YouTestMe Standard Edition

Installation and Support Manual

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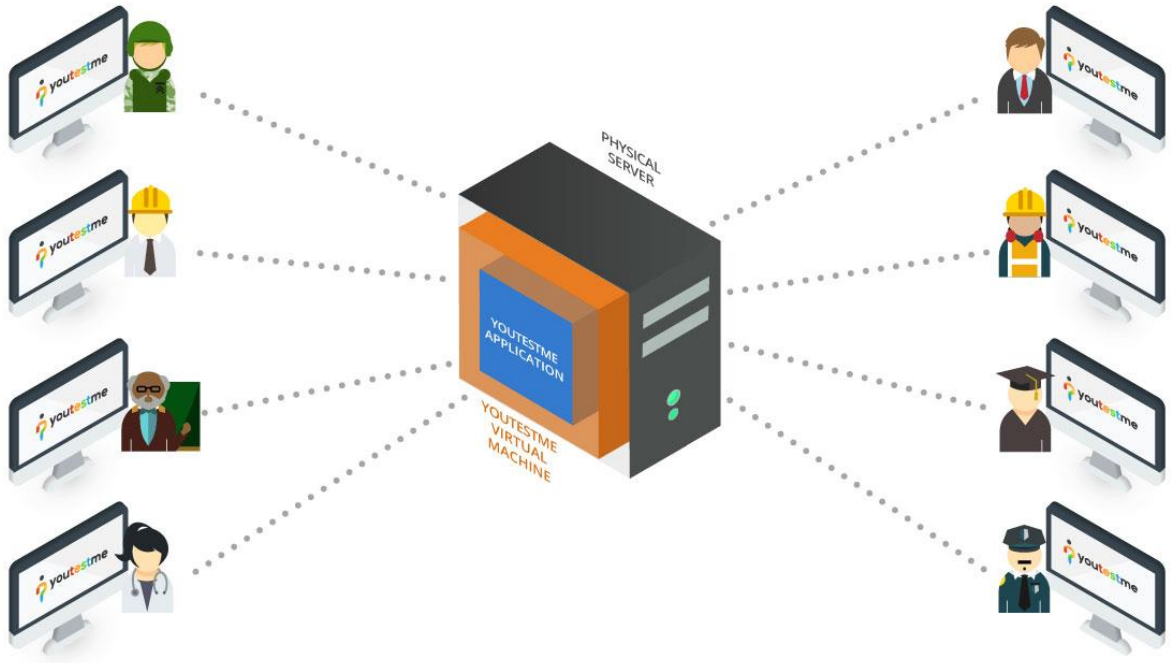
1 YouTestMe Software Distribution

YouTestMe is a complex server-based system. It consists of CentOS 7 Linux host operating system, Tomcat application server, PostgreSQL database, and utility scripts. They are all packaged in one pre-configured Virtual Appliance called Virtual Machine. Virtualization is a popular concept that significantly simplifies complex computer systems' distribution, installation, configuration, and maintenance.



Hypervisor software is required to run a Virtual Appliance. The following major hypervisor software supports YouTestMe:

Hypervisor Software	Description	Price
Oracle VirtualBox	Suitable for workstations and small to medium servers	Free Download
VMware Player	Ideal for workstations and small to medium servers	License ($149)
VMware Workstation 17 Pro	Ideal for workstations and small to medium servers.	License ($199)
VMware ESXi	Suitable for data centers. Contact your system administrator for more information.	Free version or License

For best performance and reliability, the recommended hypervisor software is VMware ESXi.

Virtualization is a popular concept in data centers, and it is likely that your organization already has an infrastructure with hypervisor software. However, you should check with your system administrators about your organization's standard Virtual Machine platform. Free Oracle VirtualBox will be adequate if you don't have any.

Please check Appendix A in this document for more information on the advantages of Virtual Machines.

2 System Requirements

2.1 YouTestMe Virtual Machine Hardware Requirements

Hardware	Minimal	Recommended
CPU	4 vCPU cores	8 vCPU cores
RAM	16 GB	32 GB
HDD or SSD	120 GB	320 GB
Network Connection	Yes	Yes

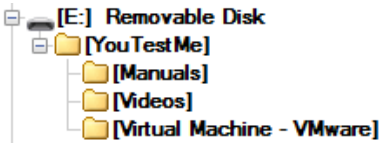
Note that the above requirements are for the YouTestMe virtual machine. To be installed on a workstation or small server, a physical device should have at least 4 GB RAM and 50 GB free disk space, more than the above requirements. However, suppose you install a virtual machine on a "bare metal" server with hypervisors like ESXi. In that case, the above conditions equal what you need to be available on the physical server.

3 Delivery Options

The YouTestMe product package can be shipped as a memory key or downloaded from our secure FTP server via the Internet.

3.1 Memory key

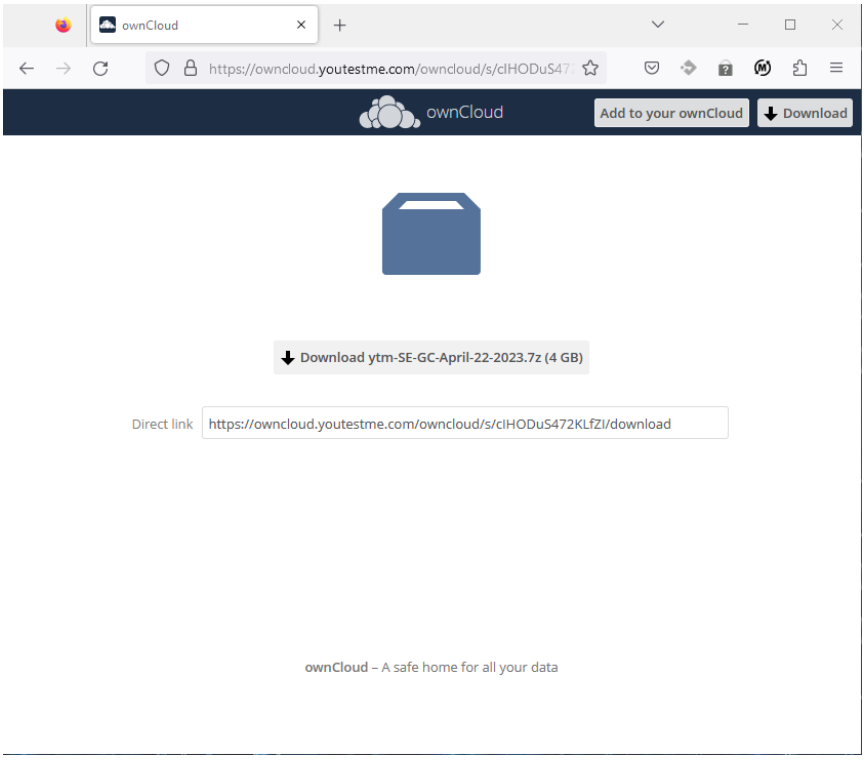
Memory key (USB) can be sent directly to the customer's address via the post or a similar service. In addition, you can find our software packaged as Virtual Machine with instructional videos and manuals in the enclosed memory key. The directory structure is shown in the picture below.



If you received the YouTestMe product package as a memory key, you should skip to Chapter 5.

4 Download

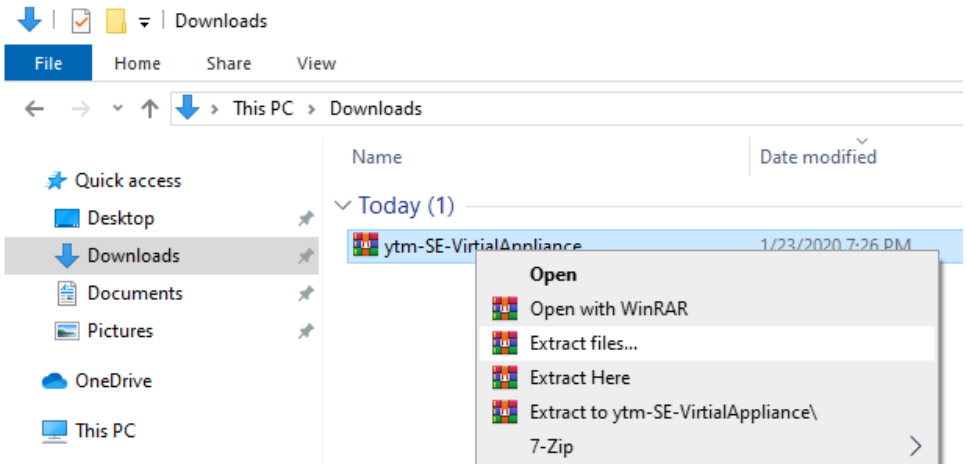
You will receive the download link by email. The file size is approximately 5 GB - it should take up to 30 minutes to download, depending on the internet connection. You should see a file in your computer's "Downloads" folder when the download completes.



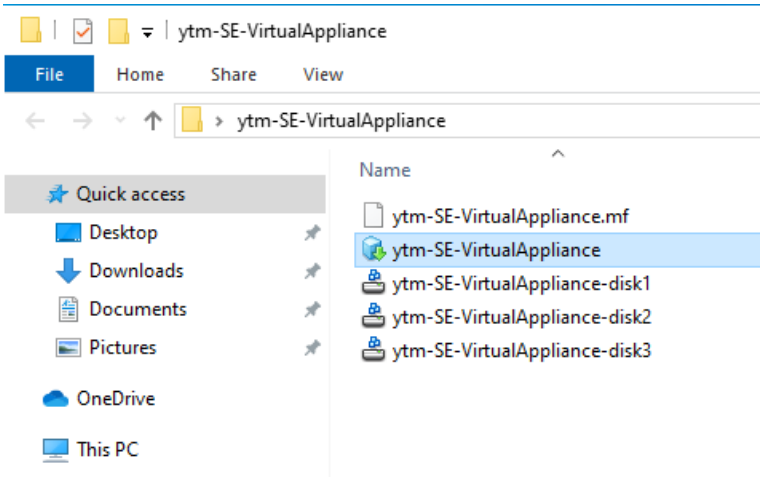
4.1 Extract Downloaded File

The file is downloaded in a ".7z" format and needs to be uncompressed using any popular compression tool (7zip, WinRAR, etc.). To do that:

1. Right-click on the file and choose one of the "extract" options.



2. Once the uncompressing process has been completed, you should see the folder containing Virtual Machine's files.



Below is the list of free compression tools that can be used to decompress the YouTestMe Virtual Machine file.

Software	Price	Download Link
7zip	Free	7-zip
WinRAR	Free	WinRAR

5 YouTestMe Virtual Machine Deployment

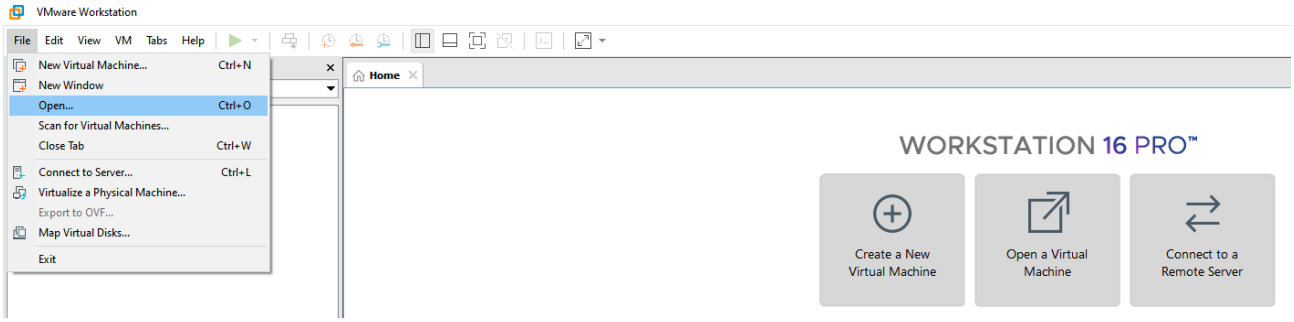
You will need hypervisor software to deploy the YTM Appliance, as stated in Chapter 1.
For demonstration purposes, we will describe the deployment process in two different environments:

1. VMware Workstation, VMware ESXi
2. Oracle's VirtualBox

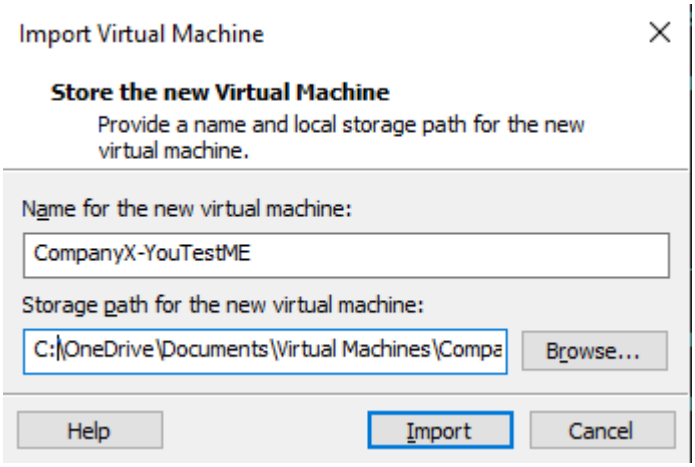
The estimated time to import the YTM Appliance is about 15 minutes.

5.1 Import YouTestMe using VMware Workstation

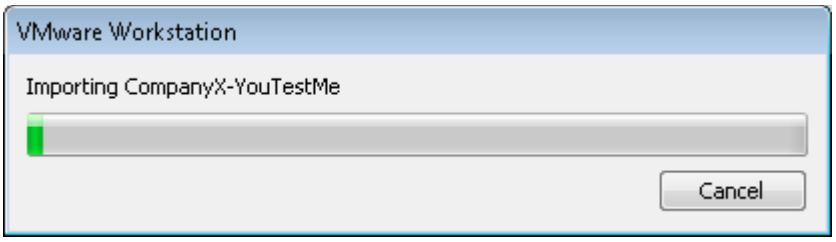
1. In VMware Workstation, choose "File -> Open"
2. Select the file in OVF format



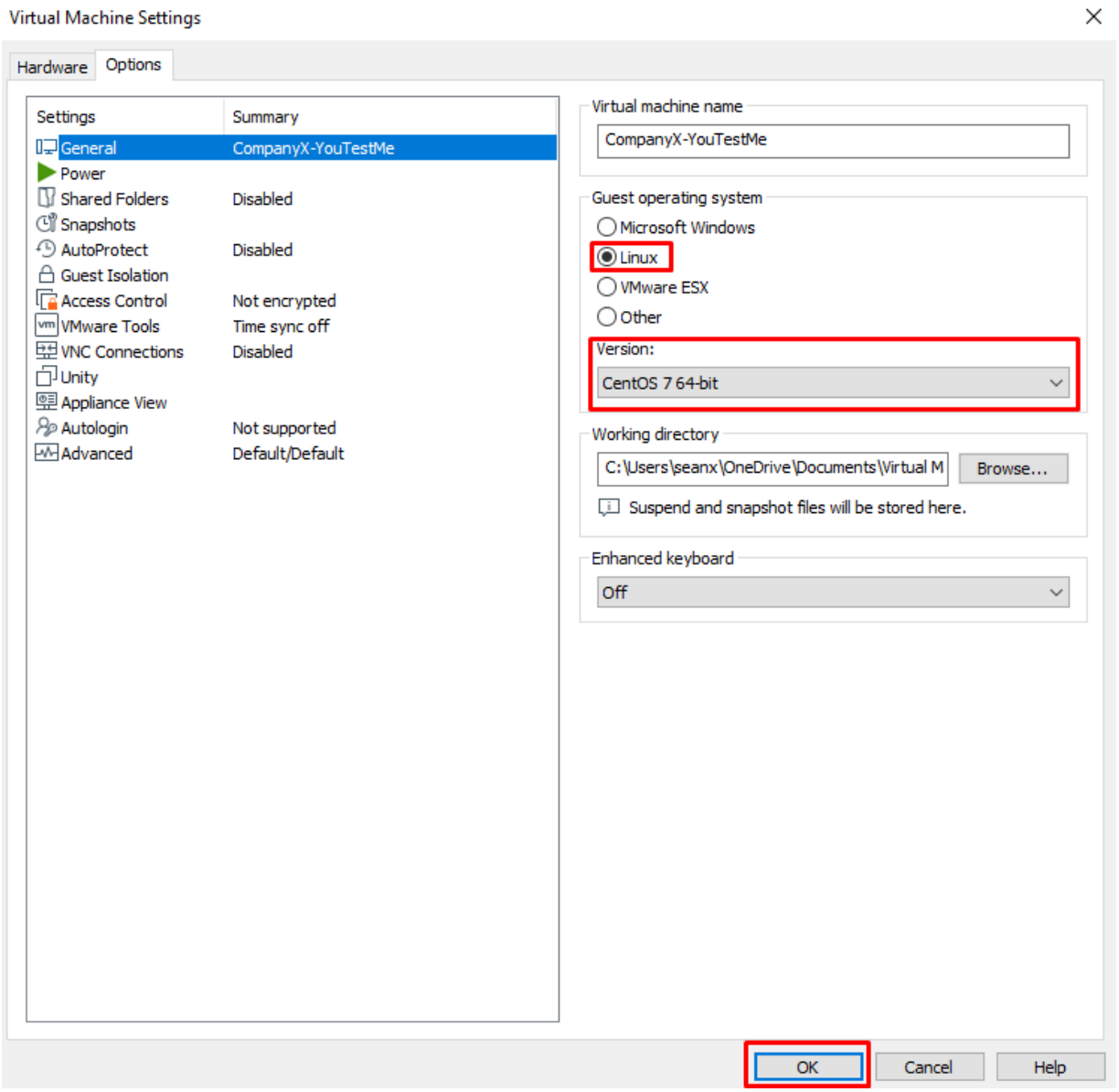
3. Click "Open"
4. In the window below, set the name of your Virtual Machine and the host location where you have at least 350 GB of free disk space. You should choose a local disk drive (not a network drive).



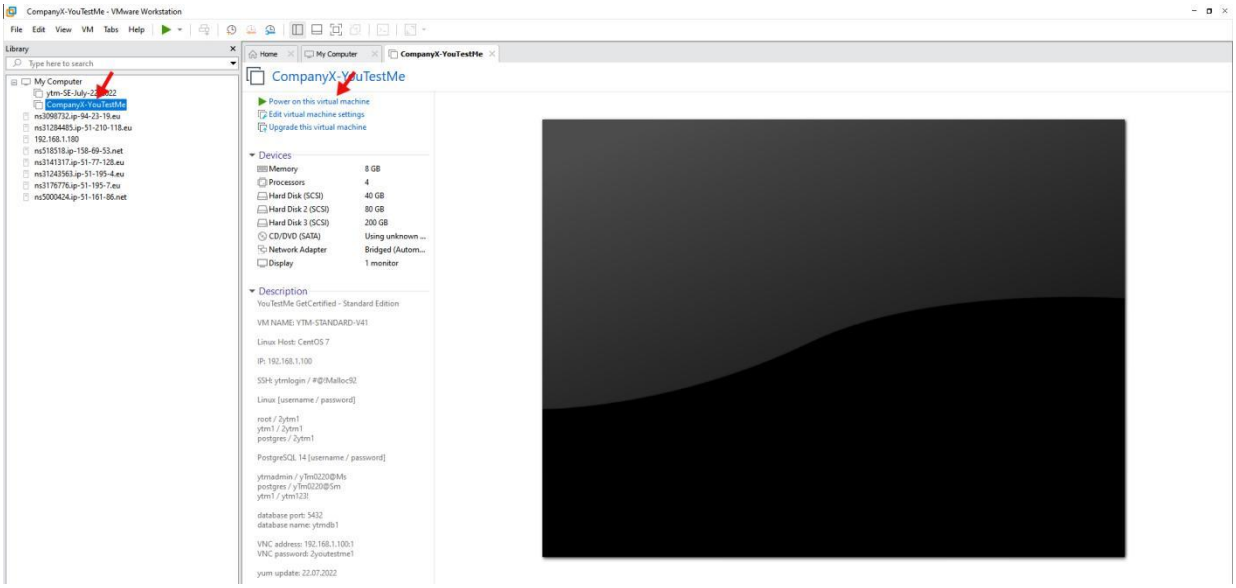
5. The virtual machine import process can take up to 30 minutes:



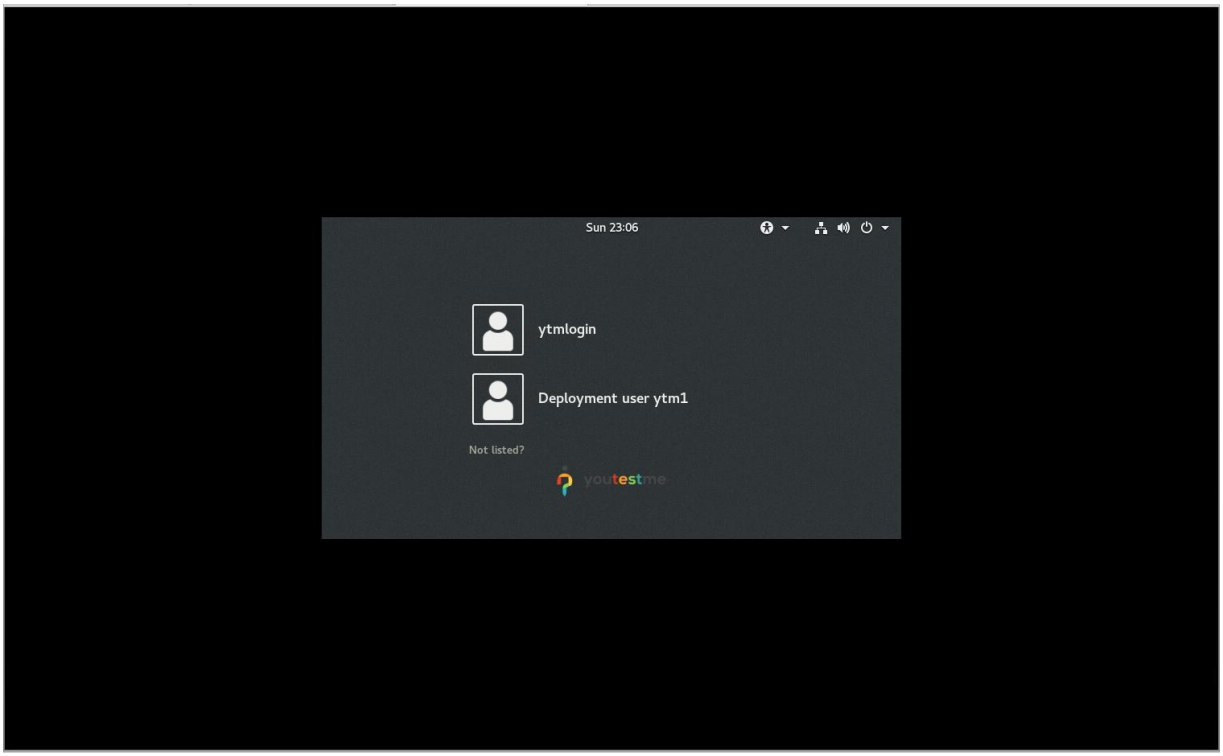
6. After the Virtual Machine is imported, right-click on its name and select "Settings" -> "Options" Make sure that "Linux" and "CentOS 7 (64-bit)" is selected, as shown in the picture below:



7. Start the Virtual Machine up by clicking **Power on this virtual machine**.



8. When the Virtual Machine starts, a login screen will appear, as shown in the picture below:



9. Wait five minutes for all services to start (database, application server, Linux services, etc.)

Check the adequate IP address and subnet mask with your network or system administrator. Then, change it according to the procedure described in the section Network Configuration.

5.2 Import YouTestMe to VMware ESXi using vSphere Client

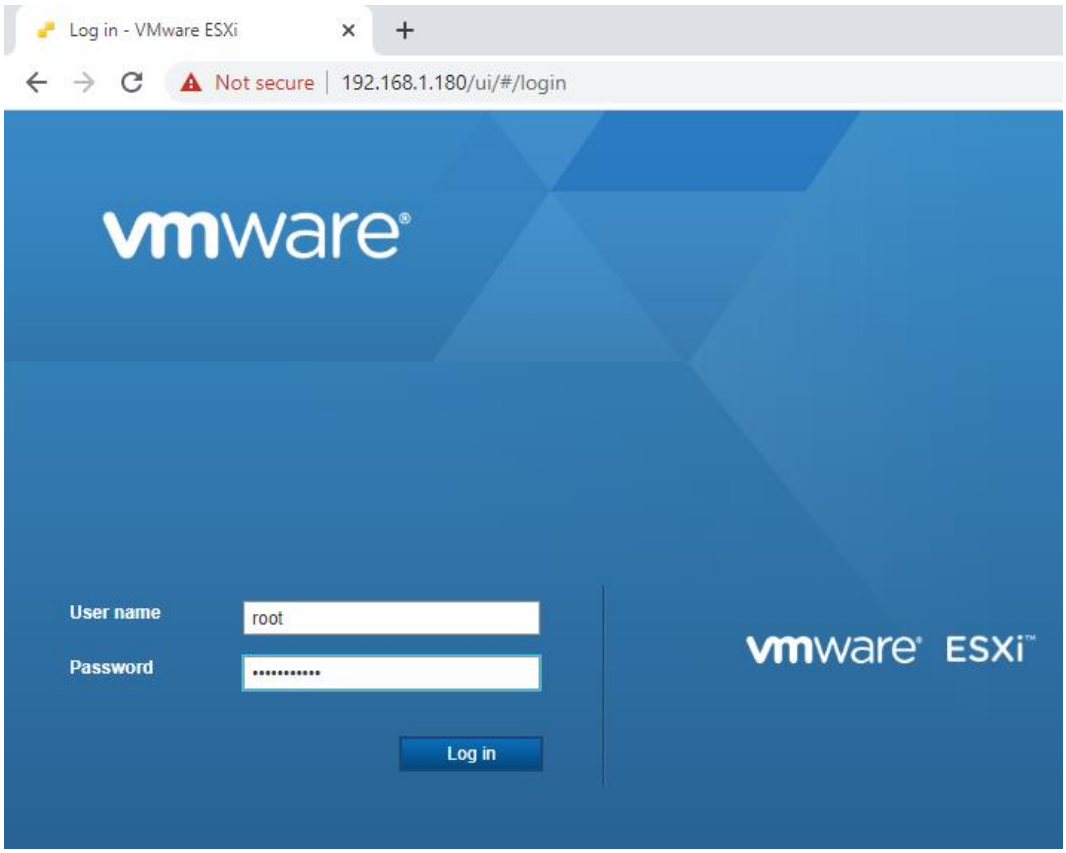
YTM Appliance can be deployed on an ESXi server using the following VMware software:

1. VMware vSphere Web Client
2. VMware vCenter Server

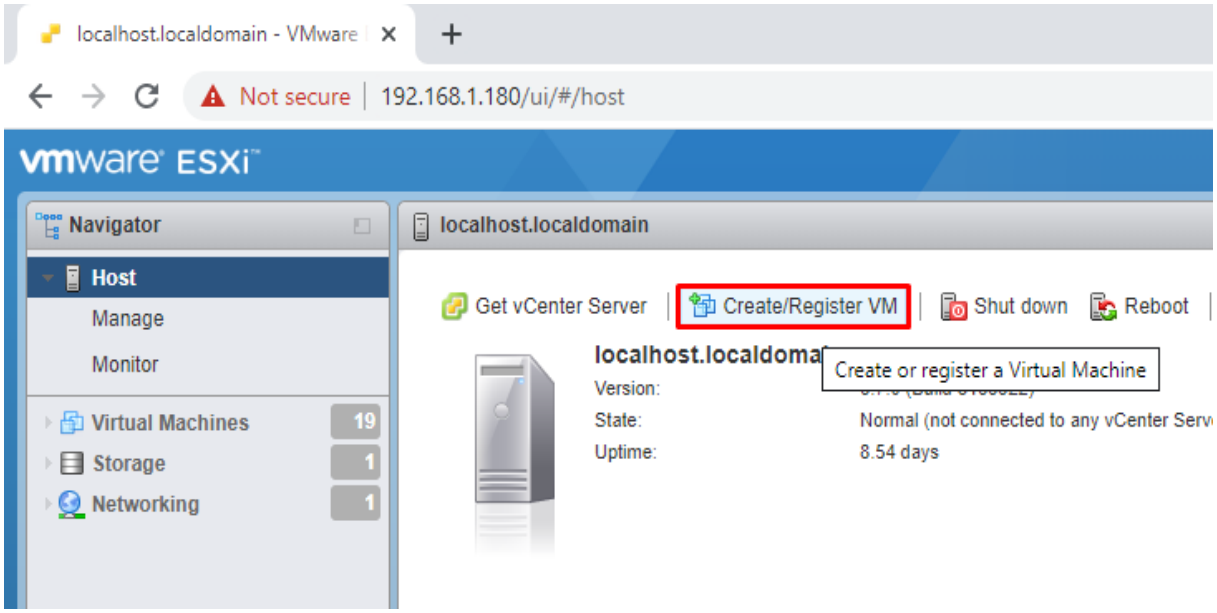
Please consult your system administrator for the recommended practice in your organization.

5.2.1 Import YouTestMe via VMware vSphere Web Client

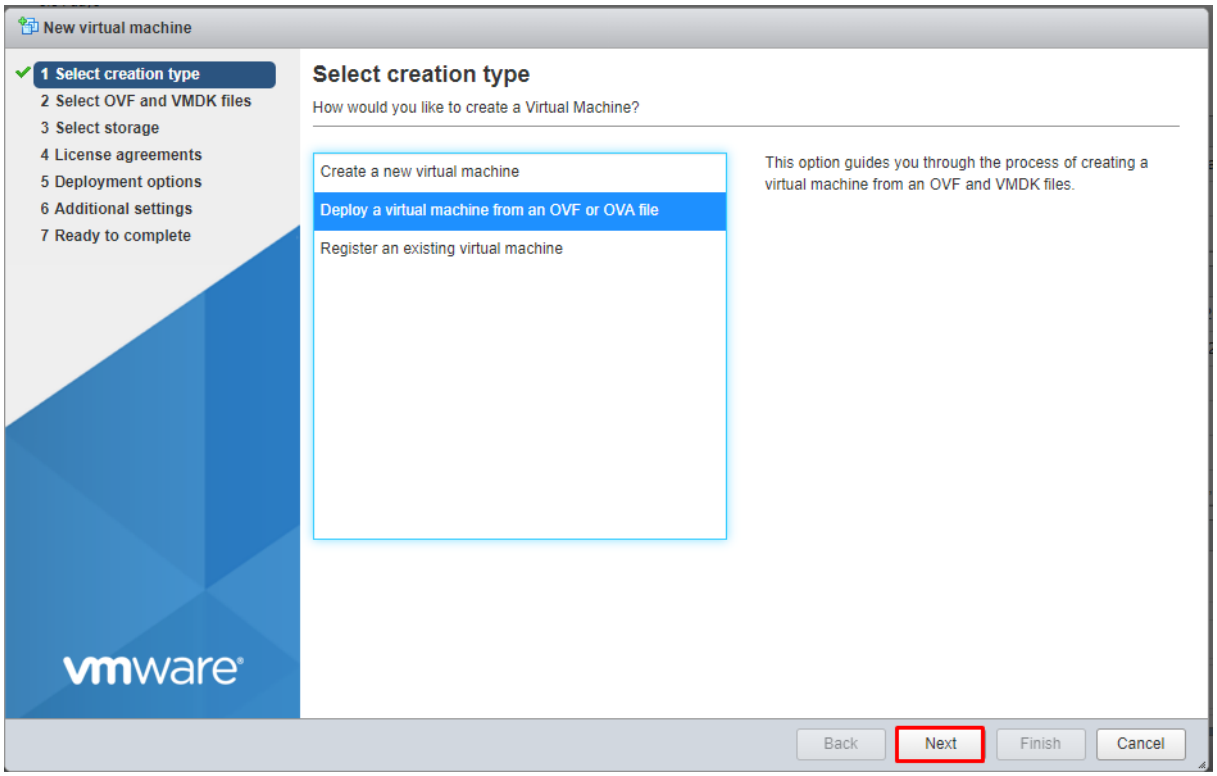
1. Open any browser on your workstation and try to access the ESXi server web console via ESXi IP address or its domain name:



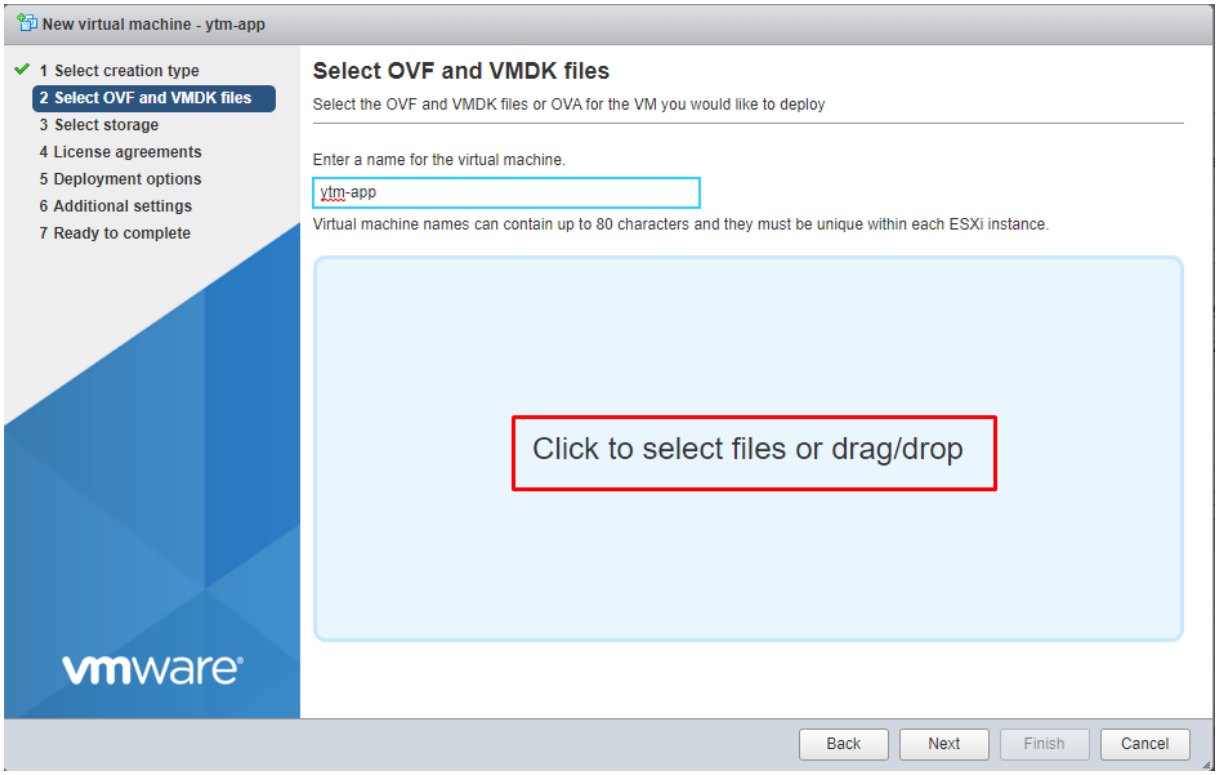
2. Select "Host" from the left menu and start the "Create/Register VM" wizard:



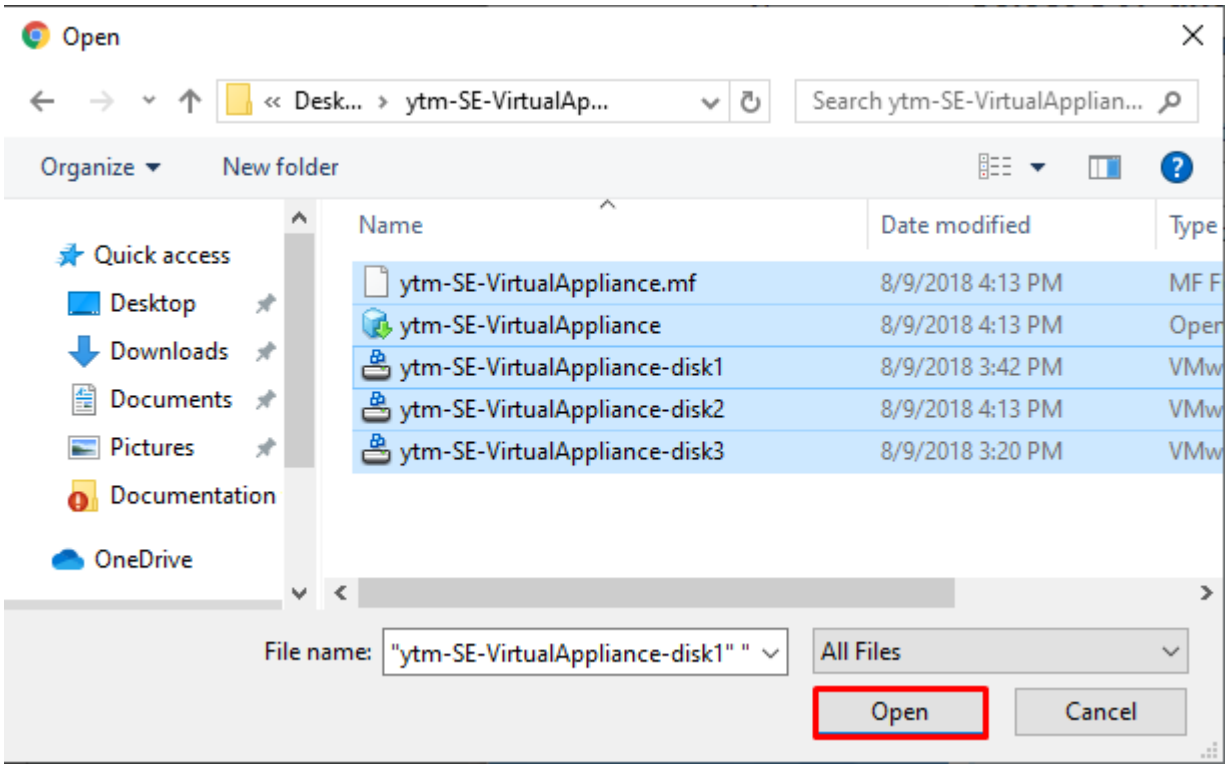
3. Select the "Deploy a virtual machine from an OVF or OVA file" option as the creation type:



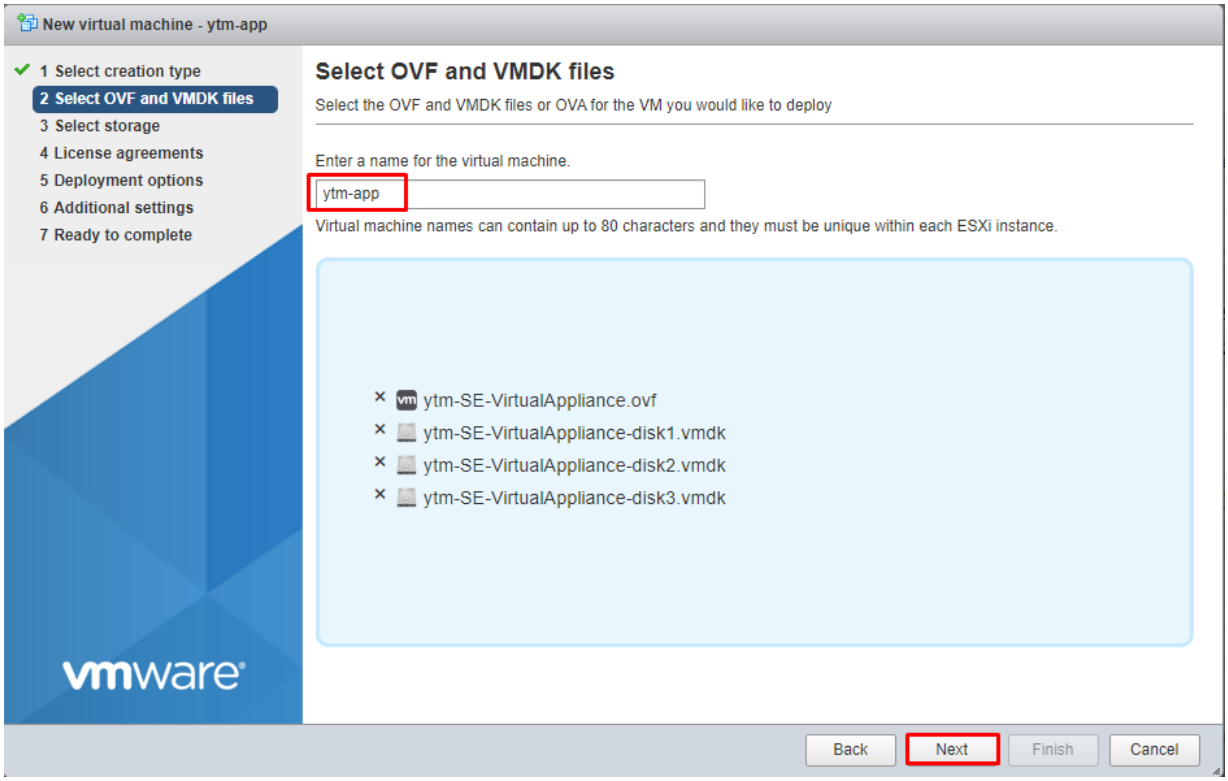
4. Specify a name for the virtual machine and choose virtual files for upload:



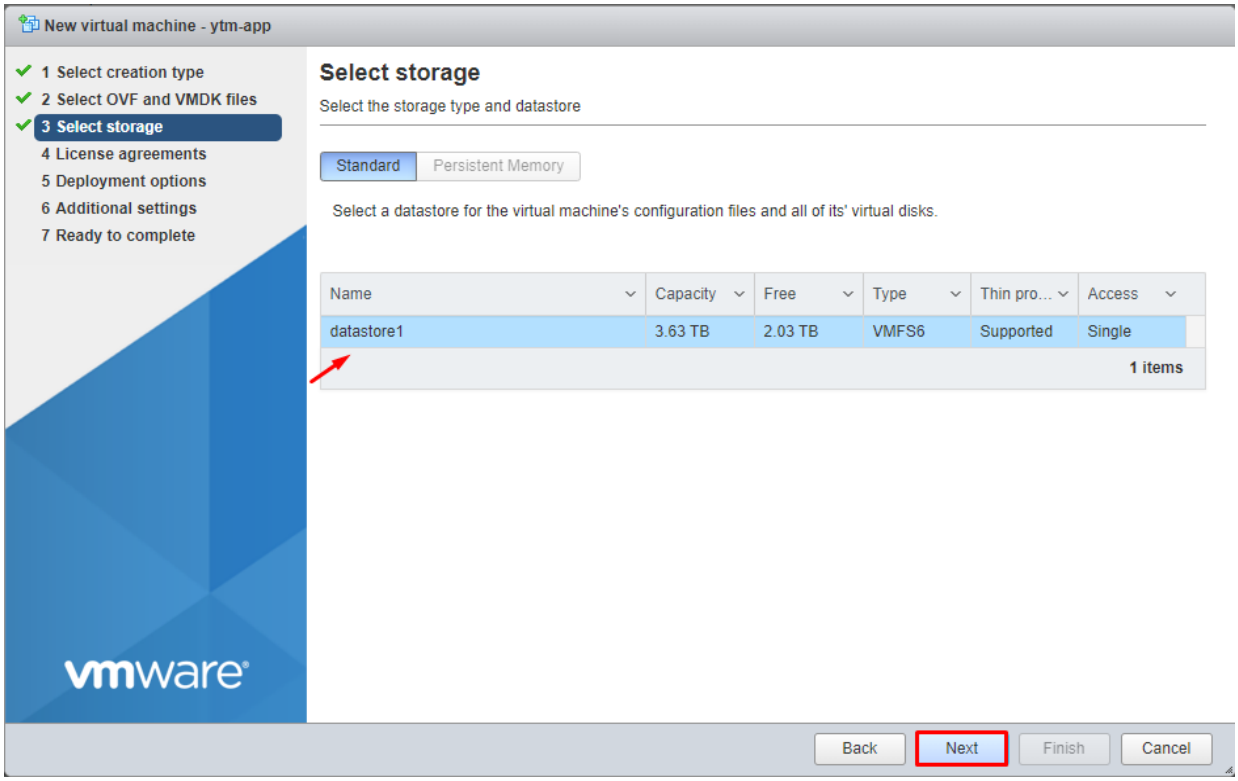
5. Select all five virtual files, as shown in the picture below:



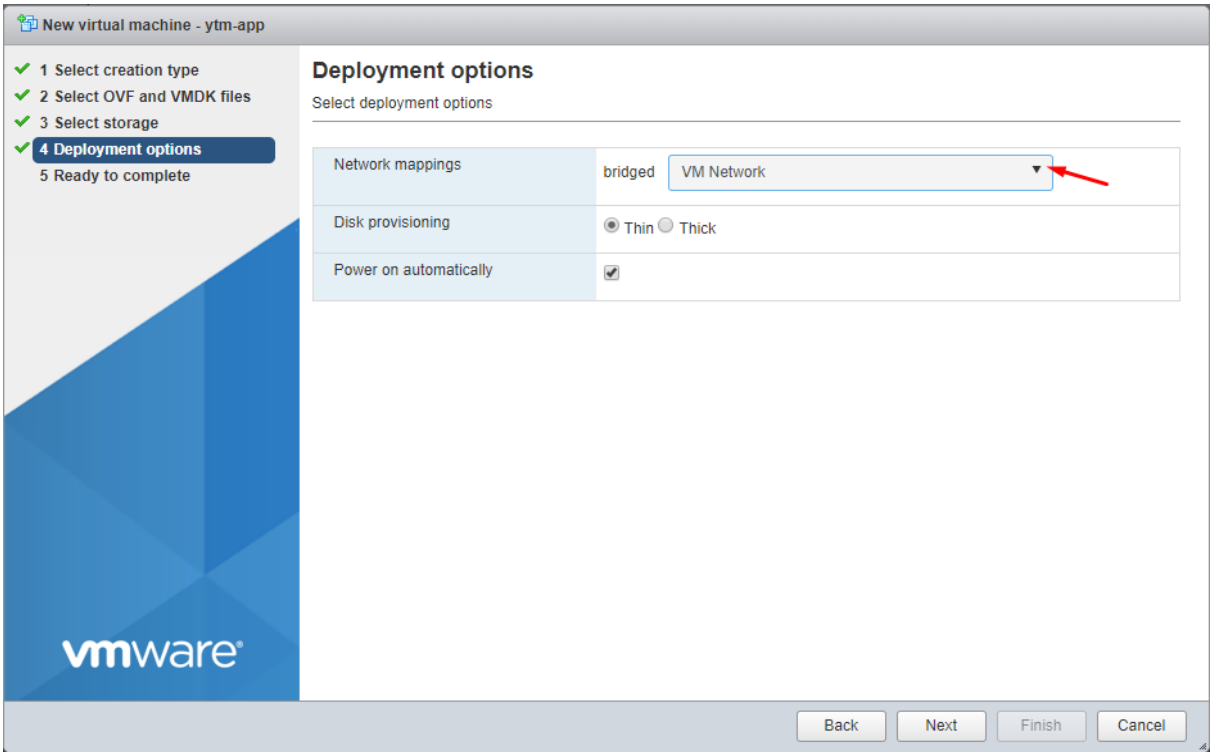
6. Manifest file "*.mf" serves for the files integrity verification, and it will not be shown:



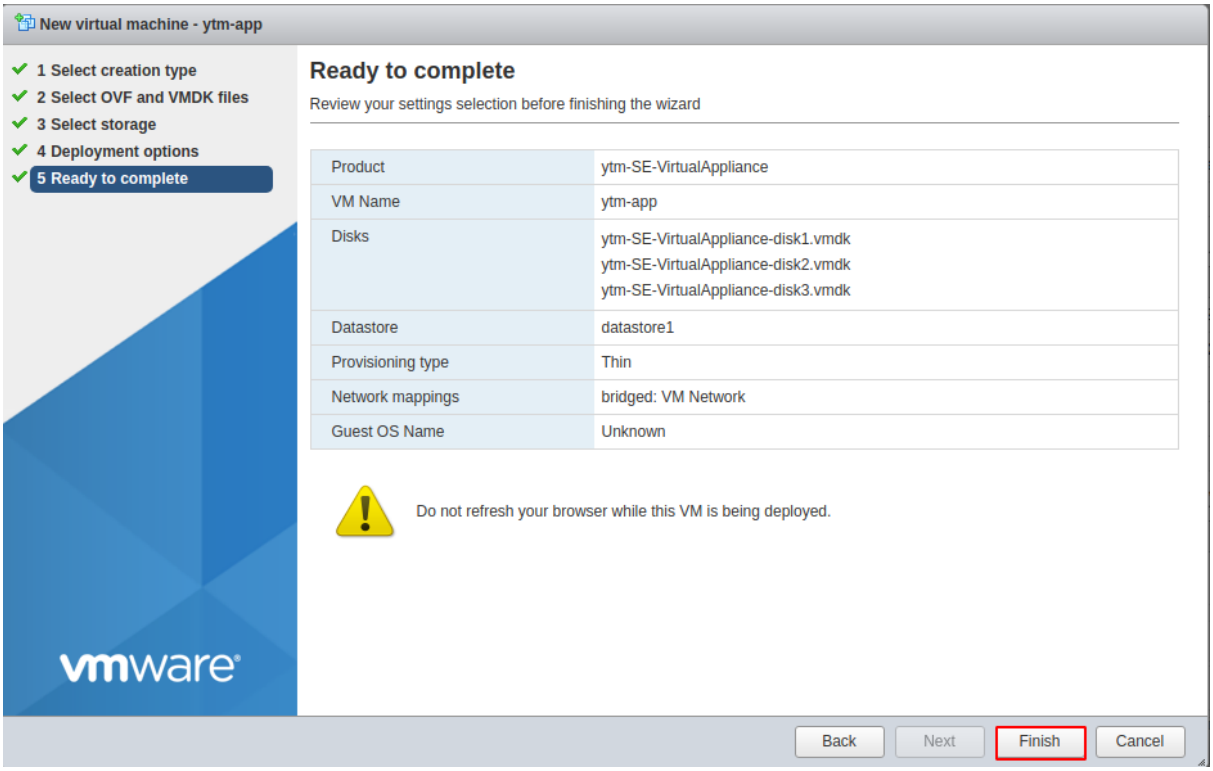
7. Select the appropriate datastore if you have more than one created:



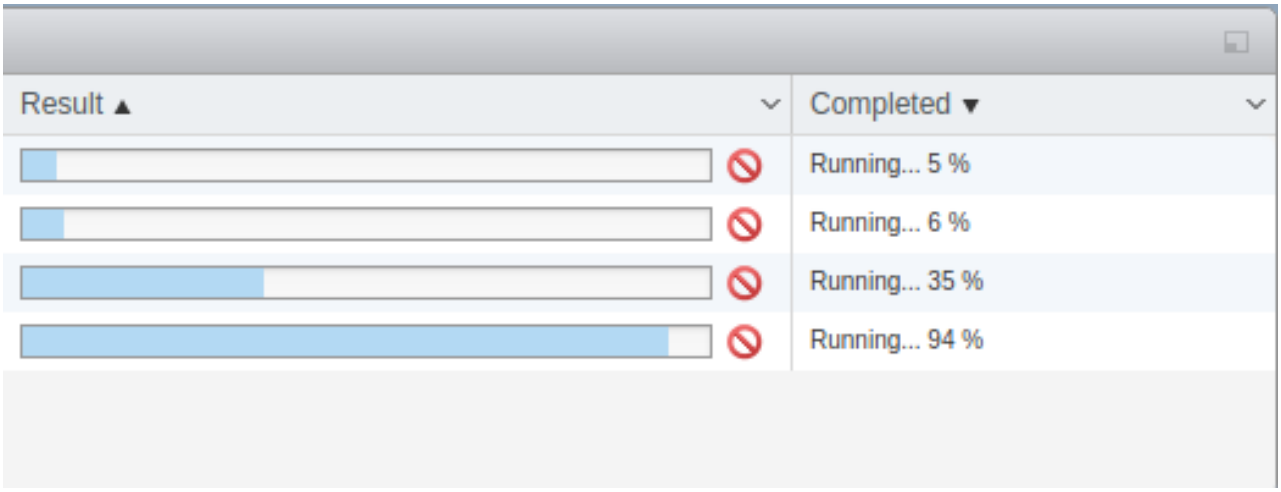
8. Select deployment options that suit you best or preserve default settings:



9. Review your settings and click the "Finish" button to start deployment:

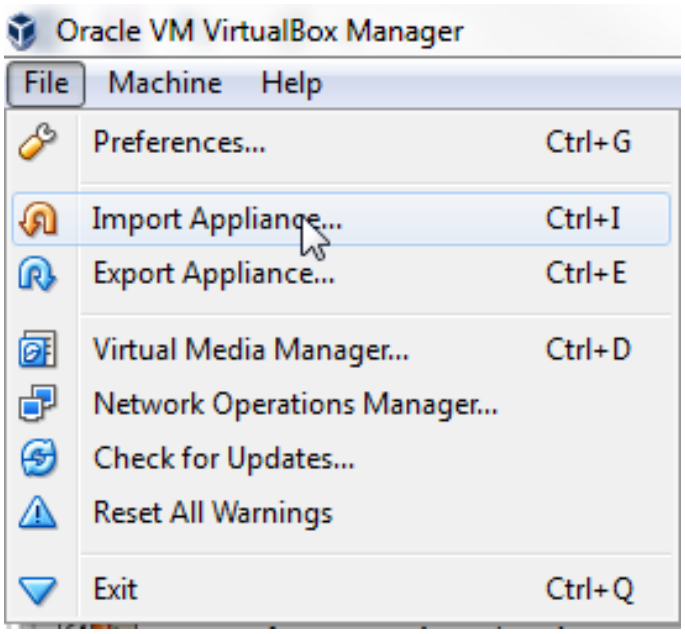


10. You can monitor the deployment process under "Recent tasks" located at the bottom of the page:

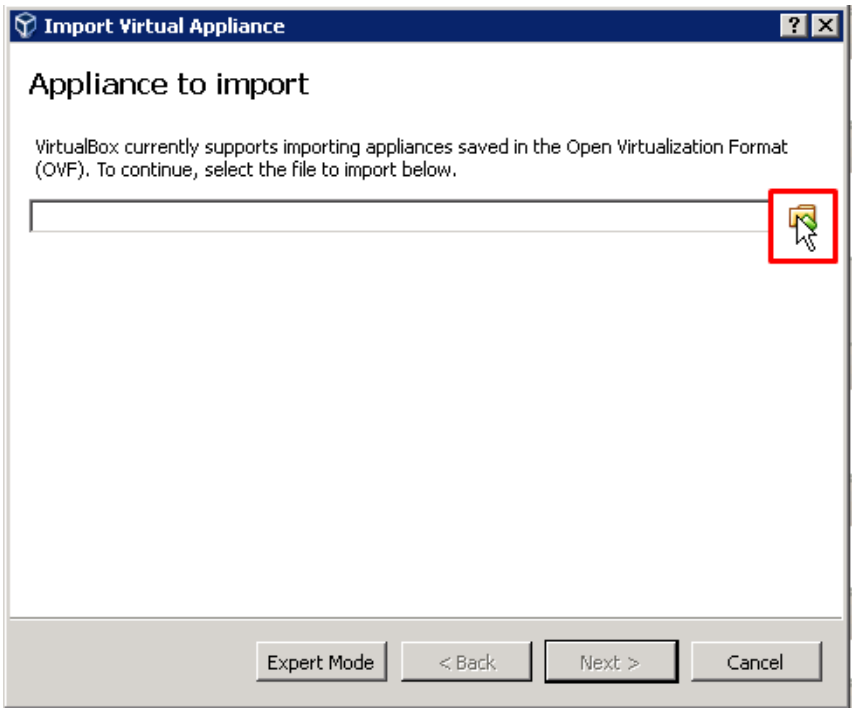


5.3 Importing YouTestMe Virtual Machine into Oracle VirtualBox

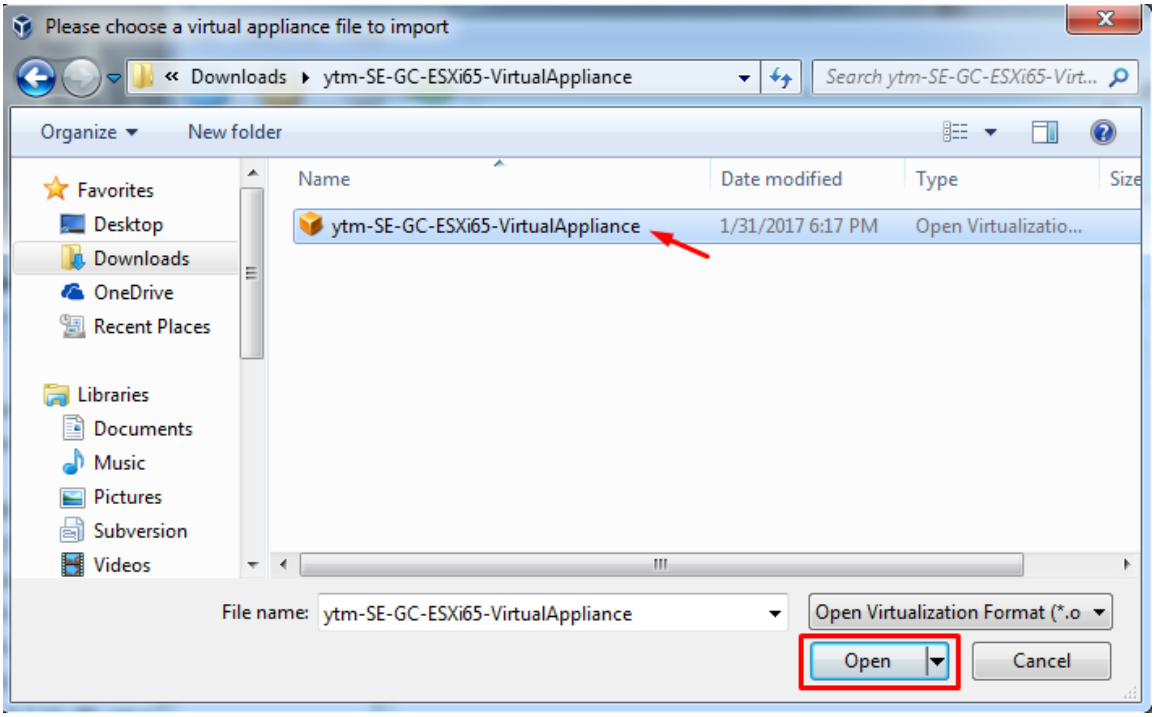
1. **File > Import Appliance**



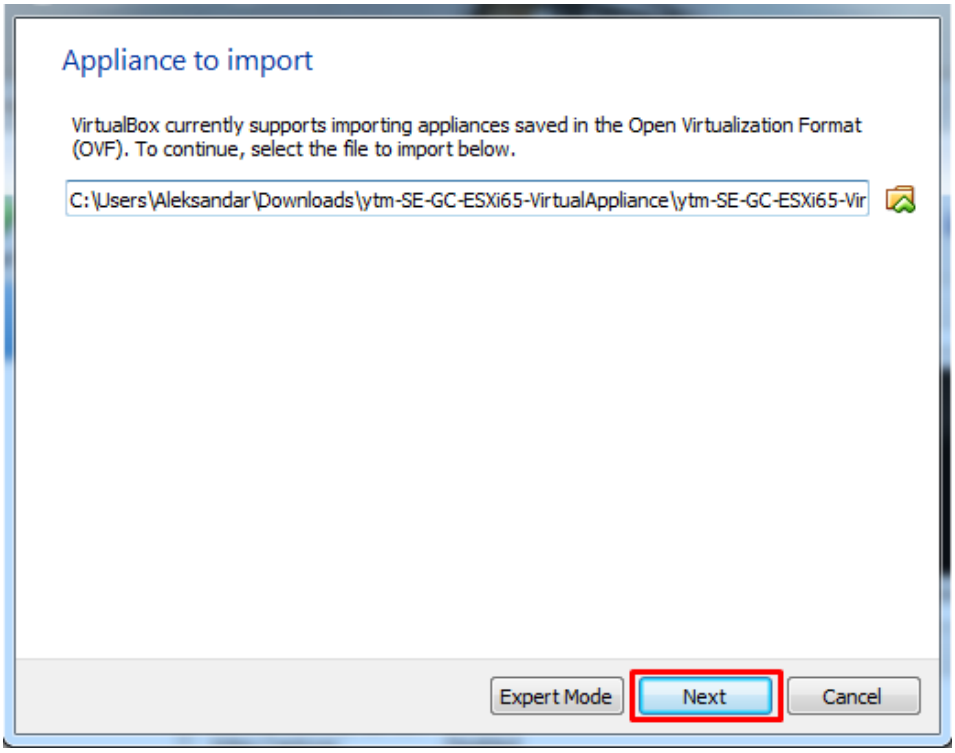
2. **Choose the virtual machine to import> Open > Next:**
   a. Click on the "Folder" button to search for the downloaded ".ovf" file



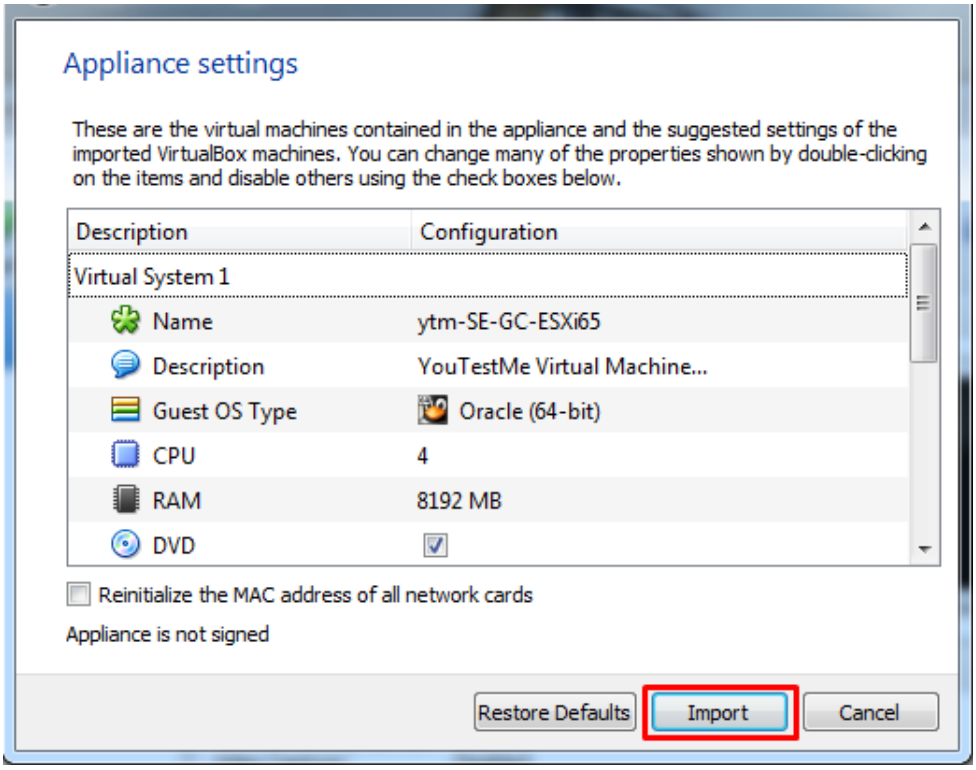
   b. Choose a virtual appliance file to import

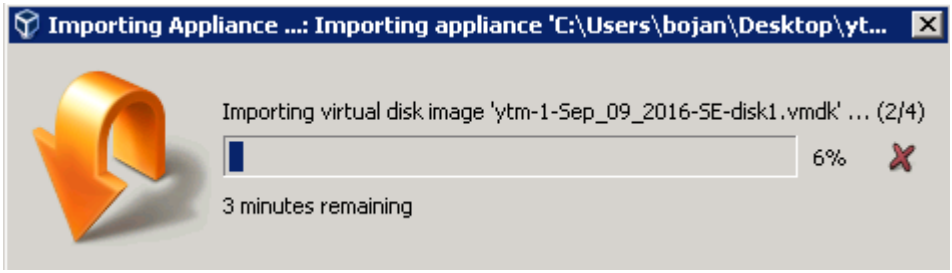


c. Check if the file path is correct

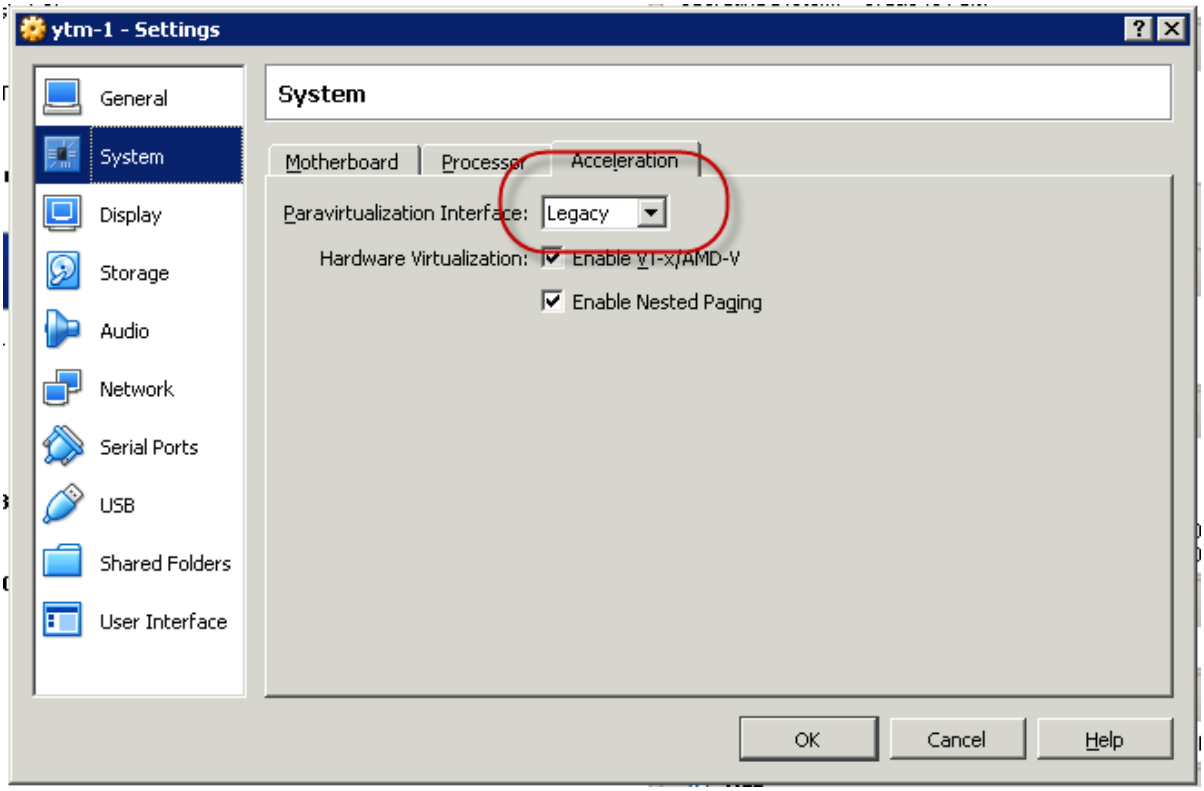


3. **Check Appliance settings>Import -** Check Appliance settings, change the name, and click "Import."

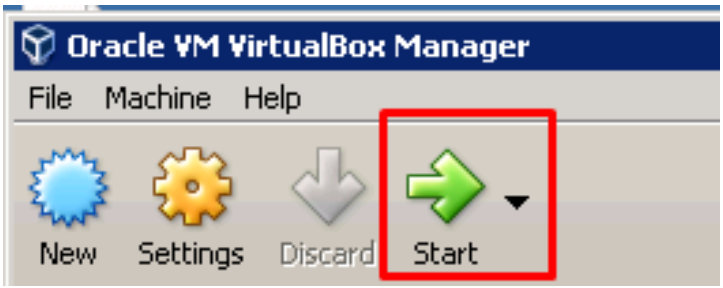




4. **When finished**, the YTM Appliance will be available in the inventory tab under the name given in Step 3. Perform this setting on Virtual Machine:
    a. VM Settings > System > Acceleration > Paravirtualization Interface -> Set to "Legacy"

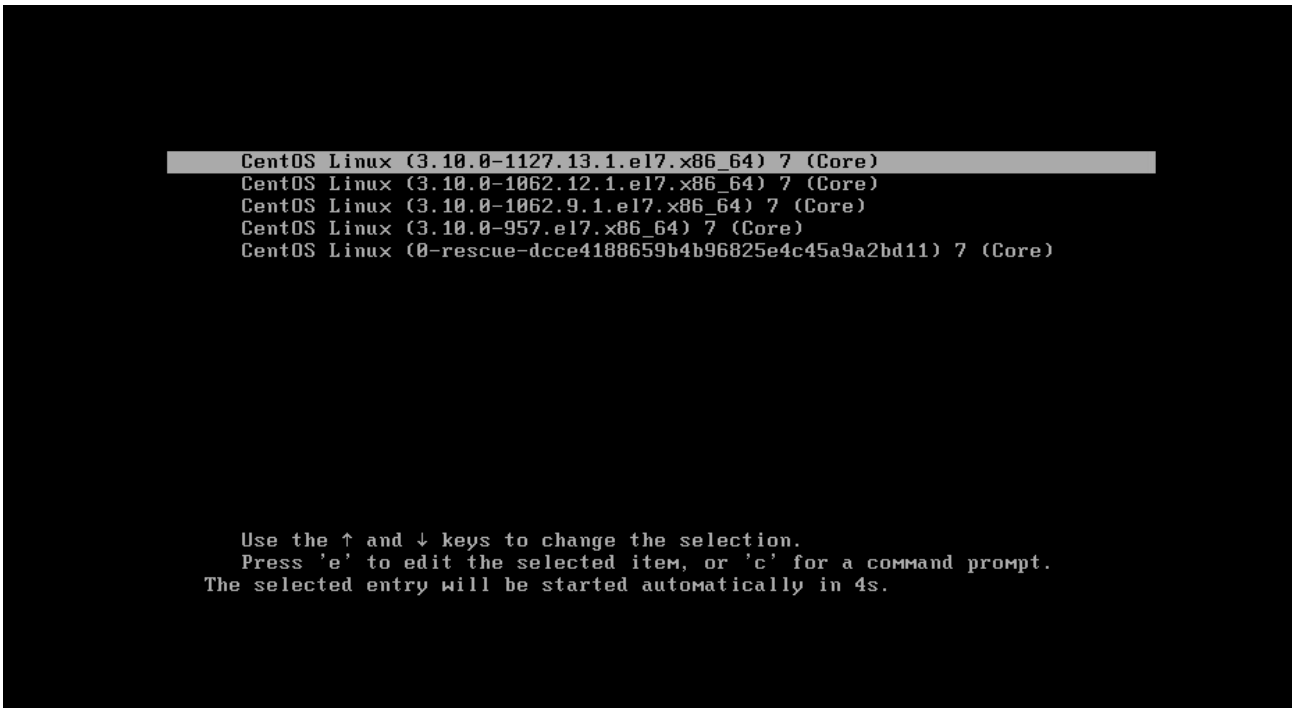


    b. Click on the "***Start"*** button to start the virtual machine.



6 Starting Virtual Machine

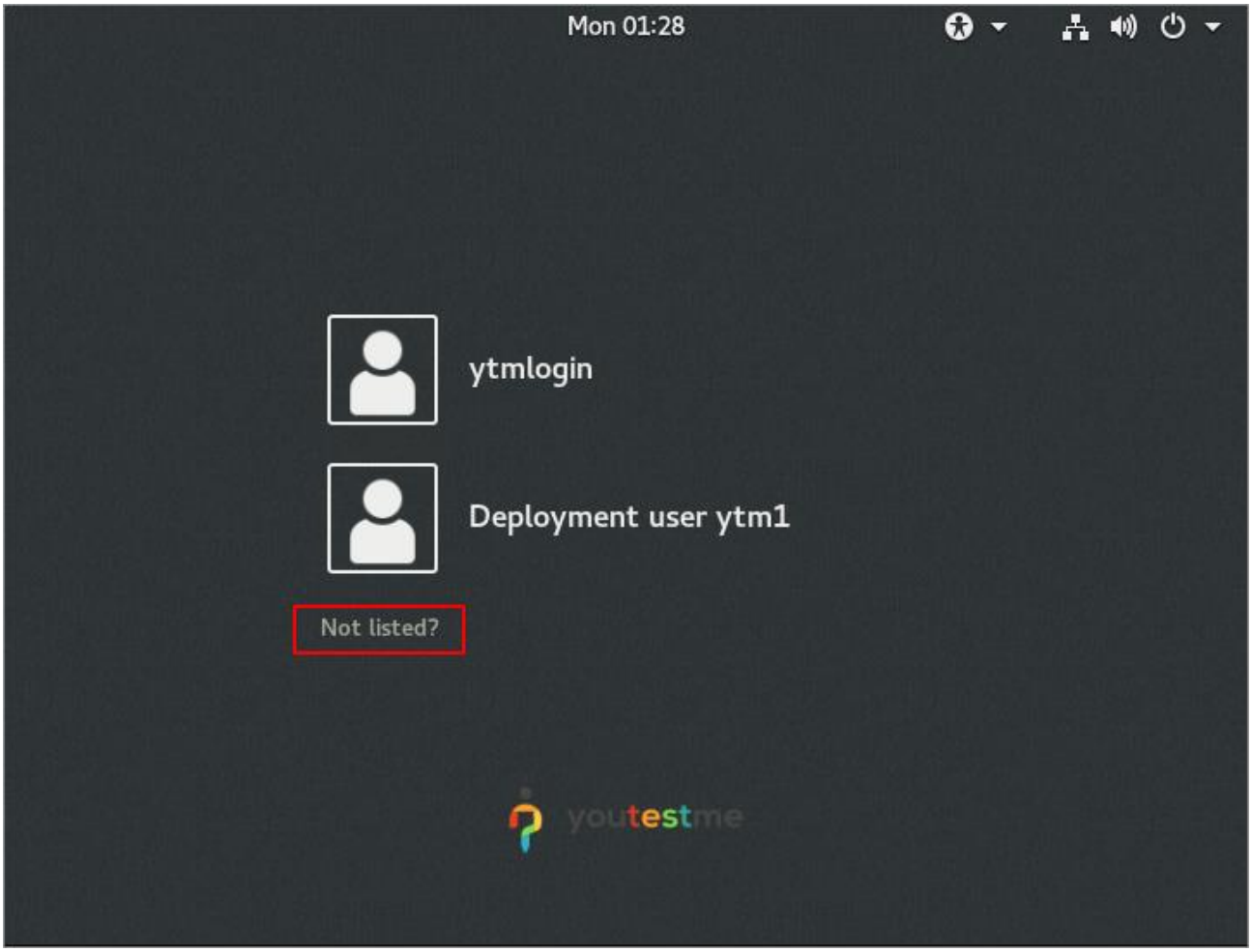
When the Virtual Machine starts, you will see the list of CentOS 7 kernel versions. Leave the default option.



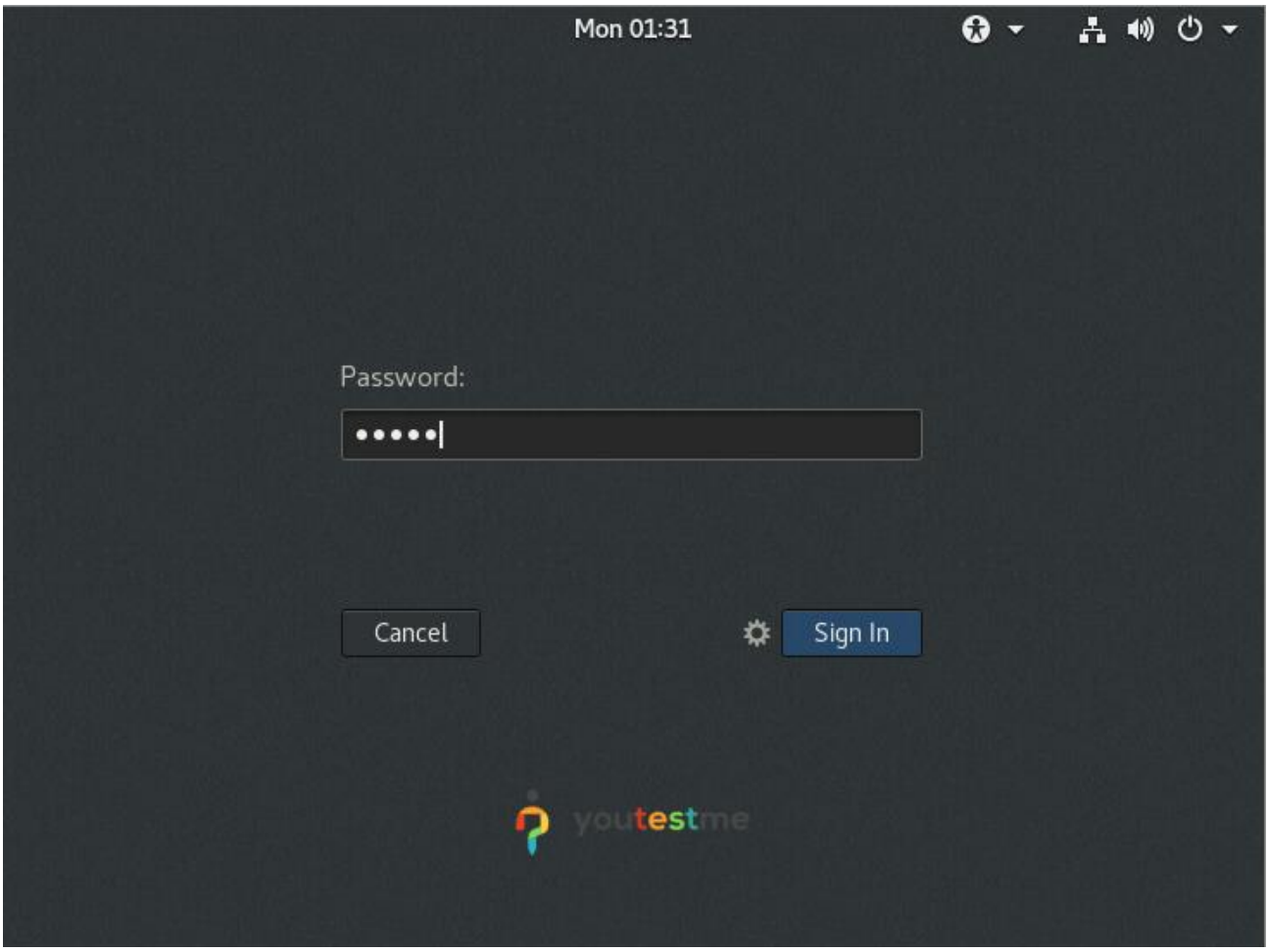
7 First Login

Default login parameters can be found in the chapter Change Linux User Password.

1. **Select "Not listed?" to enter your username and type "root" to log in as a VM administrator. Choose "Next" to proceed.**



2. **Enter a password and choose "Sign in."**



8 Text Editors

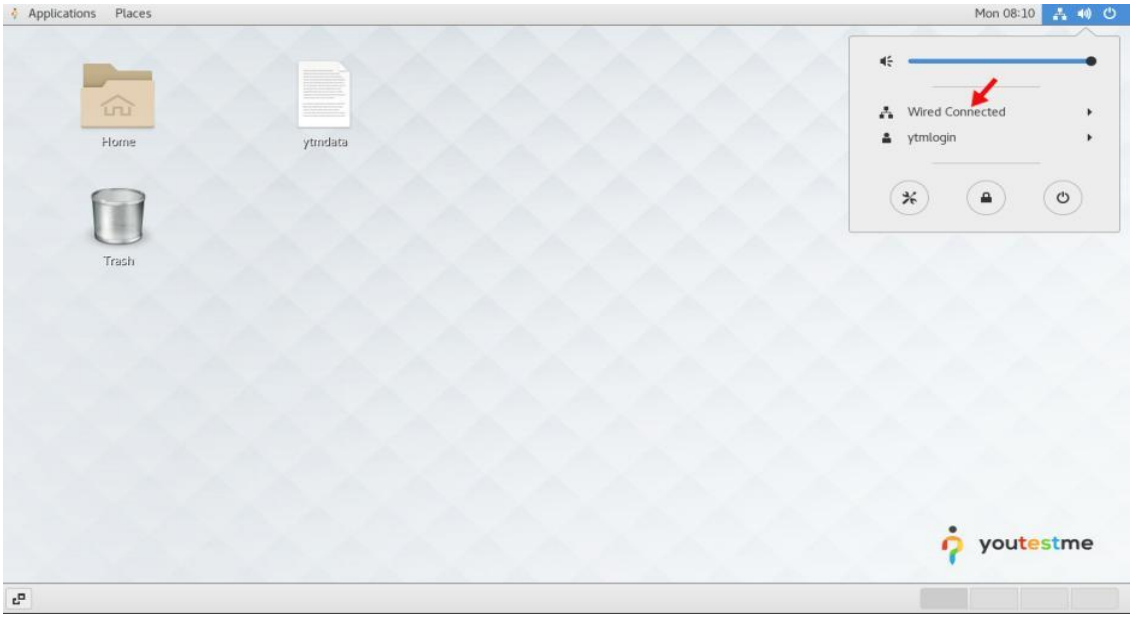
You may need to edit some files on YTM virtual machine to accomplish specific configuration settings. The following text editors are available:

Editor	Description	Example
vi (or vim)	Linux advanced character-based editor	`vi file_name`
nano	More user-friendly character-based editor	`nano file_name`
sublime	GUI based editor	`subl file_name`
gedit	GUI based editor	`gedit file_name`

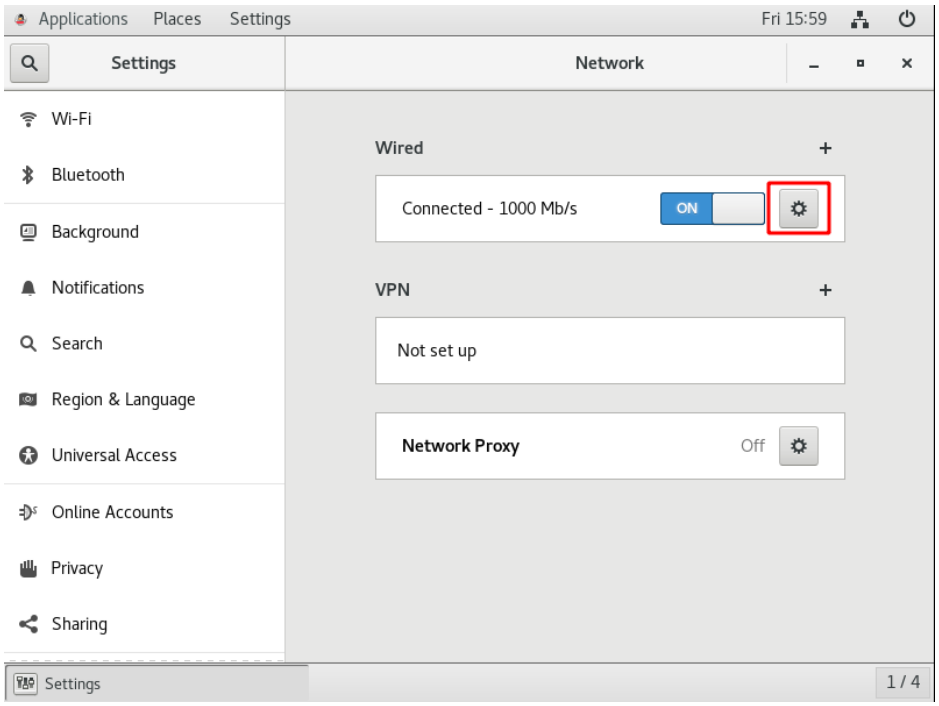
9 Network Configuration

To complete the following procedure, log in as user "root":

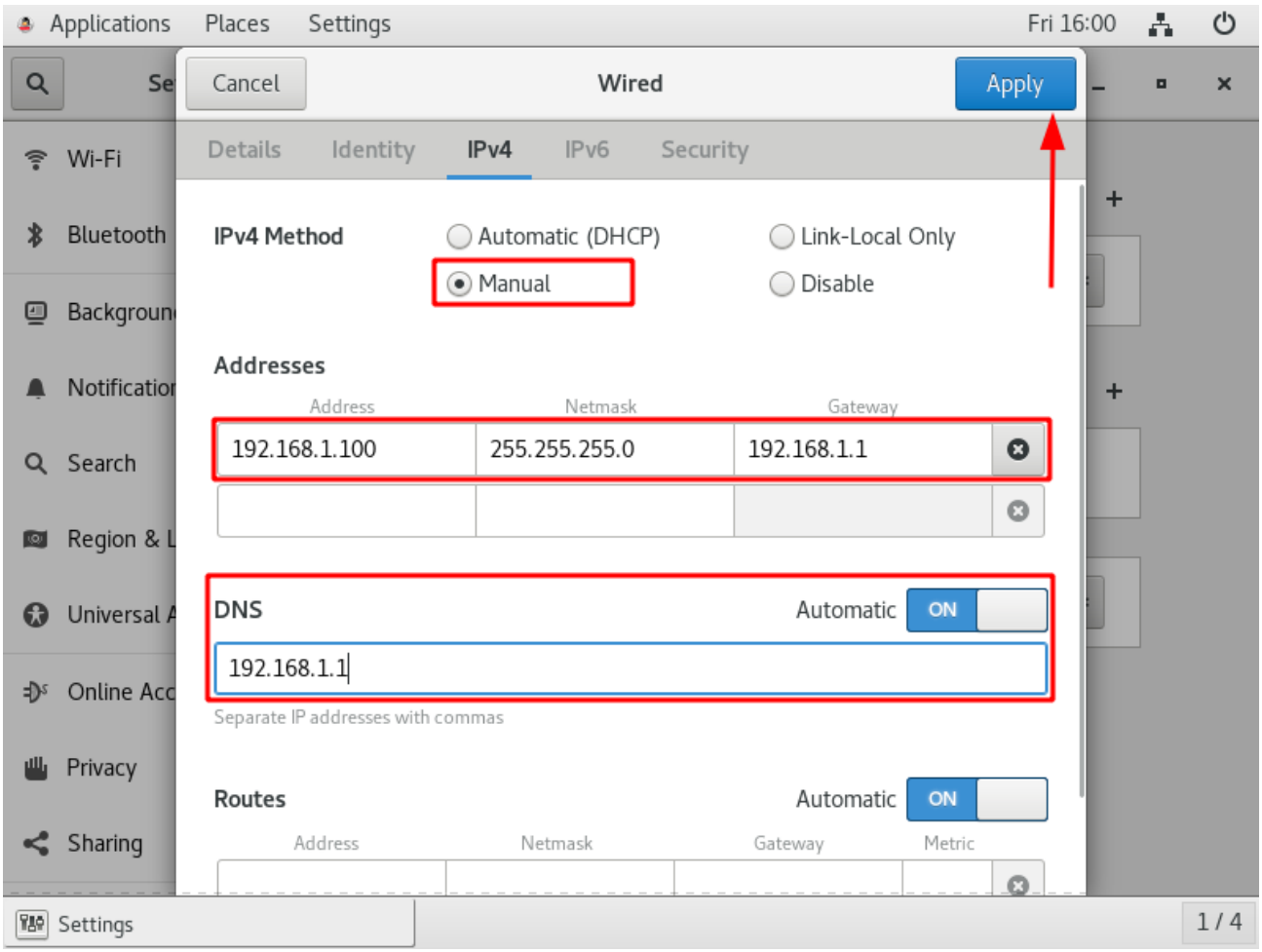
1. To open the network manager, go to "Wired Settings" by clicking on the "Power button":



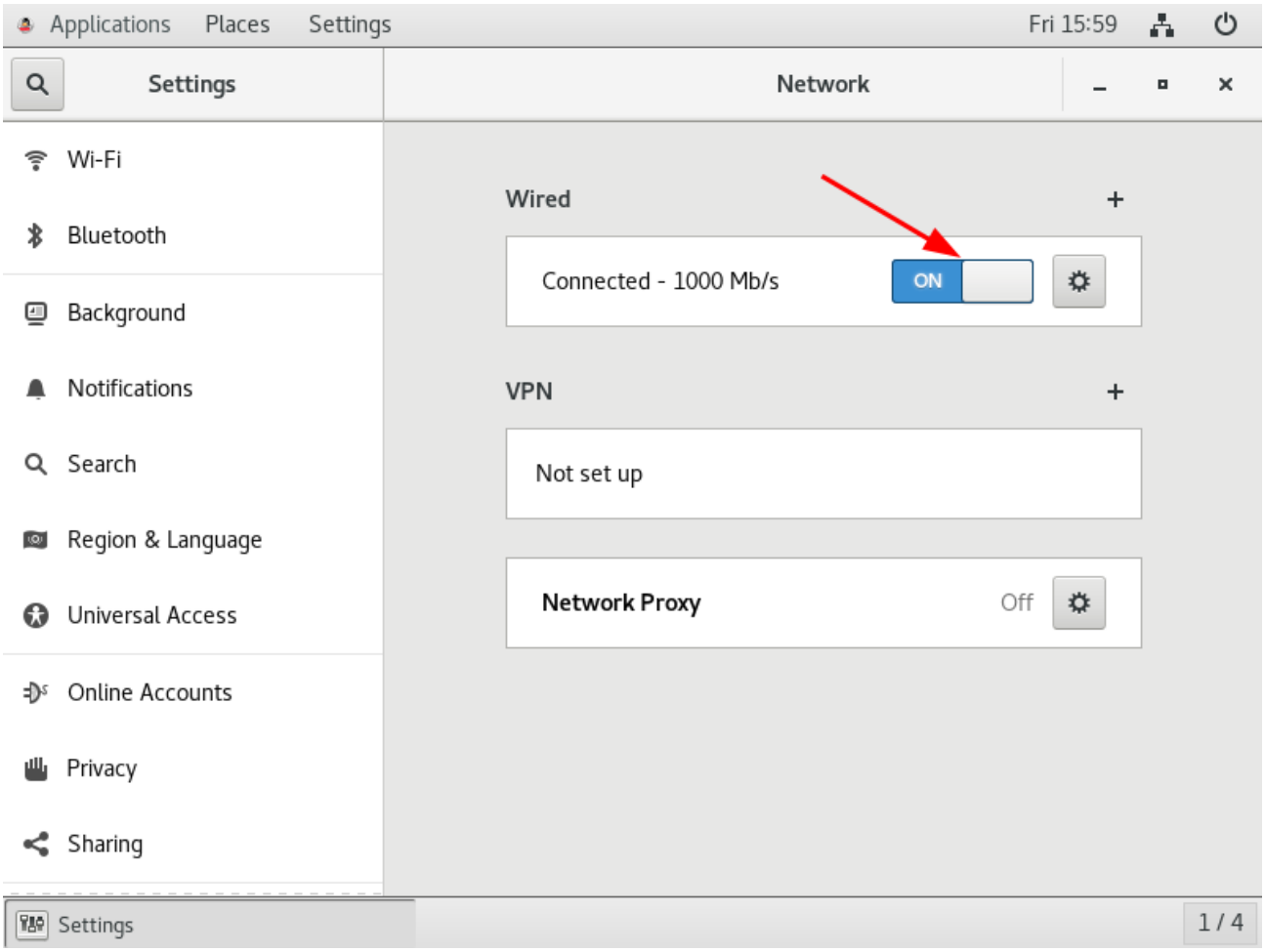
2. To edit the network configuration, click on the "Settings" button:



3. Click on the "IPv4" tab and edit network-marked parameters that suit your system. When finished, click "Apply" settings.



4. Restart the network to apply the changes:



9.1 Network Troubleshooting

After configuring network parameters using Network Manager (configuration panel via GUI), you should perform a simple network connection test. Values that should be changed are listed below:

#	Value	Description
1.	**VM_IP**	The IP address assigned to YTM Virtual Machine
2.	**GATEWAY_IP**	The address of your default gateway
3.	**NET_MASK**	The netmask of your network, usually 255.255.255.0 in the local networks
4.	**NETINTERFACE**	Network interface name; usually has the prefix "**ens**"
5.	**VIRTUAL_MAC_ADDRESS**	The virtual MAC address assigned to the network interface

9.1.1 Network diagnostics

Test your network connection by applying the following actions:

1. Open the Terminal located on VM's Desktop
2. Try to ping any network device **DEVICE_IP** connected to the same network from YTM Virtual Machine using the following command in the Terminal:
   `ping DEVICE_IP`
3. Try to ping **VM_IP** from any network device connected to the same network:
   `ping VM_IP`
4. Try to ping any publicly available server on the Internet from deployed YTM Virtual Machine, for example, Google Public DNS server 8.8.8.8 (only if Internet access is allowed):
   `ping 8.8.8.8`

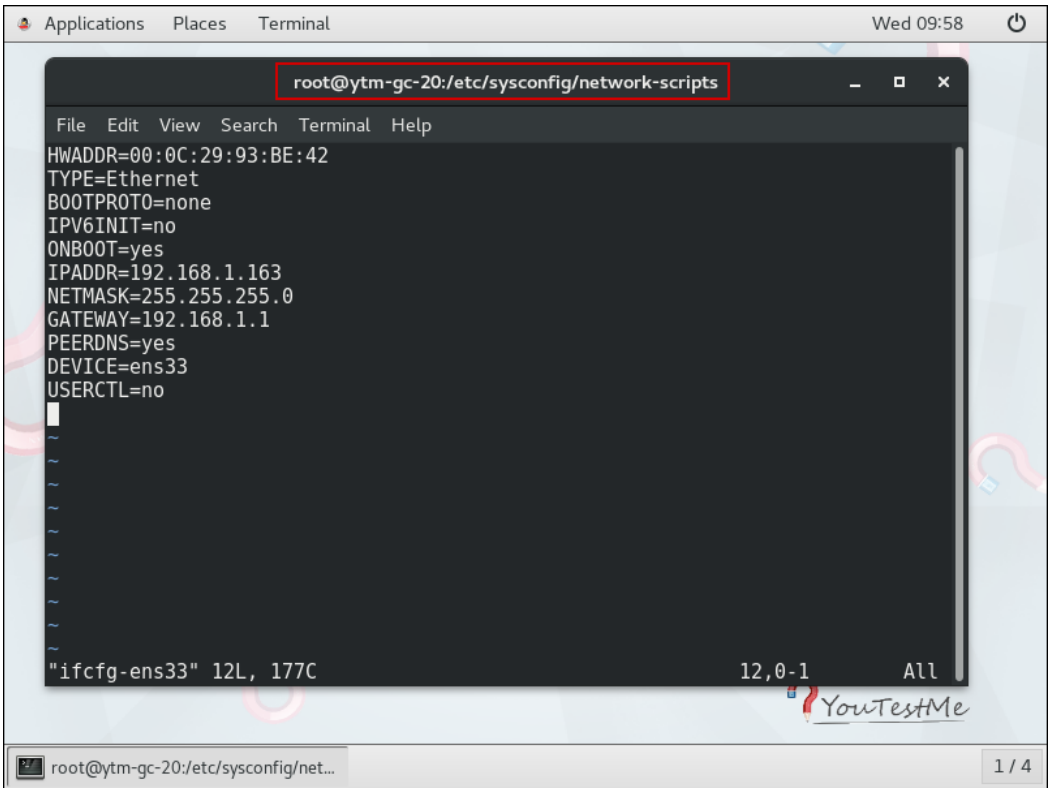
If the first or second operation fails, a networking problem is probably related to invalid network configuration parameters. Please recheck your network parameters: **GATEWAY_IP** and **NET_MASK,** and ensure that the **VM_IP** address is not assigned to another device in the same network.

If only the third test fails (can not ping 8.8.8.8 successfully), a routing problem can be solved by manually configuring the network, as explained in the next chapter.

9.1.2 Network Configuration

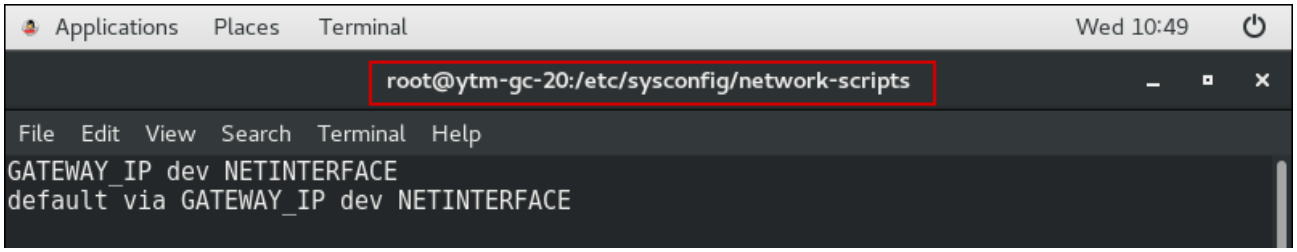
The chapter describes configuring your network manually rather than using Network Manager.

1. Disable Network Manager:
   ```
   systemctl stop NetworkManager
   systemctl disable NetworkManager
   ```
2. Determine the network interface name:
   ```
   ip link show
   ```
3. Rename network file "ifcfg-ens32" and remove its content:
   ```
   cd /etc/sysconfig/network-scripts/
   mv ifcfg-Wire_connection1 ifcfg-NETINTERFACE
   truncate -s 0 ifcfg-NETINTERFACE
   ```
4. Add the following lines in "ifcfg-NETINTERFACE" (please remember to replace our variables with your values):
   a. DEVICE=NETINTERFACE
   b. BOOTPROTO=none
   c. ONBOOT=yes
   d. USERCTL=no
   e. IPV6INIT=no
   f. PEERDNS=yes
   g. TYPE=Ethernet
   h. NETMASK=NET_MASK
   i. IPADDR=VM_IP
   j. GATEWAY=GATEWAY_IP
   k. HWADDR=VIRTUAL_MAC_ADDRESS



an example of a local network configuration

5. Disable the "zeroconf" route if it exists:
   `echo "NOZEROCONF=yes" >> /etc/sysconfig/network`
6. Flush all routes and empty a routing cache:
   `ip route flush table main`
   `ip route flush cache`
7. Create a new configuration file, "route-NETINTERFACE," in "/etc/sysconfig/network-scripts" directory and add two *persistent static routes* that reflect the configuration below (please remember to replace our variable with your values):



8. Restart the network service and test your network connection once more:
   `systemctl restart network`

10 Starting YouTestMe Server Application

The YouTestMe server application will start once the Virtual Machine is turned on. If the network is configured correctly, restart the appliance, and the application will be available.

To restart the appliance, follow the instruction from Restarting YouTestMe Virtual Machine section.

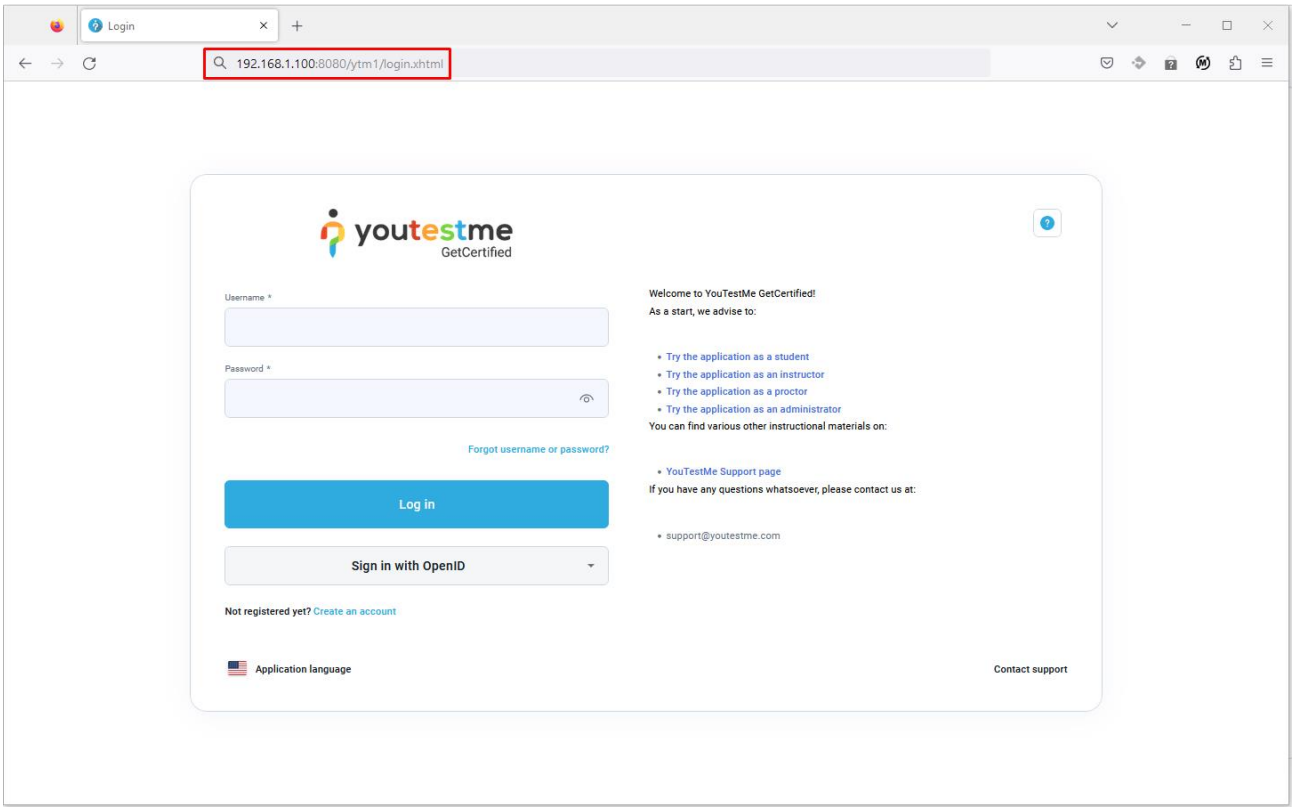
To access the application, type the following string in your browser's address bar:

`http://VM-IP:8080/ytm1/login.xhtml`

For example, *http://192.168.1.100:8080/ytm1/login.xhtml*

VM-IP represents the "Address" parameter configured in the Network Configuration chapter.

Login information and the instructions for configuring recommended initial settings can be found here.



11 Changing Application Default Port

1. Create a snapshot of the Virtual Machine so you can revert to the previous configuration if something gets corrupted
2. Log in as Linux user "root" and check ports that are currently in use by executing this command: `lsof -i -P -n |grep LISTEN`
3. Choose the port that is not currently used
4. Log in as Linux user "ytm1"
5. Edit file: `/home/ytm1/ytm/res/ProgramFiles/tomcat/apache-tomcat-9.0.56/conf/server.xml`
6. Change the port in the line below:

```
<!-- A "Connector" represents an endpoint by which requests are received
     and responses are returned. Documentation at :
     Java HTTP Connector: /docs/config/http.html
     Java AJP  Connector: /docs/config/ajp.html
     APR (HTTP/AJP) Connector: /docs/apr.html
     Define a non-SSL/TLS HTTP/1.1 Connector on port 8080
-->
<Connector port="8080" protocol="HTTP/1.1"
           connectionTimeout="20000"
           redirectPort="8443" />
<!-- A "Connector" using the shared thread pool-->
<!--
<Connector executor="tomcatThreadPool"
           port="8080" protocol="HTTP/1.1"
           connectionTimeout="20000"
           redirectPort="8443" />
-->
```

7. Save file
8. Restart Tomcat by executing these two commands:
   a. `tstop` + [ENTER]
   b. wait for 30 seconds to allow Tomcat to shutdown gracefully
   c. `tstart` + [ENTER]
9. In case that application does not start:
   a. Reboot VM:
      Log in as user "root" and execute the command "`reboot`"
   b. If the reboot does not solve the problem, try a different port or restore the previous configuration.

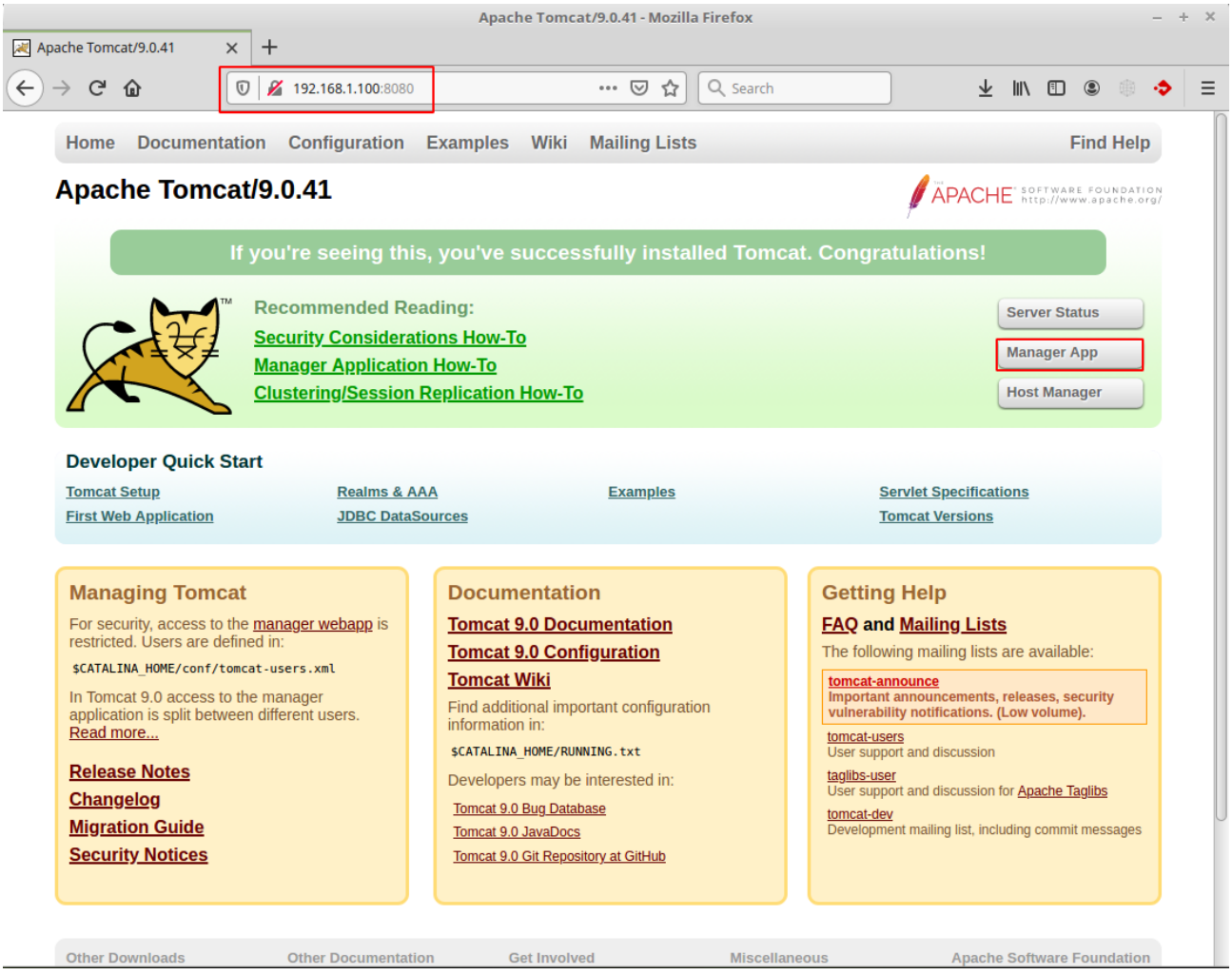
12 Tomcat Manager

Tomcat Manager App is a web application packaged with the Tomcat server and provides us with the basic functionality we need to manage our deployed web applications.

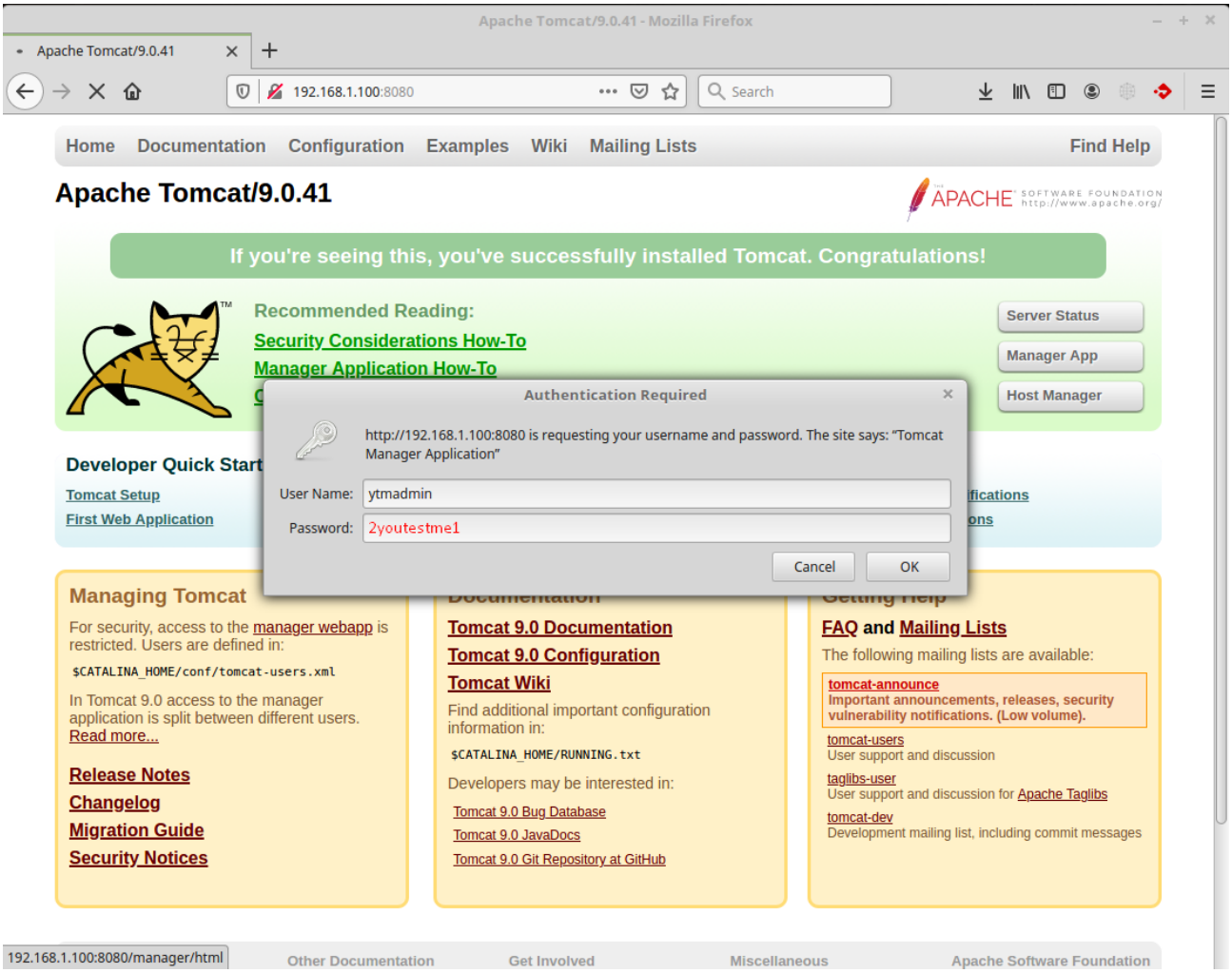
To access the Tomcat Manager application, do the following steps:

1. Open any browser and type the following URL:

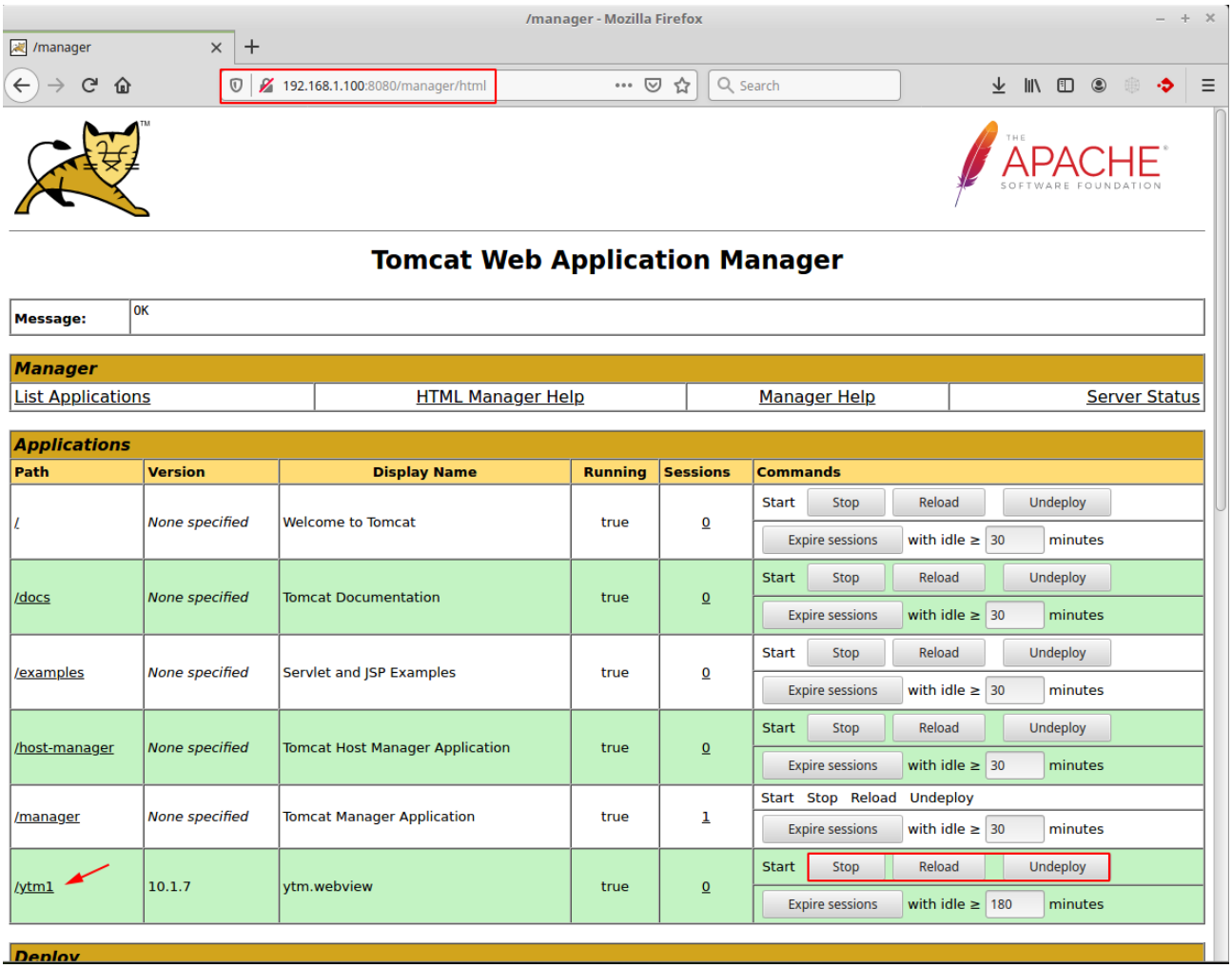
   `http://VM-IP:8080`



2. Click on the "Manager App" button and enter the login credentials shown in the picture below



3. Now you can easily manage the YouTestMe application from the GUI as an alternative to the Linux command executed in the terminal



Note: Check the official documentation for more details about Tomcat Manager functionality.

12.1 Login Credentials

To change Tomcat Manager login credentials, perform the following operation:

1. Login to YouTestMe Virtual Machine as ***ytm1*** user

2. Edit the following configuration file and set up your values for username and password

```
vim /home/ytm1/ytm/res/ProgramFiles/tomcat/apache-tomcat-
9.0.56/conf/tomcat-users.xml
```

```
<tomcat-users>

  <role rolename="admin-gui"/>
  <role rolename="manager-gui"/>
  <role rolename="tomcat"/>
  <role rolename="manager-script"/>

  <user username="ytmadmin" password="2youtestme1" roles="admin-gui,manager-gui,tomcat,manager-script"/>

</tomcat-users>
```

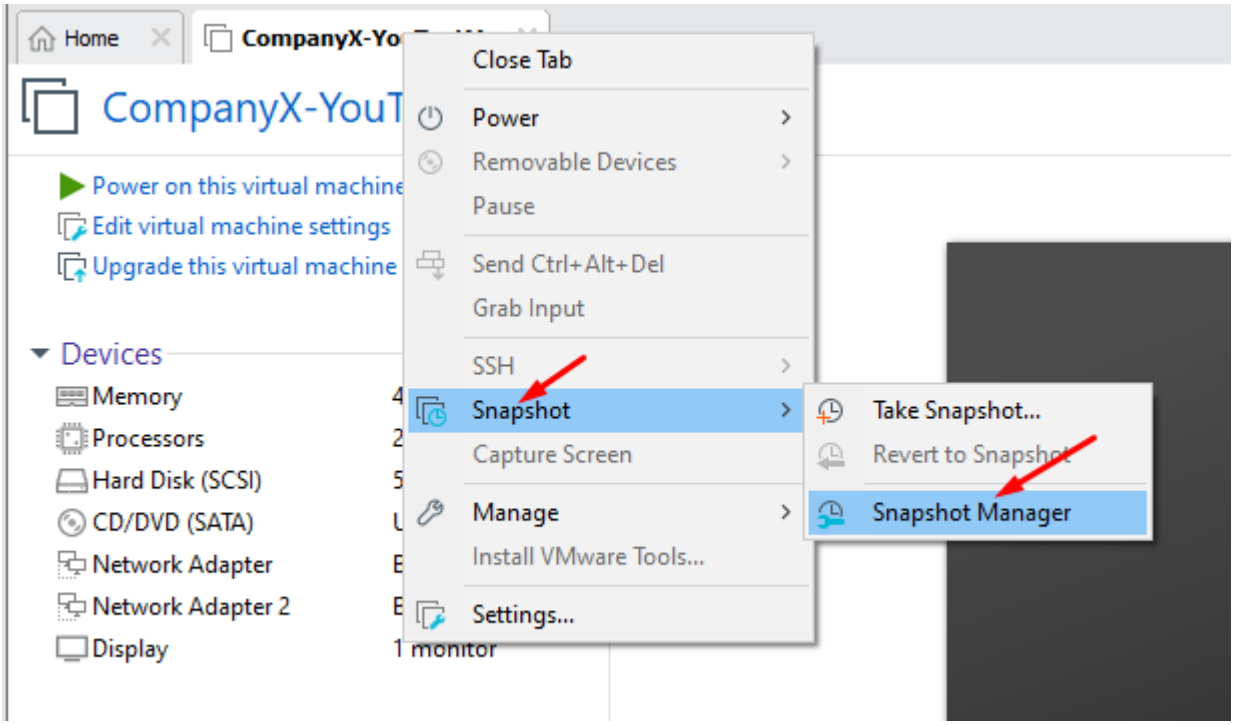
3. Reboot YouTestMe Virtual machine or restart Tomcat Server explicitly by executing the following command:
    - ***tstop***
    - *wait 10 seconds for Tomcat gracefully shutdown*
    - ***tstart***

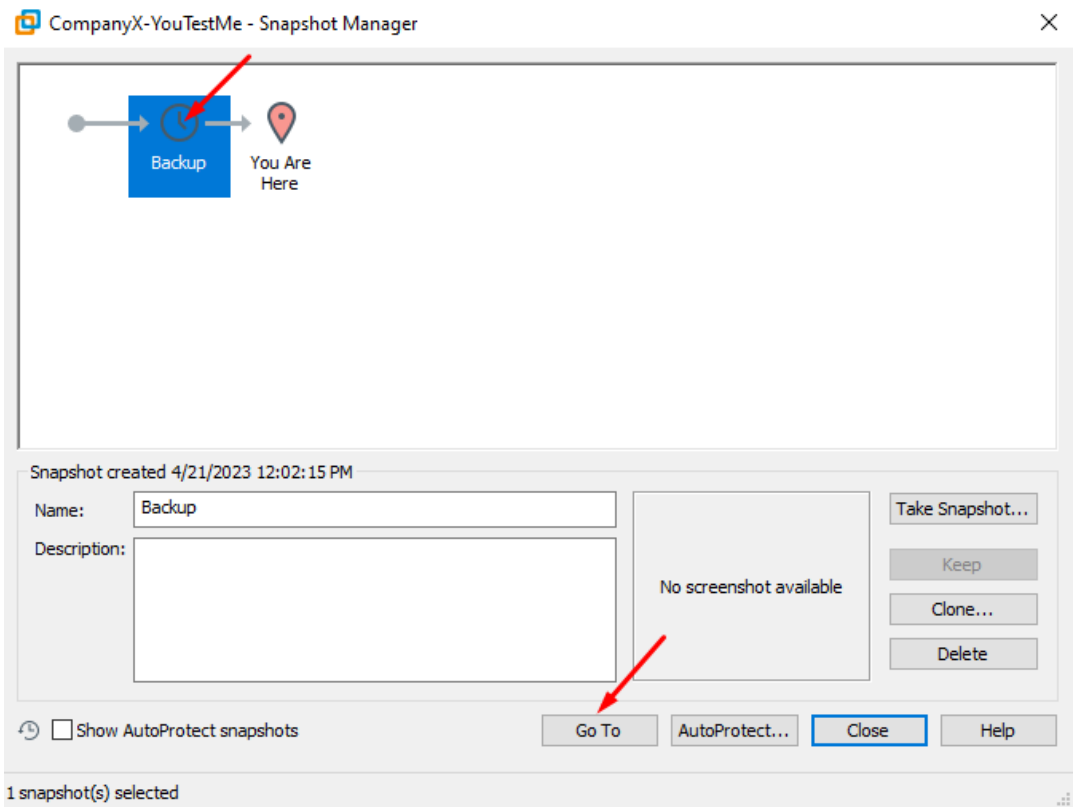
13 Restore VM State from Snapshot

Snapshot is a convenient way of creating a light backup of the Virtual Machine, so we can easily roll back to a specific point in time. The restore procedure will be shown below for three major virtualization software.

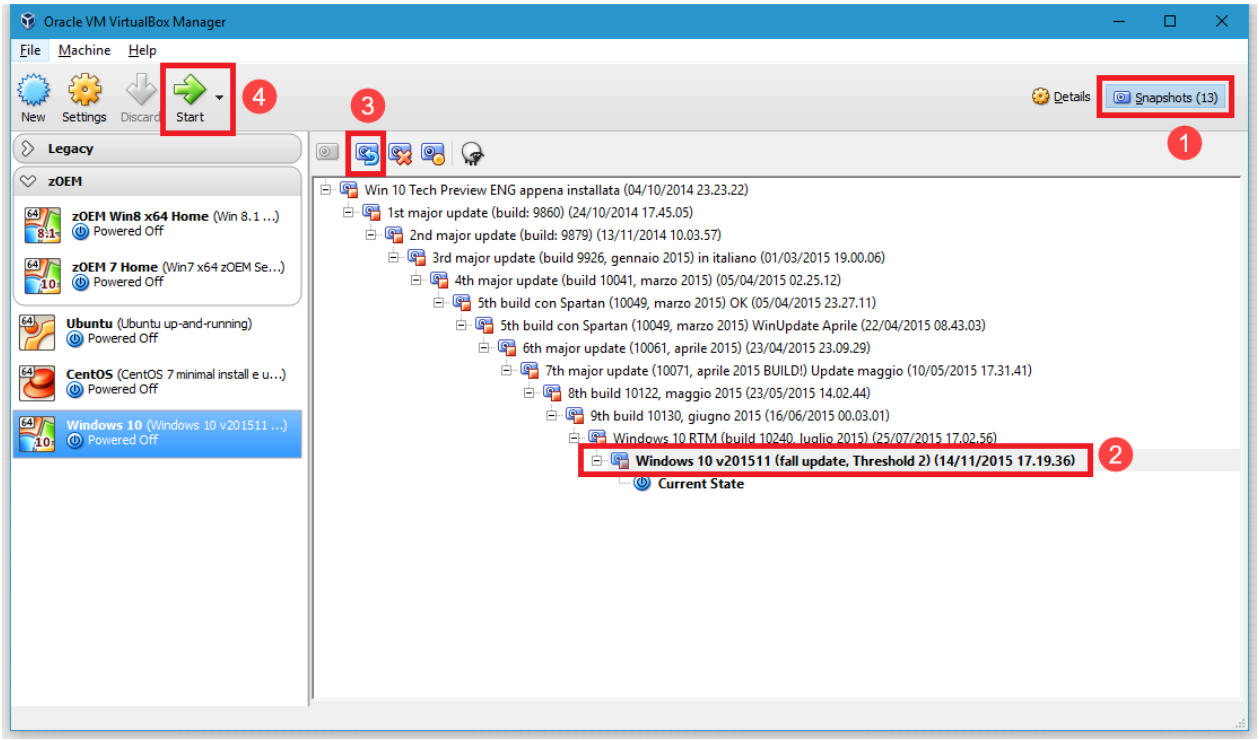
We highly recommend powering off the YTM Virtual Machine before reverting to one of the previous states.

13.1 VMware Workstation





13.2 VirtualBox



14 Protecting Your System and Data - Good Practices

Protecting your system and data is of extreme importance. Several easy-to-follow procedures and best practices should be used to protect your system and data from various events, such as hardware failure.

Company system administrators usually do these tasks regularly, and end-users don't need to worry about them. However, YouTestMe can run even on desktop computers in small departments. In that case, the person responsible for the application should use the best practices written below to ensure that the system can be recovered in case of hardware failure or accidental damage.

14.1 Create Virtual Machine Snapshots

A virtual machine snapshot is a one-click backup of the current state of your Virtual machine. Everything on the Virtual Machine is preserved at the time of the snapshot, and you can revert to that state at any time. Snapshots should be created as often as possible; however, it is generally recommended to do it:

- whenever you have a significant change in data or system settings or
- every few days

14.2 Export Virtual Machine File to another computer or disk

It is necessary because if the Virtual Machine file gets corrupted for some reason (i.e., hardware failure), even previously created snapshots may become unusable. It is less likely to happen if the Virtual Machine is hosted in the data center with various redundancy systems such as RAID disks, redundant power supply, etc. However, it is strongly recommended that this type of backup is regularly created.
Once a week is recommended, but generally, more often is better.

14.3 Manage Important Passwords

Please write down your administrative passwords and store them in a secure place. If they are lost, it is impossible to recover administrative passwords for UNIX and the Database.

The most critical administrative passwords are listed in the table below.

Account	Description
root	administrative account for the Operating System (Linux)
postgres	administrative user for the database management (PostgreSQL)

14.4 Use Administrative Accounts with Caution

You should never log in to the system using administrative accounts unless you know what you are doing. These accounts are there to be used by system administrators for troubleshooting problems with the system. The YouTestMe system is designed to do maintenance automatically through scheduled jobs; however, it may require manual intervention under exceptional and rare circumstances. An example would be installing patches or recovering the system after hardware failure where a backup does not exist. Note that accidentally deleting or changing some critical files may damage the system or data, and the only way to recover may be to revert to the previous VM snapshot or backup.

14.5 Shut down the YTM system gracefully before turning off the Server computer

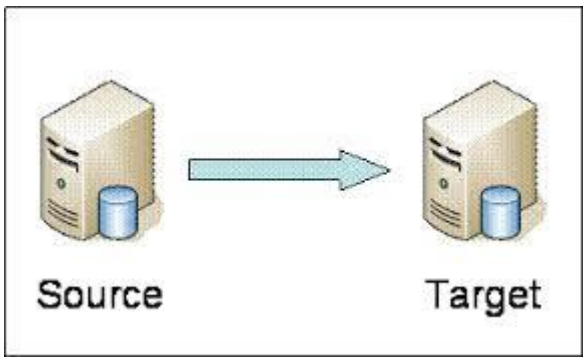
If the server computer needs to be turned off or restarted, the YouTestMe system should be shut down gracefully.

15 Creating YouTestMe Standby Site

For the maximum protection of your data and system availability, you can create the YouTestMe standby (mirror) site used as a failover system if the primary system gets unavailable (due to hardware failure or similar).

It can be accomplished by installing two YTM Virtual machines on two servers. One would be the "Primary" server used in your production process, and the other one will be the "Standby" server.

The standby server will always run, but users will not access it. The data copy process will run periodically on the standby server and copy all data from the Primary server. The user can set this copy's frequency to be, for example, several times per day, once per day, or a week. More frequent data copying may impose a load on the source system and network, so scheduling it for "quiet" time is best.



15.1 Scheduling data copy process

Log in to YouTestMe Virtual Appliance as application user "ytm1" and open the Terminal:

Execute:

```
crontab -e
```

Add to crontab file:

```
################################################################################

#

# WARNING! USE THE OPTION BELOW ONLY IF THIS IS STANDBY SERVER!

# Activating this option will delete data on this server, and it

# will refresh it with data from the Primary server.

# Below setting will run data copy every day at midnight

#

################################################################################

0 0 * * * * ${HOME}/ytm/res/Scripts/Unix/ytm/system_upgrade/ytm_copy_db_to_new_vm.sh
79.127.105.146 5432 ytm123pw ytm1
```

Save file exit with "vi" command: ":wq" + ENTER

Parameters in the command line are:

1. The IP address of the source VM from where we are copying data
2. port of the source database (usually "5432")
3. source database schema where the original data resides

Note that log files and target database backup is stored in the following directory:

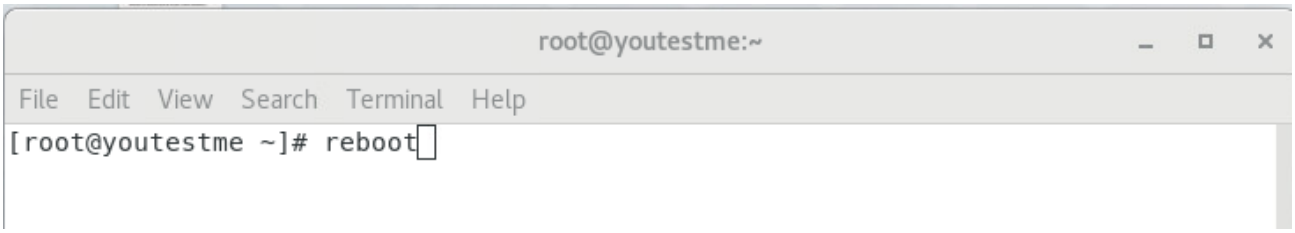
```
/ytmdata/ytm_data_pump_dir/
```

16 YouTestMe System Maintenance

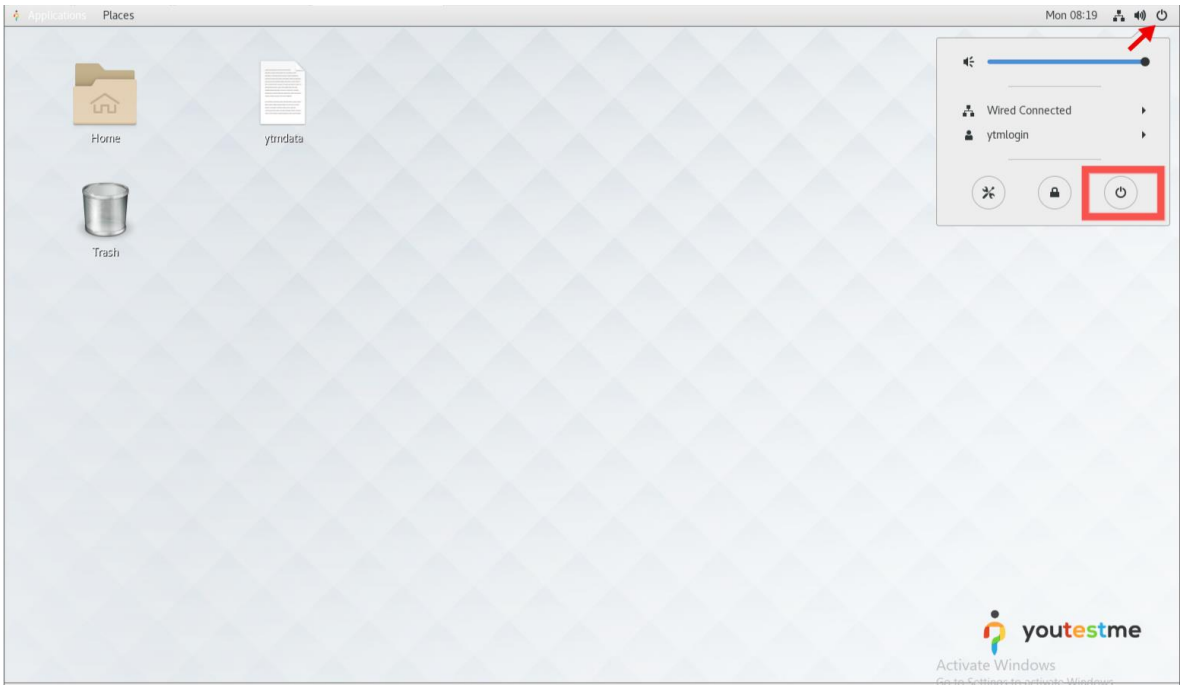
16.1 Restarting YouTestMe Virtual Machine

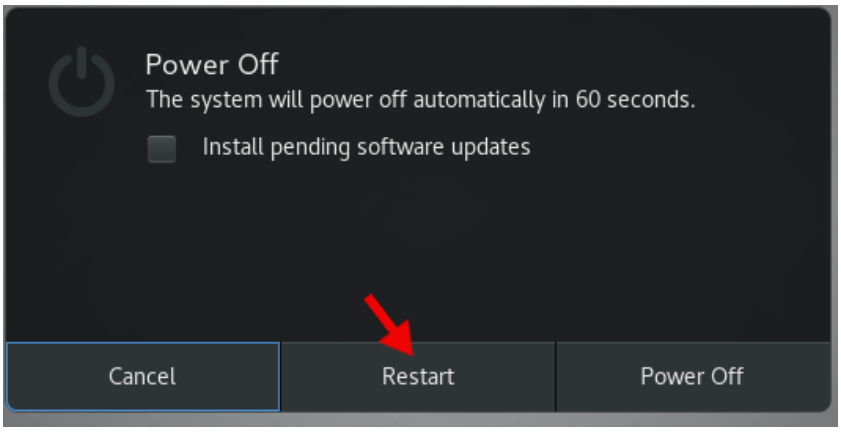
To complete this procedure, you must be logged in as "root" user.

1. **Using a terminal, execute the command "reboot"**

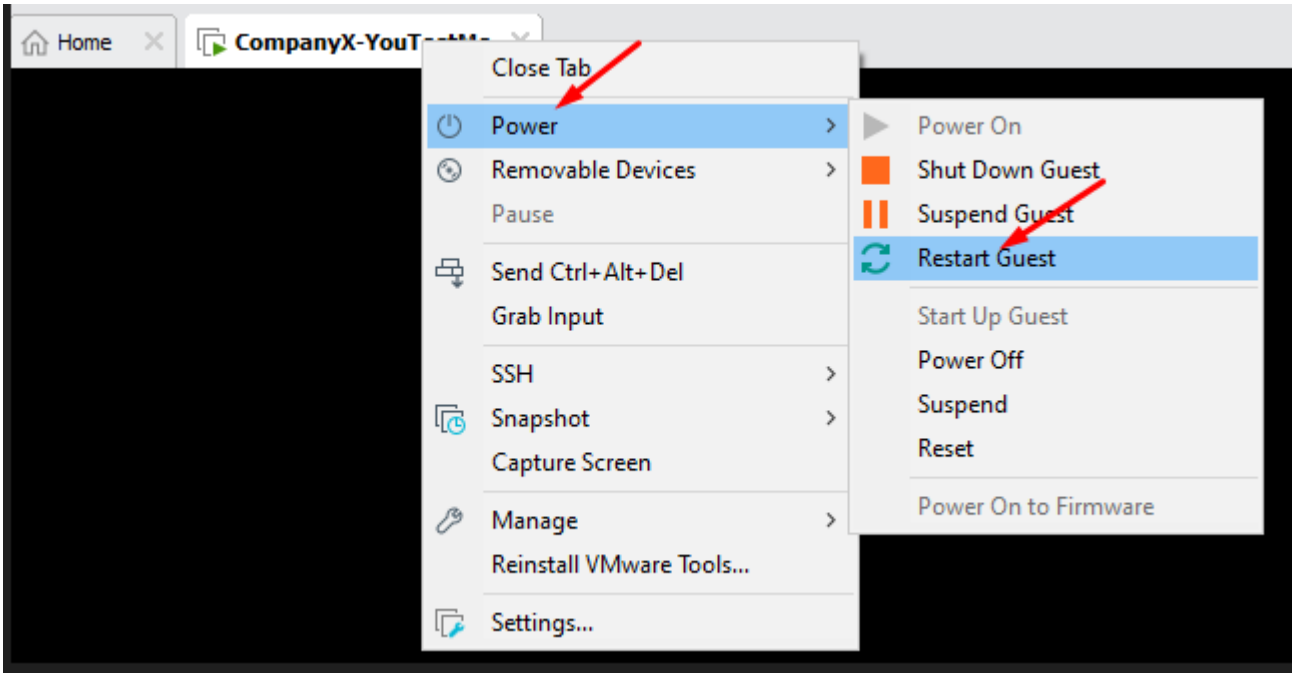


2. **Using the Graphical User Interface, choose the "Power" button from the upper right corner -> "Power" button again, market with red -> "Restart"**





3. **From VMware Workstation, select virtual machine from inventory > right-click > "Power"> "Restart guest"**



16.2 Shutting down YouTestMe Virtual Machine

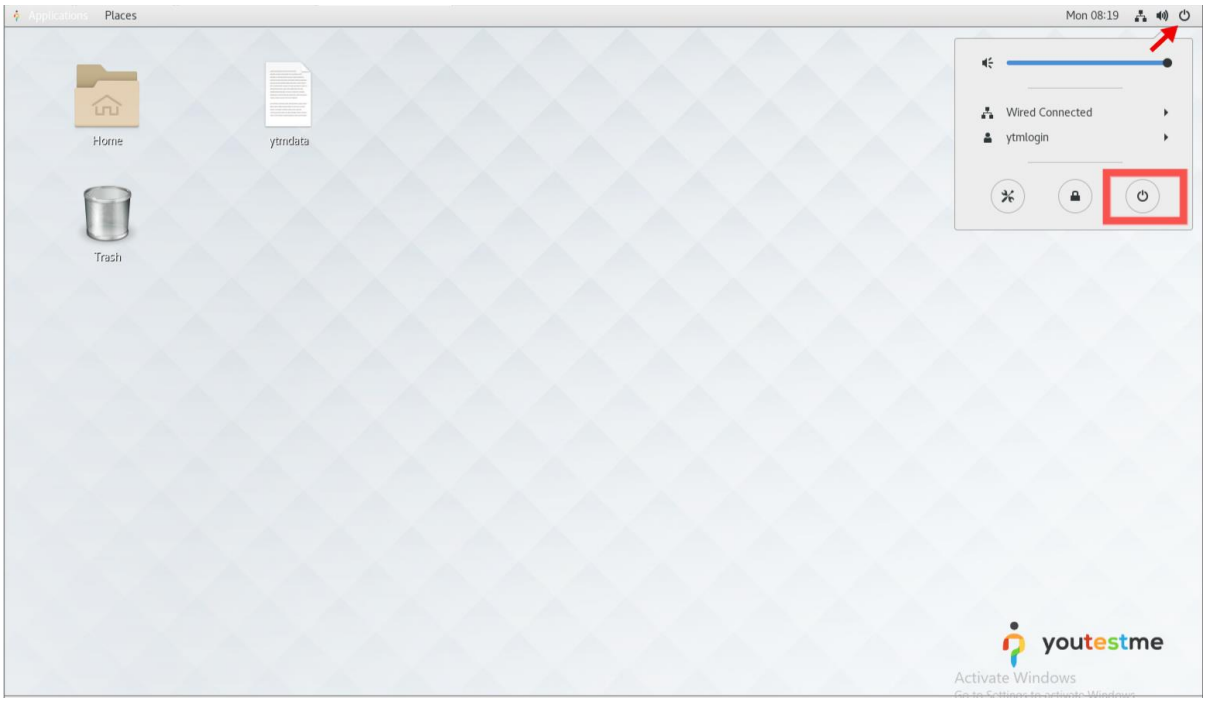
To complete this procedure, you must be logged in as "root" user.

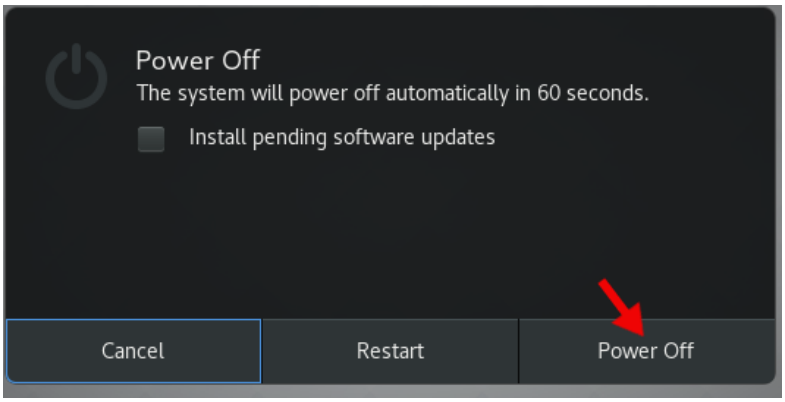
Before shutting down the physical server, the Virtual Machine should be shut down gracefully so server files and data are not corrupted.

1. **Using a terminal, execute the command "shutdown"**

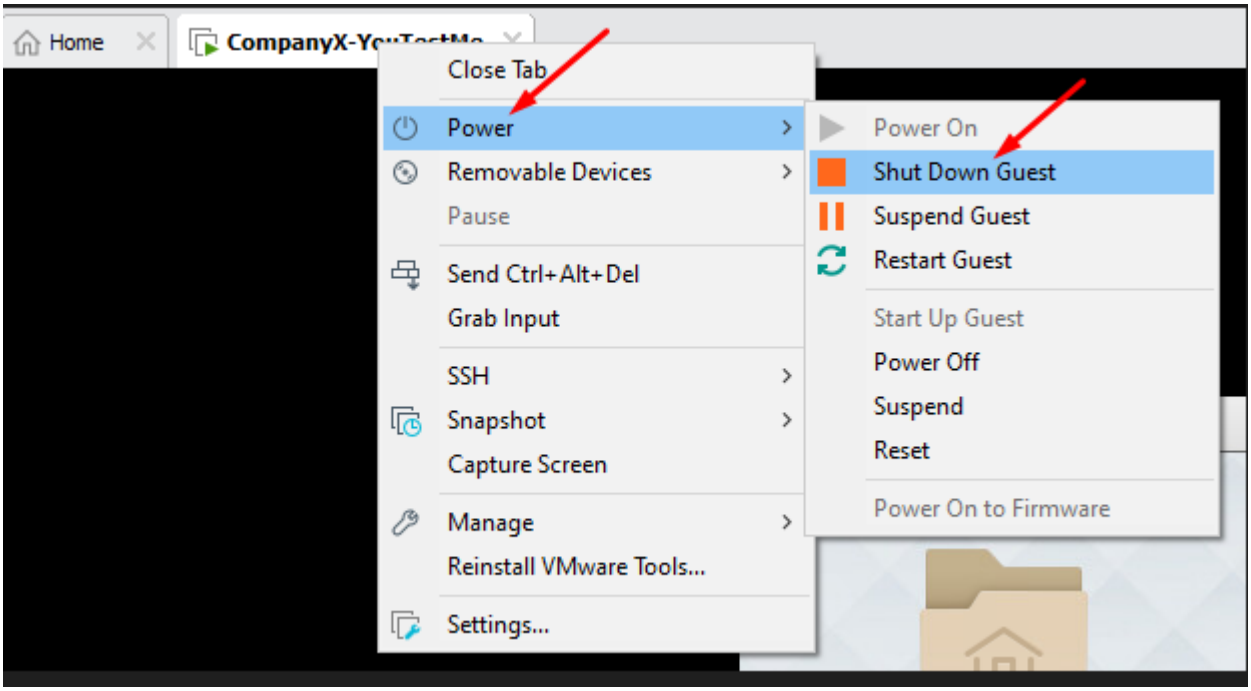
```
[root@ytm-1 ~]# shutdown
Shutdown scheduled for Sun 2016-09-25 10:06:52 EDT, use 'shutdown -c' to cancel.

Broadcast message from root@ytm-1 (Sun 2016-09-25 10:05:52 EDT):

The system is going down for power-off at Sun 2016-09-25 10:06:52 EDT!
```

2. **Using the Graphical User Interface, choose the "Power" button from the upper right corner > "Power" button again, market with red > "Power Off"**





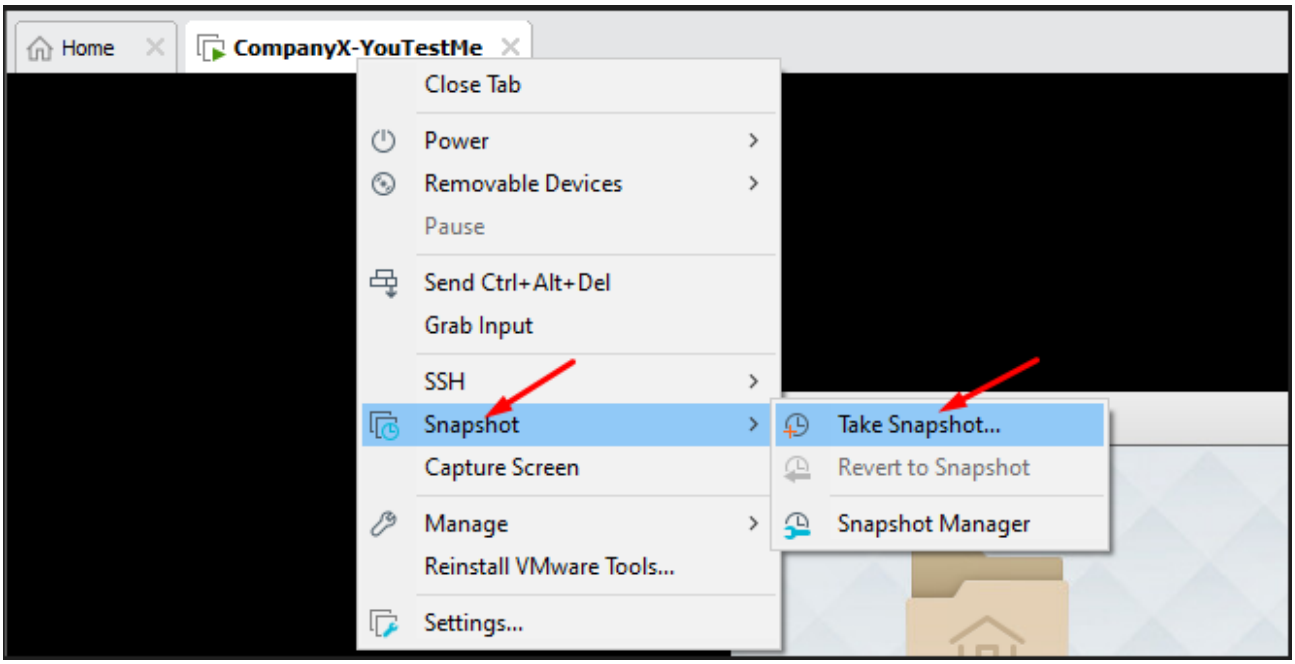
3. **From VMware Workstation, select the virtual machine from inventory > right-click > "Power"> "Shut Down Guest"**



16.3 Creating a Snapshot of the Virtual Machine

Snapshot is a convenient way of creating Virtual Machines backups. With snapshots, we can roll back to a specific point in time.

From VMware Workstation select a virtual machine from inventory > right-click > "Snapshot"> "Take Snapshot"



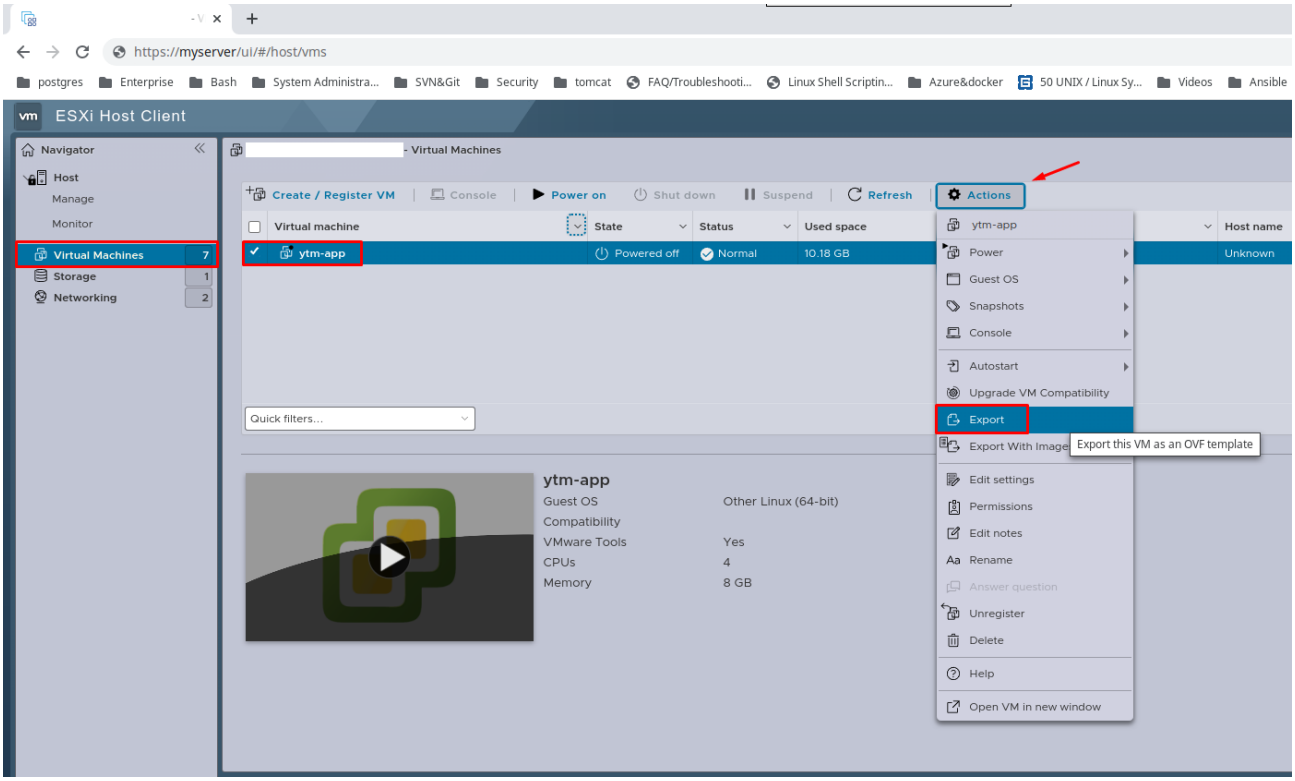
16.4 Creating Export (Physical Backup) Of Virtual Machine

Virtual Machine Export is the ultimate physical backup. It should be done regularly and kept in a safe place.

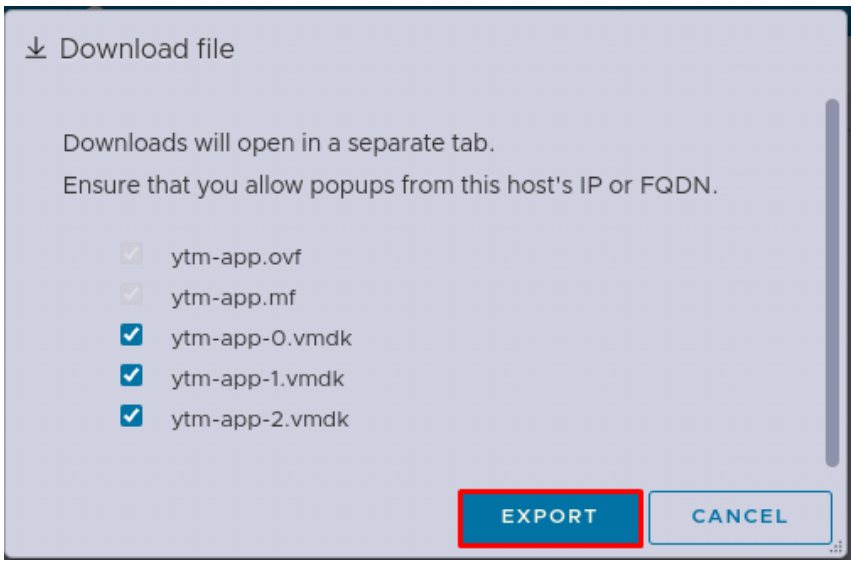
If Virtual Machine files get corrupted, it may not be possible to roll back to previous snapshots, so it is essential to make these backups regularly.

Using this type of export, you can also move or clone YouTestMe virtual machines. Cloning should be done only for backup. Backup files can be used to import Virtual Machine at the same or different location using the procedure explained in installing the YouTestMe Virtual Machine chapter.

1. **From the vSphere web client (VMware), select the virtual machine from the list and navigate to Actions -> Export:**



2. **Confirm the operation by clicking the "EXPORT" button:**

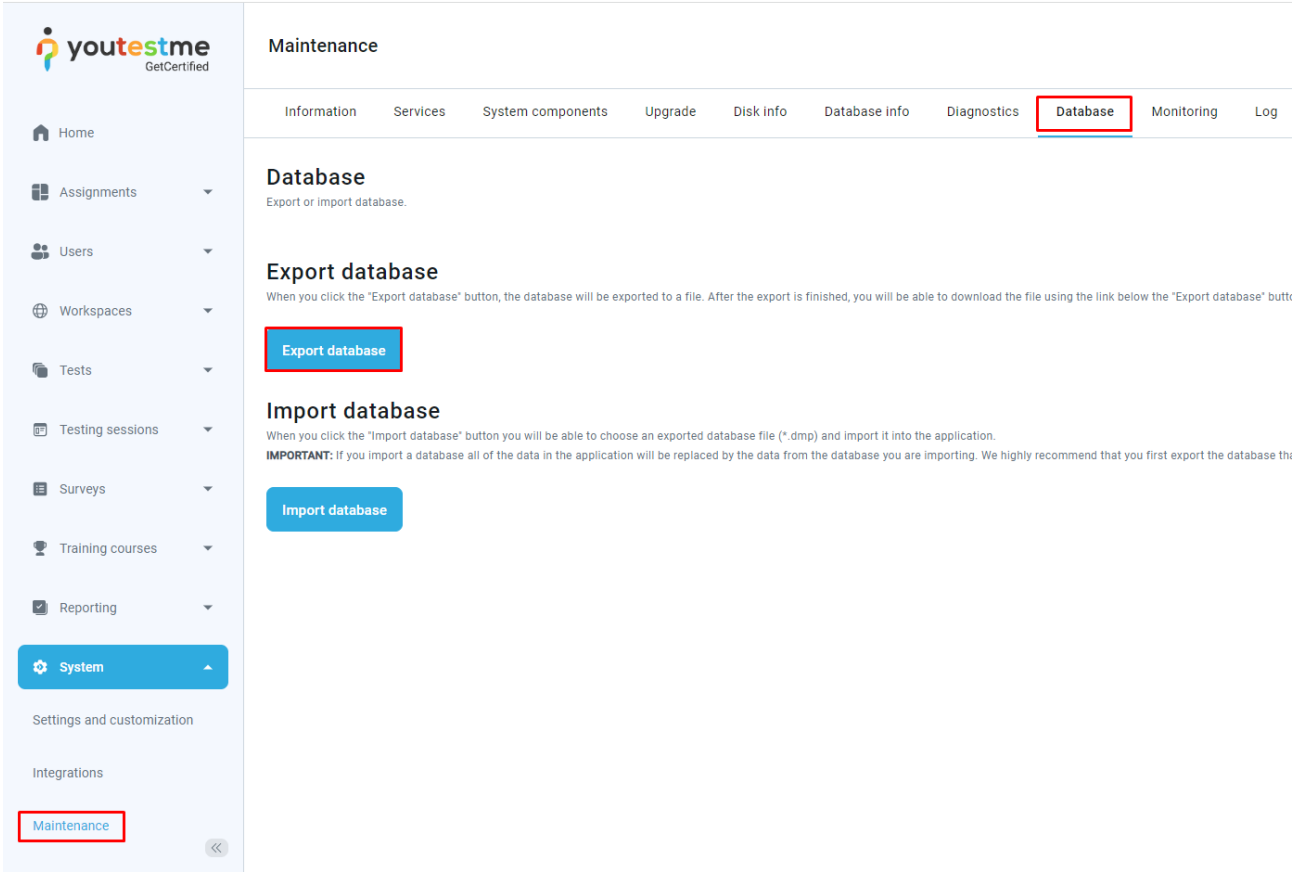


3. **To turn off pop-up blocking or to exclude the host's IP or FQDN from being blocked, follow the instructions for your web browser:** Chrome or Firefox

16.5 Export Database Data to a File

It is a good practice to back up your data occasionally by exporting them into a file. Then, the file can be downloaded and stored in a safe place. In addition, it can be helpful in data loss because the saved user data can be imported into the database (check the picture below).

Navigate to the **system -> Maintenance** page to execute database data export to a file within the application.



16.6 Import Database Data from a File

The PostgreSQL data file can be restored from the backup via CLI (command-line interface) by performing the following procedure:

1. Copy your data file (***ytm1-backup.dmp***, for example) to YTM Virtual Machine, and place it in the following directory:

   ```
   /ytmdata/ytm_data_pump_dir/
   ```

   The file can be migrated using any SFTP client software like WinSCP or FileZilla.

2. Log in to YTM Virtual Machine as user "***postgres***" and navigate to the directory where you transferred the database backup file :

   ```
   $ cd /ytmdata/ytm_data_pump_dir/
   ```

3. Backup your current database data (schema):

   ```
   pg_dump -v -U ytm1 -n ytm1 -b -Fc ytmdb1 > ytm1-backup2.dmp
   ```

4. Drop database schema "***ytm1***":

   ```
   psql -U ytmadmin -d ytmdb1 -c 'drop schema ytm1 cascade';
   ```

5. Restore user data from the backup file "***ytm1-backup.dmp***":

   ```
   pg_restore -U ytmadmin -d ytmdb1 < ytm1-backup.dmp
   ```

16.7 Database Parameters

Table showing default database parameters

Setting	Value
Statistics gathering	automatic
Database Name	ytmdb1
YTM database administrative user	ytmadmin
YTM database schema (user data)	ytm1
Character Set	UTF8
Time Zone	UTC
Database Port	5432
Log Rotation	automatic

17 Securing network access to the YouTestMe system

This section describes ensuring that only specific computers on your network can access the YouTestMe system.

17.1 YouTestMe Virtual Machine Active Ports

Port	Protocol	Purpose
22	SSH	System support
5432	TCP	Access to the PostgreSQL database
8080	HTTP	Access to YouTestMe Web Application through a web browser
8009	AJP	Access to YouTestMe Application from optional Proxy/Load Balancing server. The Apache JServ Protocol (AJP) is a binary protocol that can proxy inbound requests from a web server to an application server that sits behind the web server.
6001 5901	TCP	VNC desktop access for support using GUI interface.

Linux bash commands that can be used to determine listening ports:

1. `netstat –tulnp`
2. `ss –nutlp`
3. `lsof -i`

17.2 Assumptions

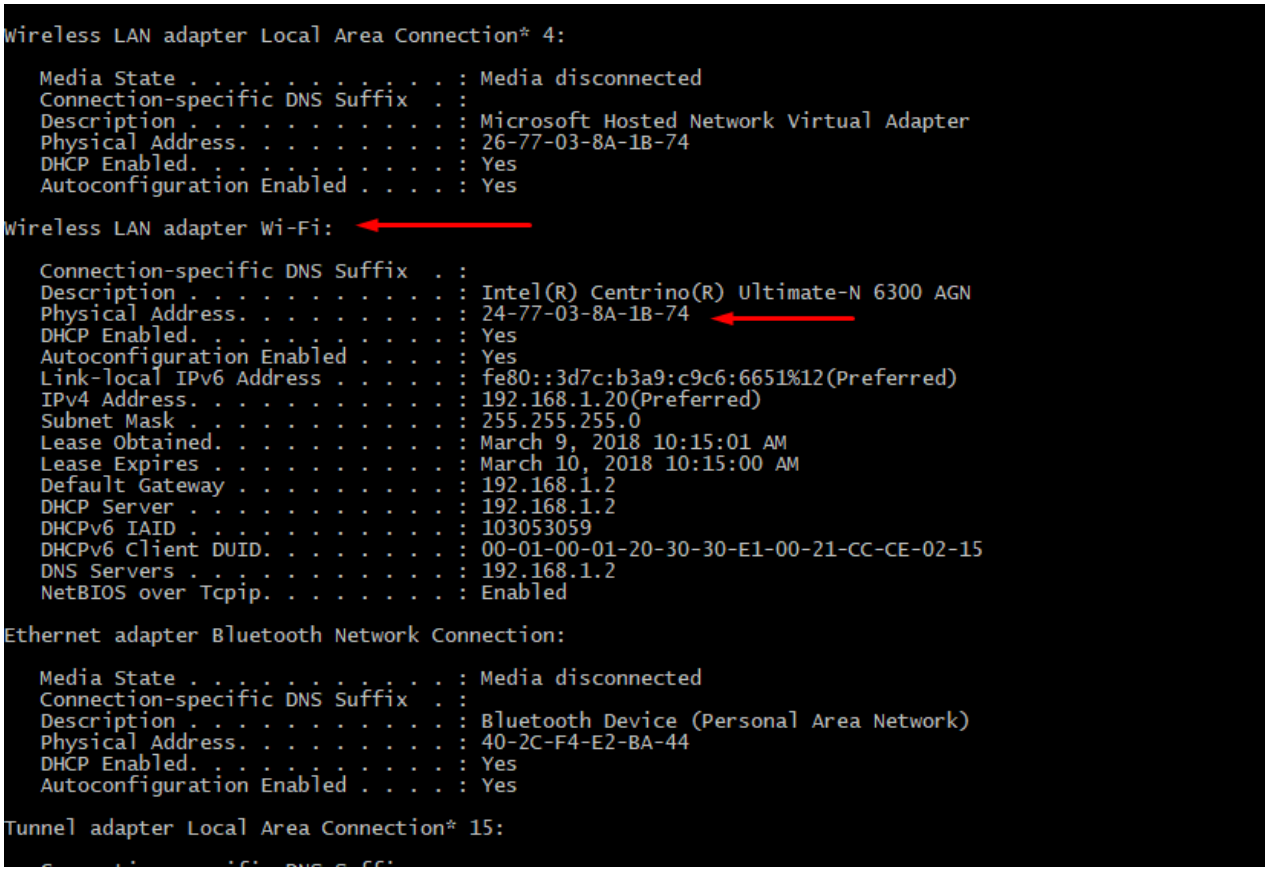
All computers are on the local network.

17.3 Step #1 - Determine a set of IP addresses with Access to the YouTestMe System

Determine the range of IP addresses permanently assigned to computers (devices) that will have access to the YouTestMe System. For example, suppose you have 30 computers (workstations) used for doing tests and for the application's administration. In that case, you could specify a range of related IP addresses from 192.168.1.100 to 192.168.1.129.

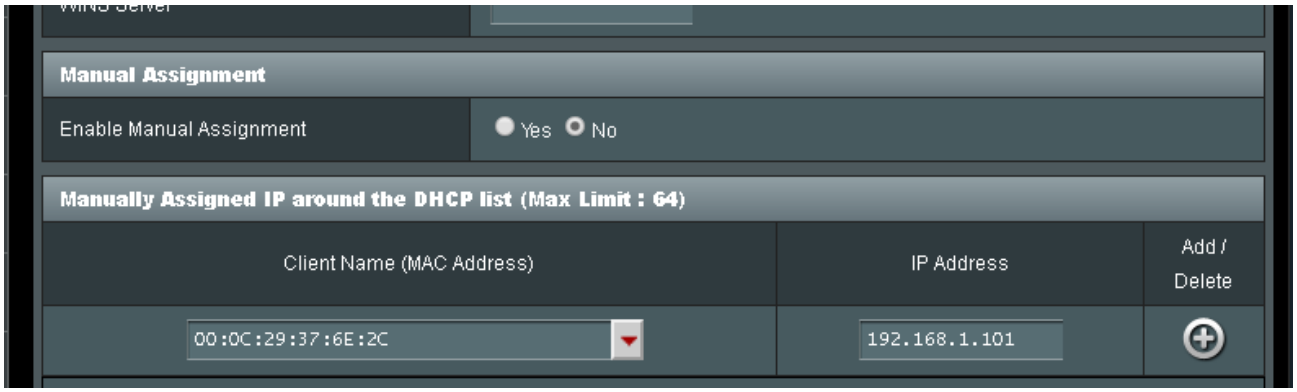
17.4 Step #1 - Collect MAC addresses

Collect MAC addresses from all computers (devices) that need access to the YouTestMe system.
Type "ipconfig /all" inside DOS Window and search for Physical Address (picture below).



17.5 Step #3 - Set up your network (DHCP server)

Set up your DHCP server to reserve specific IP addresses to specific MAC addresses.
An example of one particular router (Asus RT-AC66U) is shown below:



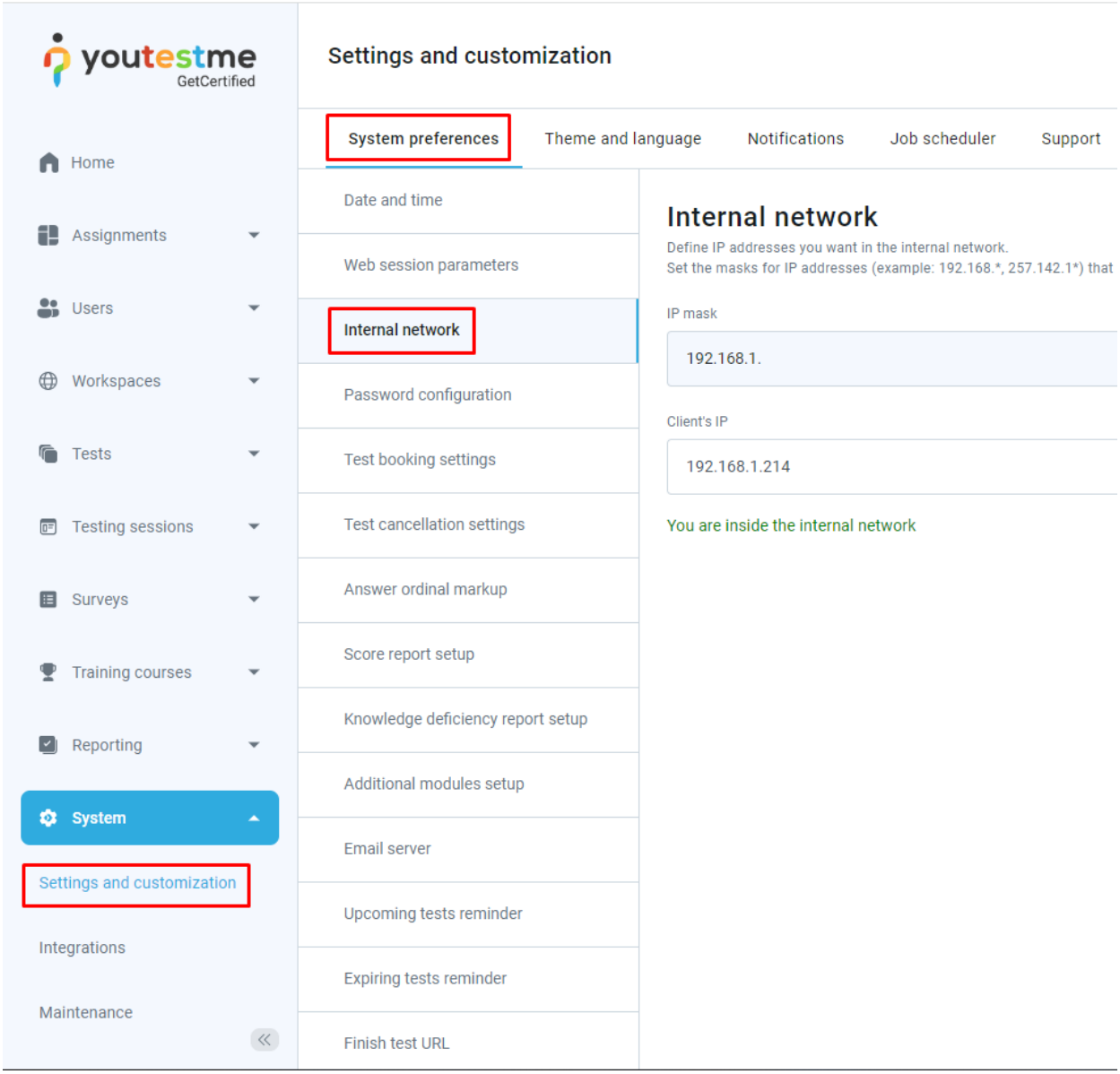
17.6 Step 4 - Verify your devices

Reboot your devices and make sure they are assigned IP addresses as set up in Step #3

17.7 Set up networking in the YouTestMe application

Set up access to the YouTestMe application to be allowed for IP ranges from 192.168.1.100 to 192.168.1.129.

Navigate to "System -> Settings and customization -> System preferences" tab, and locate the "Internal network" settings, where you can set a range of your local IP addresses.



18 YTM application Access via HTTPS Link Using Apache HTTPD

Requirements:

1. Apache HTTPD
2. Apache module **mod_ssl**
3. SSL certificate for your domain/subdomain

18.1 Copy Your SSL Certificate to Apache Server

1. SSH to your web server
2. Switch to "root" user
3. Copy your certificate file, the certificate key, and the certificate of the CA that signed the SSL certificate to the following directory: **/etc/ssl/certs**

18.2 Add Virtual Host to Apache HTTPD

1. Navigate to the following directory: **/etc/httpd/conf.d**
   (On Debian/Ubuntu, the path is: */etc/apache2/conf.d*)
2. Update/Create **httpd-vhosts.conf** file using some text editor
3. Create **VirtualHost** elements (your domain/subdomain should replace **getcertified.example.com**)

```
<VirtualHost *:80>
      ServerName              getcertified.example.com
      Redirect          /     https://getcertified.example.com/
</VirtualHost>

<VirtualHost *:443>

      ServerName        getcertified.example.com

      SSLEngine on
      SSLCertificateFile /etc/ssl/certs/YOUR_CERTIFICATE.crt
      SSLCertificateKeyFile /etc/ssl/certs/YOUR_key.key
      SSLCACertificateFile /etc/ssl/certs/YOUR_CA.ca-bundle

      ProxyPreserveHost on

      RewriteEngine on
      RewriteCond %{REQUEST_URI} ^/$
      RewriteRule (.*) /ytm1/ [R=301]

      ProxyPass        /ytm1/ ajp://YTM_VM_IP:9101/ytm1/ secret=2youtestme1
      ProxyPassReverse /ytm1/ ajp://YTM_VM_IP:9101/ytm1/ secret=2youtestme1

</VirtualHost>
```

4. Check HTTPD for syntax errors:
   `httpd -t`

5. Reload HTTPD:
   `httpd -k graceful`

```
<!-- Define an AJP 1.3 Connector on port 8009 -->

<Connector protocol="AJP/1.3"
           secretRequired="true"
           secret="2youtestme1"
           address="0.0.0.0"
           port="9101"
           redirectPort="8443" />
```

The "secret" option for the Apache HTTPD "mod_proxy_ajp" module has been available since version 2.4.17.

It is strongly recommended that you change the default value for the "secret" option on both servers – Apache HTTPD and Tomcat application server. Then, restart the services after the change.

19 Ensuring Stability and Reliability of the System

You can do several things to ensure that the system is running without interruptions:

1. Monitor disk space usage and memory usage on the host server
2. Monitor disk space usage and memory within YouTestMe Virtual Machine
3. Install the latest patches for your host operating system and hypervisor software; however, ensure you can revert to previous versions in case of compatibility issues.

20 Getting YouTestMe System Support

Basic and Advanced support services are included for free in the first year, and after that, they are based on a chosen support plan.

20.1 Without Remote Access

In case our technical support team doesn't have access to your infrastructure, you can use the following support:

1. User Manuals (Basic)
2. Technical Documentation (Basic)
3. Email (Basic)
4. Video Tutorials (Basic)
5. Phone (Advanced)
6. Personal, on-demand video tutorials (Advanced)

20.2 With Remote Access

1. Crisis management (Basic)
2. On-site training (Advanced)
3. On-site maintenance (Advanced)
4. Personnel Administrators (Advanced)
5. Troubleshooting by our technical support team (Advanced)

20.2.1 WebEx Support

Our support team can help you using the Cisco WebEx meeting platform if remote access is possible. With WebEx, you can share the screen with our support team, and they can guide you on which actions to take, leaving you complete control over your system.

20.2.2 About WebEx Meetings

- Cisco WebEx is a web-based application used for conference calls and video presentations. Multiple people from different locations can participate in a ring.
- You will need a web browser, speakers or headphones, and an Internet connection to participate in the call.
- A microphone is optional, depending on whether you will listen to the presentation or participate in the discussion.
- If you are unfamiliar with this tool, watch our video tutorial (linked here).

21 Troubleshooting

21.1 Virtual Machine Freezes

When a virtual machine freezes, usually the reason is that the host server is running out of memory or disk space. The solution is to shut down some processes on your host server or add more memory. If the cause runs out of disk space on the host server, adding disk space or cleaning unnecessary files will solve it.

21.2 Checking Tomcat Log

To complete this procedure, you must be logged in as a "ytm1" user.

In most cases, there will be a problem with the YTM application. There are two aliases set up to make checking of Tomcat log easier and faster:

1. **tlog ytm1** (the command will open the log with the vim text editor, and you can examine the entire log)
2. **tlogt ytm1** (the command will open the log tail and monitor the changes in real-time – default ten lines)

Aliases are defined as:

```
alias tlog='vim /home/ytm1/ytm/res/ProgramFiles/tomcat/apache-tomcat-9.0.56/logs/ytm1.log'
alias tlogt='tail -f /home/ytm1/ytm/res/ProgramFiles/tomcat/apache-tomcat-9.0.56/logs/ytm1.log'
```

21.3 Tomcat could not be stopped

To complete this procedure, you must be logged in as a "ytm1" user.

Use the command "**istomcat**" to see if Tomcat is running.

Sample output:

ytm1 6341 1 2 Jan06 ? 17:07:31 /usr/lib/jvm/adoptopenjdk-8-hotspot/bin/java -
Djava.util.logging.config.file=/home/ytm1/ytm/res/ProgramFiles/tomcat/apache-tomcat-9.0.56/conf/logging.properties -
Djava.util.logging.manager=org.apache.juli.ClassLoaderLogManager -Xms6144M -Xmx6144M -Xmn1024M -Djdk.tls.ephemeralDHKeySize=2048 -
Djava.protocol.handler.pkgs=org.apache.catalina.webresources -Dorg.apache.catalina.security.SecurityListener.UMASK=0027 -
Dignore.endorsed.dirs= -classpath /home/ytm1/ytm/res/ProgramFiles/tomcat/apache-tomcat-
9.0.56/bin/bootstrap.jar:/home/ytm1/ytm/res/ProgramFiles/tomcat/apache-tomcat-9.0.56/bin/tomcat-juli.jar -
Dcatalina.base=/home/ytm1/ytm/res/ProgramFiles/tomcat/apache-tomcat-9.0.56 -
Dcatalina.home=/home/ytm1/ytm/res/ProgramFiles/tomcat/apache-tomcat-9.0.56 -
Djava.io.tmpdir=/home/ytm1/ytm/res/ProgramFiles/tomcat/apache-tomcat-9.0.56/temp org.apache.catalina.startup.Bootstrap start

Use the command "***tstop***" to stop the Tomcat server.

After issuing "***tstop***," check if Tomcat is still running. If it is still running after several minutes, use the "***kill***" command to kill the process: **kill -9 6341**

Note that "6341" is a Unix process id that could be seen in the output of the command "***istomcat***".

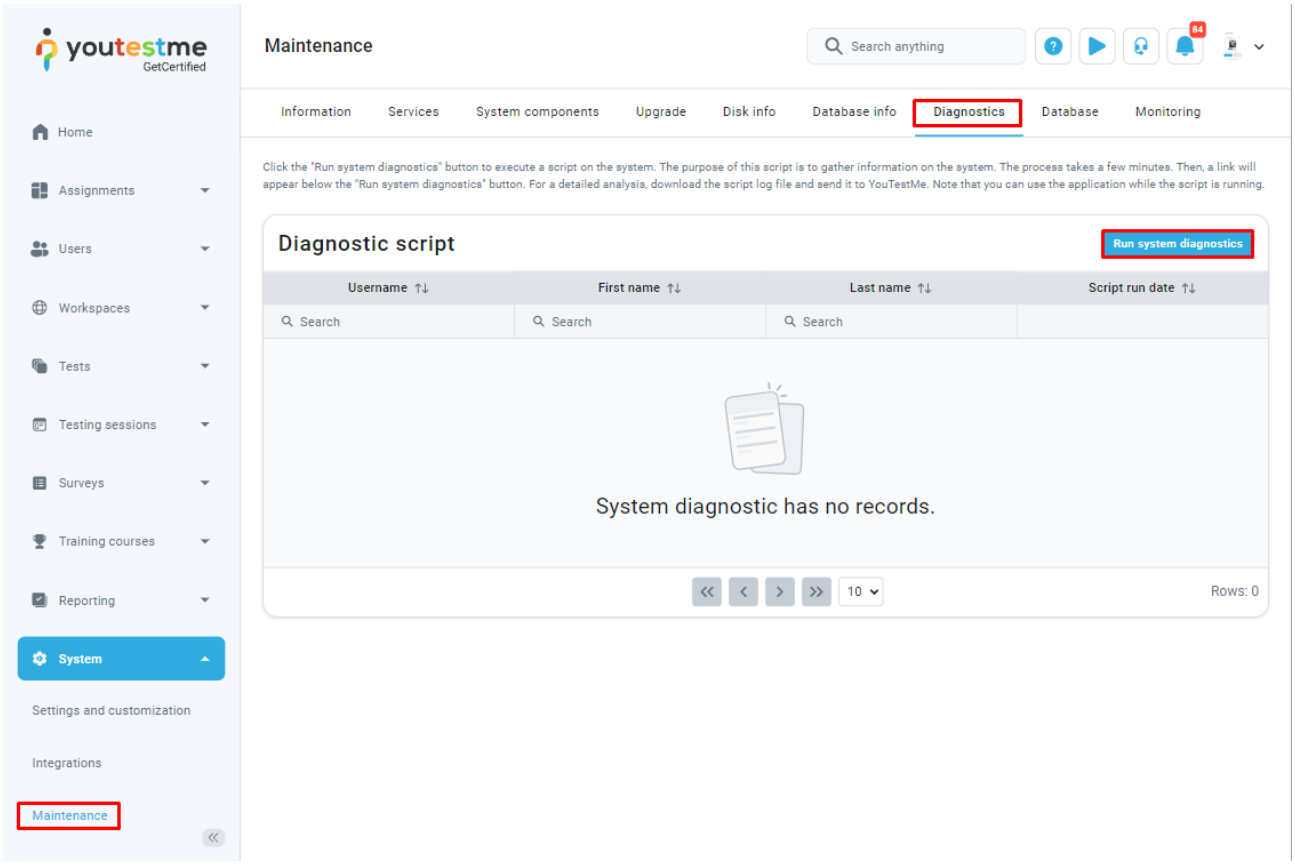
21.4 System Resources

1. check minimal required system resources (RAM, Disk, CPU)
   command "free -m -h"
   command "cat /proc/meminfo"

2. check free disk space on all file systems
   use the command "df -h"

21.5 How to Collect Important System Information from VM

Navigate to the "System -> Maintenance" page in the application and select the "Diagnostics" tab to collect relevant system information:



21.6 How to fix VirtualBox Clipboard not working

To complete this procedure, you must be logged in as "root" user.

Kill VBoxClient:

```
[developer@localhost ~]$ ps -ef|grep clip
503        5140     1  0 14:07 ?        00:00:00 /usr/bin/VBoxClient --clipboard
503        5141  5140  0 14:07 ?        00:00:00 /usr/bin/VBoxClient --clipboard
503        5174  5075  0 14:09 pts/0    00:00:00 grep clip
[developer@localhost ~]$

kill -9 5140
kill -9 5141
```

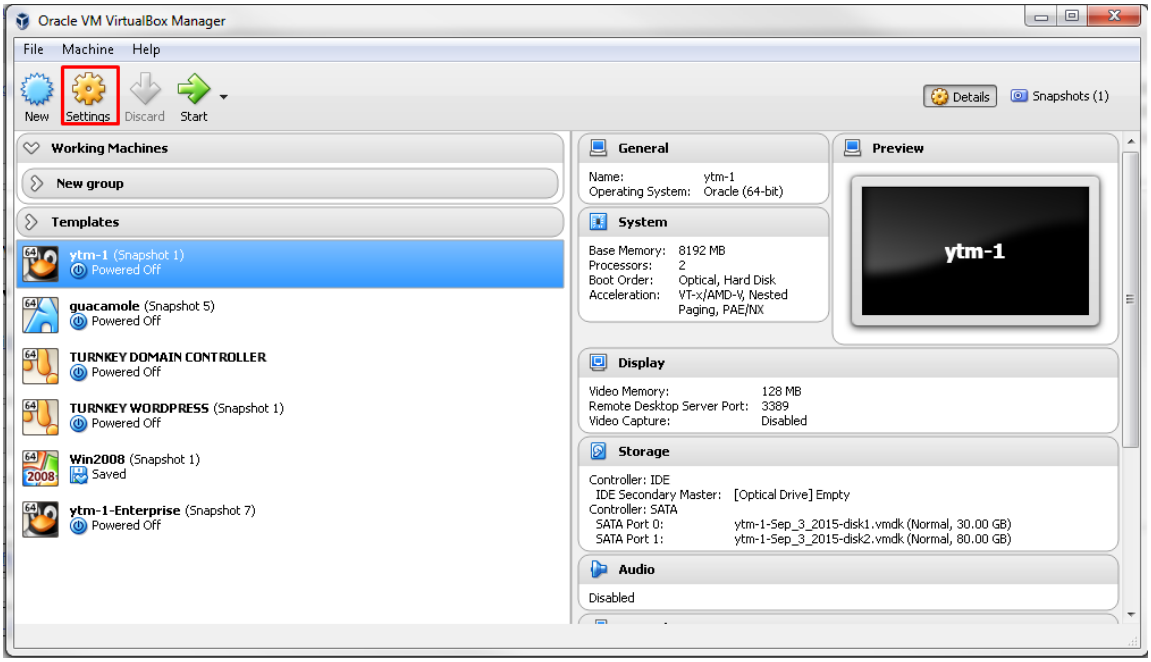
Stat again VBoxClient with:
/usr/bin/VBoxClient –clipboard

The "vboxclient" client runs in the background by default.

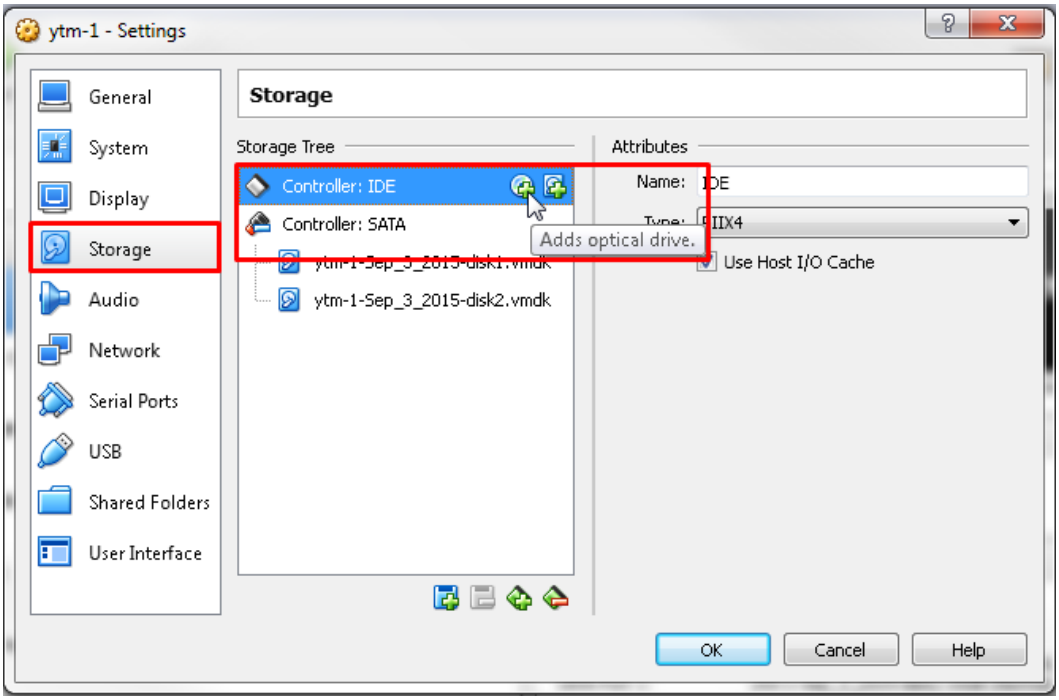
21.7 How to add an optical drive in VirtualBox

In some cases, the optical drive gets detached from the virtual machine. To attach an optical drive, follow the steps:

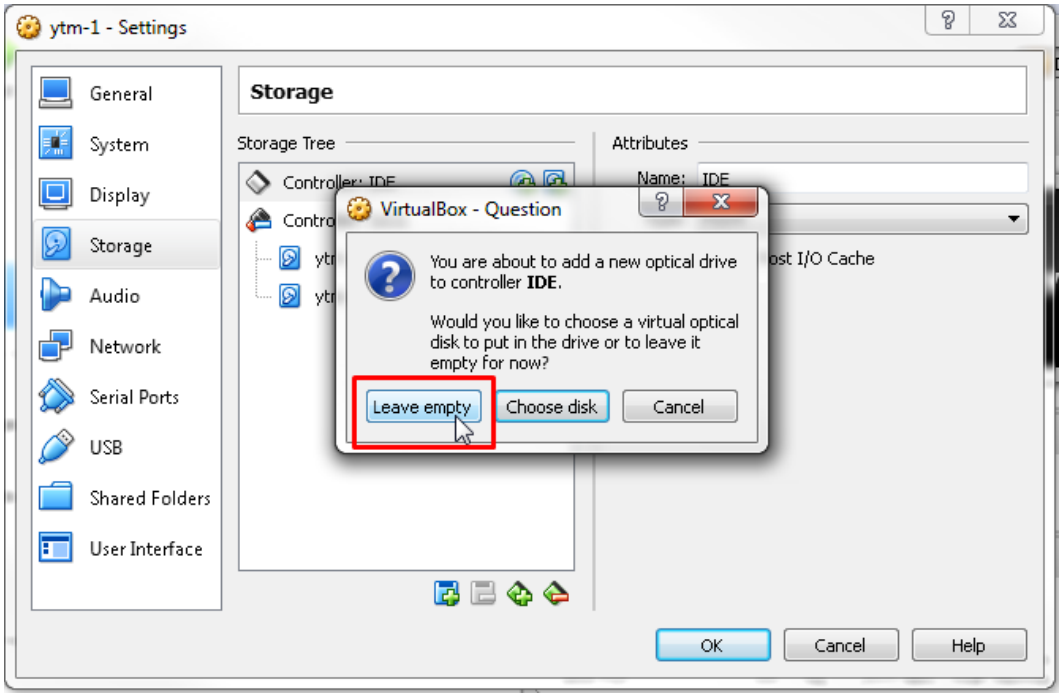
1. Select the virtual machine from the inventory on the left and choose "Settings"



2. Choose "Storage" and choose "Add an optical drive"



3. Choose "Leave empty":



This question often happens when importing a virtual machine into VirtualBox previously exported from VMware.

21.8 Antivirus software

21.8.1 The system scanning using ClamAV

To scan the system using ClamAV antivirus software, run the following command checking the "/home" directory and output only infected files, and ring a bell when they are found. The process may take a while.

```
clamscan -r --bell -i /home
```

To update the ClamAV antivirus database, run the following command:

```
freshclam
```

21.8.2 Automatic Anti Virus Scanning

In YouTestMe virtual machine, antivirus software is scheduled to run automatically every Sunday at midnight.

Anti Virus log files are located in the following directory:
`/root/ytm/unix/ytm/system_diagnostics/logs`

21.9 Troubleshooting VMware Workstation

21.9.1 VM shuts down on its own after a period of inactivity

Uncheck the "Keep VMs running after workstation closes" in the **Edit menu > Preferences > Workspace** tab and shut the server down. Once it is back up, re-enable the "Keep VMs running after workstation closes."

21.9.2 Collecting diagnostic information for VMware Workstation

https://kb.vmware.com/selfservice/search.do?cmd=displayKC&docType=kc&docTypeID=DT_KB_1_1&externalId=1346

21.10 Troubleshooting CentOS 7 Linux Host

21.10.1 Diagnostic techniques

Examine system logs in	`/var/log/`
Examine kernel messages	`dmesg | more`
Use “sosreport”	`sosreport -l`

22 Configuration Procedures

22.1 Utility Software

List of software and their download links used to administer YouTestMe products. Depending on the system, choose the most appropriate of the following:

Software	Description
VMware Workstation	Used to run Virtual Machines and change their settings (i.e., increase memory or disk space)
VNC Viewer	Used to access VM desktop remotely
Putty	Used to open a terminal session to VM

22.2 Change Linux User Password

To complete this procedure, you must be logged in as "root" user.
To log in as the ***root*** user via Terminal, execute the following command and enter the password afterward:

"`su -`"

Default Linux passwords:

Username	Password	Role
root	2ytm1	Linux administrator
postgres	2ytm1	PostgreSQL administrator
ytm1	2ytm1	YouTestMe application user

Notes:

The "#" sign in front of the command means the **root** user is logged in and will execute the following command.

The "$" sign in front of the command indicates that the **regular** user is logged in and will execute the following command.

22.2.1 Changing password using SSH Terminal

To change the password for the Linux user:

1. execute the command "`passwd username`"
2. enter a new password
3. confirm by pressing the key "Enter"

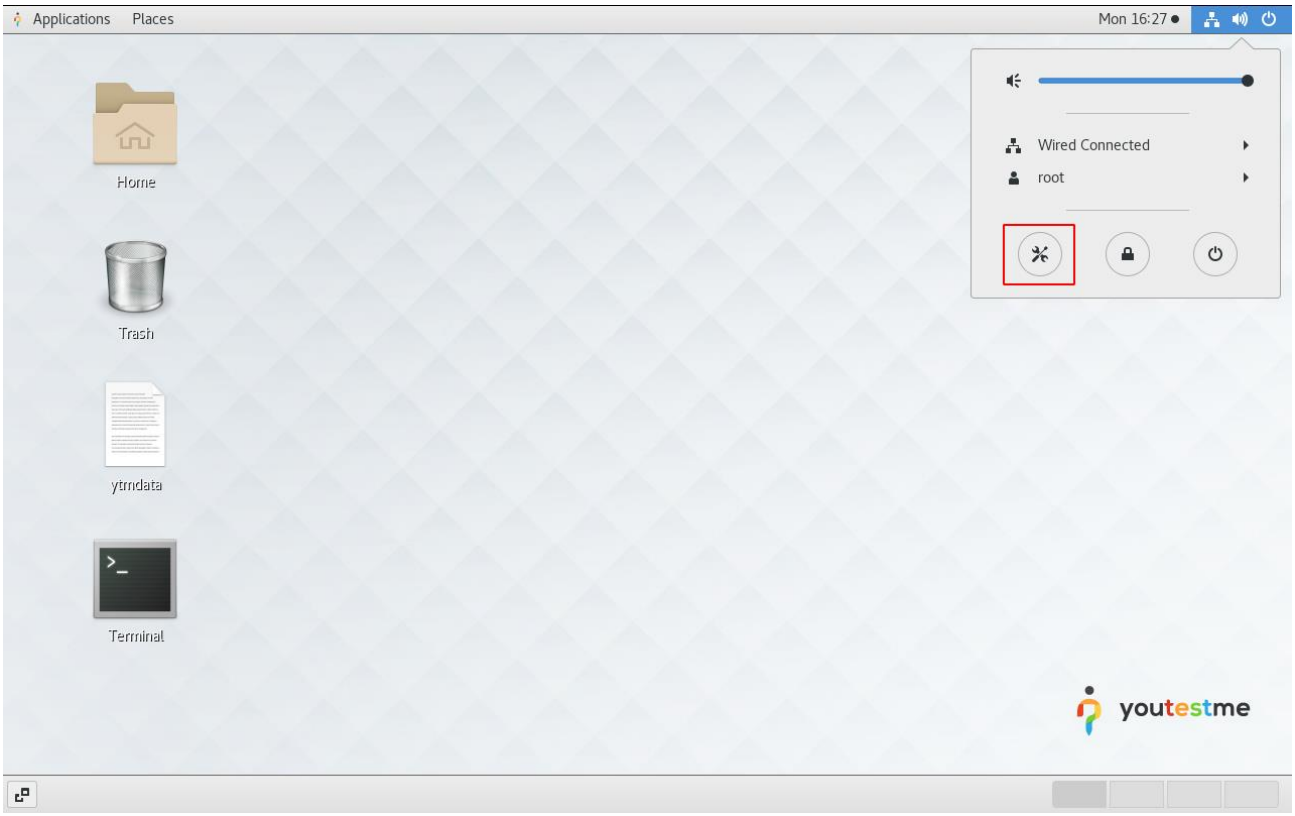
Example:
`# passwd ytm1`

```
[root@centosse ~]# passwd ytm1
Changing password for user ytm1.
New password:
BAD PASSWORD: The password is shorter than 7 characters
Retype new password:
passwd: all authentication tokens updated successfully.
```

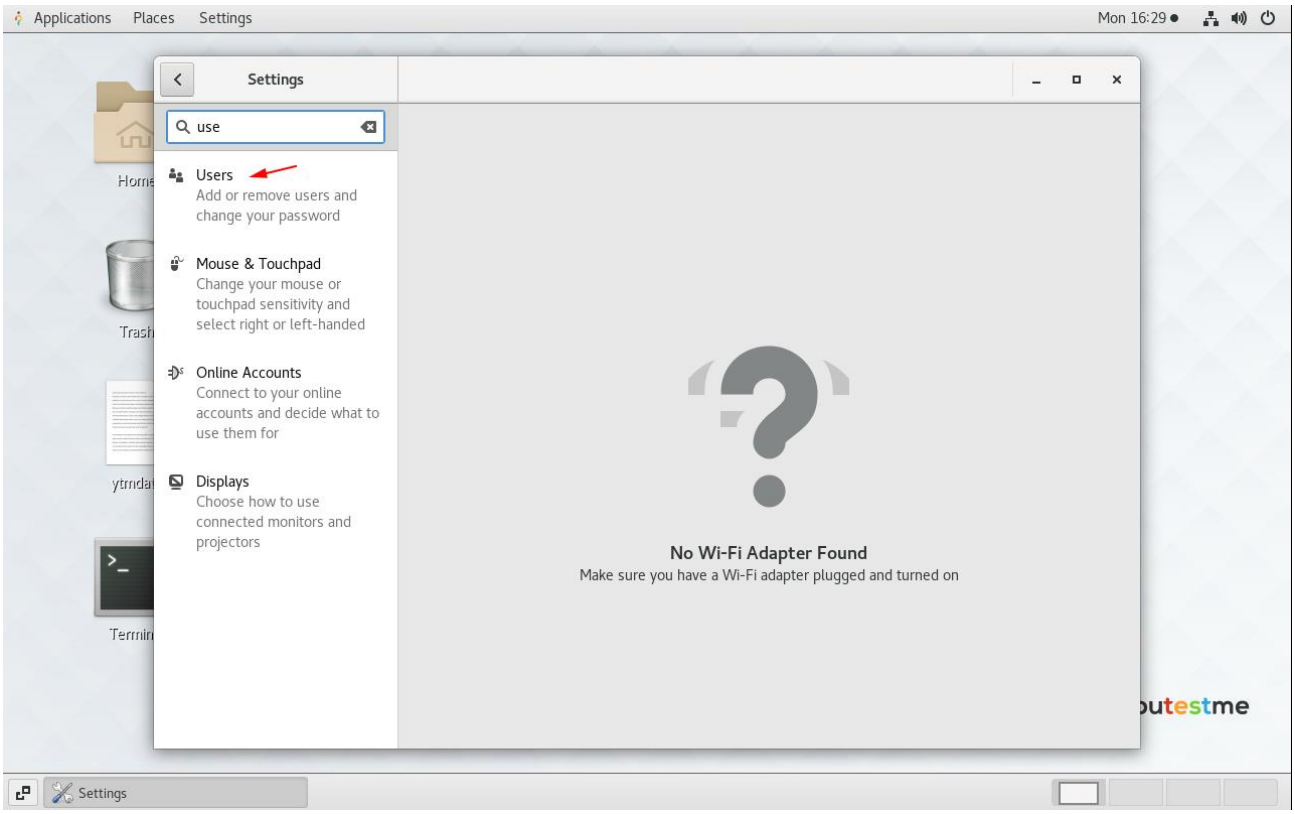
Test new password by logging in as a newly configured user:
`# su - ytm1`

22.2.2 Changing User Password using Graphical User Interface

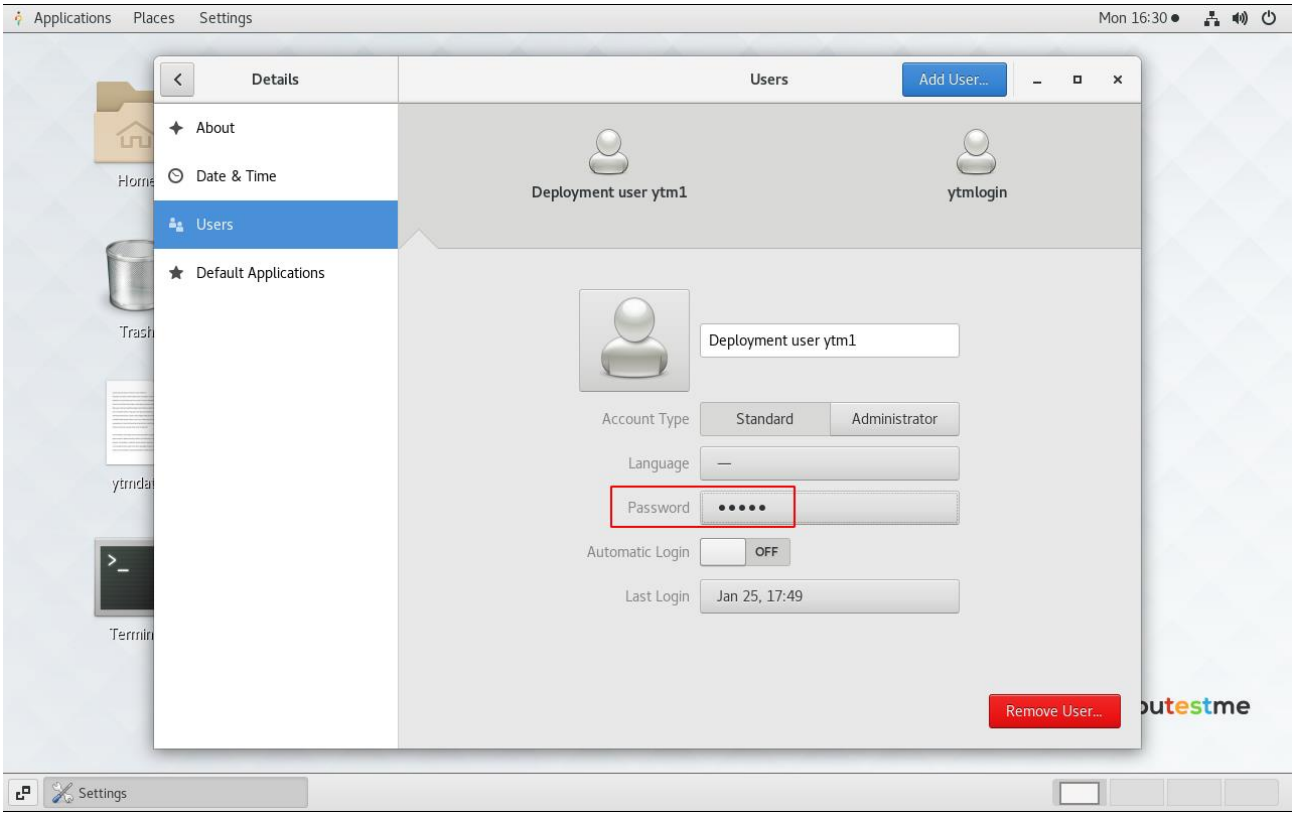
1. Click on the power button and then click the "Settings" button.



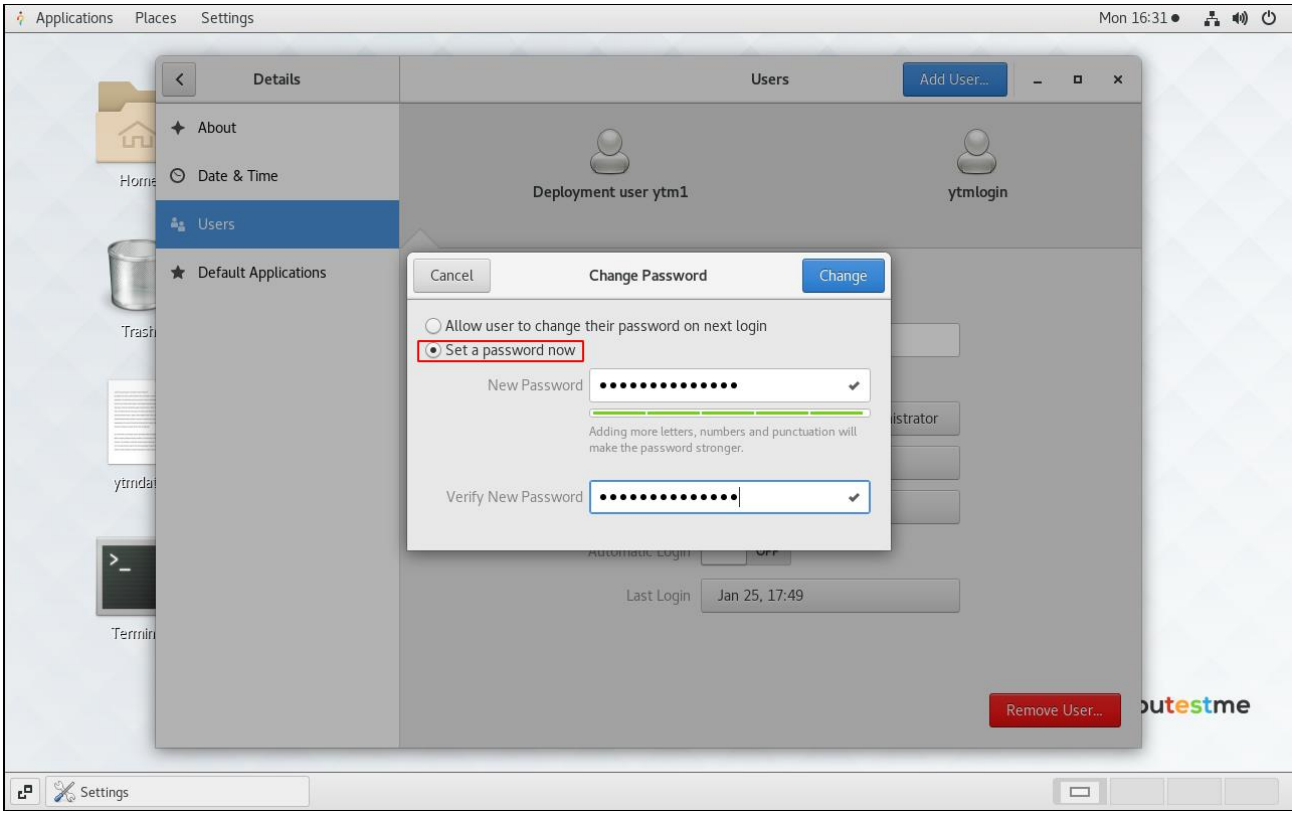
2. Click on the "Users" icon:



3. Select a user from the user's list and click on the "Password" field:



4. Select "Set a password now," enter the password and then click "Change":



22.3 Change PostgreSQL Database Administrator's Passwords

The default database administrative account passwords in the table below should be changed.

Username	Role
postgres	PostgreSQL native database administrator
ytmadmin	PostgreSQL YouTestMe database administrator

Essential: write down new passwords and store them in a secure place. Ensure you don't lose them since it may be impossible to recover them except by restoring the backup or snapshot system.

To complete this procedure, you need to be logged in to Linux as the "postgres" user.

Changing passwords for database users "postgres" and "ytmadmin" is highly recommended when installing the system. To do that, you will need to log in as user "postgres" into the Linux system and log into the database as user "psql" (see example below):

```
$ psql
postgres=# ALTER USER ytmadmin WITH PASSWORD 'new_password';
postgres=# ALTER USER postgres WITH PASSWORD 'new_password';
```

22.4 Memory Configuration

By default, RAM is allocated in the following order if using minimal requirements:

1. 4 GB of RAM for PostgreSQL Database
2. 8 GB of RAM for Tomcat Application Server
3. 4 GB of RAM for OS

The memory assigned can be optimized to best suit your needs. For example, you optimize SWAP space according to the RAM set for optimal database performance (see procedures for instructions).

22.5 Configure SWAP space

To complete this procedure, you must be logged in as "root" user.

The table below describes the relationship between the installed RAM and the configured swap space recommendation:

RAM	Swap Space
Between 1 GB and 2 GB	1.5 times the size of the RAM
Between 2 GB and 16 GB	Equal to the size of RAM
More than 16 GB	16 GB

Execute the "free –h" command to check SWAP and RAM.

```
[root@ytm-1 ~]# free -h
              total        used        free      shared  buff/cache   available
Mem:           7.8G        1.8G         64M        3.2G        5.9G        2.7G
Swap:          2.0G          0B        2.0G
```

In this example, RAM is 8GB, and SWAP is 2 GB. We will add 6GB of additional SWAP for smooth PostgreSQL database performance.

1. Create an "additional-swap" file with the "dd" command:

   ```
   # dd if=/dev/zero of=/additional-swap bs=1M count=6144
   ```

   ```
   [root@ytm-1 ~]# dd if=/dev/zero of=/additional-swap bs=1M count=6144
   6144+0 records in
   6144+0 records out
   6442450944 bytes (6.4 GB) copied, 20.4585 s, 315 MB/s
   ```

1. Run the "mkswap" command to make a swap area:

   ```
   # mkswap /additional-swap
   ```

   ```
   [root@ytm-1 ~]# mkswap /additional-swap
   Setting up swapspace version 1, size = 6291452 KiB
   no label, UUID=fc0d67a4-1386-4531-bdec-aeff2aacfdde
   ```

2. Change the permission of the file "additional-swap":

   ```
   # chmod 600 /additional-swap
   ```

3. Edit the "/etc/fstab" file for permanent mounting, and add the following line:

   /additional-swap swap swap defaults 0 0

   ```
   # vim /etc/fstab
   ```

```
#
# /etc/fstab
# Created by anaconda on Wed Jul 30 20:32:03 2014
#
# Accessible filesystems, by reference, are maintained under '/dev/disk'
# See man pages fstab(5), findfs(8), mount(8) and/or blkid(8) for more info
#
/dev/mapper/ol-root     /                       xfs     defaults        1 1
UUID=c87d39c6-3145-49c5-b5b2-9b2a5e4b954a /boot                   xfs     defaul
ts        1 2
/dev/mapper/ol-swap     swap                    swap    defaults        0 0
/additional-swap        swap                    swap    defaults        0 0
LABEL=/home             /home                   ext4    defaults        1 2
~
~
~
~
~
~
~
~
~
                                                              1,0-1         All
```

4. Mount swap area

```
# mount -a
```

5. Enable swap area

```
# swapon -a
```

6. Check the number swap space mounted on your system

```
# swapon -s
```

7. Check available swap space on the system

```
# free -h
```

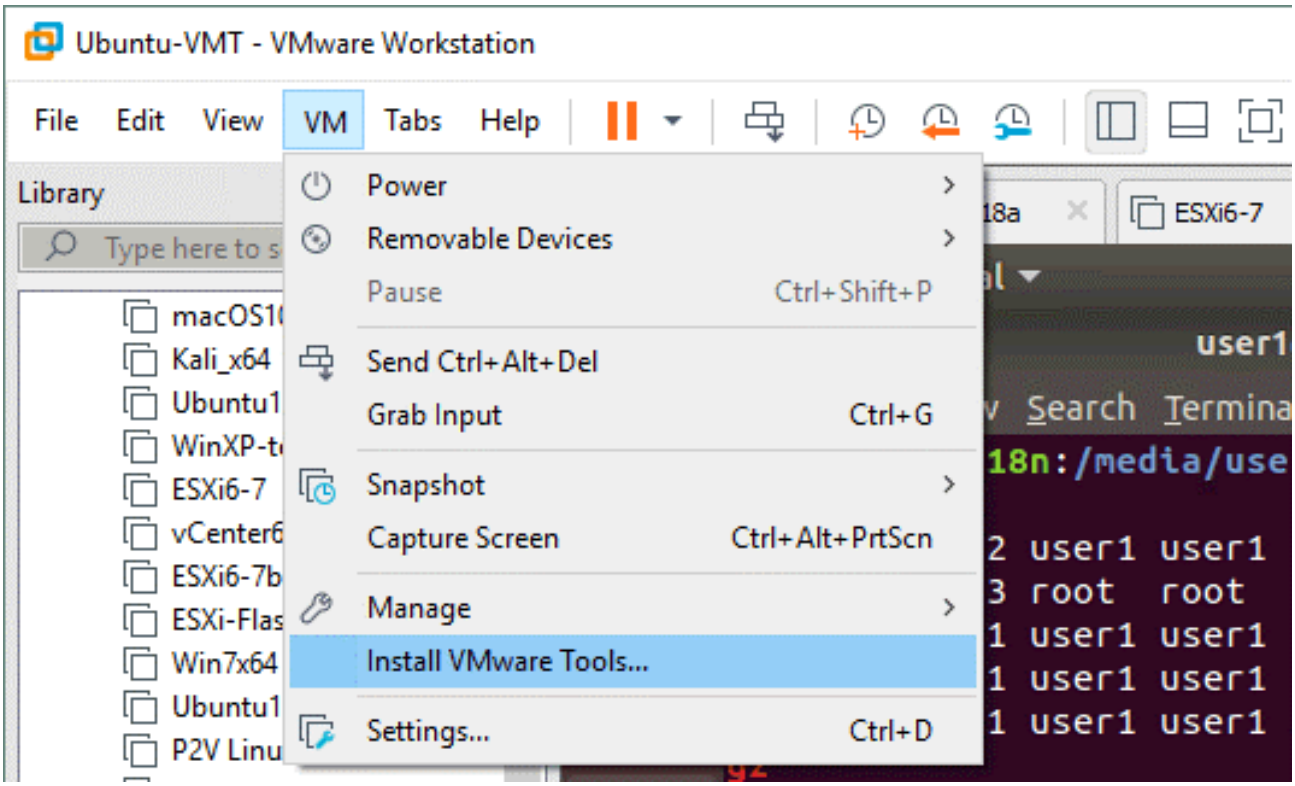
```
[root@ytm-1 ~]# chmod 600 /additional-swap
[root@ytm-1 ~]# vim /etc/fstab
[root@ytm-1 ~]#
[root@ytm-1 ~]#
[root@ytm-1 ~]# mount -a
[root@ytm-1 ~]# swapon -a
[root@ytm-1 ~]# swapon -s
Filename                                Type            Size    Used    Priority
/dev/dm-0                               partition       2113532 6724    -1
/additional-swap                        file    6291452 0       -2
[root@ytm-1 ~]# free -h
              total        used        free      shared  buff/cache   available
Mem:           7.8G        2.7G         54M        3.1G        5.0G        1.8G
Swap:          8.0G        6.6M        8.0G
```

22.6 Install VMware Tools

To complete this procedure, you must be logged in as "root" user.

If YTM Appliance is deployed over VMware products, it is advised to install VMware tools.

1. Power on the virtual machine
2. Choose "VM" and "Install VMware tools" in VMware software. The guest operating system mounts the VMware Tools Installation virtual CD.
3. As root (su -), copy the ***VMwareTool-version.tar.gz*** file into the "/tmp" directory.
   `cp /run/media/root/VMware\ Tools/VMwareTools-version.tar.gz /tmp`
4. Untar the VMware Tools tar file:
   `tar –xvzf /tmpVMwareTools-version.tar.gz`
5. Run the VMware Tools tar installer:
   `cd /tmp/vmware-tool-distrib`
   `./vmware-install.pl`
6. Respond to the configuration questions on the screen. Press Enter to accept the default value.

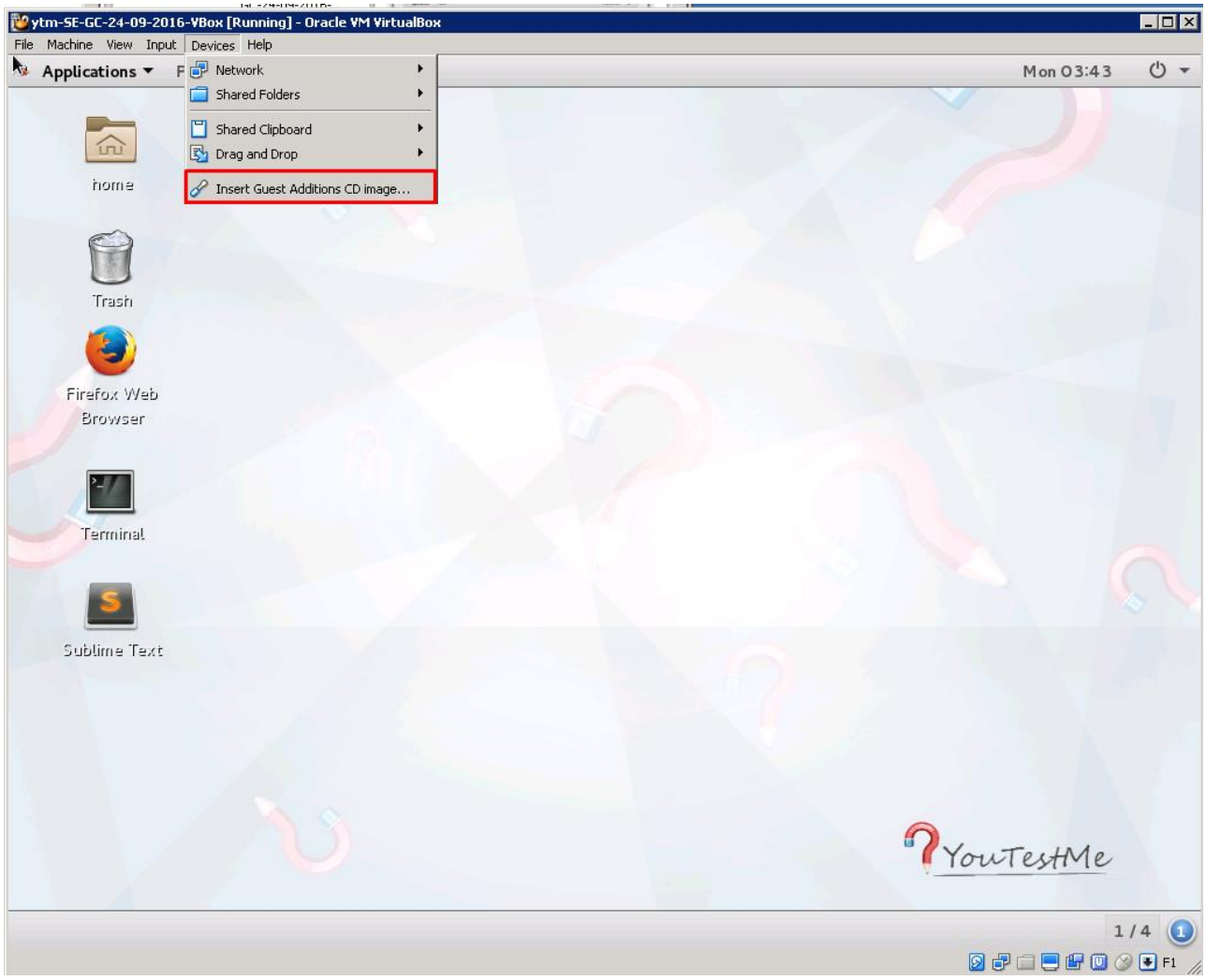


22.7 Install VirtualBox Guest Additions

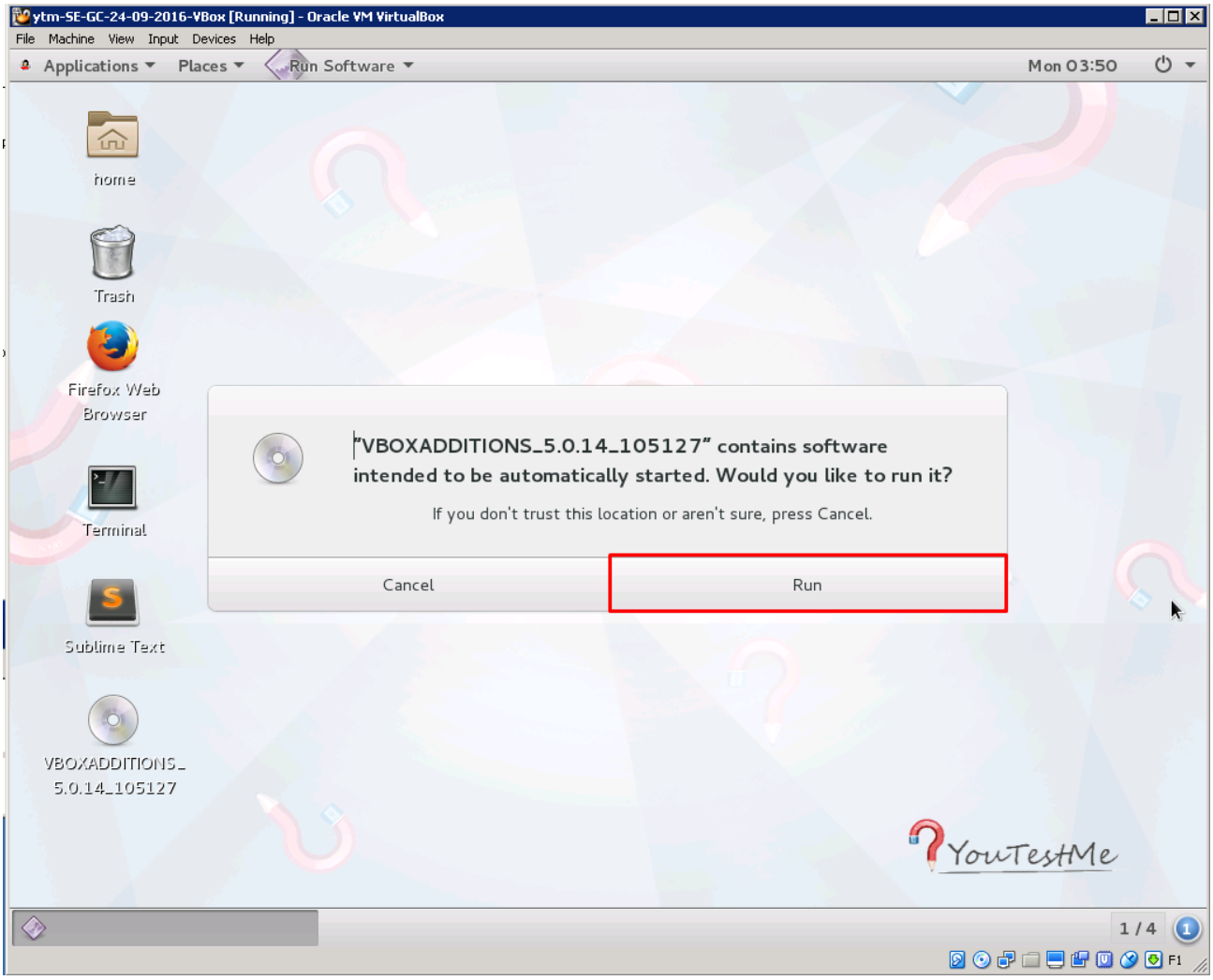
To complete this procedure, you must be logged in as "root" user.

If YTM Appliance is deployed using VirtualBox Hypervisor, it is advised to install Guest Additions.

1. Power on the virtual machine
2. In VirtualBox, choose "Devices" and "Insert Guest Additions CD image."

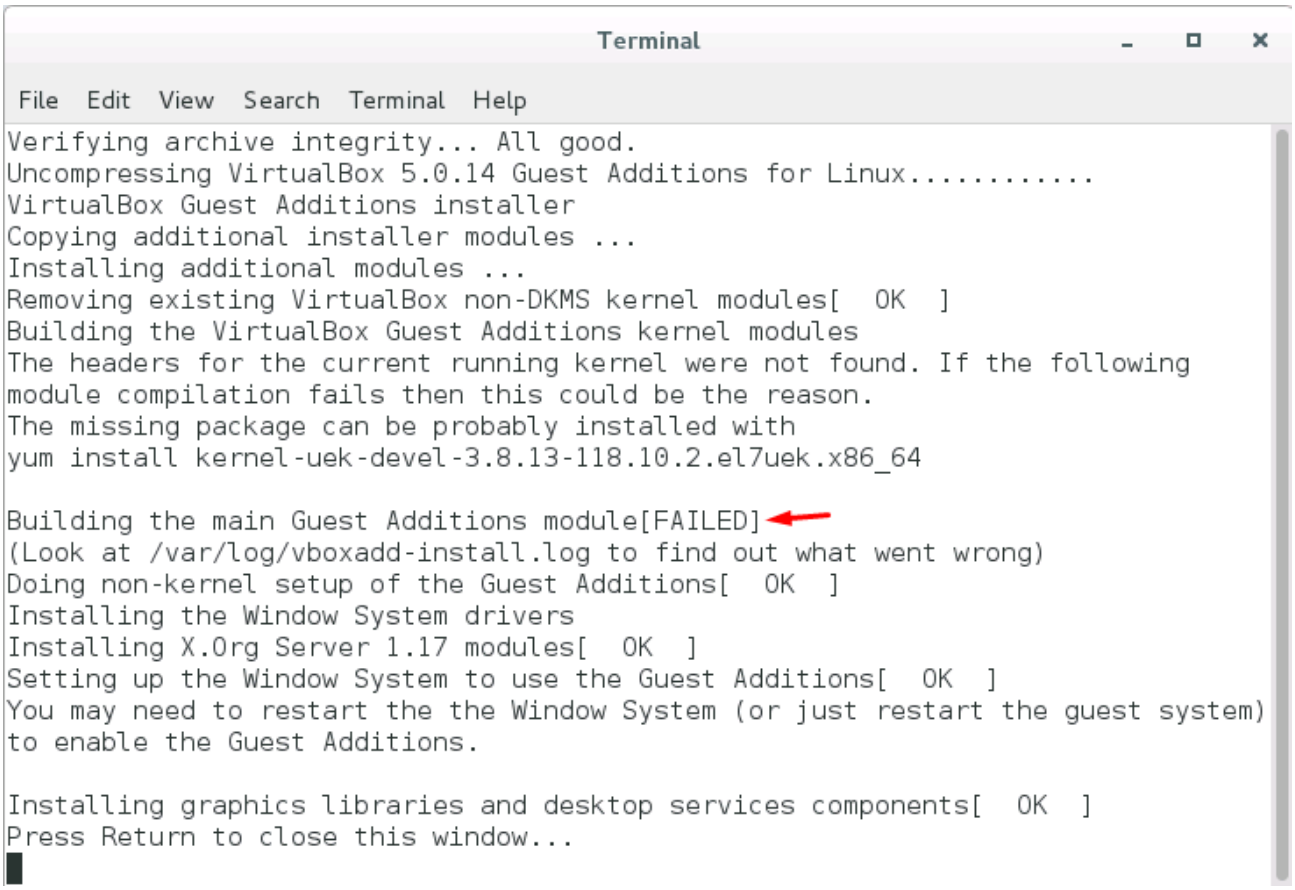


3. When the pop-up window appears, choose "Run":



4. Click Run to start the Guest Additions installation
5. If the "Guest Additions" main module installation fails, run the following command and retry the process:

```
yum install kernel-uek-devel-$(uname -r) -y
```

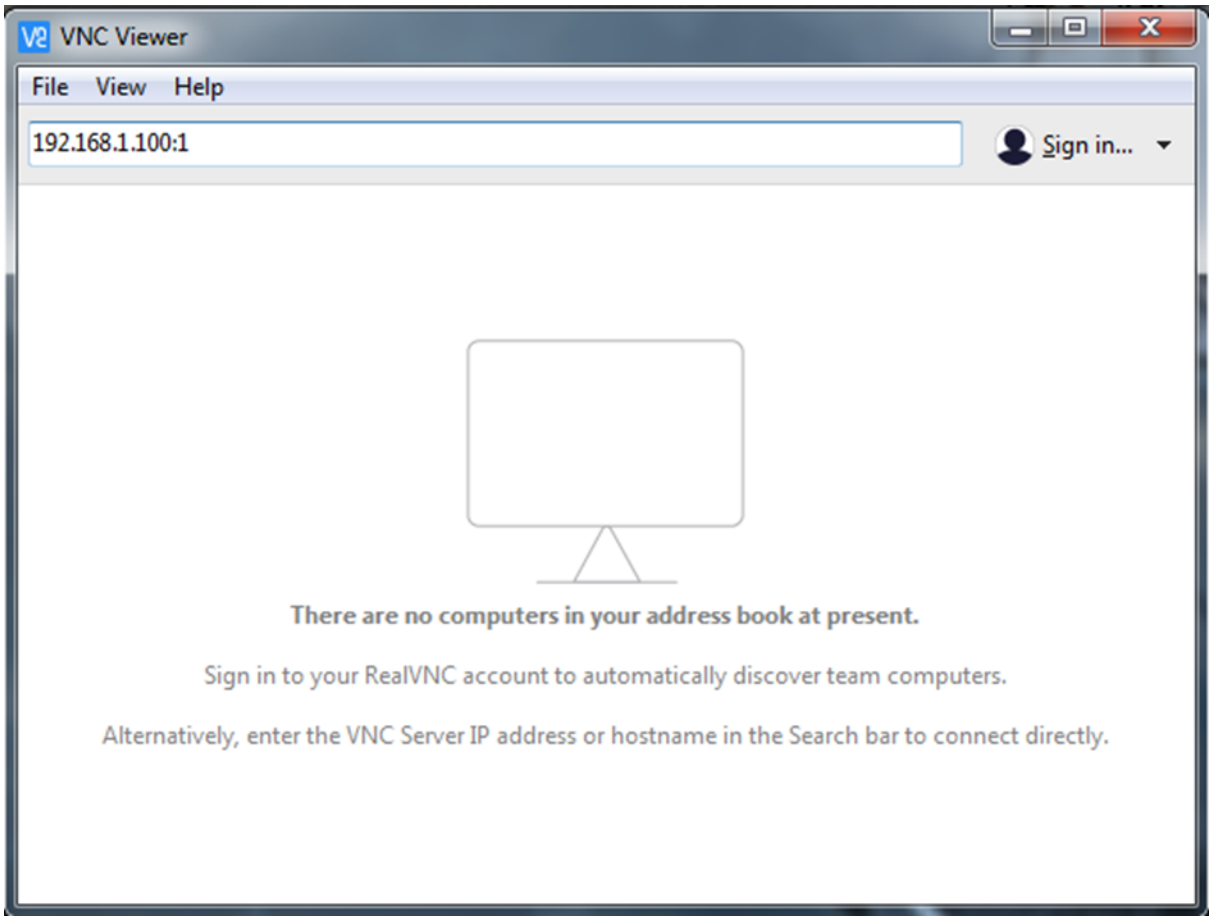


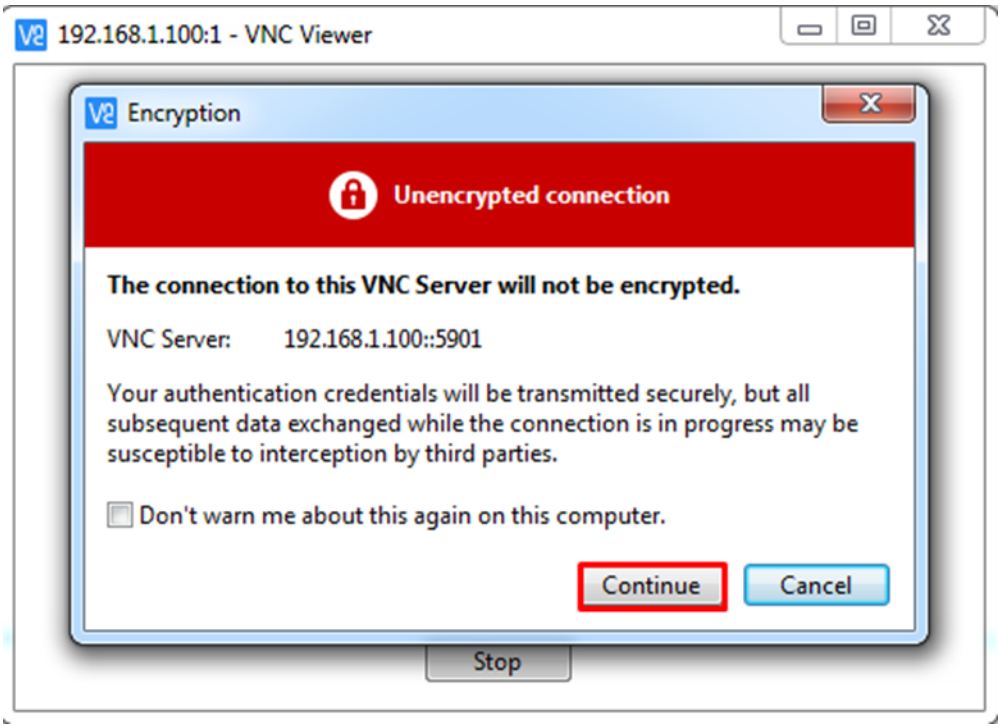
22.8 Remote Desktop Access

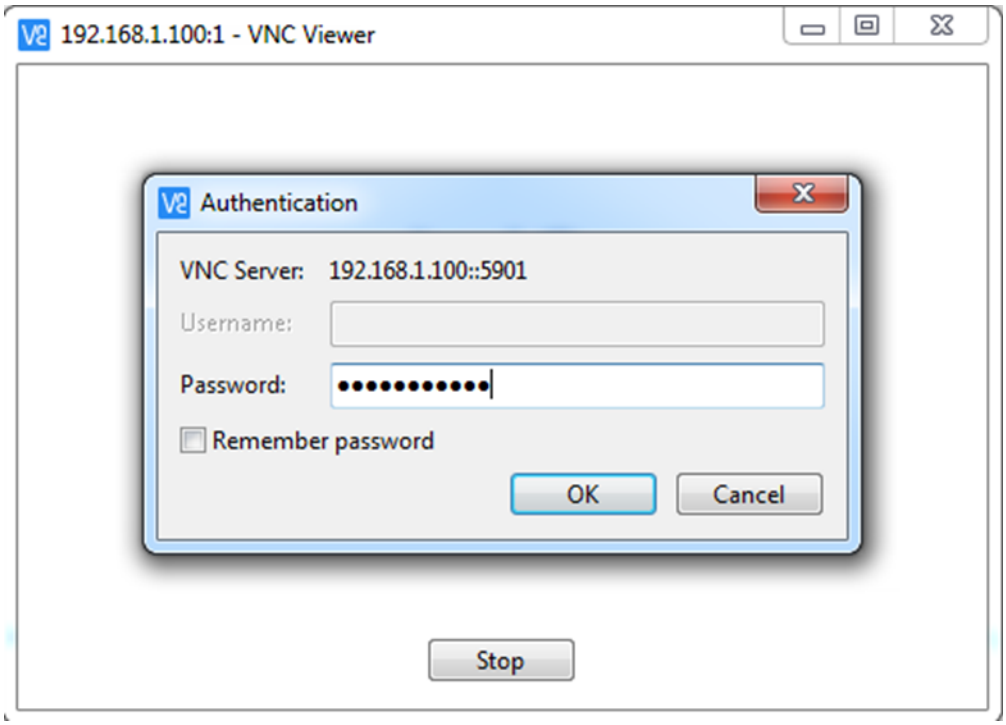
Install VNC Viewer for remote access to VM's desktop:
https://www.realvnc.com/en/connect/download/viewer/

Open VNC Viewer, type the Virtual Machine's IP address, and append "**:1**".

The VNC password can be found in the VM's description.


VNC Viewer
File View Help
192.168.1.100:1
Sign in...
There are no computers in your address book at present.
Sign in to your RealVNC account to automatically discover team computers.
Alternatively, enter the VNC Server IP address or hostname in the Search bar to connect directly.


192.168.1.100:1 - VNC Viewer
Encryption
Unencrypted connection
The connection to this VNC Server will not be encrypted.
VNC Server: 192.168.1.100::5901
Your authentication credentials will be transmitted securely, but all subsequent data exchanged while the connection is in progress may be susceptible to interception by third parties.
Don't warn me about this again on this computer.
Continue
Cancel
Stop



22.9 Upgrading CentOS Linux Operating System

To install the latest patches to your operating system, log in as "root" and execute:

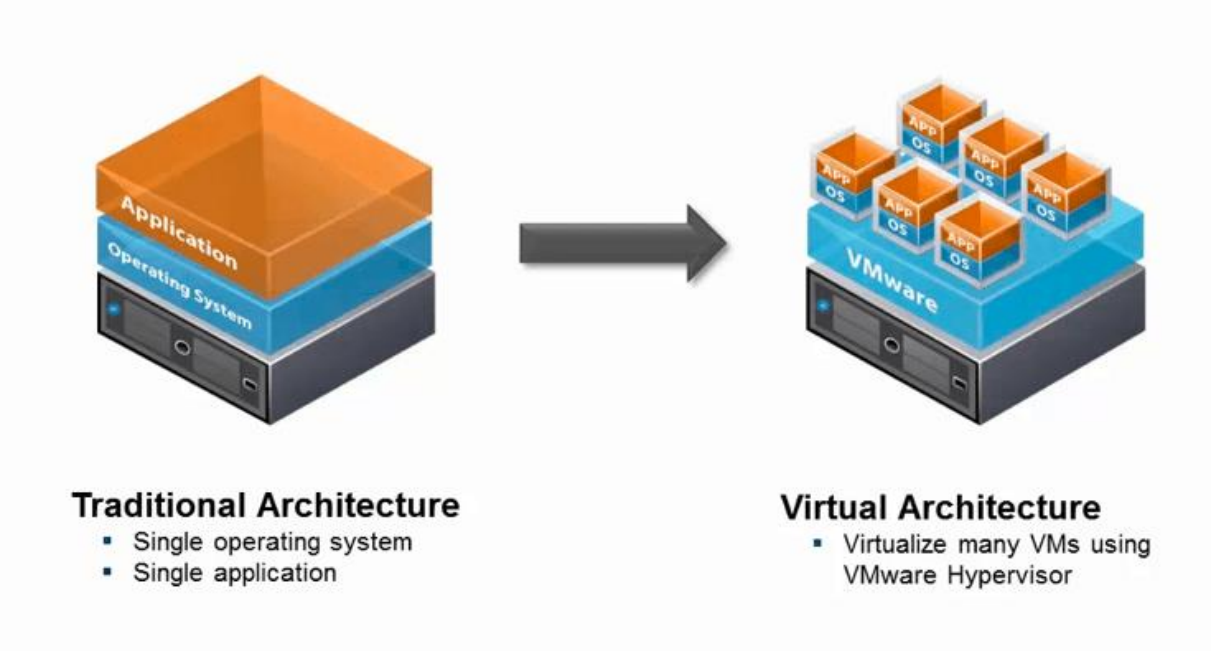
```
$ yum -y update
```

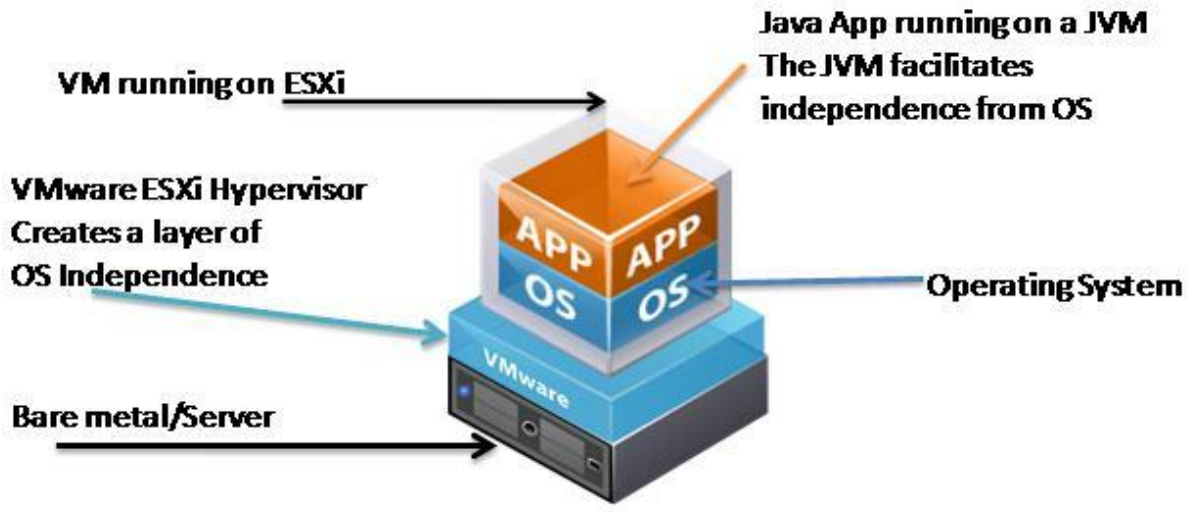
More information about using "yum": yum info

23 Appendix "A" - Virtual Machine Explained

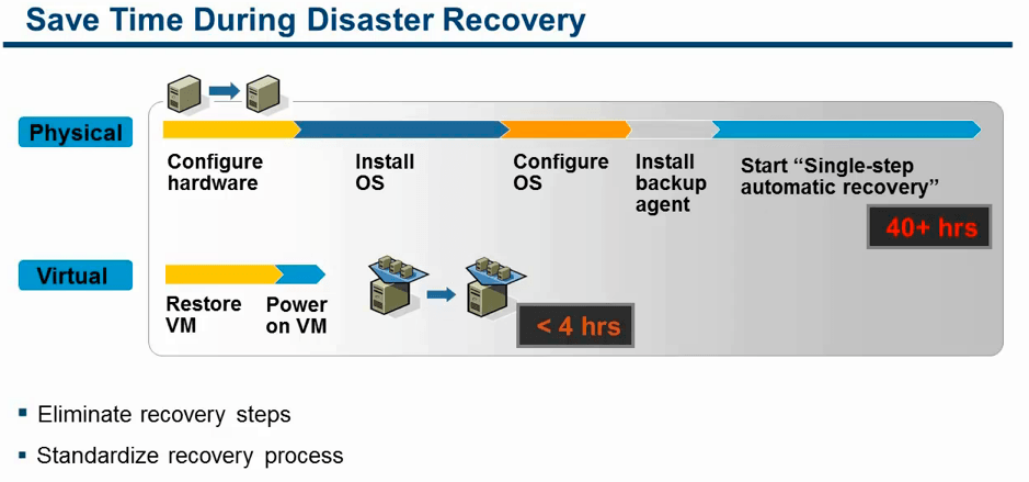
There are many advantages of using the concept of Virtual Machines:

1. Very complex computer systems are packaged in pre-configured in one VM and hence very easy to install
2. The virtual machine is independent of the underlying operating system
3. It is easy to assign additional virtual memory or virtual disk space to Virtual Machine
4. Backup and restore of the entire system is straightforward
5. Moving a Virtual Machine from one server to another is fast and convenient



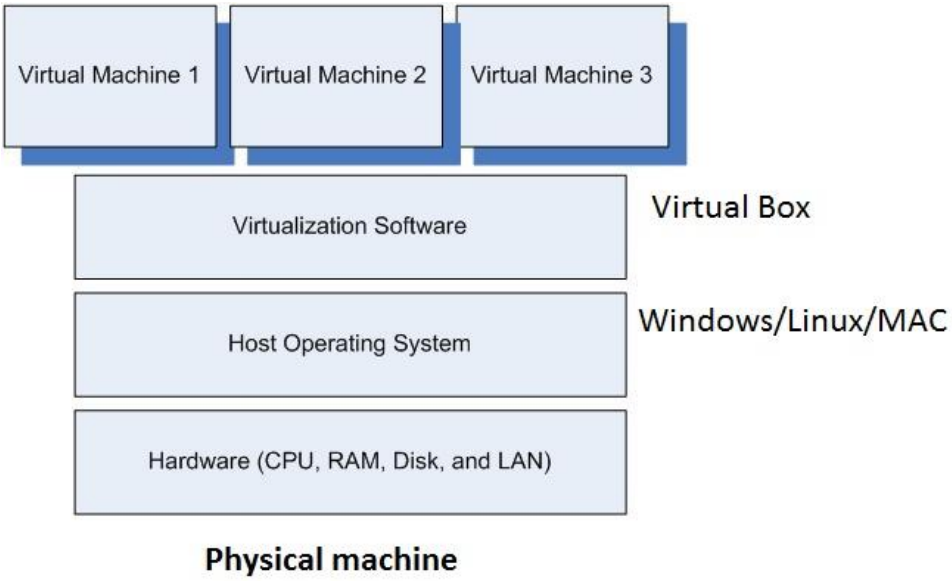


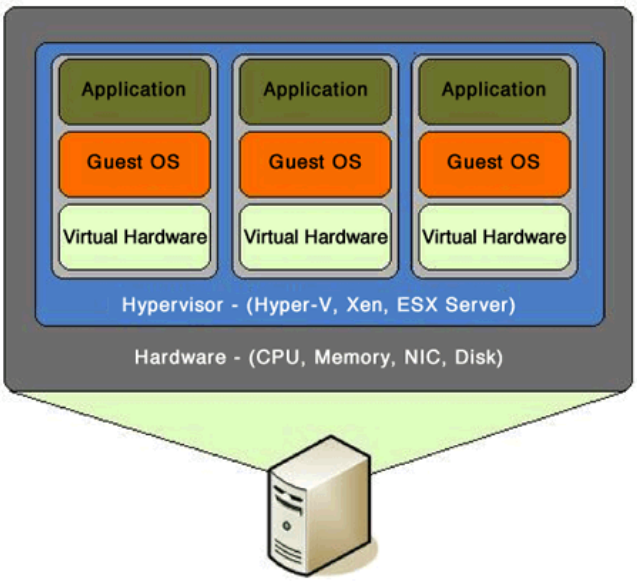
24 VM Advantages



25 VM Concepts

25.1 Physical Server with Operation System



25.2 "Bare Metal" Physical Servers

"Bare Metal" Physical Servers do not have an underlying Operating System. Instead, hypervisor software is installed directly on the hardware platform.