



Sharif University of Technology
Department of Computer Engineering

Operating Systems

Installing Ubuntu Server on VMware virtual machine

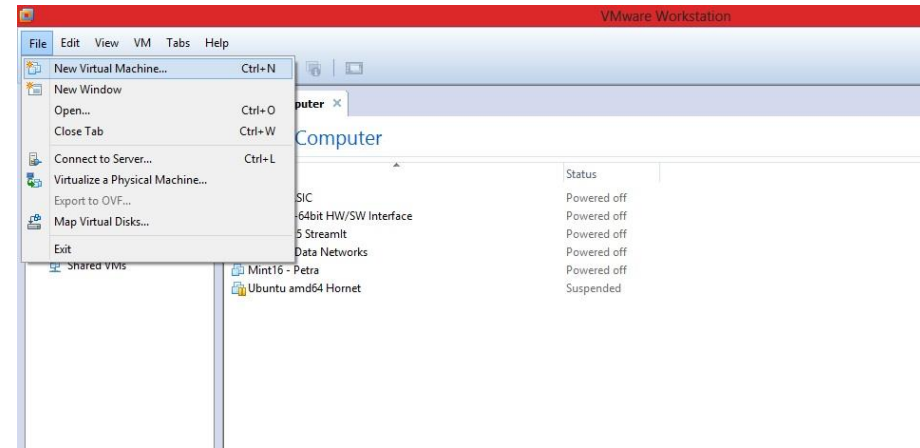
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CE424

Fall 2022

Creating Virtual Machine

- You can use any Virtual Machine Software (such as VMware Workstation, VirtualBox, Parallel Desktop, ...)
- In order to install Ubuntu Server on VMware Workstation, first we should create a virtual machine
- To create virtual machine , open VMware Workstation and click on the File
- In this menu you will find option “New Virtual Machine...” which you need to click on



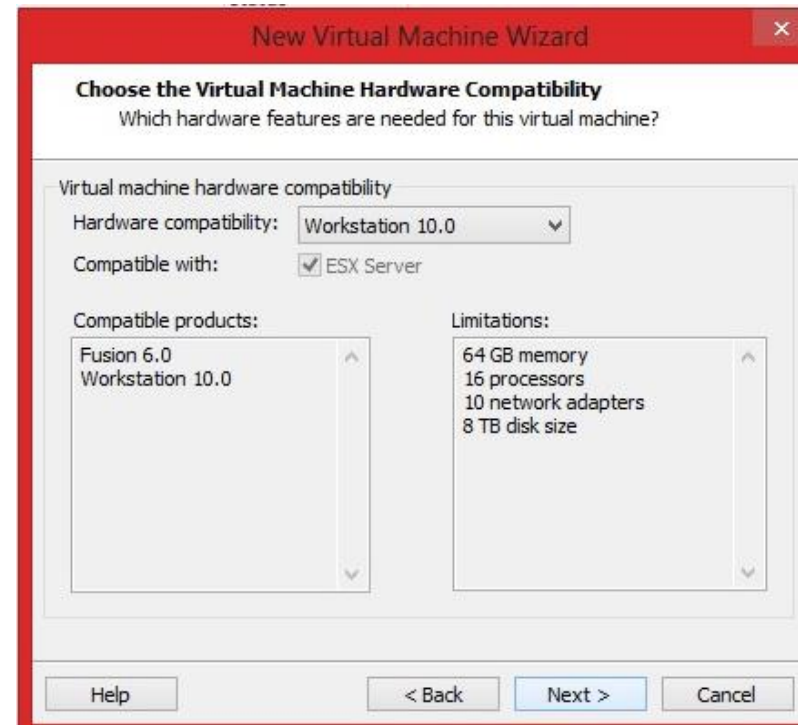
Creating Virtual Machine

- After clicking on “New Virtual Machine...” menu, VMware will ask you if you want “typical” configuration or “custom” one
- To prevent VMware from installing Ubuntu automatically you should select “Custom”



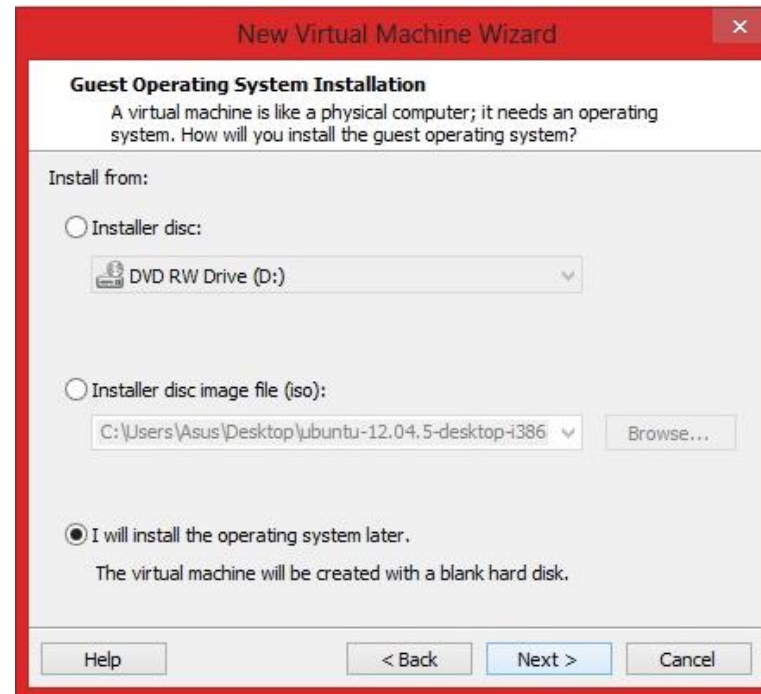
Creating Virtual Machine

- After choosing configuration, VMware will ask about “Hardware Compatibility”
- Just click on “Next”



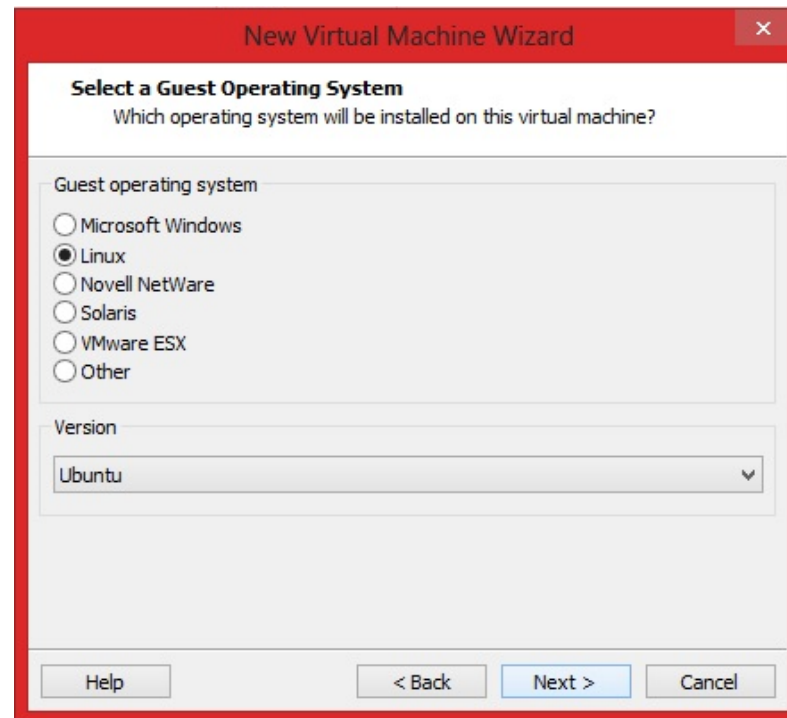
Creating Virtual Machine

- Next you need to choose , how would you like to install “Guest Operating System”
- Again, to get rid of VMware automatic installation, select “I will install the operating system later”



Creating Virtual Machine

- Next you need to select “Guest Operating System”
- Since we are installing 32-bit Ubuntu Server, choose “Linux” in upper part and “Ubuntu” in bottom part of window and click “Next”



Creating Virtual Machine

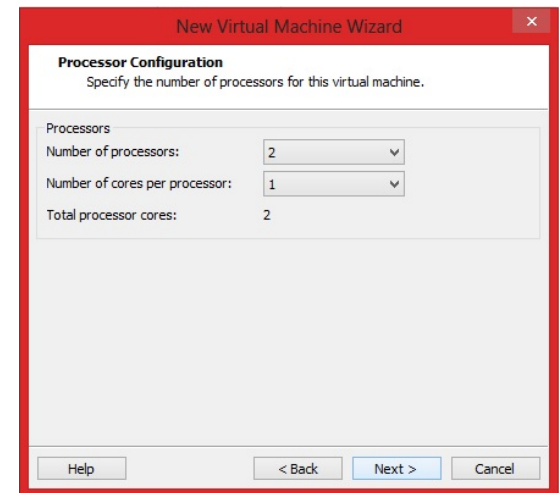
- Name your virtual machine in this window and click on “Next”
- Specify the VM location, wherever you have enough (about 30GB) free space



The screenshot shows a Windows-style dialog box titled "New Virtual Machine Wizard" with a red header bar. The main content area is titled "Name the Virtual Machine" and asks "What name would you like to use for this virtual machine?". There are two input fields: "Virtual machine name:" with the text "OS Ubuntu Server" and "Location:" with the text "C:\Users\Asus\Documents\Virtual Machines\OS Ubuntu Server". A "Browse..." button is next to the location field. Below the location field, it says "The default location can be changed at Edit > Preferences." At the bottom, there are three buttons: "< Back", "Next >" (highlighted with a blue border), and "Cancel".

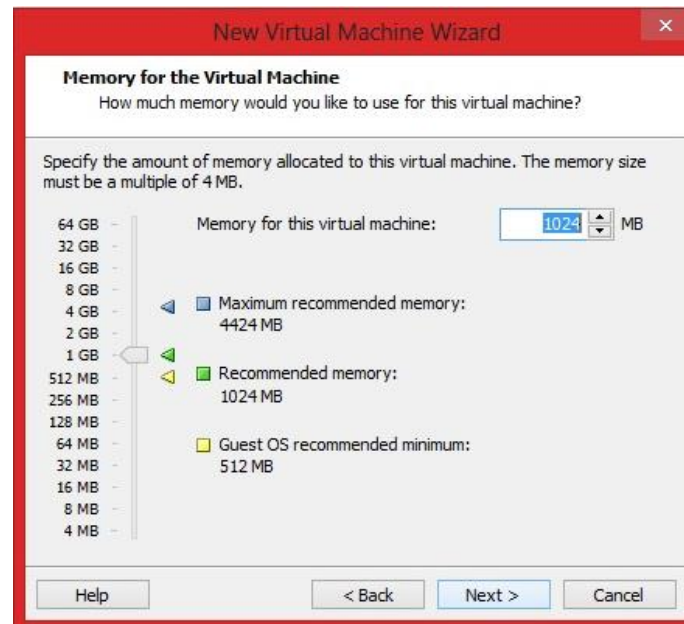
Creating Virtual Machine

- Specify “number of processors” and “number of cores per processor” of your virtual machine in this window based on your machine configuration
- Having more number of cores allocated to VM will speed up kernel compilation process
- If your CPU supports Hyper Threading (as most Intel processors does) you may set “number of cores per processor” to 2



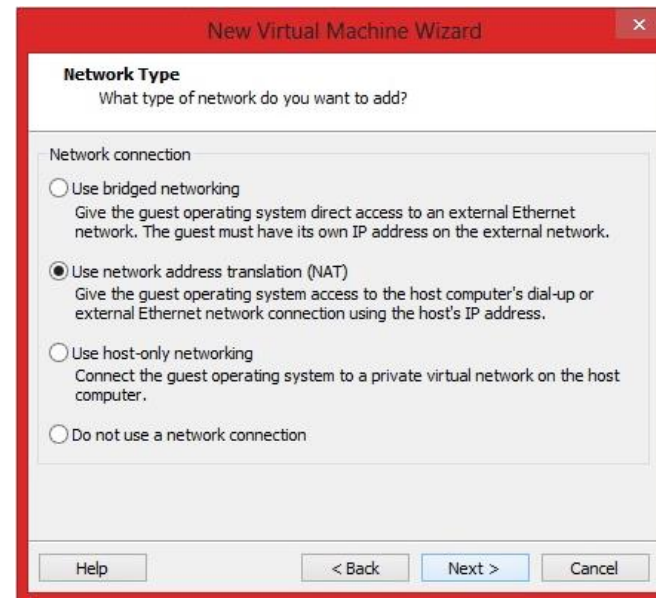
Creating Virtual Machine

- Determine how much memory you want to allocate to your VM in this window
- 1024MB of memory is quite enough for kernel compilation



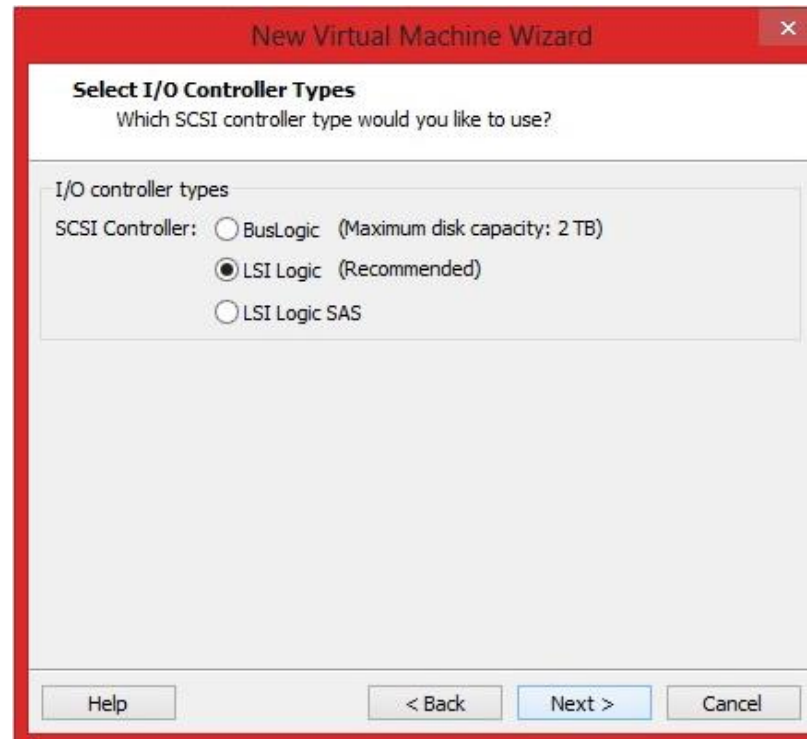
Creating Virtual Machine

- Select the type of network you would like to use in your VM
- For ordinary purposes, such as connecting to Internet from VM and connecting to VM from host using SSH and sFTP, Network Address Translator (NAT) works well



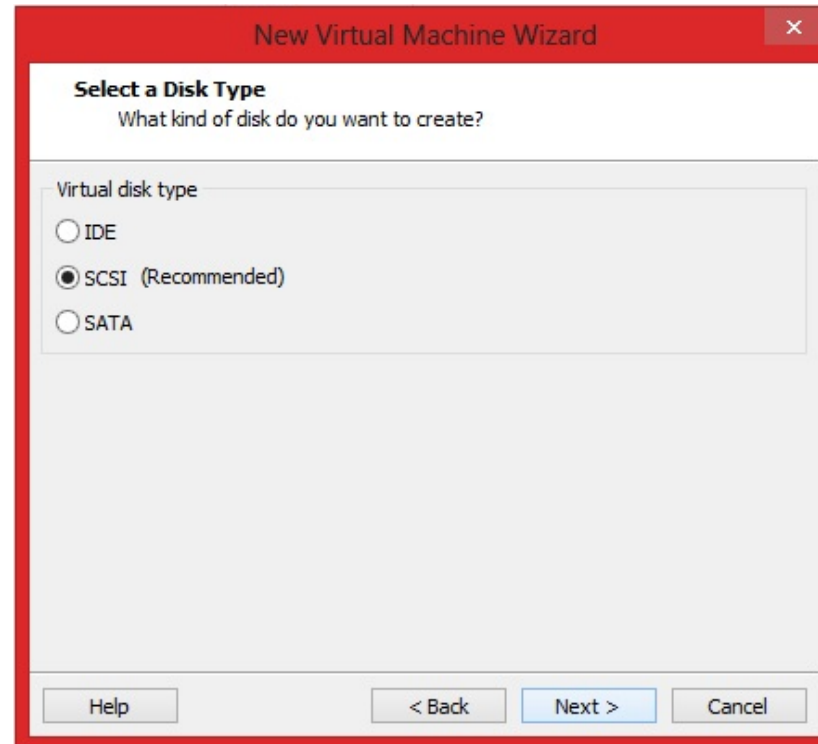
Creating Virtual Machine

- Choose type of I/O controller for your VM
- Select recommended option (LSI Logic) and click on “Next”



Creating Virtual Machine

- Choose type of your virtual disk
- Select recommended option (SCSI) and click on “Next”



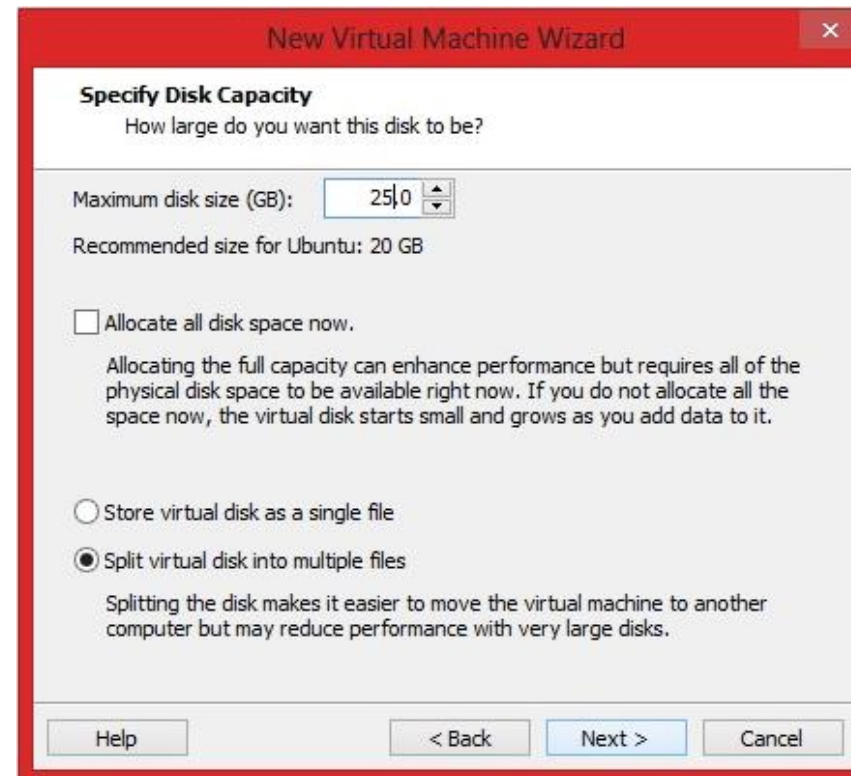
Creating Virtual Machine

- You need to select the disk you want to use
- Select “Create a new virtual disk” and click on “Next”



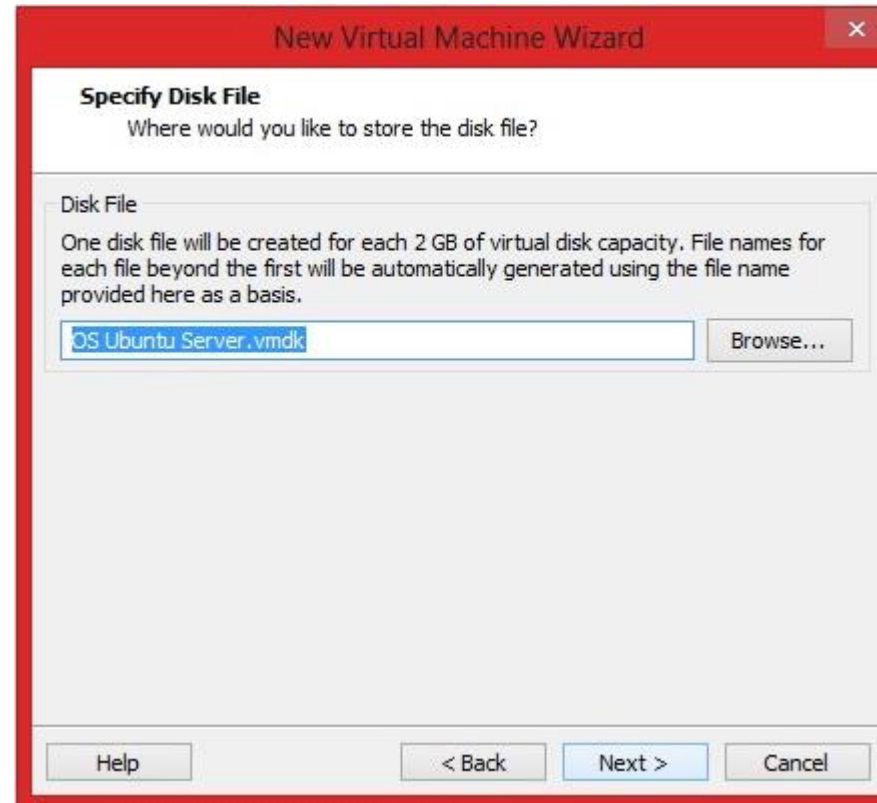
Creating Virtual Machine

- Next you will specify disk capacity
- It is best to choose “25.0” GB for kernel compilation and leave other options unchanged



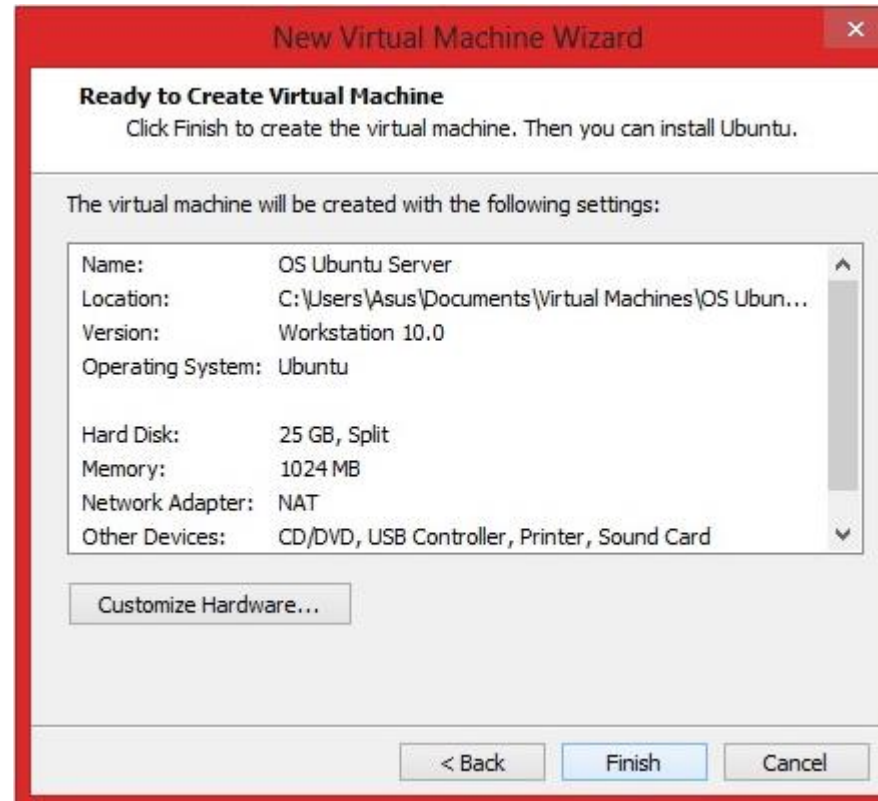
Creating Virtual Machine

- Browse to the path you would like your virtual disk to be stored and specify its name



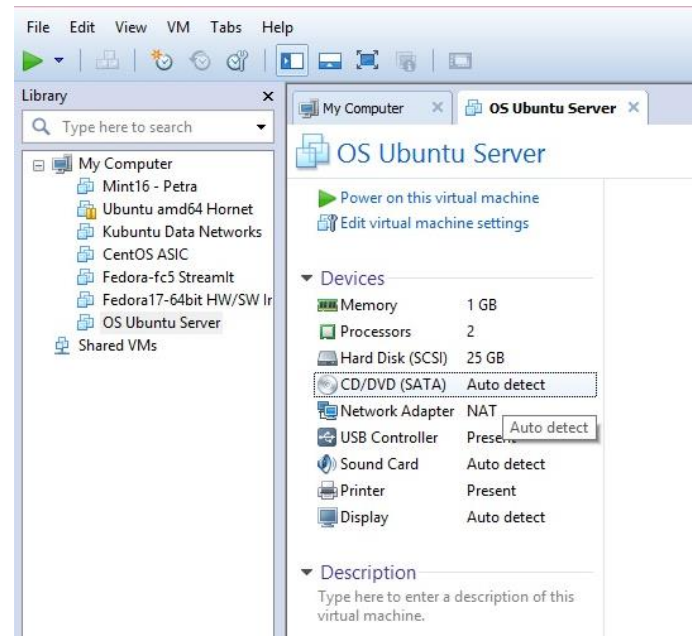
Creating Virtual Machine

- Click on “Finish” to create virtual machine



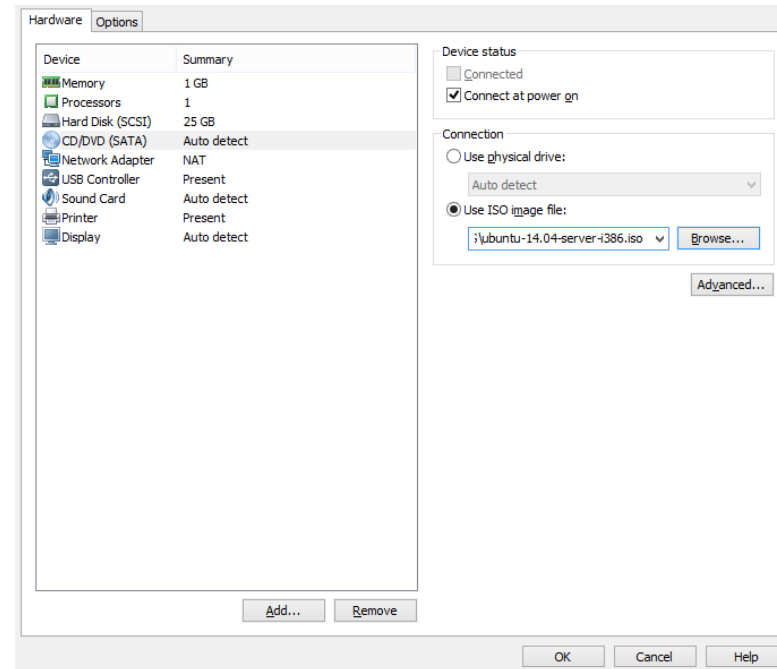
Installing Ubuntu Server

- To install guest operating system, first you need to insert Ubuntu Server Installation Image in VM's CDRom
- To do so, click on “CD/DVD”



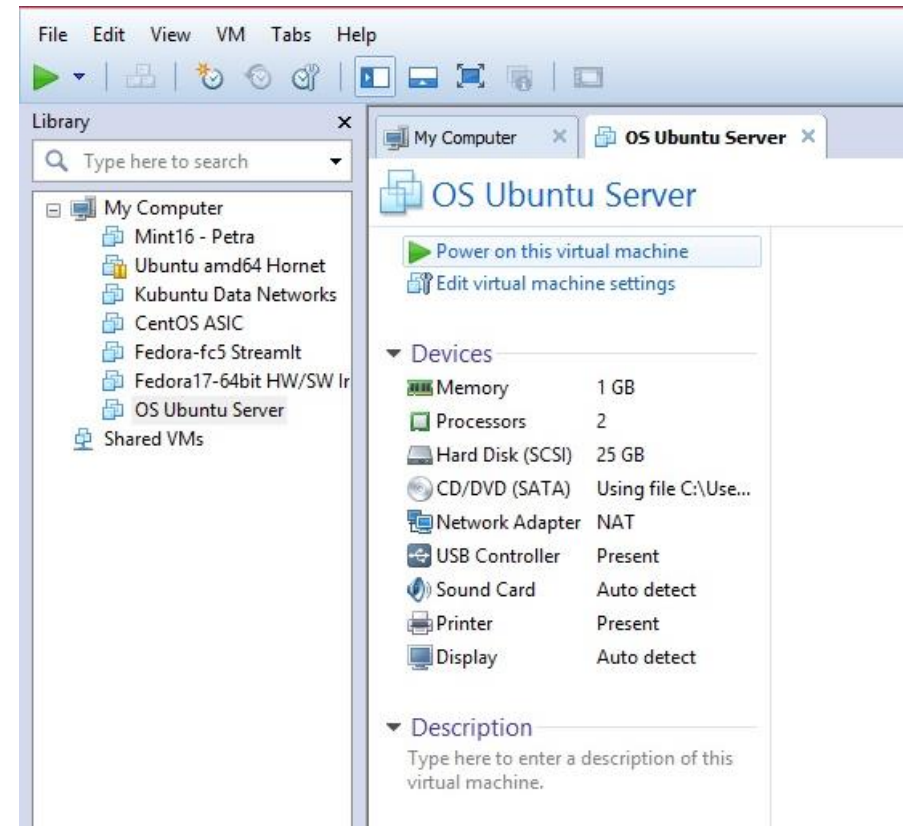
Installing Ubuntu Server

- Here you need to select option “Use ISO image file” and browse to .iso file
- Make sure “Connected at power on” is enabled
- Once done, click on “OK”



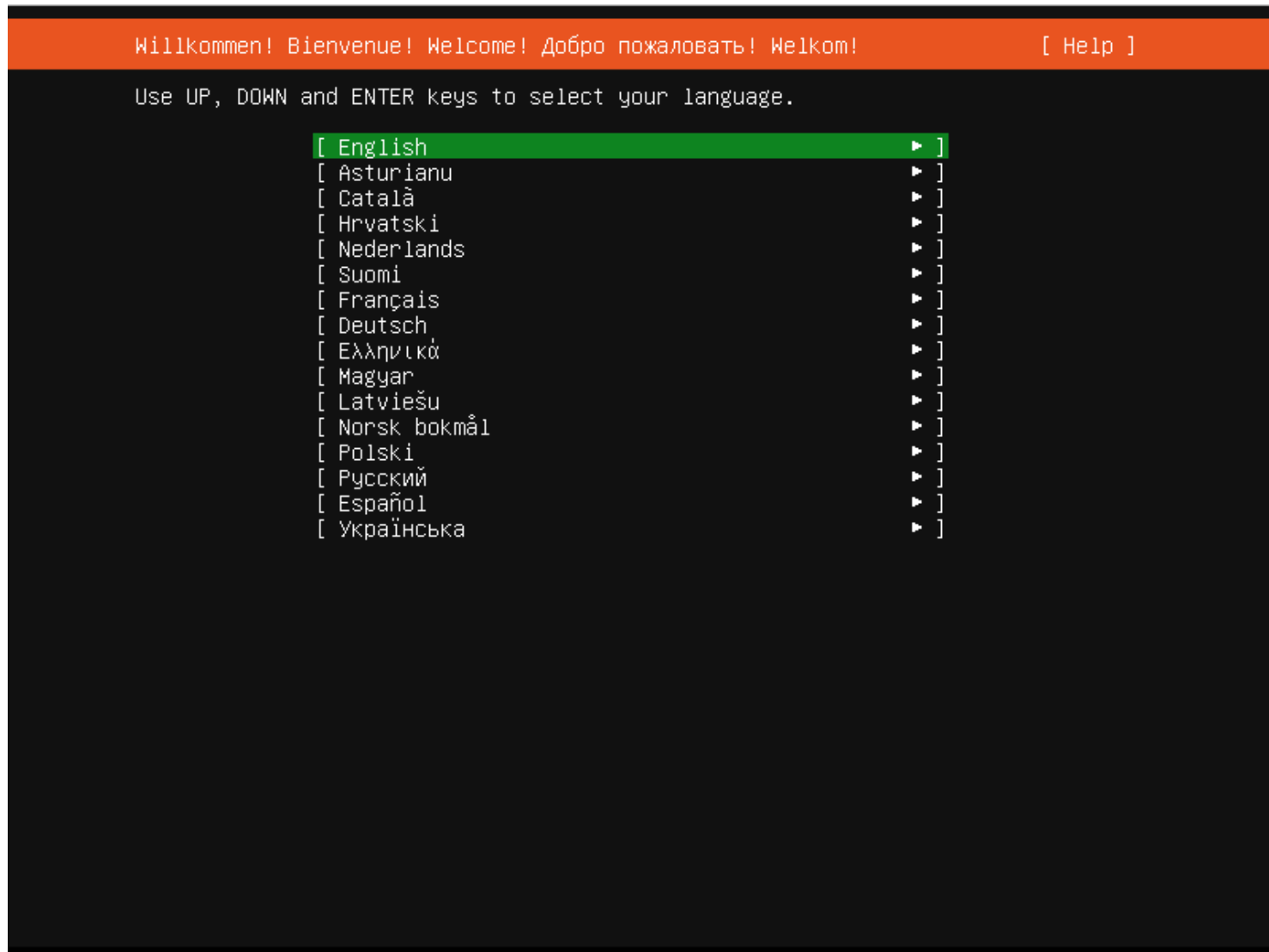
Installing Ubuntu Server

- Now your VM is ready to be started
- Click on “Power on this virtual machine”



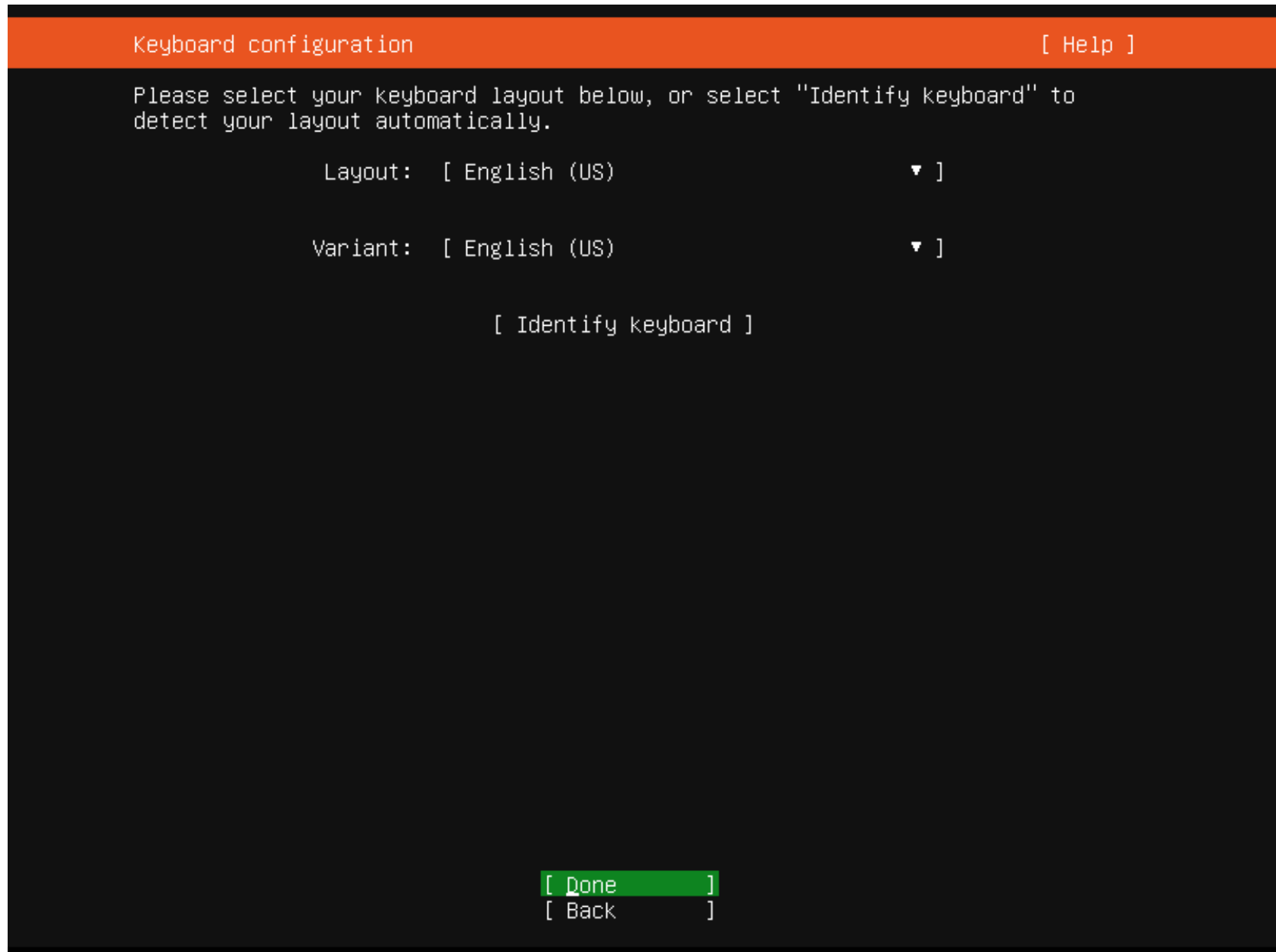
Installing Ubuntu Server(Language)

Once the system has booted, you will land on the installer welcome interface shown in the following screenshot asking you to select the installation language. Press **Enter** to continue.



Installing Ubuntu Server(Keyboard)

Next, select your **keyboard** layout and press **Enter** to proceed.



The screenshot shows the 'Keyboard configuration' screen from the Ubuntu Server installer. The title bar is orange with 'Keyboard configuration' on the left and '[Help]' on the right. The main area has a dark background with white text. It prompts the user to select a keyboard layout or choose 'Identify keyboard' for automatic detection. Two dropdown menus are shown: 'Layout: [English (US) ▼]' and 'Variant: [English (US) ▼]'. Below them is the option '[Identify keyboard]'. At the bottom, there are two highlighted options: '[Done]' (with a green background) and '[Back]'.

```
Keyboard configuration [ Help ]

Please select your keyboard layout below, or select "Identify keyboard" to
detect your layout automatically.

Layout:  [ English (US) ▼ ]

Variant: [ English (US) ▼ ]

[ Identify keyboard ]

[ Done ]
[ Back ]
```

Installing Ubuntu Server(Network)

If your system is connected to a network, it should receive an IP address from your DHCP server. Press **Done** to continue.

```
Network connections [ Help ]

Configure at least one interface this server can use to talk to other machines,
and which preferably provides sufficient access for updates.

NAME      TYPE  NOTES
[ enp0s3  eth   -           ▶ ]
  DHCPv4  10.42.0.249/24
    08:00:27:90:63:46 / Intel Corporation / 82540EM Gigabit Ethernet Controller
    (PRO/1000 MT Desktop Adapter)

[ Create bond ▶ ]

[ Done ]
[ Back ]
```

Installing Ubuntu Server(Proxy Server)

Based on your network set up, if you need a proxy server to connect to the internet, enter its details here. Otherwise, leave it empty and press **Done**.

Configure proxy

[Help]

If this system requires a proxy to connect to the internet, enter its details here.

Proxy address:

If you need to use a HTTP proxy to access the outside world, enter the proxy information here. Otherwise, leave this blank.

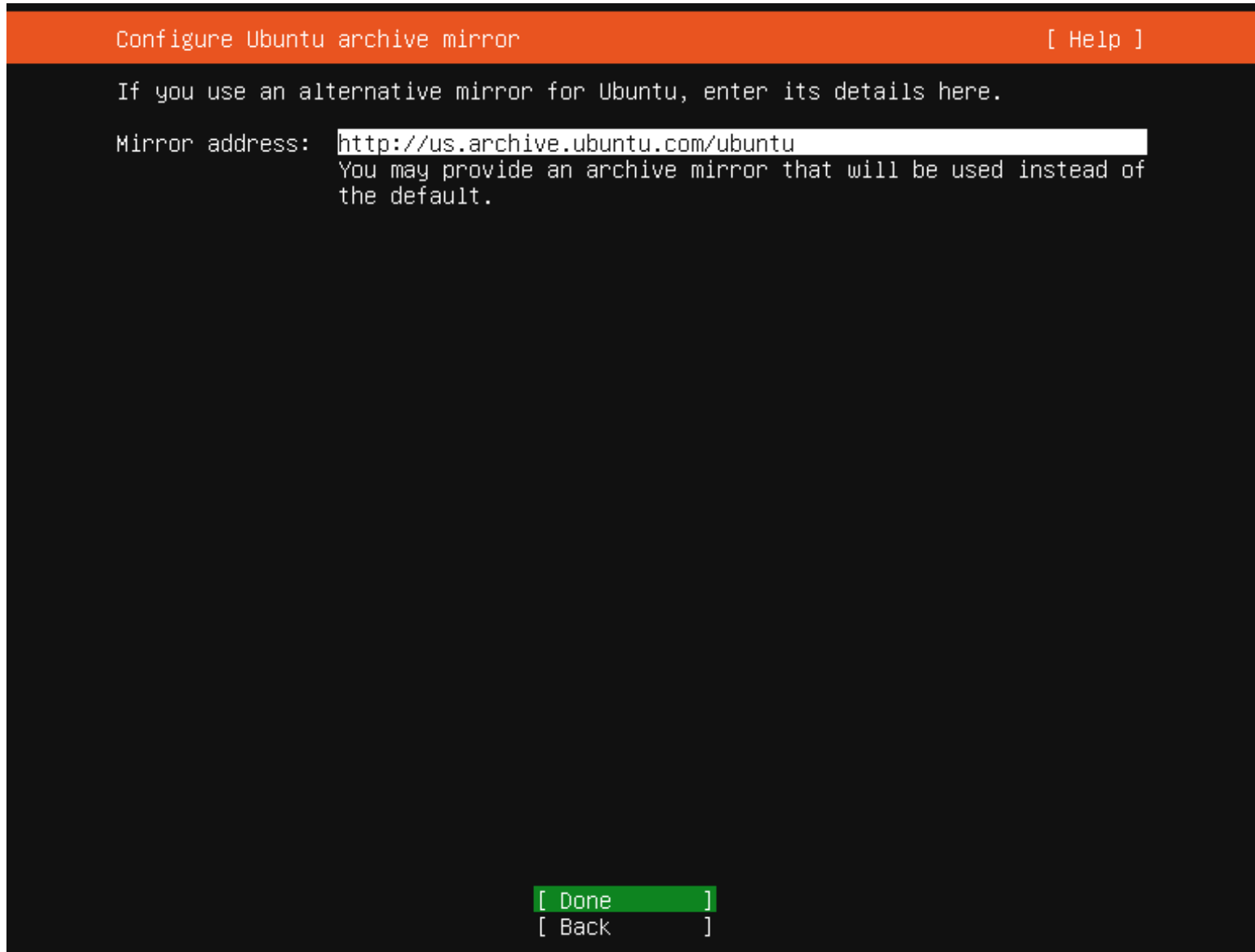
The proxy information should be given in the standard form of "http://[[user] [:pass]@]host [:port]/".

[Done]

[Back]

Installing Ubuntu Server(Archive Mirror)

Next, you need to configure the Ubuntu archive mirror. The installer will select it automatically based on your country. Press **Done** to proceed.



Configure Ubuntu archive mirror [Help]

If you use an alternative mirror for Ubuntu, enter its details here.

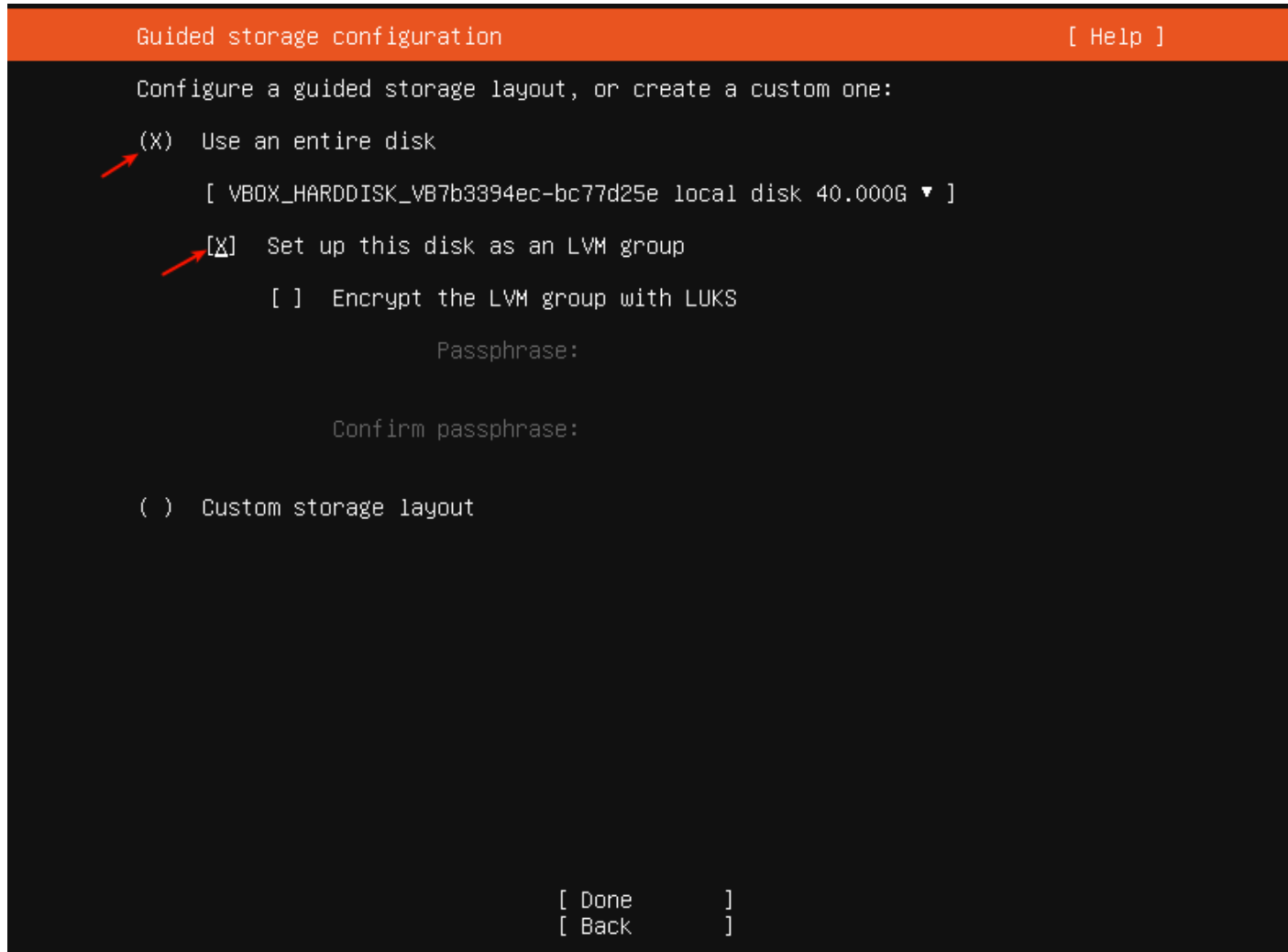
Mirror address:

You may provide an archive mirror that will be used instead of the default.

[Done]
[Back]

Installing Ubuntu Server(Disk Config)

Now its time to configure your storage. You need to create the storage layout as explained below. For this guide, we will show how to do this manually, therefore, go to **Use an entire disk** and then select check the option **Set up this disk as an LVM group**.



```
Guided storage configuration [ Help ]

Configure a guided storage layout, or create a custom one:

(X) Use an entire disk
    [ VBOX_HARDDISK_VB7b3394ec-bc77d25e local disk 40.000G ▼ ]

    [X] Set up this disk as an LVM group
        [ ] Encrypt the LVM group with LUKS
            Passphrase:
            Confirm passphrase:

( ) Custom storage layout

[ Done ]
[ Back ]
```

Installing Ubuntu Server(root partition)

Next, under **USED DEVICES**, scroll to the **root** partition and press enter to get partitioning options. Select **Edit** as shown in the following screenshot, and press **Enter**.

```
AVAILABLE DEVICES

DEVICE                                TYPE                                SIZE
[ ubuntu-vg (new)                    LVM volume group                    78.996G ▶ ]
  free space                          74.996G

[ Create software RAID (md) ▶ ]
[ Create volume group (LVM) ▶ ]

USED DEVICES

DEVICE                                TYPE                                SIZE
[ ubuntu-vg (new)                    LVM volume group                    78.996G ▶ ]
ubuntu-lv    new, to be formatted as ext4, mounted at /    4.000G ▶
[ VBOX_HARDDISK_VB86e64330-e3a7d572    local disk                        80.000G ▶ ]
  partition 1    new, bios_grub                                1.000M ▶
  partition 2    new, to be formatted as ext4, mounted at /boot    1.000G ▶
  partition 3    new, PV of LVM volume group ubuntu-vg            78.997G ▶
```

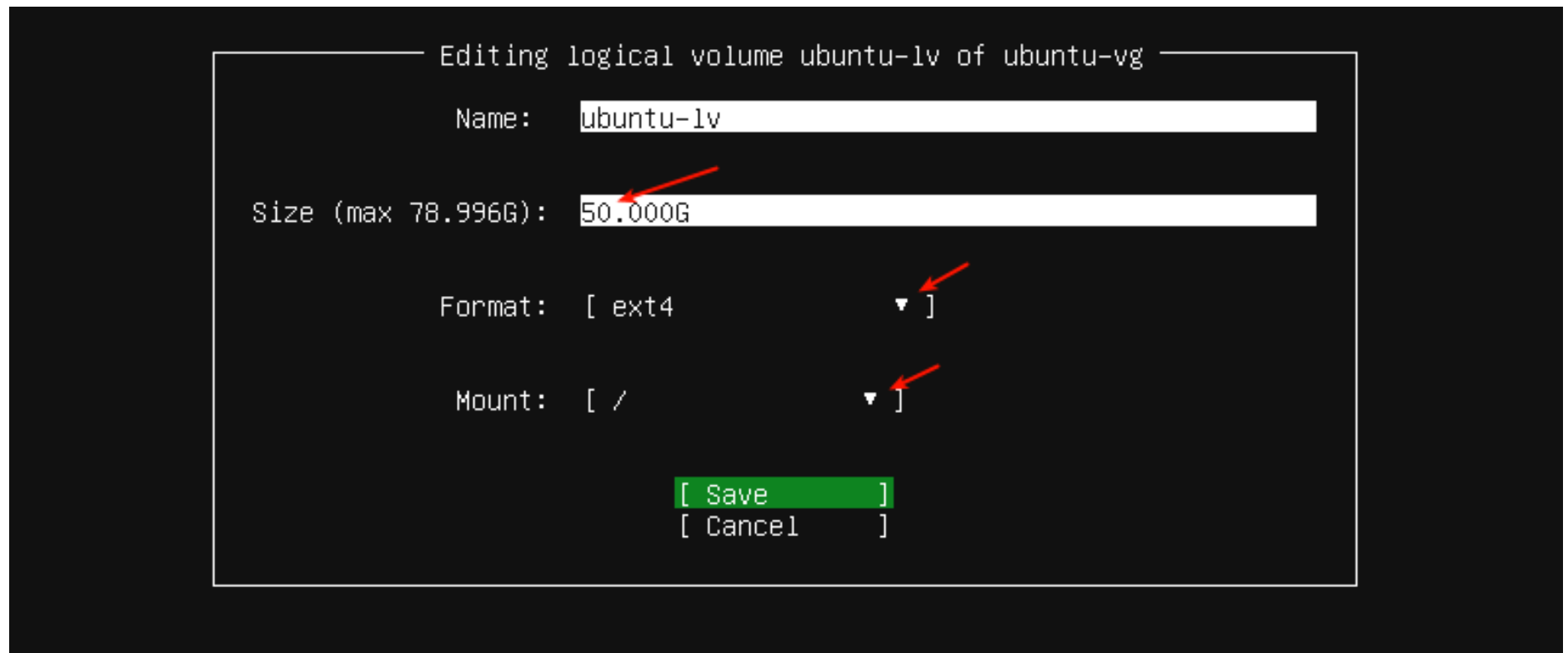
◀ (close)

Edit ▶

Delete ▶

Installing Ubuntu Server(root partition)

Then edit the partition size as shown in the following screenshot. For example, set it to **50GB** and scroll down or use tab to go to **Save** and press **Enter**.



Installing Ubuntu Server(root partition)

Now the **root** partition should have a size amounting to what you specified while editing it. Root partition is shown with “/” symbol.

FILE SYSTEM SUMMARY

MOUNT POINT	SIZE	TYPE	DEVICE TYPE
[/	50.000G	new ext4	new LVM logical volume ▶]
[/boot	1.000G	new ext4	new partition of local disk ▶]

AVAILABLE DEVICES

DEVICE	TYPE	SIZE
[ubuntu-vg (new)	LVM volume group	78.996G ▶]
free space		28.996G
[Create software RAID (md) ▶]		
[Create volume group (LVM) ▶]		

USED DEVICES

DEVICE	TYPE	SIZE
[ubuntu-vg (new)	LVM volume group	78.996G ▶]
ubuntu-lv	new, to be formatted as ext4, mounted at /	50.000G ▶
[VBOX_HARDDISK_VB86e64330-e3a7d572		
partition 1	new, bios_grub	1.000M ▶
partition 2	new, to be formatted as ext4, mounted at /boot	1.000G ▶
partition 3	new, PV of LVM volume group ubuntu-vg	78.997G ▶

Installing Ubuntu Server(home partition)

Next, you need to create a home partition for storing user files. Under **AVAILABLE DEVICES**, select the **LVM** volume group and press **Enter**. In the partitioning options, scroll down to **Create Logical Volume**.

```
FILE SYSTEM SUMMARY

MOUNT POINT      SIZE    TYPE    DEVICE TYPE
[ /              50.000G new ext4 new LVM logical volume ► ]
[ /boot         1.000G  new ext4 new partition of local disk ► ]

AVAILABLE DEVICES

DEVICE                                TYPE
[ ubuntu-vg (new)                     LVM volume group
free space

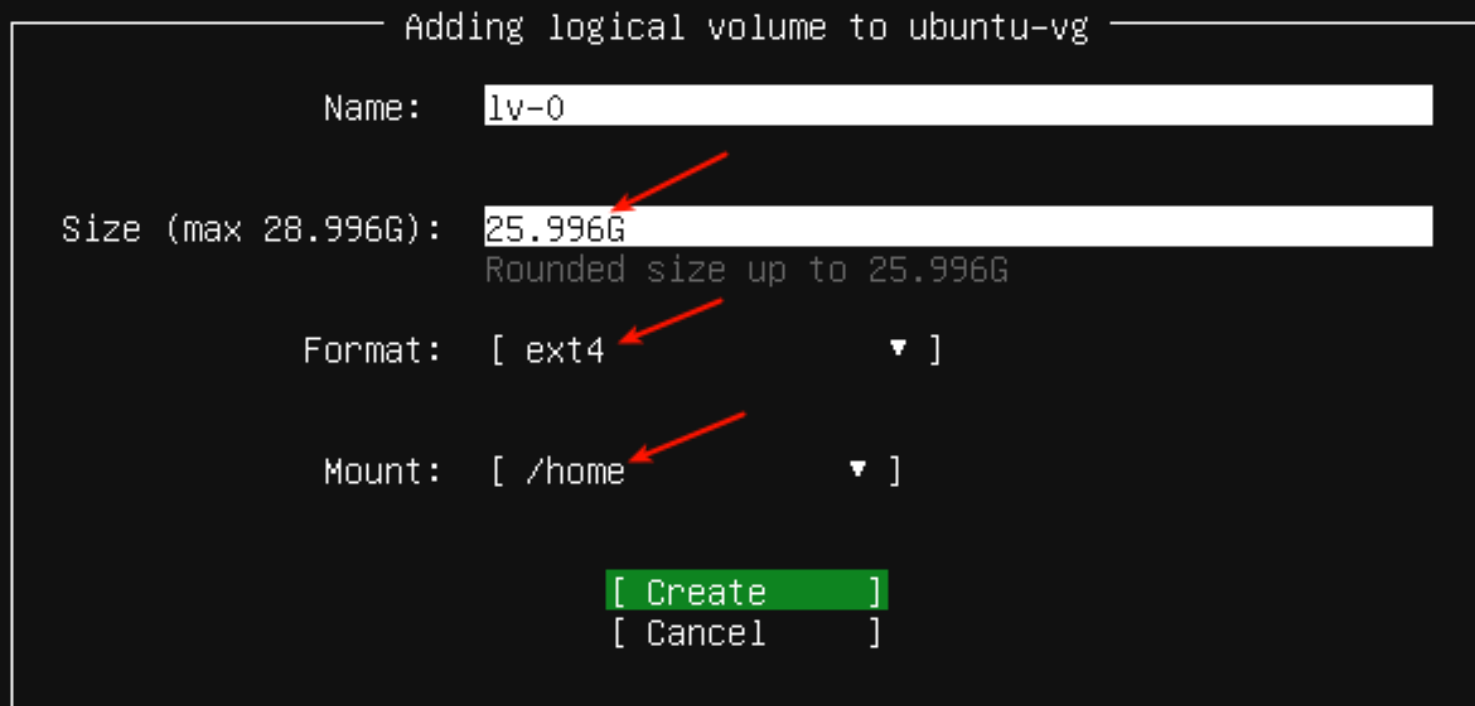
[ Create software RAID (md) ► ]
[ Create volume group (LVM) ► ]

USED DEVICES
```

```
◀ (close)
Edit *
Create Logical Volume ►
Delete * ►
```

Installing Ubuntu Server(home partition)

Next, enter the home partition size. Set it appropriately so that you leave some space for a swap partition. Under **Format**, select **ext4** and **Mount** should be /home as highlighted in the following screenshot. Then scroll down to **Create** and press **Enter**.



```

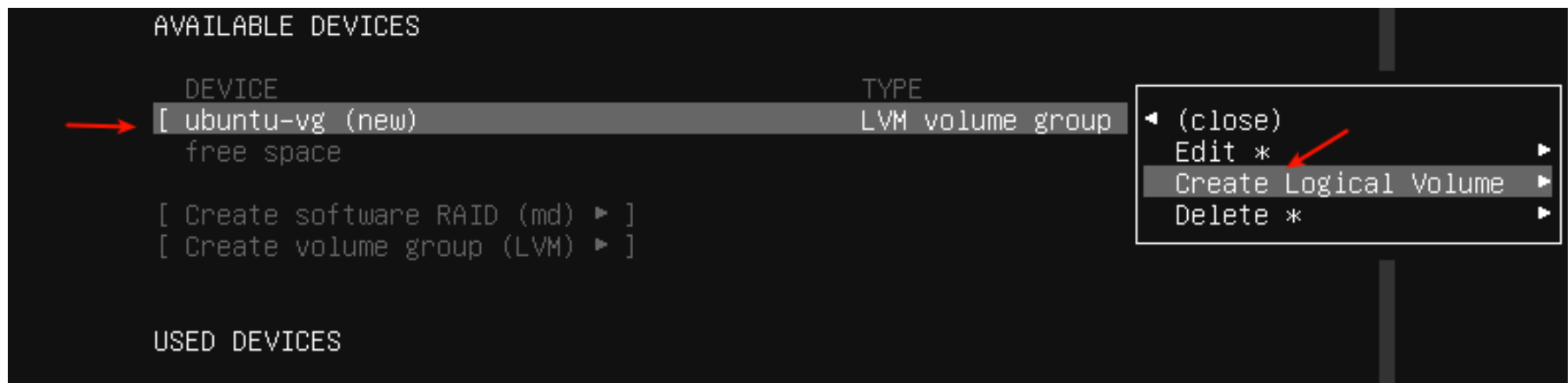
Adding logical volume to ubuntu-vg
Name: lv-0
Size (max 28.996G): 25.996G
                    Rounded size up to 25.996G
Format: [ ext4 ▼ ]
Mount:  [ /home ▼ ]

[ Create ]
[ Cancel ]

```

Installing Ubuntu Server (swap partition)

Now you need to create a **swap** partition. Under **AVAILABLE DEVICES**, select the **LVM** volume group and press **Enter**. In the partitioning options, scroll down to **Create Logical Volume**.



Installing Ubuntu Server (swap partition)

Then edit the partition size and set the **Format** field to **swap** as highlighted in the following screenshot and press Enter.

```
Adding logical volume to ubuntu-vg
```

Name:	lv-1
Size (max 3.000G):	3.000G Rounded size up to 3.000G
Format:	[swap ▼]
Mount:	[/srv ▼]
	[Create]
	[Cancel]

Installing Ubuntu Server(Disk Config)

Your new file system summary should now have a /boot, /root, /home, and swap partition as shown in the following screenshot. To write the changes to the harddisk, scroll down to **Done**, and press **Enter**.

```
FILE SYSTEM SUMMARY

MOUNT POINT      SIZE      TYPE      DEVICE TYPE
[ /              50.000G   new ext4   new LVM logical volume ▶ ]
[ /boot          1.000G   new ext4   new partition of local disk ▶ ]
[ /home          25.995G   new ext4   new LVM logical volume ▶ ]
[ SWAP           3.000G   new swap   new LVM logical volume ▶ ]

AVAILABLE DEVICES

No available devices

[ Create software RAID (md) ▶ ]
[ Create volume group (LVM) ▶ ]

USED DEVICES

DEVICE                                TYPE                                SIZE
[ ubuntu-vg (new)                     LVM volume group                   78.996G ▶ ]
ubuntu-lv    new, to be formatted as ext4, mounted at /    50.000G ▶ ]
lv-0         new, to be formatted as ext4, mounted at /home  25.995G ▶ ]
lv-1         new, to be formatted as swap                          3.000G ▶ ]

[ VBOX_HARDDISK_VB86e64330-e3a7d572    local disk                          80.000G ▶ ]
partition 1  new, bios_grub                            1.000M ▶ ]
partition 2  new, to be formatted as ext4, mounted at /boot  1.000G ▶ ]
partition 3  new, PV of LVM volume group ubuntu-vg           78.997G ▶ ]

[ Done ▶ ]
[ Reset ]
[ Back ]
```

Installing Ubuntu Server(Disk Config)

Confirm the action by selecting **Continue** and press **Enter**.

```
AVAILABLE DEVICES

Confirm destructive action

Selecting Continue below will begin the installation process and
result in the loss of data on the disks selected to be formatted.

You will not be able to return to this or a previous screen once the
installation has started.

Are you sure you want to continue?

[ No ]
[ Continue ]

partition 1  new, bios_grub                                1.000M ▶
partition 2  new, to be formatted as ext4, mounted at /boot 1.000G ▶
partition 3  new, PV of LVM volume group ubuntu-vg          78.997G ▶
```

Installing Ubuntu Server(User Account)

Now create a user profile by typing your name, server's name, **username(as described beside the image)**, and a password. Now select **Done & Enter**.

You must enter the
username as
follows:
firstName_lastName_studentID



```
Enter the username and password you will use to log in to the system. You can
configure SSH access on the next screen but a password is still needed for
sudo.

Your name: TecMint How-Tos

Your server's name: tecmint-appserver1
The name it uses when it talks to other computers.

Pick a username: tecmint

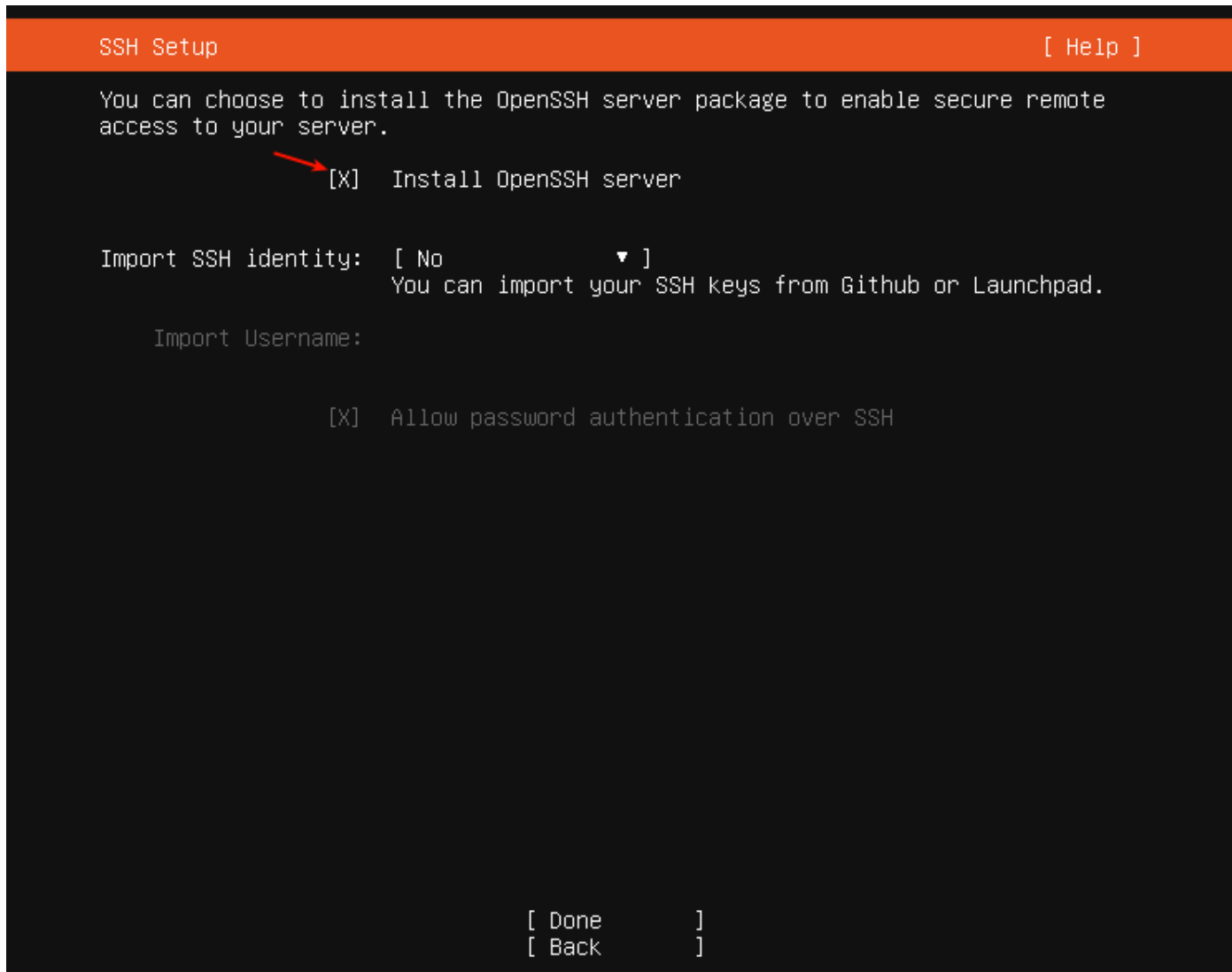
Choose a password: *****

Confirm your password: *****

[ Done ]
```

Installing Ubuntu Server(OpenSSH)

Next, the installer will prompt you to install the **OpenSSH** package for remote access. Use space to choose that option. Then scroll down to Done and press Enter.



```
SSH Setup [ Help ]

You can choose to install the OpenSSH server package to enable secure remote
access to your server.

[X] Install OpenSSH server

Import SSH identity: [ No ▼ ]
You can import your SSH keys from Github or Launchpad.

Import Username:

[X] Allow password authentication over SSH

[ Done ]
[ Back ]
```

Installing Ubuntu Server(Utility Apps)

If you want to install some **snaps**, select them from the provided list. Use the space bar to select a **snap**. Then go to Done and press Enter.

```
Featured Server Snaps [ Help ]

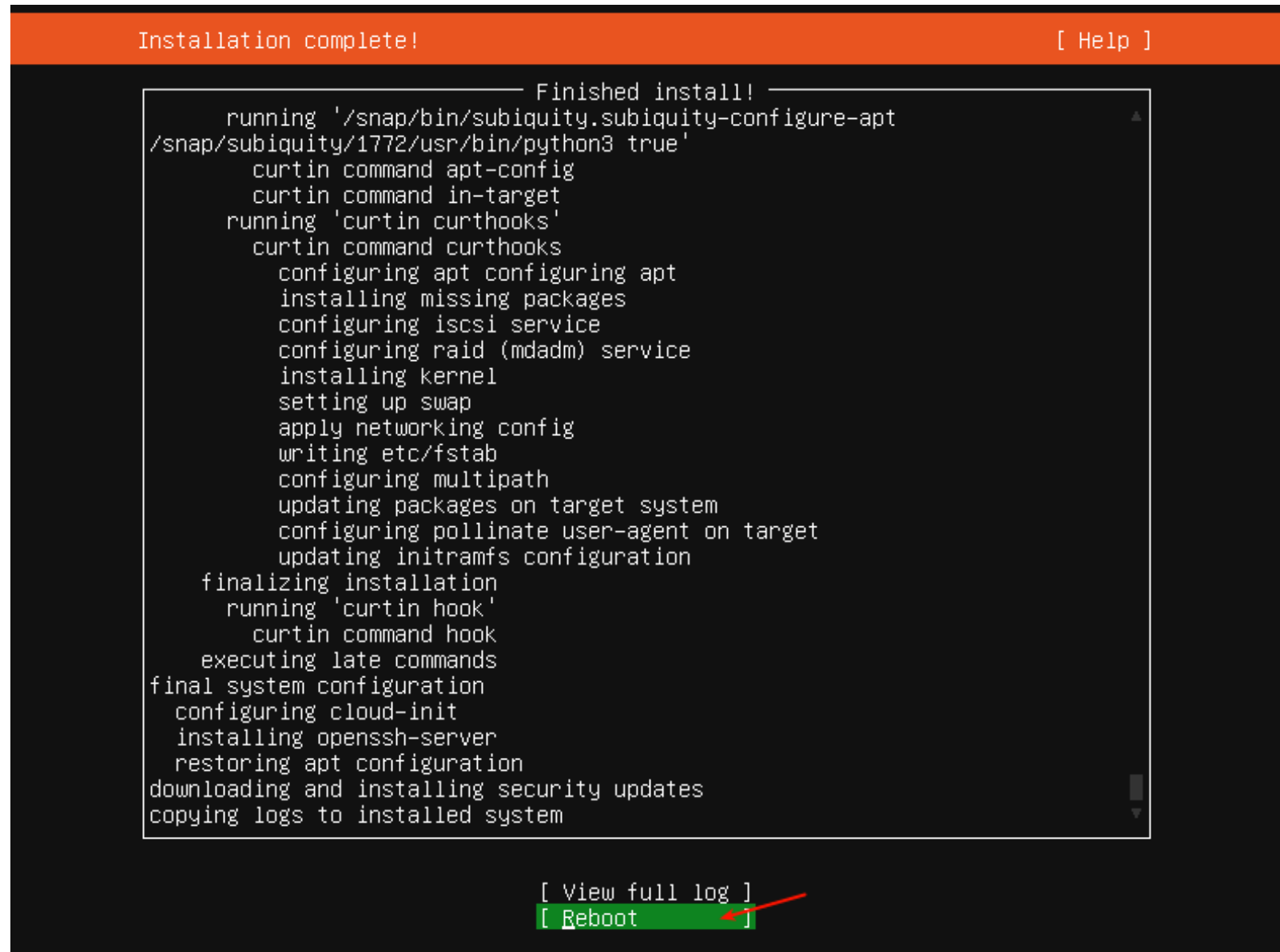
These are popular snaps in server environments. Select or deselect with SPACE,
press ENTER to see more details of the package, publisher and versions
available.

[ ] microk8s           Kubernetes for workstations and appliances ▶
[ ] nextcloud          Nextcloud Server - A safe home for all your data ▶
[ ] wekan              Open-Source kanban ▶
[ ] kata-containers    Lightweight virtual machines that seamlessly plug int ▶
[ ] docker             Docker container runtime ▶
[ ] canonical-livepatch Canonical Livepatch Client ▶
[ ] rocketchat-server  Group chat server for 100s, installed in seconds. ▶
[ ] mosquitto          Eclipse Mosquitto MQTT broker ▶
[ ] etcd              Resilient key-value store by CoreOS ▶
[ ] powershell        PowerShell for every system! ▶
[ ] stress-ng          A tool to load, stress test and benchmark a computer ▶
[ ] sabnzbd            SABnzbd ▶
[ ] wormhole           get things from one computer to another, safely ▶
[ ] aws-cli            Universal Command Line Interface for Amazon Web Servi ▶
[ ] google-cloud-sdk   Command-line interface for Google Cloud Platform prod ▶
[ ] slcli              Python based SoftLayer API Tool. ▶
[ ] doctl              DigitalOcean command line tool ▶
[ ] conjure-up          Package runtime for conjure-up spells ▶
[ ] minidlna-escoand   server software with the aim of being fully compliant ▶
[ ] postgresql10       PostgreSQL is a powerful, open source object-relation ▶
[ ] heroku             CLI client for Heroku ▶
[ ] keepalived         High availability VRRP/BFD and load-balancing for Lin ▶
[ ] prometheus         The Prometheus monitoring system and time series data ▶
[ ] juju              Simple, secure and stable devops. Juju keeps complexi ▶

[ Done ]
[ Back ]
```

Installing Ubuntu Server(Finish & Reboot)

The installation process should now start as shown in the following screenshot. Once it is done, press Enter to reboot the system.



```
Installation complete! [ Help ]

----- Finished install! -----
running '/snap/bin/subiquity.subiquity-configure-apt
/snap/subiquity/1772/usr/bin/python3 true'
  curtin command apt-config
  curtin command in-target
running 'curtin curthooks'
  curtin command curthooks
    configuring apt configuring apt
    installing missing packages
    configuring iscsi service
    configuring raid (mdadm) service
    installing kernel
    setting up swap
    apply networking config
    writing etc/fstab
    configuring multipath
    updating packages on target system
    configuring pollinate user-agent on target
    updating initramfs configuration
finalizing installation
  running 'curtin hook'
    curtin command hook
executing late commands
final system configuration
  configuring cloud-init
  installing openssh-server
  restoring apt configuration
  downloading and installing security updates
  copying logs to installed system

[ View full log ]
[ Reboot ]
```

Installing Ubuntu Server(First Login)

Congrats! You're almost there.

Enter your username and password to login.

```
Ubuntu 20.04.3 LTS hpc tty1
```

```
Hint: Num Lock on
```

```
hpc login: tecmint
```

```
Password: _
```

Connecting to Guest

- In case you want to connect your guest using SSH or sFTP, you need to know its IP address
- To get IP address of machine running Linux , enter “ifconfig” in terminal
- This will print all network information in format below
- Your IP address is address specified by “**inet addr**” field of “**eth0**” (since we are using NAT) and it’s something like 192.168.x.x

```
0 packages can be updated.
0 updates are security updates.

os@ubuntu:~$ ifconfig
eth0      Link encap:Ethernet  HWaddr 00:0c:29:ee:46:43
          inet addr:192.168.18.129  Bcast:192.168.18.255  Mask:255.255.255.0
          inet6 addr: fe80::20c:29ff:fee:4643/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:8 errors:0 dropped:0 overruns:0 frame:0
          TX packets:37 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:1048 (1.0 KB)  TX bytes:3470 (3.4 KB)
          Interrupt:19 Base address:0x2000

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:16 errors:0 dropped:0 overruns:0 frame:0
          TX packets:16 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:1184 (1.1 KB)  TX bytes:1184 (1.1 KB)

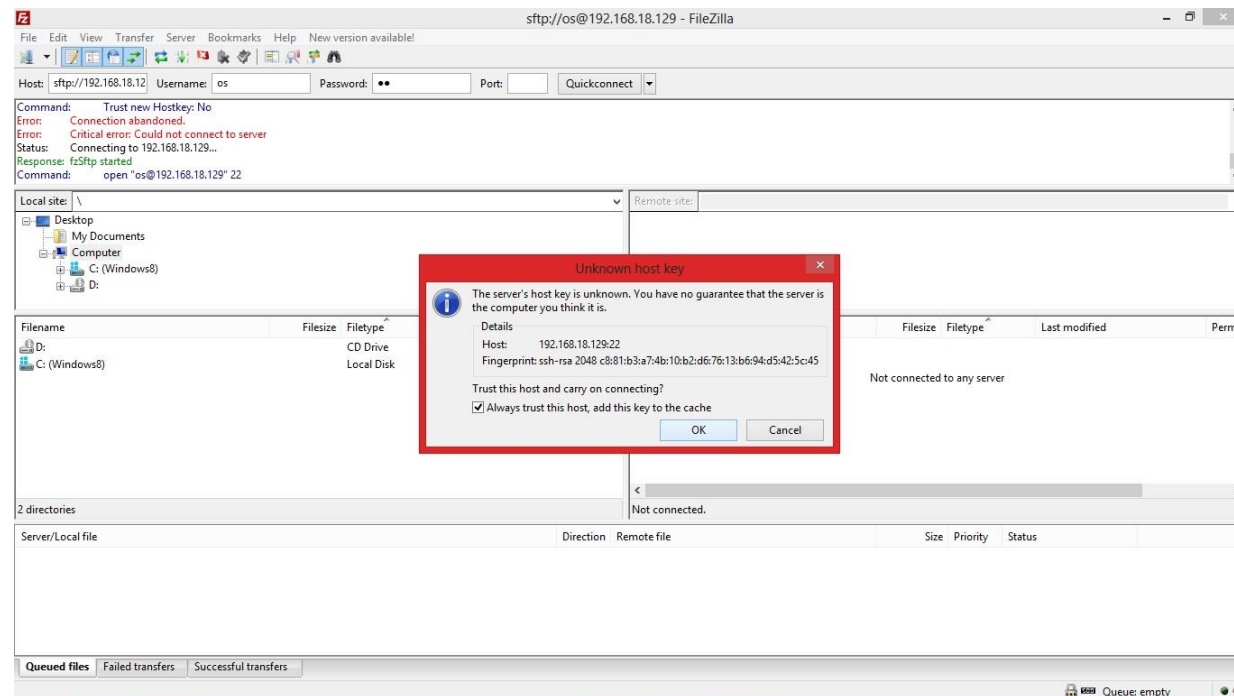
os@ubuntu:~$ _
```


Connecting to Guest

- If you like to transfer some files (such as kernel source code) to your guest or from your guest (such as Makefiles you are required to submit along HWs) you need to connect to your guest using a sFTP client
- One very popular open-source FTP client is [FileZilla](#) or WinSCP. To use these FTP clients you need to enter **IP address of FTP Server , username , password and port number to be used** (which is 22 for sFTP)
- We've used FileZilla in this tutorial!

Connecting to Guest

- In first attempt to connect to FTP server, FileZilla will ask you about trusting FTP server fingerprint to your system.
- Check “always trust” to avoid this question appearing each time



Connecting to Guest

- After connecting to FTP server, you should be able to see server's directory as below
- If you would like to connect to your guest using ssh , you need to enter “ssh username@hostip” in any Linux/MAC terminal or PuTTY in Windows

