GLOBAL

INSTITUTE OF ENGINEERING AND TECHNOLOGY

MELVISHARAM, RANIPET- 632509

DEPARTMENT OF
ARTIFICIAL INTELLIGENCE & DATA SCIENCE

AL3452-OPERATING SYSTEMS LABORATORY

ACADEMIC YEAR (2024 - 2025)

NAME : _____

REG NO : _____

YEAR/SEM : **II / IV**

GLOBAL

INSTITUTE OF ENGINEERING AND TECHNOLOGY
257/1, Bangalore - Chennai Highway, Melvisharam - 632509

BONAFIDE CERTIFICATE

Name :

Course : B. TECH-AIDS

Year / Sem: II / IV

Register No:

Certified that this is a bonafide record of work done by the above student in the **AL3452-OPERATING SYSTEMS LABORATORY** period 2024 to 2025.

Staff-in-Charge **Head of the Department**

Submitted for the Practical examination held on_____at Global Institute of Engineering and Technology, Melvisharam, Ranipet - 632509.

Internal Examiner **External Examiner**

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EX.NO:1	INSTALLATION OF WINDOWS OPERATING SYSTEM
DATE:	

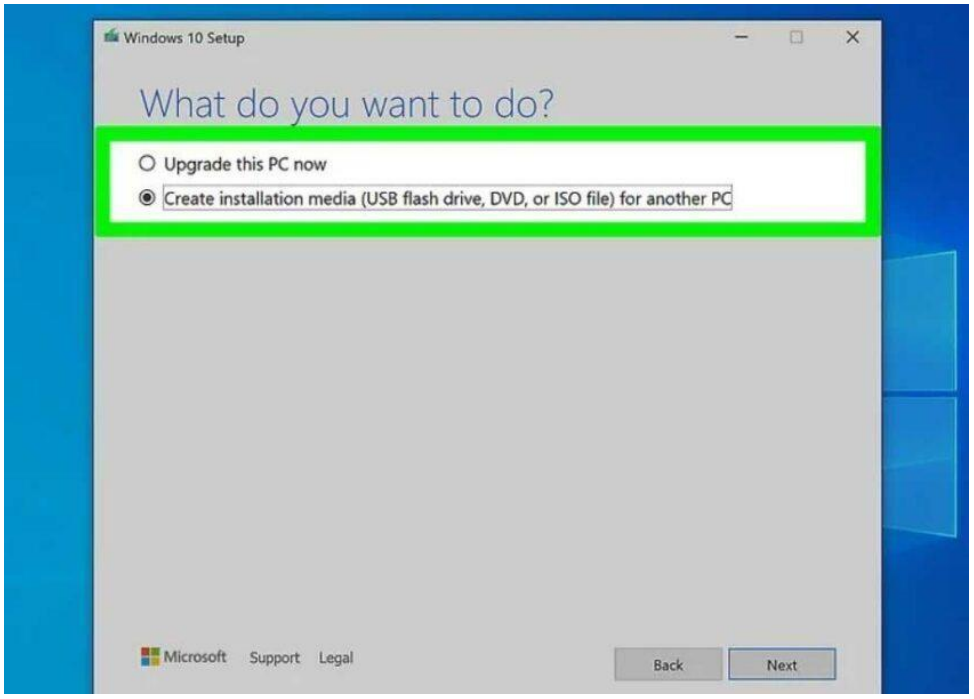
AIM:

To install windows operating system.

Operating System

In simple words, Operating System is system software that is required to run applications programs and utilities.

Create a window installation media



Requirement:

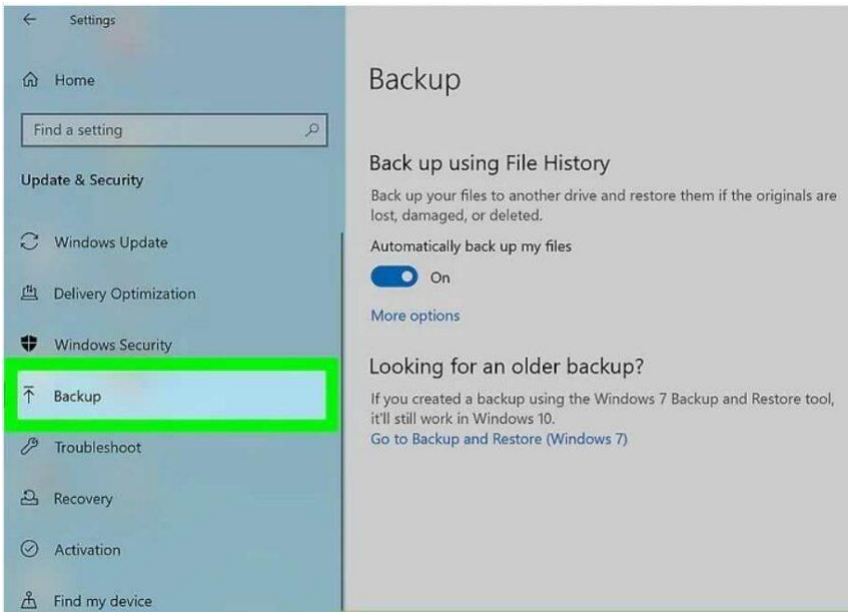
- Minimum 8 GB of Pen Drive.
- A computer with an internet connection.

download windows from the official website of Microsoft. After successfully downloaded the .exe file, follow the steps below:

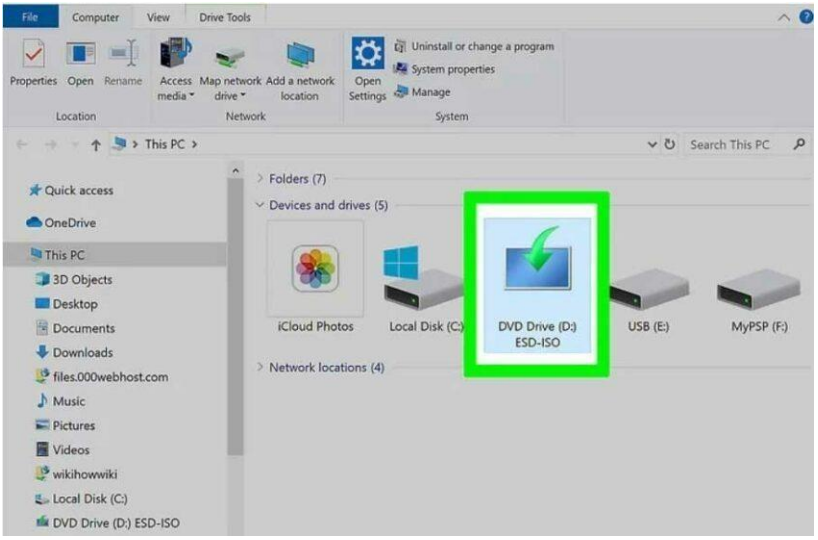
Steps to create installation media

- Plugin a flash drive
- Download a tool MediaCreationTool.exe
- Run it, and click on accept
- Select installation media (DVD/ISO, USB Drive) from another PC and click next
- Select your language, windows edition and PC architecture and click NEXT
- Now, you need to select the USB Pen drive and click NEXT

Backup your files (optional)

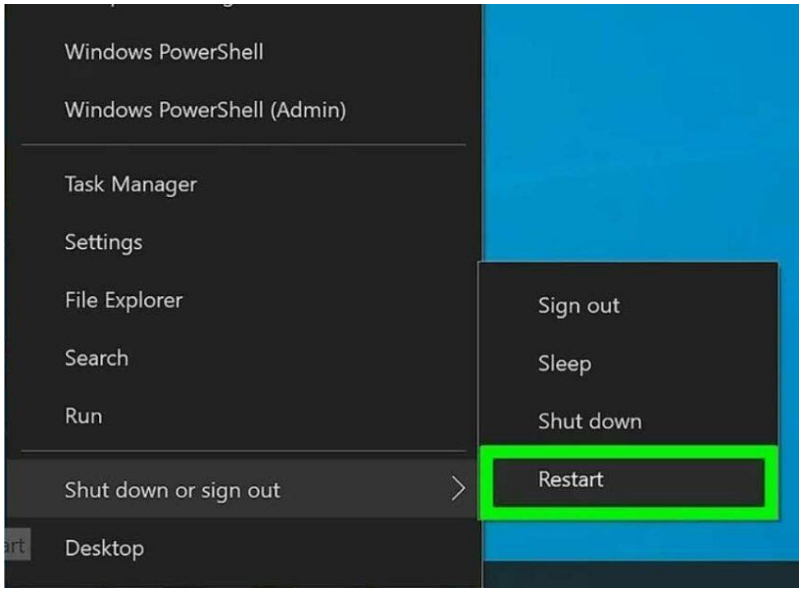


Insert Window installation media to Computer



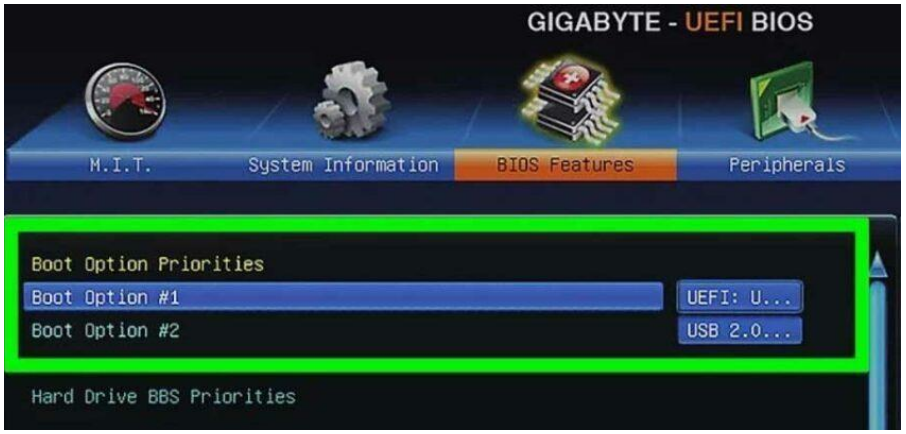
Now, It's time to insert a media installation (USB or DVD) into the computer. Make sure all the windows files have been copied to the flash drive.

Boot the computer



click on the windows icon and choose the option "**Shut down or sign out**" and then "**Restart**". as pc reboot, press **F10, F11, F12, or ESC** in order to enter the boot menu.Press **F1, F2, F3, or ESC** to enter the BIOS (Basic Input Output System).

Select the USB Drive



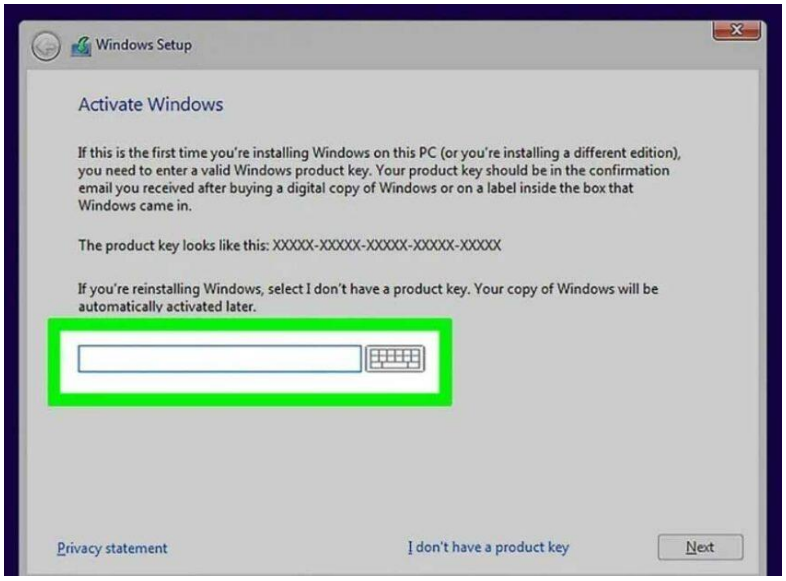
Select BIOS Features option

In Boot Options Priorities, Select the Boot Option #1. Click it and select the flash drive option.

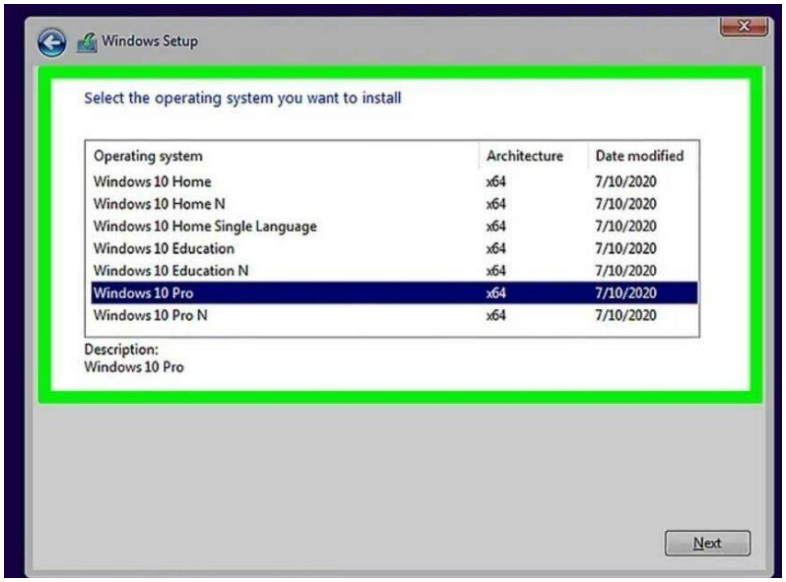
Install Now

Click on “Install now” and continue to the next step.

Enter your windows product key and click next



Select the edition of window to install



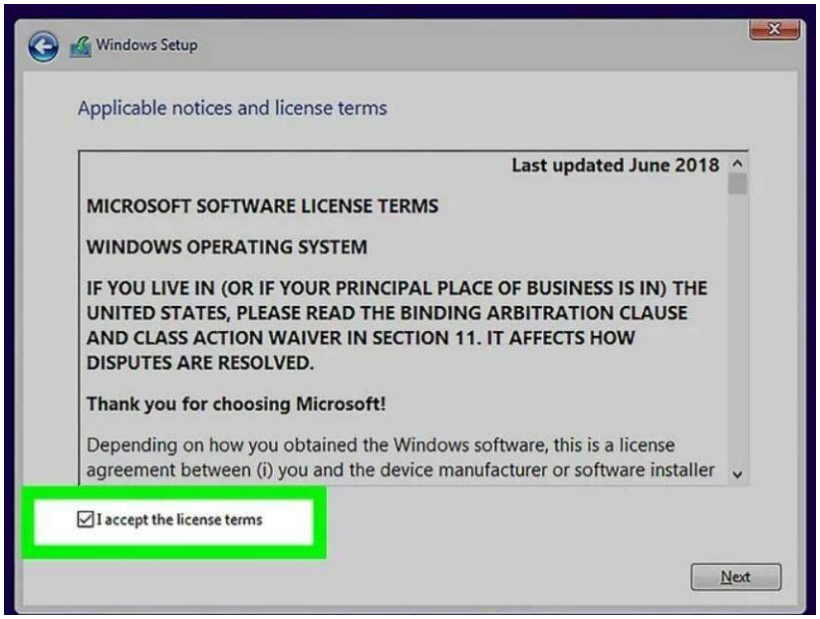
Windows operating system comes in two-bit options 32-bit and 64-bit. x86 denotes 32-bit and x64 denotes 64-bit.

Difference between 32-bit and 64-bit

- "The 32 bit OS can store and handle lesser data than the 64 bit OS. it addresses a maximum of 4,294,967,296 bytes (4 GB) of RAM. The 64 bit OS, on the other hand, can handle more data than the 32 bit OS."
- x86 or 32-bit operating system supports only 32-bit software programme
- x64 or 64-bit operating system supports both 32-bit and 64-bit software programme.

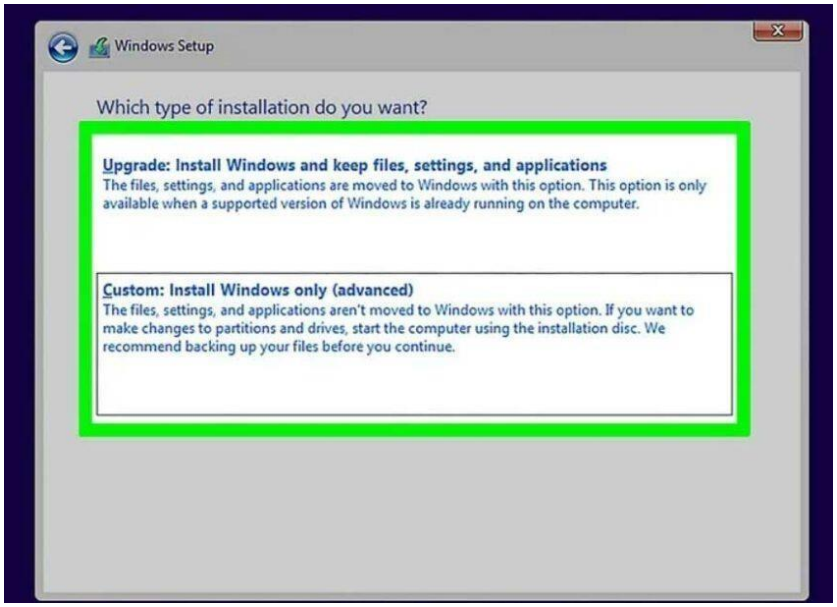
go for "**Windows 10 Home**" mostly used OS for personal computers. now click "NEXT".

Accept License Term "I accept the license terms"



Before proceeding further, accept the license terms and then click next to continue the installation.

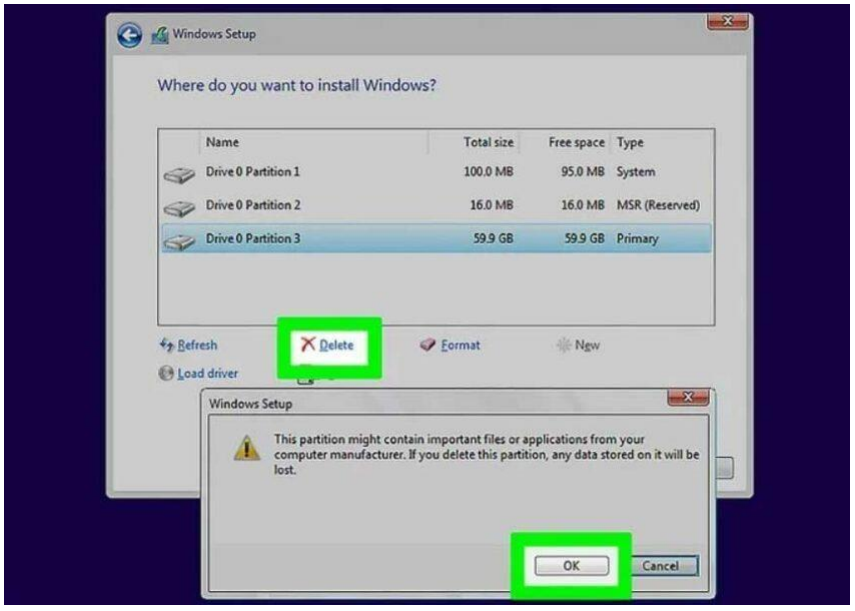
Choose: Custom install window only or Upgrade:



Upgrade: This option is useful when installing the latest OS to your existing supporting versions of the operating system.

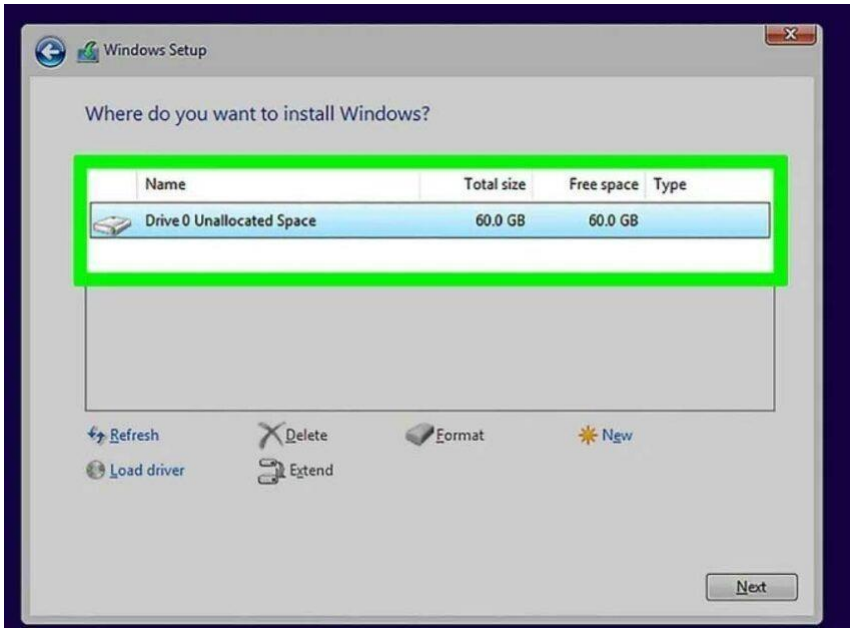
Custom Installation: This option is useful while installing OS to brand new or existing computer, which doesn't have an OS.

Select a drive or partition



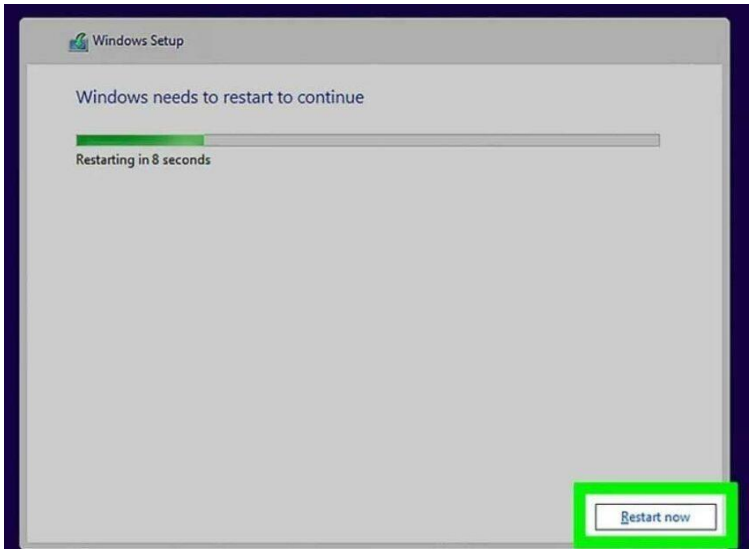
Choose the correct partition where you are going to install your operating system and then click on "Delete".

Select a drive with unallocated space and click “Next”



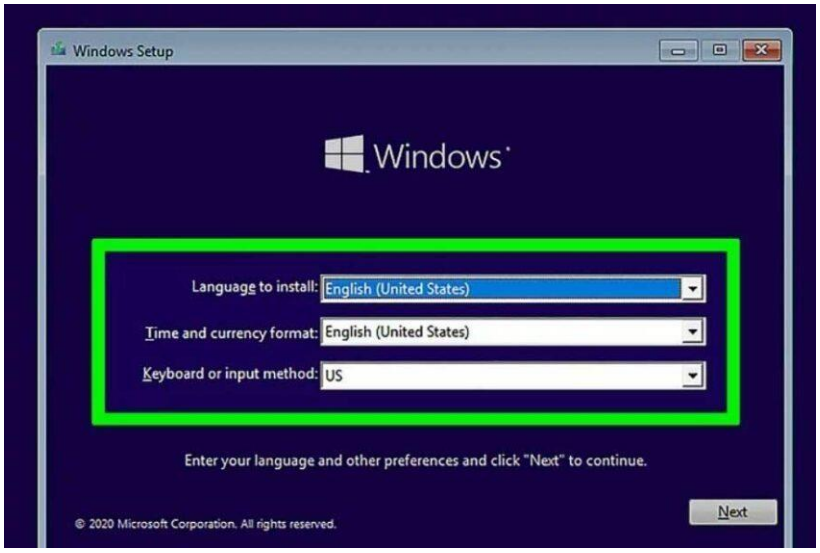
Choose the drive with unallocated space and click “Next” to continue the installation of windows. This might take little time to copy data to hard drive, as it’s done move on to the next step.

Remove the USB flash drive and restart your computer.



As you can see, you have successfully installed the operating system to the computer system. Now, remove the USB flash drive and restart your computer.

Setting Up Windows



For setting up windows, only a few steps as mentioned below:

- Verify your region and keyboard input
- Connect to your Wireless network.
- Select for Personal Use or Organizational use and click next

Sign in to Windows

- Click "**Accept**" to Set up Cortana
- Click "Yes" and follow instructions to set up the Windows timeline
- Choose your privacy settings and click "**Accept**"

This will take a few more times to set up your windows. Now, wait for the setting up. As it's done.

RESULT:

Thus the installation of windows operating system was executed successfully.

EX.NO:2(a)	BASICS OF UNIX COMMANDS
DATE:	

AIM:

To study and execute Unix commands.

PROCEDURE:

Unix is security conscious, and can be used only by those persons who have anaccount.

Telnet (Telephone Network) is a Terminal emulator program for TCP/IP networks that enables users to log on to remote servers.

To logon, type telnet server_ip address in run window.

User has to authenticate himself by providing username and password. Once verified, a greeting and $ prompt appears. The shell is now ready to receive commands from the user. Options suffixed with a hyphen (–) and arguments are separated by space**.**

GENERAL COMMANDS

Command	Function
Date	Used to display the current system date and time.
date +%D	Displays date only
date +%T	Displays time only
date +% Y	Displays the year part of date
date +% H	Displays the hour part of time
Cal	Calendar of the current month
Calyear	Displays calendar for all months of the specified year
calmonth year	Displays calendar for the specified month of the year
Who	Login details of all users such as their IP, Terminal No, User name,
who am i	Used to display the login details of the user
Tty	Used to display the terminal name
Uname	Displays the Operating System
uname –r	Shows version number of the OS (kernel).
uname –n	Displays domain name of the server
echo "txt"	Displays the given text on the screen
echo $HOME	Displays the user's home directory
Bc	Basic calculator. Press **Ctrl+d**to quit
Lpfile	Allows the user to spool a job along with others in a print queue.
man cmdname	Manual for the given command. Press **q** to exit
History	To display the commands used by the user since log on.
Exit	Exit from a process. If shell is the only process then logs out

DIRECTORY COMMANDS

Command	Function
Pwd	Path of the present working directory
Mkdirdir	A directory is created in the given name under the current directory
mkdirdir1 dir2	A number of sub-directories can be created under one stroke
cd subdir	Change Directory. If the subdirstarts with / then path startsfrom **root** (absolute) otherwise from current working directory.
Cd	To switch to the home directory.
cd /	To switch to the root directory.
cd..	To move back to the parent directory
rmdirsubdir	Removes an empty sub-directory.

FILE COMMANDS

Command	Function
cat >filename	To create a file with some contents. To end typing press **Ctrl+d**. The >symbol means redirecting output to a file. (<for input)
cat filename	Displays the file contents.
cat >>filename	Used to append contents to a file
cpsrc des	Copy files to given location. If already exists, it will be overwritten
cp –i src des	Warns the user prior to overwriting the destination file
cp –r src des	Copies the entire directory, all its sub-directories and files.
mv old new	To rename an existing file or directory. –i option can also be used
mv f1 f2 f3 dir	To move a group of files to a directory.
mv –v old new	Display name of each file as it is moved.
Rmfile	Used to delete a file or group of files. –i option can also be used
rm *	To delete all the files in the directory.
rm –r *	Deletes all files and sub-directories
rm –f *	To forcibly remove even write-protected files
Ls	Lists all files and subdirectories (blue colored) in sorted manner.
Lsname	To check whether a file or directory exists.
lsname*****	Short-hand notation to list out filenames of a specific pattern.
ls –a	Lists all files including hidden files (files beginning with **.**)
ls –x dirname	To have specific listing of a directory.
ls –R	Recursive listing of all files in the subdirectories

ls –l	Long listing showing file access rights (read/write/execute-**rwx** for user/group/others-**ugo**).
cmpfile1 file2	Used to compare two files. Displays nothing if files are identical.

OUTPUT

GENERAL COMMANDS

[student@veccse ~]date

Sat May 06 06:10:34 UTC 2025

[student@veccse ~]date +%D

05/06/24

[student@veccse ~]date +%T

10:13:11

[student@veccse ~]date +%Y

2024

[student@veccse ~]date +%H

10

[student@veccse ~]who

studentpts/1 May 06 10:05 (172.16.1.14)

[student@veccse ~]who am i

studentpts/1 May 16 10:05 (172.16.1.14)

[student@veccse ~]tty

/dev/pts/1

[student@veccse ~]uname

Linux

[student@veccse ~]echo "hello"

hello

[student@veccse ~]echo $HOME

/home/student

[student@veccse ~]bcbc

1.06

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For details type `warranty'.

[student@veccse ~]man lp

lp(1) Easy Software Products lp(1)

NAME

lp - print files cancel - cancel jobs SYNOPSIS

lp [-E] [-c] [-d destination] [-h server] [-m] [-n num- copies [-o option] [-qpriority] [-s] [-t title] [-H handling

] [-P page-list] [file(s)]

lp [-E] [-c] [-h server] [-i job-id] [-n num-copies [-o option] [-q priority] [-ttitle] [-H handling] [-P page-list] cancel [-a] [-h server] [-u username] [id] [destination] [destination-id]

DESCRIPTION

lpsubmits files for printing or alters a pending job. Use a filename of "-" to forceprinting from the standard input.

cancelcancels existing print jobs. The -a option will remove all jobs from thespecified destination.

OPTIONS

The following options are recognized by lp:

[student@veccse ~]history

1 date
2 date +%D
3 date +%T
4 date +%Y
5 date +%H
6 who
7 who am i
8 tty
9 uname
10 uname -r
11 uname -n
12 echo "helloi"
13 echo $HOME
14 bc
15 man lp
16 history

DIRECTORY COMMANDS

[student@veccse]$ pwd

/home/student

[student@veccse ~]mkdir san

[student@veccse ~]mkdir s1 s2

[student@veccse ~]ls

s1 s2 san **[student@veccse ~]cd**

s1 [student@veccse s1]$ cd /

[student@veccse /]$ cd . .

[student@veccse /]$ rmdir s1

[student@veccse ~]$ ls

s2 san

FILE COMMANDS

[student@vecit ~]$ cat>test

hi welcome operating systems lab

[student@vecit ~]$ cat test

hi welcome operating systems lab **[student@vecit ~]$**

cat>>test fourth semester[student@vecit ~]$ cat test

hi welcome operating systems lab fourth semester

[student@vecit ~]$ cat>test1

[student@vecit ~]$ cp test test1

[student@vecit ~]$ cat test1

hi welcome operating systems lab fourth semester **[student@vecit ~]$**

cp -i test test1 cp: overwrite `test1'? y[student@vecit ~]$ cp -r test

test1

[student@vecit ~]$ ls

s s2 san swap.sh temp.sh test TEST test1

[student@vecit ~]$ mv san san1 [student@vecit ~]$

ls

s s2 san1 swap.sh temp.sh test TEST test1

[student@vecit ~]$ mv test test1 san1 [student@vecit

~]$ mv -v san1 sannew

`san1' -> `sannew'

[student@vecit ~]$ ls

s s2 sannew swap.sh temp.sh TEST

[student@vecit ~]$ cmp test test1cmp:

test: No such file or directory

RESULT

Thus the study and execution of Unix commands has been completedsuccessfully.

EX. NO: 1(b)	SIMPLE SHELL PROGRAMS
DATE:	

AIM:

To write simple shell scripts using shell programming fundamentals.

DESCRIPTION:

The activities of a shell are not restricted to command interpretation alone. The shell also has Rudimentary programming features. When a group of commands has to be executed regularly, they are stored in a file (with extension .sh). All such files are called shell scripts or shell programs. Shell programs run in interpretive mode.

Preliminaries

1. Comments in shell script start with #. It can be placed anywhere in a line; the shell ignores contents to its right. Comments are recommended but not mandatory
2. Shell variables are loosely typed i.e. not declared. Their type depends on the value assigned. Variables when used in an expression or output must be prefixed by $.
3. The read statement is shell's internal tool for making scripts interactive.
4. Output is displayed using echo statement. Any text should be within quotes. Escape sequence should be used with –e option.
5. Commands are always enclosed with ` ` (back quotes).
6. Expressions are computed using the expr command. Arithmetic operators are + - * / %. Meta characters * ( ) should be escaped with a \.
7. Multiple statements can be written in a single line separated by ;
8. The shell scripts are executed using the sh command (sh filename).

Swapping values of two variables

Algorithm

Step 1 : Start

Step 2 : Read the values of a and b

Step 3 : Interchange the values of a and b using another variable t as follows:t = a,a = b,

b =t

Step 4 : Print a and b

Step 5 : Stop

Program (swap.sh) # Swapping values

```
echo -n "Enter value for A : " read a  echo
-n "Enter value for B : " read bt=$a
```

```
a=$b b=$t
echo "Values after Swapping" echo "A Value is $a"echo
"B Value is $b"
```

Output

[student@vecit ~]$ sh swap.sh Enter Value for A:5 Enter Value for B:6 Values after Swapping A value is 6B values is 5 [student@vecit ~]$

Farenheit to Centigrade Conversion

Algorithm

Step 1: Start

Step 2: Read Fahrenheit value

Step 3: Convert Fahrenheit to centigrade using the formulae:

(Fahrenheit – 32) × 5/9

Step 4: Print centigrade

Step 5: Stop

Program

```
# Degree conversion
echo -n "Enter Fahrenheit : " read f
c=`expr\( $f - 32 \) \* 5 / 9`
echo "Centigrade is : $c"
```

Output

[student@vecit ~]$ sh temp.sh Enter Fahrenheit:4 Centrigrade is: -15[student@vecit ~]$

RESULT

Thus using programming basics, simple shell scripts were executed

CONDITIONAL CONSTRUCTS

AIM:

To write shell scripts using decision-making constructs.

DESCRIPTION:

Shell supports decision-making using if statement. The if statement like its counterpart in programming languages has the following formats. The first construct executes the statements when the condition is true. The second construct adds an optional else to the first one that has different set of statements to be executed depending on whether the condition is true or false. The last one is an elif ladder, in which conditions are tested in sequence, but only one set of statements is executed.

if [condition *]then* *statements* *fi*	*if [condition* *]then* *statements* *else* *statements* *fi*	*if [condition* *]then* *statements elif* *[condition]* *then* *statements .. .* *else* *statements* *fi*

Operator Description

-eq	Equal to
-ne	Not equal to
-gt	Greater than
-ge	Greater than or equal to
-lt	Less than
-le	Less than or equal to
-a	Logical AND
-o	Logical OR
!	Logical

Odd or even

Algorithm

Step1:Start

Step 2 : Read number

Step 3 : If number divisible by 2 then Print "Number is Even"

Step 3.1 : else Print "Number is Odd"

Step 4 : Stop Program

 # Odd or even using if-else

```
echo -n "Enter a non-zero number : " readnumrem=`expr
$num % 2` if [ $rem -eq 0 ]
then
echo "$num is Even" elseecho
"$num is Odd" fi
```

Output

```
[student@vecit ~]$ sh oddeven.sh
Enter a non-zero number : 12 12 is Even
```

String comparison

Algorithm

Step 1 : Start

Step 2 : Read strings str1 and str2

Step 3 : If str1 = str2 then Print "Strings are the same"

Step 3.1 : else Print "Strings are distinct"

Step 4 : Stop

Program

```
echo -n "Enter the first string : " read s1 echo -n
"Enter the second string : " read s2if [ $s1 ==
$s2 ] then
echo "Strings are the same" elseecho
"Strings are distinct" fi
```

Output

```
[student@vecit ~]$ sh strcomp.sh
Enter the first string :ece-a Enter the second string : ECE-A Strings are distinct
```

RESULT

Thus using if statement scripts with conditional expressions were executed

MULTI-WAY BRANCHING

AIM:

To write shell scripts using case construct to match patterns.

DESCRIPTION:

The case statement is used to compare a variables value against a set of constants (integer, character, string, range). If it matches a constant, then the set of statementsfollowed after)is executed till a ;; is encountered. The optional default block is indicated by *. Multiple constants can be specified in a single pattern separated by

|.

case variable in

constant1)

statements ;;

constant2)

statements ;;

. . .

constantN) statements ;;

**) statements*

esac

Simple Calculator

Algorithm

Step 1 : Start

Step 2 : Read operands a and b

Step 3 : Display operation menu

Step 4 : Read option

Step 5 : If option = 1 then Calculate c = a + b

Step 5.1 : else if option = 2 then Calculate c = a – b Step

5.2 : else if option = 3 then Calculate c = a * b Step 5.3

: else if option = 4 then Calculate c = a / b Step 5.4 :

else if option = 5 then Calculate c = a % b

Step 5.5 : else Print "Invalid option"

Step 6 : Print c

Step 7 : Stop

Program

```
# Arithmetic operations--multiple statements in a block echo -n "Enter the two numbers : "
read a b
echo " 1. Addition" echo " 2. Subtraction" echo
" 3. Multiplication" echo " 4. Division"
echo " 5. Modulo Division" echo -n "Enter the option : " read optioncase
$option in
1)      c=`expr $a + $b` echo "$a + $b = $c";;
2)      c=`expr $a - $b` echo "$a - $b = $c";;
3)      c=`expr $a \* $b` echo "$a * $b = $c";;
4)      c=`expr $a / $b` echo "$a / $b = $c";;
5)      c=`expr $a % $b` echo "$a % $b = $c";;
*) echo "Invalid Option" esac
```

Output

```
[student@vecit ~]$ shsimplecal.shEnter
the two numbers : 2 4
1.      Addition
2.      Subtraction
3.      Multiplication
4.      Division
5.      Modulo Division Enter the option : 1 2 + 4 = 6
```

RESULT

Thus using case statement, shell scripts were executed.

LOOPING

AIM

To write shell scripts using looping statements.

DESCRIPTION:

Shell supports a set of loops such as for, while and until to execute a set of statementsrepeatedly. The body of the loop is contained between do and done statement.

The for loop doesn't test a condition, but uses a list instead.

For variable in listdo

statements

done

The while loop executes the statements as long as the condition remains true.

while [condition]do

statements

done

The until loop complements the while construct in the sense that the statementsare executed as long as the condition remains false.

until [condition]

do

statements

done

Armstrong Number

Algorithm

Step 1 : Start

Step 2 : Read number

Step 3 : Initialize 0 to sum and number to num

Step 4 : Extract last digit by computing number modulo 10

Step 5 : Cube the lastdigitand add it to sum

Step 6 : Divide number by 10

Step 7: Repeat

Steps 4–6 until number > 0

Step 8 : If sum = number then Print “Armstrong number”

Step 8.1 : else Print “Not an Armstrong number”

Step 9 : Stop**Program (armstrong.sh)**

```
# Armstrong number using while loopecho -n
"Enter a number : "
read n a=$n s=0 while [
$n -gt 0 ] dor=`expr $n
% 10`
s=`expr $s + \( $r \* $r \* $r \)` n=`expr $n / 10`done
if [ $a -eq $s ] then
echo "Armstrong Number" else
echo -n "Not an Armstrong number" fi
```

OUTPUT:

```
[student@vecit ~]$ sh armstrong.sh Enter a
number : 370 Armstrong Number
```

RESULT:

Thus using loops, iterative scripts were executed

EX.NO:3	IMPLEMENTATION OF FORK, EXEC, GETPID, EXIT, WAIT, AND CLOSE SYSTEM CALLS.
DATE:	

AIM:

To write a program for implementing process management using the following system calls of UNIX operating system: fork, exec, getpid, exit, wait, close.

ALGORITHM:

1. Start the program.
2. Read the input from the command line.
3. Use fork() system call to create process, getppid() system call used to get the parent process ID and getpid() system call used to get the current process ID
4. execvp() system call used to execute that command given on that command line argument
5. execlp() system call used to execute specified command.
6. Open the directory at specified in command line input.
7. Display the directory contents.
8. Stop the program.

PROGRAM:

```
#include<stdio.h> main(int
arc,char*ar[])
{
int pid; char s[100]; pid=fork();if(pid<0)
printf("error");else if(pid>0)
{
wait(NULL);
printf("\n Parent  Process:\n"); printf("\n\tParent Process
id:%d\t\n",getpid());execlp("cat","cat",ar[1],(char*)0);
error("can't execute cat %s,",ar[1]);
}
```

```
else
{
                printf("\nChild process:");
                printf("\n\tChildprocess parent id:\t %d",getppid());
                printf(s,"\n\tChild process id :\t%d",getpid());
                write(1,s,strlen(s));
                printf("  ");
                printf("  ");
                printf(" "); execvp(ar[2],&ar[2]);
                error("can't execute %s",ar[2]);
}
      }
```

OUTPUT:

```
[root@localhost ~]# ./a.out tst date Child process:
Child process id :
3137 Sat Apr 10 02:45:32 IST 2010
Parent Process:
Parent Process id:3136 sd
dsaASD[root@localhost ~]# cat tst sd
dsaASD
```

RESULT:

Thus the program for process management was written and successfully executed.

EX.NO:4A	IMPLEMENTATION OF FCFS SCHEDULING ALGORITHM
DATE:	

AIM

To write a C program to implement First Come First Serve scheduling algorithm.

DESRIPTION:

For FCFS scheduling algorithm, read the number of processes/jobs in the system, their CPU burst times. The scheduling is performed on the basis of arrival time of the processes irrespective of their other parameters. Each process will be executed according to its arrival time. Calculate the waiting time and turnaround time of eachof the processes accordingly.

.**ALGORITHM:**

Step 1: Start the program.

Step 2: Get the input process and their burst time.

Step 3: Sort the processes based on order in which it requests CPU.

Step 4: Compute the waiting time and turnaround time for each process.

Step 5: Calculate the average waiting time and average turnaround time.

Step 6: Print the details about all the processes.

Step 7: Stop the program.

PROGRAM

PROGRAM:

```
#include<stdio.h>Void
main()
{
int bt[50],wt[80],at[80],wat[30],ft[80],tat[80];int i,n;
float awt,att,sum=0,sum1=0;char
p[10][5];
printf("\nenter the number of process
                                                    ")
;scanf("%d",&n);
printf("\nEnter the process name and burst-time:");for(i=0;i<n;i++)
```

```
scanf("%s%d",p[i],&bt[i]);
printf("\nEnter the arrival-time:");
for(i=0;i<n;i++)
scanf("%d",&at[i]);wt[0]=0;
for(i=1;i<=n;i++)
wt[i]=wt[i-1]+bt[i-1];
ft[0]=bt[0];
 for(i=1;i<=n;i++)
ft[i]=ft[i-1]+bt[i];
 printf("\n\n\t\t\tGANTT CHART\n");
printf("\n  \n");
 for(i=0;i<n;i++)
printf("|\t%s\t",p[i]);
 printf("|\t\n");
printf("\n                    \n");
printf("\n");
for(i=0;i<n;i++)
printf("%d\t\t",wt[i]);
printf("%d",wt[n]+bt[n]); printf("\n   \n");
printf("\n");
for(i=0;i<n;i++)
wat[i]=wt[i]-at[i];
for(i=0;i<n;i++)
tat[i]=wat[i]-at[i];
printf("\n FIRST COME FIRST SERVE\n");
printf("\n Process Burst-time Arrival-time Waiting-time Finish-time Turnaround-time\n");
for(i=0;i<n;i++)
printf("\n\n%d%s\t%d\t\t%d\t\t    %d\t\t     %d    \t\t
%d",i+1,p[i],bt[i],at[i],wat[i],ft[i],tat[i]); for(i=0;i<n;i++)
sum=sum+wat[i];awt=sum/n;
for(i=0;i<n;i++)
sum1=sum1+bt[i]+wt[i];att=sum1/n;
printf("\n\nAverage waiting time:%f",awt);
printf("\n\nAverage  turnaround  time:%f",att);
}
```

OUTPUT:

enter the number of process 3

Enter the process name and burst-time:p1

2

p2 3

p3 4

Enter the arrival-time:0 1 2

GANTT CHART

| p1 | p2 | p3 |

0 2 5 9

FIRST COME FIRST SERVE

Process	Burst-time	Arrival-time	Waiting-time	Finish-time	Turnaround-time
p1	2	0	0	2	2
p2	3	1	1	5	4
p3	4	2	3	9	7

Average waiting time:1.333333 Average

turnaround time:5.333333

RESULT:

The FCFS scheduling algorithm has been implemented in C.

EX.NO:4B	IMPLEMENTATION OF SJF SCHEDULING ALGORITHM
DATE:	

AIM:

To write a C program to implement shortest job first (non-pre-emptive) schedulingalgorithm.

DESCRIPTION:

For SJF scheduling algorithm, read the number of processes/jobs in the system, their CPU burst times. Arrange all the jobs in order with respect to their burst times. There may be two jobs in queue with the same execution time, and then FCFS approach is to be performed. Each process will be executed according to the length of its burst time. Then calculate the waiting time and turnaround time of each of the processes accordingly.

ALGORITHM:

Step 1: Start the program.

Step 2: Get the input process and their burst time.

Step 3: Sort the processes based on burst time.

Step 4: Compute the waiting time and turnaround time for each process.

Step 5: Calculate the average waiting time and average turnaround time.

Step 6: Print the details about all the processes.

Step 7: Stop the program.

PROGRAM:

```
#include<stdio.h>void
main()
{
int i,j,n,bt[30],at[30],st[30],ft[30],wat[30],wt[30],temp,temp1,tot,tt[30];float awt, att;
int p[15];
wat[1]=0;
printf("ENTER THE NO.OF PROCESS");
scanf("%d",&n);
printf("\nENTER THE PROCESS NUMBER,BURST TIME AND ARRIVAL
TIME");
```

```
for(i=1;i<=n;i++)
{
scanf("%d\t %d\t %d",&p[i],&bt[i],&at[i]);
}
printf("\nPROCESS\tBURSTTIME\tARRIVALTIME");
for(i=1;i<=n;i++)
{
printf("\np%d\t%d\t\t%d",p[i],bt[i],at[i]);
}
for(i=1;i<=n;i++)
{
for(j=i+1;j<=n;j++)
{
if(bt[i]>bt[j])
{
temp=bt[i]; bt[i]=bt[j]; bt[j]=temp;
temp1=p[i];p[i]=p[j]; p[j]=temp1;
}
}
if(i==1)
{
                    st[1]=0;
                    ft[1]=bt[1]; wt[1]=0;
}
else
{
                    st[i]=ft[i-1];
                    ft[i]=st[i]+bt[i];
```

```
wt[i]=st[i];
}
}
printf("\n\n\t\t\tGANTT CHART\n"); printf("\n
                                    \n");
for(i=1;i<=n;i++)
printf("|\tp%d\t",p[i]);
 printf("|\t\n"); printf("\n  \n");
printf("\n");
for(i=1;i<=n;i++)
printf("%d \t\t",wt[i]);
printf("%d",wt[n]+bt[n]);
 printf("\n     \n");
for(i=2;i<=n;i++)
wat[i]=wt[i]-at[i];for(i=1;i<=n;i++)
tt[i]=wat[i]+bt[i]-at[i];
printf("\nPROCESS\tBURSTTIME\tARRIVALTIME\tWAITINGTIME\tT URNAROUNDTI
ME\n");
for(i=1;i<=n;i++)
{
                printf("\np%d %5d %15d %15d %15d",p[i],bt[i],at[i],wat[i],tt[i]);
}
for(i=1,tot=0;i<=n;i++)tot+=wt[i];
awt=(float)tot/n;
printf("\n\n\n AVERAGE WAITING TIME=%f",awt);for(i=1,tot=0;i<=n;i++)
tot+=tt[i];att=(float)tot/n;
printf("\n\n AVERAGE TURNAROUND TIME=%f",att);}
```

OUTPUT:

enter the no.of process3

enter the process number,burst time and arrival time1 8 1

2 5 1

3 3 1

PROCESS	BURSTTIME	ARRIVALTIME	WAITINGTIME	TURNAROUNDTIME
p3	3	1	0	2
p2	5	1	2	6
p1	8	1	7	14

AVERAGE WAITING TIME=3.666667

AVERAGE TURNAROUND TIME=7.333333

RESULT:

The SJF scheduling algorithm has been implemented in C.

EX.NO.4C:	IMPLEMENTATION OF ROUND ROBIN SCHEDULING ALGORITHM
DATE:	

AIM:

To write a C program to implement Round Robin scheduling algorithm.

DESCRIPTION:

For round robin scheduling algorithm, read the number of processes/jobs inthe system, their CPU burst times, and the size of the time slice. Time slices are assigned to each process in equal portions and in circular order, handling all processes execution. This allows every process to get an equal chance. Calculate the waiting time and turnaround time of each of the processes accordingly.

ALGORITHM:

Step 1: Start the program.

Step 2: Get the input process and their burst time.

Step 3: Sort the processes based on priority.

Step 4: Compute the waiting time and turnaround time for each process.

Step 5: Calculate the average waiting time and average turnaround time.

Step 6: Print the details about all the processes.

Step 7: Stop the program.

PROGRAM:

```
#include<stdio.h> voidmain()
{
int ct=0,y[30],j=0,bt[10],cwt=0; int
tq,i,max=0,n,wt[10],t[10],at[10],tt[10],b[10]; float
a=0.0,s=0.0;
char p[10][10];
printf("\n enter the no of process:");
scanf("%d",&n);
printf("\nenter the time quantum");scanf("%d",&tq);
printf("\nenter the process name,bursttime,arrival time");
```

```
for(i=0;i<n;i++)
{
scanf("%s",p[i]);
scanf("%d",&bt[i]); scanf("%d",&at[i]);
wt[i]=t[i]=0;b[i]=bt[i];
}
printf("\n\t\tGANTT CHART");
printf("\n       \n");
for(i=0;i<n;i++)
{
if(max<bt[i])
max=bt[i];
}
while(max!=0)
{
for(i=0;i<n;i++)
{
if(bt[i]>0)
{
if(ct==0)
wt[i]=wt[i]+cwt;
else
wt[i]=wt[i]+(cwt-t[i]);
}
if(bt[i]==0)cwt=cwt+0;
else if(bt[i]==max)
{
if(bt[i]>tq)
{
cwt=cwt+tq;
```

```
                                        bt[i]=bt[i]-tq;
                                        max=max-tq;
}
else
{
                                        cwt=cwt+bt[i];
                                        bt[i]=0;
                                        max=0;
}
printf("|\t%s",p[i]); y[j]=cwt;
j++;
}
else if(bt[i]<tq)
{

cwt=cwt+bt[i]; bt[i]=0; printf("|\t%s",p[i]);
y[j]=cwt;
j++;
}
else if(bt[i]>tq)
{
cwt=cwt+tq; bt[i]=bt[i]-tq;
printf("|\t%s",p[i]); y[j]=cwt;
j++;
}
else if(bt[i]==tq)
{
cwt=cwt+bt[i];
```

```
printf("|\t%s",p[i]); bt[i]=0;y[j]=cwt; j++;
}
t[i]=cwt;
}
ct=ct+1;
}
for(i=0;i<n;i++)
{
wt[i]=wt[i]-at[i]; a=a+wt[i];
tt[i]=wt[i]+b[i]-at[i];s=s+tt[i];
}
a=a/n; s=s/n;

 printf("\n                    ");
printf("\n0");
for(i=0;i<j;i++)
printf("\t%d",y[i]);
printf("\n");
printf("\n                    ");
 printf("\n\t\t ROUND ROBIN\n");
printf("\nProcess Burst-time Arrival-time Waiting-time Turnaround- time\n");
for(i=0;i<n;i++)
printf("\n\n %d%s \t %d\t\t %d \t\t %d\t\t %d", i+1, p[i], b[i], at[i],wt[i], tt[i]);
printf("\n\nAvg waiting time=%f",a);
printf("\n\nAvgturn around time=%f",s);
}
```

OUTPUT:

enter the no of process:3 enter

the time quantum2

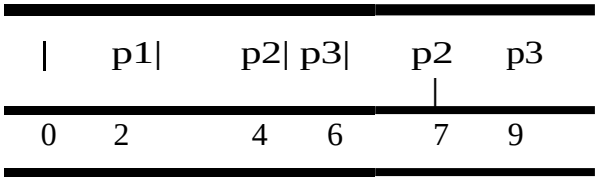
enter the process name, bursttime, arrival time

p1 2 0

p2 3 1

p3 4 2

GANTT CHART



ROUND ROBIN

Process	Burst-time	Arrival-time	Waiting-time	Turnaround-time
p1	2	0	0	2
p2	3	1	3	5
p3	4	2	3	5

Avg Waiting Time=2.000000 Avg

Turnaround Time=4.000000

RESULT

The Round Robin scheduling algorithm has been implemented in C.

EX.NO:4D	IMPLEMENTATION OF PRIORITY SCHEDULING ALGORITHM
DATE:	

AIM:

To write a C program to implement Priority Scheduling algorithm.

DESCRIPTION:

For priority scheduling algorithm, read the number of processes/jobs in the system, their CPU burst times, and the priorities. Arrange all the jobs in order with respect to their priorities. There may be two jobs in queue with the same priority, and then FCFS approach is to be performed. Each process will be executed according to its priority. Calculate the waiting time and turnaround time of each of the processes accordingly**.**

ALGORITHM:

Step 1: Start the program.

Step 2: Get the input process and their burst time.

Step 3: Sort the processes based on priority.

Step 4: Compute the waiting time and turnaround time for each process.

Step 5: Calculate the average waiting time and average turnaround time.

Step 6: Print the details about all the processes.

Step 7: Stop the program.

PROGRAM:

```
#include<stdio.h>
#include<string.h> void
main()
{
int  bt[30],pr[30],np;  intwt[30],tat[30],wat[30],at[30],ft[30];int  i,j,x,z,t;
float sum1=0,sum=0,awt,att;char
p[5][9],y[9];
printf("\nenter the number of process");
scanf("%d",&np);
printf("\nEnter the process,burst-time and priority:");
```

```
for(i=0;i<np;i++)
scanf("%s%d%d",p[i],&bt[i],&pr[i]);
 printf("\nEnter the arrival-time:");
 for(i=0;i<np;i++)
 scanf("%d",&at[i]);
for(i=0;i<np;i++)
 for(j=i+1;j<np;j++)
{
if(pr[i]>pr[j])
{
x=pr[j]; pr[j]=pr[i]; pr[i]=x;
 strcpy(y,p[j]);
strcpy(p[j],p[i]);
strcpy(p[i],y); z=bt[j];
 b t[j]=bt[i]; bt[i]=z;

}
} wt[0]=0;
for(i=1;i<=np;i++)
wt[i]=wt[i-1]+bt[i-1]; ft[0]=bt[0];
for(i=1;i<np;i++)
ft[i]=ft[i-1]+bt[i];
printf("\n\n\t\tGANTT
CHART\n");printf("\n  \n");
for(i=0;i<np;i++)
printf("|\t%s\t",p[i]);
```

```
printf("|\t\n");
printf("\n                    \n");
printf("\n");
for(i=0;i<=np;i++)
printf("%d\t\t",wt[i]);
printf("\n                              \n");
printf("\n");
for(i=0;i<np;i++)
wat[i]=wt[i]-at[i];
for(i=0;i<np;
i++) tat[i]=wat[i]-at[i];
printf("\nPRIORITYSCHEDULING:\);
printf("\nProcess Priority Burst-time Arrival-time Waiting-time Turnaround-time");
for(i=0;i<np;i++)
printf("\n\n%d%s\t%d\t\t%d\t\t%d\t%d\t\t%d",i+1,p[i],pr[i],bt[i],a t[i],wt[i],tat[i]);
for(i=0;i<np;i++)
sum=sum+wat[i];
awt=sum/np;
 for(i=0;i<np;i++) sum1=sum1+tat[i];
att=sum1/np;
printf("\n\nAverage waiting time:%f",awt);
printf("\n\nAverageturn aroundtime is:%f",att);
}
```

OUTPUT:

Enter the number of process3

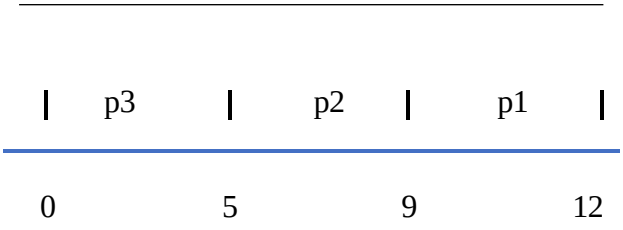
Enter the process, burst-time and priority:p1 3 3

p2 4 2

p3 5 1

Enter the arrival-time: 0 1 2

GANTT CHART



PRIORITY SCHEDULING:

Process	Priority	Burst-time	Arrival-time	Waiting-time	Turnaround-time
p3	1	5	0	0	0
p2	2	4	1	5	3
p1	3	3	2	9	5

Average waiting time: 3.666667 Average turnaround time is: 2.666667

RESULT

The Priority scheduling algorithm has been implemented in C.

EX.NO:5	IMPLEMENTATION OF SHARED MEMORY AND INTER PROCESS COMMUNICATION
DATE:	

AIM:

To write a program for developing Application using Inter Process communication with pipes.

ALGORITHM:

1. Start the program.
2. Read the input from parent process and perform in child process.
3. Write the date in parent process and read it in child process.
4. Data is read.
5. Stop the program.

SHARED MEMORY FOR WRITER PROCESS

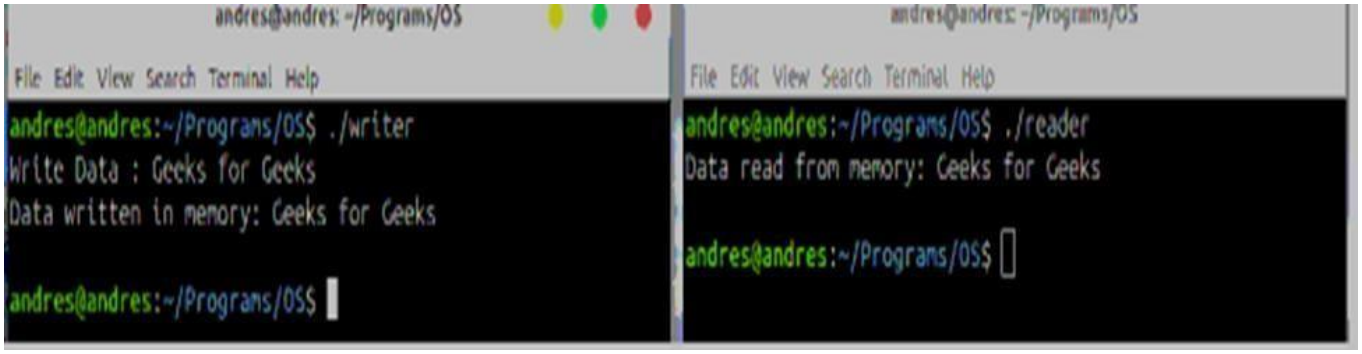
```
#include <iostream>
#include <sys/ipc.h>
#include <sys/shm.h>
#include <stdio.h> using
namespace std;int main()
{
// ftok to generate unique key key_tkey ftok("shmfile",65);
// shmget returns an identifier in shmid
int shmid = shmget(key,1024,0666|IPC_CREAT);
// shmat to attach to shared memory
char *str = (char*) shmat(shmid,(void*)0,0);

printf("Write Data : ");
gets(str);
printf("Data written in memory: %s\n",str);
//detach from shared memoryshmdt(str);
return 0;
```

}

SHARED MEMORY FOR READER PROCESS

```
#include <iostream>
#include <sys/ipc.h>
#include <sys/shm.h>
#include <stdio.h> using
namespace std;int main()
{
// ftok to generate unique key key_tkey=ftok("shmfile",65);
// shmget returns an identifier in shmid
int shmid = shmget(key,1024,0666|IPC_CREAT);
// shmat to attach to shared memory
char *str = (char*) shmat(shmid,(void*)0,0);printf("Data
read from memory: %s\n",str);
//detach from shared memoryshmdt(str);
// destroy the shared memory
shmctl(shmid,IPC_RMID,NULL); return 0;
}
```

OUTPUT:



RESULT:

Thus the program was executed successfully.

EX.NO:6	PRODUCER CONSUMER PROBLEM USING SEMAPHORE
DATE:	

AIM:

To write a C program to implement the Producer & consumer Problem(Semaphore)

DESCRIPTION:

Producer-consumer problem, is a common paradigm for cooperating processes. A producer process produces information that is consumed by a consumer process. One solution to the producer-consumer problem uses shared memory. To allow producer and consumer processes to run concurrently, there must be available a buffer of items that can be filled by the producer and emptied by the consumer. This buffer will reside in a region of memory that is shared by the producer and consumer processes. A producer can produce one item while the consumer is consuming another item. The producer and consumer must be synchronized, so that the consumer does not try to consume an item that has not yet been produced.

ALGORITHM:

Step 1: The Semaphore mutex, full & empty are initialized.

Step 2: In the case of producer process

i) Produce an item in to temporary variable.

ii) If there is empty space in the buffer check the mutex value for enter intothe critical section.

iii) If the mutex value is 0, allow the producer to add value in the temporary variable to the buffer.

Step 3: In the case of consumer process

i) It should wait if the buffer is empty

ii) If there is any item in the buffer check for mutex value, if the mutex==0, remove item from buffer

iii) Signal the mutex value and reduce the empty value by 1.

iv) Consume the item.

Step 4: Print the result

PROGRAM :

```
#define BUFFERSIZE 10
 int mutex,n,empty,full=0,item,item1;
 int buffer[20];
int in=0,out=0,mutex=1;void

wait(int s)

{

while(s<0)

{

                pintf("\nCannot add an item\n");

                exit(0);
}

s--;

        }
```

```
void signal(int s)
{
s++;
}
void producer()
{
do
{
wait (empty);
wait(mutex);
printf("\nEnter an item:");
scanf("%d",&item);
 buffer[in]=item;
in=in+1; signal(mutex);
signal(full);
}
while(in<n);
}
void consumer()
{
do
{
wait(full);
wait(mutex);
item1=buffer[out];
printf("\nConsumed item =%d",item1);
out=out+1; signal(mutex);
signal(empty);
}
while(out<n);
}
void main()
{
printf("Enter the value of n:");
scanf("%d ",&n);
empty=n; while(in<n)
producer();while(in!=out)
consumer(); }
```

OUTPUT:

```
$ cc prco.c
$ a.out
Enter the value of n :3Enter
the item:2
Enter the item:5 Enter the
item:9 consumed item=2
consumed item=5
consumed item=9
$
```

RESULT:

Thus the program for solving producer and consumer problem using semaphore wasexecuted successfully.

EX.NO: 7 **DEADLOCK AVOIDANCE**

DATE:

AIM:

To Simulate Algorithm for Deadlock avoidance

DESCRIPTION:

In a multiprogramming environment, several processes may compete for a finite number of resources. A process requests resources; if the resources are not available at that time, the process enters a waiting state. Sometimes, a waiting process is never again able to change state, because the resources it has requested are held by other waiting processes. This situation is called a deadlock. Deadlock avoidance is one of the techniques for handling deadlocks. This approach requires that the operating system be given in advance additional information concerning which resources a process will request and use during its lifetime. With this additional knowledge, it can decide for each request whether or not the process should wait. To decide whether the current request can be satisfied or must be delayed, the system must consider the resources currently available, the resources currently allocated to each process, and the future requests and releases of each process. Banker's algorithm is a deadlock avoidance algorithm that is applicable to a system with multiple instances of each resource type

ALGORITHM:

Step 1: Start the Program

Step 2: Get the values of resources and processes.

Step 3: Get the avail value.

Step 4: After allocation find the need value.

Step 5: Check whether its possible to allocate. If possible it is safe state

Step 6: If the new request comes then check that the system is in safety or not if weallow the request.

Step 7: Stop the execution

10.Stop the program

PROGRAM:

```
#include<stdio.h>
```

```
void main()
{
int pno,rno,i,j,prc,count,t,total;
count=0; clrscr();
printf("\n Enter number of process:");
scanf("%d",&pno); printf("\n Enter number of resources:");
scanf("%d",&rno); for(i=1;
i< =pno;i++)
{
flag[i]=0;
}
printf("\n Enter total numbers of each resources:");
for(i=1;i<= rno;i++)
 scanf("%d",&tres[i]);
printf("\n Enter Max resources for each process:");
for(i=1;i<= pno;i++)
{
printf("\n for process %d:",i);
for(j=1;j<= rno;j++)
 scanf("%d",&max[i][j]);
}
printf("\n Enter allocated resources for each process:");
for(i=1;i<= pno;
i++)
{
printf("\n for process %d:",i);
for(j=1;j<= rno;j++)
scanf("%d",&allocated[i][j]);
}
printf("\n available resources:\n");
for(j=1;j<= rno;
j++)
```

```
{
avail[j]=0;
total=0;
 for(i=1;
i<= pno;
i++)
{
total+=allocated[i][j];
}
avail[j]=tres[j]-total;
work[j]=avail[j];
  printf("                          %d \t",work[j]);
}
do
{
for(i=1;i<= pno;i++)
{
for(j=1;j<= rno;j++)
{
                                need[i][j]=max[i][j]-allocated[i][j];
}
}
printf("\n  Allocated matrix Max  need");
for(i=1;i<= pno;
i++)
{
printf("\n");
 for(j=1;
j<= rno;
j++)
{
printf("%4d",allocated[i][j]);
}
```

```
printf("|");
for(j=1;
j<= rno;
j++)
{
printf("%4d",max[i][j]);
}
printf("|"); for(j=1;
j<= rno;
j++)
{
                printf("%4d",need[i][j]);
                }
        }
        prc=0;
for(i=1;
        i<= pno;
        i++)
{
if(flag[i]==0)
{
prc=i;
for(j=1;j<= rno;
j++)
{
if(work[j]< need[i][j])
{
prc=0; break;
}
}
}
if(prc!=0)break;
}

if(prc!=0)
```

```
{
printf("\n Process %d completed",i);
count++;
printf("\n Available matrix:");
for(j=1;
j<= rno;
j++)
```

```
{
  work[j]+=allocated[prc][j];
  allocated[prc][j]=0;
   max[prc][j]=0;
   flag[prc]=1;
  printf("                                %d",work[j]);
  }
  }
  }while(count!=pno&&prc!=0);
  if(count==pno)
  printf("\nThe system is in a safe state!!");
  else
  printf("\nThe system is in an unsafe state!!");
  getch();
  }
```

OUTPUT:

Enter number of process:5 Enter
number of resources:3
Enter total numbers of each resources:10 5 7Enter Max
resources for each process:
for process 1: 7 5 3
for process 2: 3 2 2
for process 3: 9 0 2
for process 4: 2 2 2
for process 5: 4 3 3
Enter allocated resources for each process:for
process 1: 0 1 0
for process 2: 3 0 2
for process 3: 3 0 2
for process 4: 2 1 1
for process 5: 0 0 2

available resources:

2 3 0

Allocated matrix Max need

0	1	0|	7	5	3|	7	4	3
3	0	2|	3	2	2|	0	2	0
3	0	2|	9	0	2|	6	0	0
2	1	1|	2	2	2|	0	1	1
0	0	2|	4	3	3|	4	3	1

Process 2 completed

Available matrix: 5 3 2 Allocated matrix Max need

0	1	0|	7	5	3|	7	4	3
0	0	0|	0	0	0|	0	0	0
3	0	2|	9	0	2|	6	0	0
2	1	1|	2	2	2|	0	1	1
0	0	2|	4	3	3|	4	3	1

Process 4 completed

Available matrix: 7 4 3 Allocated matrix Max need

0	1	0|	7	5	3|	7	4	3
0	0	0|	0	0	0|	0	0	0
3	0	2|	9	0	2|	6	0	0
0	0	0|	0	0	0|	0	0	0
0	0	2|	4	3	3|	4	3	1

Process 1 completed

Available matrix: 7 5 3 Allocated matrix Max need

0 0 0| 0 0 0| 0 0 0

0 0 0| 0 0 0| 0 0 0

3 0 2| 9 0 2| 6 0 0

0 0 0| 0 0 0| 0 0 0

0 0 2| 4 3 3| 4 3 1

Process 3 completed

Available matrix: 10 5 5

Allocated matrix Max need

0 0 0| 0 0 0| 0 0 0

0 0 0| 0 0 0| 0 0 0

0 0 0| 0 0 0| 0 0 0

0 0 0| 0 0 0| 0 0 0

0 0 2| 4 3 3| 4 3 1

Process 5 completed

Available matrix: 10 5 7

The system is in a safe state!!

RESULT:

Thus the program to implement the deadlock avoidance was executed and verified.

EX.NO:8 **DEADLOCK DETECTION**

DATE: **ALGORITHM**

AIM:

To Simulate Algorithm for Deadlock detection

ALGORITHM:

Step 1: Start the Program

Step 2: Get the values of resources and processes.

Step 3: Get the avail value..

Step 4: After allocation find the need value.

Step 5: Check whether its possible to allocate.

Step 6: If it is possible then the system is in safe state.

Step 7: Stop the execution

PROGRAM

```
#include<stdio.h>
#include<conio.h>

 int max[100][100];

int alloc[100][100];

int need[100][100];

int avail[100];
int n,r;
void input();

void  show();

void cal();

 int main()
{
int i,j;
printf("********** Deadlock Detection Algo **********\n");

 input();show(); cal();
getch(); return 0;
```

```
}

void input()
{
int i,j;
printf("Enter the no of Processes\t");
scanf("%d",&n);
printf("Enter the no of resource instances\t");
scanf("%d",&r); printf("Enter the Max Matrix\n");
for(i=0;i<n;
i++)
{
for(j=0;
j<r;j++)
{
scanf("%d",&max[i][j]);
}
}
printf("Enter the Allocation Matrix\n");
for(i=0;
i<n;
i++)
{
for(j=0;
j<r;
j++)
{
scanf("%d",&alloc[i][j]);
}
}
printf("Enter the available Resources\n");
for(j=0;j<r;j++)
{
scanf("%d",&avail[j]);
```

```
}
}
void show()
{
int i,j;
printf("Process\t Allocation\t Max\t Available\t");
for(i=0;
i<n;
i++)
{
printf("\nP%d\t ",i+1);
for(j=0;
j<r;
j++)
{
printf("%d ",alloc[i][j]);
}
printf("\t");
for(j=0;
j<r;
j++)
{
printf("%d ",max[i][j]);
}
printf("\t");
if(i==0)
{
for(j=0;
j<r;
j++)
printf("%d ",avail[j]);
}
}
}
void cal()
```

```
{
int finish[100],temp,need[100][100],flag=1,k,c1=0;

int dead[100];

int safe[100];

int i,j; for(i=0;

i<n;

i++)

{

finish[i]=0;

}

//find need matrix

for(i=0;

i<n;

i++)

{

for(j=0;j<r;j++)

{

need[i][j]=max[i][j]-alloc[i][j];

}

}

while(flag)

{

flag=0;

 for(i=0;i<n;i++)

{

int c=0;

 for(j=0;j<r;j++)

{

if((finish[i]==0)&&(need[i][j]<=avail[j]))

{

c++;

if(c==r)

{

for(k=0;k<r;k++)
```

```
{
avail[k]+=alloc[i][j];
finish[i]=1;
flag=1;
}
//printf("\nP%d",i); if(finish[i]==1)
{
                                        i=n;
                                                }
                                    }
}
```

```
}
}
} j=0;
flag=0; for(i=0;i<n;i++)
{
if(finish[i]==0)
{
dead[j]=i;j++;
flag=1;
}
}
if(flag==1)
{
                printf("\n\nSystem is in Deadlock and the Deadlock process are\n");
                for(i=0;i<n;i++)
                {
}               }
else
{
                printf("P%d\t",dead[i]);
}
        }
```

OUTPUT:

Enter the no. Of processes 3

Enter the no of resources instances 3Enter

the max matrix

3 6 8

4 3 3

3 4 4

Enter the allocation matrix3 3 3

2 0 3

1 2 4

Enter the available resources1 2 0

Process	allocation	max	available
P1	3 3 3	3 6 8	1 2 0
P2	2 0 3	4 3 3	
P3	1 2 4	3 4 4	

System is in deadlock and deadlock process areP1 P2

P3

RESULT:

Thus the program to implement the deadlock detection was executed

successfully.

EX.NO: 9	IMPLEMENTATION OF THREADING
DATE:	

AIM:
To write a c program to implement Threading and Synchronization Applications.

ALGORITHM:

Step 1: Start the process
Step 2: Declare process thread, thread-id.
Step 3: Read the process thread and thread state.
Step 4: Check the process thread equals to thread-id by using if condition.
Step 5: Check the error state of the thread.
Step 6: Display the completed thread process.
Step 7: Stop the process

PROGRAM:

```
#include<stdio.h>
#include<string.h>
#include<pthread.h>
#include<stdlib.h>
#include<unistd.h>
pthread_t tid[2];
void* doSomeThing(void *arg)
{
unsigned long i = 0;
 pthread_t id = pthread_self();

if(pthread_equal(id,tid[0]))
{
printf("\n First thread processing\n");
}
else
{
printf("\n Second thread processing\n");
}


for(i=0;
 i<(0xFFFFFFFF);
i++);
return NULL;
}
int main(void)
{
int i = 0;

int err;
 while(i < 2){
```

```
err = pthread_create(&(tid[i]), NULL, &doSomeThing, NULL);
                if (err != 0)
printf("\ncan't create thread :[%s]", strerror(err));
else
printf("\n Thread created successfully\n");

i++;
}

sleep(5);
return 0;
}
```

OUTPUT:

```
Thread created successfully

 First thread processing
Thread created successfully

 Second thread processing
```

RESULT:

Thus the implementation of threading using c program was executed successfully.

EX.NO:10	IMPLEMENTATION OF PAGING TECHNIQUE
DATE:	

AIM:

To write a C program to implement paging concept for memory management.

ALGORIHTM:

Step 1: Start the program.

Step 2: Enter the logical memory address.

Step 3: Enter the page table which has offset and page frame.

Step 4: The corresponding physical address can be calculate by, PA = [pageframe* No. of pagesize] + Page offset.

Step 5: Print the physical address for the corresponding logical address.

Step 6:Terminate the program.

PROGRAM:

```
#include<stdio.h>
#include<conio.h>
main()
{
int ms, ps, nop, np, rempages, i, j, x, y, pa, offset;

int s[10], fno[10][20];
clrscr();
printf("\nEnter the memory size -- ");

scanf("%d",&ms);
printf("\nEnter the page size -- ");
scanf("%d",&ps);
nop = ms/ps;
printf("\nThe no. of pages available in memory are -- %d ",nop);

printf("\nEnter number of processes -- ");
scanf("%d",&np);
 rempages = nop;
for(i=1;
i<=np;i++)
```

```
{

printf("\nEnter no. of pages required for p[%d]-- ",i);
scanf("%d",&s[i]);
if(s[i] >rempages)
{
printf("\nMemory is Full");
 break;
}
rempages = rempages  -  s[i];
printf("\nEnter pagetable for p[%d] --- ",i);
for(j=0;
j<s[i];
j++)
 scanf("%d",&fno[i][j]);
}

printf("\nEnter Logical Address to find Physical Address ");
printf("\nEnter process no. and pagenumber and offset -- ");
 scanf("%d %d %d",&x,&y, &offset);
if(x>np || y>=s[i] || offset>=ps)
printf("\nInvalid Process or Page Number or offset");
else
{
                pa=fno[x][y]*ps+offset;
                printf("\nThe Physical Address is -- %d",pa);
}

getch();
}
```

OUTPUT:

Enter the memory size – 1000Enter

the page size -- 100

The no. of pages available in memory are 10
Enter number of processes -- 3

Enter no. of pages required for p[1]-- 4

Enter pagetable for p[1] --- 8 6 9 5

Enter no. of pages required for p[2]-- 5

Enter pagetable for p[2] --- 1 4 5 7 3

Enter no. of pages required for p[3]-- 5

Memory is Full

Enter Logical Address to find Physical Address Enter process no. and pagenumberand offset -

- 2

3

60

The Physical Address is --- 760

RESULT:

Thus C program for implementing paging concept for memory management has been executed successfully.

Ex.NO: 11	IMPLEMENTATION OF MEMORY ALLOCATION TECHNIQUES
DATE:	

AIM:

To write a C program to implement Memory Management concept using the technique best fit, worst fit and first fit algorithms.

ALGORITHM:

1. Get the number of process.
2. Get the number of blocks and size of process.
3. Get the choices from the user and call the corresponding switch cases.
4. First fit -allocate the process to the available free block match with the size ofthe process
5. Worst fit –allocate the process to the largest block size available in the list
6. Best fit-allocate the process to the optimum size block available in the list
7. Display the result with allocations

PROGRAM:

```
#include<stdio.h>main()
{
int p[10],np,b[10],nb,ch,c[10],d[10],alloc[10],flag[10],i,j;

printf("\nEnter the no of process:");
scanf("%d",&np);
printf("\nEnter the no of blocks:");

scanf("%d",&nb);
printf("\nEnter the size of each process:");
for(i=0;i<np;i++)
{
printf("\nProcess %d:",i);scanf("%d",&p[i]);
}
```

```
printf("\nEnter the block sizes:");
for(j=0;
j<nb;
j++)
{
printf("\nBlock %d:",j);
scanf("%d",&b[j]);c[j]=b[j];d[j]=b[j];
}
if(np<=nb)
{
printf("\n1.First fit 2.Best fit 3.Worst fit");do
{
printf("\nEnter your choice:");scanf("%d",&ch);
switch(ch)
{
        case 1: printf("\nFirst Fit\n");for(i=0;i<np;i++)
                                        {
for(j=0;j<nb;j++)
{
if(p[i]<=b[j])
{
alloc[j]=p[i];
printf("\n\nAlloc[%d]",all oc[j]);
printf("\n\nProcess %d of size %d is allocated in block:%d of size:%d",i,p[i],j,b[j]);
flag[i]=0,b[j]=0;
break;
}
else
flag[i]=1;
```

```
}                                                   }
for(i=0;
i<np;
i++)
{                                       if(flag[i]!=0)

printf("\n\nProcess %d of size %d is notallocated",i,p[i]);
}
break;

case 2: printf("\nBest Fit\n");for(i=0;i<nb;i++)
{
for(j=i+1;j<nb;j++)
{
if(c[i]>c[j])
{
int temp=c[i];

c[i]=c[j];   c[j]=temp;
}
                                                }
}
printf("\nAfter sorting block sizes:");

for(i=0;
i<nb;
i++)
 printf("\nBlock %d:%d",i,c[i]);
for(i=0;i<np;i++)
{
for(j=0;j<nb;j++)
{
```

```
if(p[i]<=c[j])
{                                   alloc[j]=p[i];
                                    printf("\n\nAlloc[%d]",alloc[j]);
                                    printf("\n\nProcess %d of size %d is allocated in block %d of
                                    size%d",i,p[i],j,c[j]);
                                     flag[i]=0,c[j]=0;
                                    break;
}
else
                                        }           flag[i]=1;


}
for(i=0;i<np;i++)
                                        if(flag[i]!=0)
{
                                        printf("\n\nProcess %d of size %d is not
                                        allocated",i,p[i]);


}
break;

case 3:
printf("\nWorst Fit\n");for(i=0;i<nb;i++)
{
for(j=i+1;
j<nb;
j++)
{
if(d[i]<d[j])
{
int temp=d[i];d[i]=d[j]; d[j]=temp;
}
```

```
                                                    }
                                                }
printf("\nAfter sorting block sizes:");for(i=0;i<nb;i++)
printf("\nBlock %d:%d",i,d[i]);for(i=0;i<np;i++)
{
for(j=0;j<nb;j++)
{
if(p[i]<=d[j])
{
alloc[j]=p[i];
printf("\n\nAlloc[%d]",alloc[j]);
printf("\n\nProcess %d of size %d isallocated in block %d of size
%d",i,p[i],j,d[j]

flag[i]=0,d[j]=0;break;                          if(flag[i]!=0)
}
else
flag[i]=1;


                                                }
for(i=0;i<np;i++)
{
                                                    printf("\n\nProcess %d of size
                                                      %d is not allocated",i,p[i]);

}
break;
default:
printf("Invalid Choice…!");break;

  }
```

```
                                        }
                        }while(ch<=3);
}
}
```

OUTPUT:

Enter the no of process:3Enter

the no of blocks:3

Enter the size of each process:

Process 0:100

Process 1:150

Process 2:200

Enter the block sizes:

Block 0:300

Block 1:350

Block 2:200

1.First fit 2.Best fit 3.Worst fit

Enter your choice:1

Alloc[100]

Process 0 of size 100 is allocated in block 0 of size 300Alloc[150]

Process 1 of size 150 is allocated in block 1 of size 350Alloc[200]

Process 2 of size 200 is allocated in block 2 of size 200Enter

your choice:2

Best Fit

After sorting block sizes are:Block

0:200

Block 1:300

Block 2:350

Alloc[100]

Process 0 of size 100 is allocated in block:0 of size:200Alloc[150]

Process 1 of size 150 is allocated in block:1 of size:300Alloc[200]

Process 2 of size 200 is allocated in block:2 of size:350enter

your choice:3

Worst Fit

After sorting block sizes are:

Block 0:350

Block 1:300

Block 2:200

Alloc[100]

Process 0 of size 100 is allocated in block 0 of size 350Alloc[150]

Process 1 of size 150 is allocated in block 1 of size 300Alloc[200]

Process 2 of size 200 is allocated in block 2 of size 200Enter

your choice:6

Invalid Choice…!

RESULT:

Thus a UNIX C program to implement memory management scheme using Best fitworst fit and first fit were executed successfully.

EX.NO:12A	IMPLEMENTATION OF THE FIFO PAGE
DATE:	REPLACEMENT ALGORITHMS

AIM:

To write a UNIX C program to implement FIFO page replacement algorithm.

DESCRIPTION :

The FIFO Page Replacement algorithm associates with each page the time when that page was brought into memory. When a page must be replaced, the oldest page is chosen . There is not strictly necessary to record the time when a page is brought in. By creating a FIFO queue to hold all pages in memory and by replacing the page at the head of the queue. When a page is brought into memory, insert it at the tail of the queue.

ALGORITHM:

1. Start the process
2. Declare the size with respect to page length
3. Check the need of replacement from the page to memory
4. Check the need of replacement from old page to new page in memory
5. Format queue to hold all pages
6. Insert the page require memory into the queue
7. Check for bad replacement and page fault
8. Get the number of processes to be inserted
9. Display the values
10. Stop the process

PROGRAM:

```
#include<stdio.h>
#include<conio.h>

main()
{
int i, j, k, f, pf=0, count=0, rs[25], m[10], n;

clrscr();
printf("\n Enter the length of reference string -- ");
```

```
scanf("%d",&n);
printf("\n Enter the reference string -- ");
for(i=0;i<n;i++)
 scanf("%d",&rs[i]);
 printf("\n Enter no. of
frames -- ");scanf("%d",&f);
for(i=0;i<f;i++)
m[i]=-1;
printf("\n The Page Replacement Process is -- \n");for(i=0;i<n;i++)
{
for(k=0;
k<f;
k++)
{
if(m[k]==rs[i])
break;
}
if(k==f)
{
m[count++]=rs[i];
pf++;
}
for(j=0;j<f;j++)
printf("\t%d",m[j]);if(k==f)
printf("\tPF No. %d",pf);
printf("\n");if(count==f)
count=0;
}
printf("\n The number of Page Faults using FIFO are %d",pf);getch();
}
```

OUTPUT:

Enter the length of reference string – 20

Enter the reference string -- 7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1

Enter no. of frames -- 3

The Page Replacement Process is –

7	-1	-1	PF No. 1
7	0	-1	PF No. 2
7	0	1	PF No. 3
2	0	1	PF No. 4
2	0	1	
2	3	1	PF No. 5
2	3	0	PF No. 6
4	3	0	PF No. 7
4	2	0	PF No. 8
4	2	3	PF No. 9
0	2	3	PF No. 10
0	2	3	
0	2	3	
0	1	3	PF No. 11
0	1	2	PF No. 12
0	1	2	
0	1	2	
7	1	2	PF No. 13
7	0	2	PF No. 14
7	0	1	PF No. 15

The number of Page Faults using FIFO are 15

RESULT:

Thus a UNIX C program to implement FIFO page replacement is executed successfully.

EX.NO:12B	IMPLEMENTATION OF LRU PAGE REPLACEMENT ALGORITHM
DATE:	

AIM:

To write UNIX C program a program to implement LRU page replacement algorithm.

DESCRIPTION:

The Least Recently Used replacement policy chooses to replace the page which has not been referenced for the longest time. This policy assumes the recent past will approximate the immediate future. The operating system keeps track of when each page was referenced by recording the time of reference or by maintaining a stack of references.

ALGORITHM:

1. Start the process
2. Declare the size
3. Get the number of pages to be inserted
4. Get the value
5. Declare counter and stack
6. Select the least recently used page by counter value
7. Stack them according the selection.
8. Display the values
9. Stop the process

PROGRAM:

```
#include<stdio.h>
#include<conio.h>

main()
{
int i, j , k, min, rs[25], m[10], count[10], flag[25], n, f, pf=0, next=1;clrscr();
printf("Enter the length of reference string -- ");
```

```
scanf("%d",&n);
printf("Enter the reference string -- ");
for(i=0;i<n;i++)
{
scanf("%d",&rs[i]); flag[i]=0;
}
printf("Enter the number of frames -- ");
scanf("%d",&f); for(i=0;i<f;i++)
{
count[i]=0;m[i]=-1;
}
printf("\nThe Page Replacement process is -- \n");
for(i=0;i<n;i++)
{
for(j=0;j<f;j++)
{
if(m[j]==rs[i])
{
flag[i]=1; count[j]=next;next++;
}
}
if(flag[i]==0)
{
if(i<f)
{
                                        m[i]=rs[i];
                                        count[i]=next;
                                        next++;
```

```
}
else
{
                                        min=0;
                                        for(j=1;j<f;j++)
                                        if(count[min] > count[j])min=j;
                                        m[min]=rs[i];
                                        count[min]=next;
                                        next++;
}
pf++;
                }
for(j=0;j<f;j++)
printf("%d\t", m[j]);if(flag[i]==0)
printf("PF No. -- %d" , pf);
printf("\n");
}
printf("\nThe number of page faults using LRU are %d",pf);getch();
}
```

OUTPUT:

Enter the length of reference string -- 20

Enter the reference string -- 7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1Enter

the number of frames -- 3

The Page Replacement process is --

7	-1	-1	PF No. -- 1
7	0	-1	PF No. -- 2
7	0	1	PF No. -- 3
2	0	1	PF No. -- 4

2	0	1	
2	0	3	PF No. -- 5
2	0	3	
4	0	3	PF No. -- 6
4	0	2	PF No. -- 7
4	3	2	PF No. -- 8
0	3	2	PF No. -- 9
0	3	2	
0	3	2	
1	3	2	PF No. -- 10
1	3	2	
1	0	2	PF No. -- 11
1	0	2	
1	0	7	PF No. -- 12
1	0	7	
1	0	7	

The number of page faults using LRU are 12

RESULT:

Thus a UNIX C program to implement LRU page replacement is executedsuccessfully.

EX.NO:12C	IMPLEMENTATION OF LFU PAGE REPLACEMENT ALGORITHM
DATE:	

AIM:

To write a program in C to implement LFU page replacement algorithm.

ALGORITHM

Step1: Start the program

Step2: Declare the required variables and initialize it.

Step3; Get the frame size and reference string from the user

Step4: Keep track of entered data elements

Step5: Accommodate a new element look for the element that is not to be used infrequently replace.

Step6: Count the number of page fault and display the value

Step7: Terminate the program

PROGRAM

```
#include<stdio.h>
#include<conio.h>

 main()
{
int rs[50], i, j, k, m, f, cntr[20], a[20], min, pf=0;clrscr();
printf("\nEnter number of page references -- ");

scanf("%d",&m);

 printf("\nEnter the reference string -- ");

for(i=0;i<m;i++)

 scanf("%d",&rs[i]);
printf("\nEnter the available no. of frames -- ");
scanf("%d",&f);
 for(i=0;i<f;i++)
{

cntr[i]=0;a[i]=-1;
}
Printf("\nThe Page Replacement Process is – \n");
```

```
for(i=0;i<m;i++)
{
for(j=0;j<f;j++)
if(rs[i]==a[j])
{
```

```
                    }   cntr[j]++;
                if(j==f)    break;
                {
min = 0;

 for(k=1;k<f;k++)
if(cntr[k]<cntr[min])min=k;
a[min]=rs[i];cntr[min]=1;pf++;
}
printf("\n"); for(j=0;j<f;j++)
printf("\t%d",a[j]);if(j==f)
printf("\tPF No. %d",pf);


}
printf("\n\n Total number of page faults -- %d",pf);getch();
}
```

OUTPUT:

Enter number of page references -- 10

Enter the reference string -- 1 2 3 4 5 2 5 2 5 1 4 3

Enter the available no. of frames 3

The Page Replacement Process is –

1	-1	-1	PF No. 1
1	2	-1	PF No. 2
1	2	3	PF No. 3
4	2	3	PF No. 4
5	2	3	PF No. 5
5	2	3	
5	2	3	
5	2	1	PF No. 6
5	2	4	PF No. 7
5	2	3	PF No. 8

Total number of page faults---------- 8

RESULT:

Thus the C programs to implement LFU page replacement algorithm wasexecuted successfully.

EX NO: 13	IMPLEMENTATION OF FILE ORGANIZATION TECHNIQUES
DATE:	

A) SINGLE LEVEL DIRECTORY:

AIM:

Program to simulate Single level directory file organization technique.

DESCRIPTION:

The directory structure is the organization of files into a hierarchy of folders. In a single-level directory system, all the files are placed in one directory. There is a root directory which has all files. It has a simple architecture and there are no sub directories. Advantage of single level directory system is that it is easy to find a file in the directory.

PROGRAM:

```
#include<stdio.h>
struct
{
char dname[10],fname[10][10];
int fcnt;
}dir;

void main()
{
int i,ch;
char f[30]; clrscr();
dir.fcnt
= 0;
printf("\nEnter name of directory -- ");
scanf("%s", dir.dname);
while(1)
{
printf("\n\n1. Create File\t2. Delete File\t3. Search File \n
4. Display Files\t5. Exit\nEnter your choice -- ");
scanf("%d",&ch);
switch(ch)
{
case 1:
printf("\nEnter the name of the file -- ");
scanf("%s",dir.fname[dir.fcnt]);
dir.fcnt++; break;
case 2:
 printf("\nEnter the name of the file -- ");
 scanf("%s",f);
for(i=0;i<dir.fcnt;i++)
{
if(strcmp(f, dir.fname[i])==0)
```

```
 {
 printf("File %s is deleted ",f);
 strcpy(dir.fname[i],dir.fname[dir.fcnt-1]);
break;
```

```
}
if(i==dir.fcnt)
printf("File %s not found",f);
else
                                                    dir.fcnt
                                                    --;
                                                    break;
case 3:
printf("\nEnter the name of the file -- "); scanf("%s",f); for(i=0;i<dir.fcnt;i++)
{
if(strcmp(f, dir.fname[i])==0)
{
printf("File %s is found ", f);break;
}
}
if(i==dir.fcnt)
printf("File %s not found",f);break;
case 4:
if(dir.fcnt==0)
printf("\nDirectory Empty");else
{
printf("\nThe Files are -- ");
for(i=0;i<dir.fcnt;i++)
printf("\t%s",dir.fname[i]);
}
break;
                default: exit(0);
                }
}
getch();}
```

OUTPUT:

```
Enter name of directory -- CSE
1. Create File 2. Delete File 3. Search File
4. Display Files 5. Exit Enter your choice – 1

Enter the name of the file -- A
1. Create File 2. Delete File 3. Search File
4. Display Files 5. Exit Enter your choice – 1

Enter the name of the file -- B
1. Create File 2. Delete File 3. Search File
4. Display Files 5. Exit Enter your choice – 1

Enter the name of the file -- C
1. Create File 2. Delete File 3. Search File
4. Display Files 5. Exit Enter your choice – 4

The Files are -- A B C
1. Create File 2. Delete File 3. Search File
4. Display Files 5. Exit Enter your choice – 3

Enter the name of the file – ABC FileABC
not found
1. Create File 2. Delete File 3. Search File
4. Display Files 5. Exit Enter your choice – 2

Enter the name of the file – BFile B
is deleted
1. Create File 2. Delete File 3. Search File
4. Display Files 5. Exit Enter your choice – 5
```

B) TWO LEVEL DIRECTORY

AIM: Program to simulate two level file organization technique

Description:
In the two-level directory system, each user has own user file directory (UFD). The system maintains a master block that has one entry for each user. This master block contains the addresses of the directory of the users. When a user job starts or a user logs in, the system's master file directory (MFD) is searched. When a user refers to a particular file, only his own UFDis searched.

PROGRAM:

```
#include<stdio.h>
struct
{
char
dname[10],fname[10][10]; int fcnt;
}
dir[10];

void main()
{
int                    i,ch,dcnt,k;    char
f[30], d[30]; clrscr(); dcnt=0;
while(1)
{
printf("\n\n1. Create Directory\t2. Create File\t3. Delete File");
printf("\n4. Search File\t\t5. Display\t6. Exit\t Enter your choice --");
scanf("%d",&ch);
switch(ch)
{
case 1:
 printf("\nEnter name of directory -- ");
scanf("%s",dir[dcnt].dname);
dir[dcnt].fcnt=0;
dcnt++;
printf("Directory created"); break;
case 2:
printf("\nEnter name of the directory -- ");
 scanf("%s",d);
for(i=0;i<dcnt;i++)
if(strcmp(d,dir[i].dname)==0)
{
printf("Enter  name  of  the file --");
scanf("%s",dir[i].fname[dir[i].fcnt]);
dir[i].fcnt++; printf("File created");
}
if(i==dcnt)
```

```
printf("Directory %s not found",d);break;
case 3:
printf("\nEnter name of the directory -- ");
```

```
scanf("%s",d);

for(i=0;i<dcnt;i++)for(i=0;i<dcnt;i++)
{
if(strcmp(d,dir[i].dname)==0)
{



printf("Enter name of  the file -- ");scanf("%s",f); for(k=0;k<dir[i].fcnt;k++)
{
if(strcmp(f, dir[i].fname[k])==0)
{
printf("File %s is deleted ",f);dir[i].fcnt--;
strcpy(dir[i].fname[k],dir[i].fname[dir[i].fcnt]);goto jmp;
}
}

printf("File %s not found",f);
 goto jmp;
}
}
printf("Directory %s not found",d);jmp :
break;
case 4:
 printf("\nEnter name of the directory -- ");
scanf("%s",d);
for(i=0;i<dcnt;i++)
{
if(strcmp(d,dir[i].dname)==0)
{
printf("Enter the name of the file -- ");
scanf("%s",f); for(k=0;k<dir[i].fcnt;k++)
{
if(strcmp(f, dir[i].fname[k])==0)
{
printf("File %s is found ",f); goto jmp1;
}
}
```

```
printf("File %s not found",f);
 goto jmp1;
}
}

printf("Directory  %s not found",d);

jmp1: break;

case 5:

 if(dcnt==0)
printf("\nNo Directory's ");
else
{
printf("\nDirectory\tFiles");for(i=0;i<dcnt;i++)
{
                                                printf("\n%s\t\t",dir[i].dname);
                                                for(k=0;k<dir[i].fcnt;k++)
                                                printf("\t%s",dir[i].fname[k]);
                }
                }
                break;


                default:exit(0);
                }
        }
}
```

OUTPUT:

1. Create Directory 2. Create File 3. Delete File
4. Search File 5. Display 6. Exit
Enter your choice -- 1
Enter name of directory -- DIR1 Directory created

1. Create Directory 2. Create File 3. Delete File
4. Search File 5. Display 6. Exit Enter your choice -- 1
Enter name of directory -- DIR2 Directory created
1. Create Directory 2. Create File 3. Delete File
4. Search File 5. Display 6. Exit Enter your choice -- 2
Enter name of the directory – DIR1
Enter name of the file -- A1File
created
1. Create Directory 2. Create File 3. Delete File
4. Search File 5. Display 6. Exit
Enter your choice -- 2
Enter name of the directory – DIR1

Enter name of the file -- A2File
created
1. Create Directory 2. Create File 3. Delete File
4. Search File 5. Display 6.Exit
Enter your choice – 6

RESULT:

Thus the implementation of file organization techniques executed successfully

EX.NO:14A **IMPLEMENTATION OF**

DATE: **SEQUENTIAL FILE ALLOCATION**

AIM:

To implement sequential file allocation technique.

ALGORITHM:

Step 1: Start the program.

Step 2: Get the number of files.

Step 3: Get the memory requirement of each file.

Step 4: Allocate the required locations to each in sequential order.

a). Randomly select a location from available location s1= random(100); b). Check whether the required locations are free from the selected location. c). Allocate and set flag=1 to the allocated locations.

Step 5: Print the results fileno, length , Blocks allocated.

Step 6: Stop the progr

PROGRAM

```
#include<stdio.h>
main()
{
int f[50],i,st,j,len,c,k;clrscr();
for(i=0;i<50;i++)
f[i]=0;
X:
printf("\n Enter the starting block & length of file");
scanf("%d%d",&st,&len);
 for(j=st;j<(st+len);
j++)if(f[j]==0)
{
f[j]=1;
printf("\n%d->%d",j,f[j]);
}
else
```

```
{
printf("Block already allocated");
break;
}
if(j==(st+len))
printf("\n the file is allocated to disk");
printf("\n if u want to enter more files?(y-1/n-0)");
scanf("%d",&c);
if(c==1)
goto X;
        else
                exit();
getch();
}
```

OUTPUT:

Output: Enter the starting block & length of file 4 104->1

5->1

6->1

7->1

8->1

9->1

10->1

11->1

12->1

13->1

The file is allocated to disk

If you want to enter more files? (Y-1/N-0)

RESULT:

Thus the program to implement the Sequential file allocation wasexecuted successfully.

EX.NO:14B LINKED FILE ALLOCATION

DATE:

AIM:

To write a C program to implement File Allocation concept using thetechnique Linked List Technique.

ALGORITHM:

Step 1: Start the Program

Step 2: Get the number of files.

Step 3: Allocate the required locations by selecting a location randomly

Step 4: Check whether the selected location is free.

Step 5: If the location is free allocate and set flag =1 to the allocated locations.

Step 6: Print the results file no, length, blocks allocated.

Step 7: Stop the execution

PROGRAM:

```
#include<stdio.h>
main()
{
int f[50],p,i,j,k,a,st,len,n,c;clrscr();
for(i=0;i<50;i++)
f[i]=0;
printf("Enter how many blocks that are already allocated");
scanf("%d",&p);
 printf("\nEnter the blocks no.s that are already allocated");
for(i=0;i<p;i++)
{
scanf("%d",&a);f[a]=1;
}
X: printf("Enter the starting index block & length");
scanf("%d%d",&st,&len);
```

```
k=len;
for(j=st;j<(k+st);j++)
{
if(f[j]==0)
{
                    f[j]=1;
                    printf("\n%d->%d",j,f[j]);
}
else
{
                    printf("\n %d->file is already allocated",j); k++;
}
          }
printf("\n If u want to enter one more file? (yes-1/no-0)");
scanf("%d",&c);
if(c==1)
goto X;
           else
                    exit();
getch( );
}
```

OUTPUT:

Enter how many blocks are already allocated 3 Enter the
blocks no's that are already allocated 4 7 9Enter the
starting index block & length 3 7
3-> 1
4-> File is already allocated 5->1
6->1
7-> File is already allocated 8->1
9-> File is already allocated 10->1
11->1
12->1
If u want to enter one more file? (yes-1/no-0)

RESULT:

Thus the program to implement the linked file allocation was executedsuccessfully

EX.NO:14C INDEXED FILE ALLOCATION

DATE:

AIM:

To write a C program to implement file Allocation concept using the techniqueindexed allocation Technique

ALGORITHM:

Step 1: Start the Program

Step 2: Get the number of files.

Step 3: Get the memory requirement of each file.

Step 4: Allocate the required locations by selecting a location randomly.

Step 5:Print the results file no,length, blocks allocated.

Step 6: Stop the execution.

PROGRAM

```
#include<stdio.h>
int f[50],i,k,j,inde[50],n,c,count=0,p;
main()
{
clrscr(); for(i=0;i<50;i++)
f[i]=0;
x: printf("enter index block\t");
scanf("%d",&p);
 if(f[p]==0)
{
                    f[p]=1;
                    printf("enter no of files on index\t");
                     scanf("%d",&n);
}
else
{
                    printf("Block already allocated\n");
                    goto x;
```

```
}
for(i=0;i<n;i++)
 scanf("%d",&inde[i]);
for(i=0;i<n;i++)
 if(f[inde[i]]==1)
{
printf("Block already allocated");
goto x;
}
for(j=0;j<n;j++)
f[inde[j]]=1;
 printf("\n allocated");
printf("\n file indexed");
for(k=0;k<n;k++)
printf("\n %d->%d:%d",p,inde[k],f[inde[k]]);
 printf(" Enter 1 to enter more files and 0 to exit\t");
 s scanf("%d",&c);
if(c==1)
goto x;
                else
                        exit();
getch();
}
```

OUTPUT:

Enter index block 9

Enter no of files on index 3 1 2 3

Allocated

File indexed 9-> 1:1

9-> 2:1

9->3:1

Enter 1 to enter more files and 0 to exit.

RESULT :

Thus the program to implement the indexed file allocation was executed successfully

EX.NO: 15 **IMPLEMENTATION OF DISK**

DATE: **SCHEDULING ALGORITHMS**

AIM:

Write a C program to simulate disk scheduling algorithms

a) FCFS b) SCAN c) C-SCAN

DESCRIPTION

One of the responsibilities of the operating system is to use the hardware efficiently. For the disk drives, meeting this responsibility entails having fast access time and large disk bandwidth. Both the access time and the bandwidth can be improved by managing the order in which disk I/O requests are serviced which is called as disk scheduling. The simplest form of disk scheduling is, of course, the first-come, first- served (FCFS) algorithm. This algorithm is intrinsically fair, but it generally does not provide the fastest service. In the SCAN algorithm, the disk arm starts at one end, and moves towards the other end, servicing requests as it reaches each cylinder, until it gets to the other end of the disk. At the other end, the direction of head movement is reversed, and servicing continues. The head continuously scans back and forth across the disk. C-SCAN is a variant of SCAN designed to provide a more uniform wait time. Like SCAN, C-SCAN moves the head from one end of the disk to the other, servicing requests along the way. When the head reaches the other end, however, it immediately returns to the beginning of the disk without servicing any requests on the return trip

PROGRAM

FCFS DISK SCHEDULING ALGORITHM

```
#include<stdio.h>

main()

{

int t[20], n, I, j, tohm[20], tot=0;


float avhm;


 clrscr();

printf(“enter the no.of tracks”);


scanf(“%d”,&n);

printf(“enter the tracks to be traversed”);

for(i=2;i<n+2;i++)
```

```
scanf(“%d”,&t*i+);for(i=1;i<n+1;i++)
{
tohm[i]=t[i+1]-t[i];

if(tohm[i]<0)
tohm[i]=tohm[i]*(-1);
}
for(i=1;i<n+1;i++)
tot+=tohm[i];avhm=(float)tot/n;
printf(“Tracks traversed\tDifference between tracks\n”); for(i=1;i<n+1;i++)
printf(“%d\t\t\t%d\n”,t*i+,tohm*i+);
printf("\nAverage header movements:%f",avhm);getch();
}
```

OUTPUT:

Enter no.of tracks:9

Enter track position:55 58 60 70 18 90 150 160 184

Tracks traversed	Difference between tracks
55	45
58	3
60	2
70	10
18	52
90	72
150	60
160	10
184	24

Average header movements:30.888889

SCAN DISK SCHEDULING ALGORITHM

```
#include<stdio.h>
main()
{
int t[20], d[20], h, i, j, n, temp, k, atr[20], tot, p, sum=0;

clrscr();

printf("enter the no of tracks to be traveresed");

scanf("%d"',&n);

 printf("enter the position of head");
scanf("%d",&h);
t[0]=0;t[1]=h;
printf("enter the tracks");
for(i=2;i<n+2;i++)
scanf("%d",&t[i]);
for(i=0;i<n+2;i++)
{
for(j=0;j<(n+2)-i-1;j++)
{
if(t[j]>t[j+1])
{
temp=t[j]; t[j]=t[j+1]; t[j+1]=temp;
}
}
}
for(i=0;i<n+2;i++)
if(t[i]==h)
```

```
j=i;k=i;
p=0;
while(t[j]!=0)
{
atr[p]=t[j];j--;
p++;
}
atr[p]=t[j];
 for(p=k+1;p<n+2;p++,k++)
atr[p]=t[k+1];
for(j=0;j<n+1;j++)
{
if(atr[j]>atr[j+1])
d[j]=atr[j]-atr[j+1];
else
d[j]=atr[j+1]-atr[j];
sum+=d[j];
}
printf("\nAverage header movements:%f",(float)sum/n);getch();
}
```

OUTPUT:

```
Enter no.of tracks:9
Enter track position:55  58   60   70   18   90   150   160   184

Tracks traversed          Difference between tracks
    150                   50
    160                    10
    1841                   24
    90                     94
```

70	20
60	10
58	2
55	3
18	37

Average header movements: 27.77

C-SCAN DISK SCHEDULING ALGORITHM

```
#include<stdio.h>
main()
{
int t[20], d[20], h, i, j, n, temp,  k, atr[20], tot, p, sum=0;clrscr();
printf("enter the no of tracks to be traveresed");
scanf("%d'",&n);
 printf("enter the position of head");
scanf("%d",&h);   t[0]=0;t[1]=h;
printf("enter total tracks");
scanf("%d",&tot);
t[2]=tot-1;
printf("enter the tracks");
for(i=3;i<=n+2;i++)
scanf("%d",&t[i]);
for(i=0;i<=n+2;i++)
for(j=0;j<=(n+2)-i-1;j++)
if(t[j]>t[j+1])
{
temp=t[j];t[j]=t[j+1];
  t[j+1]=temp;
                                }
for(i=0;i<=n+2;i++)
if(t[i]==h)
j=i;break;
p=0;
while(t[j]!=tot-1)
{
atr[p]=t[j];j++;
p++;
}
```

```
atr[p]=t[j];p++;
i=0;
while(p!=(n+3) && t[i]!=t[h])
{
atr[p]=t[i];i++;
p++;
}
for(j=0;j<n+2;j++)
{
if(atr[j]>atr[j+1])
d[j]=atr[j]-atr[j+1];
else
d[j]=atr[j+1]-atr[j];
sum+=d[j];
}
printf("total header movements%d",sum);
```

```
printf("avg is %f",(float)sum/n);
getch();
}
```

OUTPUT:

Enter the track position: 55 58 60 70 18 90 150 160 184

Enter starting position : 100

Tracks traversed	Difference Between tracks
150	50
160	10
184	24
18	240
55	37
58	3
60	2
70	10
90	29

Average seek time : 35.7777779

RESULT:

Thus the program to implement disk Scheduling algorithm has beenexecuted and verified

EX.NO: 16	INSTALLATION OF UBUNTU OPERATING SYSTEM USING VMWARE
DATE:	

Ubuntu:
Ubuntu is one of the popular Linux distributions developed on the Debian Linux platform. Ubuntu is a full operating system available in multiple editions: Desktop edition, Servers edition, IoT, and Cloud. These editions can run on either a computer or virtual machines.

What Is VMWare Workstation?
VMWare Workstation is an application developed by VMWare to create virtual machines, containers, and Kubernetes clusters on any desktop or server system. VMWare released VMWare Workstation in two products: VMWare Workstation Pro and VMWare Workstation Player. VMWare Workstation Player is released on a free license with limited features, whereas VMWare Workstation Pro is an enterprise paid version that has loaded with a lot of features.

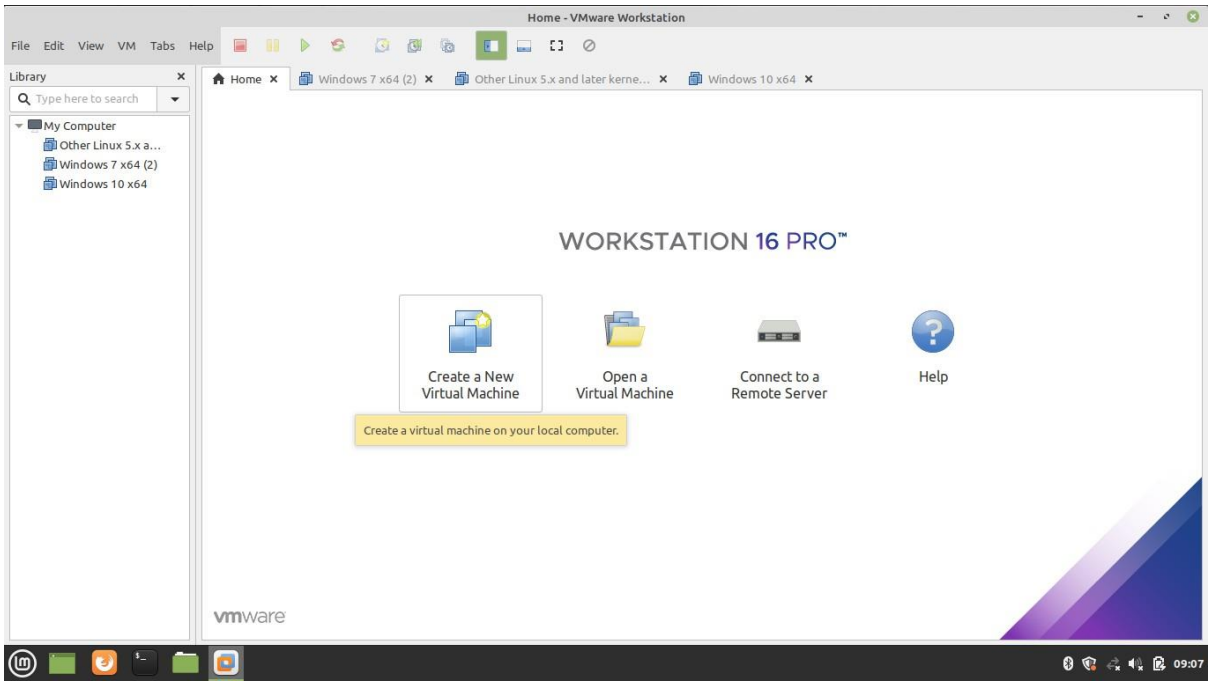
Prerequisites To Install Ubuntu On VMWare Workstation:
To install Ubuntu Linux on VMWare Workstation you just need a physical machine, VMWare Workstation Pro or Player, and Ubuntu Linux ISO image.

1. A host system with minimum:
1. 8 GB of memory
2. A quad core CPU
3. 500 GB of Hard Drive
2. VMWare Workstation Pro or Player application:0
1. Download VMWare Workstation
3. Ubuntu Operating System to install on VMWare Workstation.
1. Download Ubuntu Linux

How To Install Ubuntu Linux On VMWare Workstation?
Time needed: 30 minutes.
How to Install Ubuntu Linux on VMWare Workstation?

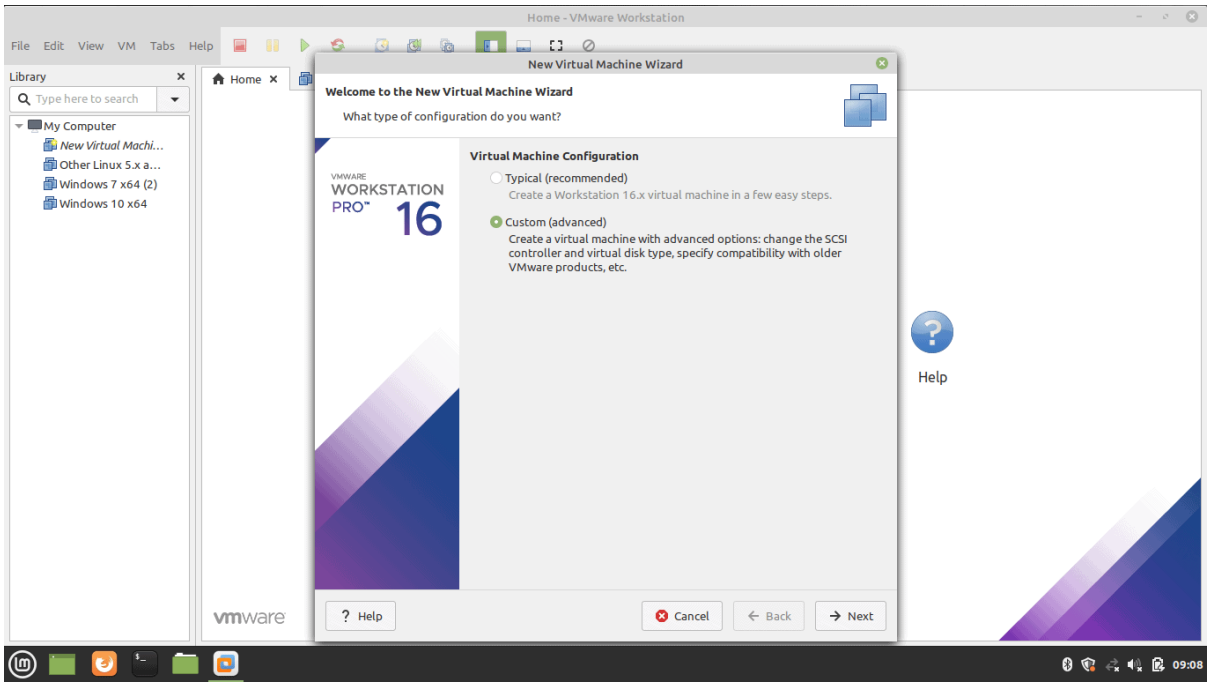
1. **Fier up VMWare Workstation**

Download the VMWare Workstation application for your host operating system and install it on your machine. The installation procedure is pretty simple and straight. Read the documentation for more details. Open the app after installation. Create a new Virtual Machine.



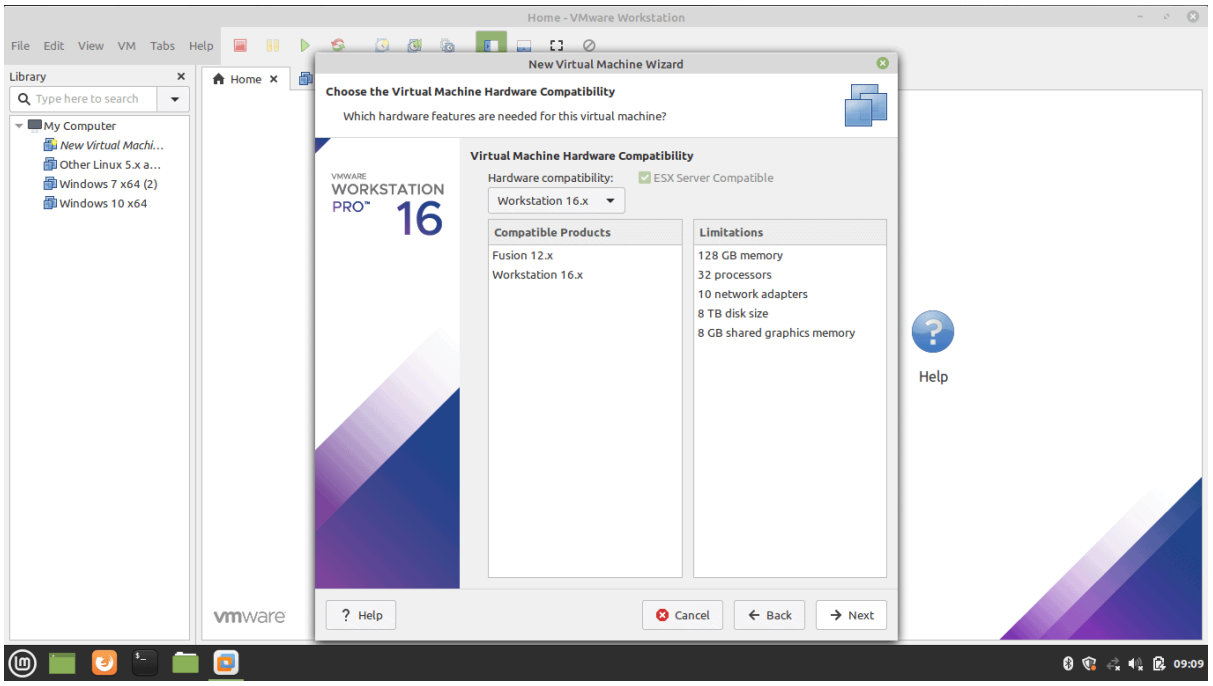
2. **Select Custom Configuration Wizard**

You can choose either Typical or Custom Wizard. We recommend selecting Custom if you want to install with all the configurations. If you are okay with default configurations then go ahead with Typical configurations.



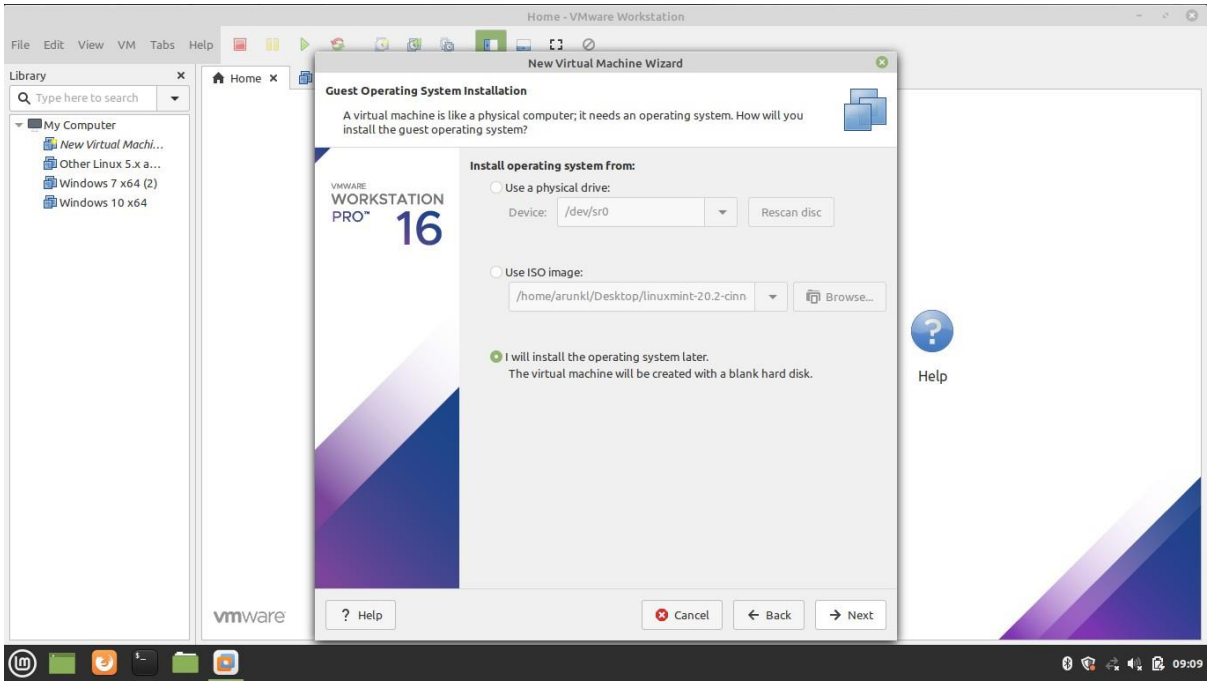
3. **Select Virtual Machine Hardware Compatibility**

Go with the default option if you don't have the choice.

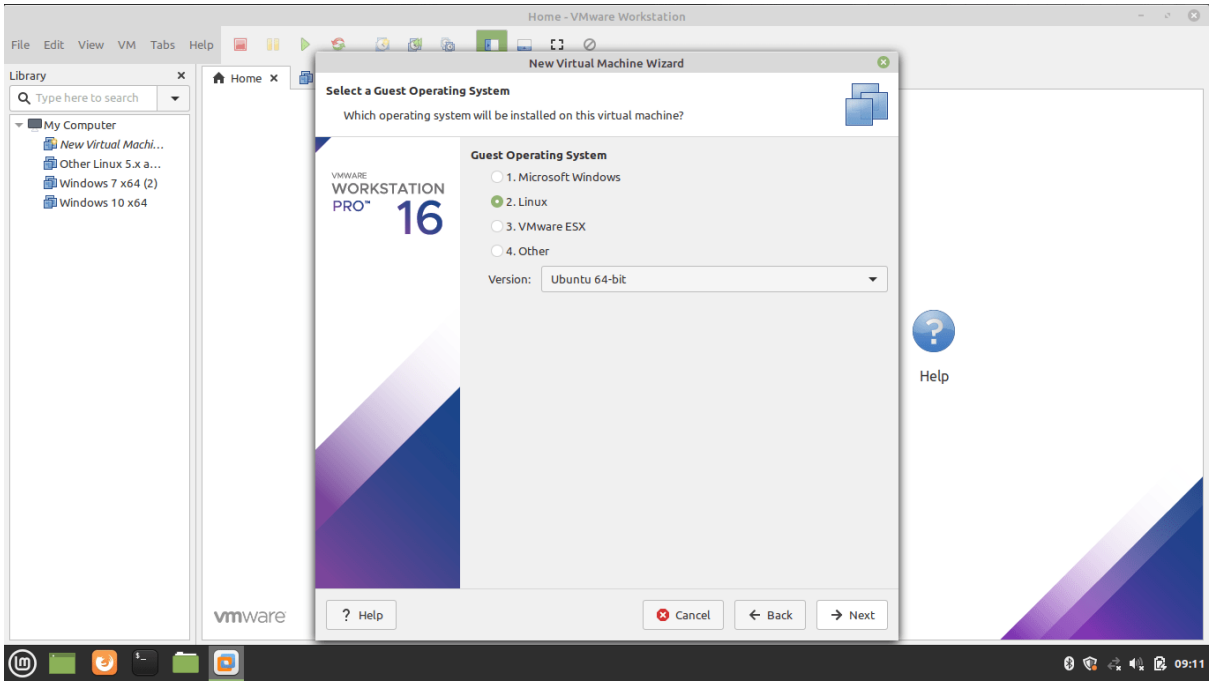


4. **Select the Operating System Media**

Select 'I will install the operating system later' for an interactive installation.

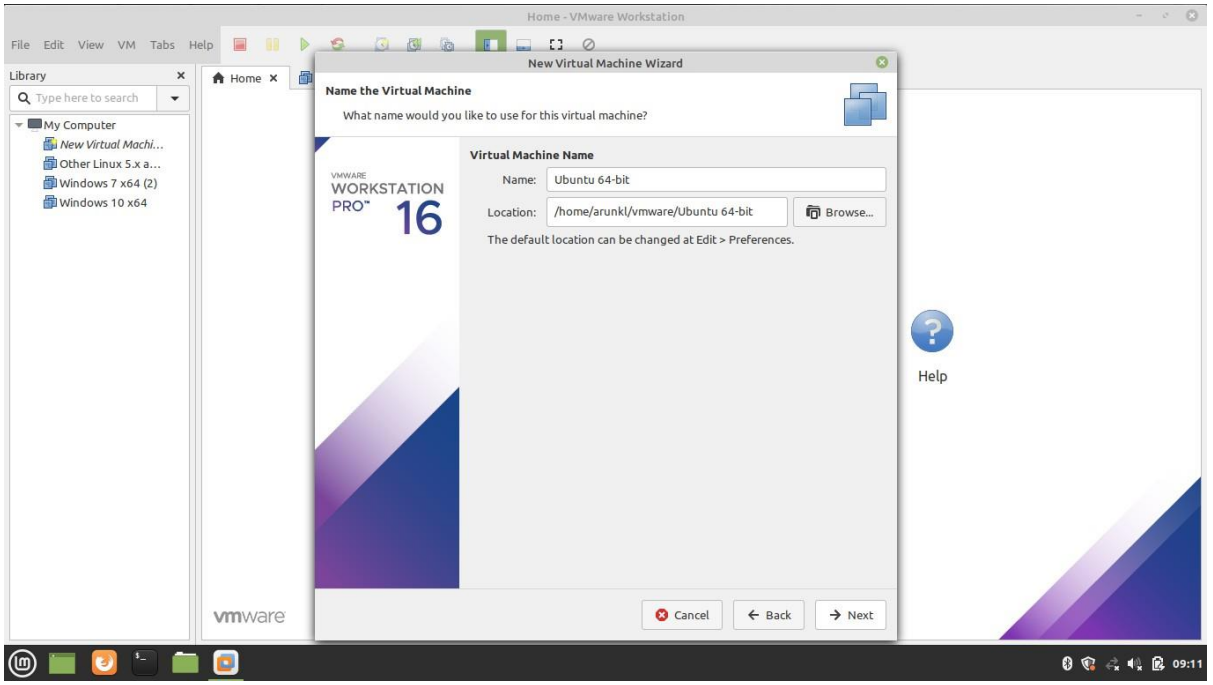


5. **Select Guest Operating System**



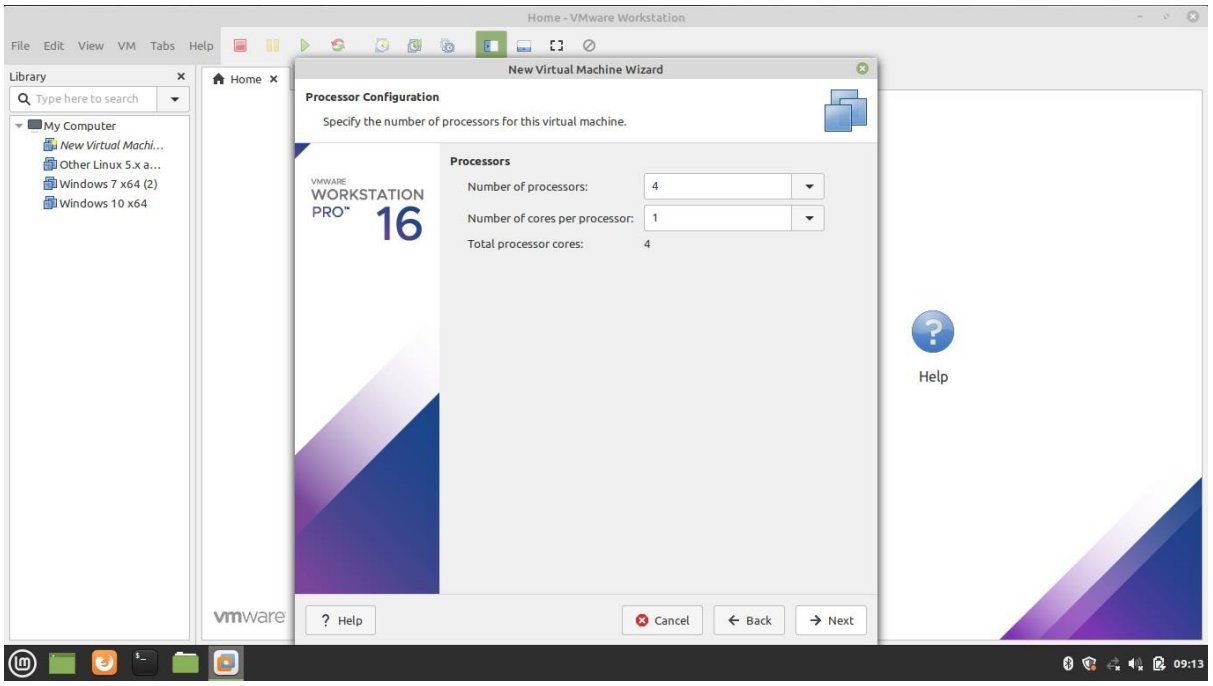
6. **Name the Virtual Machine Name and location**

Type a name and give the location details.



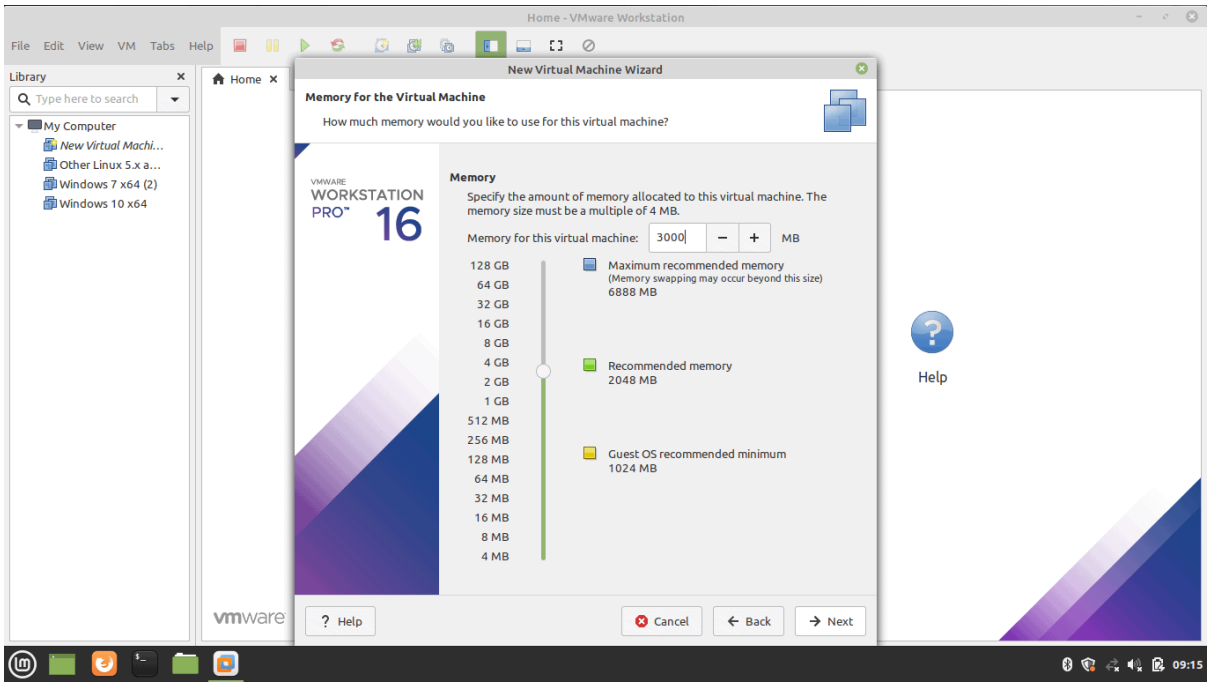
7. **Allocate the Processors**

Assign the processors, Calculate the processor required to run the host machine. Assign the leftover resources to the virtual machine.



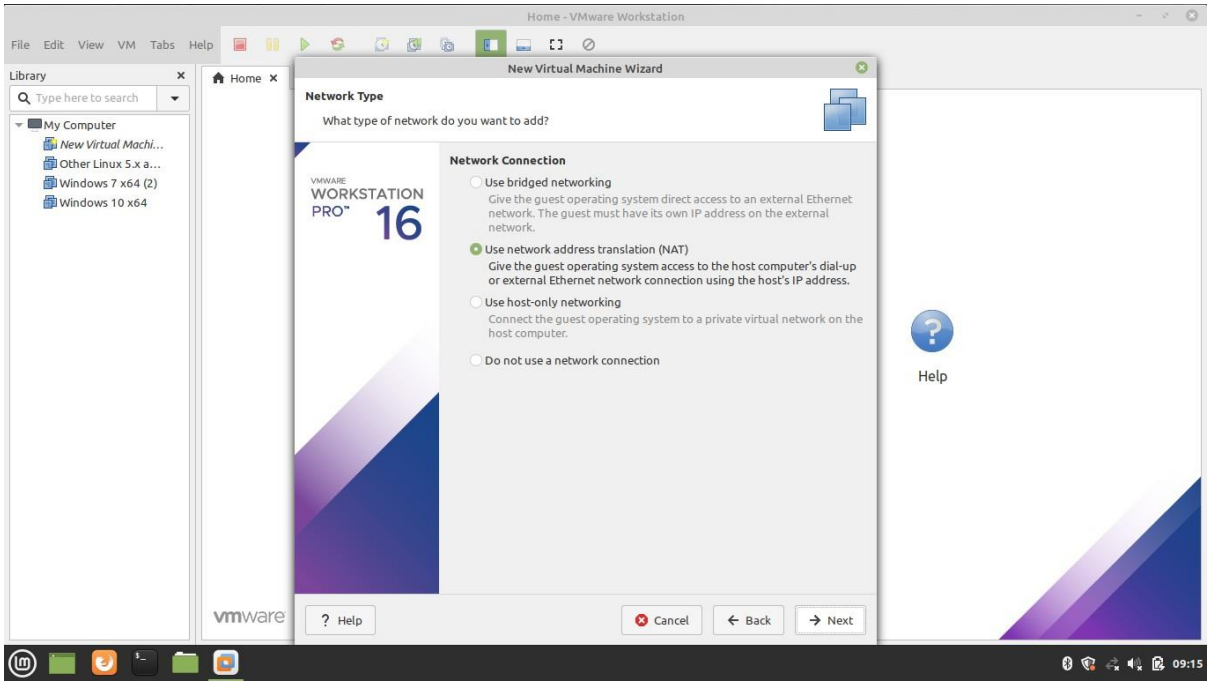
8. **Allocate the Memory for Virtual Machine**

Memory allocation calculation is the same as the processor allocation. Leave sufficient memory for the host system and allocate the remaining memory for the virtual machine.

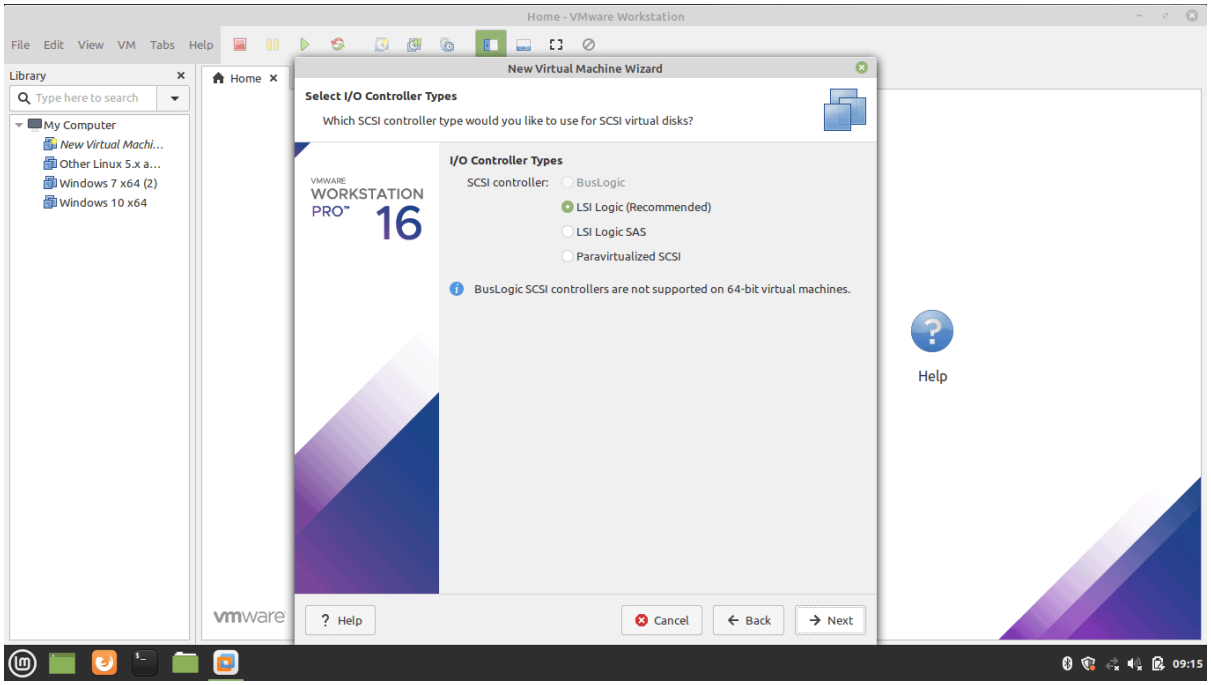


9. **Choose the Network Configuration**

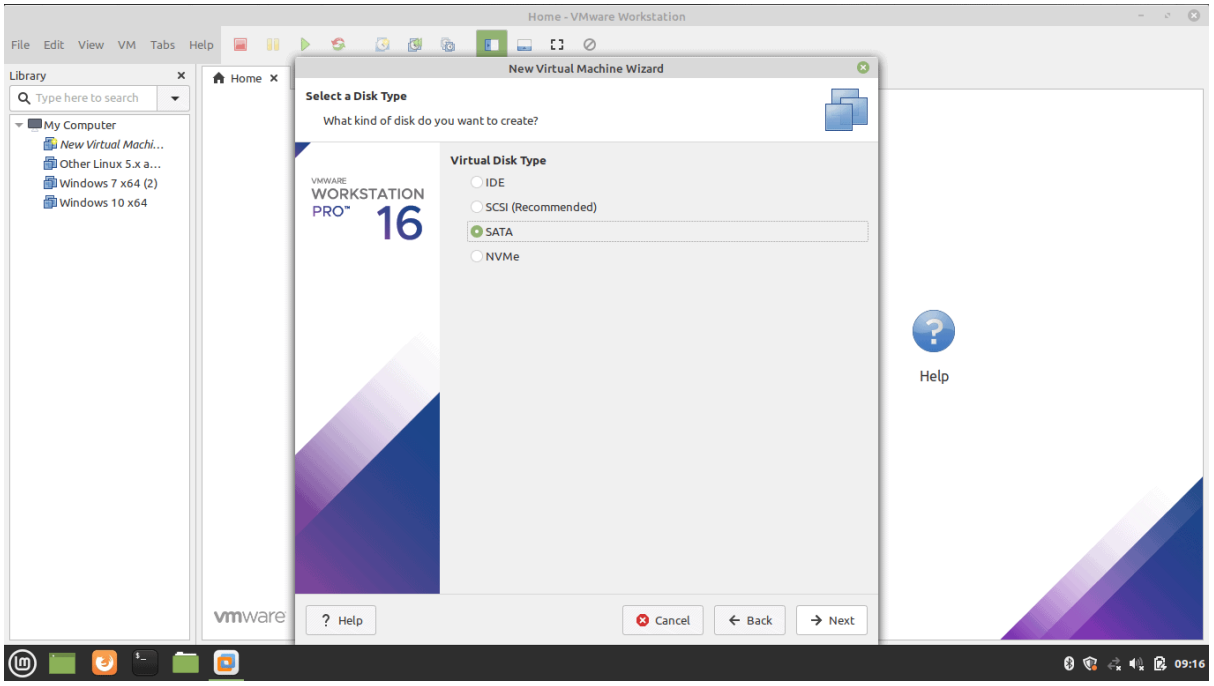
Select any one of the network configurations as per your requirement.



10. **Select the I/O Controller Type**

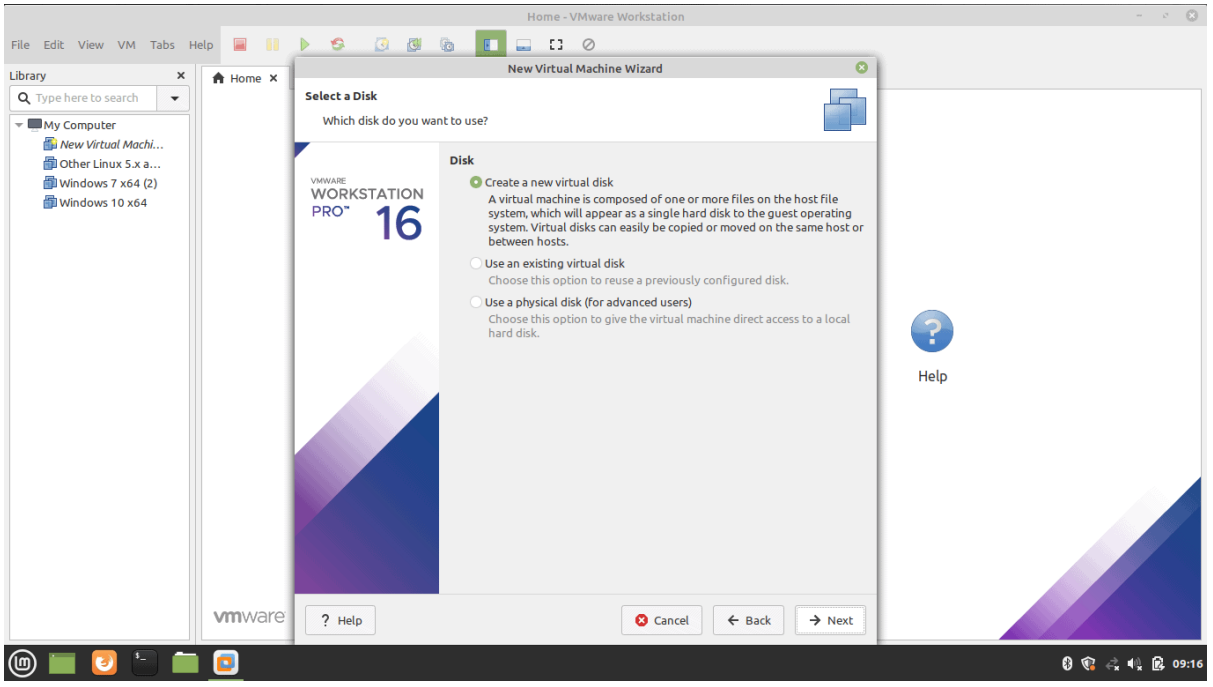


11. **Select Disk Type**



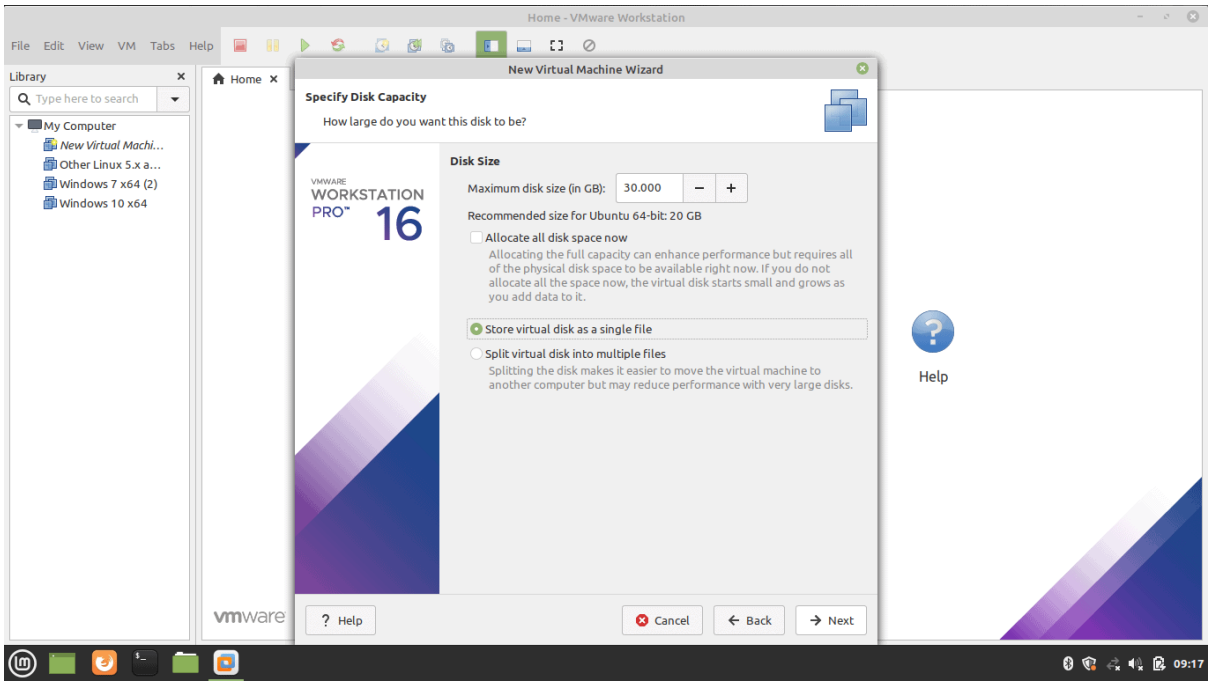
12. **Select Virtual Disk**

Select the Virtual Disk if you have or create one.

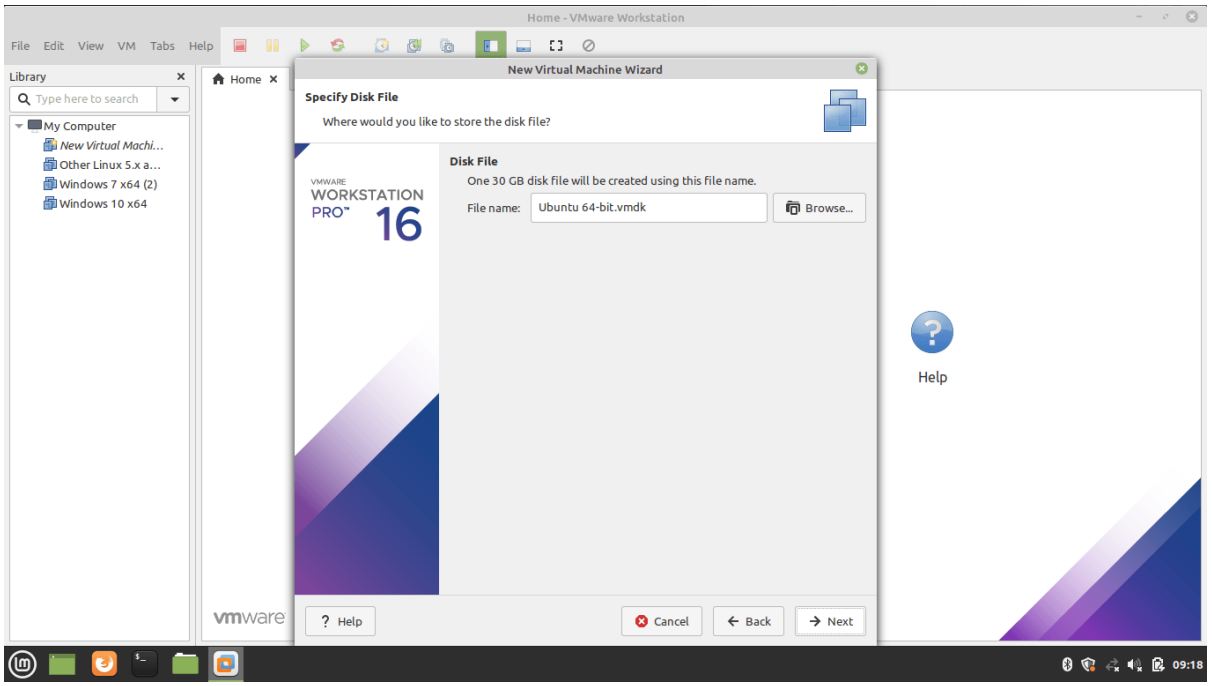


13. **Select Disk Capacity**

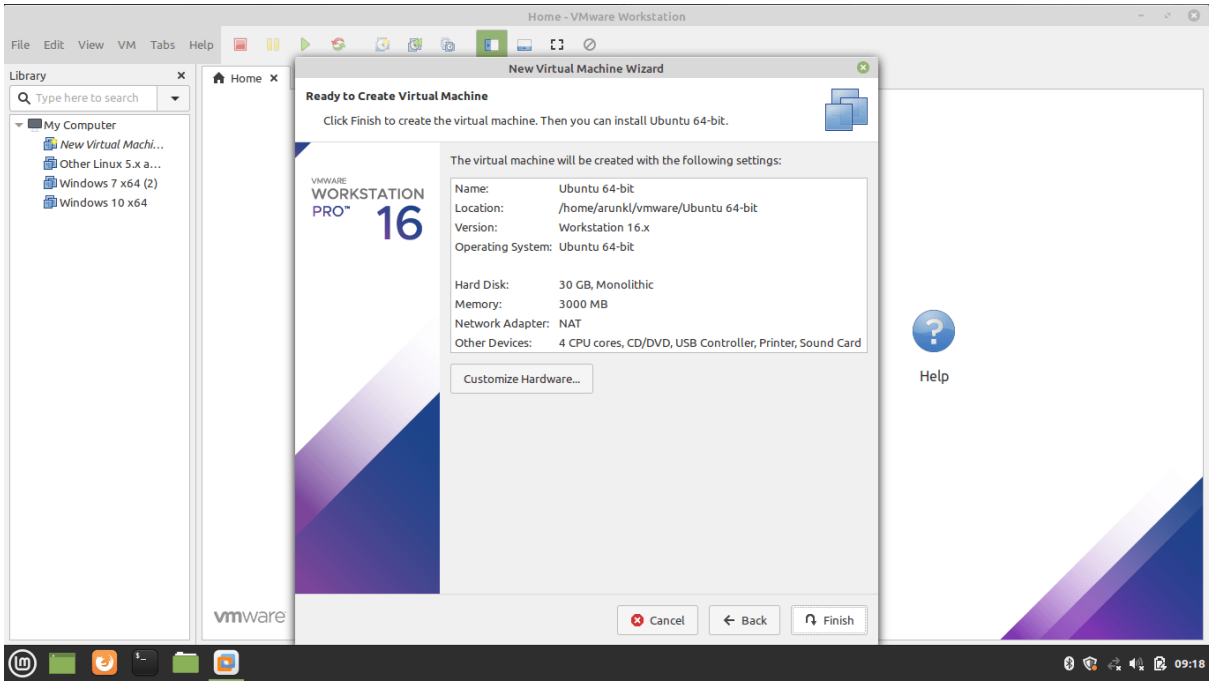
Select the disk size. Selecting a single disk will increase the performance. However, selecting a split disk will help in the disk transfer scenario.



14. **Specify Virtual Disk File**

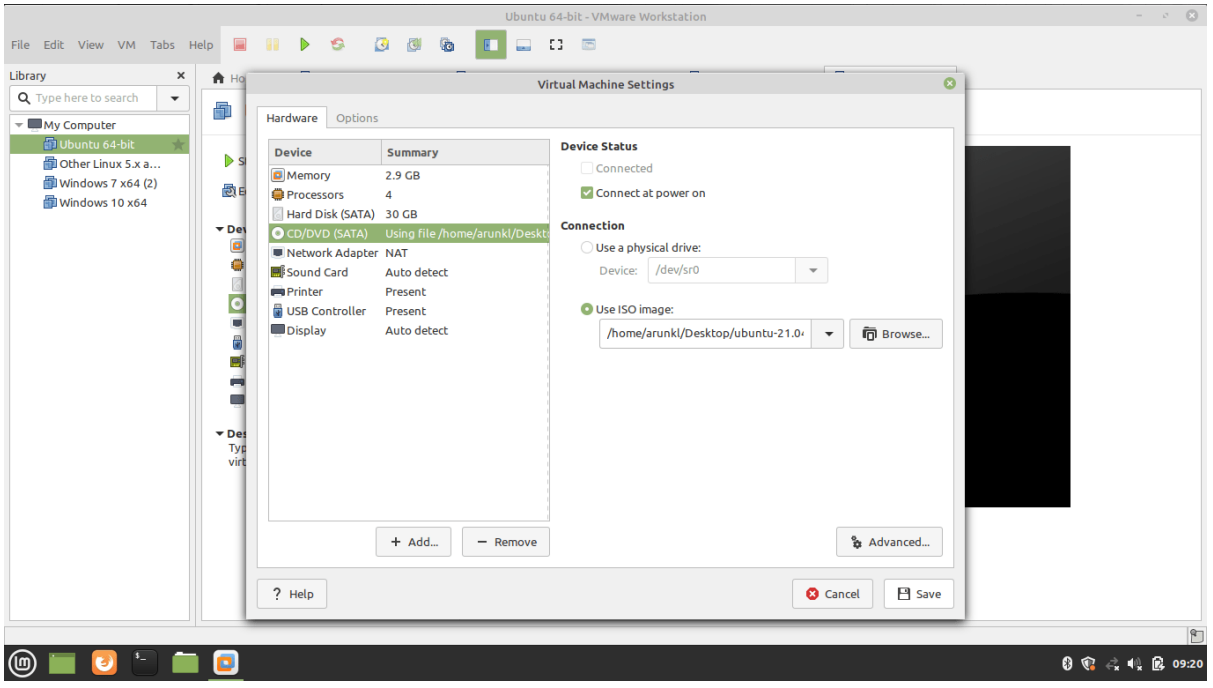


15. **Create Virtual Machine**

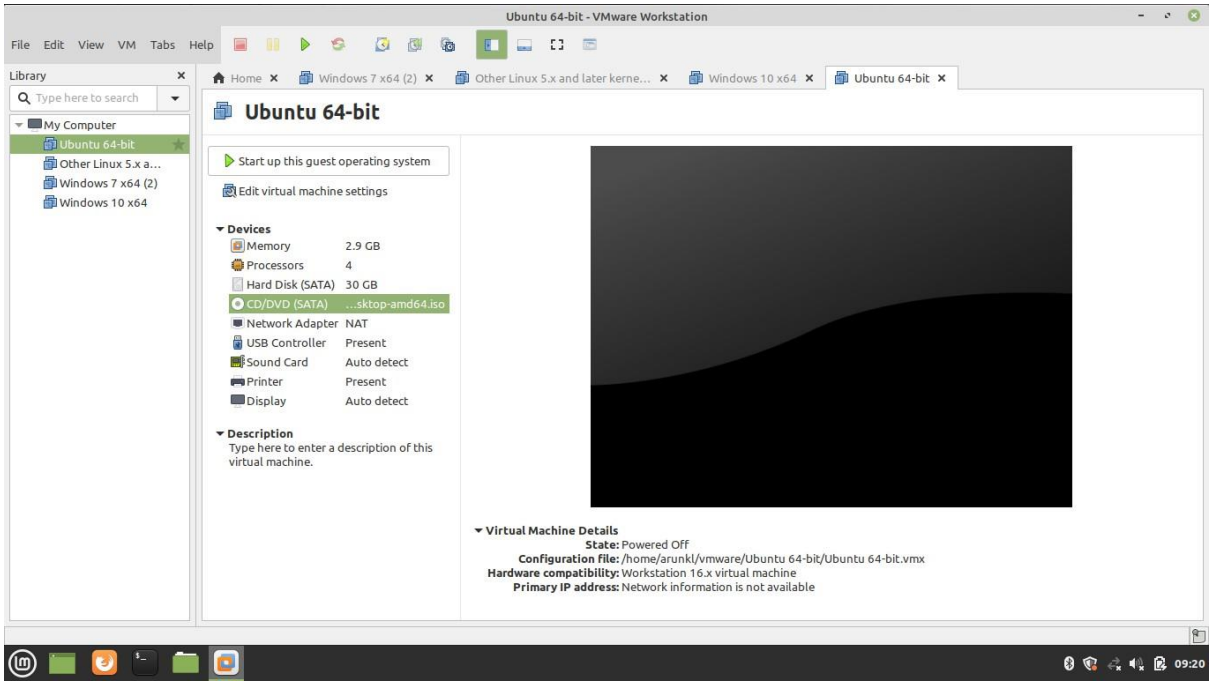


16. **Supply Ubuntu ISO Image to Virtual Machine**

Download Ubuntu image. Edit the CD/DVD settings and import the downloaded Ubuntu image.

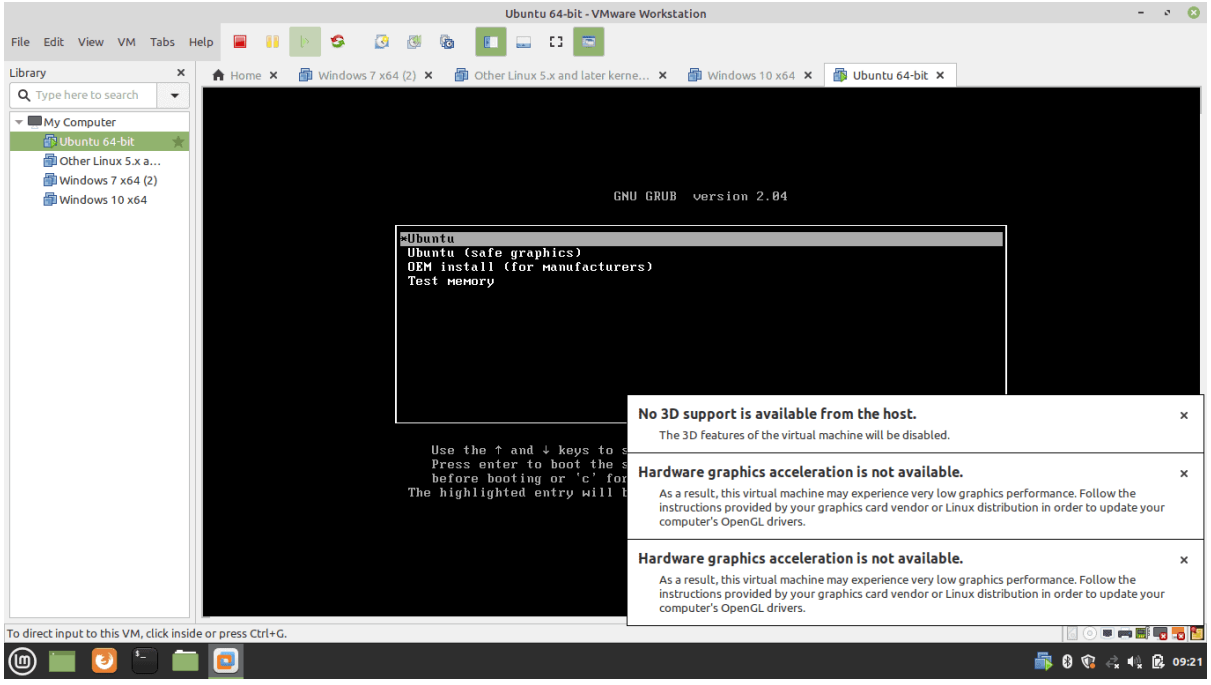


17. **Install Ubuntu Linux on VMWare Workstation**



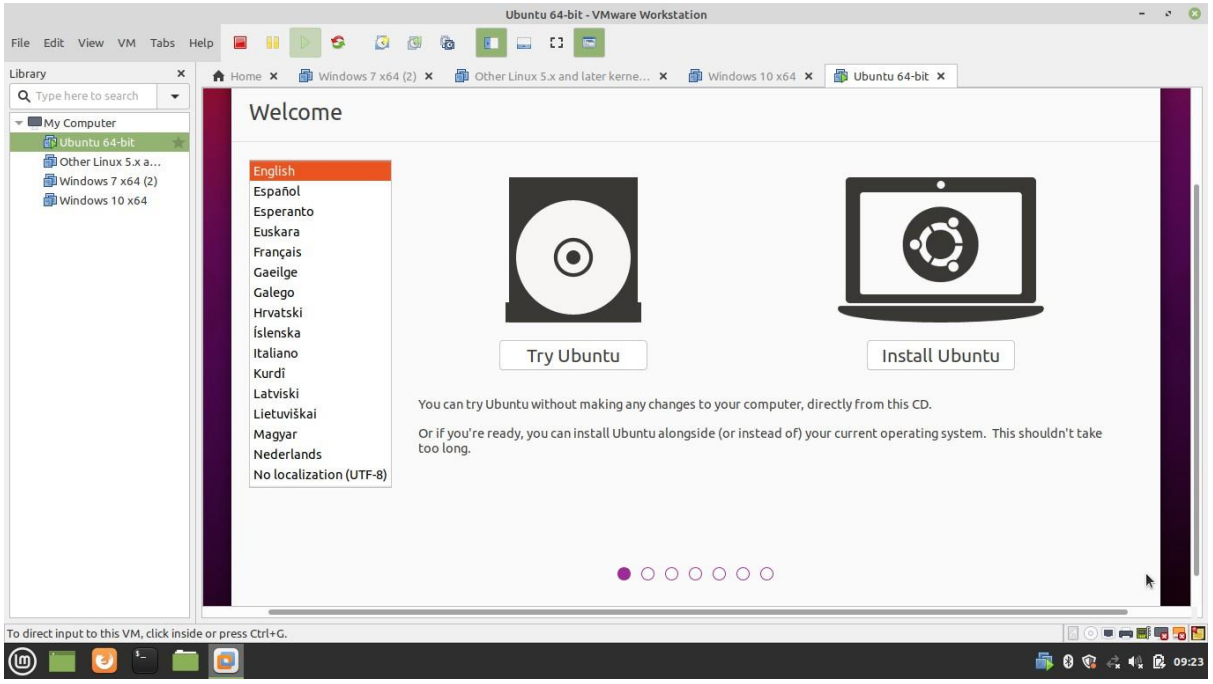
18. **Power On the Virtual Machine**

Press the Play button to power on the Virtual Machine.

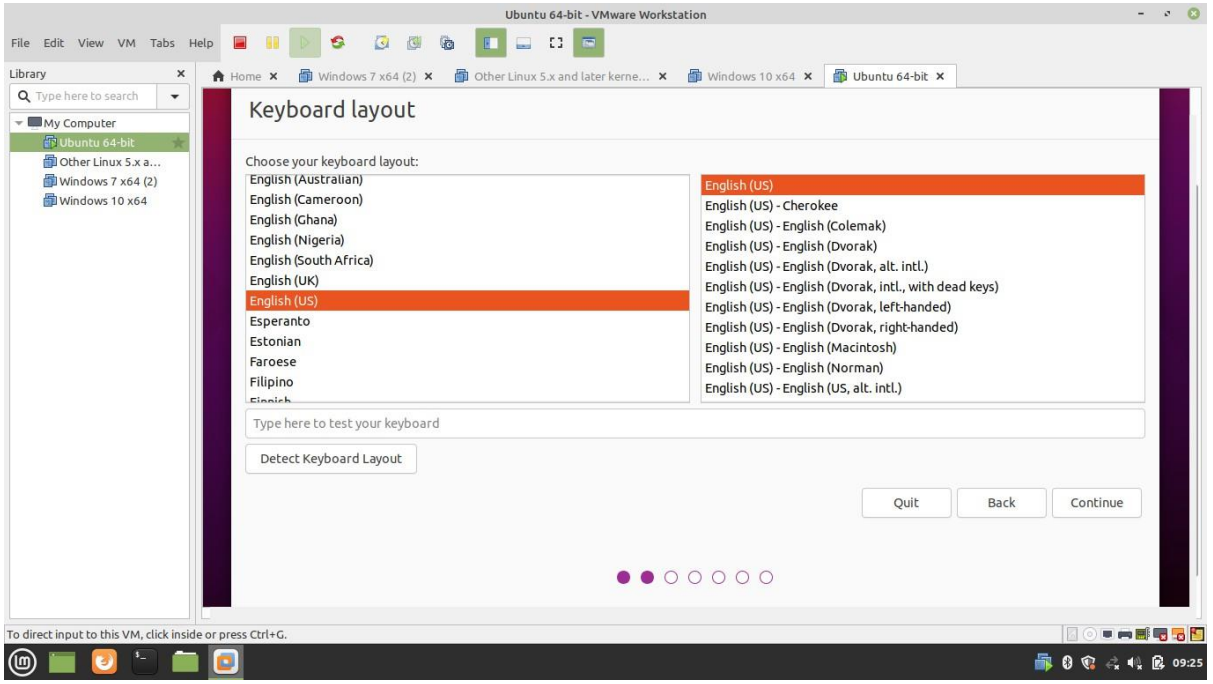


19. **Welcome Ubuntu Virtual Machine**

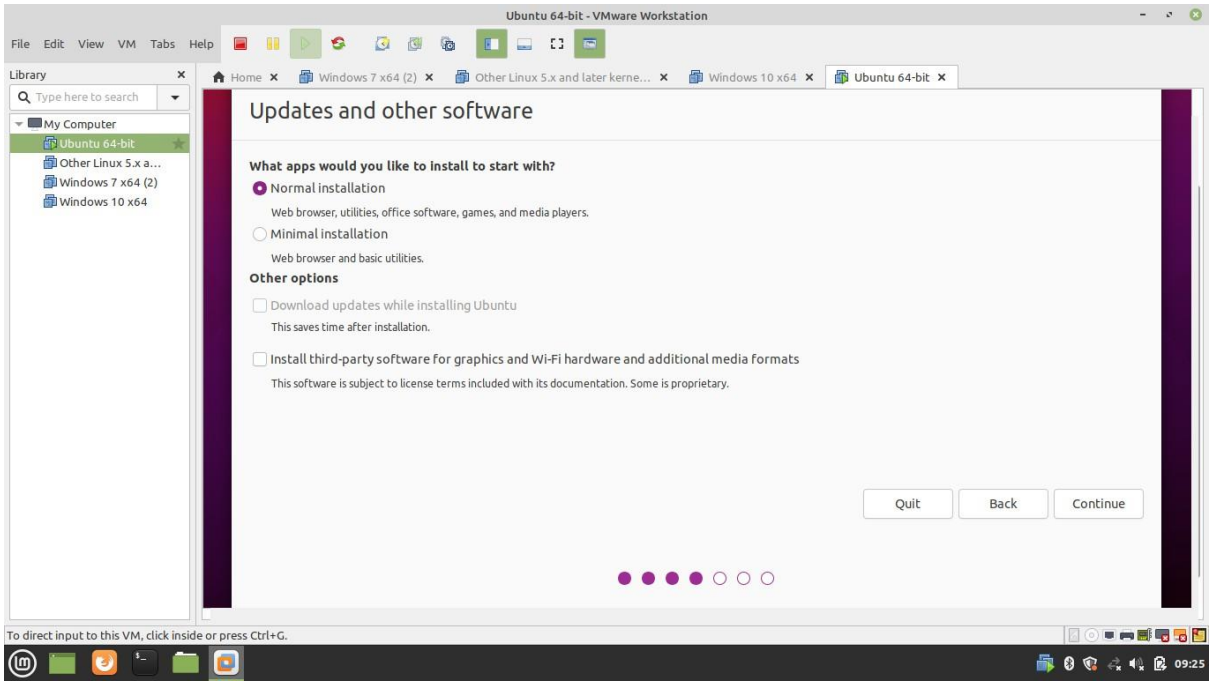
After powering on the Virtual machine, you will be treated with a welcome screen on which you will see two options: Try Ubuntu and Install Ubuntu. Select Try Ubuntu if you want to run Ubuntu in live mode. Select Install to continue the installation process.



20. **Select Keyboard Layout**

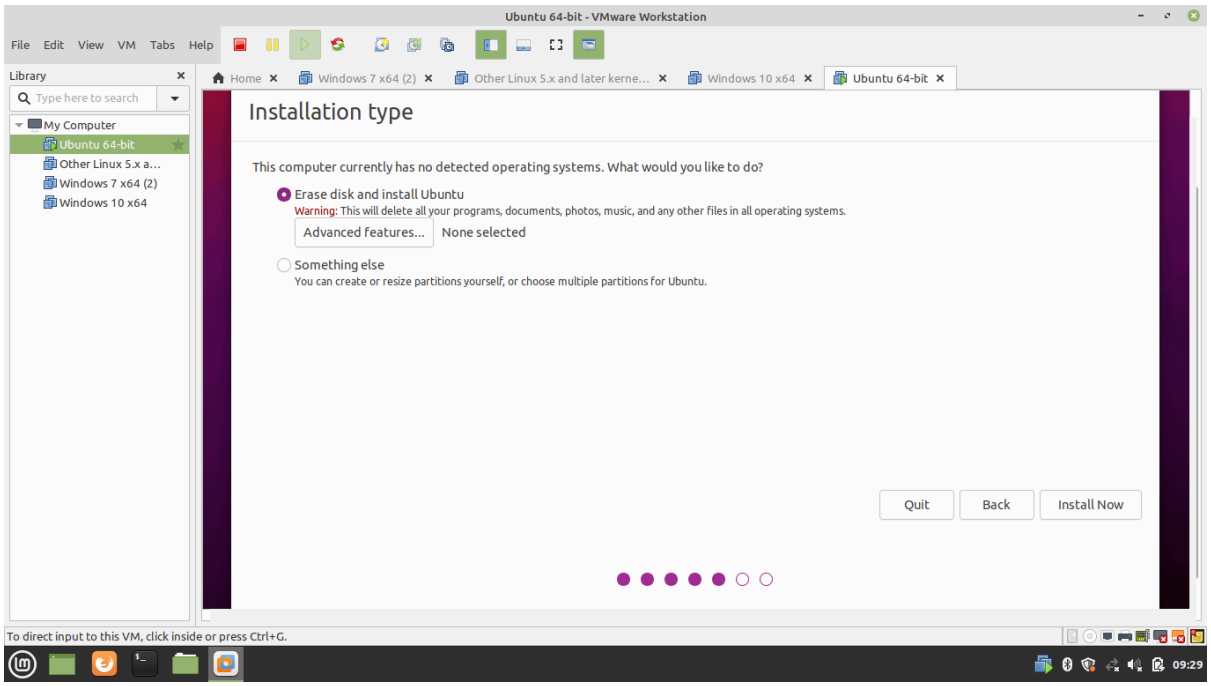


21. **Software Update and Package Selection in Virtual Machine**

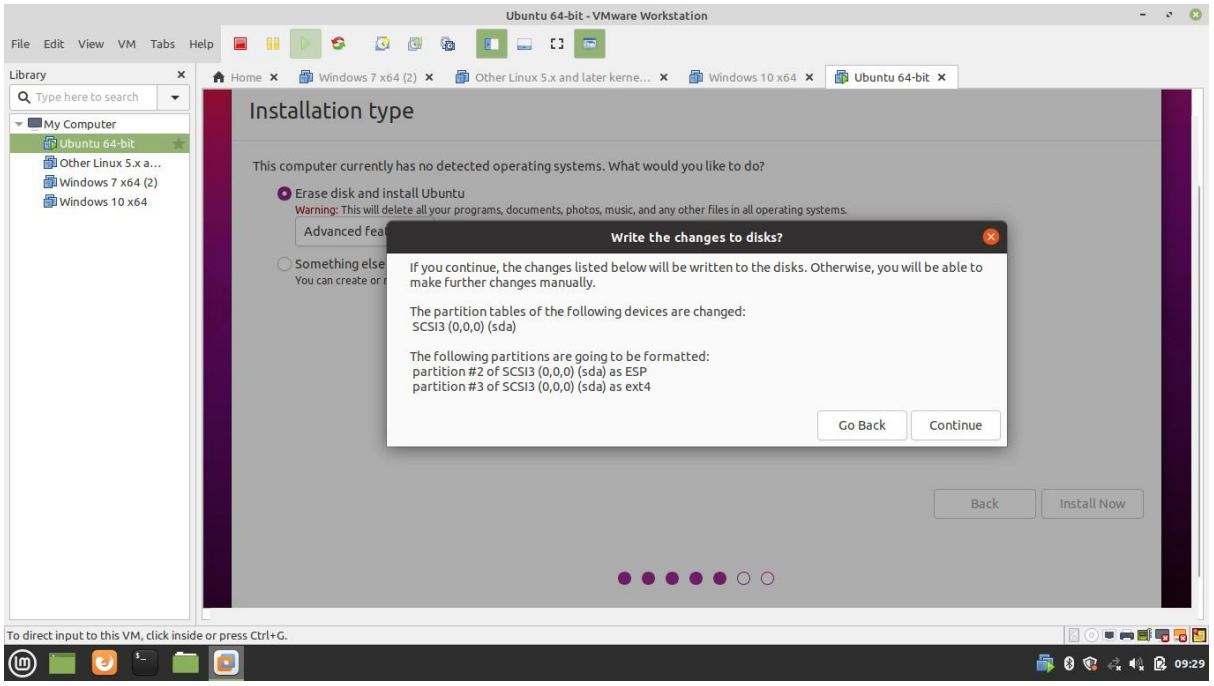


22. **Partition the Disk**

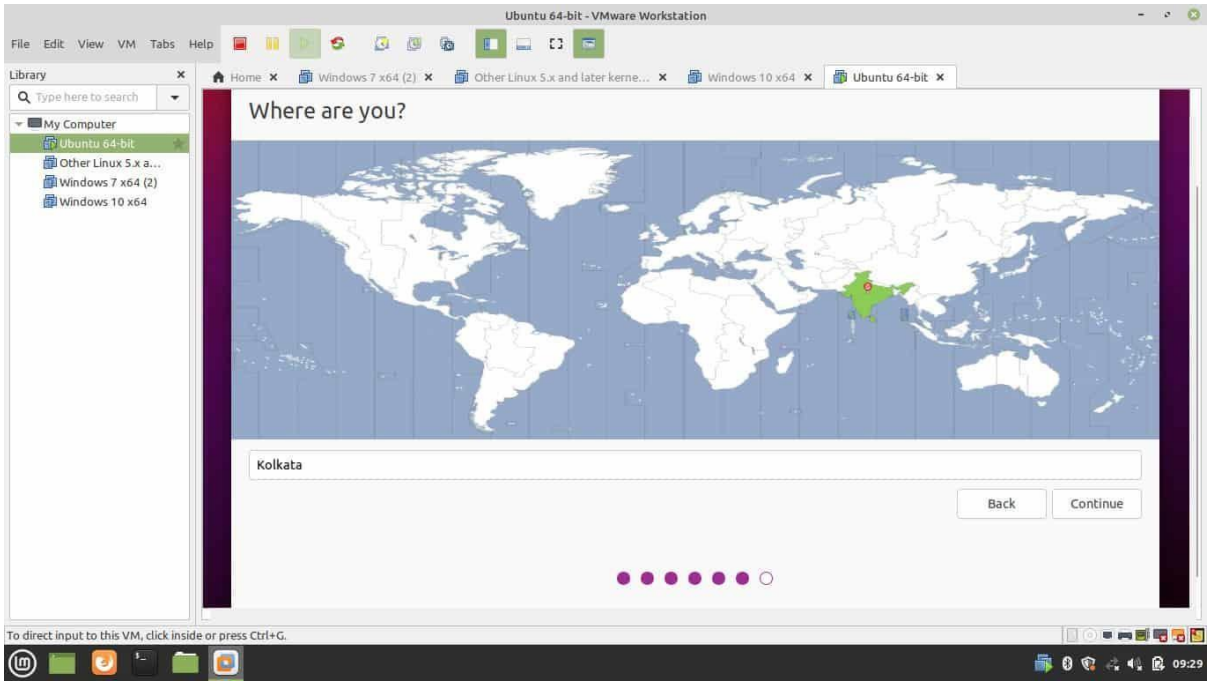
Select Erase the Disk for auto partition. Or Select the Advance option to create the custom partition.



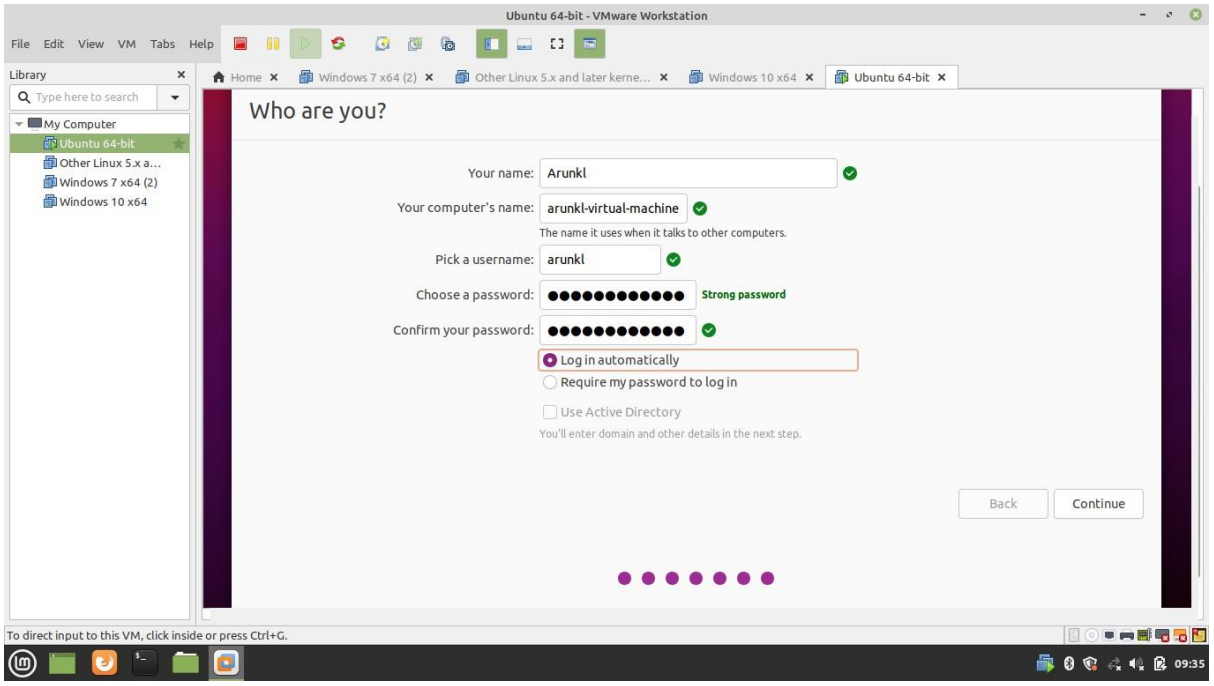
23. **Write Changes to Disk**



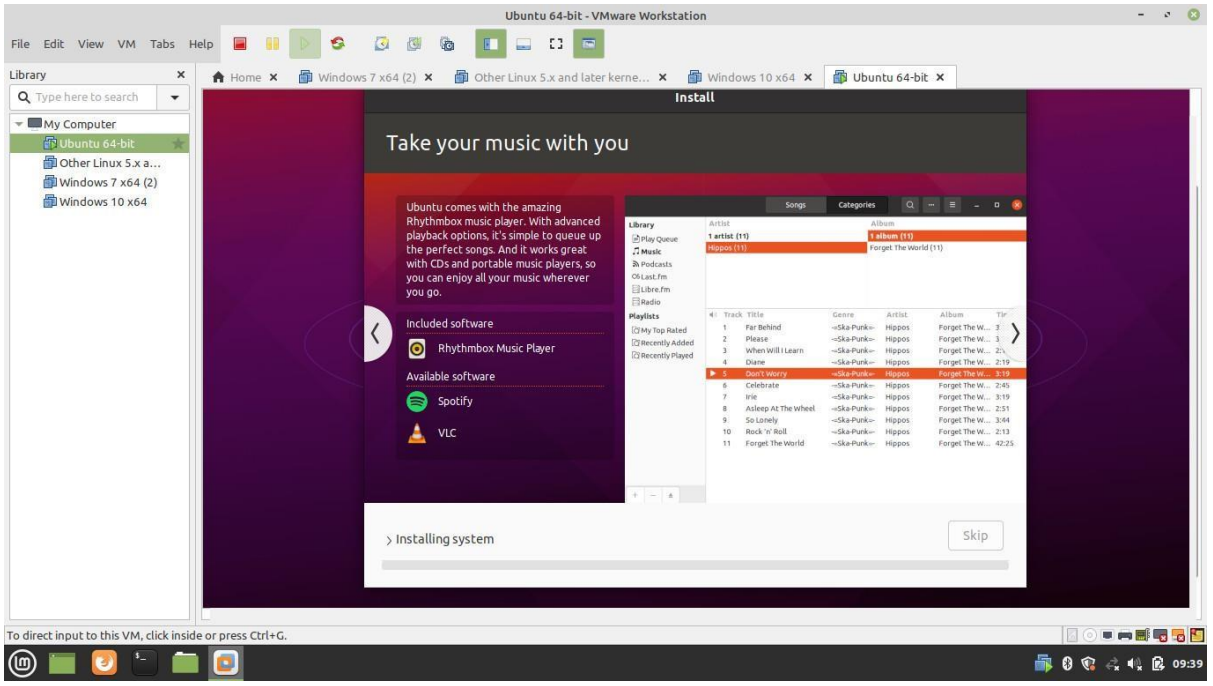
24. **Select Time Zone**



25. **Create an Admin Account**

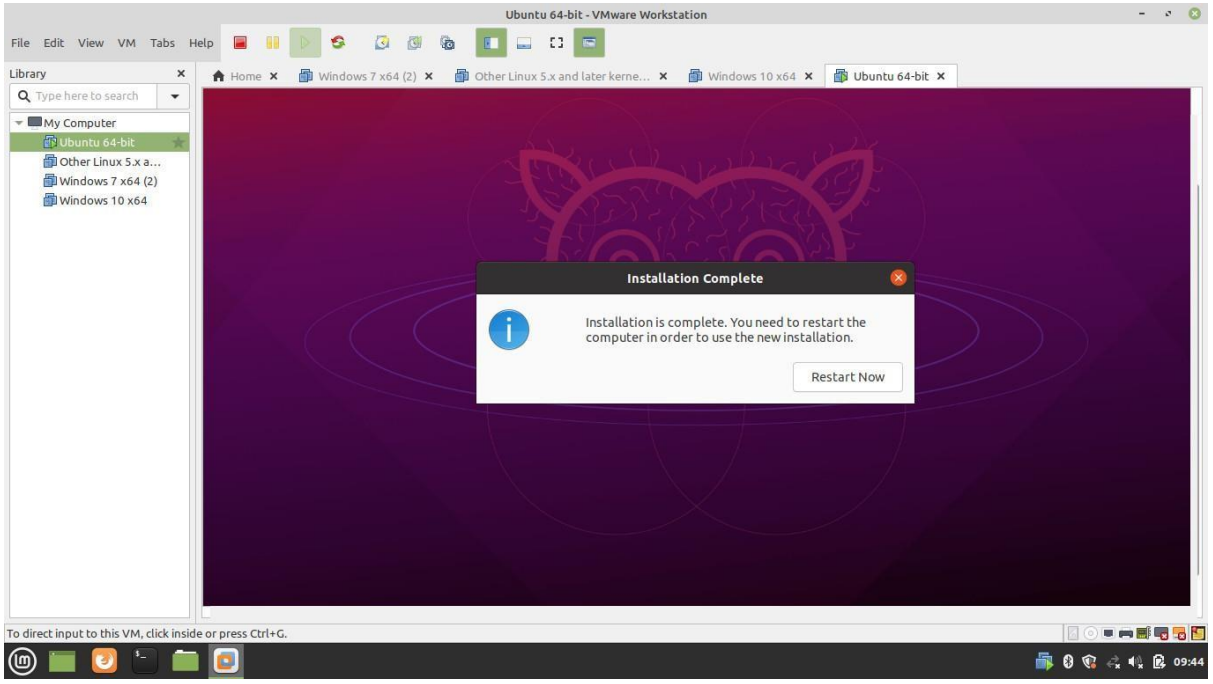


26. **Installation of Ubuntu in Progress**



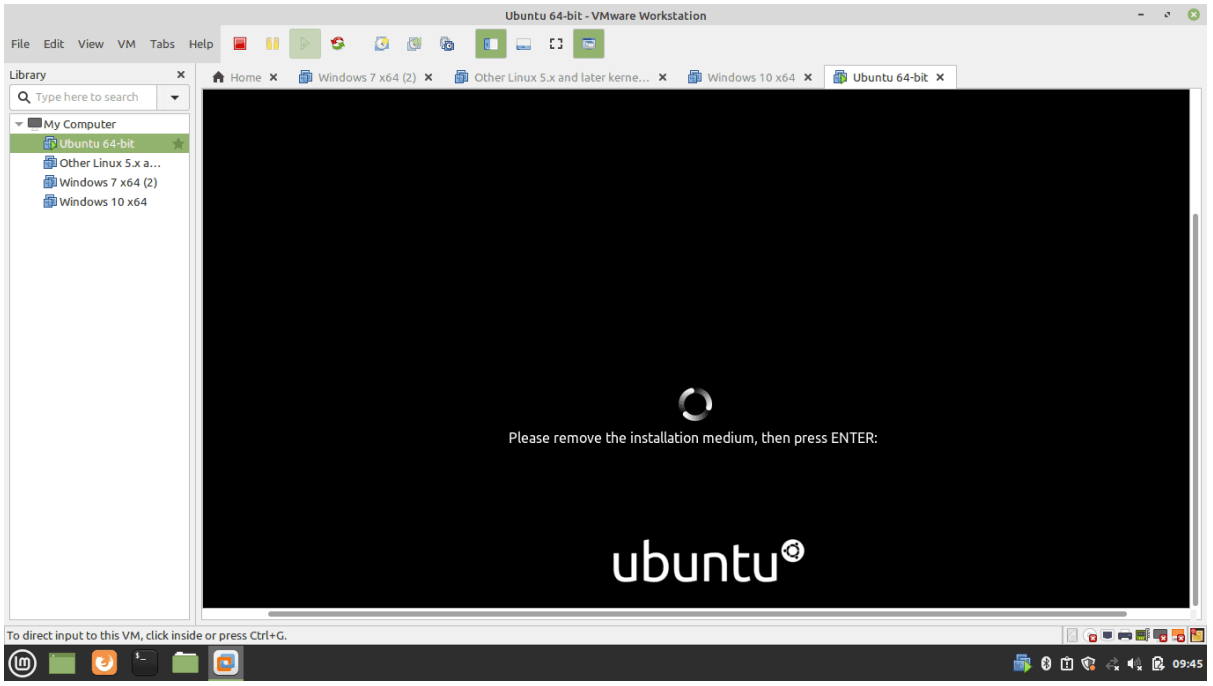
27. **Reboot Virtual Machine**

Reboot the machine after installation.

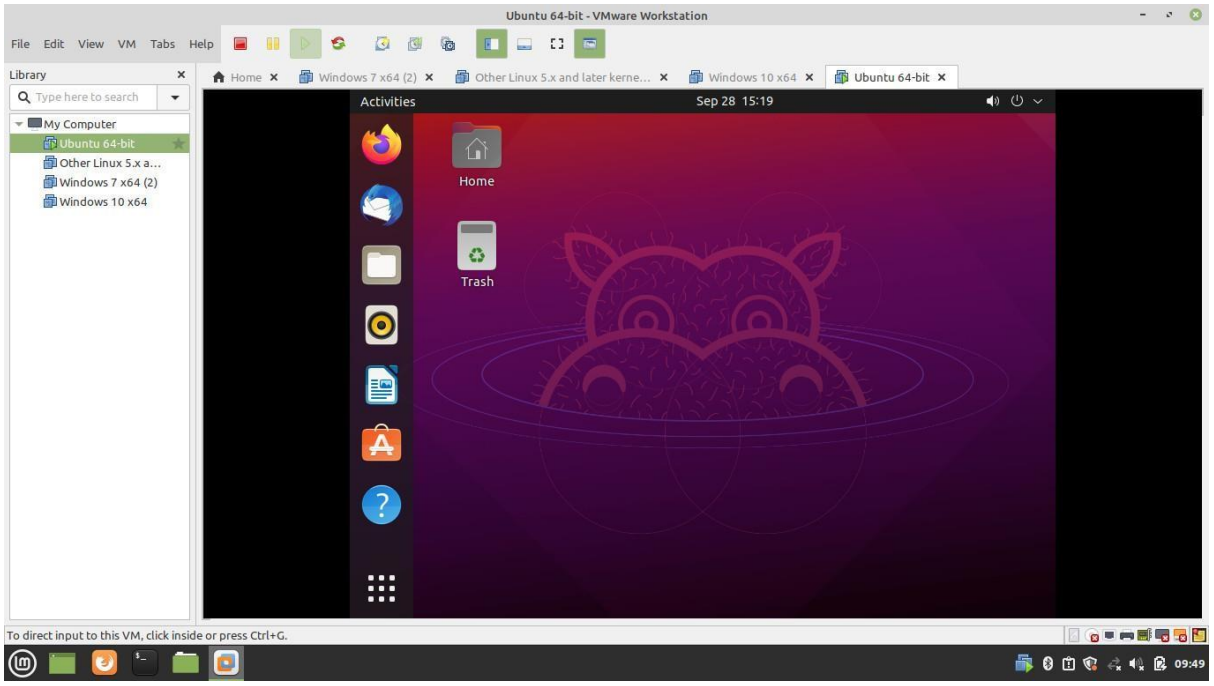


28. **Remove the installation media**

Remove the installation media before reboot.



29. **Boot Ubuntu**



RESULT:

Thus the installation of ubuntu operating system using VMware executed successfully.