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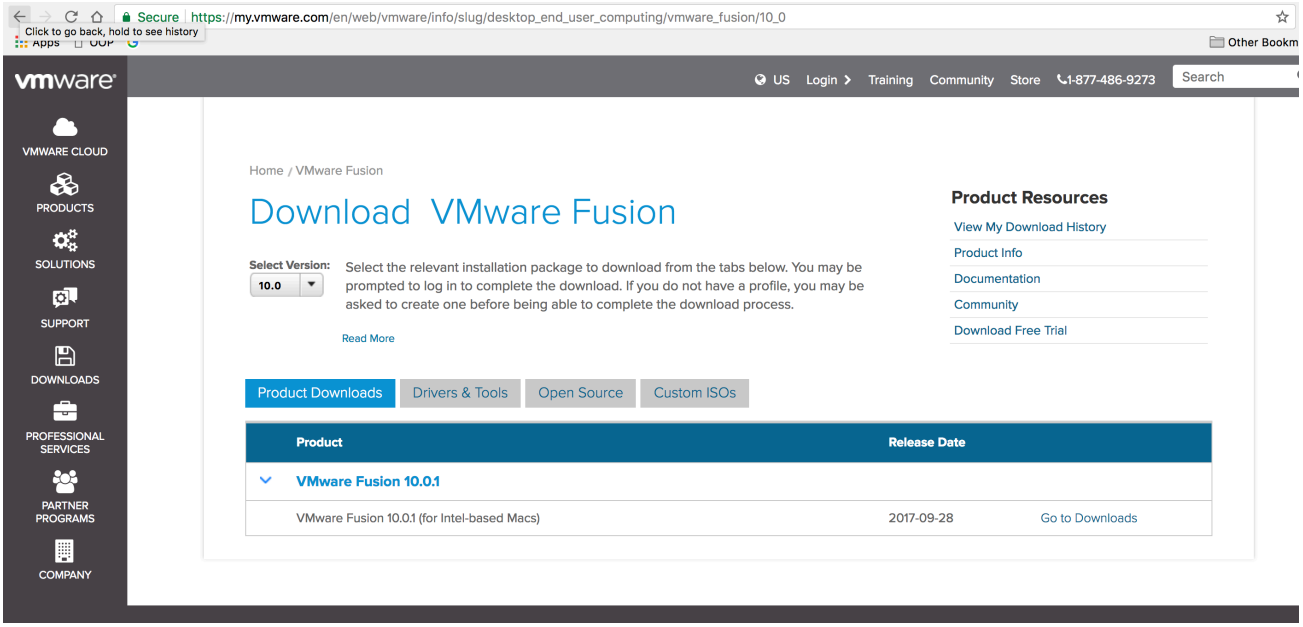
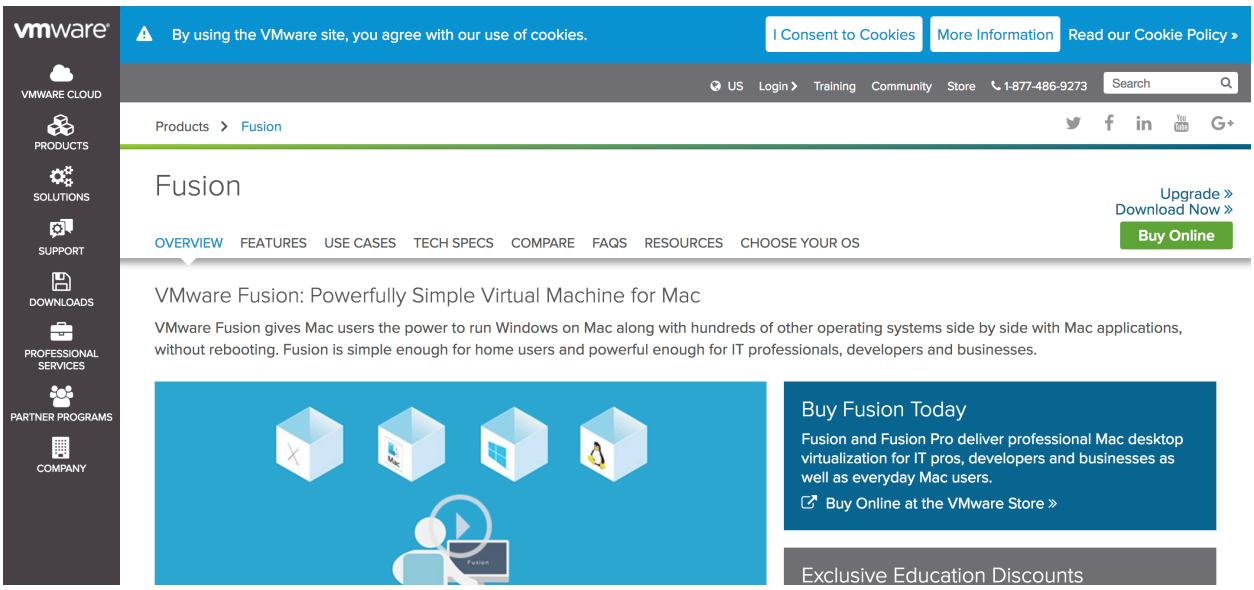
Cloud Computing
Lab 2

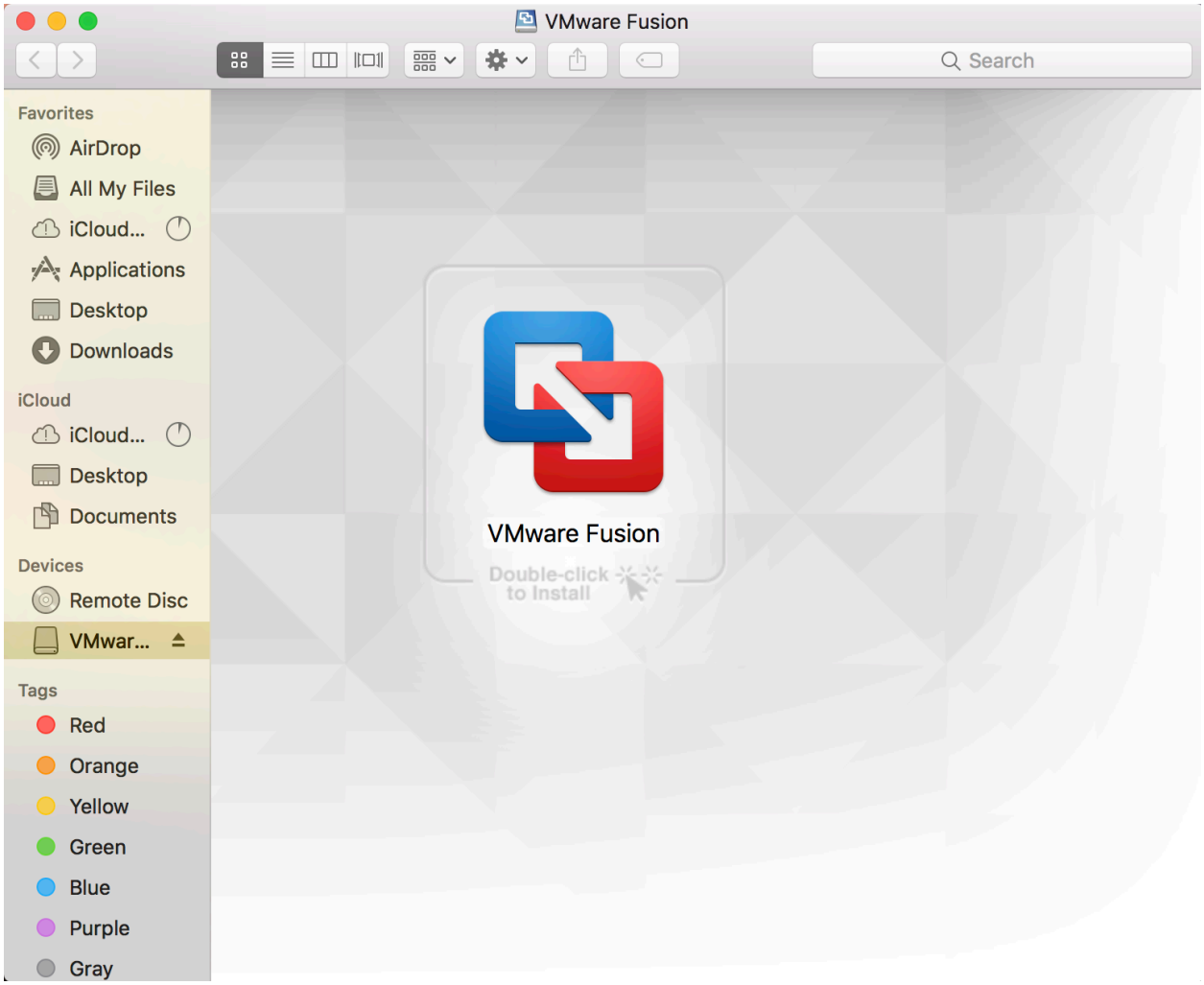
For Lab 2 I have installed VMWare in my MAC and installed Ubuntu as the guest Operating System.
I have downloaded the VMWare fusion.



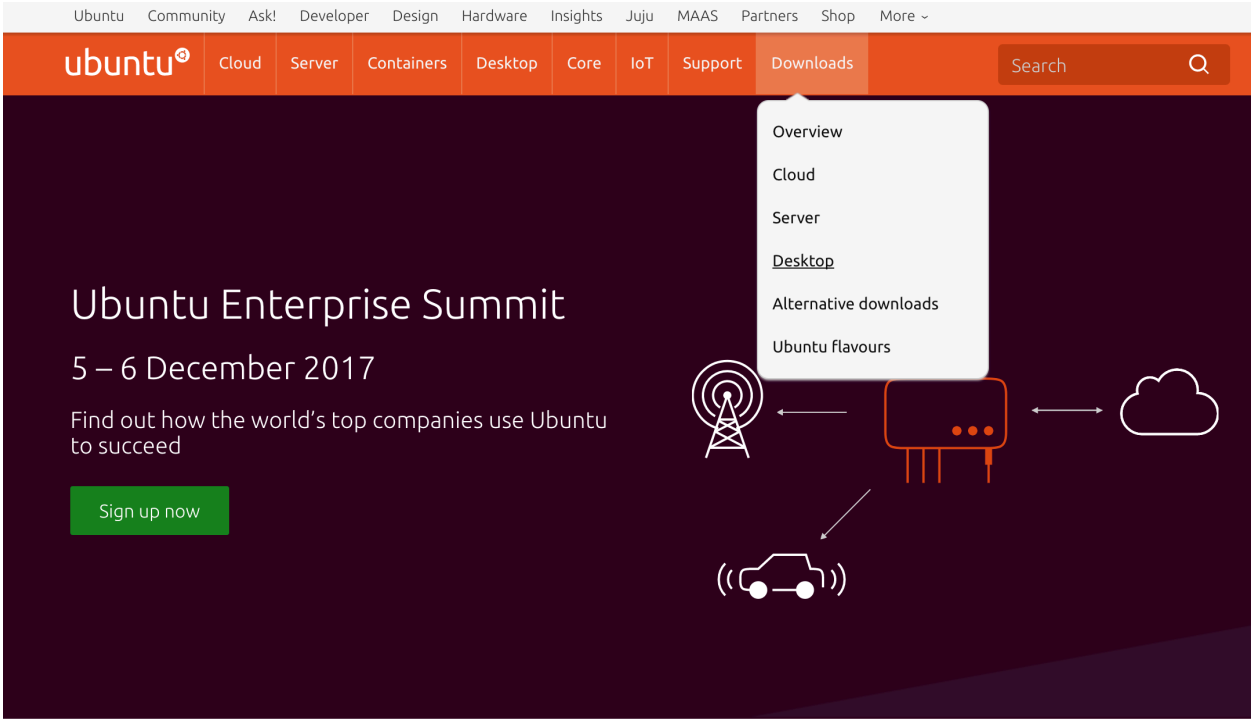
Click on Download free trial

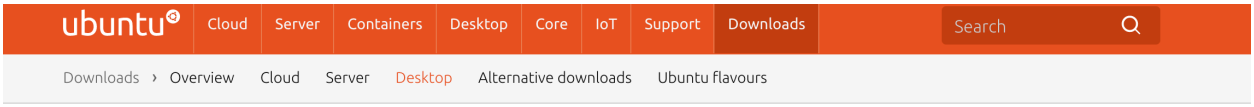


I downloaded 30 day free trial. After downloading the free trial VMware Fusion Icon appears and double click on the Icon to start installing.



Now, try installing Ubuntu from www.ubuntu.com as shown





Download Ubuntu Desktop

Ubuntu 16.04.3 LTS

Download the latest LTS version of Ubuntu, for desktop PCs and laptops. LTS stands for long-term support — which means five years of free security and maintenance updates, guaranteed.

Ubuntu 16.04 LTS release notes

Recommended system requirements:

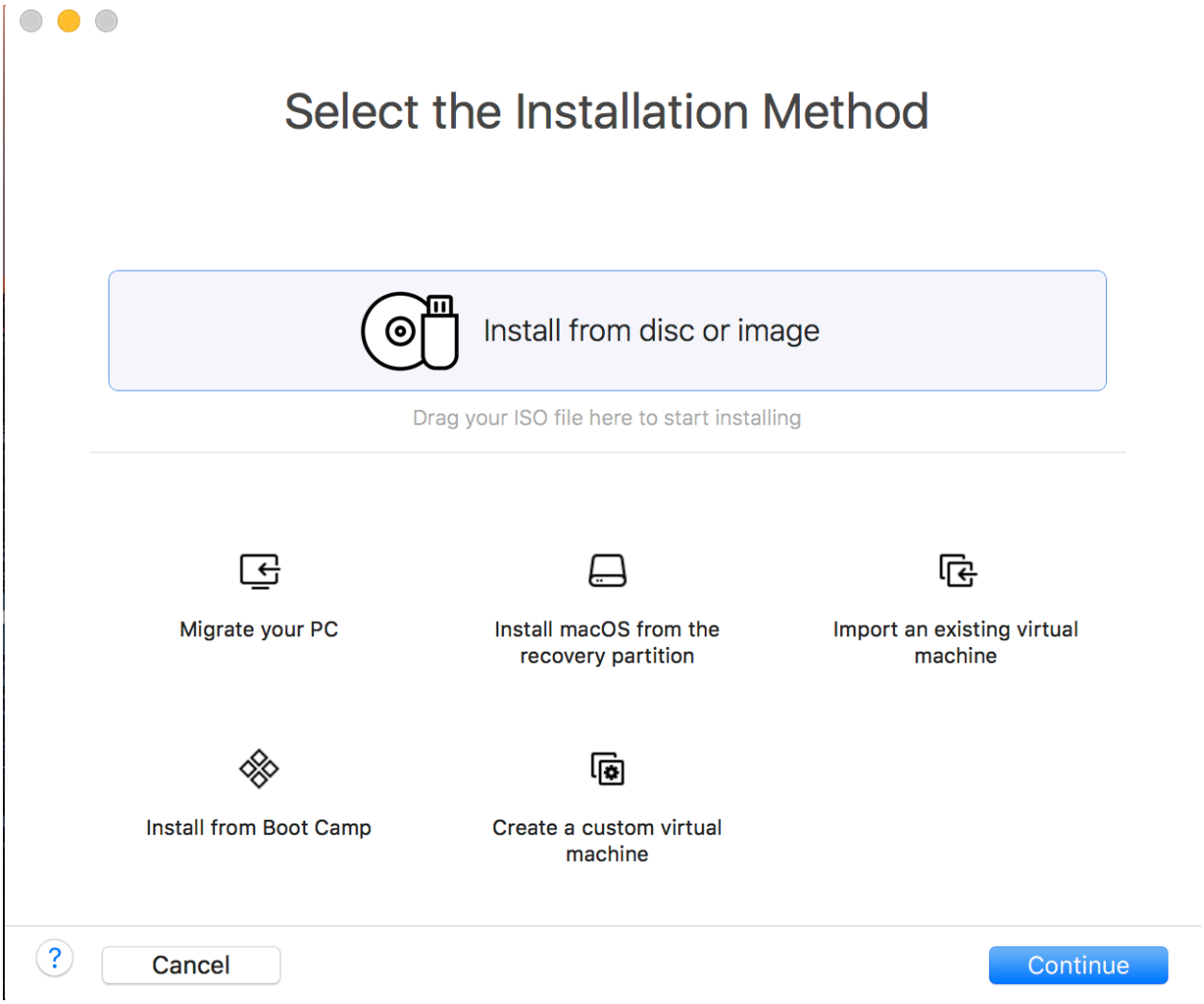
- 2 GHz dual core processor or better
- 2 GB system memory
- 25 GB of free hard drive space
- Either a DVD drive or a USB port for the installer media
- Internet access is helpful

Download

Alternative downloads and torrents ›

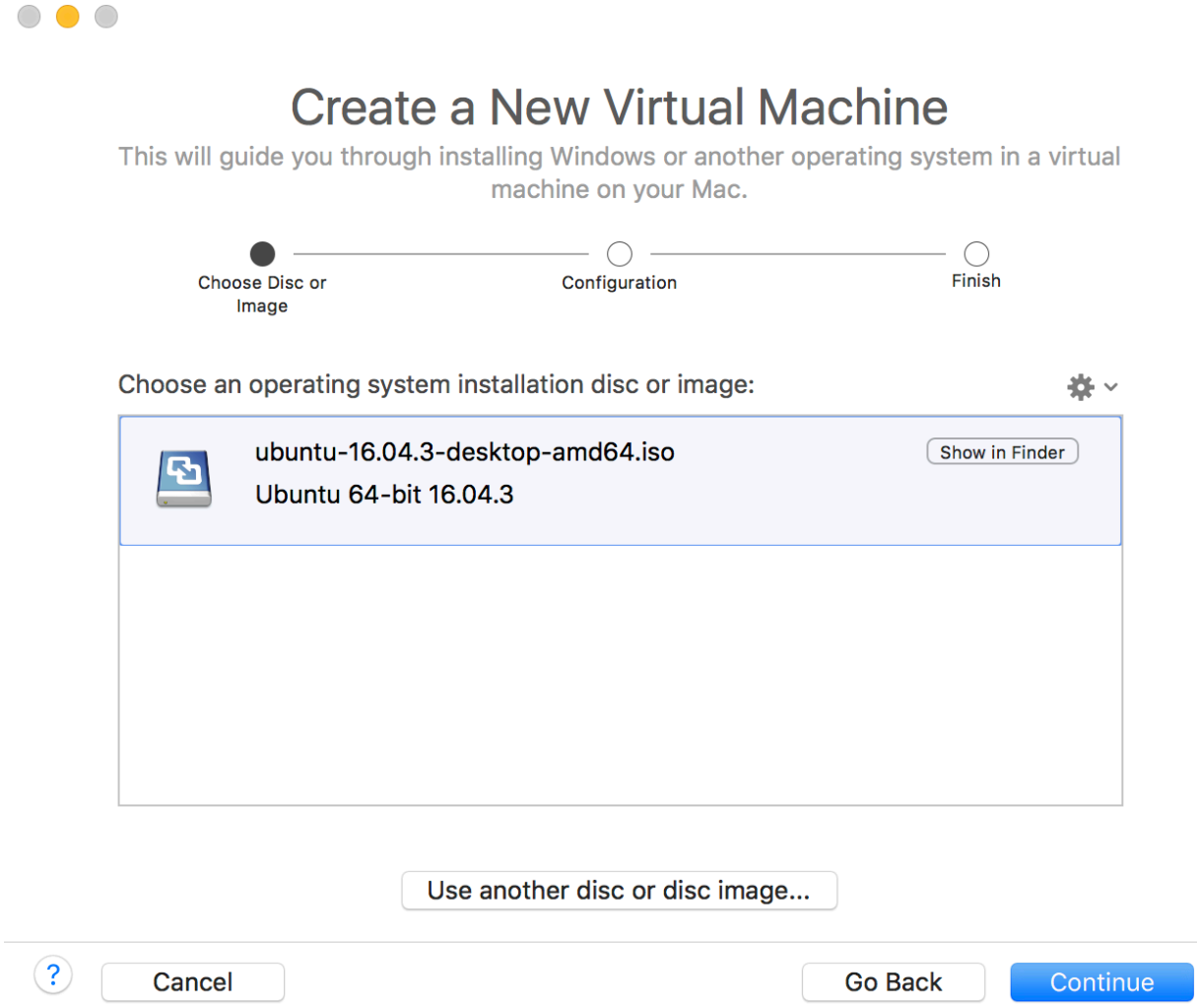
Now click on Download and complete downloading Ubuntu.

Go back to VMware Fusion Icon and it asks for the Installation Method

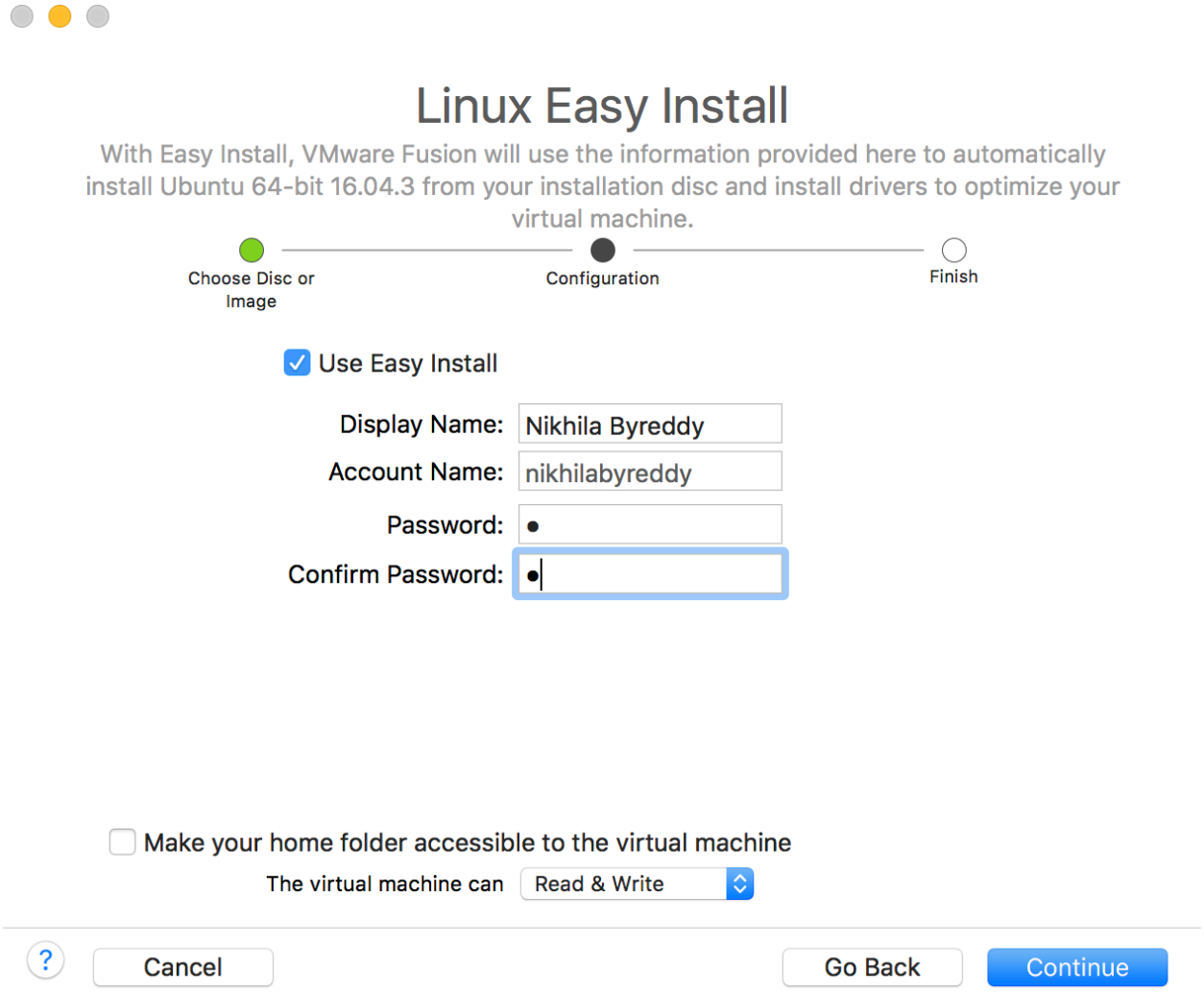


Click On continue.

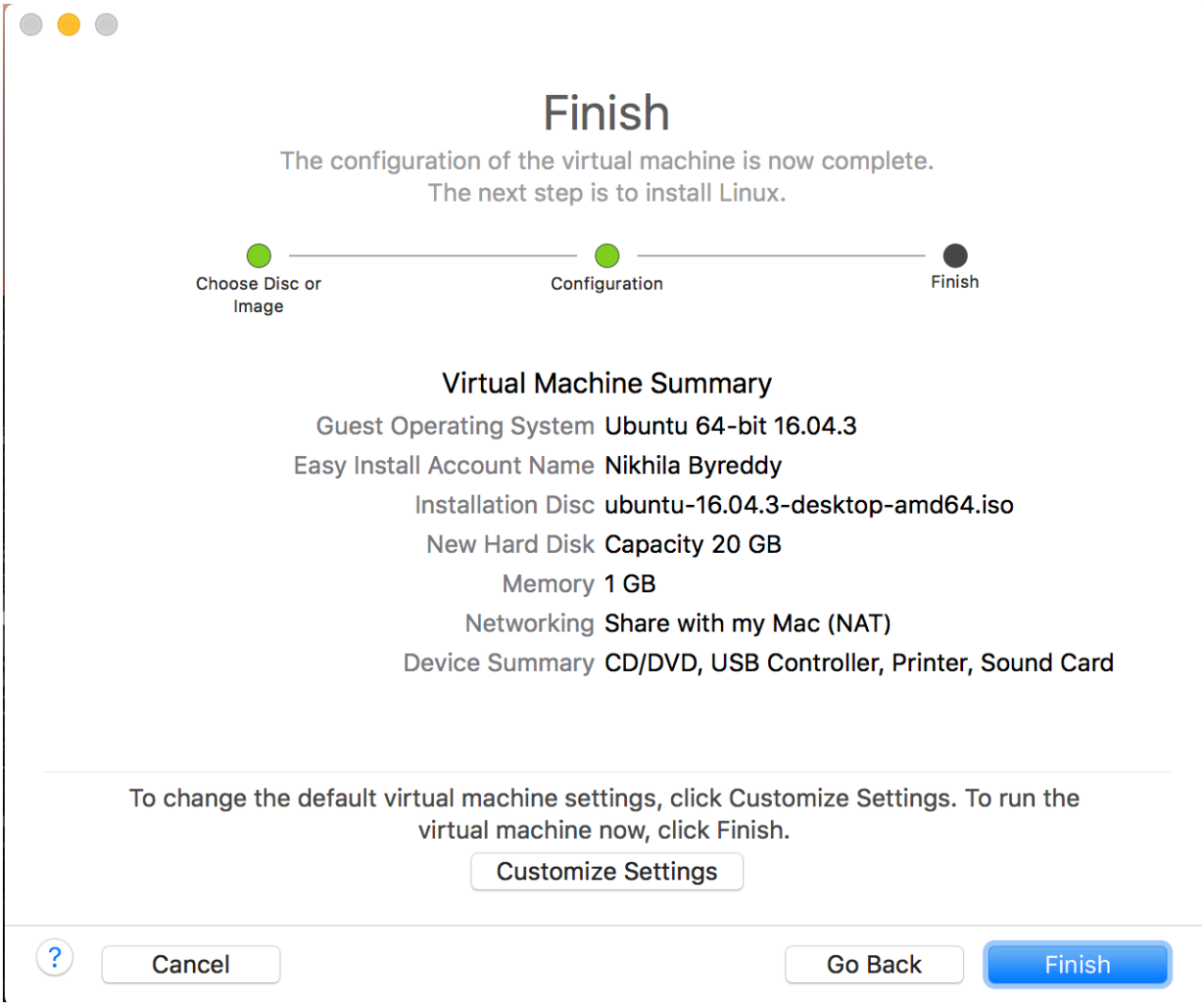
Now drag the Ubuntu ISO Icon on the desktop, it shows as below.



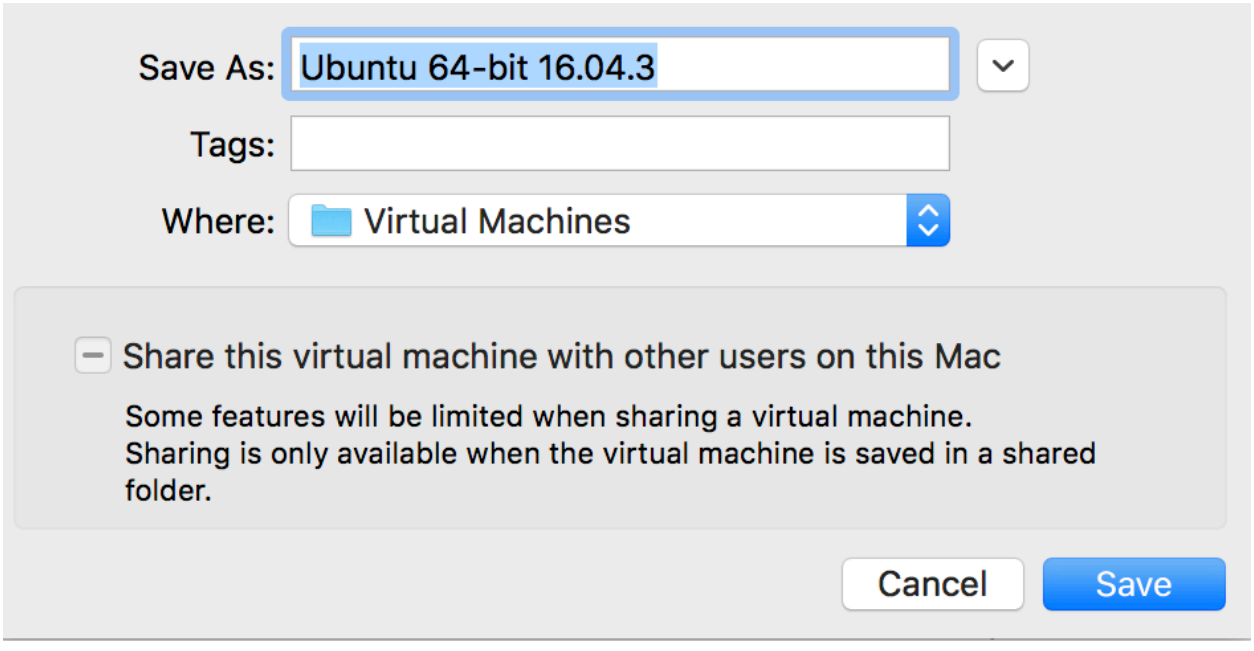
Now click on continue and it shows up as below.



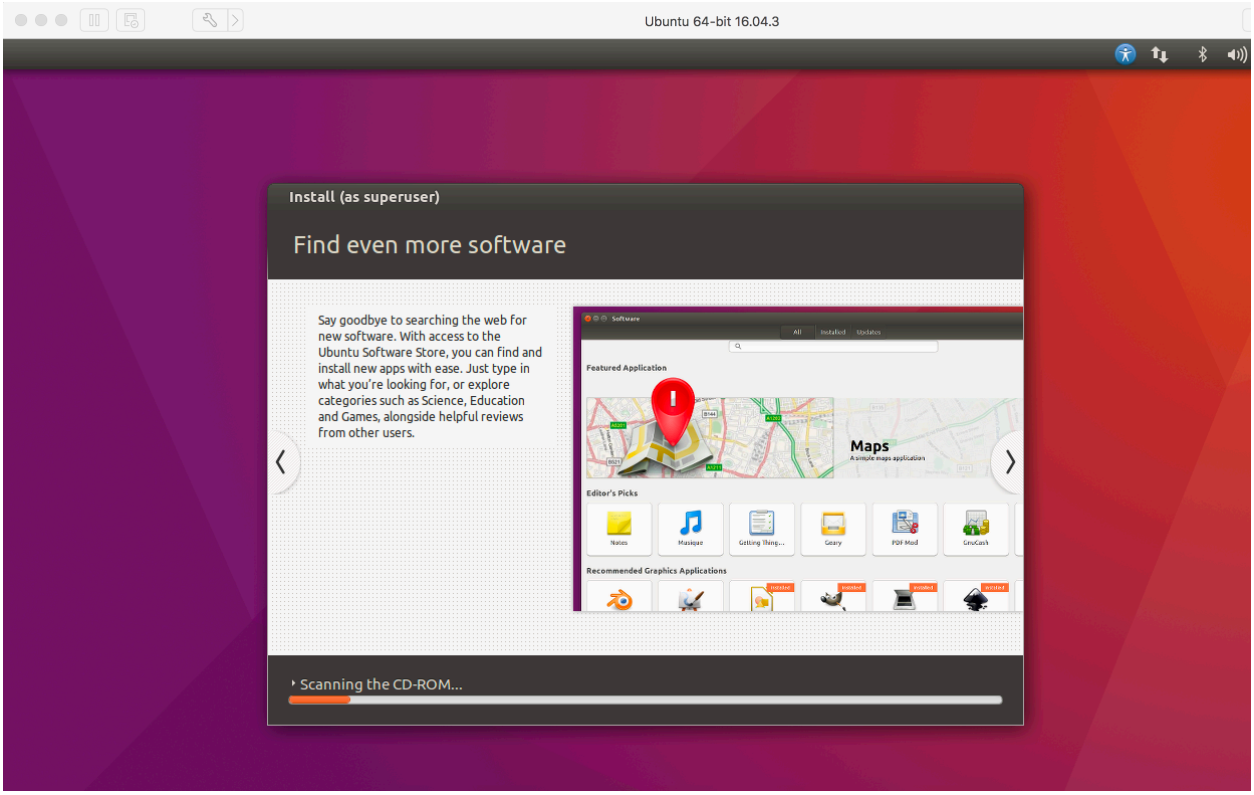
Click on continue.

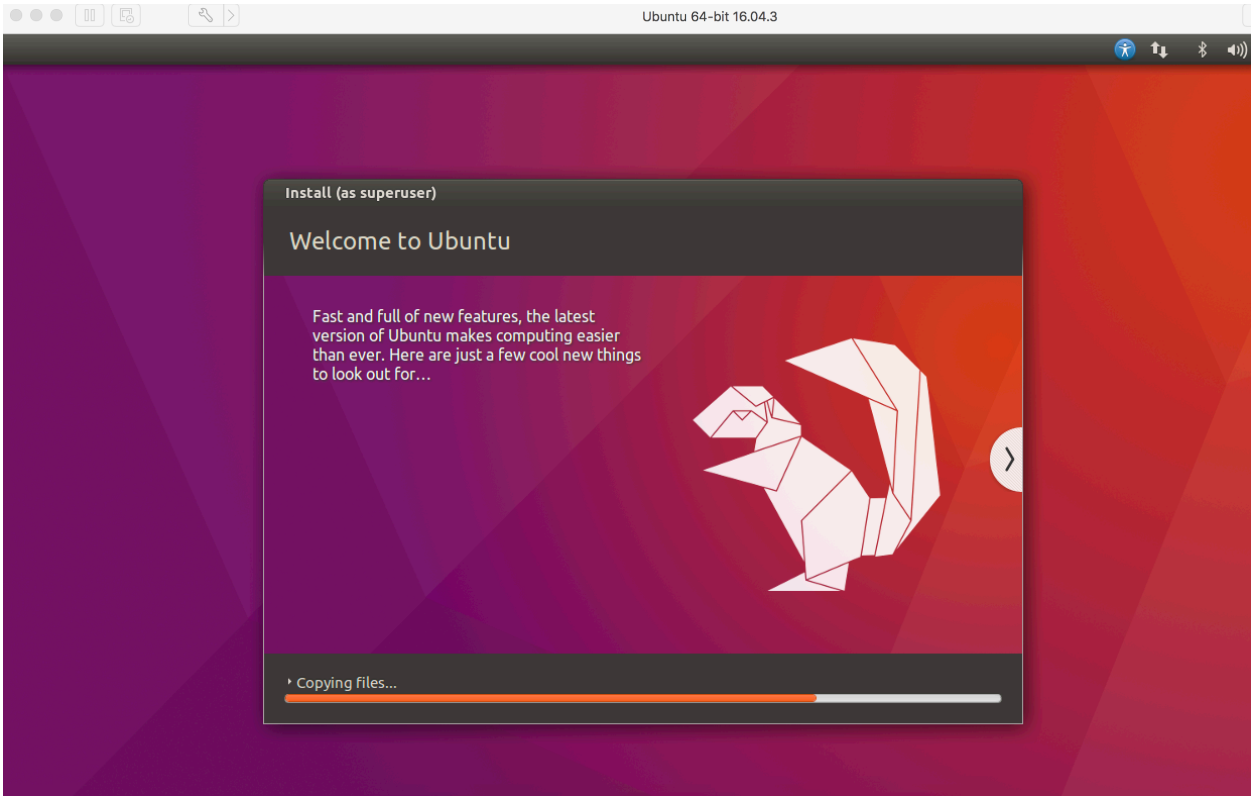


Now click on Finish.

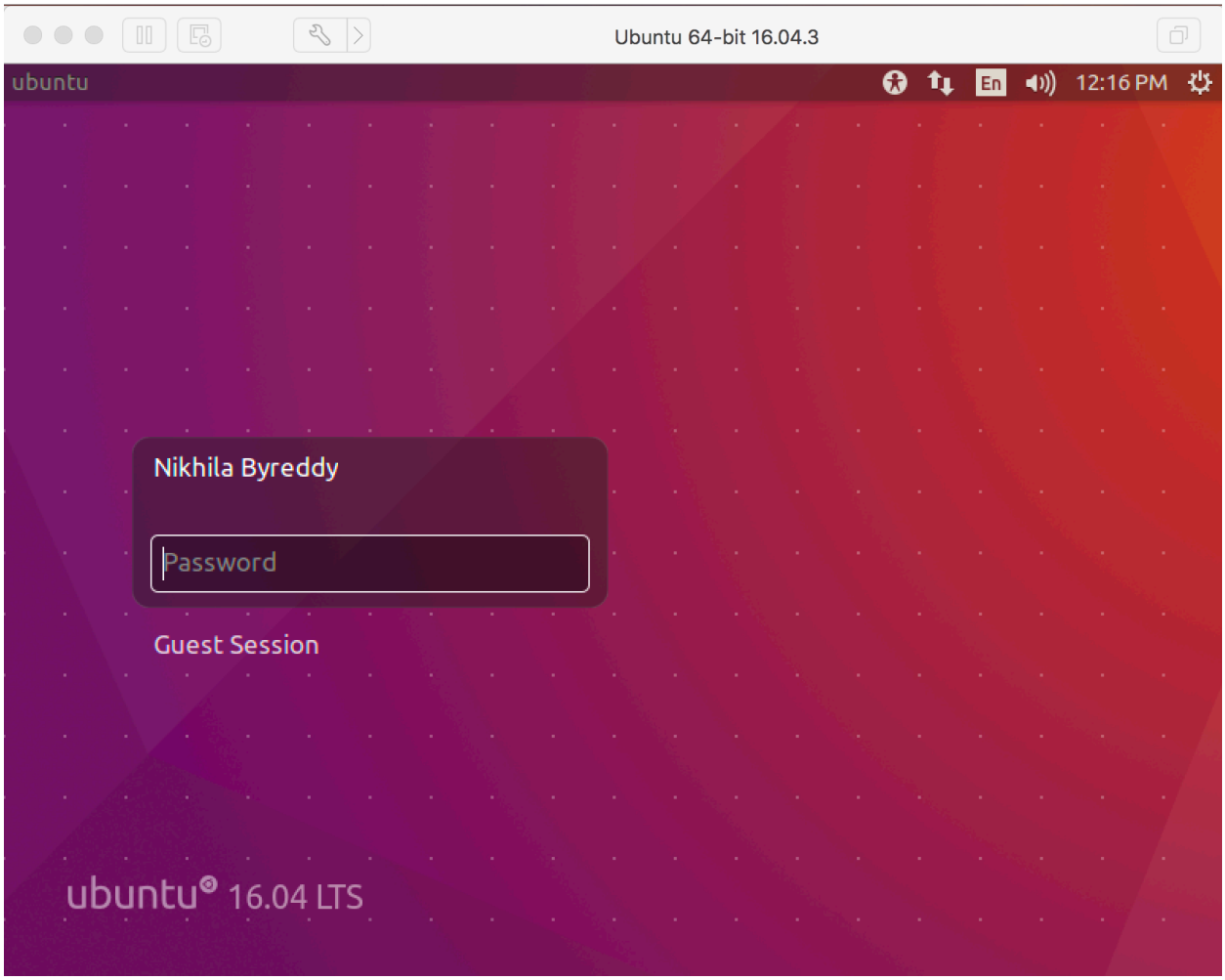


Click on Save.
Ubuntu starts installing as a Guest Operating System in VMware.
This may take some time.

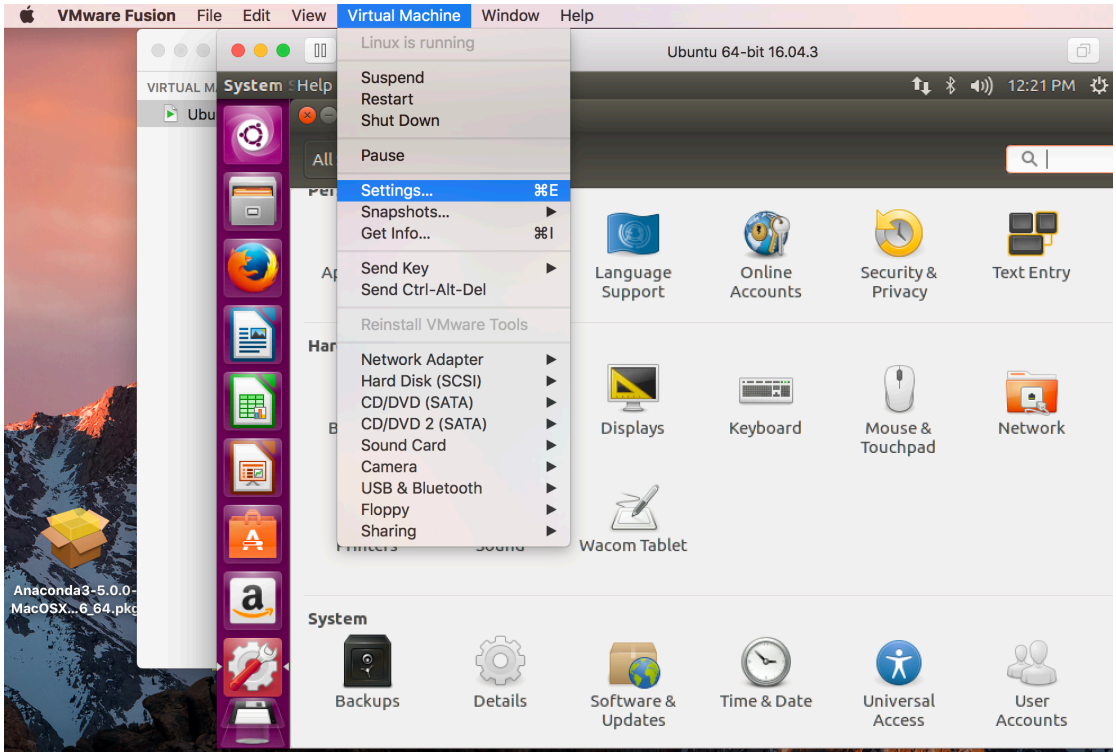




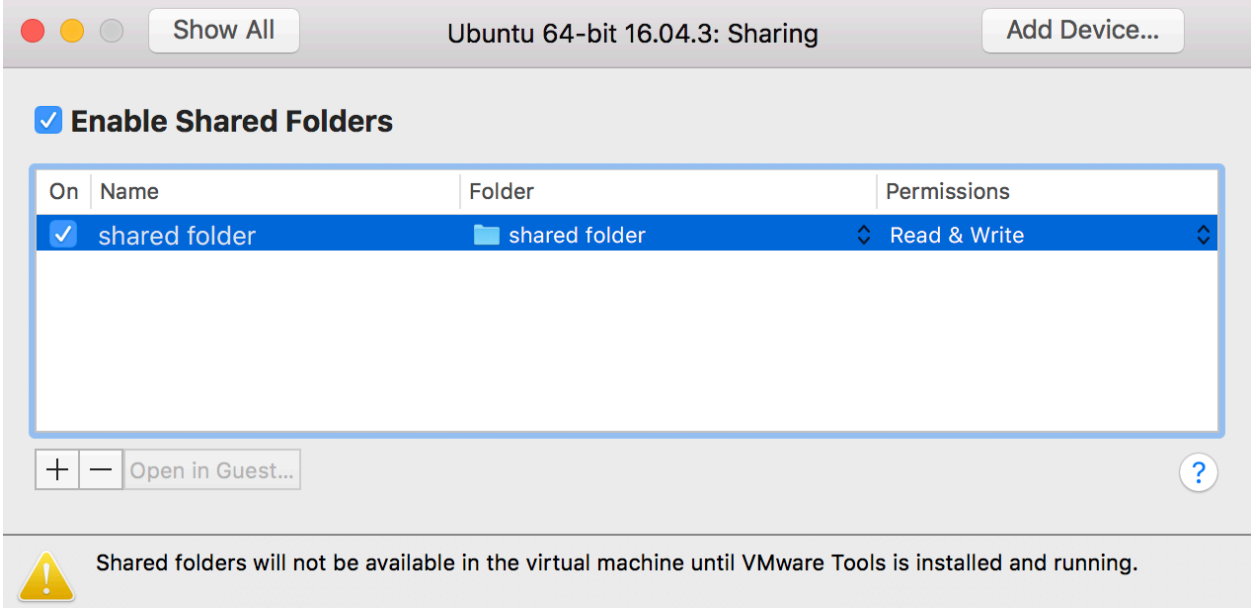
After installing Ubuntu in our VMware, it asks for password.
Enter the password and your Guest Operating system is ready to use.



Now Go to settings in Virtual Machine and go to Sharing Folder.

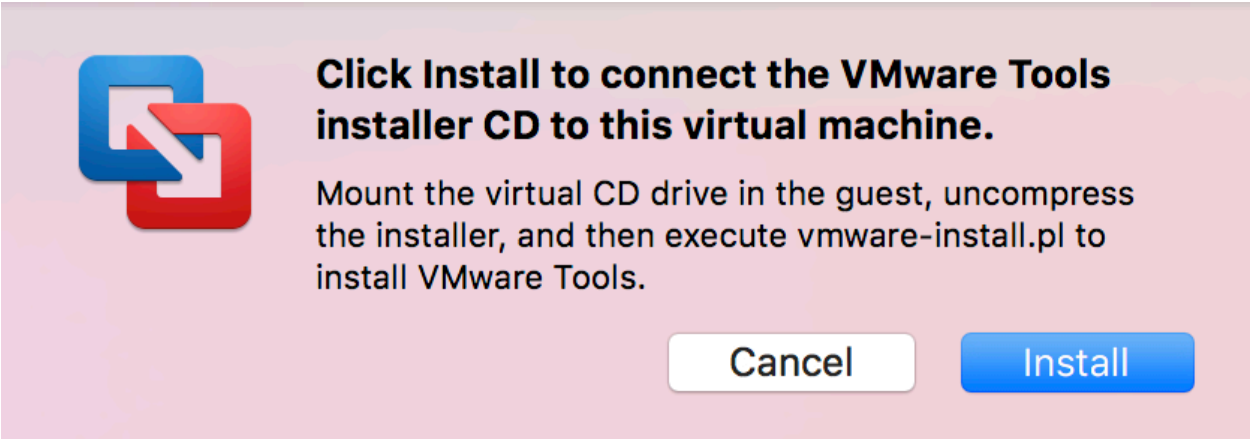

VMware Fusion
File
Edit
View
Virtual Machine
Window
Help
Linux is running
Suspend
Restart
Shut Down
Pause
Settings... ⌘E
Snapshots...
Get Info... ⌘I
Send Key
Send Ctrl-Alt-Del
Reinstall VMware Tools
Network Adapter
Hard Disk (SCSI)
CD/DVD (SATA)
CD/DVD 2 (SATA)
Sound Card
Camera
USB & Bluetooth
Floppy
Sharing
Ubuntu 64-bit 16.04.3
12:21 PM
Language Support
Online Accounts
Security & Privacy
Text Entry
Displays
Keyboard
Mouse & Touchpad
Network
Wacom Tablet
System
Backups
Details
Software & Updates
Time & Date
Universal Access
User Accounts
Anaconda3-5.0.0-MacOSX...6_64.pkg


Show All
Ubuntu 64-bit 16.04.3: Settings
Add Device...
System Settings
General
Sharing
Keyboard & Mouse
Processors & Memory
Display
Removable Devices
Network Adapter
Hard Disk (SCSI)
CD/DVD (SATA)
CD/DVD 2 (SATA)
Sound Card
USB & Bluetooth
Floppy
Printer
Camera
Other
Startup Disk
Encryption & Restrictions
Compatibility
Isolation
Advanced

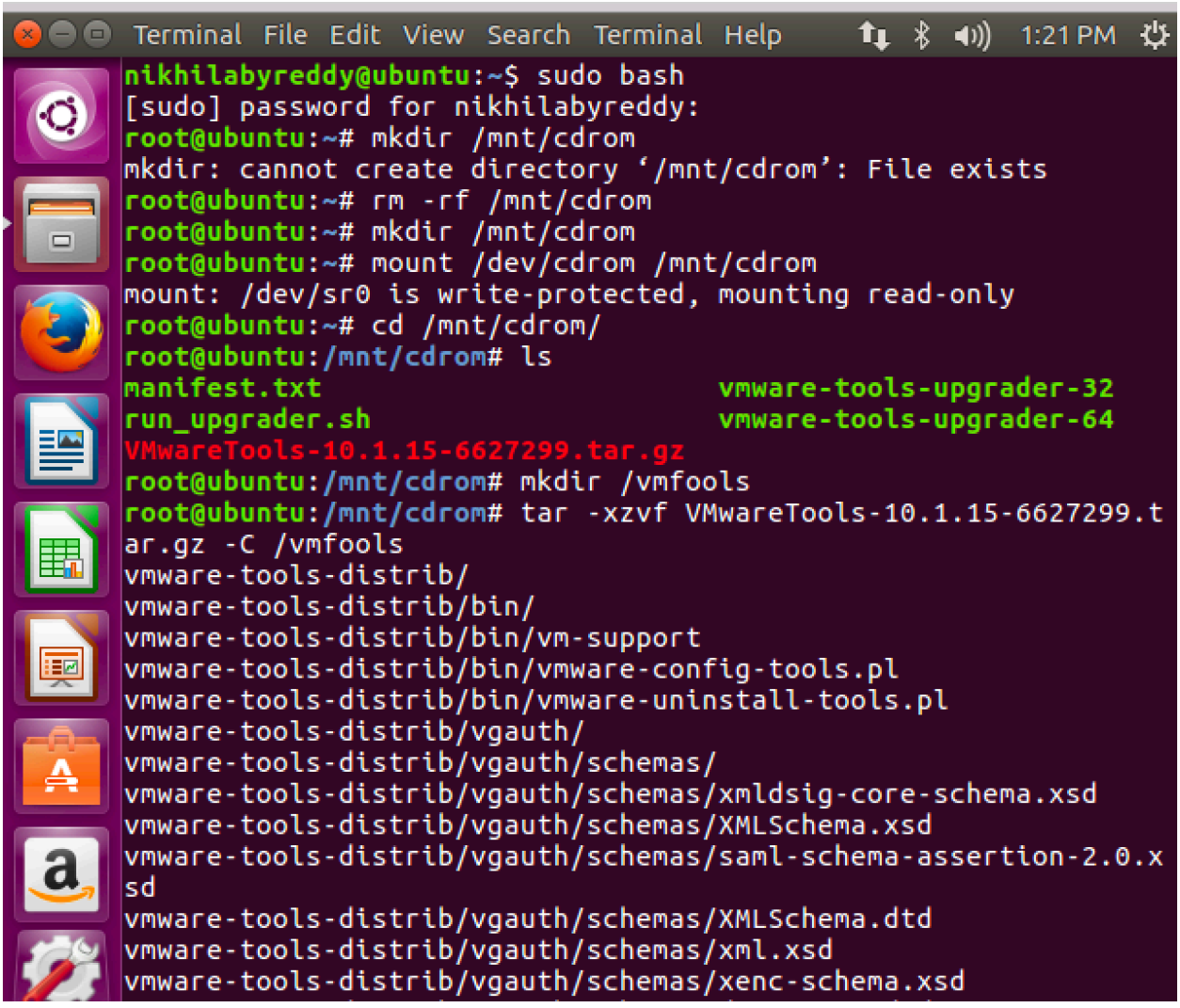


Enable shared folder.

Also install VMware Tools.



After installing VMware tools, you need to go to terminal and set the path of the shared Folder.


Terminal File Edit View Search Terminal Help
1:21 PM
nikhilabyreddy@ubuntu:~$ sudo bash
[sudo] password for nikhilabyreddy:
root@ubuntu:~# mkdir /mnt/cdrom
mkdir: cannot create directory '/mnt/cdrom': File exists
root@ubuntu:~# rm -rf /mnt/cdrom
root@ubuntu:~# mkdir /mnt/cdrom
root@ubuntu:~# mount /dev/cdrom /mnt/cdrom
mount: /dev/sr0 is write-protected, mounting read-only
root@ubuntu:~# cd /mnt/cdrom/
root@ubuntu:/mnt/cdrom# ls
manifest.txt vmware-tools-upgrader-32
run_upgrader.sh vmware-tools-upgrader-64
VMwareTools-10.1.15-6627299.tar.gz
root@ubuntu:/mnt/cdrom# mkdir /vmfools
root@ubuntu:/mnt/cdrom# tar -xzvf VMwareTools-10.1.15-6627299.tar.gz -C /vmfools
vmware-tools-distrib/
vmware-tools-distrib/bin/
vmware-tools-distrib/bin/vm-support
vmware-tools-distrib/bin/vmware-config-tools.pl
vmware-tools-distrib/bin/vmware-uninstall-tools.pl
vmware-tools-distrib/vgauth/
vmware-tools-distrib/vgauth/schemas/
vmware-tools-distrib/vgauth/schemas/xmldsig-core-schema.xsd
vmware-tools-distrib/vgauth/schemas/XMLSchema.xsd
vmware-tools-distrib/vgauth/schemas/saml-schema-assertion-2.0.xsd
vmware-tools-distrib/vgauth/schemas/XMLSchema.dtd
vmware-tools-distrib/vgauth/schemas/xml.xsd
vmware-tools-distrib/vgauth/schemas/xenc-schema.xsd

```
Found VMware Tools CDROM mounted at /mnt/cdrom. Ejecting device
 /dev/sr0 ...
root@ubuntu:/vmfools/vmware-tools-distrib# cd /mnt/hgfs
root@ubuntu:/mnt/hgfs# ls
shared folder
```

Now copy the shared folder to Desktop and run the program.

Compile and run smuprogram1a as shown below.

```
nikhilabyreddy@ubuntu: ~/Desktop/sf
Search your computer
u:~$ ls
Desktop    Downloads         Music     Public     Videos
Documents  examples.desktop  Pictures  Templates
nikhilabyreddy@ubuntu:~$ cd Desktop
nikhilabyreddy@ubuntu:~/Desktop$ ls
sf
nikhilabyreddy@ubuntu:~/Desktop$ cd sf
nikhilabyreddy@ubuntu:~/Desktop/sf$ ls
indata.dat  outdata.dat  smuprogram1a.c  smuprogram1bthreads.c  smuprogram3c.c
nikhilabyreddy@ubuntu:~/Desktop/sf$ gcc smuprogram1a.c -o smuprogram1a.out
nikhilabyreddy@ubuntu:~/Desktop/sf$ ./smuprogram1a.out
1924145348608    17179869184     112     40171497
1889785610240    17179869184     110     10582481
377957122048     17179869184     22      24417189
1391569403904    17179869184     81      4062121
1254130450432    17179869184     73      5487515
773094113280     17179869184     45      8985853
1030792151040    17179869184     60      42173417
721554505728     17179869184     42      41792379
1511828488192    17179869184     88      16803540
1236950581248    17179869184     72      29179344
1065151889408    17179869184     62      63624324
1460288880640    17179869184     85      15405611
1889785610240    17179869184     110     20364589
```

```
nikhila+   2337  0.0  1.4 656936 14100 ?        Sl   13:24   0:00 /usr/bin/unity
nikhila+   2338  0.0  0.8 563928  8724 ?        Sl   13:24   0:00 /usr/lib/x86_6
nikhila+   2377  0.0  1.7 607104 17508 ?        Sl   13:25   0:00 update-notifie
nikhila+   2455  0.0  0.8 595832  8508 ?        Sl   13:26   0:00 /usr/lib/x86_6
root       2506  0.0  0.0      0     0 ?        S    13:29   0:00 [kworker/u256:
nikhila+   2558  0.2  3.4 669080 34508 ?        Sl   13:31   0:00 /usr/lib/gnome
nikhila+   2565  0.0  0.4  29448  4744 pts/4    Ss   13:31   0:00 bash
nikhila+   2600 98.2  0.0   4356   652 pts/4    S+   13:34   0:46 ./smuprogram1a
nikhila+   2606  0.0  0.0   4508   804 pts/4    S+   13:35   0:00 sh -c ps aux
nikhila+   2607  0.0  0.3  44432  3160 pts/4    R+   13:35   0:00 ps aux
process id 2600
```

Now similarly, Compile and run Program1b.

```
nikhilabyreddy@ubuntu:~/Desktop/sf$ gcc -pthread smuprogram1bthreads.c -o smupro
gram1bthreads.out
nikhilabyreddy@ubuntu:~/Desktop/sf$ ./smuprogram1bthreads.out
In main: creating thread 0
In main: creating thread 1
1024     17179869184     0       39623917        1
1024     17179869184     0       10268397        2
1024     17179869184     0       23592286        3
1024     17179869184     0       4062121         4
1024     17179869184     0       5487515         5
1024     17179869184     0       8743732         6
1024     17179869184     0       41996162        7
1024     17179869184     0       41154532        8
1024     17179869184     0       16306679        9
1024     17179869184     0       28682508        10
1024     17179869184     0       62385536        11
1024     17179869184     0       15184593        12
1024     17179869184     0       20094770        13
1024     17179869184     0       48079952        14
1024     17179869184     0       20629873        15
1024     17179869184     0       23258932        16
1024     17179869184     0       14719940        17
1024     17179869184     0       28638339        18
```

```
nikhila+   2279  0.0  0.9 358136  9912 ?        Sl   13:24   0:00 /usr/bin/zeitg
nikhila+   2286  0.0  0.9 321600  9936 ?        Sl   13:24   0:00 /usr/lib/x86_6
nikhila+   2301  0.0  0.3 368788  3960 ?        Sl   13:24   0:00 /usr/lib/gvfs/
nikhila+   2327  0.0  1.1 654292 11036 ?        Sl   13:24   0:00 /usr/lib/x86_6
nikhila+   2337  0.0  1.4 656936 14100 ?        Sl   13:24   0:00 /usr/bin/unity
nikhila+   2338  0.0  0.8 563928  8724 ?        Sl   13:24   0:00 /usr/lib/x86_6
nikhila+   2377  0.0  1.7 607104 17508 ?        Sl   13:25   0:00 update-notifie
nikhila+   2455  0.0  0.8 595832  8508 ?        Sl   13:26   0:00 /usr/lib/x86_6
root       2506  0.0  0.0      0     0 ?        S    13:29   0:00 [kworker/u256:
nikhila+   2558  0.3  3.4 669272 34652 ?        Sl   13:31   0:01 /usr/lib/gnome
nikhila+   2565  0.0  0.4  29448  4744 pts/4    Ss   13:31   0:00 bash
nikhila+   2628 97.3  0.1  90584  1028 pts/4    S+   13:37   0:38 ./smuprogram1b
nikhila+   2636  0.0  0.0   4508   712 pts/4    S+   13:38   0:00 sh -c ps aux
nikhila+   2637  0.0  0.3  44432  3160 pts/4    R+   13:38   0:00 ps aux
process id 2628
```

Now compile and run program 3c

```
nikhilabyreddy@ubuntu:~/Desktop/sf$ gcc -pthread smuprogram3c.c -o smuprogram3c.
out
nikhilabyreddy@ubuntu:~/Desktop/sf$ ./smuprogram3c.out
100000 iterations
200000 iterations
300000 iterations
400000 iterations
USER         PID %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
root           1  0.0  0.4 185464  4720 ?        Ss   13:23   0:01 /sbin/init aut
root           2  0.0  0.0      0     0 ?        S    13:23   0:00 [kthreadd]
root           3  0.0  0.0      0     0 ?        S    13:23   0:00 [kworker/0:0]
root           4  0.0  0.0      0     0 ?        S<   13:23   0:00 [kworker/0:0H]
root           6  0.0  0.0      0     0 ?        S    13:23   0:00 [ksoftirqd/0]
root           7  0.0  0.0      0     0 ?        S    13:23   0:00 [rcu_sched]
root           8  0.0  0.0      0     0 ?        S    13:23   0:00 [rcu_bh]
root           9  0.0  0.0      0     0 ?        S    13:23   0:00 [migration/0]
root          10  0.0  0.0      0     0 ?        S<   13:23   0:00 [lru-add-drain
```

```
nikhila+   2337  0.0  1.4 656936 14084 ?        Sl   13:24   0:00 /usr/bin/unity
nikhila+   2338  0.0  0.8 563928  8712 ?        Sl   13:24   0:00 /usr/lib/x86_6
nikhila+   2377  0.0  1.7 607104 17508 ?        Sl   13:25   0:00 update-notifie
nikhila+   2455  0.0  0.8 595832  8508 ?        Sl   13:26   0:00 /usr/lib/x86_6
root       2506  0.0  0.0      0     0 ?        S    13:29   0:00 [kworker/u256:
nikhila+   2558  0.3  3.5 669272 34932 ?        Sl   13:31   0:02 /usr/lib/gnome
nikhila+   2565  0.0  0.4  29448  4744 pts/4    Ss   13:31   0:00 bash
root       2650  0.0  0.0      0     0 ?        S    13:38   0:00 [kworker/0:1]
nikhila+   2674 34.0  0.7 307144  7068 pts/4    S+   13:41   0:00 ./smuprogram3c
nikhila+   2679  0.0  0.0   4508   712 pts/4    S+   13:41   0:00 sh -c ps aux
nikhila+   2680  0.0  0.3  44432  3148 pts/4    R+   13:41   0:00 ps aux
process id 2674
```

Now for the outdata.dat
cat outdata.dat gives

```
Search Val 218809          is in position 212529
Search Val 362884          is in position 352739
Search Val 337351          is in position 327908
Search Val 98207           is in position 95391
Search Val 346432          is in position 336736
Search Val 304504          is in position 295916
Search Val 74689           is in position 72576
Search Val 352087          is in position 342243
Search Val 499989          is in position 485989
Search Val 103211          is in position 100249
Search Val 54650           is in position 53102
Search Val 39776           is in position 38642
Search Val 50943           is in position 49483
Search Val 255257          is in position 248024
Search Val 247592          is in position 240575
Search Val 109760          is in position 106623
Search Val 214870          is in position 208711
Search Val 294732          is in position 286436
Search Val 396489          is in position 385419
Search Val 87183           is in position 84696
```

Now, cat indata.dat gives,

```
304504,499986
74689,499987
352087,499988
499989,499989
103211,499990
54650,499991
39776,499992
50943,499993
255257,499994
247592,499995
109760,499996
214870,499997
294732,499998
396489,499999
87183,500000nikhilabyreddy@ubuntu:~/Desktop/sf$
```