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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.

The screenshot shows the VMware website at https://my.vmware.com. The left sidebar has icons for VMware Cloud, Products, Solutions, Support, Downloads, Professional Services, Partner Programs, and Company. The main content area is titled "Download VMware Fusion". A dropdown menu "Select Version:" shows "10.0". Below it is a table:

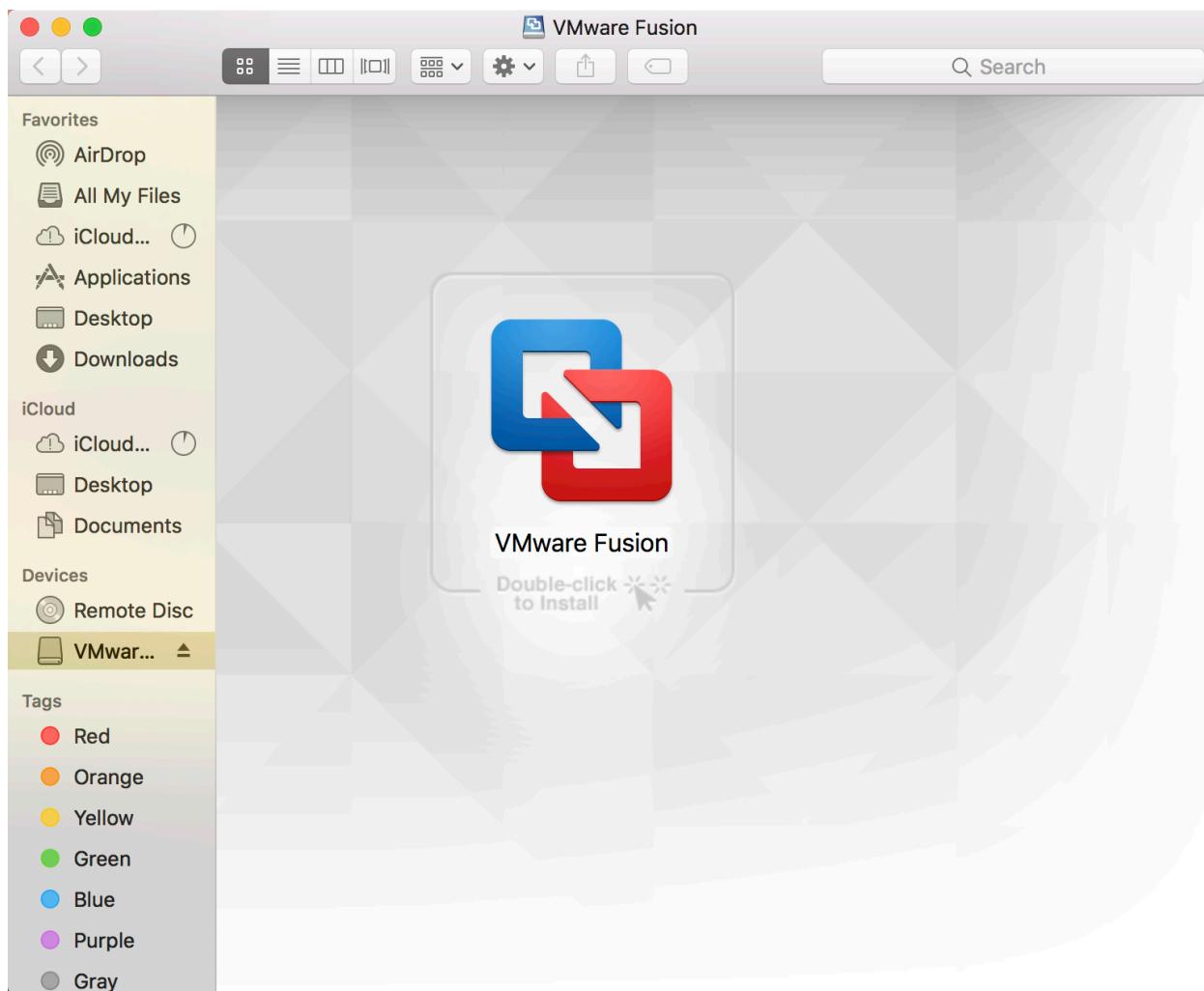
Product	Release Date
VMware Fusion 10.0.1	2017-09-28
VMware Fusion 10.0.1 (for Intel-based Macs)	2017-09-28

On the right, under "Product Resources", there are links for "View My Download History", "Product Info", "Documentation", "Community", and "Download Free Trial".

Click on Download free trial

The screenshot shows the VMware Fusion product page. The left sidebar is identical to the previous screenshot. The main content area has a banner: "By using the VMware site, you agree with our use of cookies." with buttons for "I Consent to Cookies", "More Information", and "Read our Cookie Policy". The navigation bar includes "Products > Fusion", social media links, and a search bar. The main title is "Fusion". Below it are tabs: OVERVIEW, FEATURES, USE CASES, TECH SPECS, COMPARE, FAQS, RESOURCES, and CHOOSE YOUR OS. To the right are buttons for "Upgrade >", "Download Now >", and "Buy Online". The central content area features a blue background with icons for various operating systems (Windows, Mac, Linux) and a person using a computer. To the right is a sidebar with "Buy Fusion Today" and "Exclusive Education Discounts".

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

The screenshot shows the Ubuntu website's desktop navigation bar. The 'Downloads' menu is open, showing options like Overview, Cloud, Server, Desktop (which is underlined), Core, IoT, Support, and Downloads. Below the navigation bar, there's a dark banner for the 'Ubuntu Enterprise Summit' from December 5-6, 2017. It includes a 'Sign up now' button and a small diagram of a network connection between a tower, a central node with three lines, and a cloud.

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Ubuntu Enterprise Summit
5 – 6 December 2017
Find out how the world's top companies use Ubuntu to succeed

Sign up now

Overview
Cloud
Server
Desktop
Alternative downloads
Ubuntu flavours

A diagram illustrating a network connection. At the top left is a tower icon. In the center is a rectangular box with three vertical lines extending downwards, each ending in a small circle. To the right of this box is a cloud icon. Arrows point from the tower to the central box and from the central box to the cloud. A line also extends downwards from the central box, pointing to a small car icon at the bottom left.

The screenshot shows the Ubuntu website's desktop navigation bar. The 'Desktop' link in the 'Downloads' menu is highlighted. Below the navigation bar, a breadcrumb trail shows the path: Downloads > Overview > Desktop. There are also links for Alternative downloads and Ubuntu flavours.

ubuntu Cloud Server Containers Desktop Core IoT Support Downloads Search

Downloads > Overview > Desktop Alternative downloads Ubuntu flavours

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:

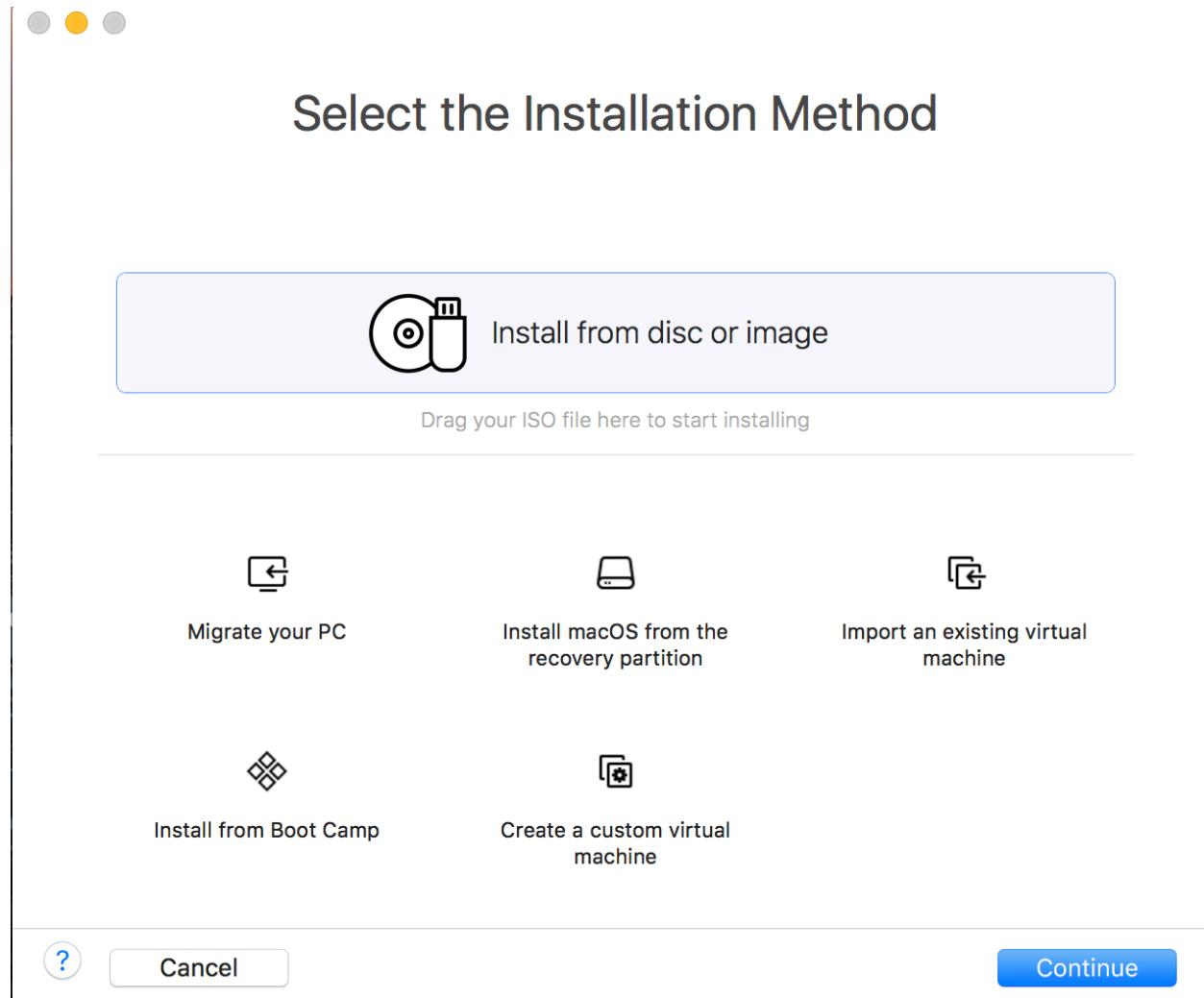
- ✓ 2 GHz dual core processor or better
- ✓ 2 GB system memory
- ✓ 25 GB of free hard drive space
- ✓ Either a DVD drive or a USB port for the installer media
- ✓ Internet access is helpful

[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.



Create a New Virtual Machine

This will guide you through installing Windows or another operating system in a virtual machine on your Mac.



Choose an operating system installation disc or image:



ubuntu-16.04.3-desktop-amd64.iso
Ubuntu 64-bit 16.04.3

Show in Finder

Use another disc or disc image...



Cancel

Go Back

Continue

Now click on continue and it shows up as below.



Linux Easy Install

With Easy Install, VMware Fusion will use the information provided here to automatically install Ubuntu 64-bit 16.04.3 from your installation disc and install drivers to optimize your virtual machine.



Use Easy Install

Display Name:

Account Name:

Password:

Confirm Password:

Make your home folder accessible to the virtual machine

The virtual machine can

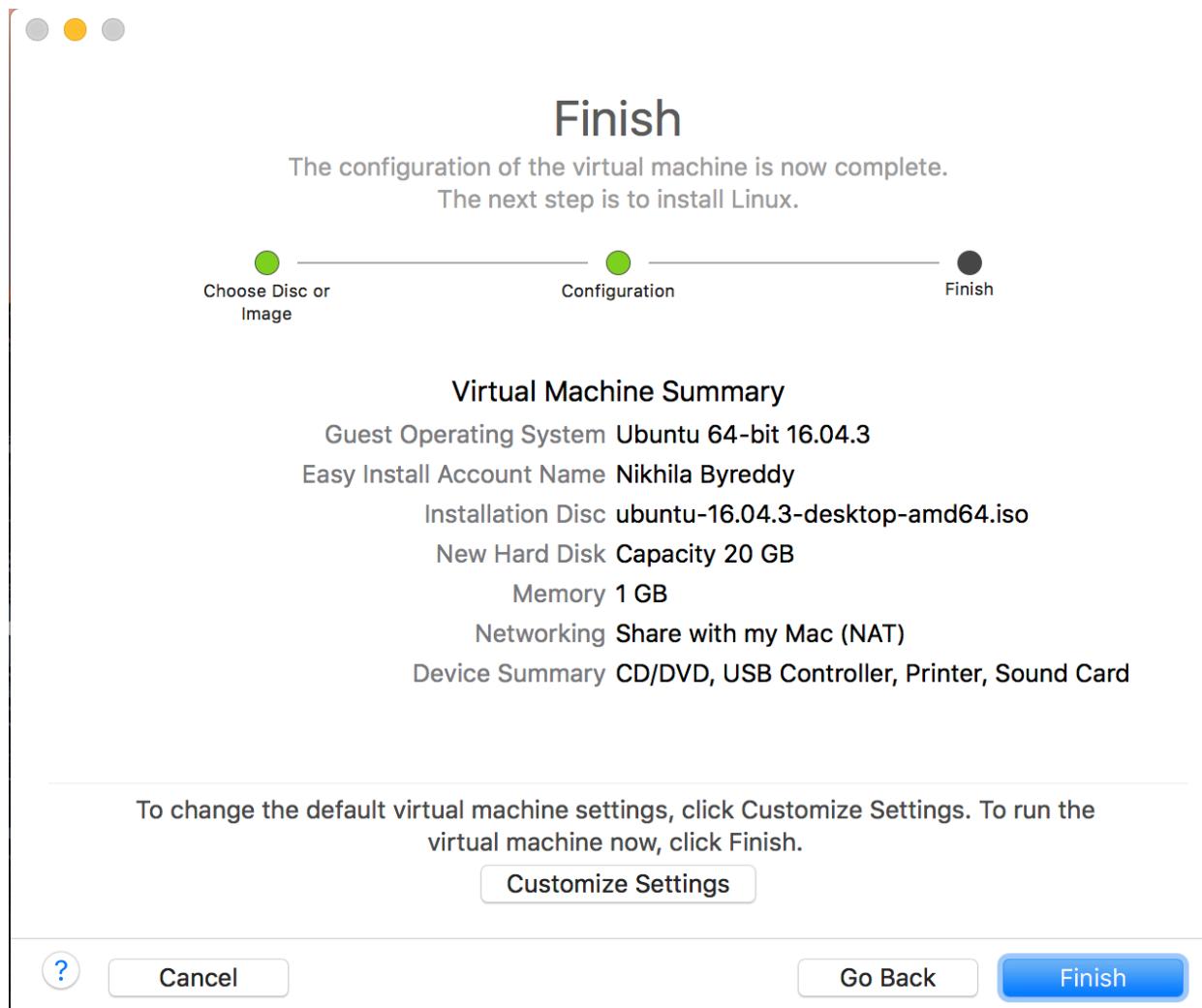


[Cancel](#)

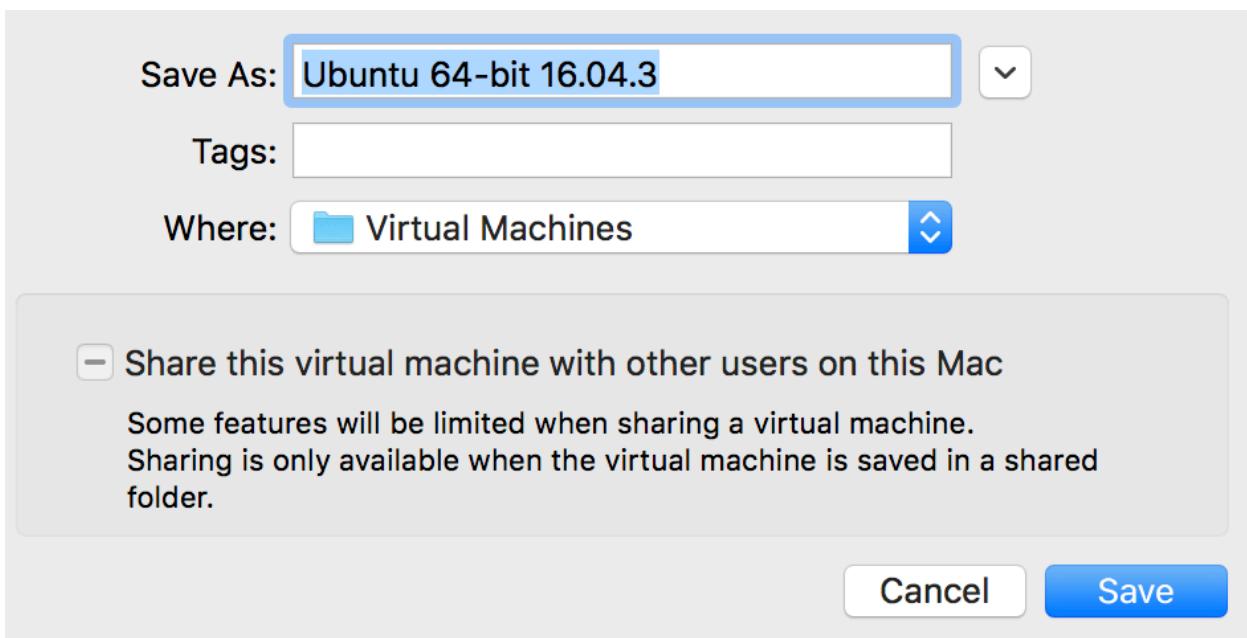
[Go Back](#)

[Continue](#)

Click on continue.

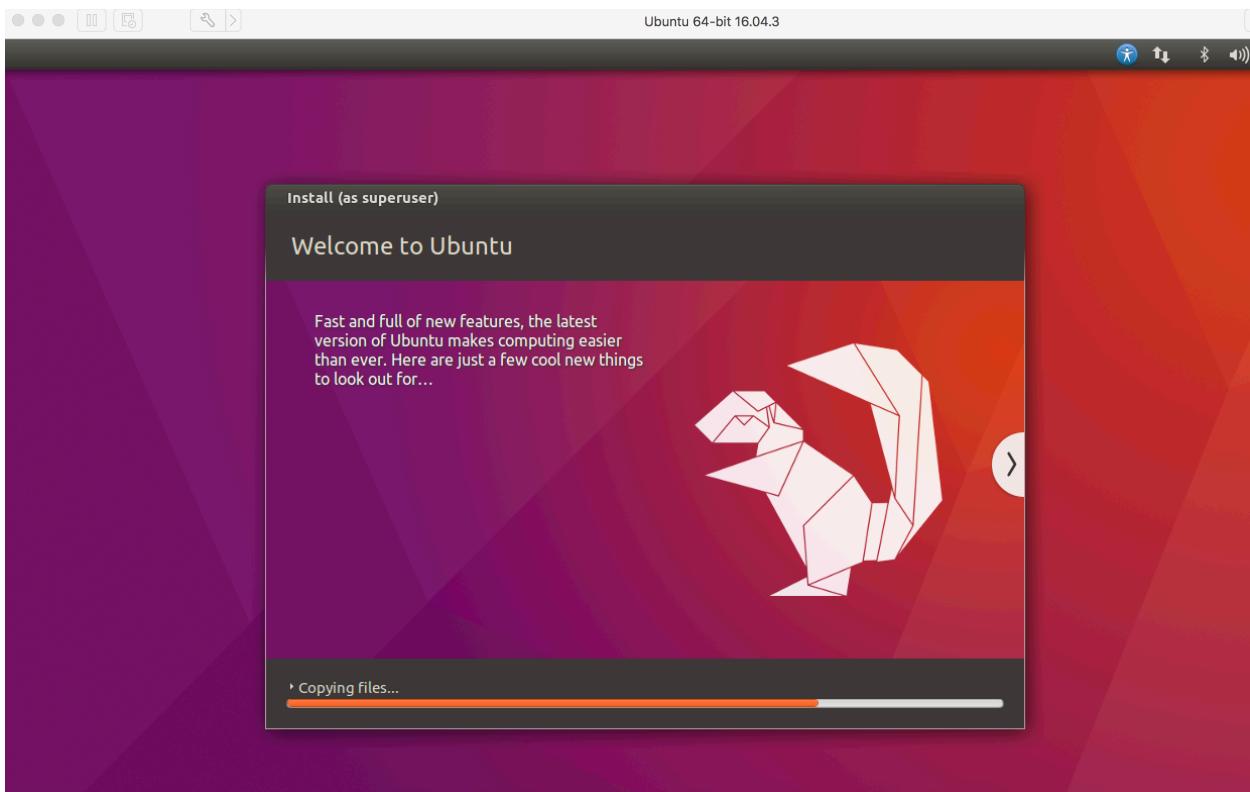
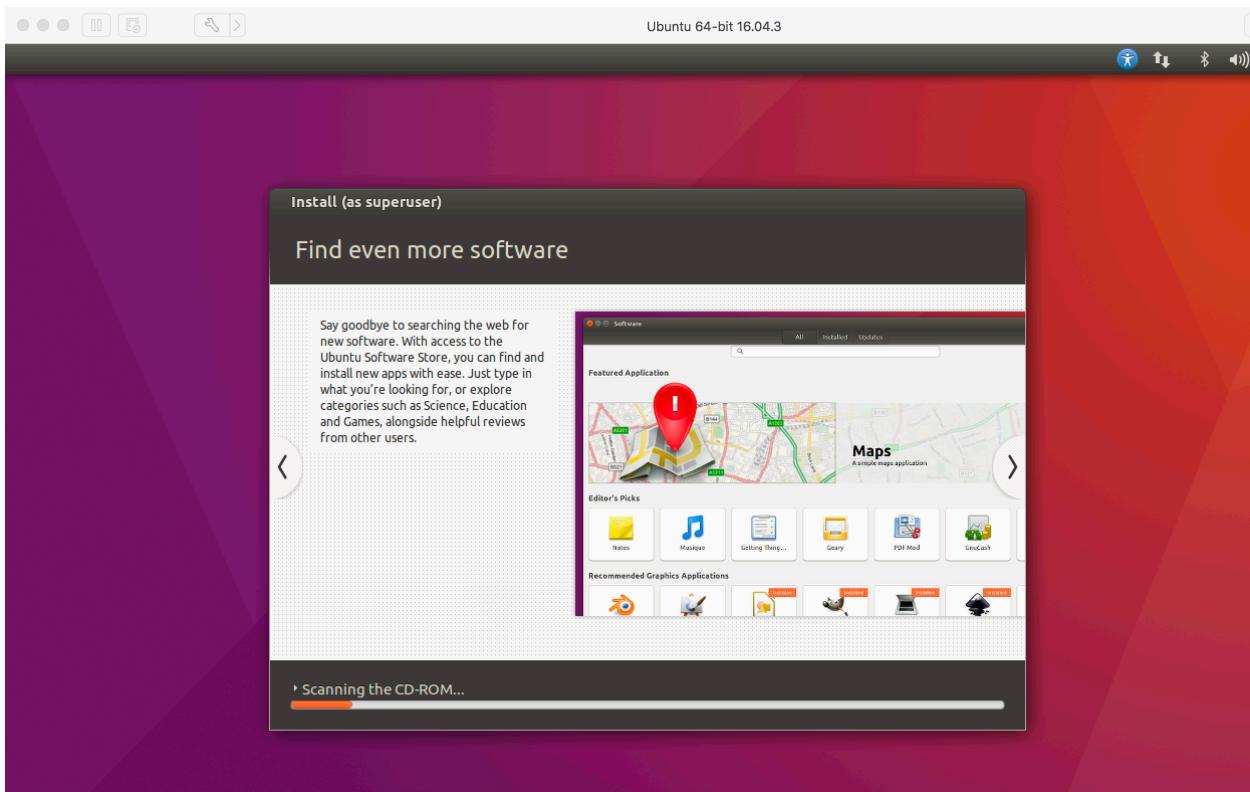


Now click on Finish.

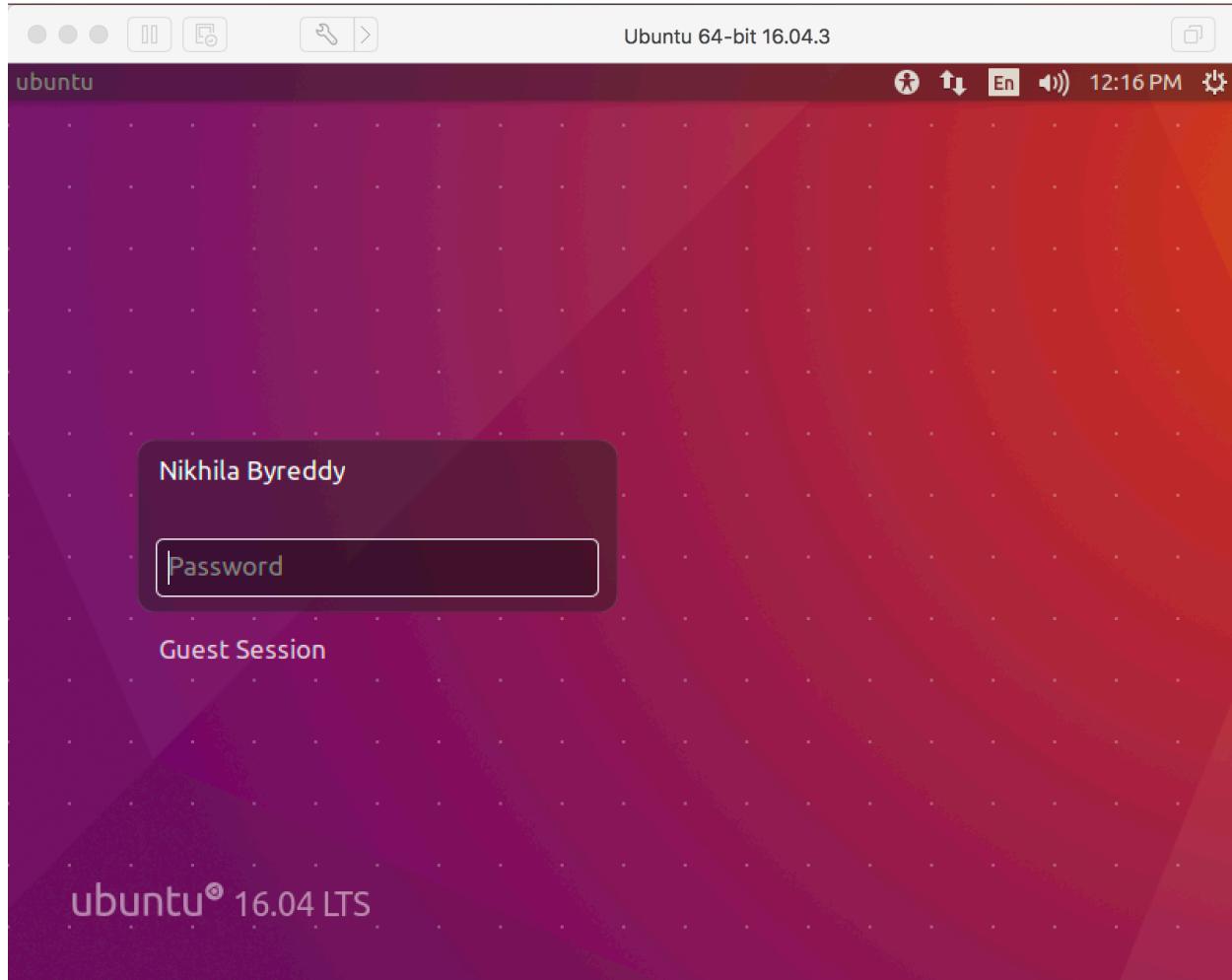


Click on Save.

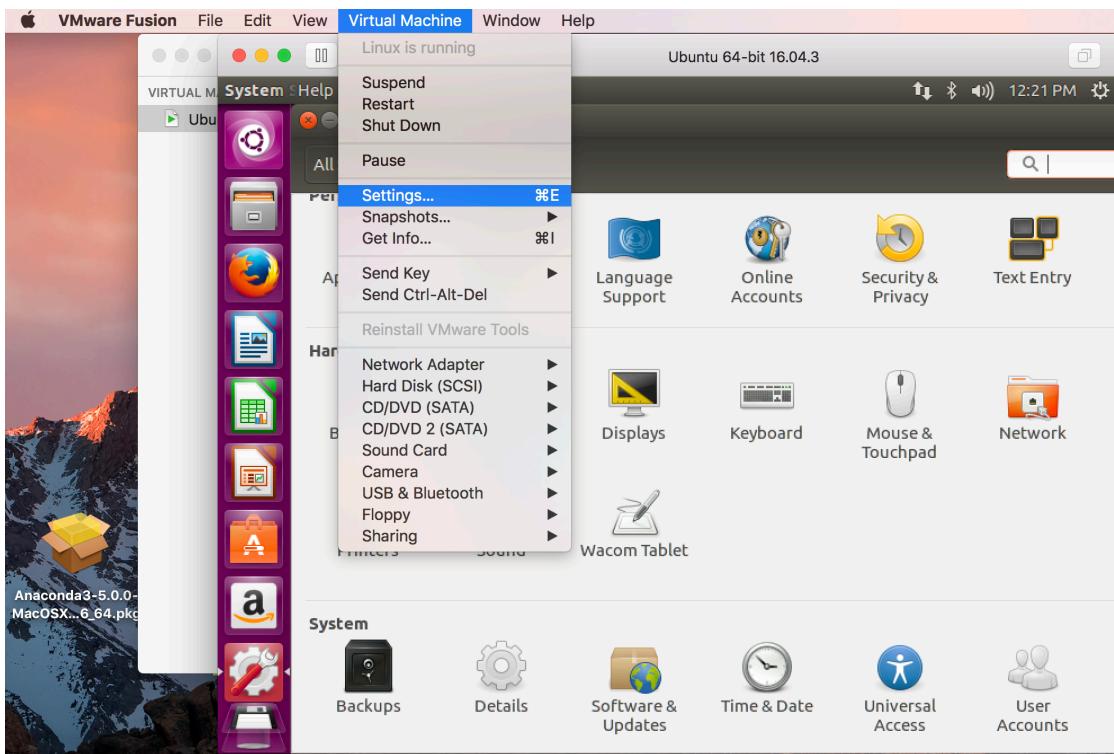
Ubuntu starts installing as a Guest Operating System in VMware.
This may take some time.



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.



This screenshot shows the "Ubuntu 64-bit 16.04.3: Settings" window. The title bar has "Show All", the window title, and "Add Device...".

System Settings

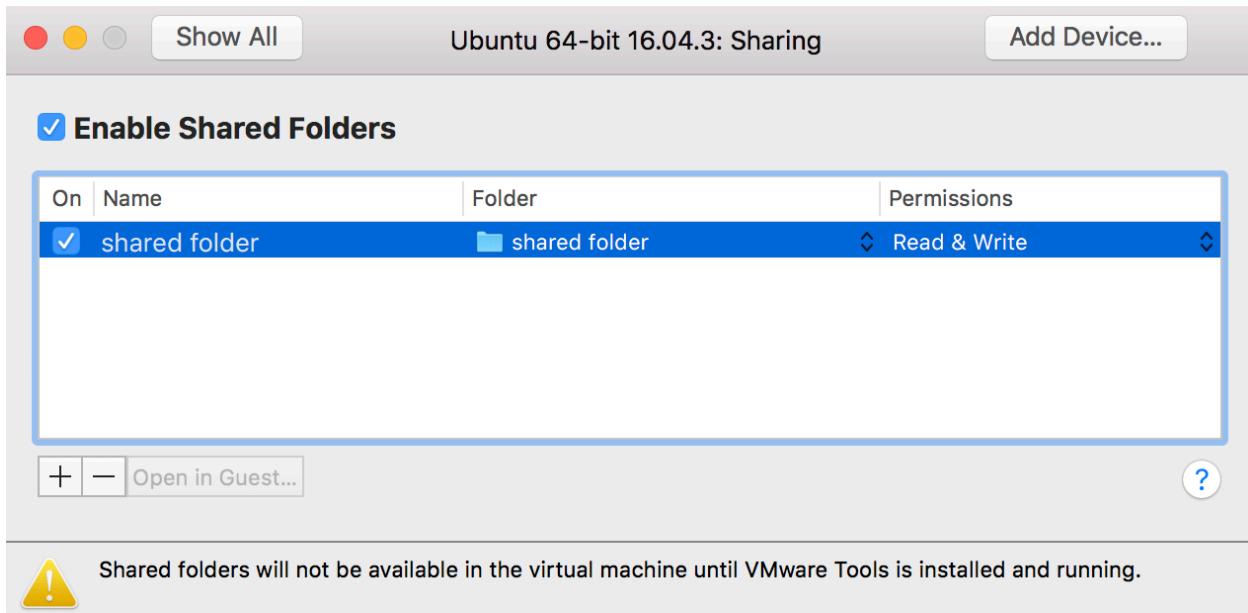
- General
- Sharing
- Keyboard & Mouse
- Processors & Memory
- Display

Removable Devices

- Network Adapter
- Hard Disk (SCSI)
- CD/DVD (SATA)
- CD/DVD 2 (SATA)
- Sound Card
- USB & Bluetooth
- Floppy

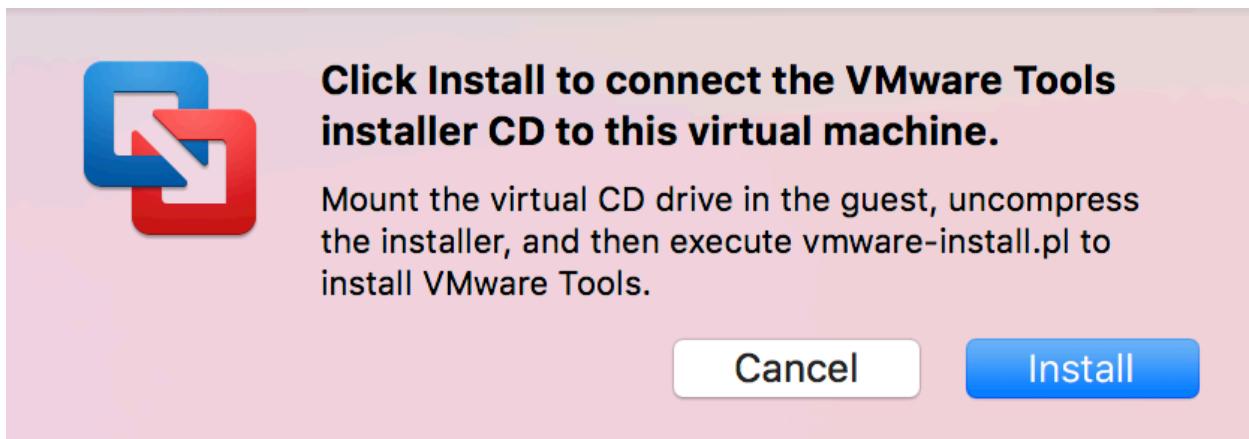
Other

- 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
nikhilabreddy@ubuntu:~$ sudo bash
[sudo] password for nikhilabreddy:
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.t
ar.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.x
sd
vmware-tools-distrib/vgauth/schemas/XMLSchema.dtd
vmware-tools-distrib/vgauth/schemas/xml.xsd
vmware-tools-distrib/vgauth/schemas/xenc-schema.xsd
```

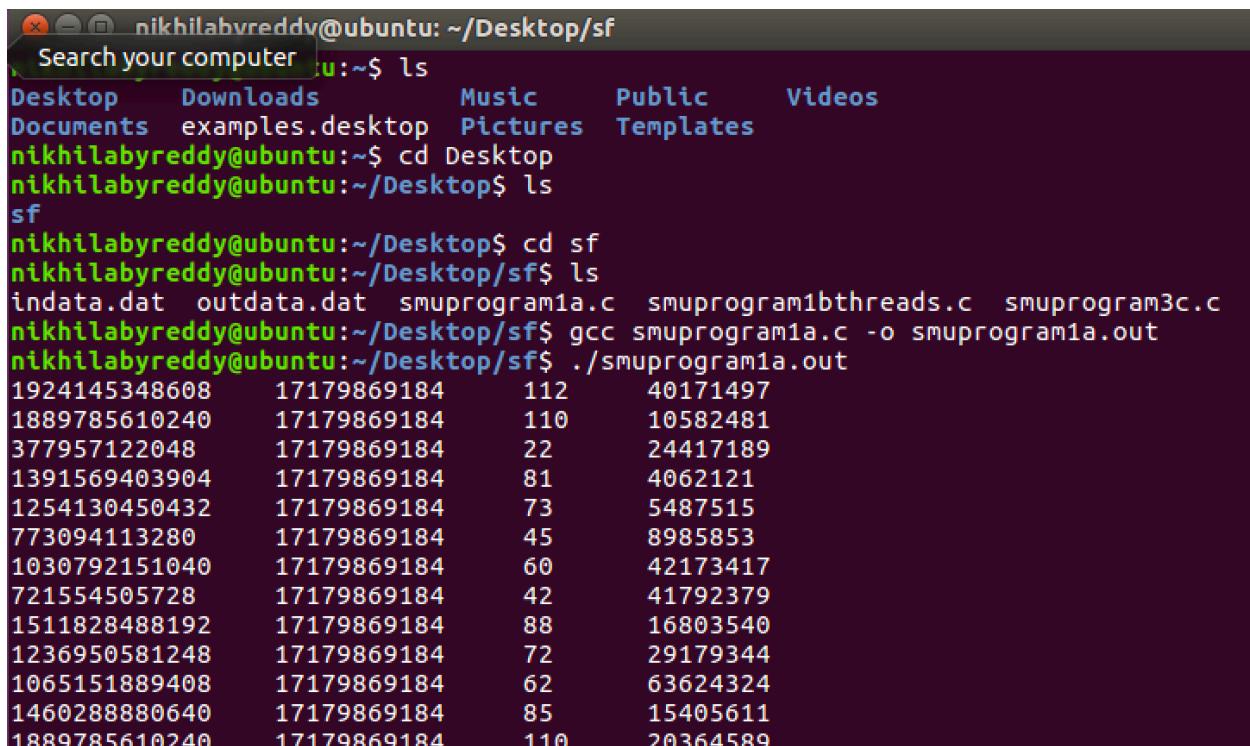
```

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.

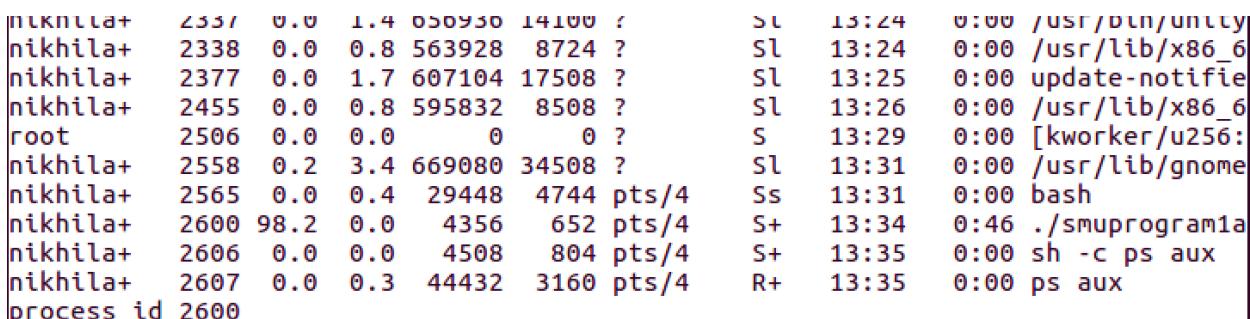
Compile and run smuprogram1a as shown below.



```

nikhilabreddy@ubuntu:~/Desktop/sf
Search your computer :~$ ls
Desktop Downloads Music Public Videos
Documents examples.desktop Pictures Templates
nikhilabreddy@ubuntu:~$ cd Desktop
nikhilabreddy@ubuntu:~/Desktop$ ls
sf
nikhilabreddy@ubuntu:~/Desktop$ cd sf
nikhilabreddy@ubuntu:~/Desktop/sf$ ls
indata.dat outdata.dat smuprogram1a.c smuprogram1bthreads.c smuprogram3c.c
nikhilabreddy@ubuntu:~/Desktop/sf$ gcc smuprogram1a.c -o smuprogram1a.out
nikhilabreddy@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

```



```

nikhilab+ 2557 0.0 1.4 050950 14100 ? Sl 13:24 0:00 /usr/bin/unity
nikhilab+ 2338 0.0 0.8 563928 8724 ? Sl 13:24 0:00 /usr/lib/x86_6
nikhilab+ 2377 0.0 1.7 607104 17508 ? Sl 13:25 0:00 update-notifie
nikhilab+ 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:
nikhilab+ 2558 0.2 3.4 669080 34508 ? Sl 13:31 0:00 /usr/lib/gnome
nikhilab+ 2565 0.0 0.4 29448 4744 pts/4 Ss 13:31 0:00 bash
nikhilab+ 2600 98.2 0.0 4356 652 pts/4 S+ 13:34 0:46 ./smuprogram1a
nikhilab+ 2606 0.0 0.0 4508 804 pts/4 S+ 13:35 0:00 sh -c ps aux
nikhilab+ 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.

```
nikhilabreddy@ubuntu:~/Desktop/sf$ gcc -pthread smuprogram1bthreads.c -o smuprogram1bthreads.out
nikhilabreddy@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/zettg
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

```

nikhilabreddy@ubuntu:~/Desktop/sf$ gcc -pthread smuprogram3c.c -o smuprogram3c.out
nikhilabreddy@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]

```

```

nikhilabreddy+ 2327  0.0  1.1  654292  11024 ?      St  13:24  0:00 /usr/lib/x86_6
nikhilabreddy+ 2337  0.0  1.4  656936  14084 ?      Sl  13:24  0:00 /usr/bin/unity
nikhilabreddy+ 2338  0.0  0.8  563928  8712 ?      Sl  13:24  0:00 /usr/lib/x86_6
nikhilabreddy+ 2377  0.0  1.7  607104  17508 ?      Sl  13:25  0:00 update-notifie
nikhilabreddy+ 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/u256:0]
nikhilabreddy+ 2558  0.3  3.5  669272  34932 ?      Sl  13:31  0:02 /usr/lib/gnome
nikhilabreddy+ 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]
nikhilabreddy+ 2674 34.0  0.7  307144  7068 pts/4   S+  13:41  0:00 ./smuprogram3c
nikhilabreddy+ 2679  0.0  0.0   4508   712 pts/4   S+  13:41  0:00 sh -c ps aux
nikhilabreddy+ 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$
```