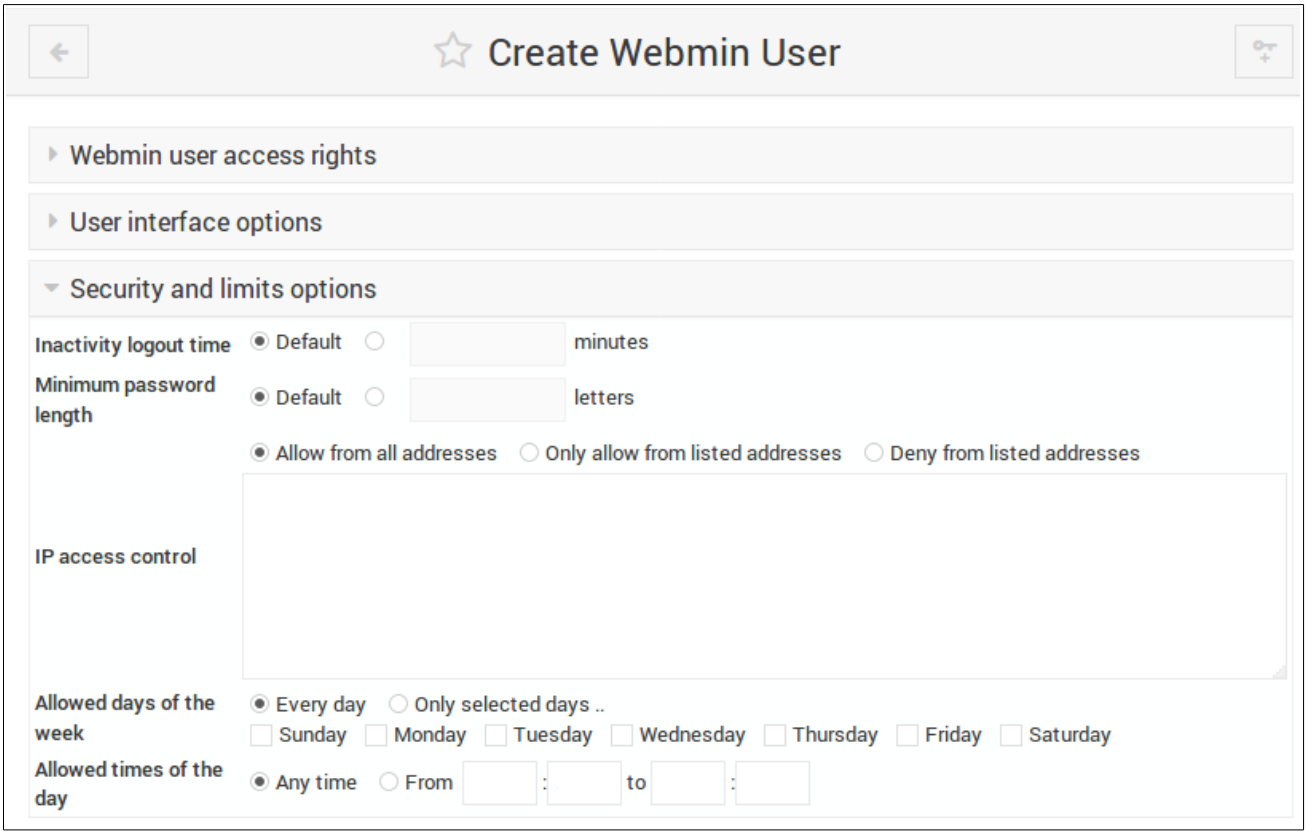
If we want to create a new user we have to click on the ***Create a new Webmin user*** button and we will have this form:



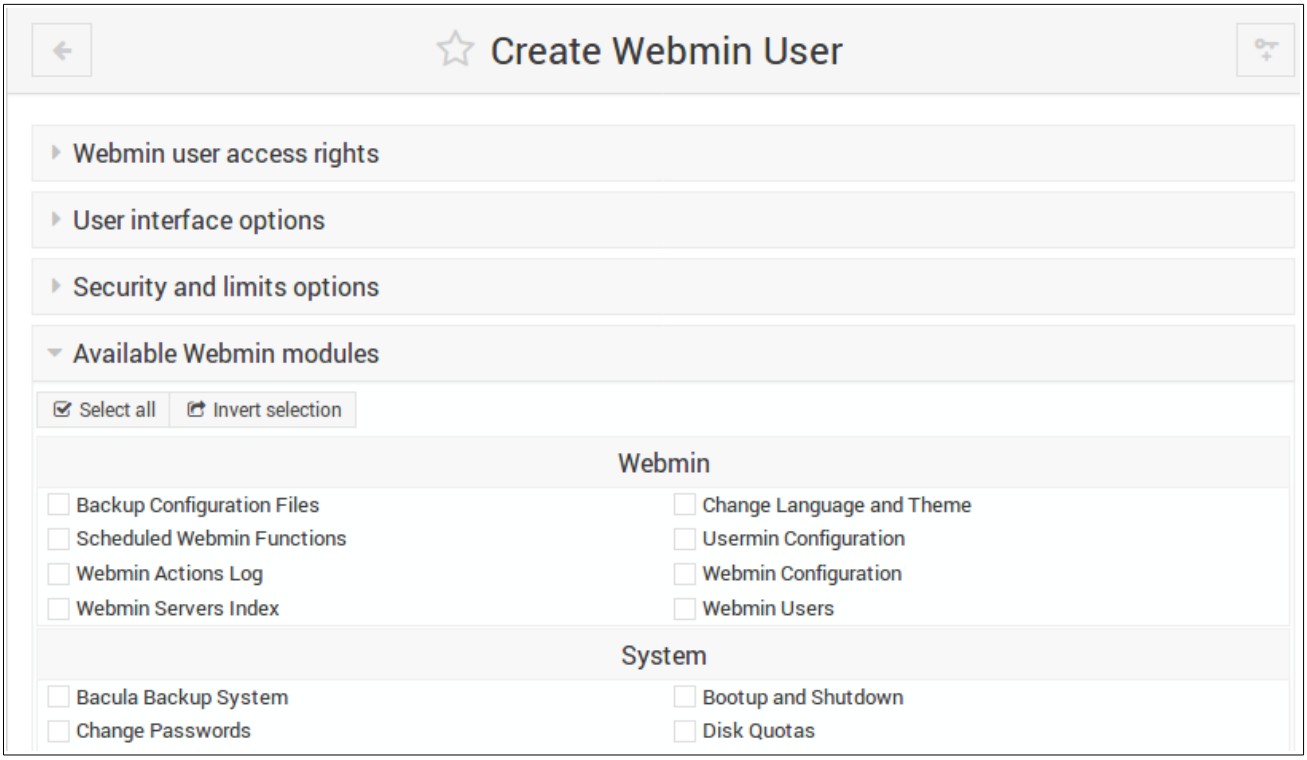
In it we will write the user name and the password. Also, we could set the language or the UI theme



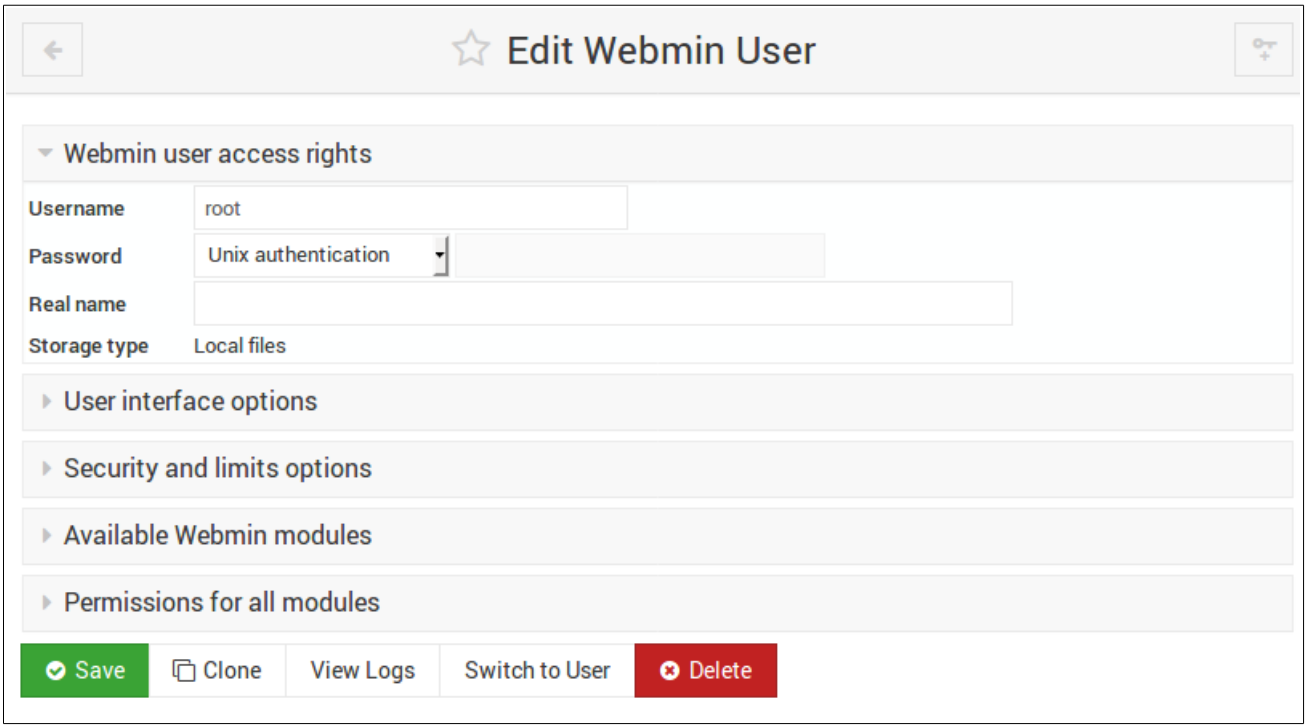
or set a minimum password length, ip access control,



or set the modules that will be available for the user.



Also, we can change options of created users. For instance, if we click on our user ***root*** we will see the same form:



Here we can change the password. We can see that we are using a Unix authentication, this mean that it uses the password of our machine. If you change it to ***Set to...*** you can set a new one.

You can read about the other options in the documentation: http://doxfer.webmin.com/Webmin/Webmin_Users.