Ex No.1 Install Virtualbox/VMware Workstation with different flavours of linux or windows OS

Aim

To install Virtualbox/VMware Workstation with different flavours of linux or windows OS.

Software Required

- Virtualbox or VMware
- Windows 10 iso or Ubuntu iso

Virtualization

Virtualization is the "creation of a virtual (rather than actual), such as a server, a desktop, a storage device, an operating system or network resources".

Virtualization is a technique, which allows sharing a single physical instance of a resource or an application among multiple customers and organizations.

VirtualBox

Oracle VirtualBox is cross-platform virtualization software. It allows users to extend their existing computer to run multiple operating systems including Microsoft Windows, Mac OS X, Linux, and Oracle Solaris, at the same time.

VMware

VMware is defined as a set of software and solutions that help convert the actual computer, server, or pool of similar hardware into several virtual machines that may be used for a variety of tasks. Each virtual machine (VMware cloud) has its own operating system and other capabilities.

VMware was the first commercially successful company to virtualize the x86 architecture.

The machine on which the virtual machine is going to create is known as **Host Machine** and that virtual machine is referred as a **Guest Machine**.

Virtual machine

A virtual machine (VM) is a digital version of a physical computer. Virtual machine software can run programs and operating system, store data, connect to networks, and do other computing functions, and requires maintenance such as updates and system monitoring.

ISO file

An ISO file is an archive file that contains an identical copy of data found on an optical disc, like a CD or DVD.

ISO images are often used for backing up optical discs or for distributing large file sets that are intended to be burned to an optical disc.

ISO images can be mounted as virtual discs, allowing apps to treat them as if a real optical disc were inserted.

Hypervisor

A hypervisor is software that you can use to run multiple virtual machines on a single physical machine. Every virtual machine has its own operating system and applications. The hypervisor allocates the

underlying physical computing resources such as CPU and memory to individual virtual machines as required. A hypervisor, also known as a virtual machine monitor or VMM, is software that creates and runs virtual machines (VMs). A hypervisor allows one host computer to support multiple guest VMs by virtually sharing its resources, such as memory and processing.

Types of Hypervisor

TYPE-1 Hypervisor

The hypervisor runs directly on the underlying host system. It is also known as a “Native Hypervisor” or “Bare metal hypervisor”. It does not require any base server operating system. It has direct access to hardware resources. Examples of Type 1 hypervisors include VMware ESXi, Citrix XenServer, and Microsoft Hyper-V hypervisor.

TYPE-2 Hypervisor

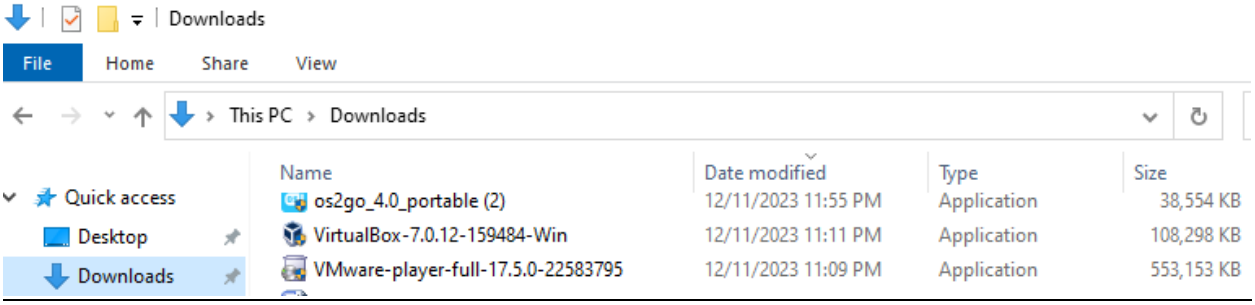
A Host operating system runs on the underlying host system. It is also known as ‘Hosted Hypervisor”. Such kind of hypervisors doesn’t run directly over the underlying hardware rather they run as an application in a Host system (physical machine). Basically, the software is installed on an operating system. An example of a Type 2 hypervisor includes VMware Player or Parallels Desktop.

Installing VMware Workstation on the top of windows OS

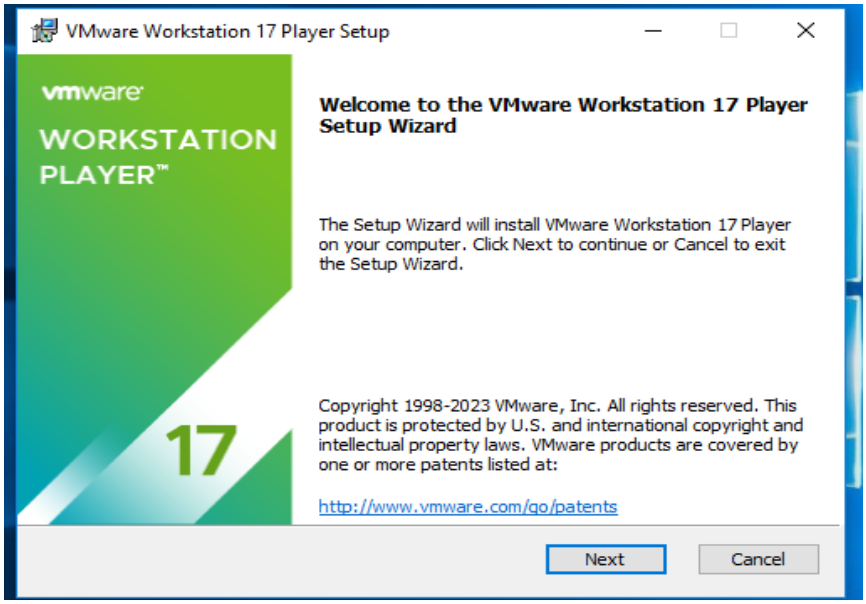
1.Download VMware workstation from link the given below. Two options for downloading. One is for Windows and other is for Linux. Choose workstation 17 Player and download.

https://www.vmware.com/in/products/workstation-player/workstation-player evaluation.html

2. Go to Downloads folder. Right click VMware Software and choose open. Click the VMware downloaded file and install.



3. Click Next in the installation wizard.

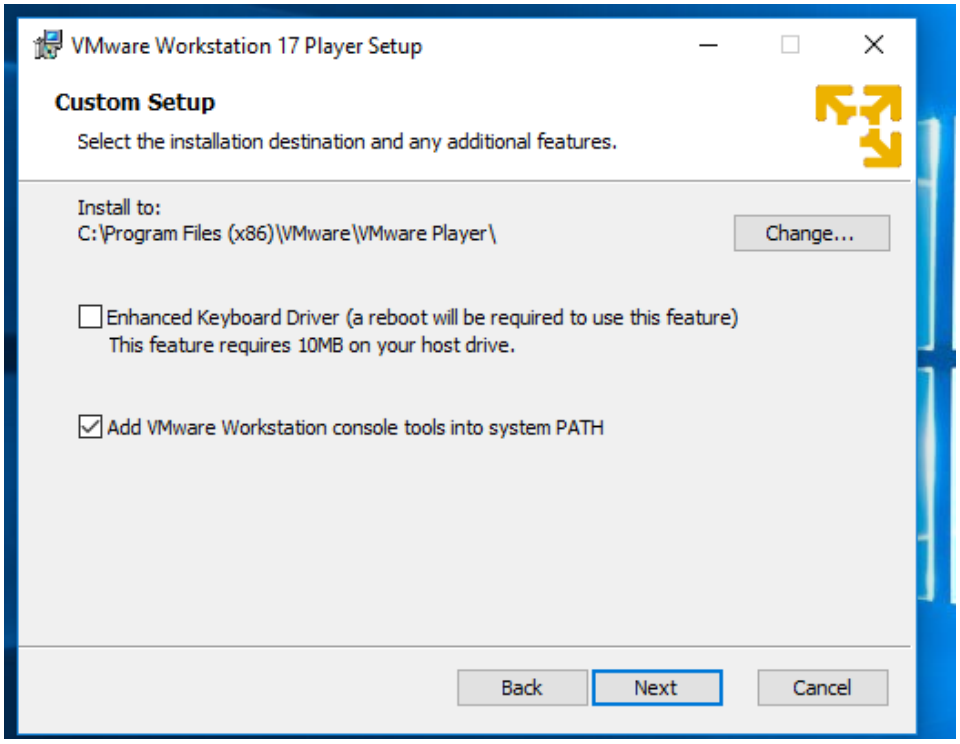


VMware Workstation 17 Player Wizard

4. Read and Accept the VMware End User license agreement. Click Next to Continue.

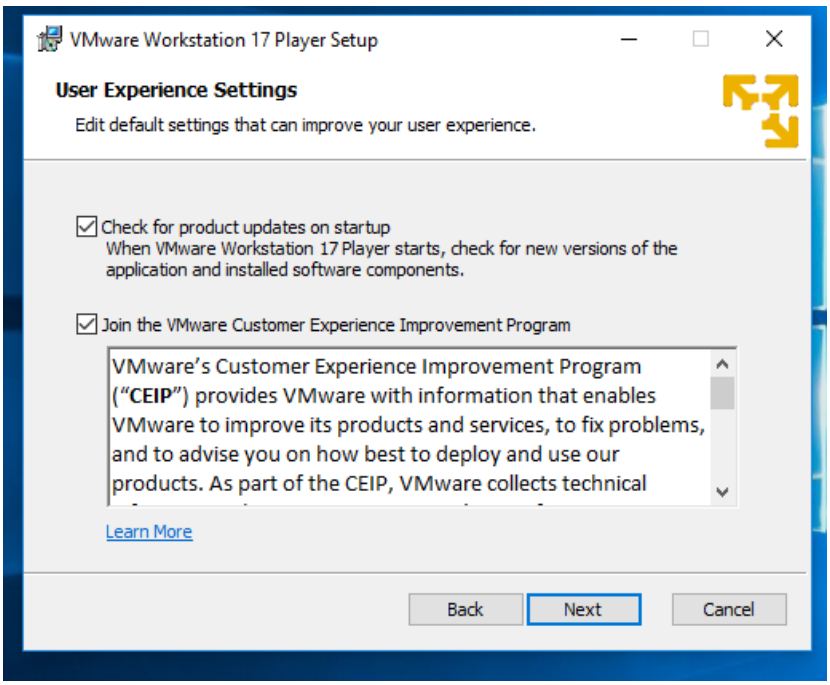
User license agreement

5. Specify the Installation directory. Click Next.



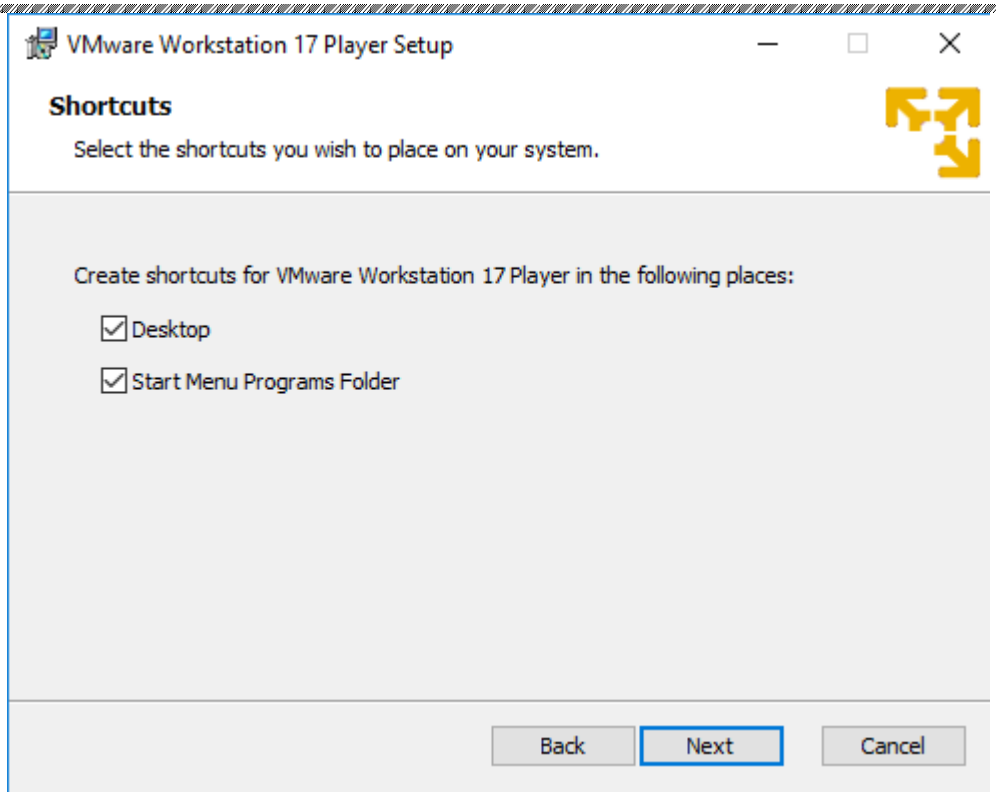
Custom setup

6. User can enable product startup and join the VMware Customer experience Improvement program here. Click Next to Continue.



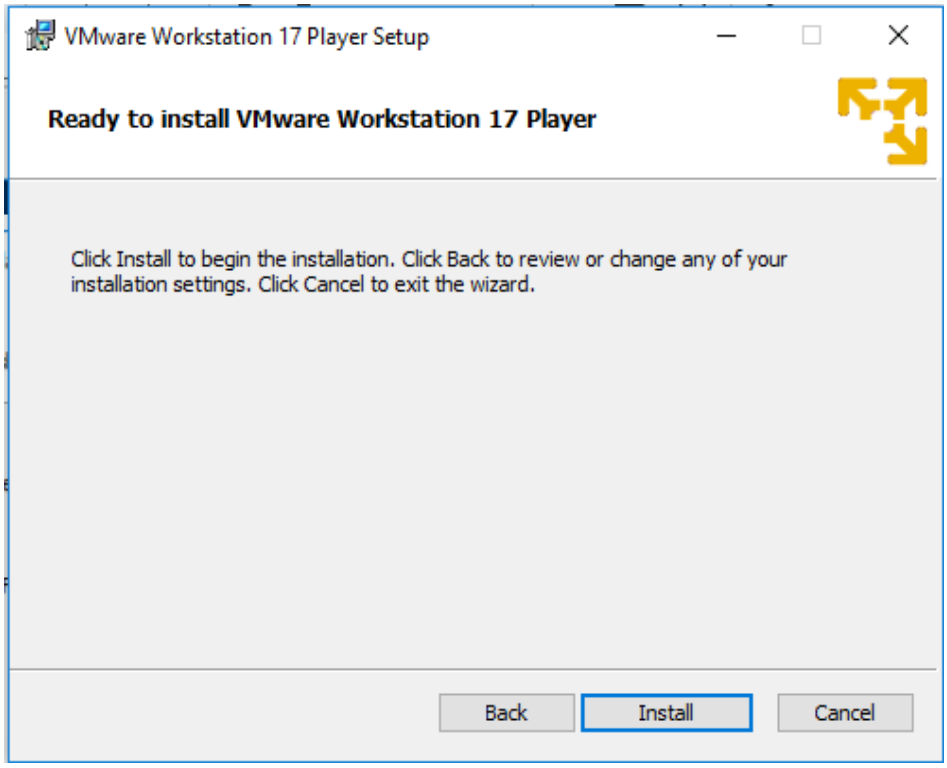
User Experience Settings

7. Select the shortcuts you want to create for easy access to VMware Workstation. Click Next to Continue.



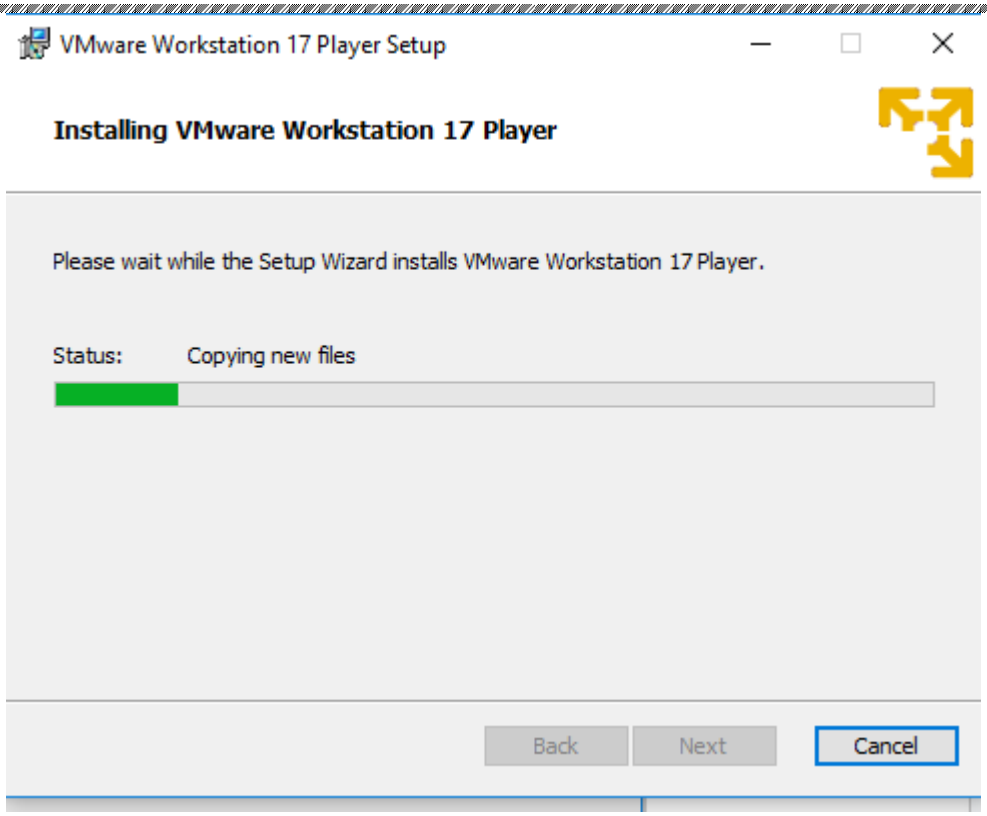
Shortcuts

8. Click Install button to start the installation.

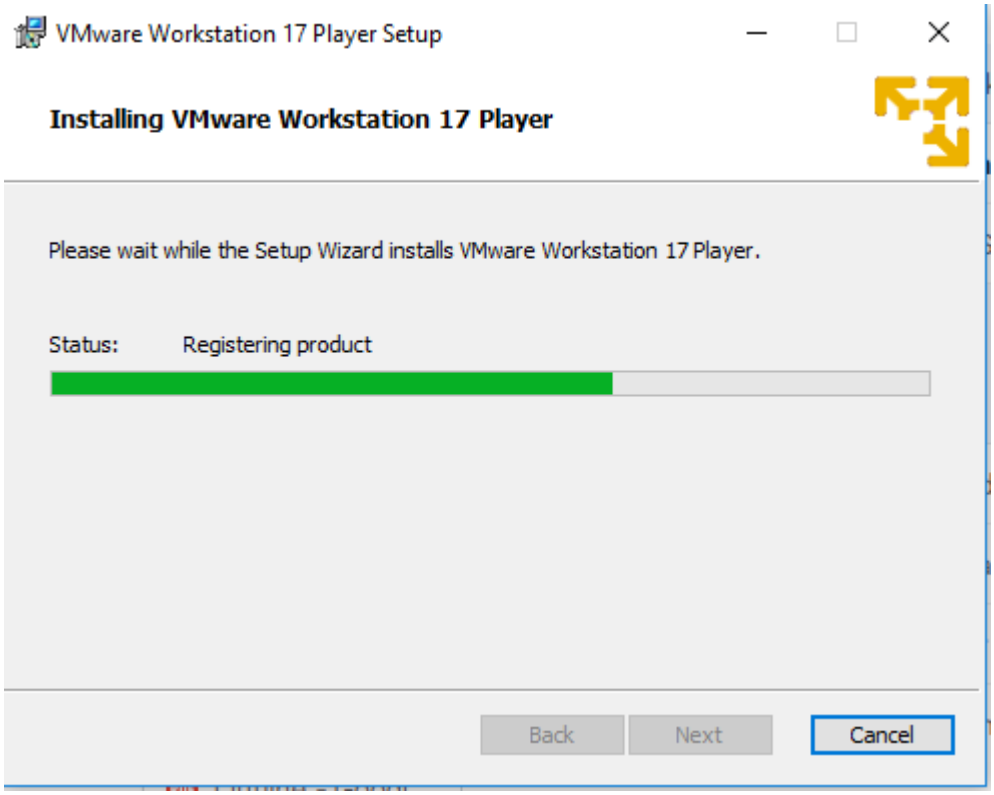


Installation Wizard

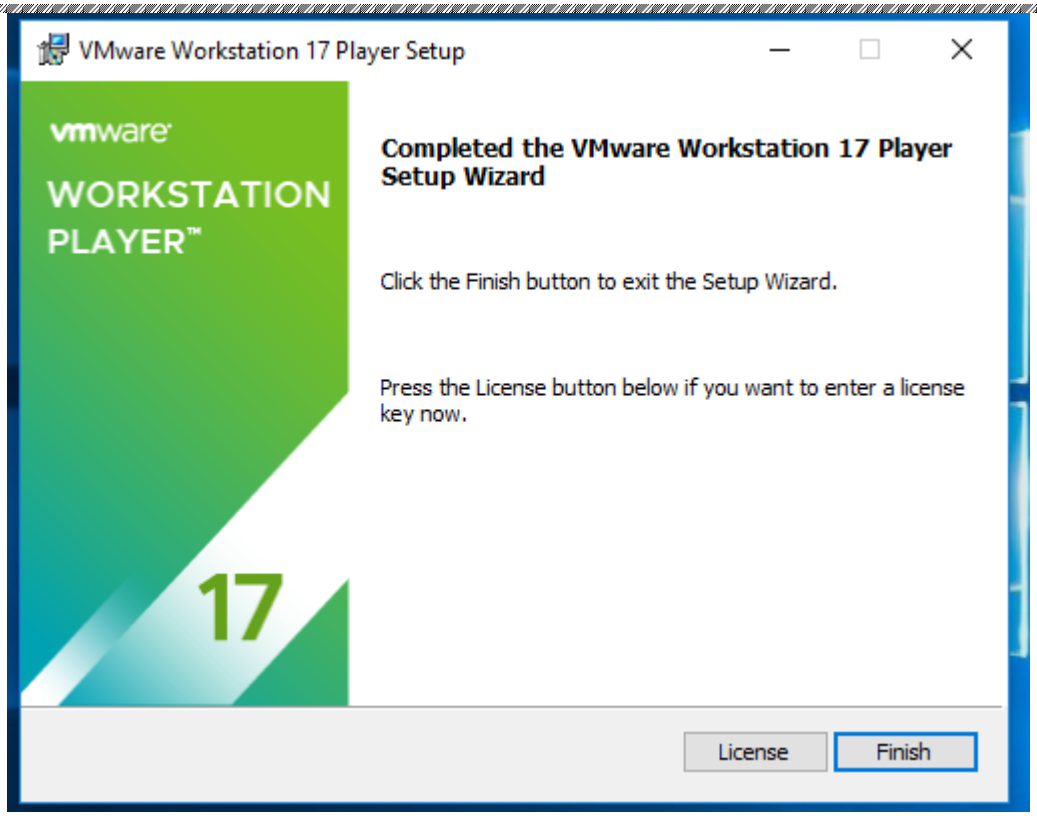
9. Installation takes just few seconds to complete.



copying files



10. Click Finish to exit the wizard.

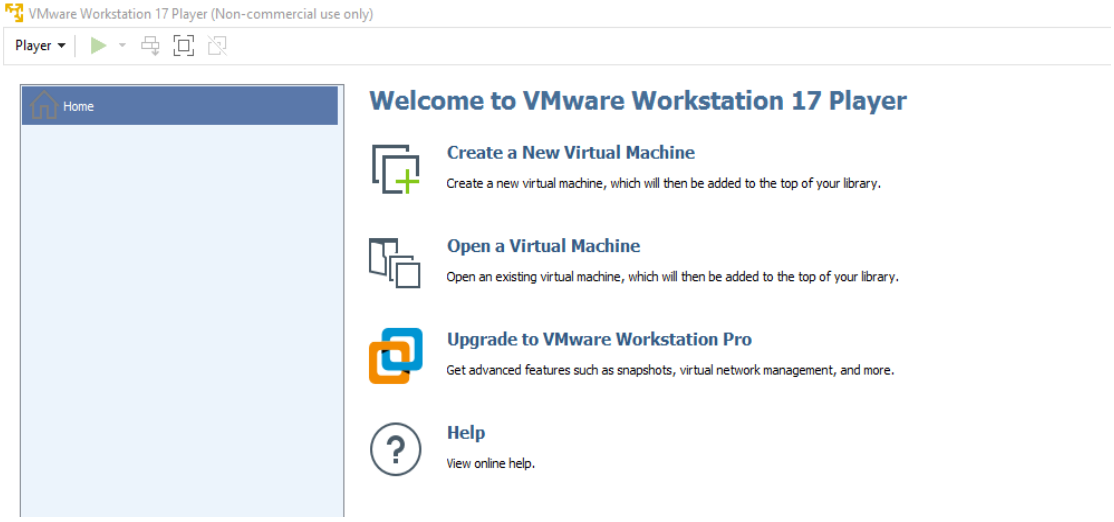


Completed Wizard

11. VMware workstation has successfully installed VMware Workstation Player. Now user can start the VMware Workstation Player by clicking on the shortcut on Desktop.
After creating the virtual machine of the Workstation Player 17, user will create a virtual computer and then install the Windows 10, and finally install VMware Tools so that the guest machine can work more efficiently.

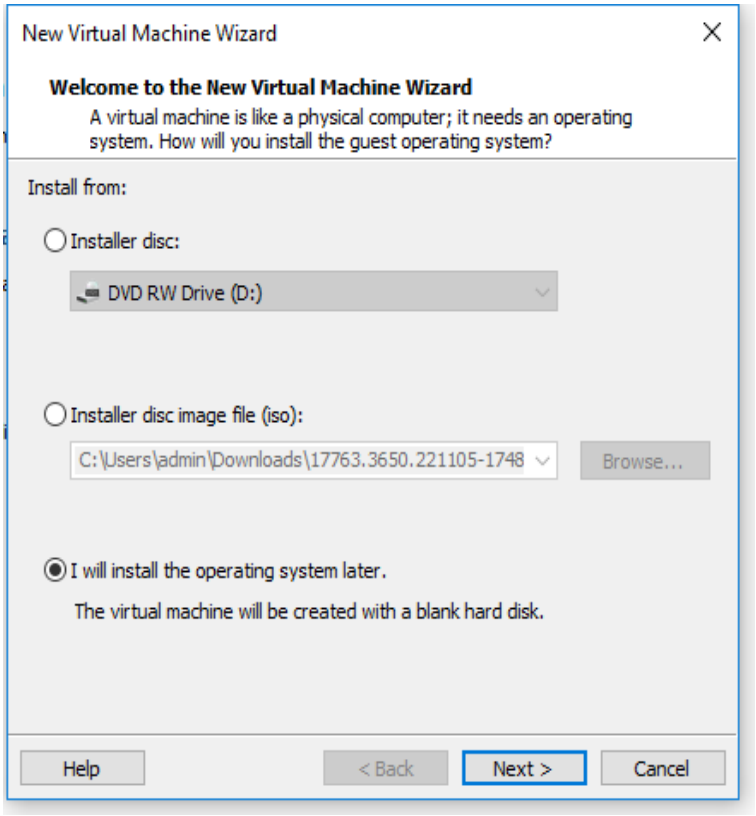
Windows 10 Installation

1. Open the VMware Workstation 17 Player software and click create a New Virtual Machine and open the virtual machine wizard.



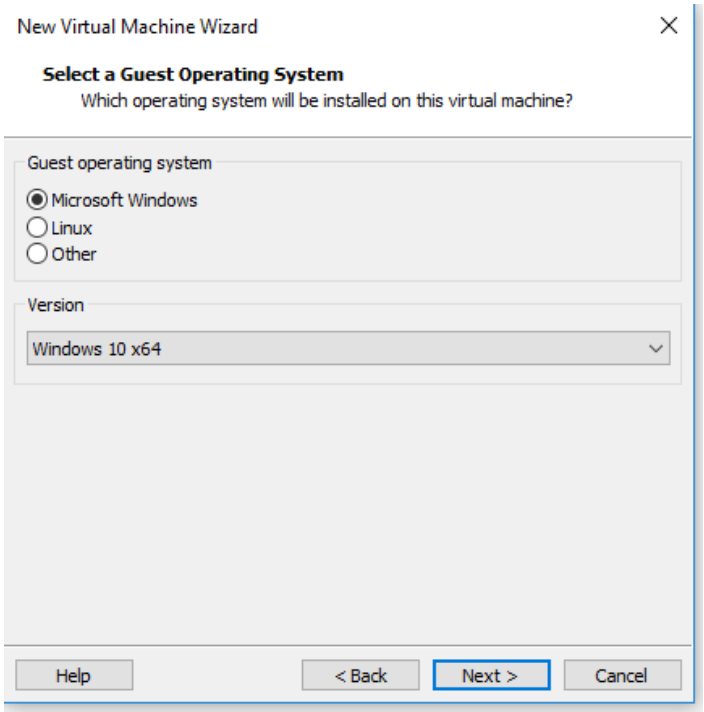
VMware workstation Player 17 Home Screen

2. To add the ISO image file to the virtual machine later in the guest machine installation, check the “I will install the operating system later” option and click Next.



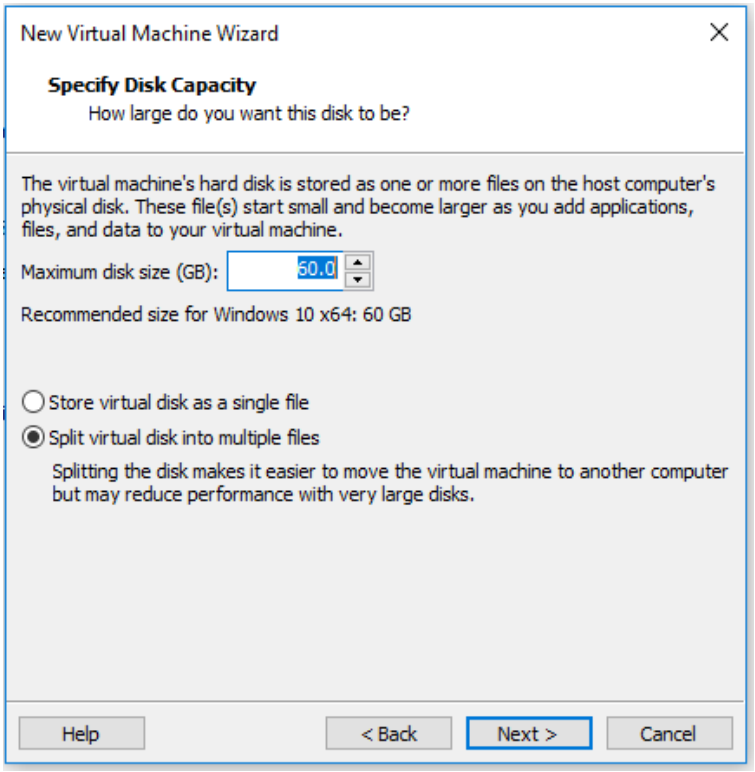
Virtual Machine Wizard

3. In the Guest operating system selection window, user must configure the system type and version that user want to install. In this step, select Microsoft Windows operating system and Windows 10 x64 in Version.



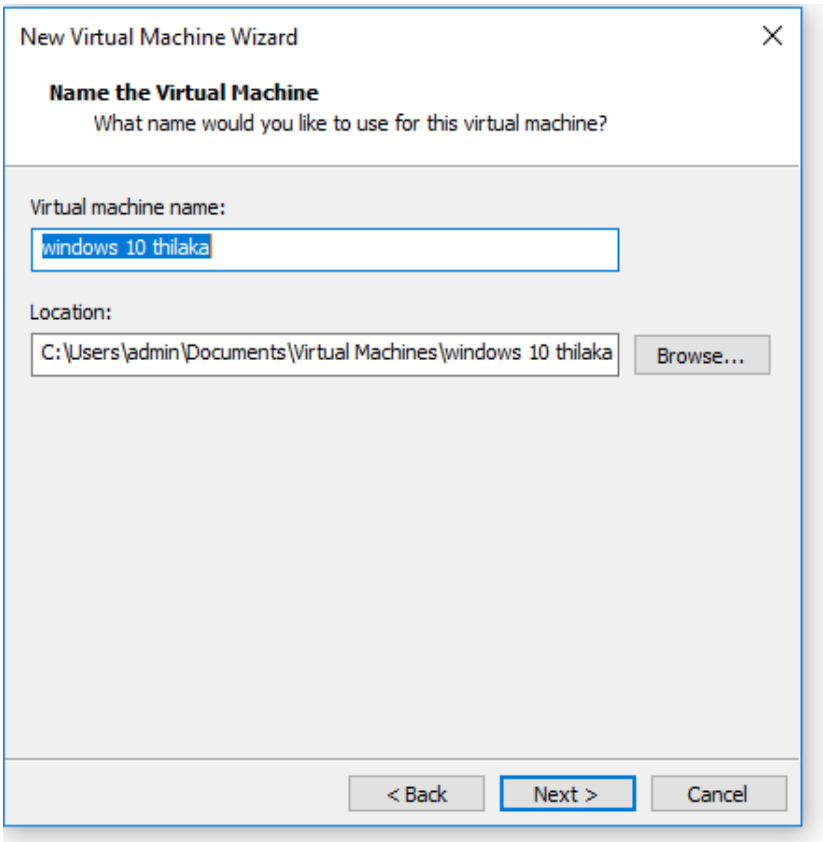
Select Guest Operating System

4. Configure a disk space of 60 GB and store the disk into multiple files.



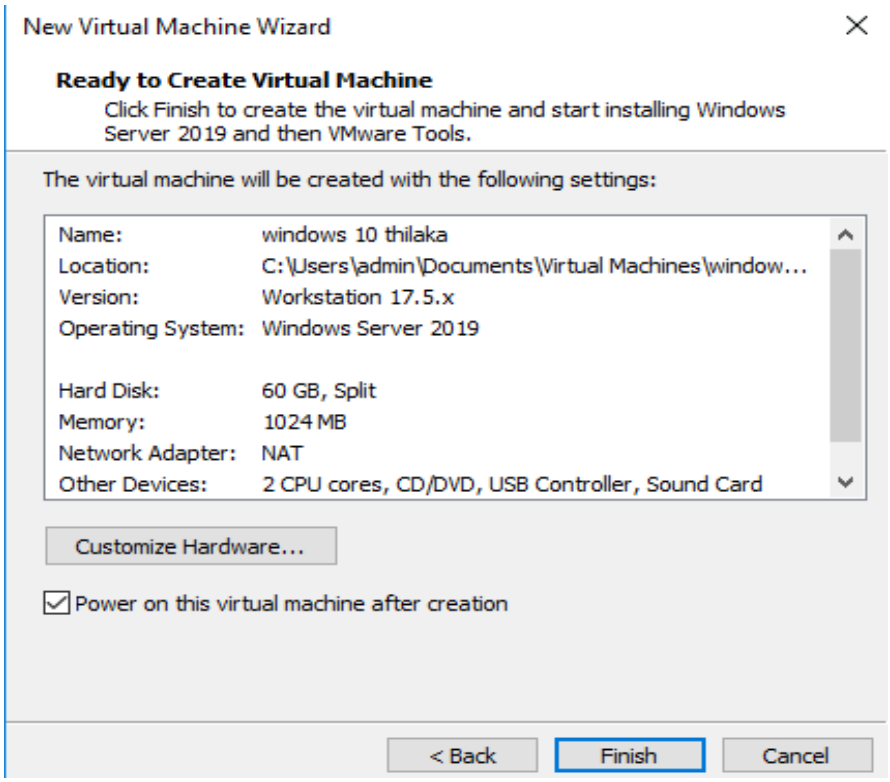
Select Disk Size

5. In the new Virtual machine Wizard, change the virtual machine name and give location.



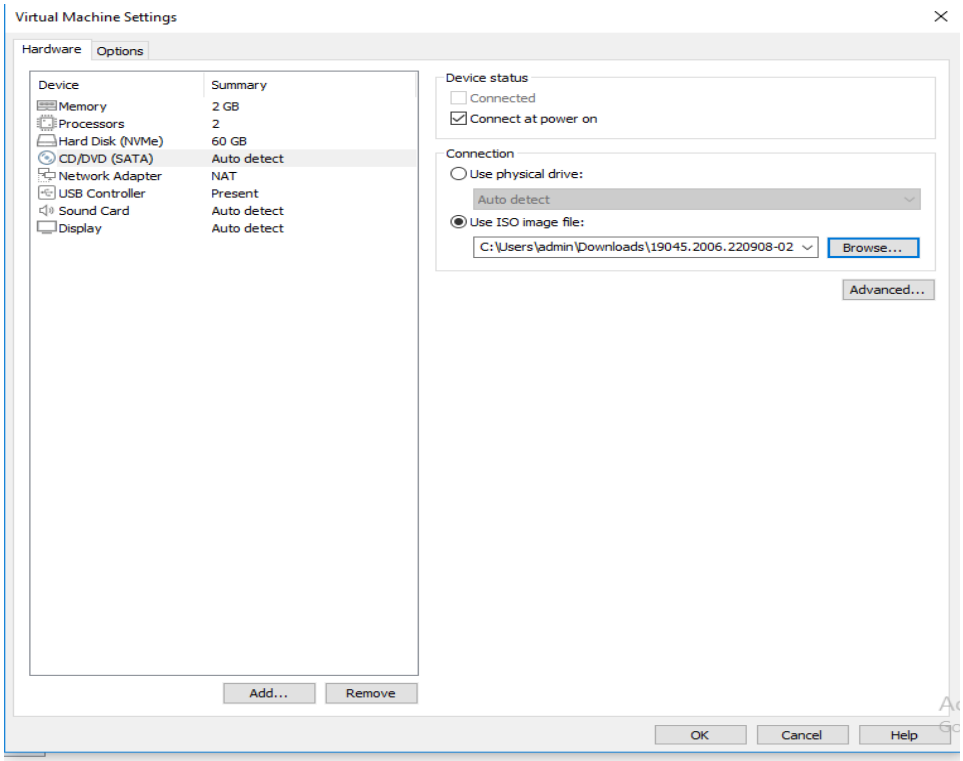
Set Virtual Machine Name

6. Click Finish.



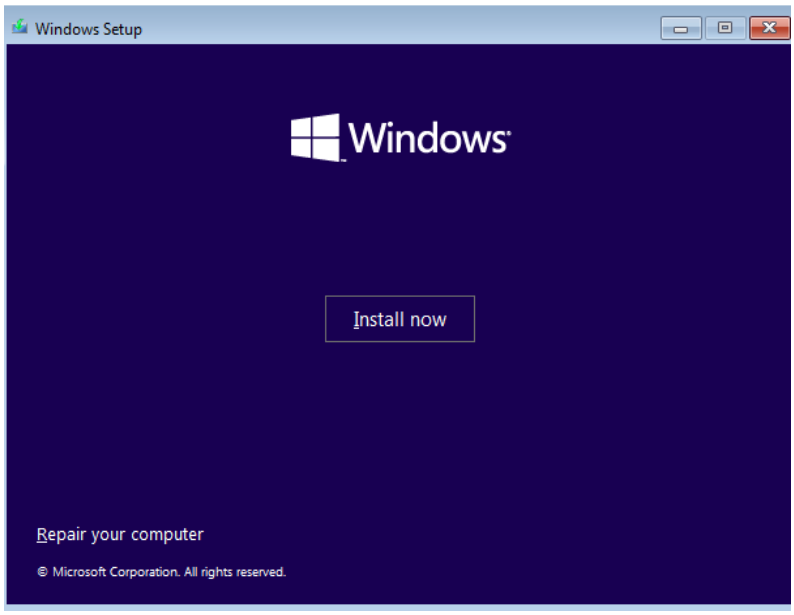
Completion Wizard

7. In the hardware settings of the virtual PC, check the Use ISO image file option in the New CD/DVD (SATA) tab, and then click the Browse button to go to the location of the Windows ISO file. In the window that opens, select the image file of the Windows 10 operating system downloaded and click Open.



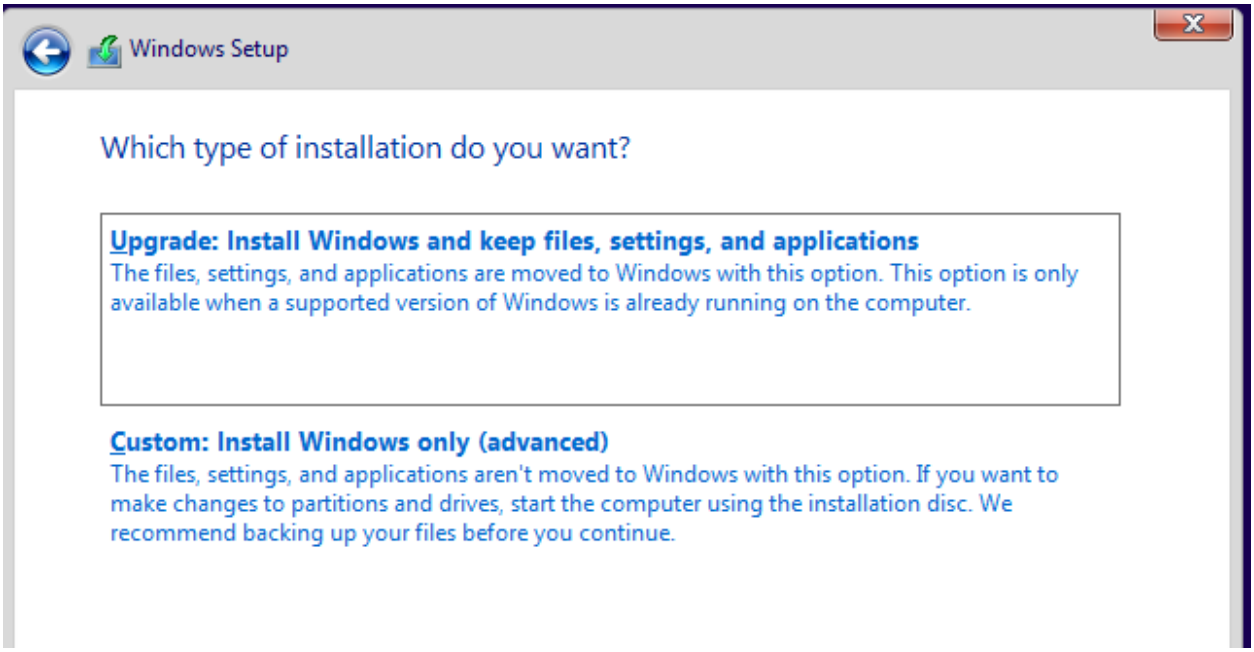
Select ISO file

8. After preparing the Windows 10 machine for installation, run the VM and press any key on the keyboard and “Press any key to boot from CD or DVD”.
9. Configure the system language, keyboard layout, and time zone user want to use for the Windows operating system and click the Next button.
10. Click the Install Now button to start the installation process.



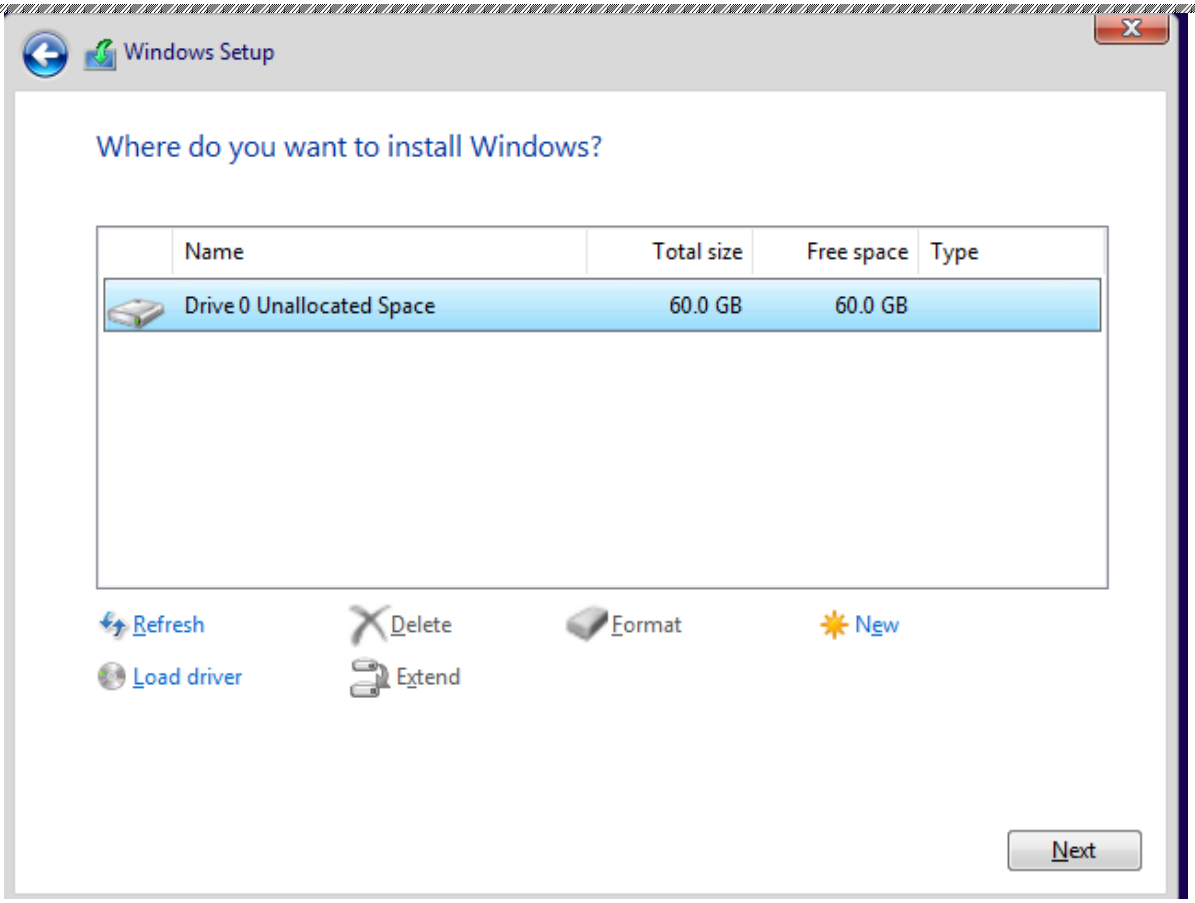
Windows Installation

11. Click Custom: Install Windows only (Advanced) to install a clean Microsoft Windows 10.



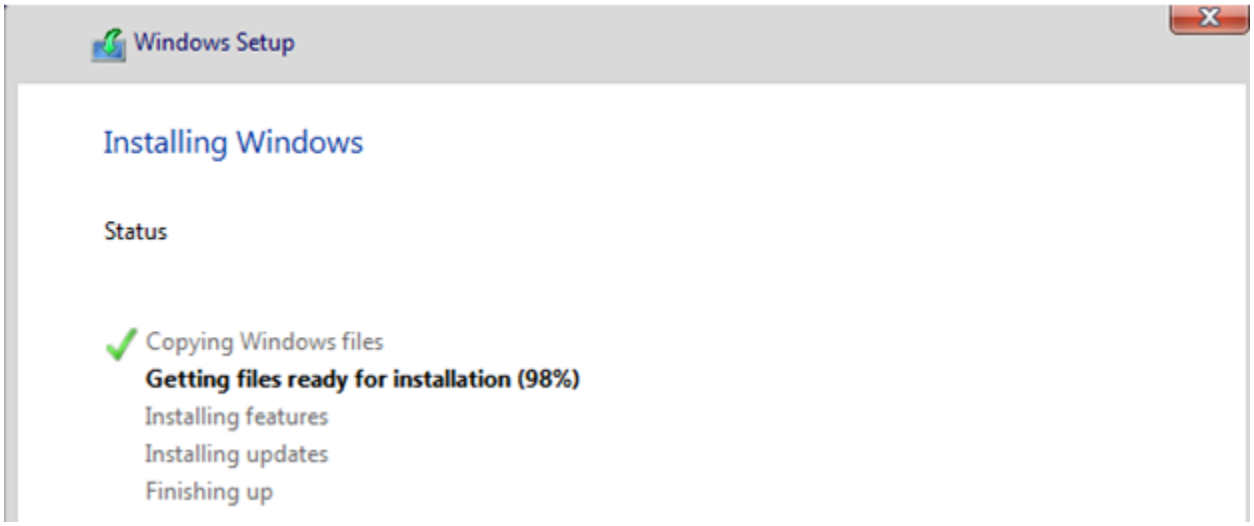
Custom Installation

12. Click New to configure the VMware virtual disk. To use the entire disk, leave the Size at the default value and click the Apply button. Click the OK button in the information window that will create additional partitions on the Windows disk.



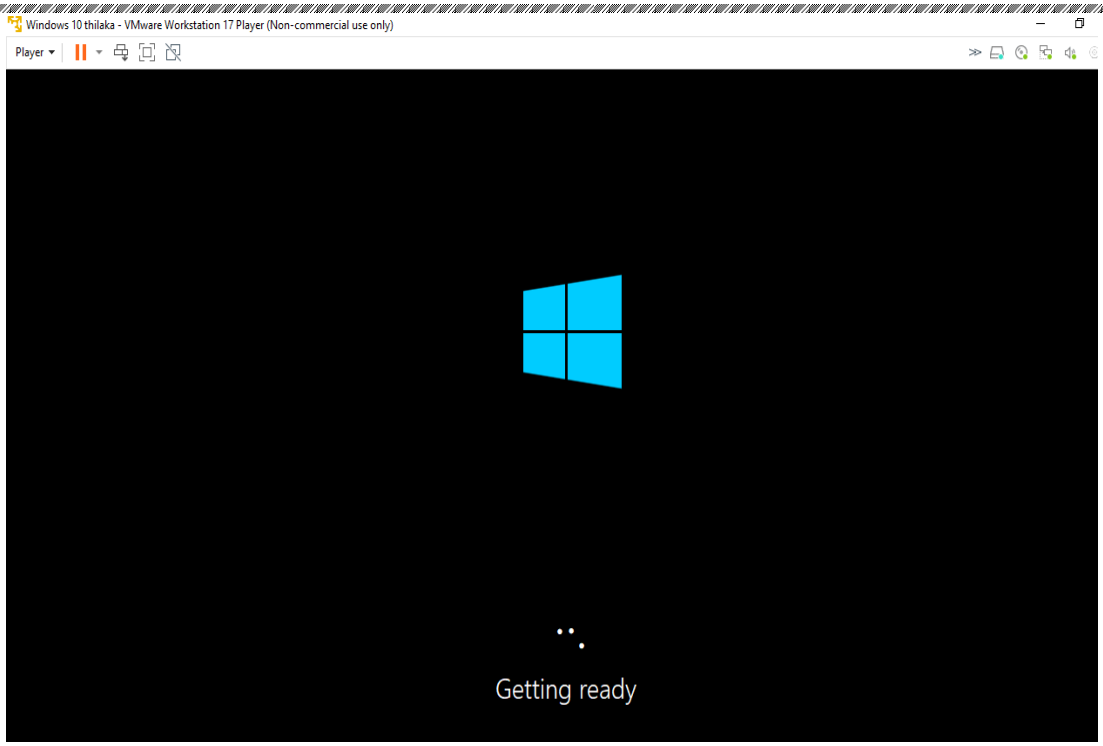
Custom Installation

13. Wait while the files are being prepared for installation. This process may take some time depending on the computer's performance and virtual machine hardware settings.



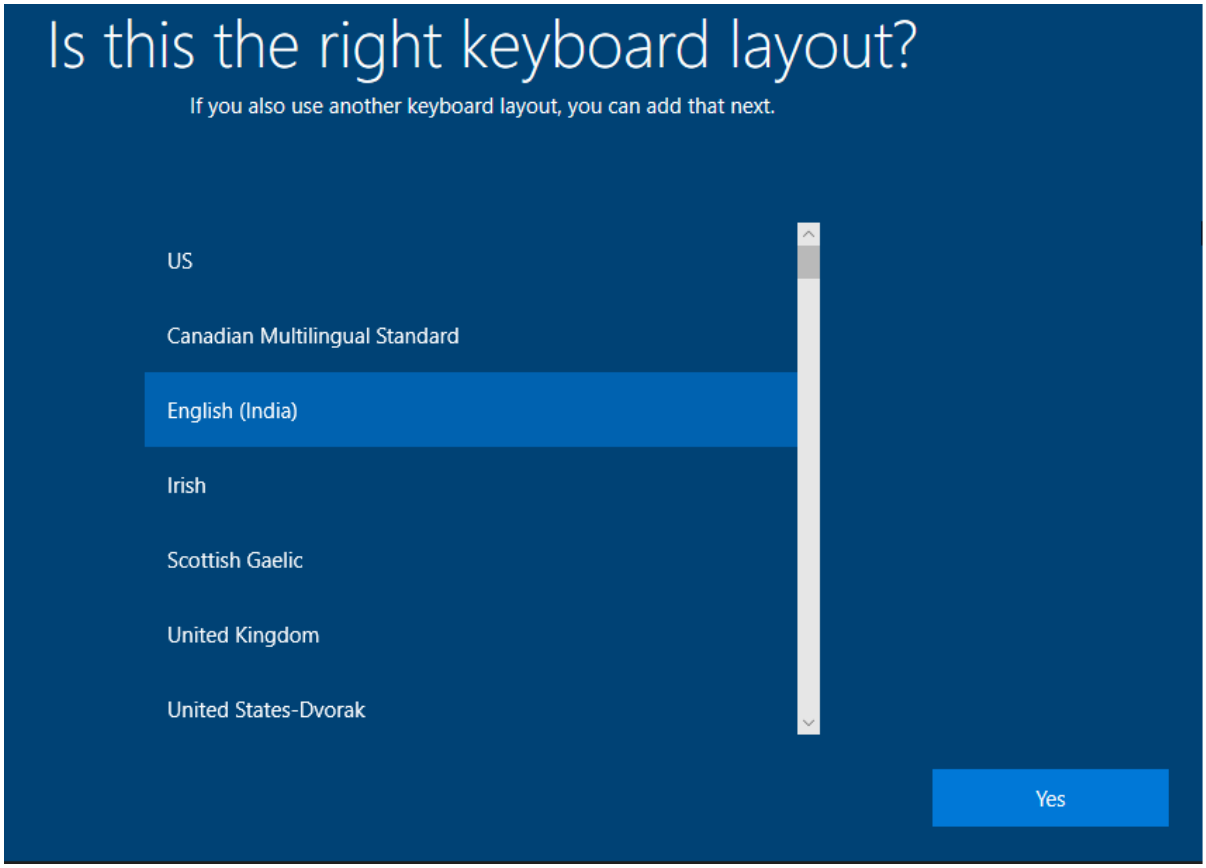
Installing Windows

14. Wait while the necessary settings are being made and the devices are being prepared.



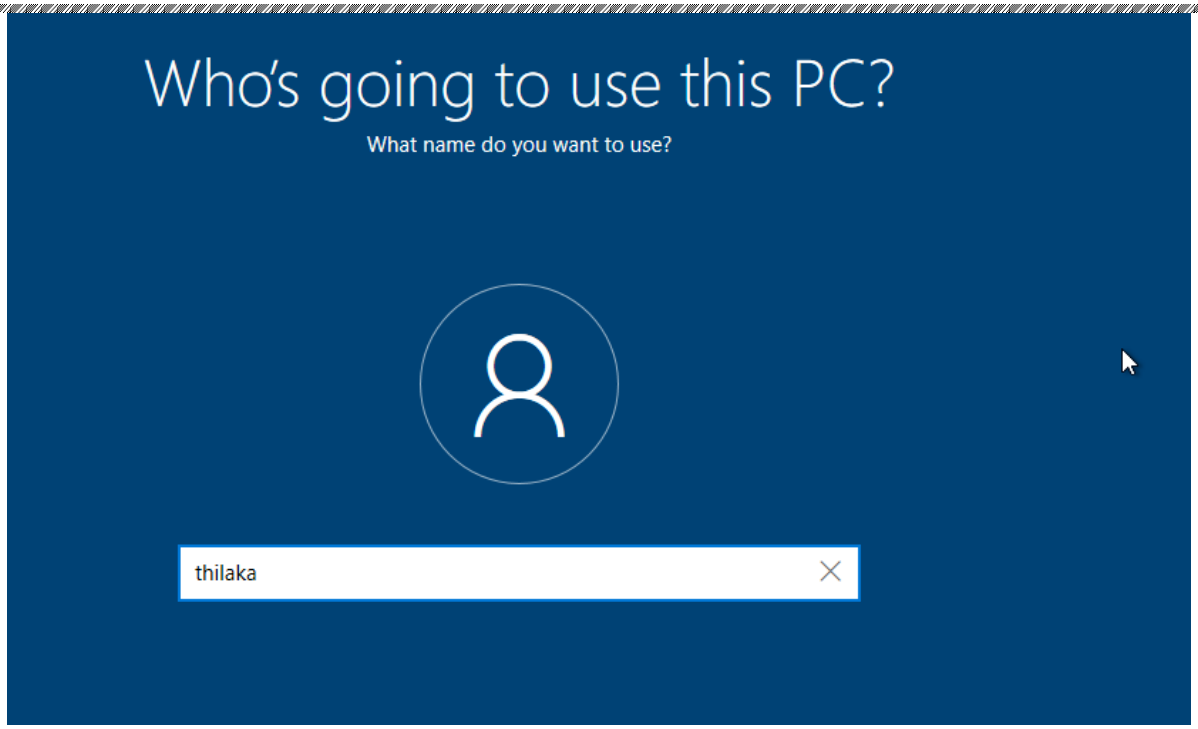
Preparation of Settings

15. Select the keyboard layout and click Yes.



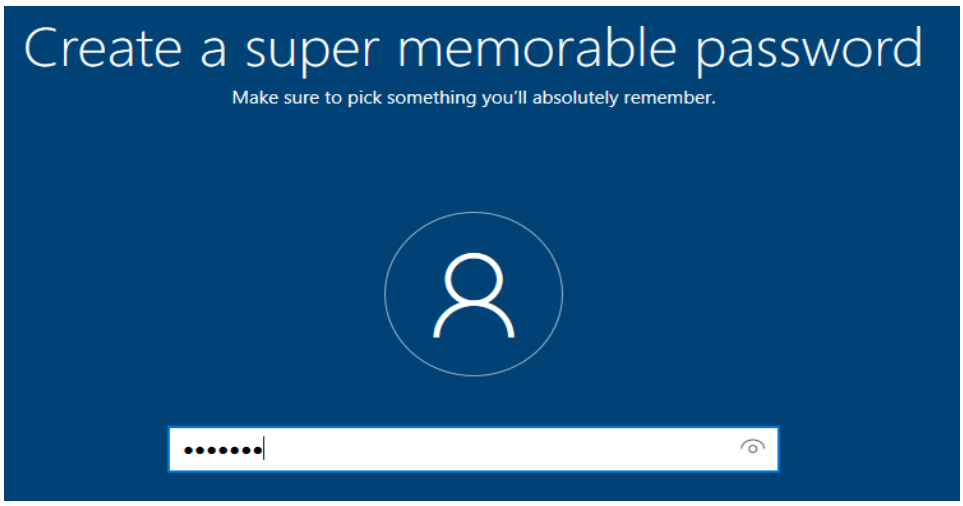
keyboard layout

16. Type the user account name on the “Who’s going to use this PC?” screen and continue with Next.



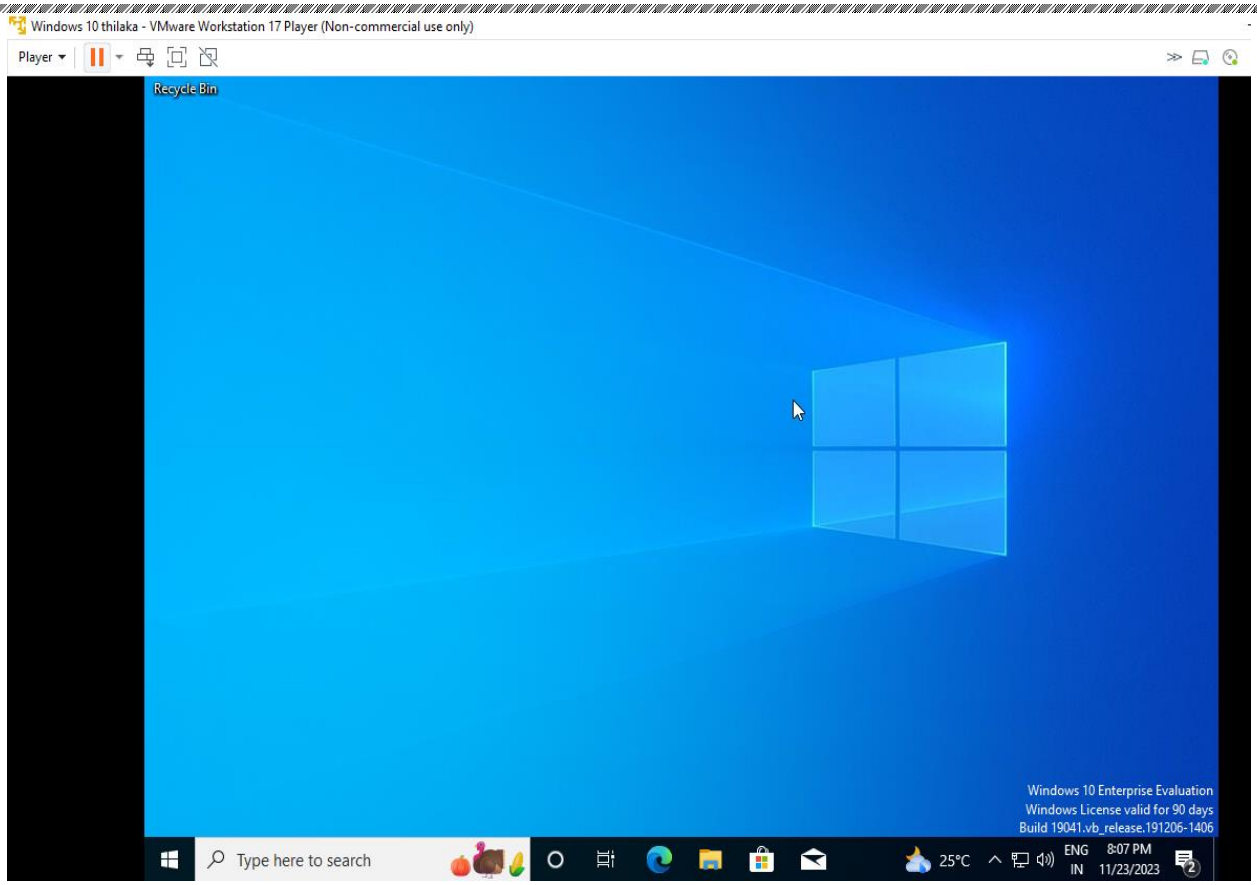
Set User Name

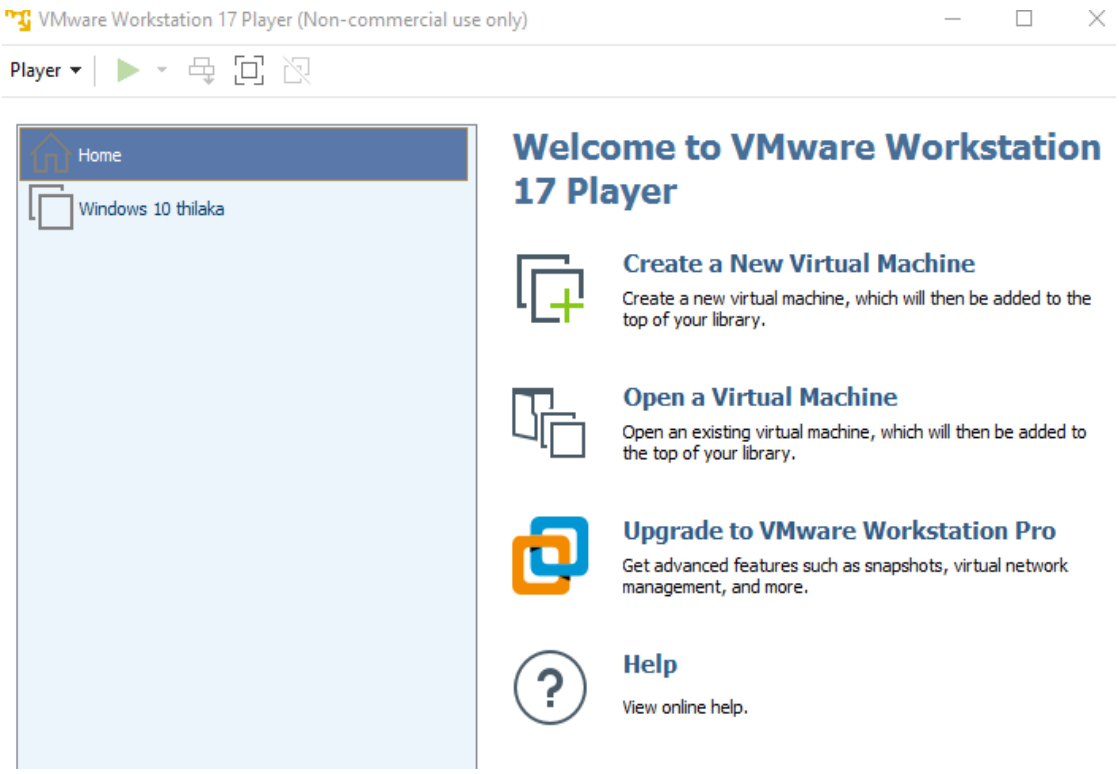
17. Create a password.



Set Password

18. Installation Completed.





Result

Thus, the VMware and Windows 10 were installed successfully.

Ex No.2 Install a C compiler in the virtual machine created using virtual box and execute Simple Programs

Aim

To Install a C compiler in the virtual machine created using virtual box and execute Simple Programs.

Software Required

- Virtualbox
- Turbo C++ 3.2

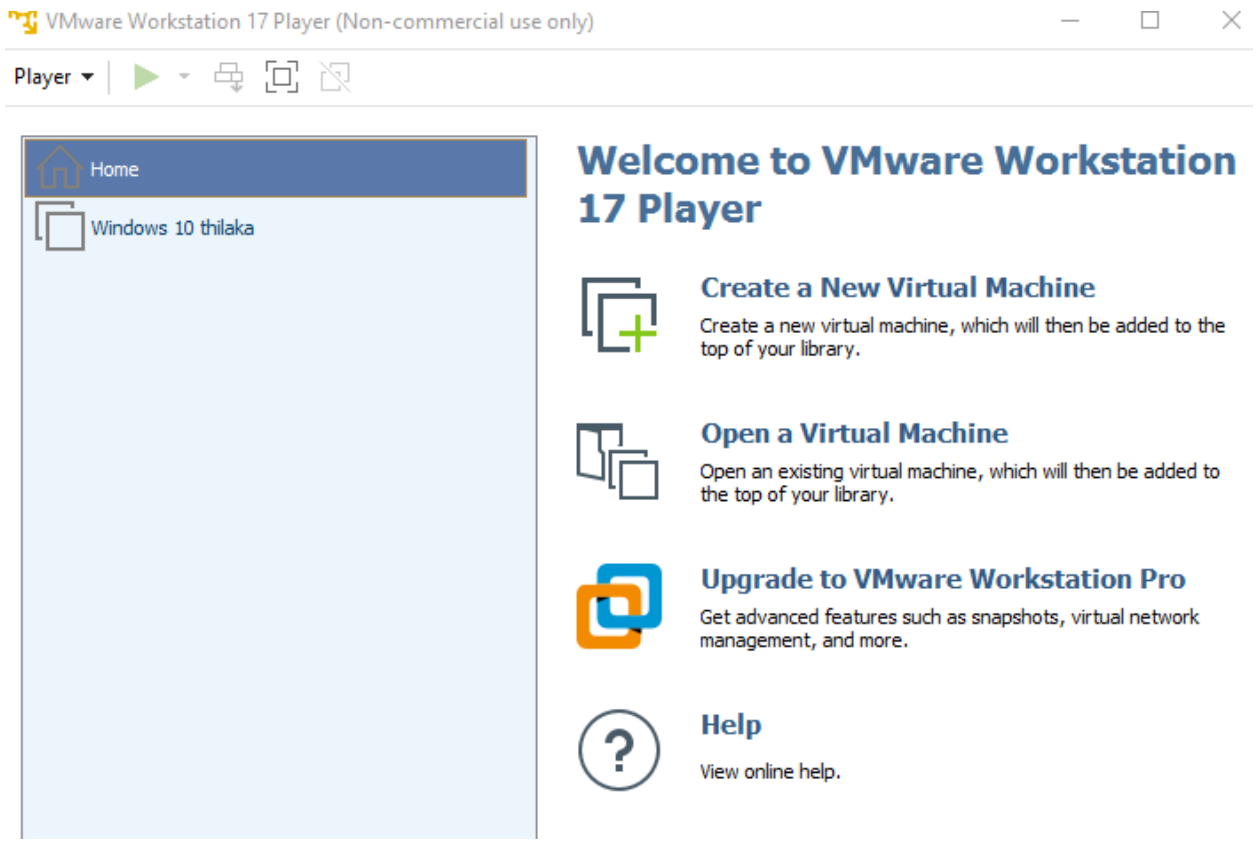
C Compiler

A compiler is a special program that translates a programming language's source code into machine code, bytecode or another programming language. The source code is typically written in a high-level, human-readable language such as Java or C++. A programmer writes the source code in a code editor or an integrated development environment (IDE) that includes an editor, saving the source code to one or more text files. A compiler that supports the source programming language reads the files, analyzes the code, and translates it into a format suitable for the target platform.

Procedure

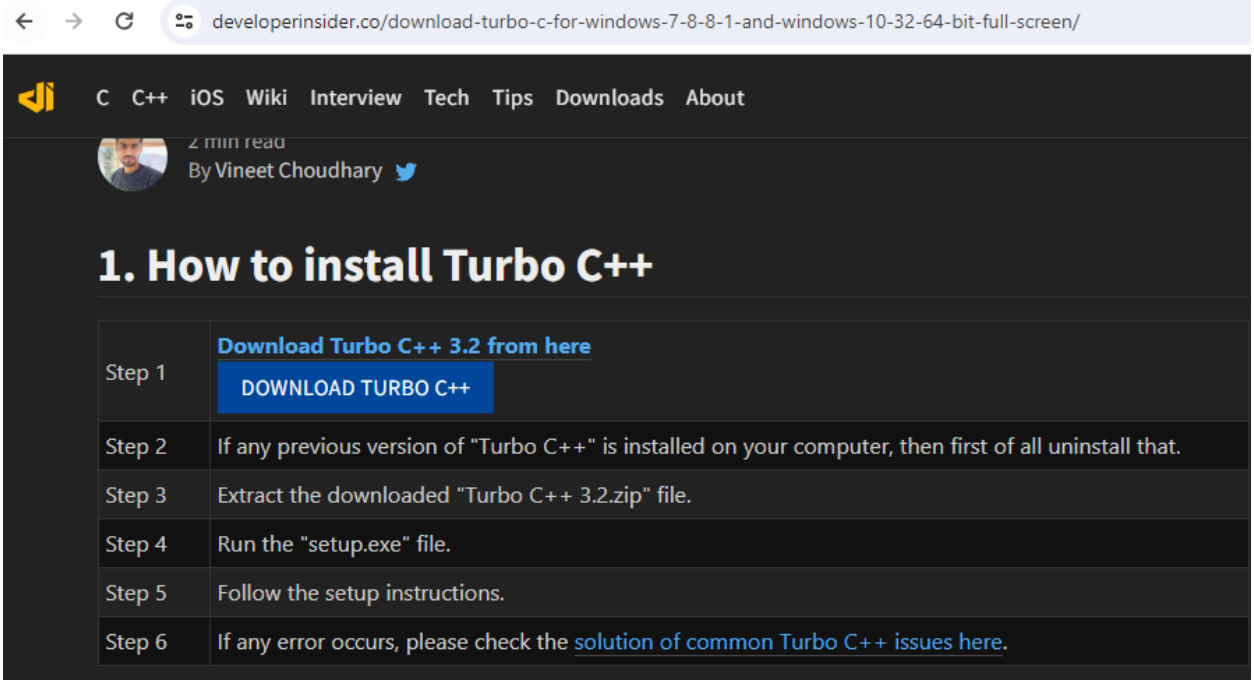
Installing Turbo C on Virtual Machine

1. Open VMware or Virtualbox and start Windows Operating system.



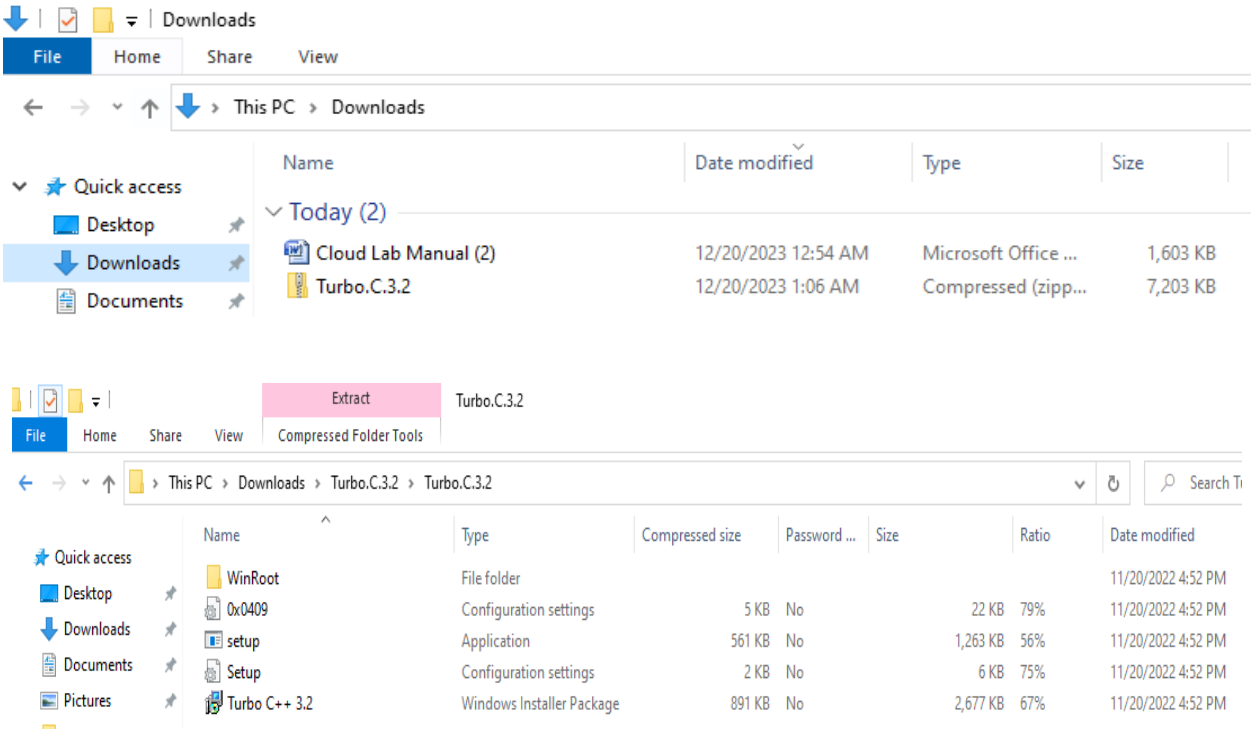
2. Downloads the Turbo C from the link given below

https://developerinsider.co/download-turbo-c-for-windows-7-8-8-1-and-windows-10-32-64-bit-full-screen/



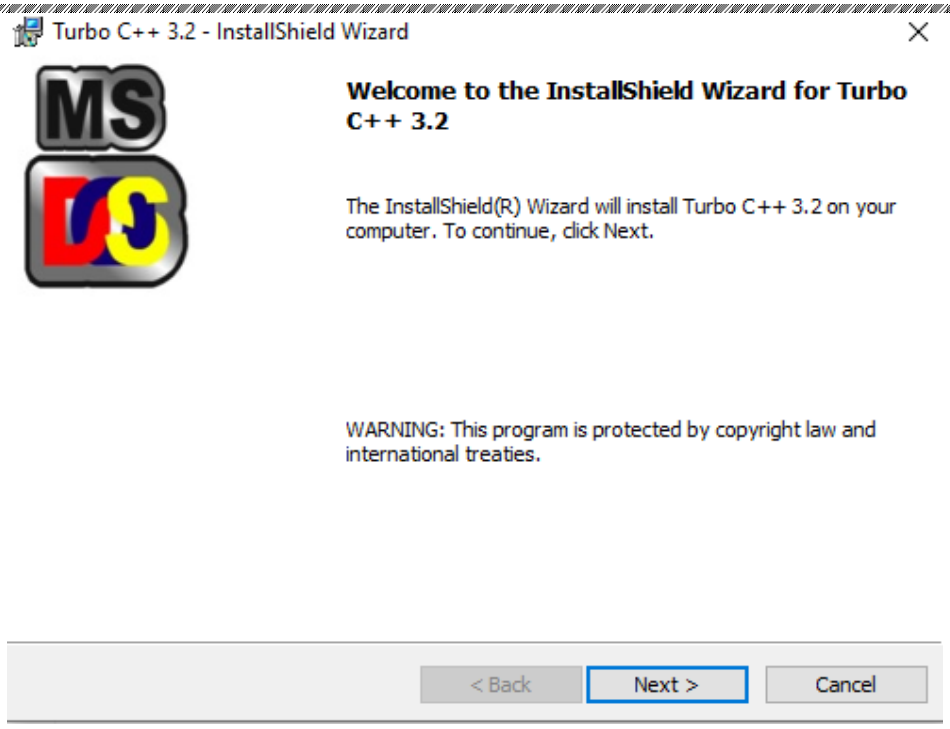
Download Turbo C++

3. Go to Downloads folder. Extract the files in program Files. After downloading, user will get a zip file. Extract it and then user can see some files as shown in the below picture. Now run setup.exe from the given files.

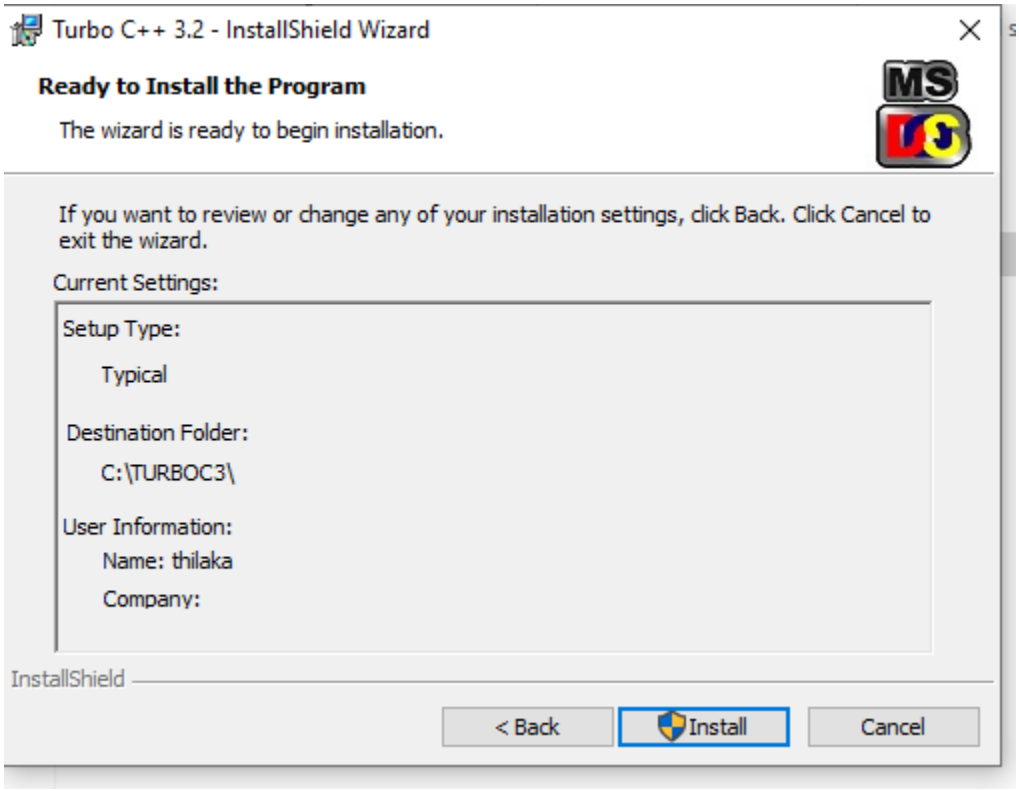


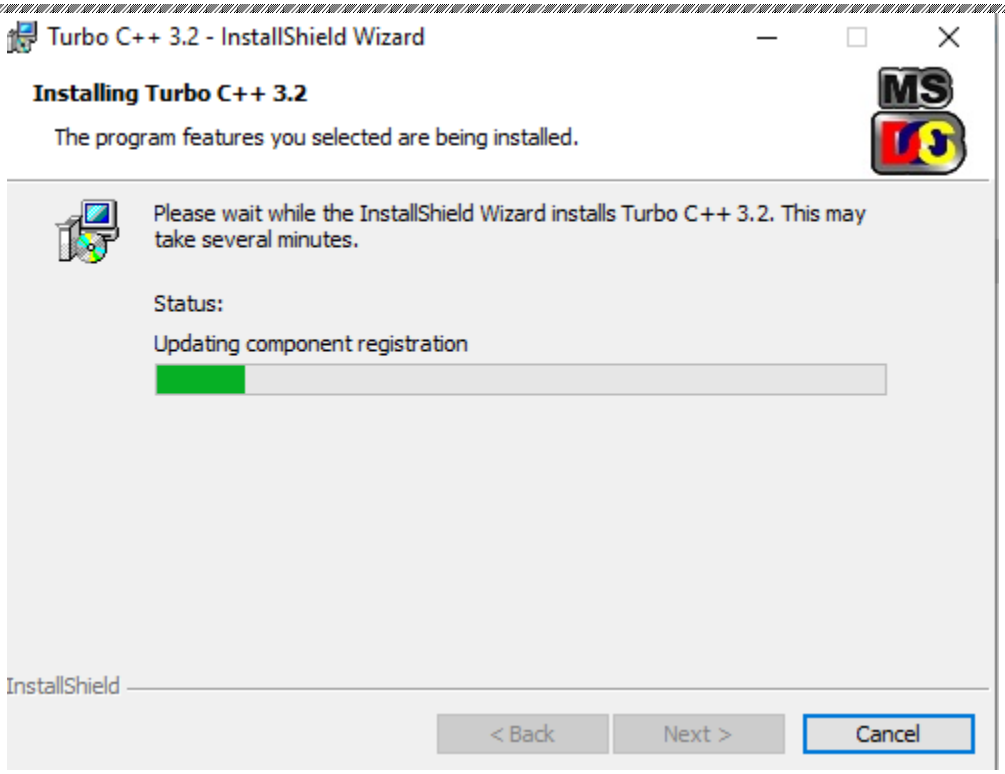
Extract zip file

4. Install the C. Click Next. After clicking on setup.exe an installation wizard will start as shown in the below picture. Now click on next then accept the terms and conditions and again click on next and then finally click on install.



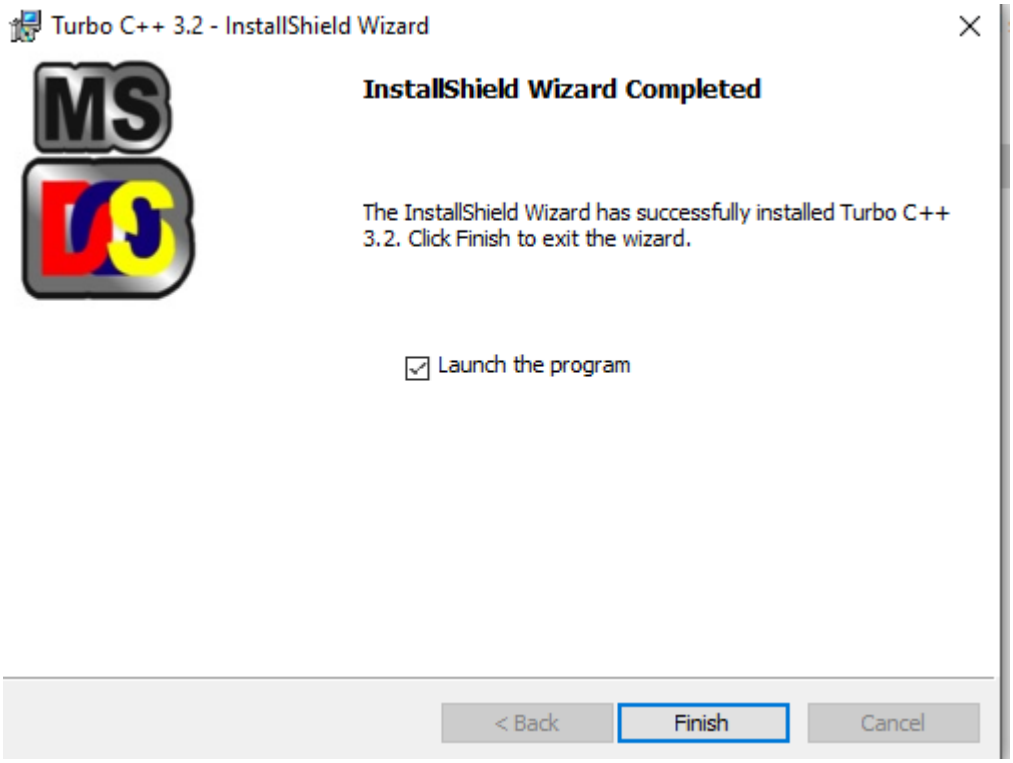
5. Click Install in the Installation wizard.



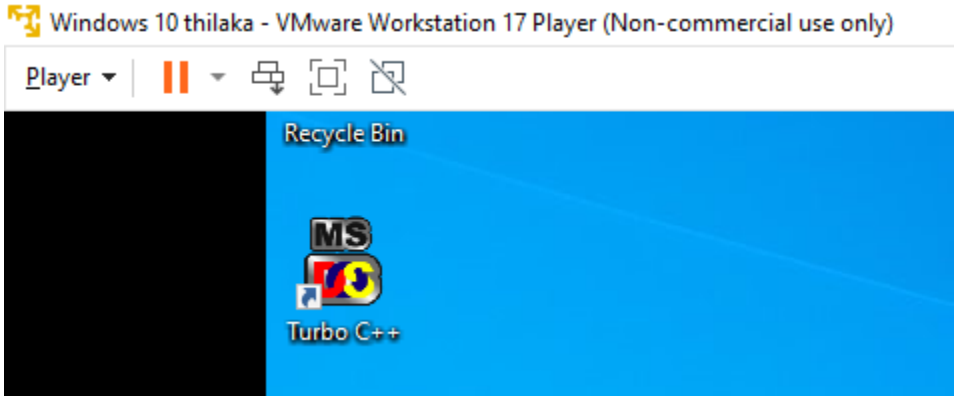


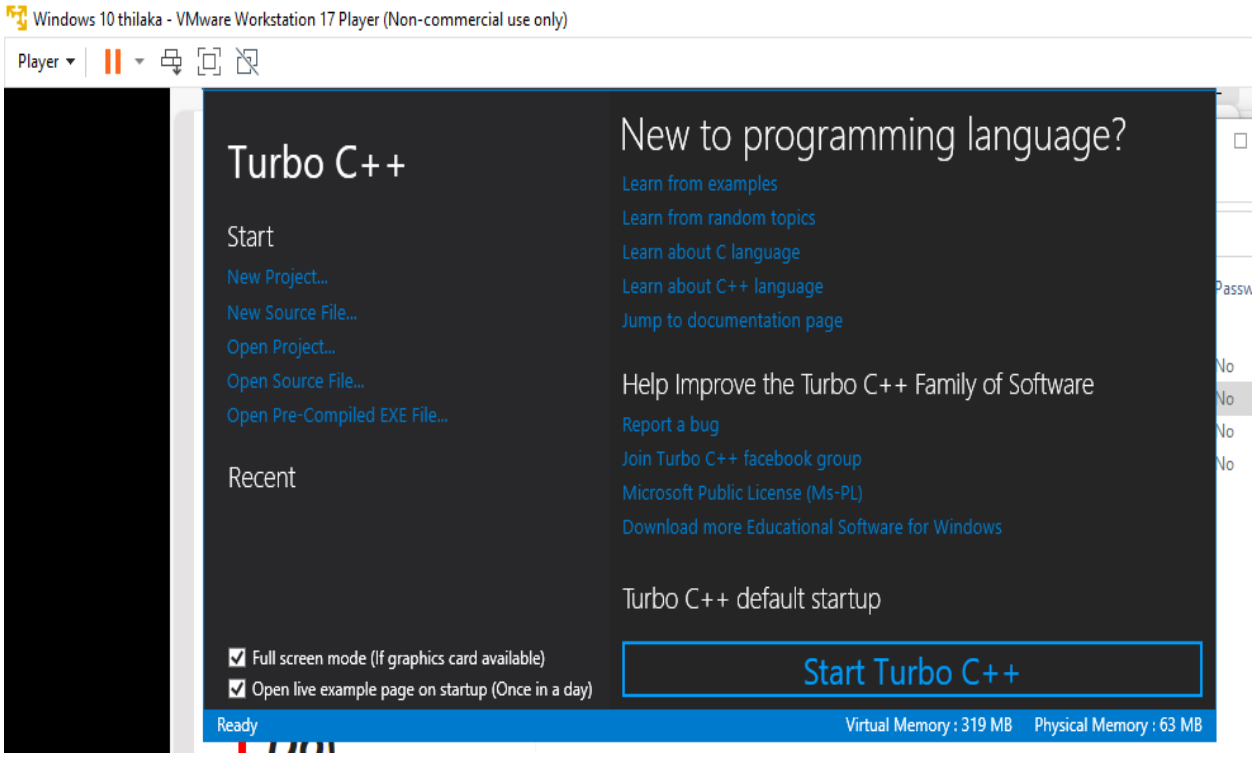
Installation process

6. When the installation gets finished user will see this screen as shown in the below picture. Now click on finish and your turbo C++ is ready to use.



Installation finished





Turbo C++ home screen

Windows 10 thilaka - VMware Workstation 17 Player (Non-commercial use only)

Player

File Edit Search Run Compile Debug Project Options Window

\TURBOC3\PROJECTS\ARRAY.C

```c
// Program to take 5 values from the user and store them in an array
// Print the elements stored in the array
#include <stdio.h>
int main() {
  int values[5];
  printf("Enter 5 integers: ");

  // taking input and storing it in an array
  for(int i = 0; i < 5; ++i) {
     scanf("%d", &values[i]);
  }

  printf("Displaying integers: ");

  // printing elements of an array
  for(int i = 0; i < 5; ++i) {
     printf("%d\n", values[i]);
  }
  return 0;
}
```

C Program to print the elements stored in the array

Windows 10 thilaka - VMware Workstation 17 Player (Non-commercial use only)

Player

```
C:\TURBOC3\BIN>TC C:\TURBOC3\Projects\array.c
Enter 5 integers: 5
4
1
2
3
Displaying integers: 5
4
1
2
3
```

Result

Thus, the C compiler in the virtual machine was installed and executed the simple programs.

Ex No.3 Install Google App Engine. Create simple web applications using python/java

Aim

To install Google App Engine and create simple web applications using python.

Software Required

- Google Cloud SDK
- Python 3.7.9

Google App Engine

Google App Engine (GAE) is a service, a scalable environment, and a cloud computing technology that Google provides for building and hosting applications. It provides both a secure execution environment and a collection of services that simplify the development of scalable and high-performance Web applications.

Google App Engine in cloud computing is a PaaS, Platform as a Service model, i.e., it provides a platform for developers to build and deploy scalable applications on the Google cloud platform.

Services provided by App Engine include:

- Platform as a Service (PaaS) to build and deploy scalable applications.
- Hosting facility in fully-managed data centers.
- A fully-managed, flexible environment platform for managing application servers and infrastructure.
- Support in the form of popular development languages and developer tools.

YAML File

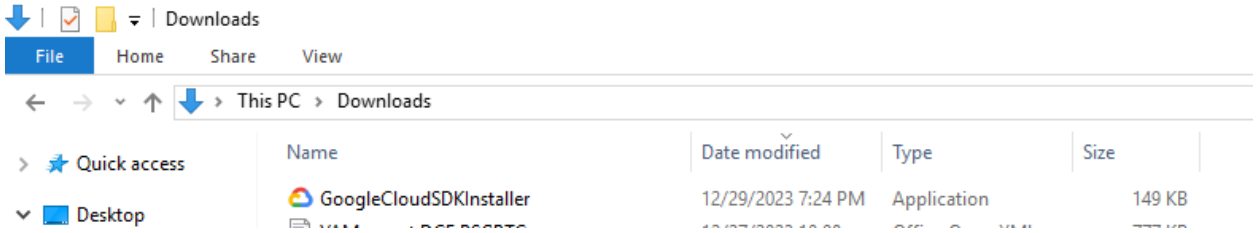
YAML (Yet Another Markup Language) is a human-readable data-serialization language. It is commonly used for configuration files, but it is also used in data storage (e.g. debugging output) or transmission (e.g. document headers).

Installation of Google Cloud SDK

1.To install Google Cloud SDK, go to the following link and download

https://cloud.google.com/sdk/docs/install

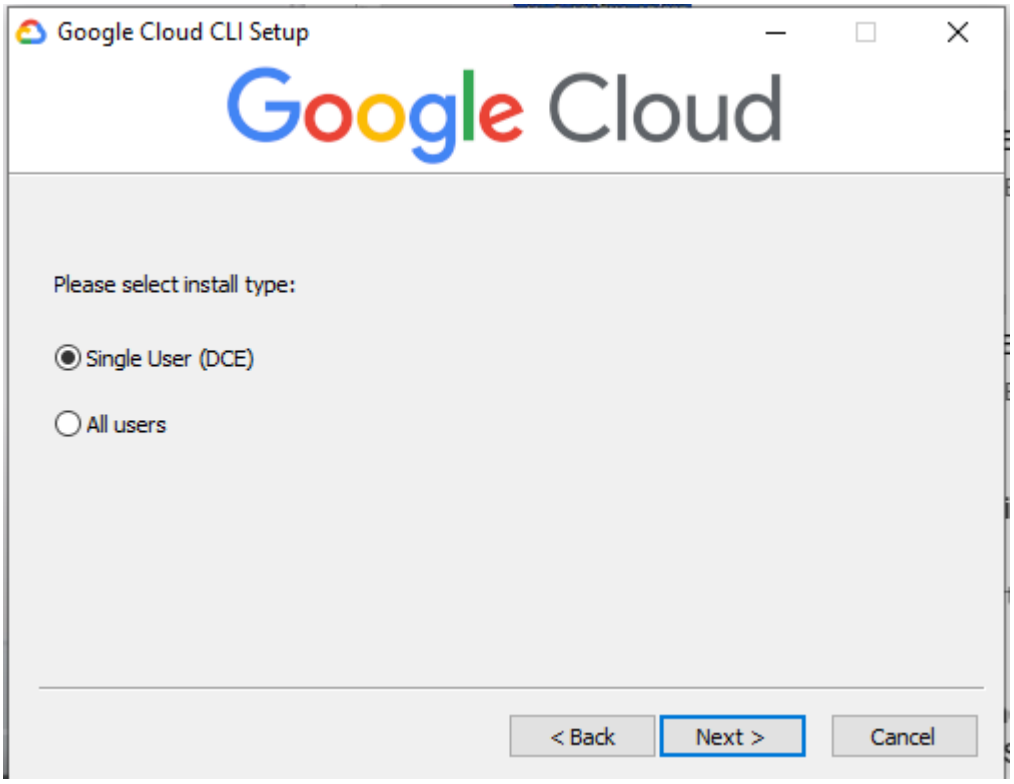
2.Download the Google Cloud CLI installer.



3. Install the GoogleCloudSDKInstaller.

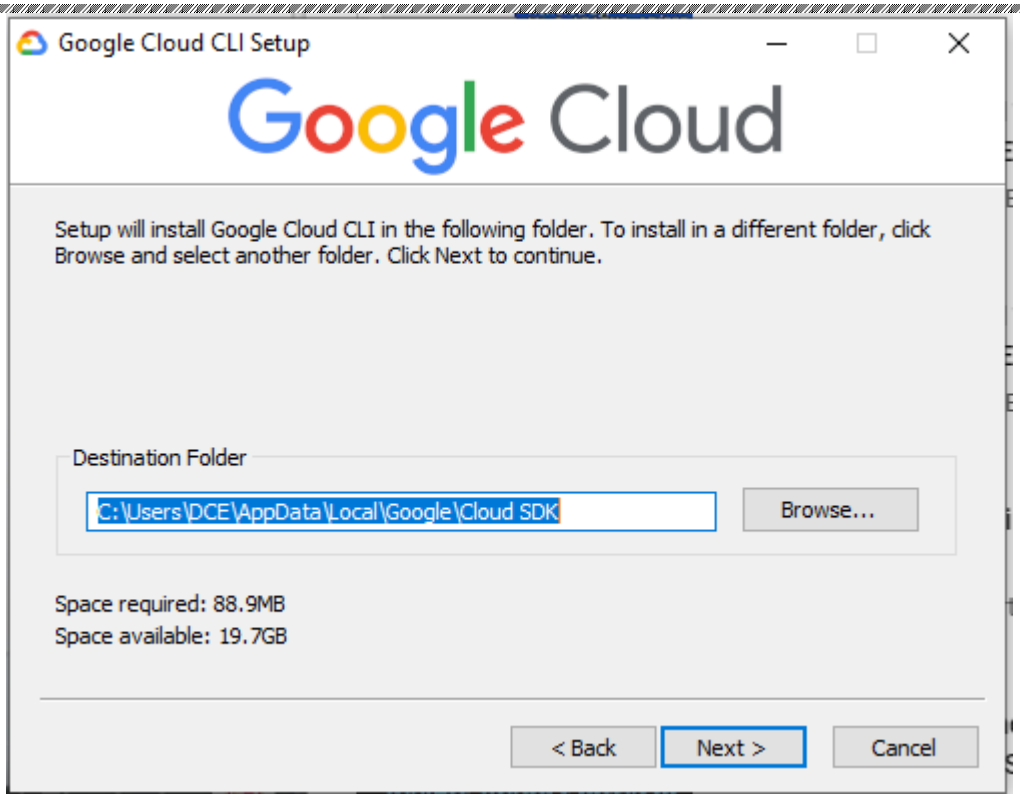
Google Cloud SDK Setup

4.Click Next to continue the installation. Select install type whether Single User or All Users. Click Next.



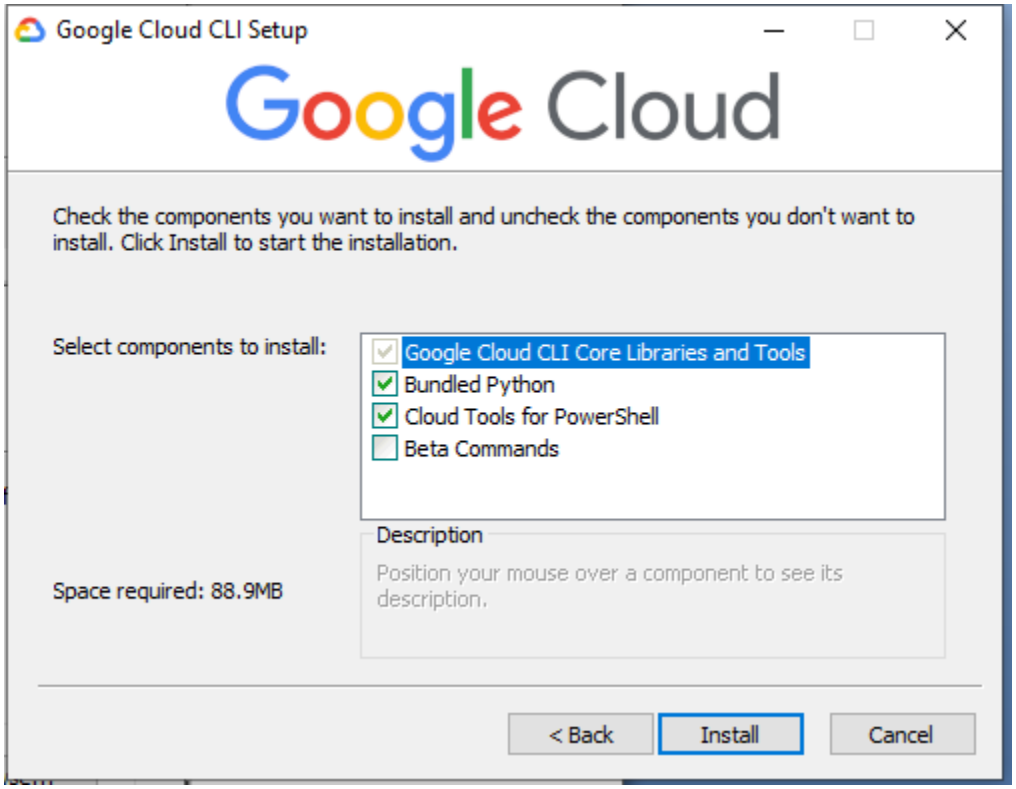
Select the user type

5.Select the folder to install the Google SDK.



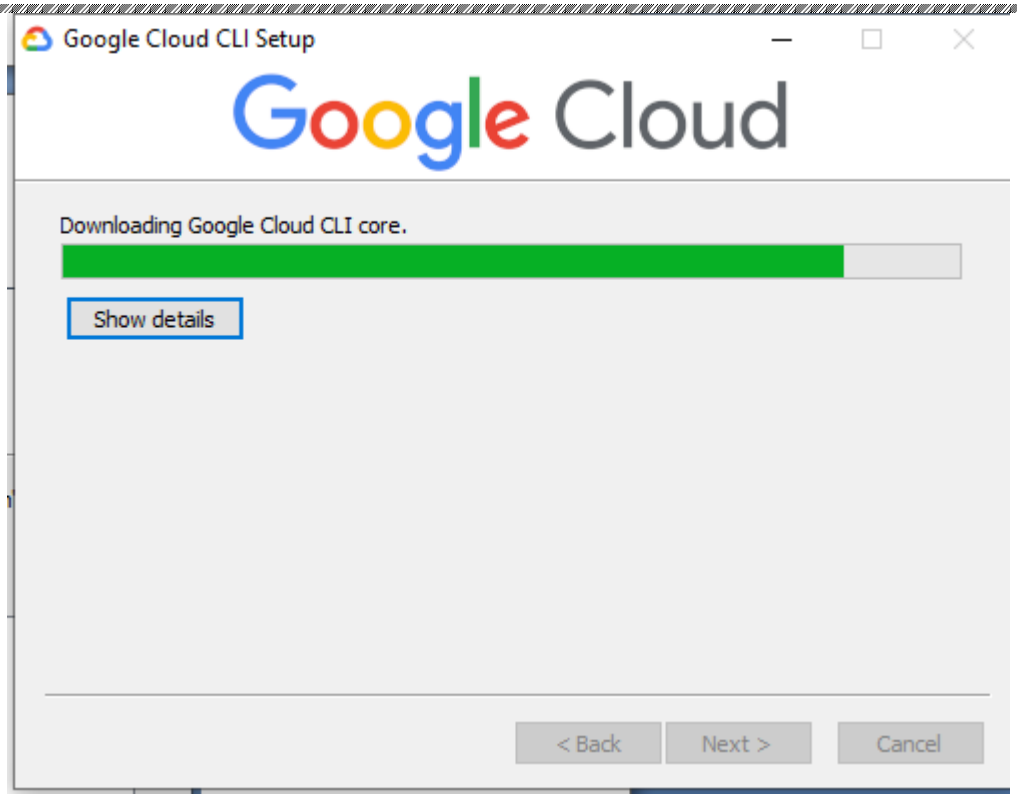
Give Destination Folder

6. Select the components to install and click install.

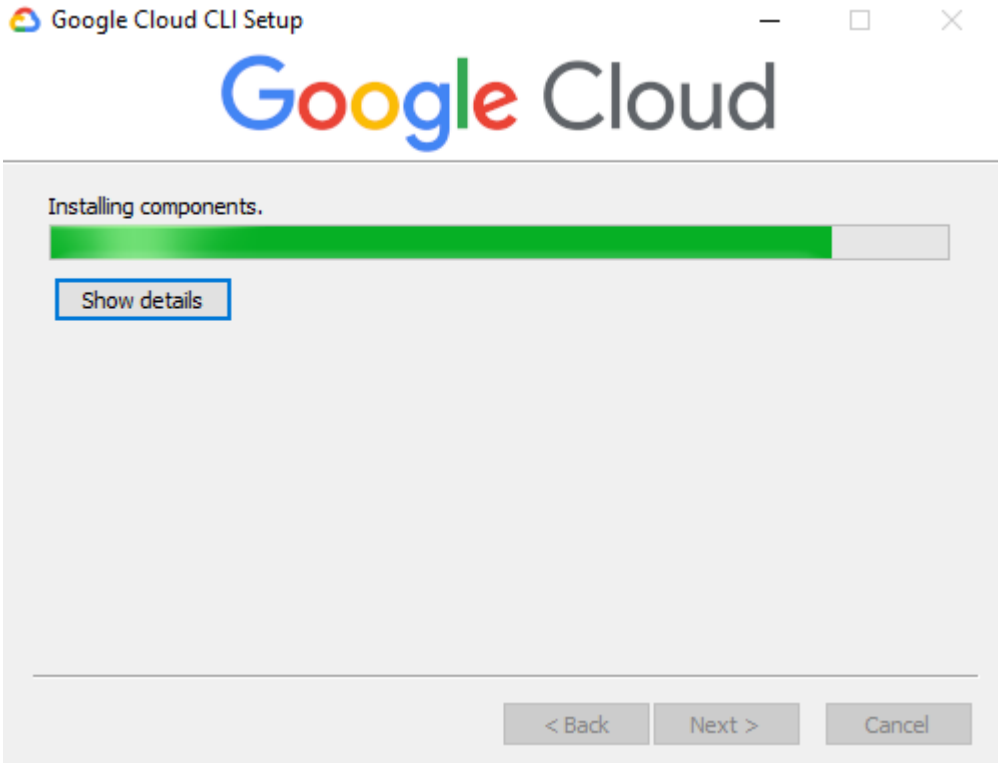


Components selection

7. Install all the packages and components.

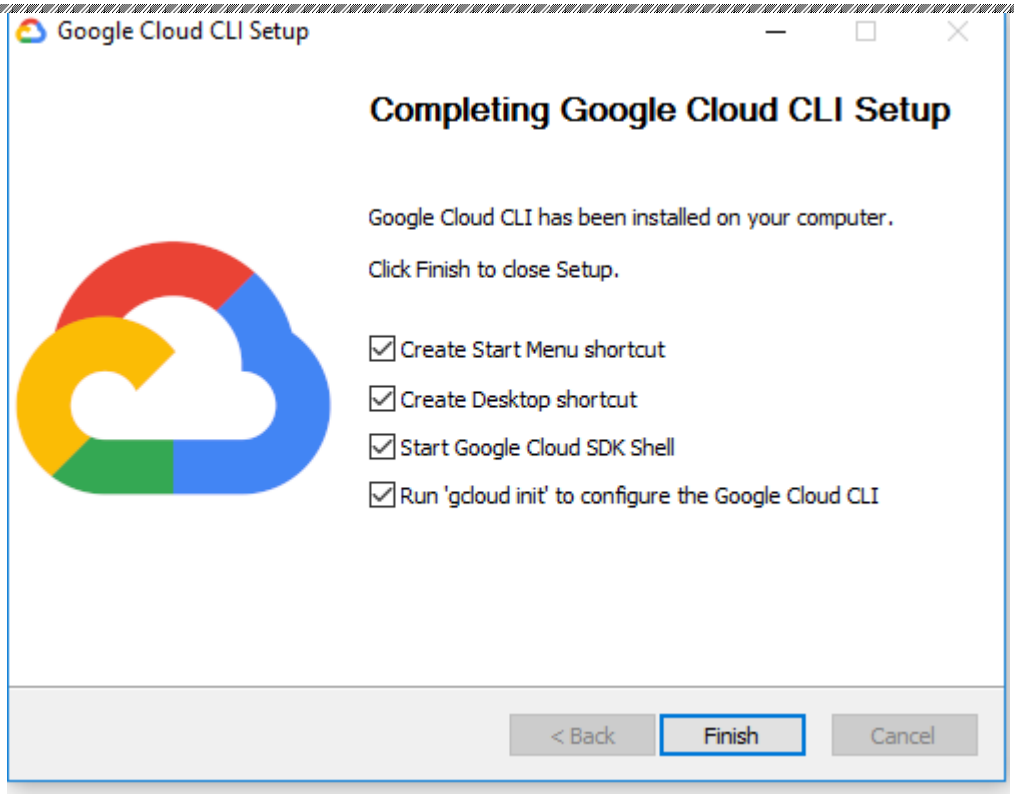


Installation



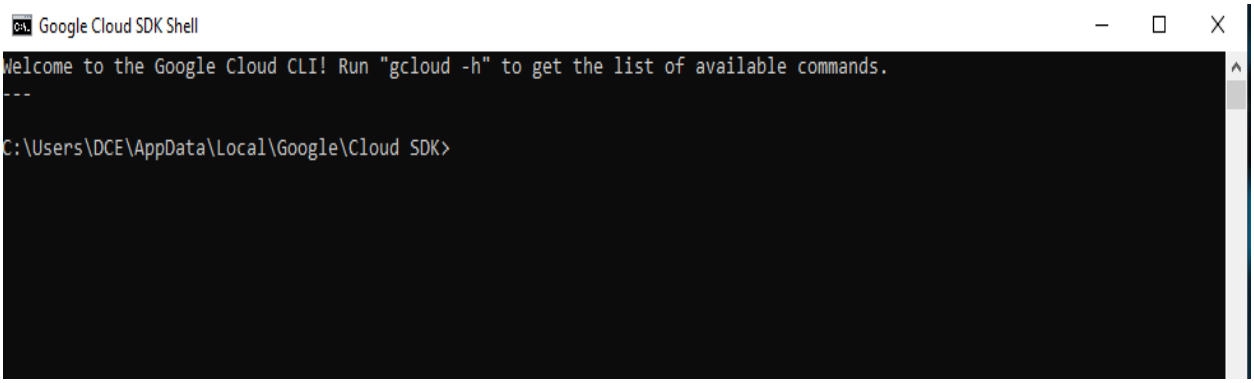
Installation Progress

Click Finish.



Completed Wizard

8.Google Cloud SDK installed successfully. Click Google Cloud SDK shell.

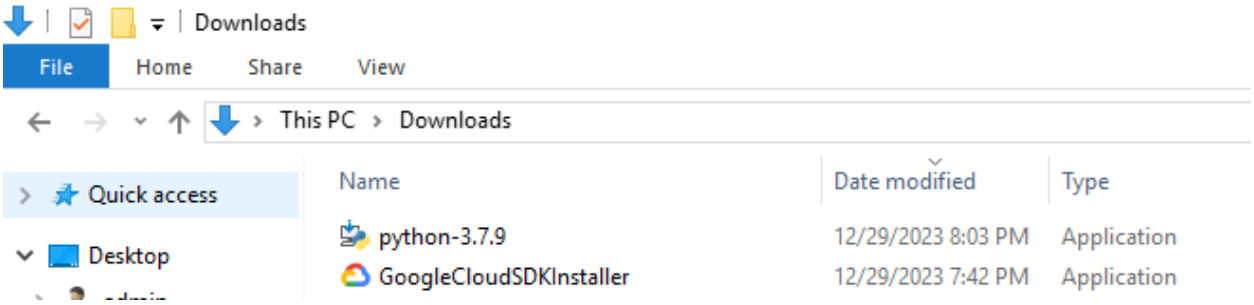


Cloud SDK

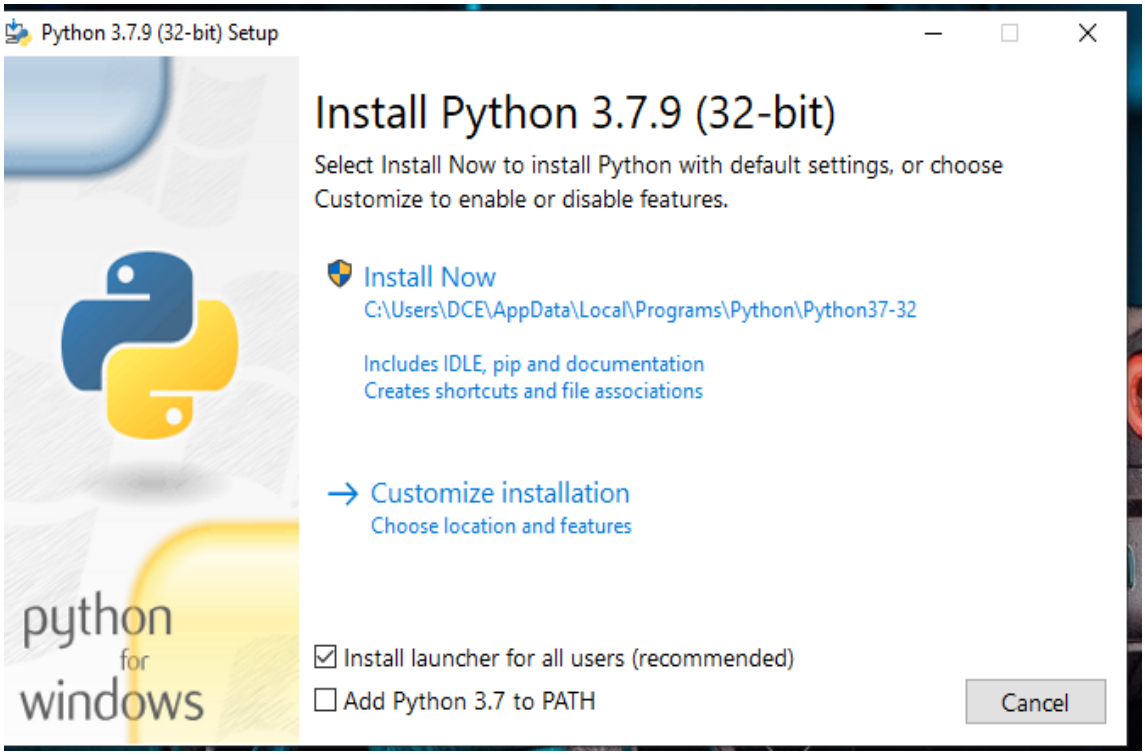
9. Install Python 3.7.9. To install, download the python from the following link.
https://www.python.org/downloads/release/python-379/
10. Select Windows x86 executable installer.

Files

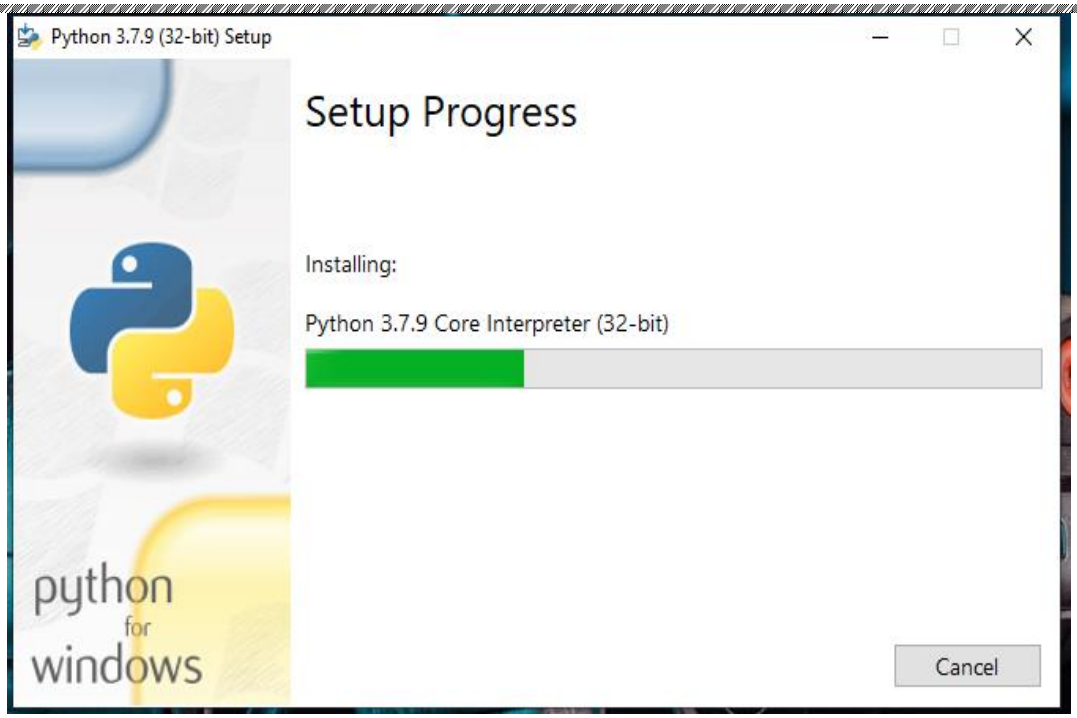
Version	Operating System	Description	MD5 Sum	File Size	GPG
Gzipped source tarball	Source release		bcd9f22cf531efc6f06ca6b9b2919bd4	23277790	SIG
XZ compressed source tarball	Source release		389d3ed26b4d97c741d9e5423da1f43b	17389636	SIG
macOS 64-bit installer	macOS	for OS X 10.9 and later	4b544fc0ac8c3cffdb67dede23ddb79e	29305353	SIG
Windows help file	Windows		1094c8d9438ad1adc263ca57ceb3b927	8186795	SIG
Windows x86-64 embeddable zip file	Windows	for AMD64/EM64T/x64	60f77740b30030b22699dbd14883a4a3	7502379	SIG
Windows x86-64 executable installer	Windows	for AMD64/EM64T/x64	7083fed513c3c9a4ea655211df9ade27	26940592	SIG
Windows x86-64 web-based installer	Windows	for AMD64/EM64T/x64	da0b17ae84d6579f8df3eb24927fd825	1348904	SIG
Windows x86 embeddable zip file	Windows		97c6558d479dc53bf448580b66ad7c1e	6659999	SIG
Windows x86 executable installer	Windows		1e6d31c98c68c723541f0821b3c15d52	25875560	SIG



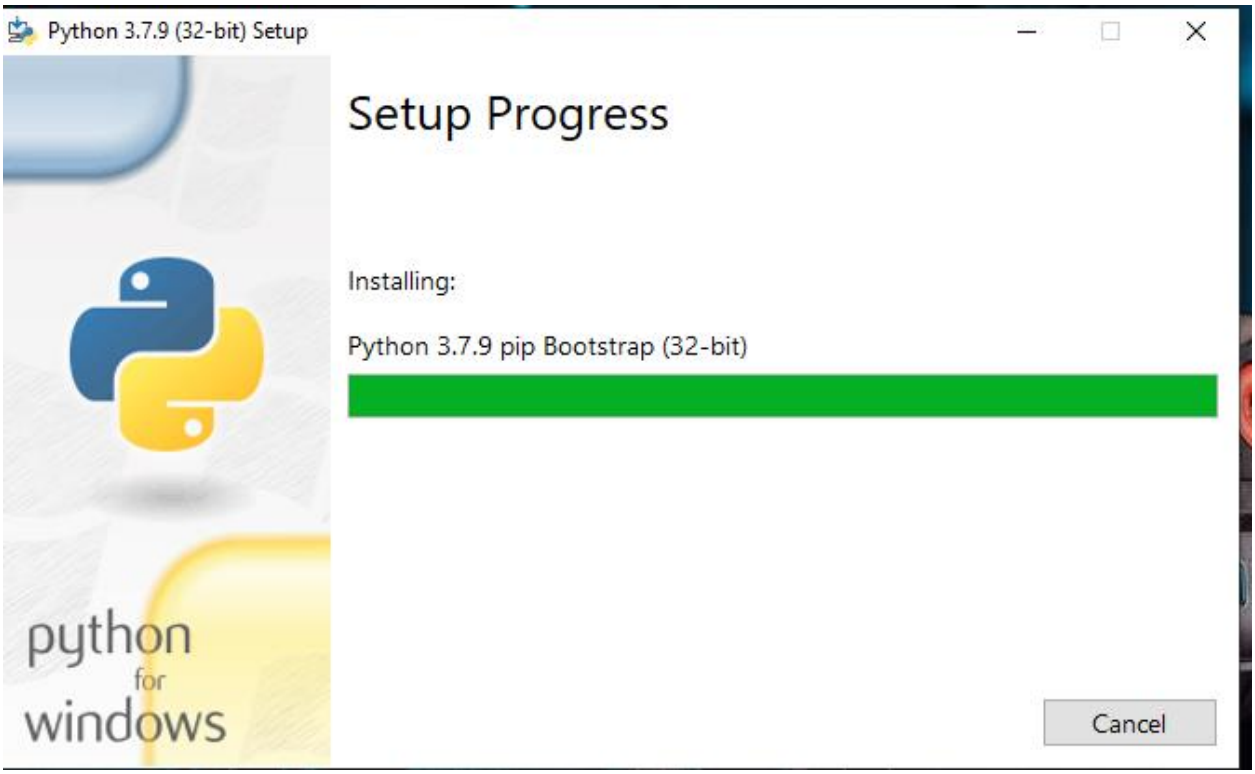
11. Install Python 3.7.9. Click Install Now or Customize Installation. Select Install Now.



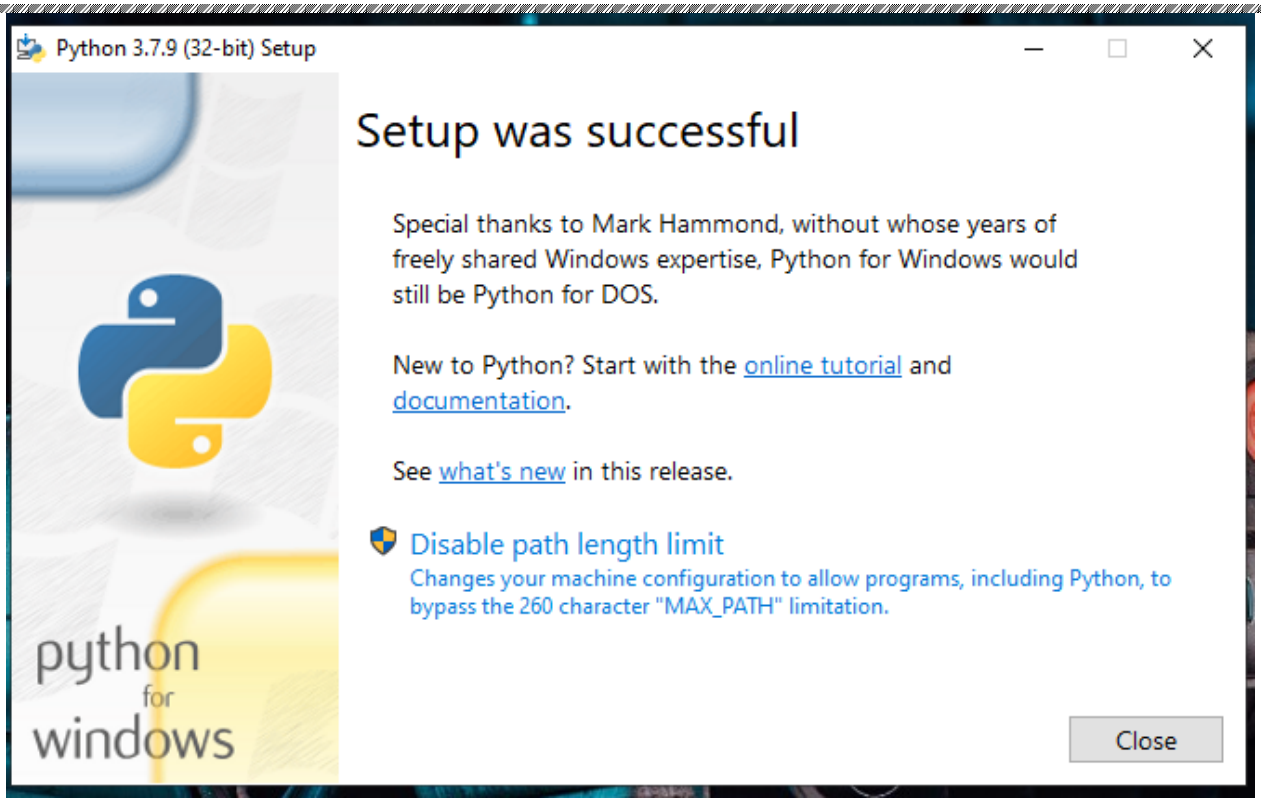
12. It takes a few minutes to install the packages.



13. Installation is in Progress.



14. Setup completed successfully. Click Close.



app.yaml file

runtime: python27
api_version: 1
threadsafe: false

handlers:
- url: /
  script: sample.py

Python File (sample.py)

print("WELCOME TO PSG POLYTECHNIC COLLEGE/ DCE")

sample.py - C:\Users\DCE\Desktop\ex3\sample.py (3.7.9)

File Edit Format Run Options Window Help

```
print("WELCOME TO PSG POLYTECHNIC COLLEGE/ DCE")
```

ex3

Share View

ex3

Name	Date modified	Type	Size
app	11/27/2023 12:56 AM	Yaml Source File	1 KB
sample	11/27/2023 2:27 AM	Python File	1 KB

Google Cloud SDK Shell

```
Welcome to the Google Cloud CLI! Run "gcloud -h" to get the list of available commands.
---

C:\Users\DCE\AppData\Local\Google\Cloud SDK>
C:\Users\DCE\AppData\Local\Google\Cloud SDK>google -cloud-sdk\bin\
'google' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\DCE\AppData\Local\Google\Cloud SDK>google -cloud-sdk\bin\dev_appserver.py
'google' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\DCE\AppData\Local\Google\Cloud SDK>google-cloud-sdk\bin\dev_appserver.py

C:\Users\DCE\AppData\Local\Google\Cloud SDK>google-cloud-sdk\bin\dev_appserver.py "C:\Users\DCE\Desktop\ex3\app"

C:\Users\DCE\AppData\Local\Google\Cloud SDK>
```

C:\Windows\SYSTEM32\cmd.exe - google-cloud-sdk\bin\dev_appserver.py "C:\Users\DCE\Desktop\ex3"

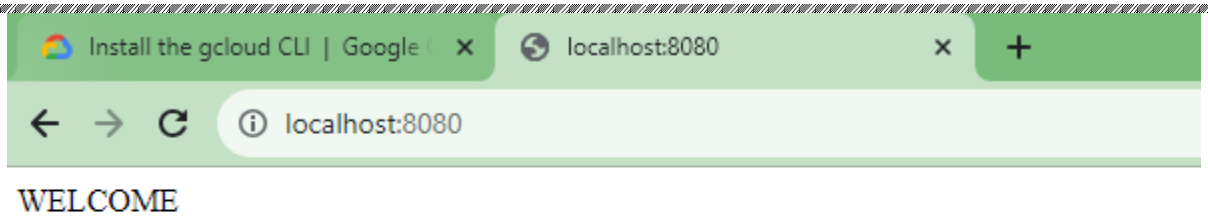
```
Welcome to the Google Cloud CLI! Run "gcloud -h" to get the list of available commands.
---
Welcome! This command will take you through the configuration of gcloud.

Settings from your current configuration [default] are:
accessibility:
  screen_reader: 'False'
core:
  account: ptv.dce@psgpolytech.ac.in
  disable_usage_reporting: 'True'

Pick configuration to use:
 [1] Re-initialize this configuration [default] with new settings
 [2] Create a new configuration
Please enter your numeric choice:  2

Enter configuration name. Names start with a lower case letter and contain only lower case letters a-z, digits 0-9, and
hyphens '-':
ERROR: (gcloud.init) Invalid name [] for a configuration.  Except for special cases (NONE), configuration names start wi
th a lower case letter and contain only lower case letters a-z, digits 0-9, and hyphens '-'.

C:\Users\DCE\AppData\Local\Google\Cloud SDK>google-cloud-sdk\bin\dev_appserver.py "C:\Users\DCE\Desktop\ex3"
WARNING:  Python 3.7.x is no longer officially supported by the Google Cloud CLI
and may not function correctly. Please use Python version 3.8 and up.

If you have a compatible Python interpreter installed, you can use it by setting
the CLOUDSDK_PYTHON environment variable to point to it.

WARNING:  Python 3.7.x is no longer officially supported by the Google Cloud CLI
and may not function correctly. Please use Python version 3.8 and up.
```

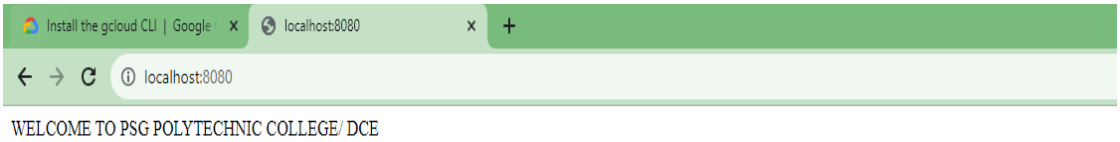
C:\Windows\SYSTEM32\cmd.exe - google-cloud-sdk\bin\dev_appserver.py "C:\Users\DCE\Desktop\ex3"

```
If you have a compatible Python interpreter installed, you can use it by setting
the CLOUDSDK_PYTHON environment variable to point to it.

WARNING:  Python 3.7.x is no longer officially supported by the Google Cloud CLI
and may not function correctly. Please use Python version 3.8 and up.

If you have a compatible Python interpreter installed, you can use it by setting
the CLOUDSDK_PYTHON environment variable to point to it.

This action requires the installation of components: [app-engine-
python, cloud-datastore-emulator]


Your current Google Cloud CLI version is: 455.0.0
Installing components from version: 455.0.0

+-----------------------------------------------------+
|        These components will be installed.          |
+-----------------------------+---------+-----------+
|             Name            | Version |   Size    |
+-----------------------------+---------+-----------+
| Cloud Datastore Emulator    |   2.3.1 | 36.2 MiB  |
| gRPC Python library         |  1.20.0 |  1.5 MiB  |
| gcloud app Python Extensions | 1.9.108 |  8.4 MiB  |
+-----------------------------+---------+-----------+

For the latest full release notes, please visit:
  https://cloud.google.com/sdk/release_notes
```

```
C:\Windows\SYSTEM32\cmd.exe - google-cloud-sdk\bin\dev_appserver.py "C:\Users\DCE\Desktop\ex3"
Do you want to continue (Y/n)?  y

#=============================================================#
#= Creating update staging area                              =#
#=============================================================#
#= Installing: Cloud Datastore Emulator                      =#
#=============================================================#
#= Installing: gRPC Python library                           =#
#=============================================================#
#= Installing: gRPC Python library                           =#
#=============================================================#
#= Installing: gcloud app Python Extensions                  =#
#=============================================================#
#= Creating backup and activating new installation           =#
#=============================================================#

Performing post processing steps...failed.
WARNING: Post processing failed.  Run `gcloud info --show-log` to view the failures.

Update done!

Restarting command:
  $ dev_appserver.py C:\Users\DCE\Desktop\ex3

WARNING:  Python 3.7.x is no longer officially supported by the Google Cloud CLI
and may not function correctly. Please use Python version 3.8 and up.

If you have a compatible Python interpreter installed, you can use it by setting
the CLOUDSDK_PYTHON environment variable to point to it.
```

```
C:\Windows\SYSTEM32\cmd.exe - google-cloud-sdk\bin\dev_appserver.py "C:\Users\DCE\Desktop\ex3"
WARNING: Post processing failed.  Run `gcloud info --show-log` to view the failures.

Update done!

Restarting command:
  $ dev_appserver.py C:\Users\DCE\Desktop\ex3

WARNING:  Python 3.7.x is no longer officially supported by the Google Cloud CLI
and may not function correctly. Please use Python version 3.8 and up.

If you have a compatible Python interpreter installed, you can use it by setting
the CLOUDSDK_PYTHON environment variable to point to it.

WARNING:  Python 3.7.x is no longer officially supported by the Google Cloud CLI
and may not function correctly. Please use Python version 3.8 and up.

If you have a compatible Python interpreter installed, you can use it by setting
the CLOUDSDK_PYTHON environment variable to point to it.

INFO     2023-11-27 02:23:36,269 devappserver2.py:321] Skipping SDK update check.
WARNING  2023-11-27 02:23:40,801 simple_search_stub.py:1196] Could not read search indexes from c:\users\dce\appdata\local\temp\appengine.None\search_indexes
INFO     2023-11-27 02:23:40,989 <string>:400] Starting API server at: http://localhost:55814
INFO     2023-11-27 02:23:40,989 dispatcher.py:276] Starting module "default" running at: http://localhost:8080
INFO     2023-11-27 02:23:41,003 admin_server.py:70] Starting admin server at: http://localhost:8000
INFO     2023-11-27 02:23:48,642 instance.py:294] Instance PID: 7400
INFO     2023-11-27 02:24:12,109 module.py:862] default: "GET / HTTP/1.1" 200 8
INFO     2023-11-27 02:24:14,667 module.py:862] default: "GET /favicon.ico HTTP/1.1" 404 -
INFO     2023-11-27 02:24:19,066 instance.py:294] Instance PID: 8620
```





Result

Thus the Google App engine was installed and created the simple application.

Ex.No 4 **Use GAE launcher to launch the web applications**

Aim

To use GAE launcher to launch the web applications.

Softwares Required

- Google App Engine Launcher
- Python

Google App Engine Launcher

Google App Engine (GAE) is a platform-as-a-service product that provides web app developers and enterprises with access to Google's scalable hosting and tier 1 internet service. GAE requires that applications be written in Java or Python, store data in Google Bigtable and use the Google query language.

Google App Engine is the Google solution for programming and publishing online web applications quickly, and easily.

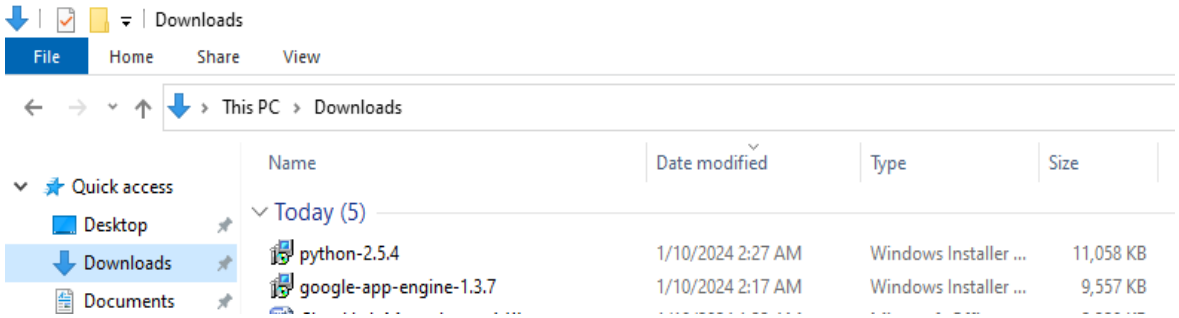
Google App Engine is a Platform as a Service (PaaS) offering that lets users build and run applications on Google's infrastructure. App Engine applications are easy to build, easy to maintain, and easy to scale as your traffic and data storage needs change.

Procedure

Installing Google App Engine

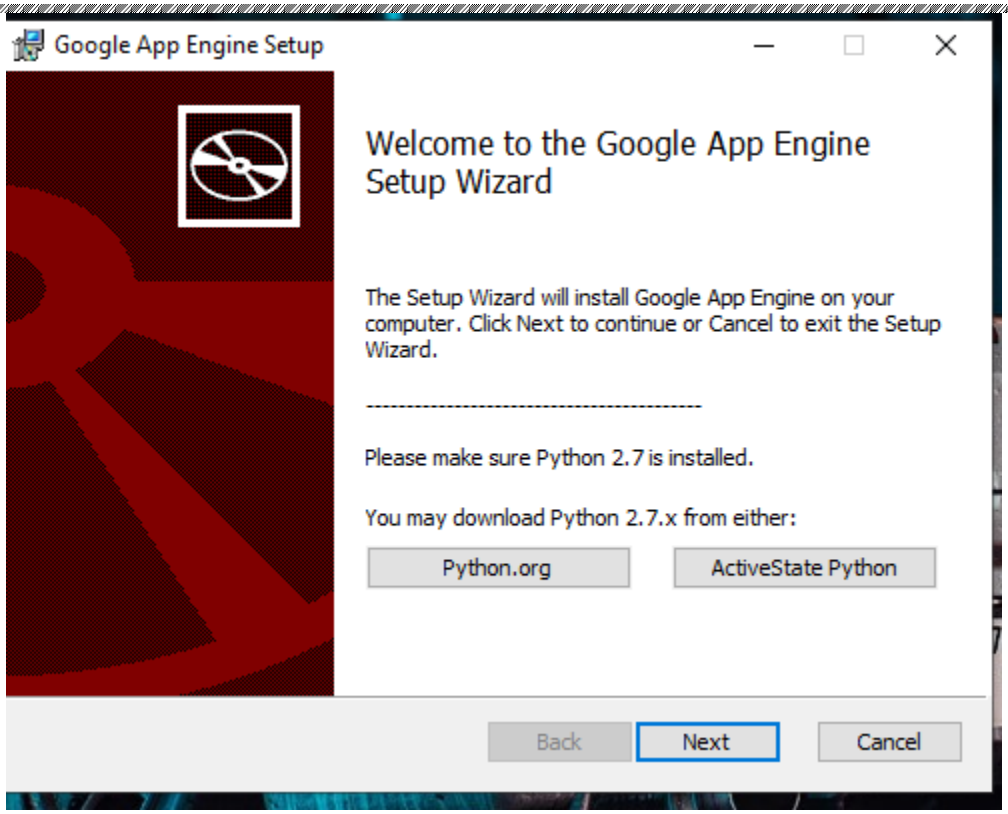
1. Download Google App Engine 1.3.7 from the following link

2. Install Python 2.5.4 from: http://www.python.org/download/releases/2.5.4/



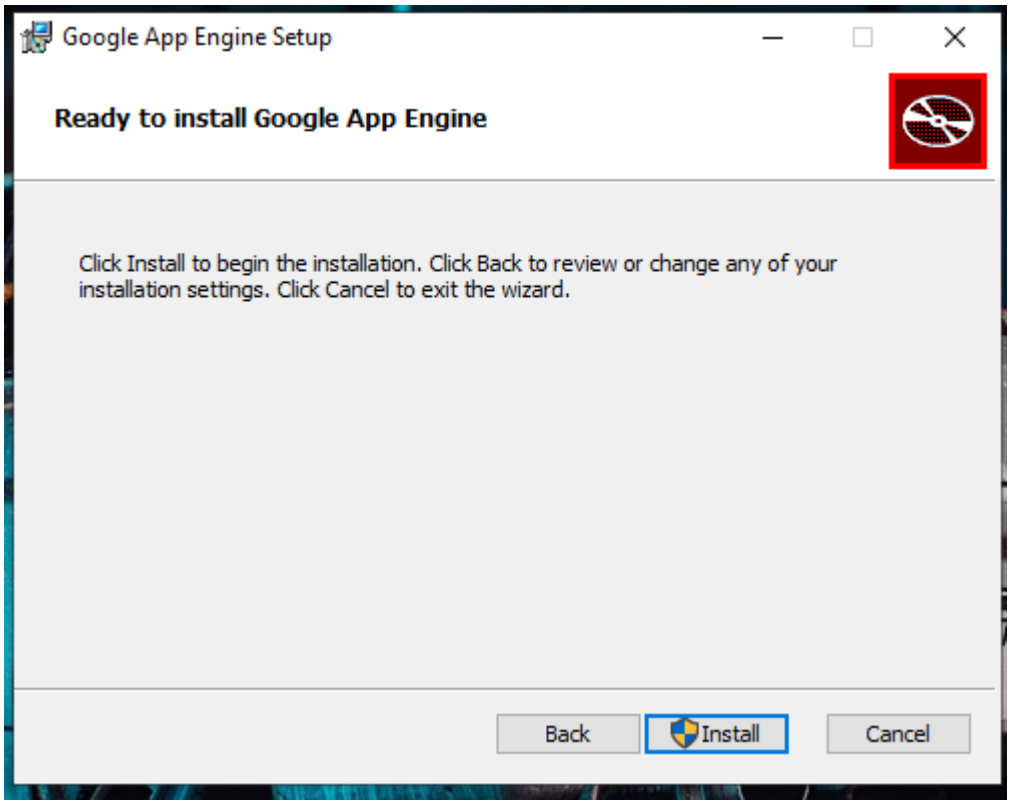
3. Click run

4. Double Click on the Google Application Engine installer.

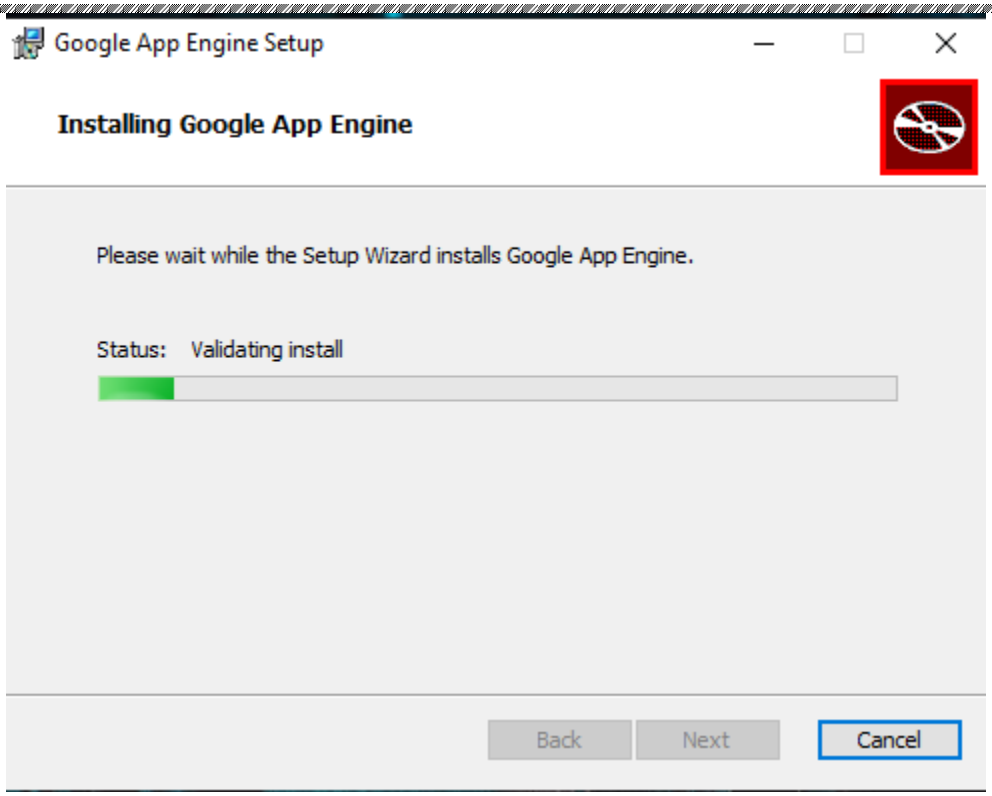


Google App Engine Setup

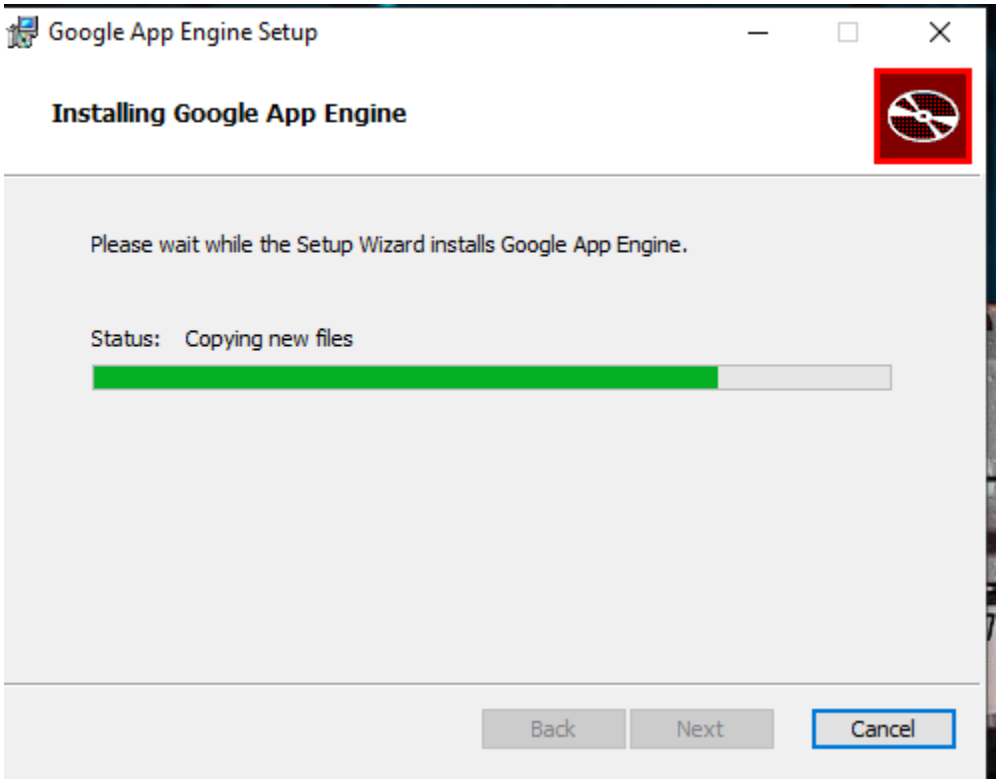
5. Click the installation wizard, and it should install the App Engine.



Installation of Google App Engine

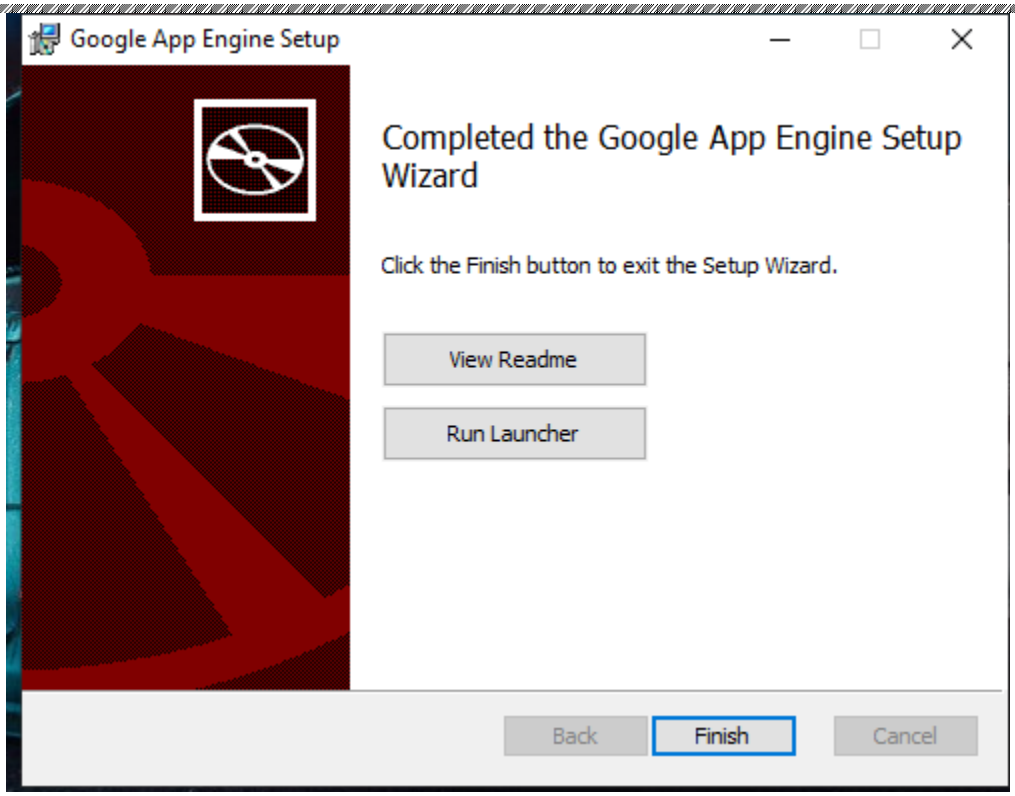


Installation Progress



Installing Google App Engine

6. Click Finish.



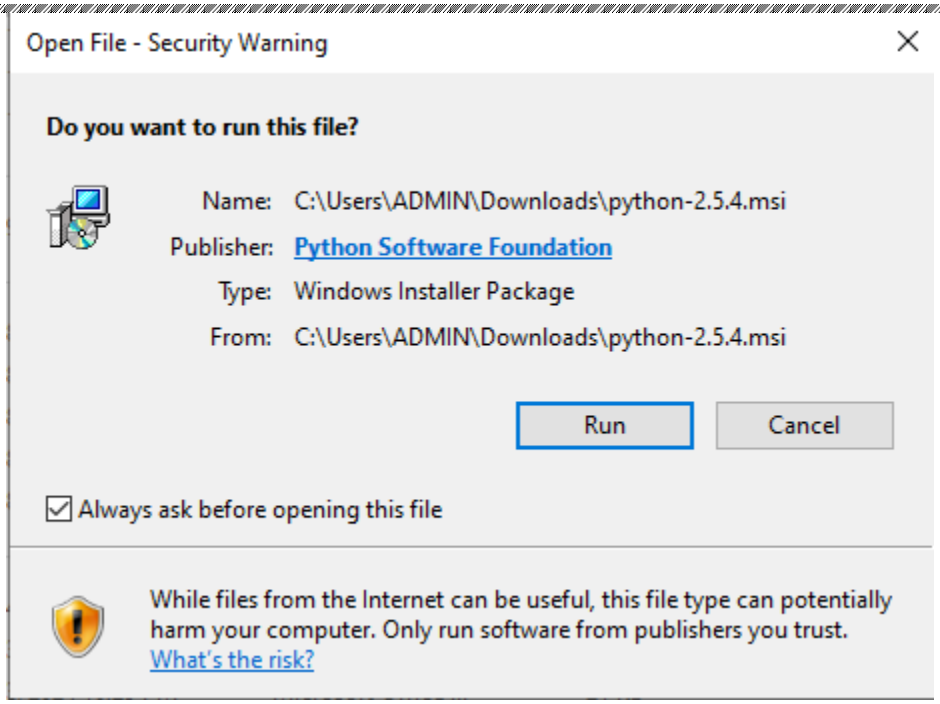
Installed

7. Open Google App Engine Launcher.

Google App Engine Launcher

Python Installation

8. Click Python 2.5.4 to install. Click run.

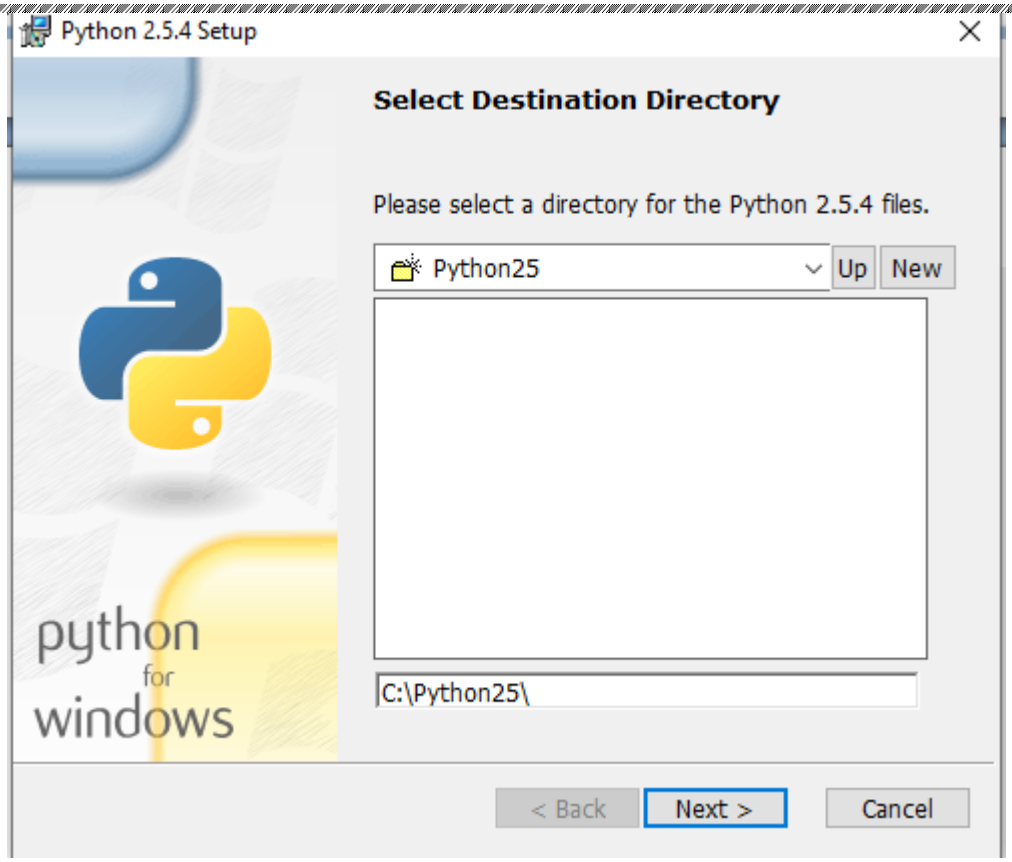


Python Installation

9. Click install for all users and select Next.

Select Users

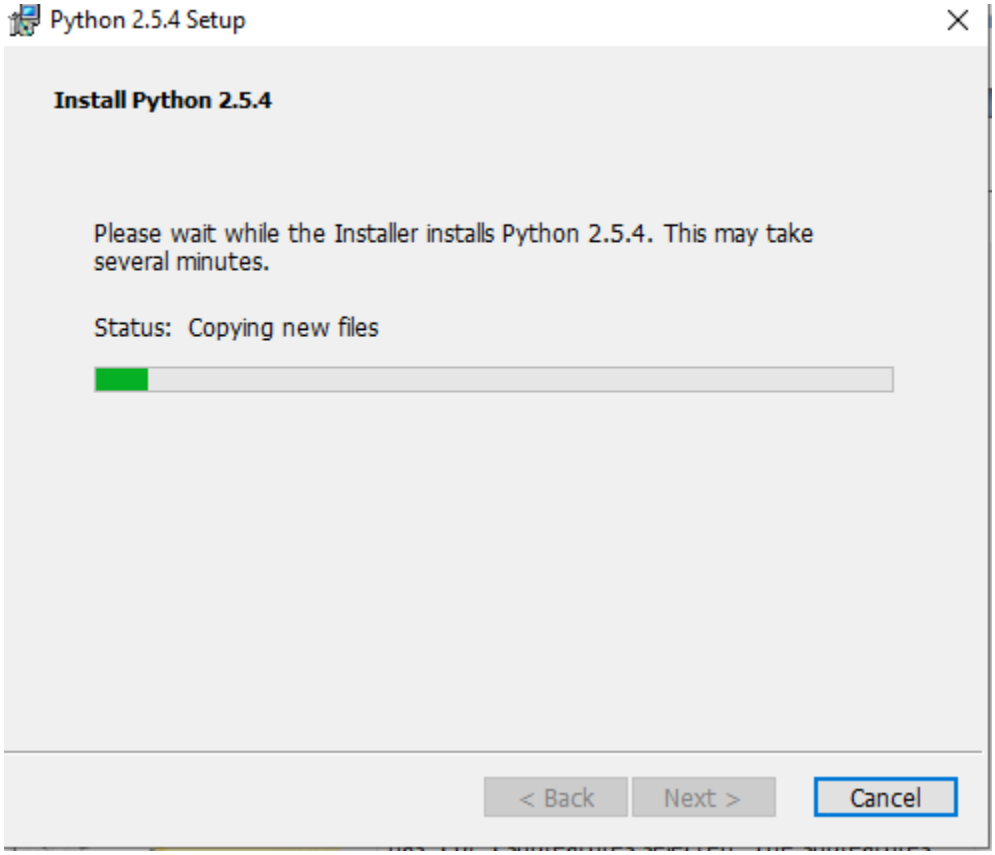
10. Select the destination directory and click Next.



Select Destination Folder

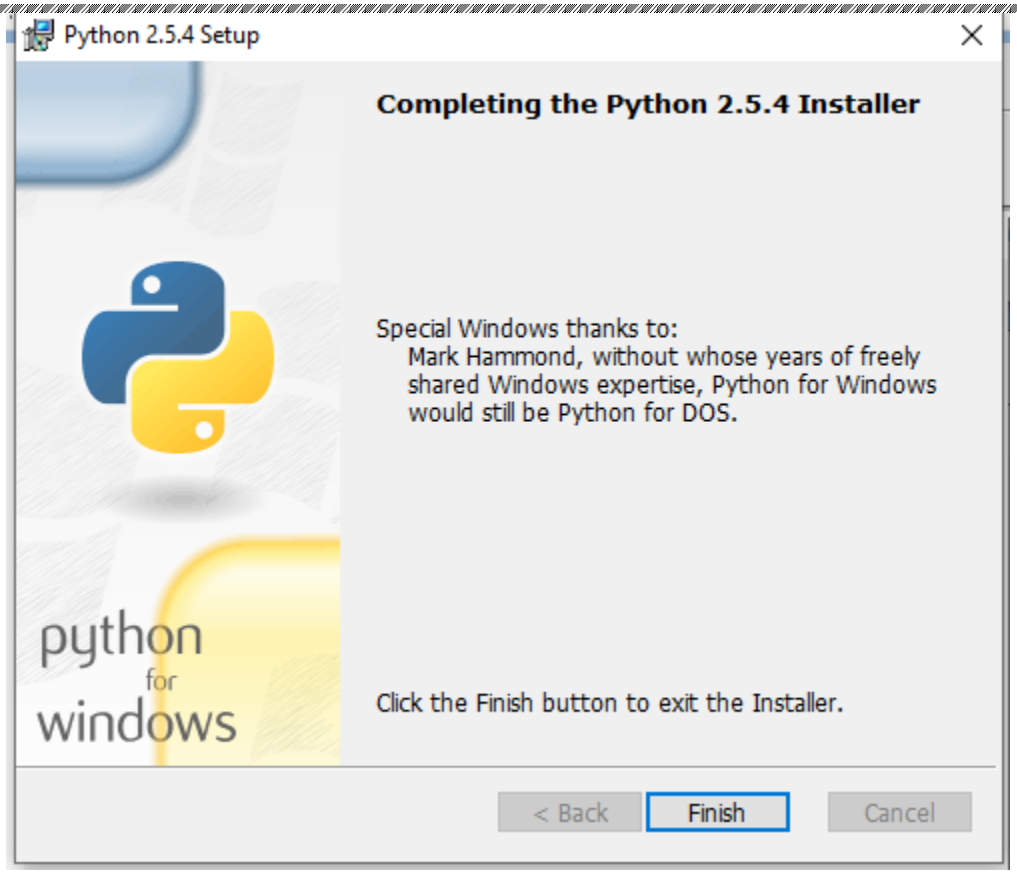
11. Select the features to be installed and click Next.

12. Installation is in Progress.

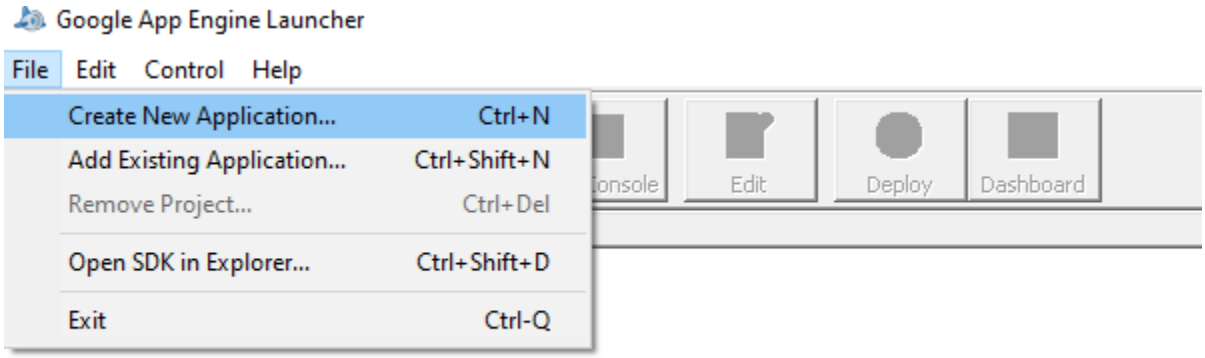


Installation Progress

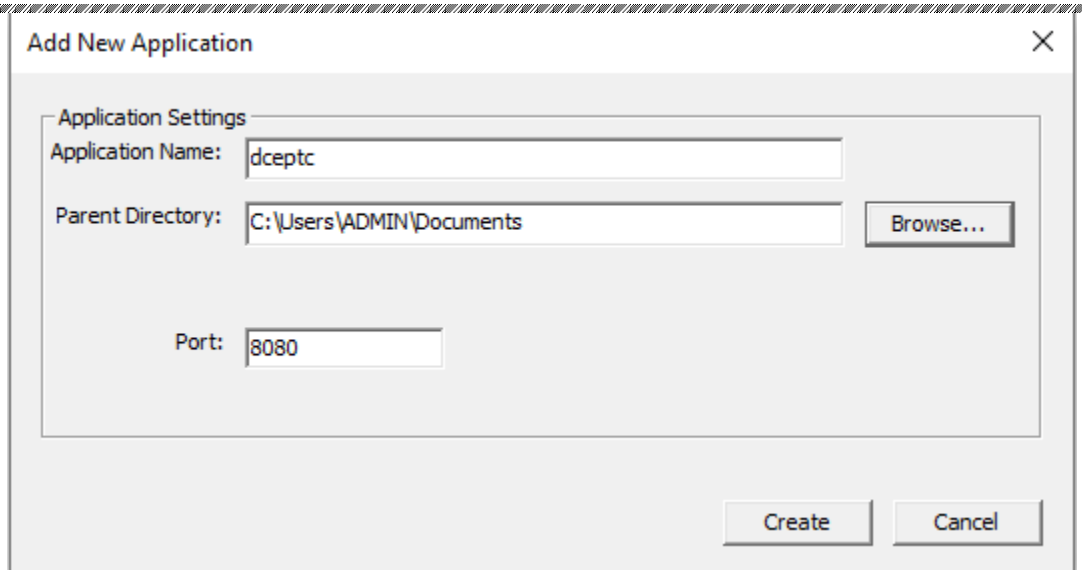
13. After the installation process, click Finish.



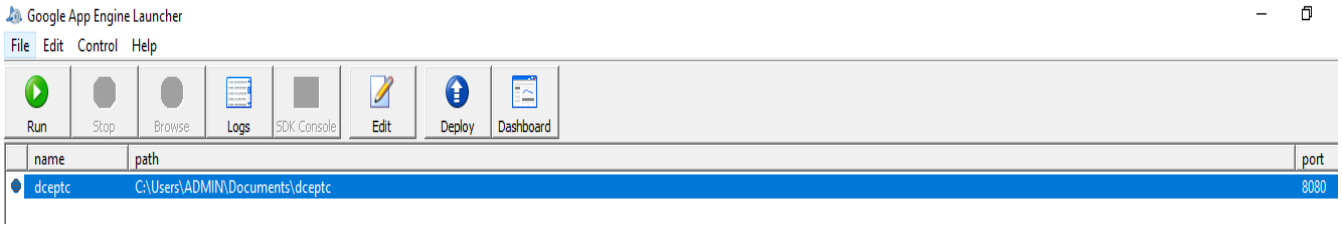
14. Select File
15. Under the File menu, select Create Application
16. It open Add New Application wizard.
17. Select parent directory and give application name.
18. Click Run to execute the application.
19. Goto Browser enter localhost: 8080

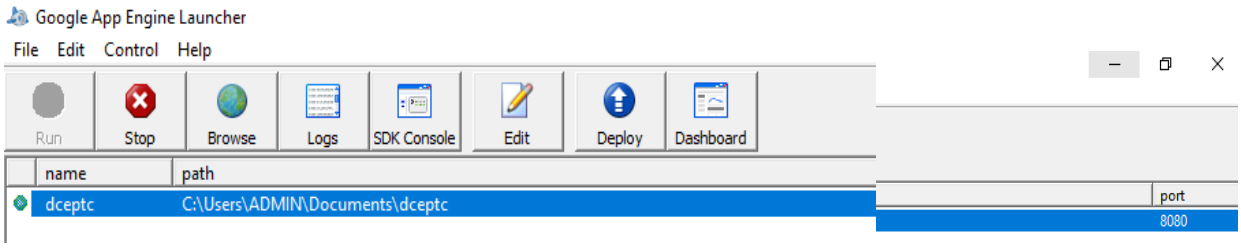


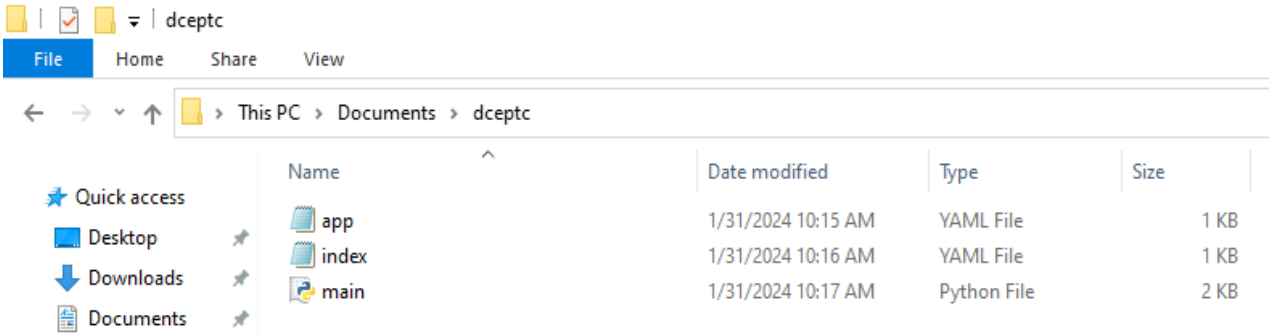
Select create new application



Select the Parent Directory







app.yaml

app - Notepad

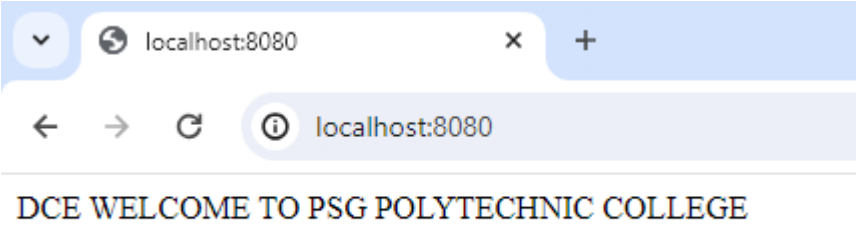
File Edit Format View Help

```
application: dceptc
version: 1
runtime: python
api_version: 1

handlers:
- url: .*
  script: main.py
```

main.py

```
#!/usr/bin/env python
#
# Copyright 2007 Google Inc.
#
# Licensed under the Apache License, Version 2.0 (the "License");
# you may not use this file except in compliance with the License.
# You may obtain a copy of the License at
#
#     http://www.apache.org/licenses/LICENSE-2.0
#
# Unless required by applicable law or agreed to in writing, software
# distributed under the License is distributed on an "AS IS" BASIS,
# WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
# See the License for the specific language governing permissions and
# limitations under the License.
#
from google.appengine.ext import webapp
from google.appengine.ext.webapp import util

class MainHandler(webapp.RequestHandler):
    def get(self):
        self.response.out.write('DCE\n')
        self.response.out.write('WELCOME TO PSG POLYTECHNIC COLLEGE')

def main():
    application = webapp.WSGIApplication([('/', MainHandler)],
                                         debug=True)
    util.run_wsgi_app(application)

if __name__ == '__main__':
    main()Goto Browser enter localhost: 8080
```

Output



Result

Thus the GAE launcher was used to launch the web applications.

Ex No.5 Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim

Aim

To simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.

Softwares Required

- Eclipse 2019-12
- jdk 18.0.2.1
- Cloudsim 3.0.3

Cloudsim

CloudSim is a framework for modeling and simulation of cloud computing infrastructures and services. CloudSim comprises huge volume of libraries for simulating the cloud based computing systems. It offers necessary classes for creating users, applications, virtual machines, data centers, computational resources and policies for controlling the different parts of the system as provisioning and scheduling.

Installation

1. Download the eclipse from the following link

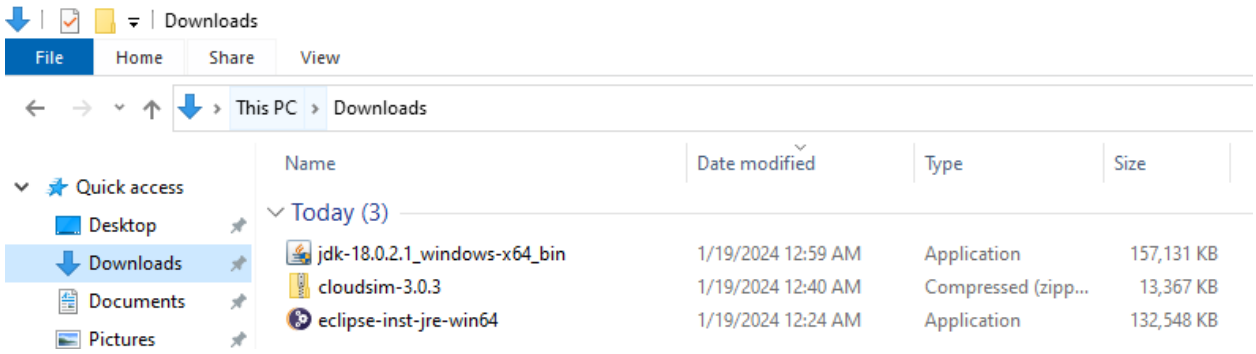
https://www.eclipse.org/downloads/packages/release/2019-12/r

2. Download the jdk 18.0.2.1 from the link

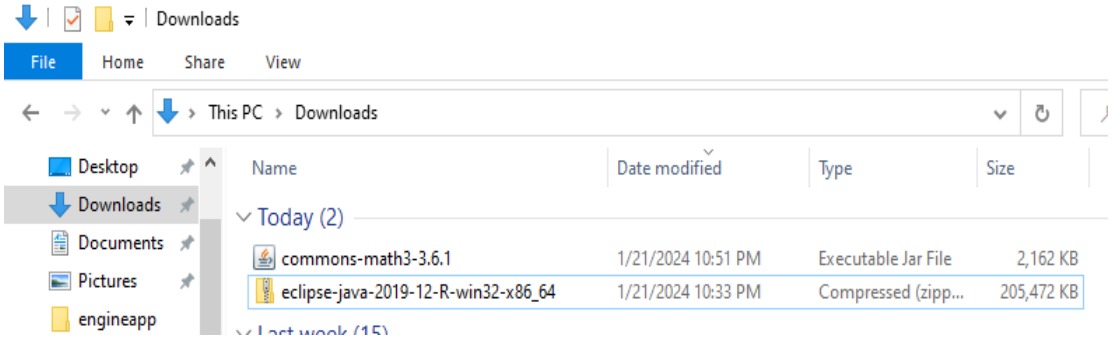
https://www.oracle.com/java/technologies/javase/jdk18-archive-downloads.html

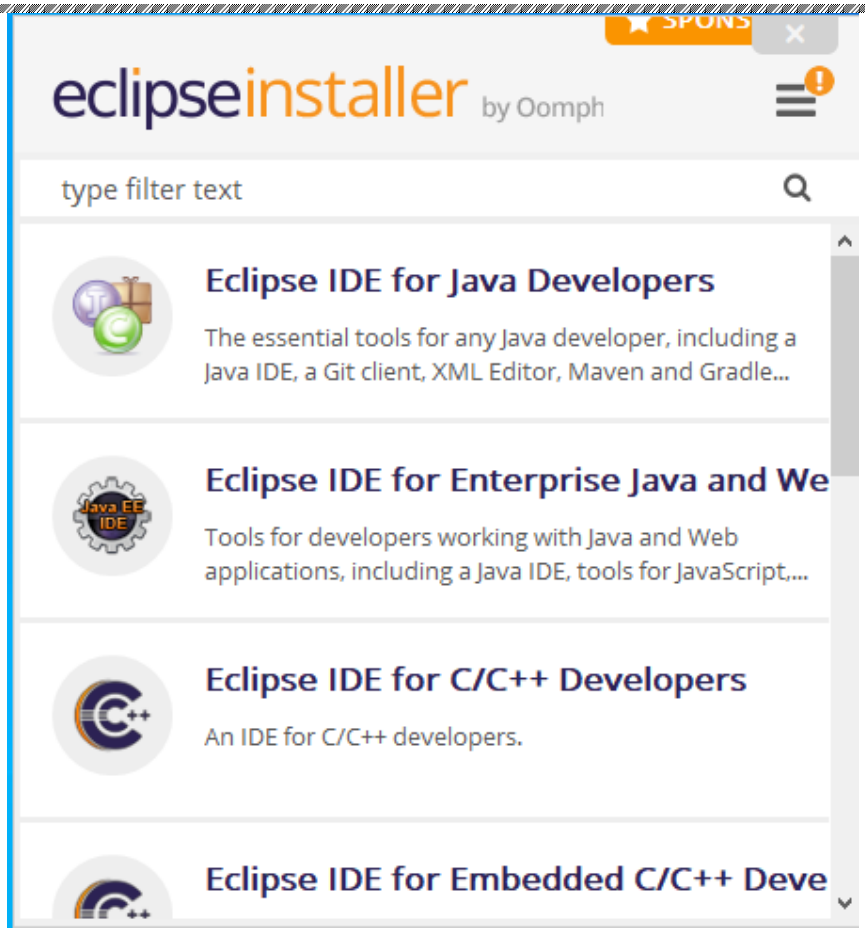
3. Download the cloudsim 3.0.3 and extract the files.

https://github.com/Cloudslab/cloudsim/releases/tag/cloudsim-3.0.3

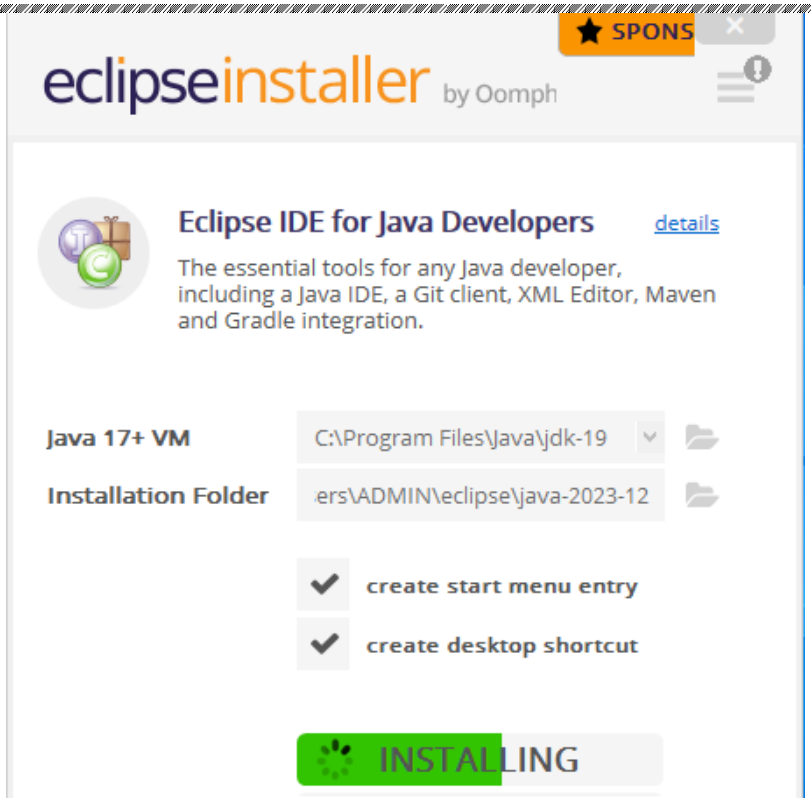


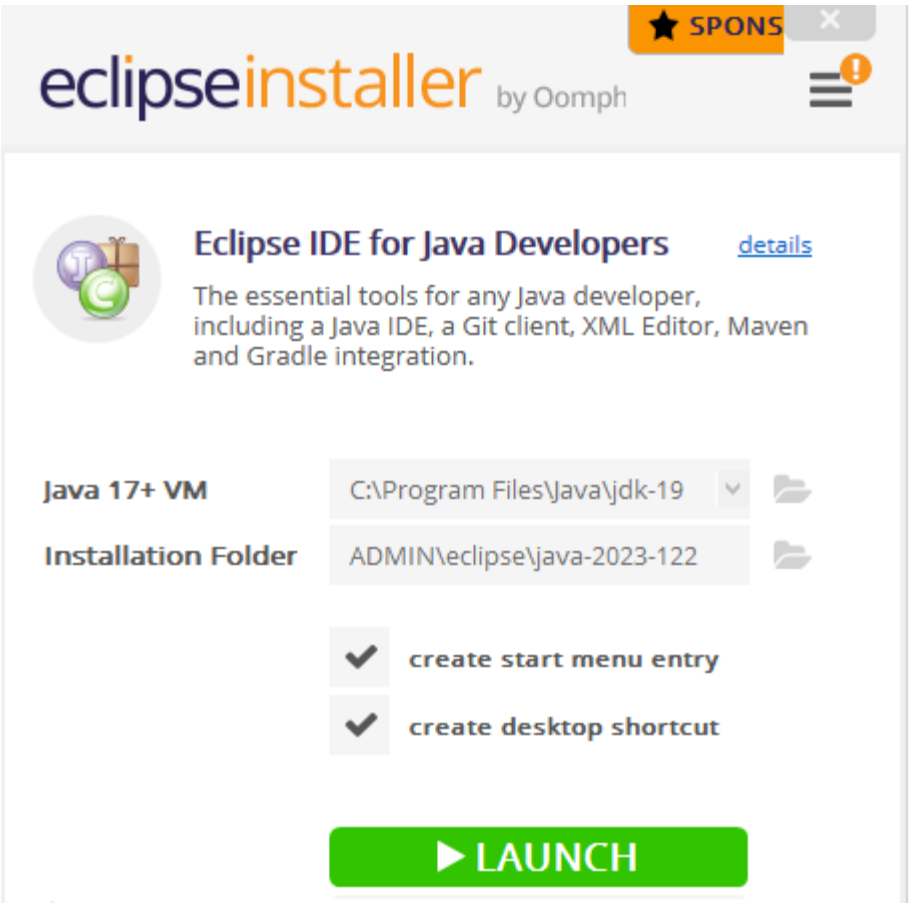
4. Run eclipse. Select eclipse IDE for Java Developers.
5. Select the folder to install the eclipse.

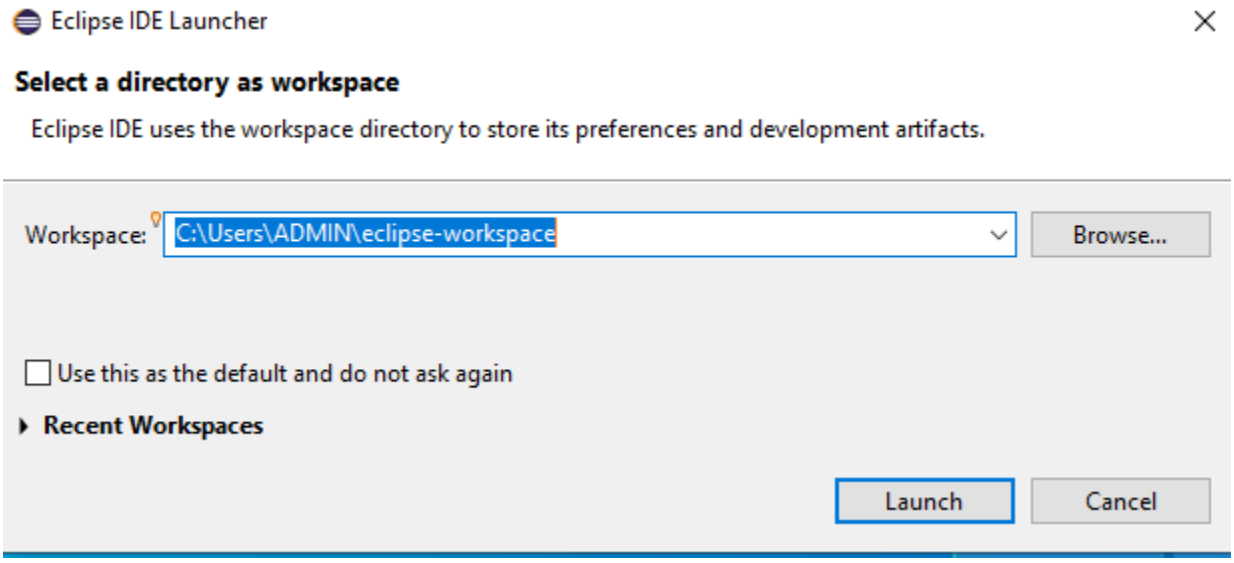


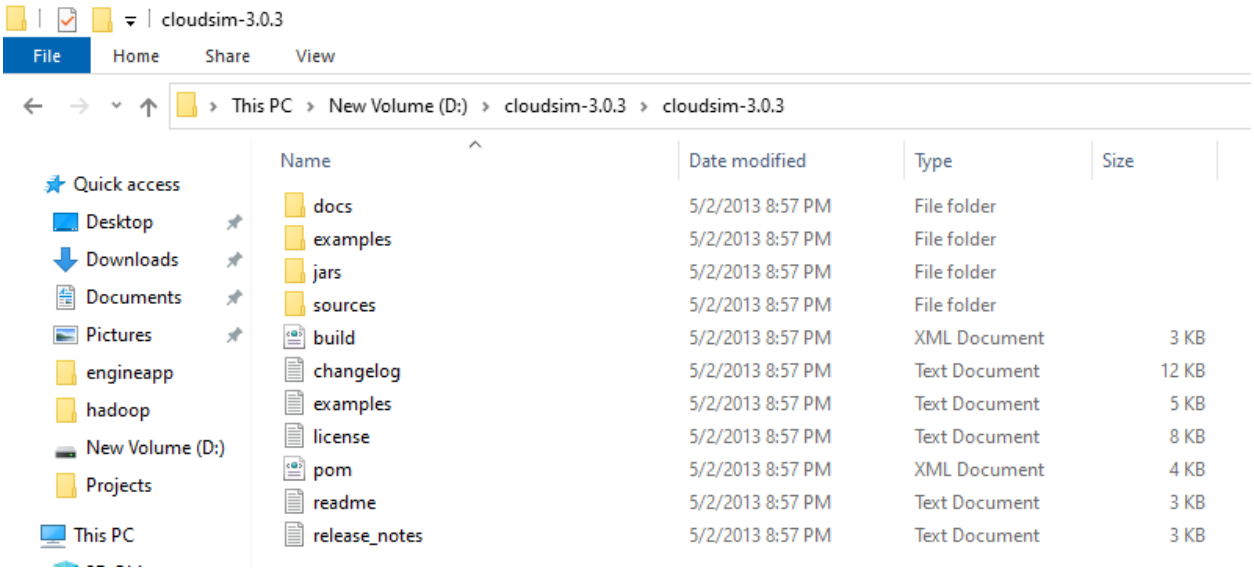

eclipseinstaller by Oomph
type filter text
Eclipse IDE for Java Developers
The essential tools for any Java developer, including a Java IDE, a Git client, XML Editor, Maven and Gradle...
Eclipse IDE for Enterprise Java and We
Tools for developers working with Java and Web applications, including a Java IDE, tools for JavaScript,...
Eclipse IDE for C/C++ Developers
An IDE for C/C++ developers.
Eclipse IDE for Embedded C/C++ Deve

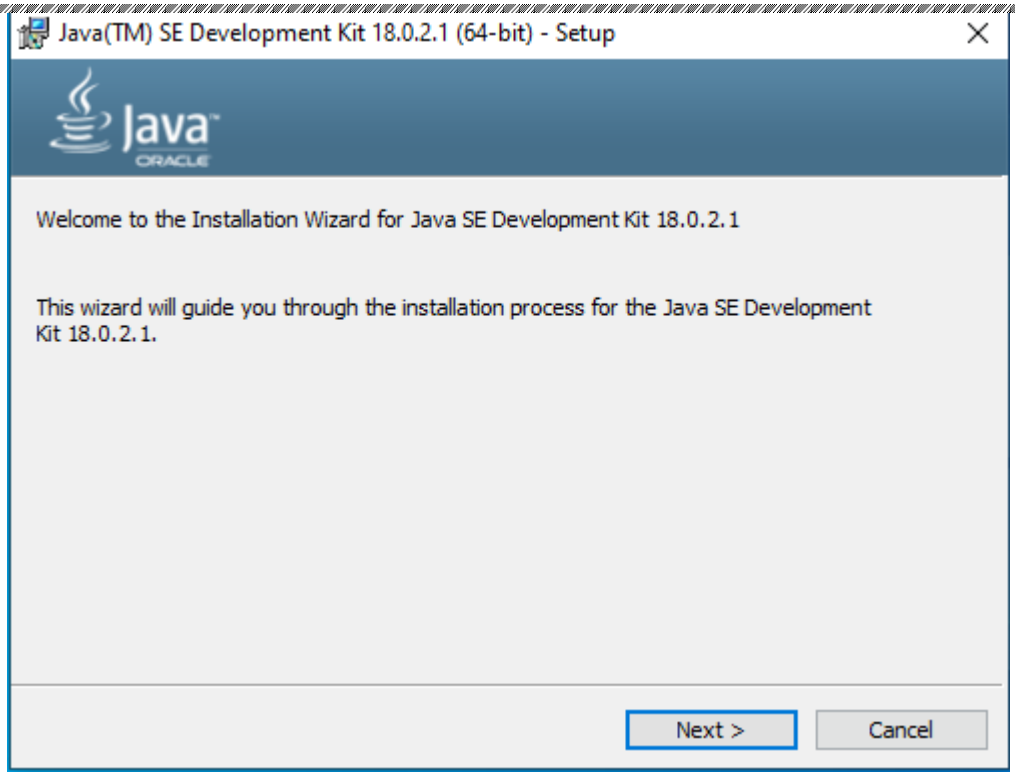
eclipse IDE
2019-12
Starting Eclipse IDE

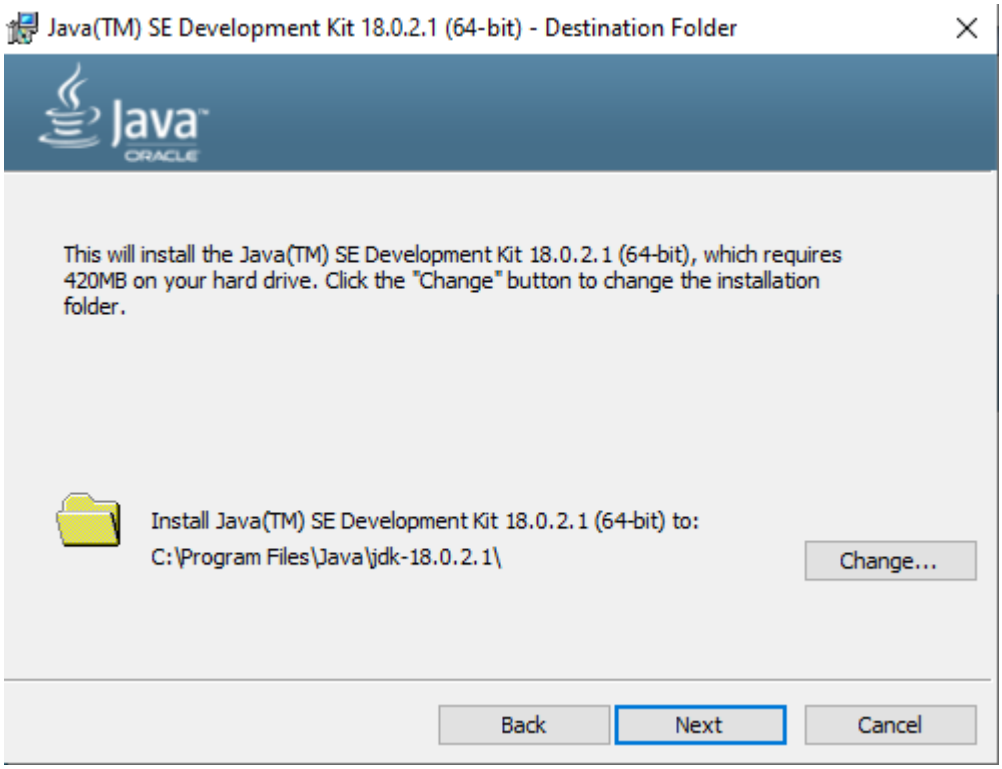

SPONS
eclipseinstaller by Oomph
Eclipse IDE for Java Developers
details
The essential tools for any Java developer, including a Java IDE, a Git client, XML Editor, Maven and Gradle integration.
Java 17+ VM
C:\Program Files\Java\jdk-19
Installation Folder
ers\ADMIN\eclipse\java-2023-12
create start menu entry
create desktop shortcut
INSTALLING

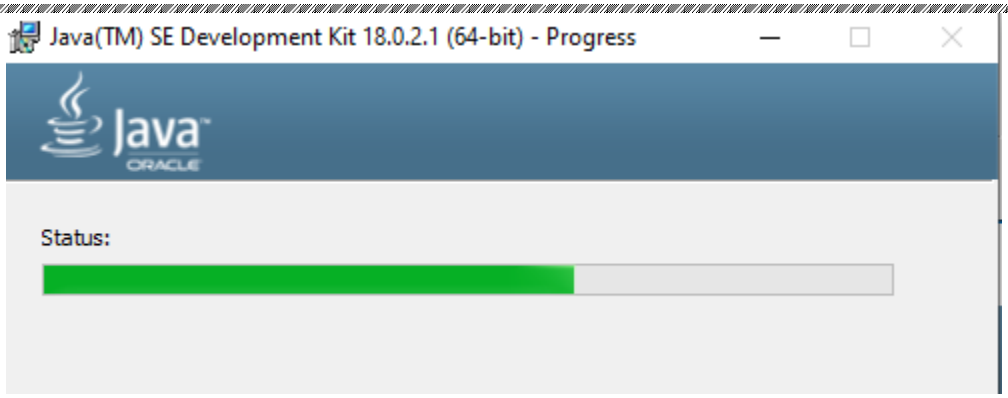

SPONS
eclipseinstaller by Oomph
Eclipse IDE for Java Developers
details
The essential tools for any Java developer, including a Java IDE, a Git client, XML Editor, Maven and Gradle integration.
Java 17+ VM
C:\Program Files\Java\jdk-19
Installation Folder
ADMIN\eclipse\java-2023-122
create start menu entry
create desktop shortcut
LAUNCH


Eclipse IDE Launcher
Select a directory as workspace
Eclipse IDE uses the workspace directory to store its preferences and development artifacts.
Workspace:
C:\Users\ADMIN\eclipse-workspace
Browse...
Use this as the default and do not ask again
Recent Workspaces
Launch
Cancel

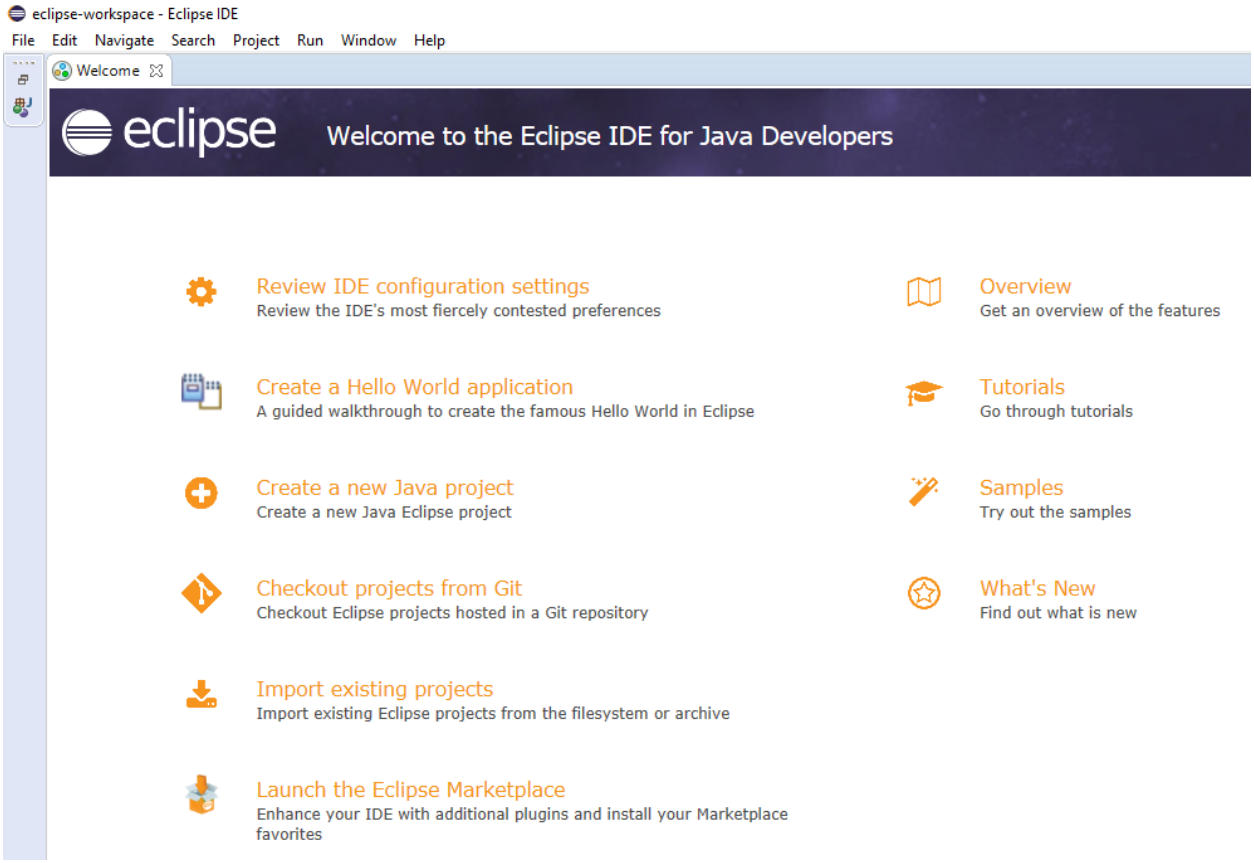

cloudsim-3.0.3
File
Home
Share
View
This PC › New Volume (D:) › cloudsim-3.0.3 › cloudsim-3.0.3
Quick access
Desktop
Downloads
Documents
Pictures
engineapp
hadoop
New Volume (D:)
Projects
This PC
Name
Date modified
Type
Size
docs 5/2/2013 8:57 PM File folder
examples 5/2/2013 8:57 PM File folder
jars 5/2/2013 8:57 PM File folder
sources 5/2/2013 8:57 PM File folder
build 5/2/2013 8:57 PM XML Document 3 KB
changelog 5/2/2013 8:57 PM Text Document 12 KB
examples 5/2/2013 8:57 PM Text Document 5 KB
license 5/2/2013 8:57 PM Text Document 8 KB
pom 5/2/2013 8:57 PM XML Document 4 KB
readme 5/2/2013 8:57 PM Text Document 3 KB
release_notes 5/2/2013 8:57 PM Text Document 3 KB

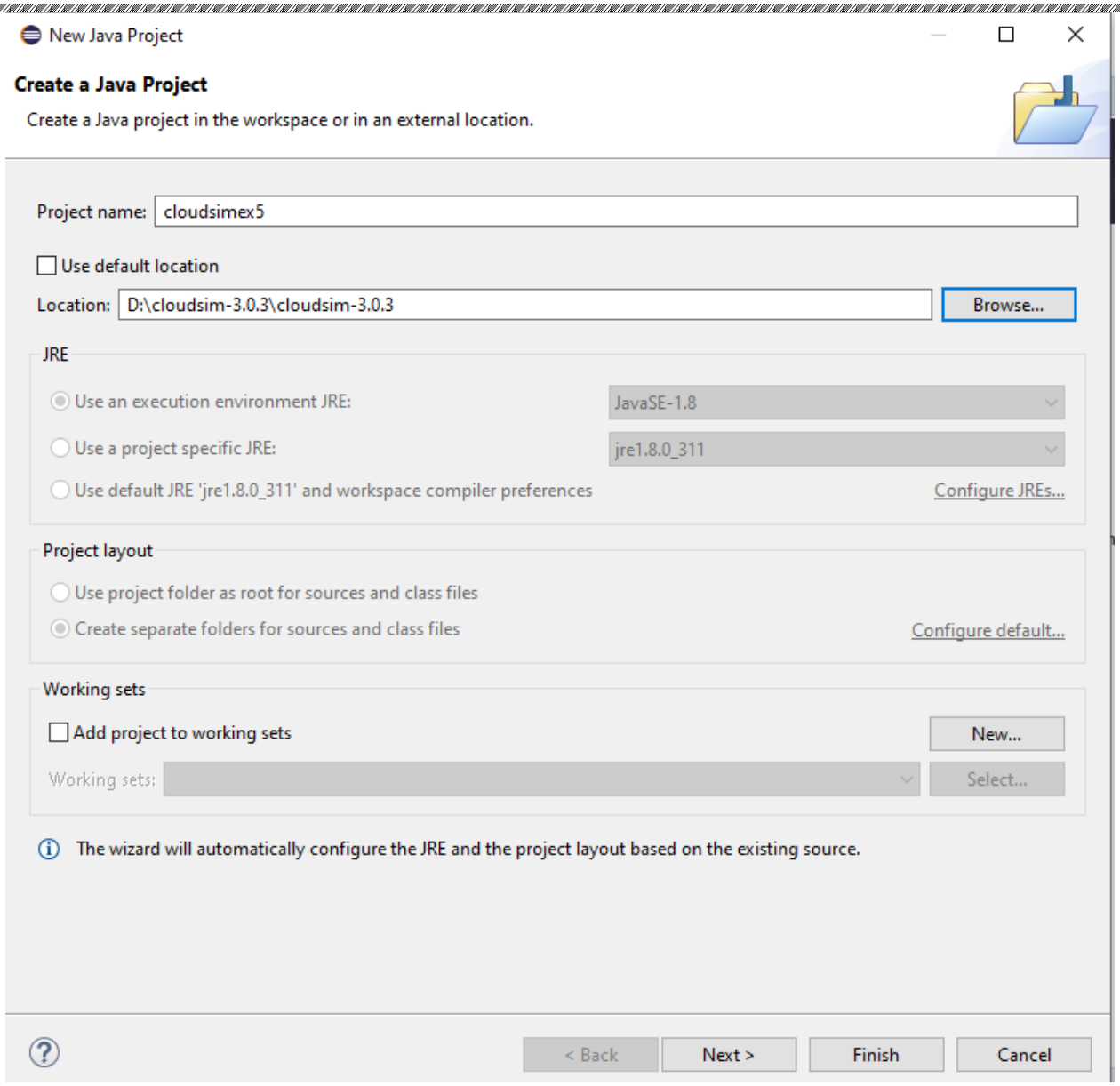

Java(TM) SE Development Kit 18.0.2.1 (64-bit) - Setup
Java
ORACLE
Welcome to the Installation Wizard for Java SE Development Kit 18.0.2.1
This wizard will guide you through the installation process for the Java SE Development Kit 18.0.2.1.
Next >
Cancel

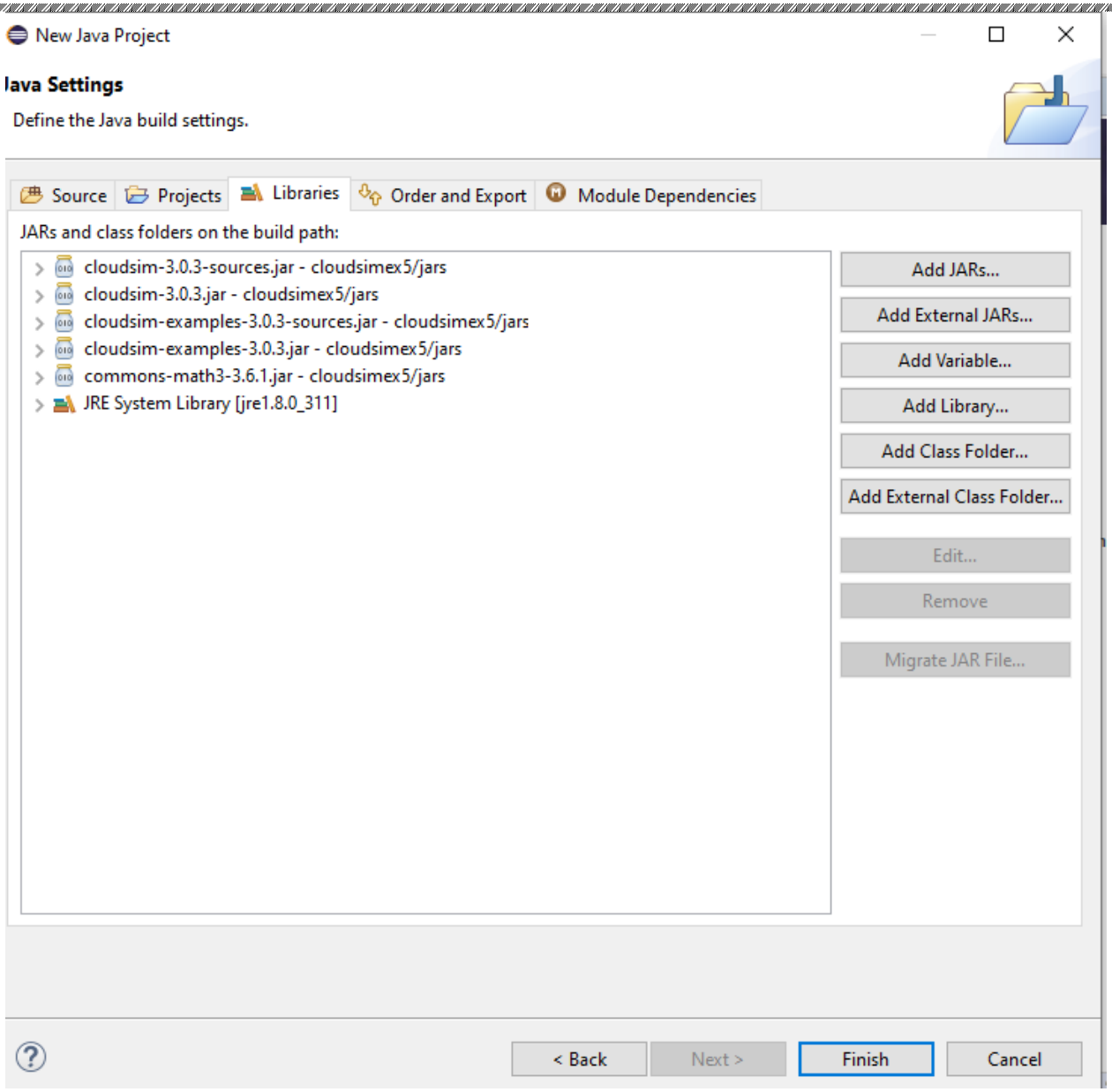

Java(TM) SE Development Kit 18.0.2.1 (64-bit) - Destination Folder
Java
ORACLE
This will install the Java(TM) SE Development Kit 18.0.2.1 (64-bit), which requires 420MB on your hard drive. Click the "Change" button to change the installation folder.
Install Java(TM) SE Development Kit 18.0.2.1 (64-bit) to:
C:\Program Files\Java\jdk-18.0.2.1\
Change...
Back
Next
Cancel


Java(TM) SE Development Kit 18.0.2.1 (64-bit) - Progress
Java
ORACLE
Status:

Java(TM) SE Development Kit 18.0.2.1 (64-bit) - Complete
Java
ORACLE
Java(TM) SE Development Kit 18.0.2.1 (64-bit) Successfully Installed
Click Next Steps to access tutorials, API documentation, developer guides, release notes and more to help you get started with the JDK.
Next Steps
Close


eclipse-workspace - Eclipse IDE
File Edit Navigate Search Project Run Window Help
Welcome
eclipse
Welcome to the Eclipse IDE for Java Developers
Review IDE configuration settings
Review the IDE's most fiercely contested preferences
Overview
Get an overview of the features
Create a Hello World application
A guided walkthrough to create the famous Hello World in Eclipse
Tutorials
Go through tutorials
Create a new Java project
Create a new Java Eclipse project
Samples
Try out the samples
Checkout projects from Git
Checkout Eclipse projects hosted in a Git repository
What's New
Find out what is new
Import existing projects
Import existing Eclipse projects from the filesystem or archive
Launch the Eclipse Marketplace
Enhance your IDE with additional plugins and install your Marketplace favorites


New Java Project
Create a Java Project
Create a Java project in the workspace or in an external location.
Project name: cloudsimex5
Use default location
Location: D:\cloudsim-3.0.3\cloudsim-3.0.3
Browse...
JRE
Use an execution environment JRE:
JavaSE-1.8
Use a project specific JRE:
jre1.8.0_311
Use default JRE 'jre1.8.0_311' and workspace compiler preferences
Configure JREs...
Project layout
Use project folder as root for sources and class files
Create separate folders for sources and class files
Configure default...
Working sets
Add project to working sets
New...
Working sets:
Select...
The wizard will automatically configure the JRE and the project layout based on the existing source.
< Back
Next >
Finish
Cancel



FCFS_Scheduler.java

```
package org.cloudbus.cloudsim.examples;
import org.cloudbus.cloudsim.*;
import org.cloudbus.cloudsim.core.CloudSim;
import utils.Constants;
import utils.DatacenterCreator;
import utils.GenerateMatrices;
import java.text.DecimalFormat;
import java.util.Calendar;
import java.util.LinkedList;
import java.util.List;
public class FCFS_Scheduler {

    private static List<Cloudlet> cloudletList;
    private static List<Vm> vmList;
    private static Datacenter[] datacenter;
```

```
    private static double[][] commMatrix;
    private static double[][] execMatrix;

    private static List<Vm> createVM(int userId, int vms) {
        //Creates a container to store VMs. This list is passed to the broker later
        LinkedList<Vm> list = new LinkedList<Vm>();

        //VM Parameters
        long size = 10000; //image size (MB)
        int ram = 512; //vm memory (MB)
        int mips = 250;
        long bw = 1000;
        int pesNumber = 1; //number of cpus
        String vmm = "Xen"; //VMM name

        //create VMs
        Vm[] vm = new Vm[vms];

        for (int i = 0; i < vms; i++) {
            vm[i] = new Vm(datacenter[i].getId(), userId, mips, pesNumber, ram, bw, size, vmm, new
CloudletSchedulerSpaceShared());
            list.add(vm[i]);
        }

        return list;
    }

    private static List<Cloudlet> createCloudlet(int userId, int cloudlets, int idShift) {
        // Creates a container to store Cloudlets
        LinkedList<Cloudlet> list = new LinkedList<Cloudlet>();

        //cloudlet parameters
        long fileSize = 300;
        long outputSize = 300;
        int pesNumber = 1;
        UtilizationModel utilizationModel = new UtilizationModelFull();

        Cloudlet[] cloudlet = new Cloudlet[cloudlets];

        for (int i = 0; i < cloudlets; i++) {
            int dcId = (int) (Math.random() * Constants.NO_OF_DATA_CENTERS);
            long length = (long) (1e3 * (commMatrix[i][dcId] + execMatrix[i][dcId]));
            cloudlet[i] = new Cloudlet(idShift + i, length, pesNumber, fileSize, outputSize, utilizationModel,
utilizationModel, utilizationModel);
            // setting the owner of these Cloudlets
            cloudlet[i].setUserId(userId);
            cloudlet[i].setVmId(dcId + 2);
            list.add(cloudlet[i]);
```

```
        }
        return list;
    }

    public static void main(String[] args) {
        Log.printLine("Starting FCFS Scheduler...");

        new GenerateMatrices();
        execMatrix = GenerateMatrices.getExecMatrix();
        commMatrix = GenerateMatrices.getCommMatrix();

        try {
            int num_user = 1;   // number of grid users
            Calendar calendar = Calendar.getInstance();
            boolean trace_flag = false;  // mean trace events

            CloudSim.init(num_user, calendar, trace_flag);

            // Second step: Create Datacenters
            datacenter = new Datacenter[Constants.NO_OF_DATA_CENTERS];
            for (int i = 0; i < Constants.NO_OF_DATA_CENTERS; i++) {
                datacenter[i] = DatacenterCreator.createDatacenter("Datacenter_" + i);
            }

            //Third step: Create Broker
            FCFSDatacenterBroker broker = createBroker("Broker_0");
            int brokerId = broker.getId();

            //Fourth step: Create VMs and Cloudlets and send them to broker
            vmList = createVM(brokerId, Constants.NO_OF_DATA_CENTERS);
            cloudletList = createCloudlet(brokerId, Constants.NO_OF_TASKS, 0);

            broker.submitVmList(vmList);
            broker.submitCloudletList(cloudletList);

            // Fifth step: Starts the simulation
            CloudSim.startSimulation();

            // Final step: Print results when simulation is over
            List<Cloudlet> newList = broker.getCloudletReceivedList();
            //newList.addAll(globalBroker.getBroker().getCloudletReceivedList());

            CloudSim.stopSimulation();

            printCloudletList(newList);

            Log.printLine(FCFS_Scheduler.class.getName() + " finished!");
        } catch (Exception e) {
```

```
            e.printStackTrace();
            Log.printLine("The simulation has been terminated due to an unexpected error");
        }
    }

    private static FCFSDatacenterBroker createBroker(String name) throws Exception {
        return new FCFSDatacenterBroker(name);
    }

    /**
     * Prints the Cloudlet objects
     *
     * @param list list of Cloudlets
     */
    private static void printCloudletList(List<Cloudlet> list) {
        int size = list.size();
        Cloudlet cloudlet;

        String indent = "    ";
        Log.printLine();
        Log.printLine("========== OUTPUT ==========");
        Log.printLine("Cloudlet ID" + indent + "STATUS" +
                indent + "Data center ID" +
                indent + "VM ID" +
                indent + indent + "Time" +
                indent + "Start Time" +
                indent + "Finish Time");

        DecimalFormat dft = new DecimalFormat("###.##");
        dft.setMinimumIntegerDigits(2);
        for (int i = 0; i < size; i++) {
            cloudlet = list.get(i);
            Log.print(indent + dft.format(cloudlet.getCloudletId()) + indent + indent);

            if (cloudlet.getCloudletStatus() == Cloudlet.SUCCESS) {
                Log.print("SUCCESS");

                Log.printLine(indent + indent + dft.format(cloudlet.getResourceId()) +
                        indent + indent + indent + dft.format(cloudlet.getVmId()) +
                        indent + indent + dft.format(cloudlet.getActualCPUTime()) +
                        indent + indent + dft.format(cloudlet.getExecStartTime()) +
                        indent + indent + indent + dft.format(cloudlet.getFinishTime()));
            }
        }
        double makespan = calcMakespan(list);
        Log.printLine("Makespan using FCFS: " + makespan);
    }
```

```
    private static double calcMakespan(List<Cloudlet> list) {
        double makespan = 0;
        double[] dcWorkingTime = new double[Constants.NO_OF_DATA_CENTERS];

        for (int i = 0; i < Constants.NO_OF_TASKS; i++) {
            int dcId = list.get(i).getVmId() % Constants.NO_OF_DATA_CENTERS;
            if (dcWorkingTime[dcId] != 0) --dcWorkingTime[dcId];
            dcWorkingTime[dcId] += execMatrix[i][dcId] + commMatrix[i][dcId];
            makespan = Math.max(makespan, dcWorkingTime[dcId]);
        }
        return makespan;
    }
}
```

FCFSDatacenterBroker.java

```
package org.cloudbus.cloudsim.examples;
import org.cloudbus.cloudsim.Cloudlet;
import org.cloudbus.cloudsim.DatacenterBroker;
import org.cloudbus.cloudsim.Log;
import org.cloudbus.cloudsim.core.CloudSim;
import org.cloudbus.cloudsim.core.SimEvent;
import java.util.ArrayList;

public class FCFSDatacenterBroker extends DatacenterBroker {

    public FCFSDatacenterBroker(String name) throws Exception {
        super(name);
    }

    //scheduling function
    public void scheduleTaskstoVms() {
        ArrayList<Cloudlet> clist = new ArrayList<Cloudlet>();
       for (Cloudlet cloudlet : getCloudletSubmittedList()) {
            clist.add(cloudlet);
        }

        setCloudletReceivedList(clist);
    }

    @Override
    protected void processCloudletReturn(SimEvent ev) {
        Cloudlet cloudlet = (Cloudlet) ev.getData();
        getCloudletReceivedList().add(cloudlet);
        Log.printLine(CloudSim.clock() + ": " + getName() + ": Cloudlet " + cloudlet.getCloudletId()
                + " received");
        cloudletsSubmitted--;
        if (getCloudletList().size() == 0 && cloudletsSubmitted == 0) {
            scheduleTaskstoVms();
            cloudletExecution(cloudlet);
```

```
        }
    }


    protected void cloudletExecution(Cloudlet cloudlet) {

        if (getCloudletList().size() == 0 && cloudletsSubmitted == 0) { // all cloudlets executed
            Log.printLine(CloudSim.clock() + ": " + getName() + ": All Cloudlets executed. Finishing...");
            clearDatacenters();
            finishExecution();
        } else { // some cloudlets haven't finished yet
            if (getCloudletList().size() > 0 && cloudletsSubmitted == 0) {
                // all the cloudlets sent finished. It means that some bount
                // cloudlet is waiting its VM be created
                clearDatacenters();
                createVmsInDatacenter(0);
            }

        }
    }
}
```

Constants.java

```
package utils;
public class Constants {
    public static final int NO_OF_TASKS = 30; // number of Cloudlets;
    public static final int NO_OF_DATA_CENTERS = 5; // number of Datacenters;
    public static final int POPULATION_SIZE = 25; // Number of Particles.
}
```

Output

```
Problems  @ Javadoc  Declaration  Console
<terminated> FCFS_Scheduler [Java Application] C:\Program Files\Java\jre1.8.0_311\bin\javaw.exe (Jan 22, 2024, 11:13:52 PM)
Starting FCFS Scheduler...
Initializing new Matrices...
Initialising...
Starting CloudSim version 3.0
Datacenter_0 is starting...
Datacenter_1 is starting...
Datacenter_2 is starting...
Datacenter_3 is starting...
Datacenter_4 is starting...
Broker_0 is starting...
Entities started.
0.0: Broker_0: Cloud Resource List received with 5 resource(s)
0.0: Broker_0: Trying to Create VM #2 in Datacenter_0
0.0: Broker_0: Trying to Create VM #3 in Datacenter_0
0.0: Broker_0: Trying to Create VM #4 in Datacenter_0
0.0: Broker_0: Trying to Create VM #5 in Datacenter_0
0.0: Broker_0: Trying to Create VM #6 in Datacenter_0
[VmScheduler.vmCreate] Allocation of VM #6 to Host #0 failed by RAM
0.1: Broker_0: VM #2 has been created in Datacenter #2, Host #0
0.1: Broker_0: VM #3 has been created in Datacenter #2, Host #0
0.1: Broker_0: VM #4 has been created in Datacenter #2, Host #0
0.1: Broker_0: VM #5 has been created in Datacenter #2, Host #0
0.1: Broker_0: Creation of VM #6 failed in Datacenter #2
0.1: Broker_0: Trying to Create VM #6 in Datacenter_1
0.2: Broker_0: VM #6 has been created in Datacenter #3, Host #0
0.2: Broker_0: Sending cloudlet 0 to VM #6
0.2: Broker_0: Sending cloudlet 1 to VM #5
0.2: Broker_0: Sending cloudlet 2 to VM #2
0.2: Broker_0: Sending cloudlet 3 to VM #6
0.2: Broker_0: Sending cloudlet 4 to VM #3
0.2: Broker_0: Sending cloudlet 5 to VM #6
0.2: Broker_0: Sending cloudlet 6 to VM #2
0.2: Broker_0: Sending cloudlet 7 to VM #2
0.2: Broker_0: Sending cloudlet 8 to VM #2
0.2: Broker_0: Sending cloudlet 9 to VM #3
0.2: Broker_0: Sending cloudlet 10 to VM #5
0.2: Broker_0: Sending cloudlet 11 to VM #5
0.2: Broker_0: Sending cloudlet 12 to VM #3
0.2: Broker_0: Sending cloudlet 13 to VM #2
0.2: Broker_0: Sending cloudlet 14 to VM #4
0.2: Broker_0: Sending cloudlet 15 to VM #3
0.2: Broker_0: Sending cloudlet 16 to VM #2
0.2: Broker_0: Sending cloudlet 17 to VM #5
0.2: Broker_0: Sending cloudlet 18 to VM #3
0.2: Broker_0: Sending cloudlet 19 to VM #3
0.2: Broker_0: Sending cloudlet 20 to VM #3
0.2: Broker_0: Sending cloudlet 21 to VM #2
```

```
0.2: Broker_0: Sending cloudlet 22 to VM #5
0.2: Broker_0: Sending cloudlet 23 to VM #6
0.2: Broker_0: Sending cloudlet 24 to VM #2
0.2: Broker_0: Sending cloudlet 25 to VM #6
0.2: Broker_0: Sending cloudlet 26 to VM #6
0.2: Broker_0: Sending cloudlet 27 to VM #2
0.2: Broker_0: Sending cloudlet 28 to VM #4
0.2: Broker_0: Sending cloudlet 29 to VM #3
2188.8759999999997: Broker_0: Cloudlet 14 received
2923.296: Broker_0: Cloudlet 4 received
2948.16: Broker_0: Cloudlet 2 received
3765.0519999999997: Broker_0: Cloudlet 1 received
4086.468: Broker_0: Cloudlet 0 received
4875.5199999999995: Broker_0: Cloudlet 28 received
4881.611999999999: Broker_0: Cloudlet 9 received
5817.552: Broker_0: Cloudlet 10 received
6830.96: Broker_0: Cloudlet 6 received
7394.464: Broker_0: Cloudlet 3 received
7835.616: Broker_0: Cloudlet 11 received
7902.22: Broker_0: Cloudlet 12 received
9465.192000000001: Broker_0: Cloudlet 7 received
9610.608: Broker_0: Cloudlet 15 received
9640.444: Broker_0: Cloudlet 17 received
11184.34: Broker_0: Cloudlet 5 received
11634.796: Broker_0: Cloudlet 18 received
12639.676: Broker_0: Cloudlet 8 received
13305.939999999999: Broker_0: Cloudlet 19 received
13351.032: Broker_0: Cloudlet 23 received
13688.383999999998: Broker_0: Cloudlet 22 received
14889.923999999999: Broker_0: Cloudlet 20 received
15273.58: Broker_0: Cloudlet 13 received
16581.94: Broker_0: Cloudlet 25 received
17513.836: Broker_0: Cloudlet 29 received
18077.056: Broker_0: Cloudlet 16 received
20310.564: Broker_0: Cloudlet 26 received
20375.06: Broker_0: Cloudlet 21 received
23179.348: Broker_0: Cloudlet 24 received
24285.312: Broker_0: Cloudlet 27 received
24285.312: Broker_0: All Cloudlets executed. Finishing...
24285.312: Broker_0: Destroying VM #2
24285.312: Broker_0: Destroying VM #3
24285.312: Broker_0: Destroying VM #4
24285.312: Broker_0: Destroying VM #5
24285.312: Broker_0: Destroying VM #6
Broker_0 is shutting down...
Simulation: No more future events
CloudInformationService: Notify all CloudSim entities for shutting down.
Datacenter_0 is shutting down...
Datacenter_1 is shutting down...
Datacenter_2 is shutting down...
Datacenter_3 is shutting down...
Datacenter_4 is shutting down...
Broker_0 is shutting down...
Simulation completed.
```

```
Simulation completed.

========== OUTPUT ==========
Cloudlet ID    STATUS    Data center ID    VM ID        Time    Start Time    Finish Time
    00        SUCCESS        03            06        4086.27        00.2            4086.47
    01        SUCCESS        02            05        3764.85        00.2            3765.05
    02        SUCCESS        02            02        2947.96        00.2            2948.16
    03        SUCCESS        03            06        3308        4086.47            7394.46
    04        SUCCESS        02            03        2923.1        00.2            2923.3
    05        SUCCESS        03            06        3789.88        7394.46            11184.34
    06        SUCCESS        02            02        3882.8        2948.16            6830.96
    07        SUCCESS        02            02        2634.23        6830.96            9465.19
    08        SUCCESS        02            02        3174.48        9465.19            12639.68
    09        SUCCESS        02            03        1958.32        2923.3            4881.61
    10        SUCCESS        02            05        2052.5        3765.05            5817.55
    11        SUCCESS        02            05        2018.06        5817.55            7835.62
    12        SUCCESS        02            03        3020.61        4881.61            7902.22
    13        SUCCESS        02            02        2633.9        12639.68            15273.58
    14        SUCCESS        02            04        2188.68        00.2            2188.88
    15        SUCCESS        02            03        1708.39        7902.22            9610.61
    16        SUCCESS        02            02        2803.48        15273.58            18077.06
    17        SUCCESS        02            05        1804.83        7835.62            9640.44
    18        SUCCESS        02            03        2024.19        9610.61            11634.8
    19        SUCCESS        02            03        1671.14        11634.8            13305.94
    20        SUCCESS        02            03        1583.98        13305.94            14889.92
    21        SUCCESS        02            02        2298        18077.06            20375.06
    22        SUCCESS        02            05        4047.94        9640.44            13688.38
    23        SUCCESS        03            06        2166.69        11184.34            13351.03
    24        SUCCESS        02            02        2804.29        20375.06            23179.35
    25        SUCCESS        03            06        3230.91        13351.03            16581.94
    26        SUCCESS        03            06        3728.62        16581.94            20310.56
    27        SUCCESS        02            02        1105.96        23179.35            24285.31
    28        SUCCESS        02            04        2686.64        2188.88            4875.52
    29        SUCCESS        02            03        2623.91        14889.92            17513.84
Makespan using FCFS: 5518.24647378326
org.cloudbus.cloudsim.examples.FCFS_Scheduler finished!
```

Result

Thus the scheduling algorithm was executed using CloudSim.

Aim

To Install and Configure Hadoop.

Software Required

- Hadoop 3.2.4
- Jdk 18.0.2.1
- Hadoop Configuration files

Hadoop

Hadoop is an open source framework based on Java that manages the storage and processing of large amounts of data for applications. Hadoop uses distributed storage and parallel processing to handle big data and analytics jobs, breaking workloads down into smaller workloads that can be run at the same time.

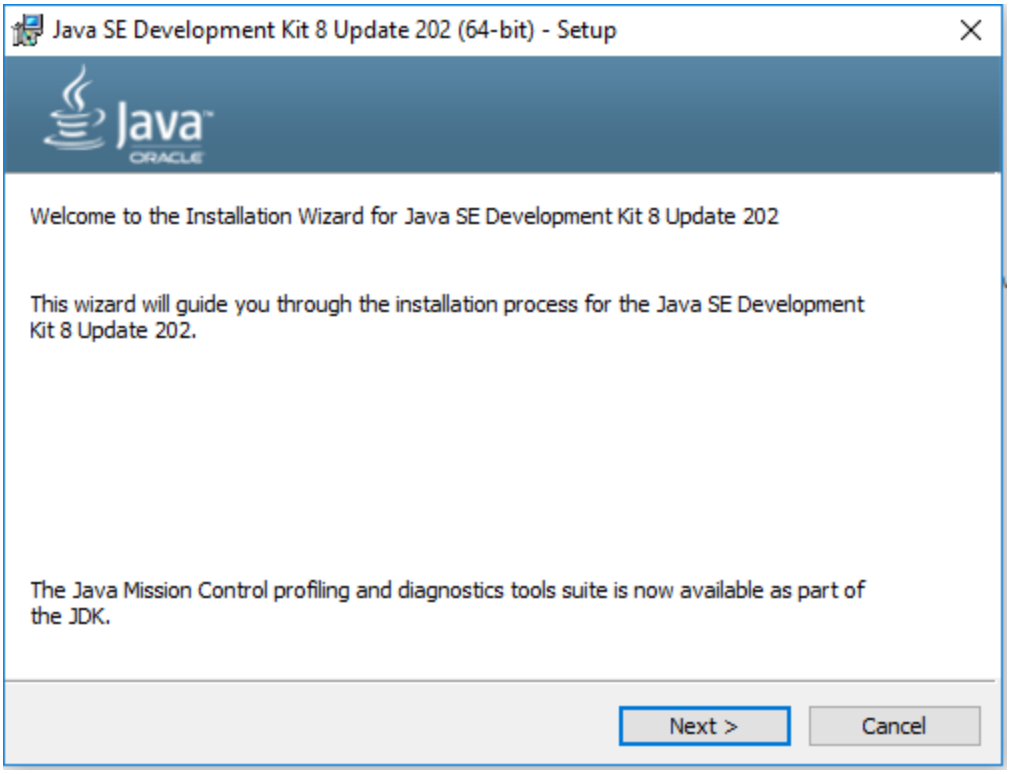
MapReduce is a programming paradigm that enables massive scalability across hundreds or thousands of servers in a Hadoop cluster.

Installation of Hadoop

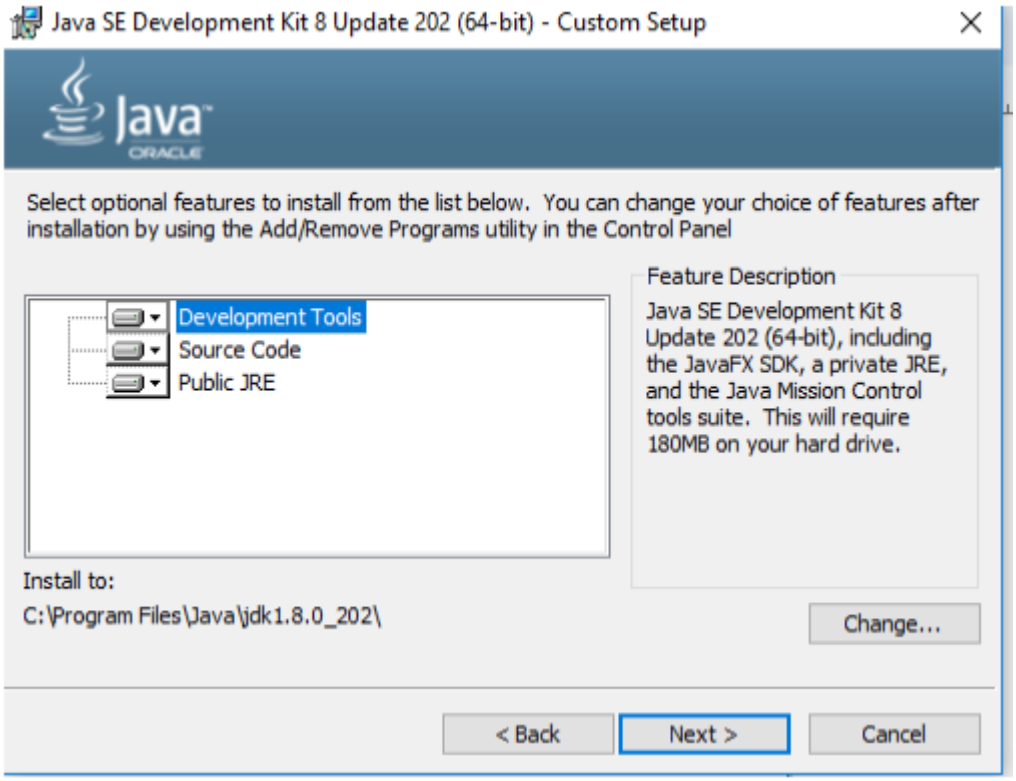
Step 1: Download and install Java

Hadoop is built on Java, so users must have Java installed on your PC. You can get the most recent version of Java from the official website. After downloading, follow the installation wizard to install Java on your system.

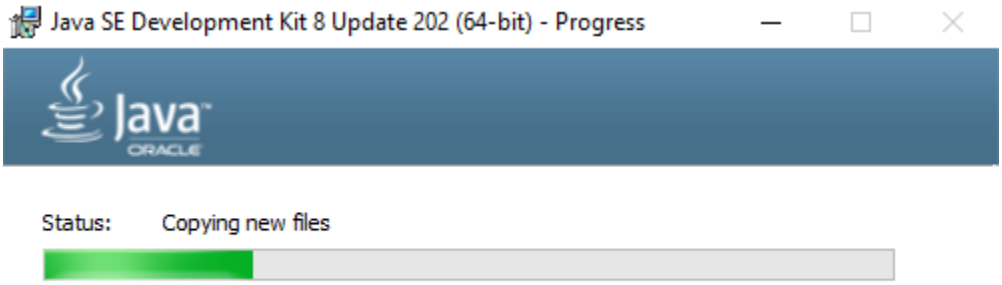
JDK: https://www.oracle.com/java/technologies/javase-downloads.html

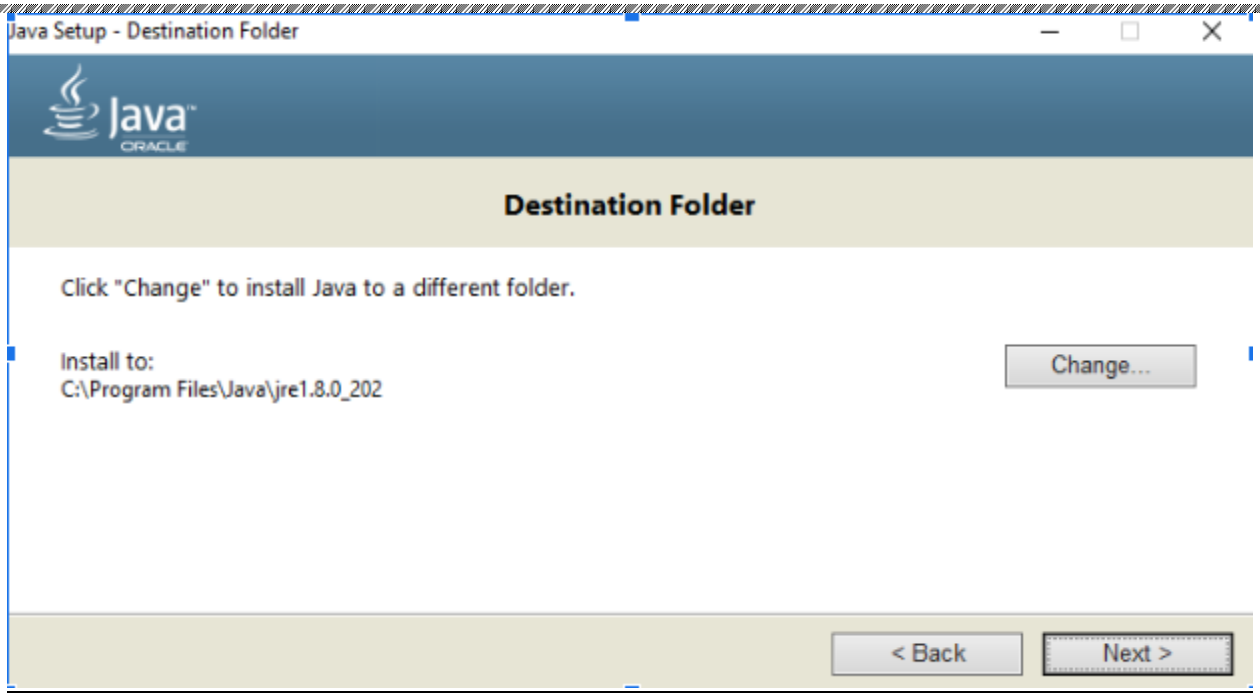


Java SDK setup

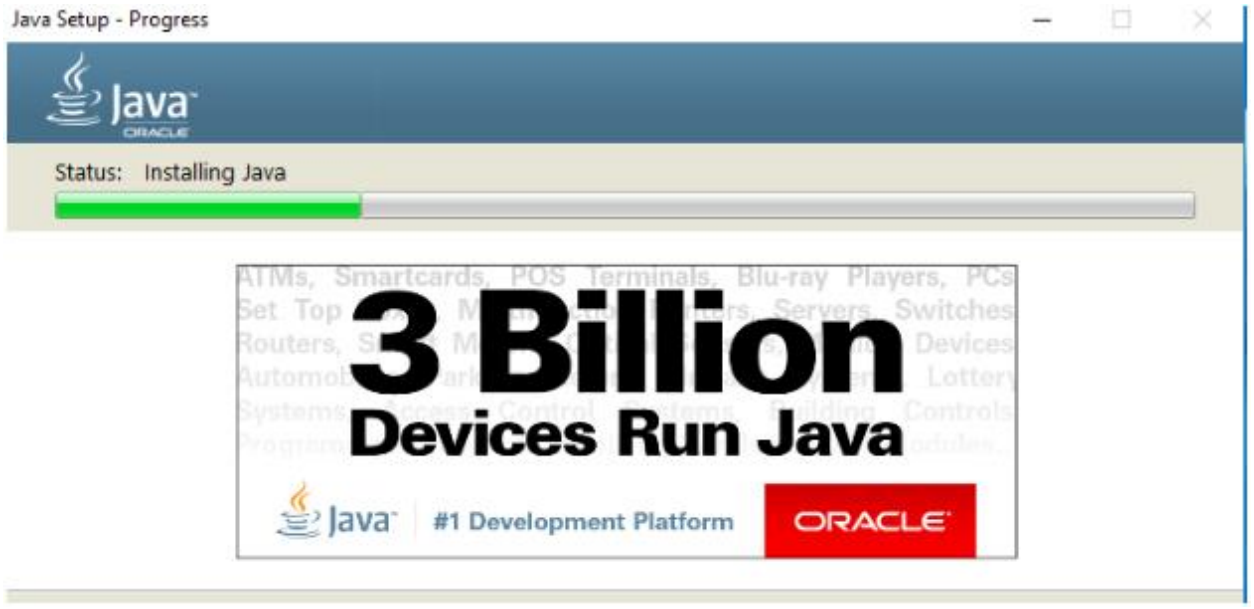


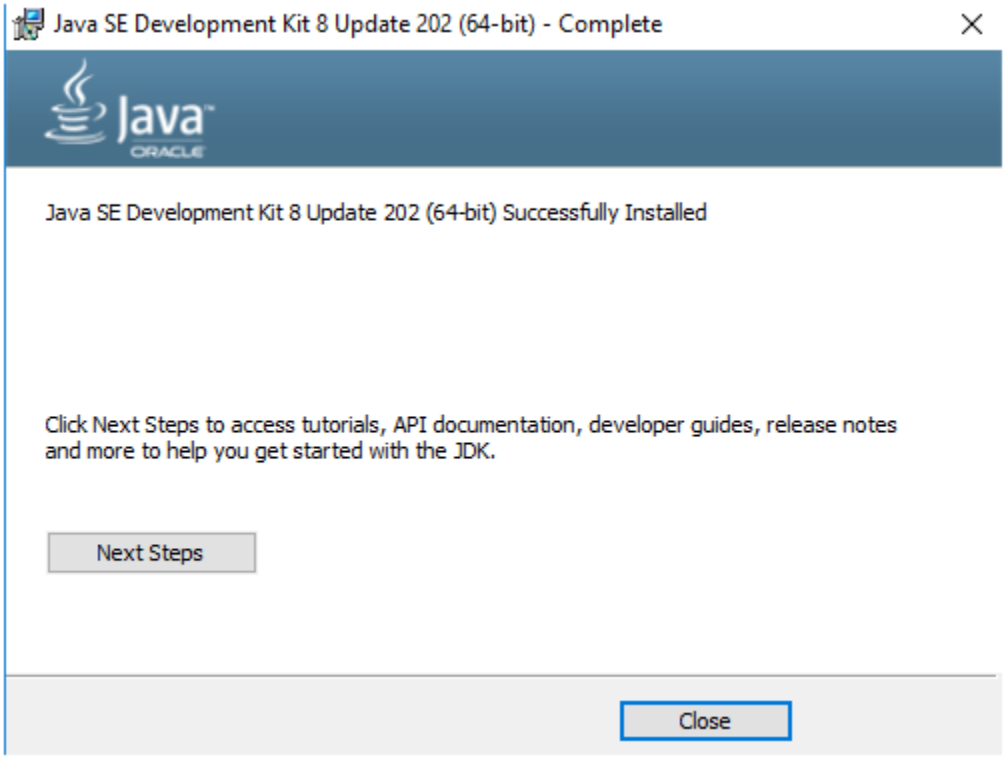
Select the features





Destination Folder





Completed Wizard

Step 2: Download Hadoop 3.2.4

Hadoop can be downloaded from the Apache Hadoop website. Make sure to have the latest stable release of Hadoop. Once downloaded, extract the contents to a convenient location.

Hadoop: https://hadoop.apache.org/releases.html

Step 3: Set Environment Variables

You must configure environment variables after downloading and unpacking Hadoop. Launch the Start menu, type “Edit the system environment variables,” and select the result. This will launch the System Properties dialogue box. Click on “Environment Variables” button to open.

Click “New” under System Variables to add a new variable. Enter the variable name “HADOOP_HOME” and the path to the Hadoop folder as the variable value. Then press “OK.”

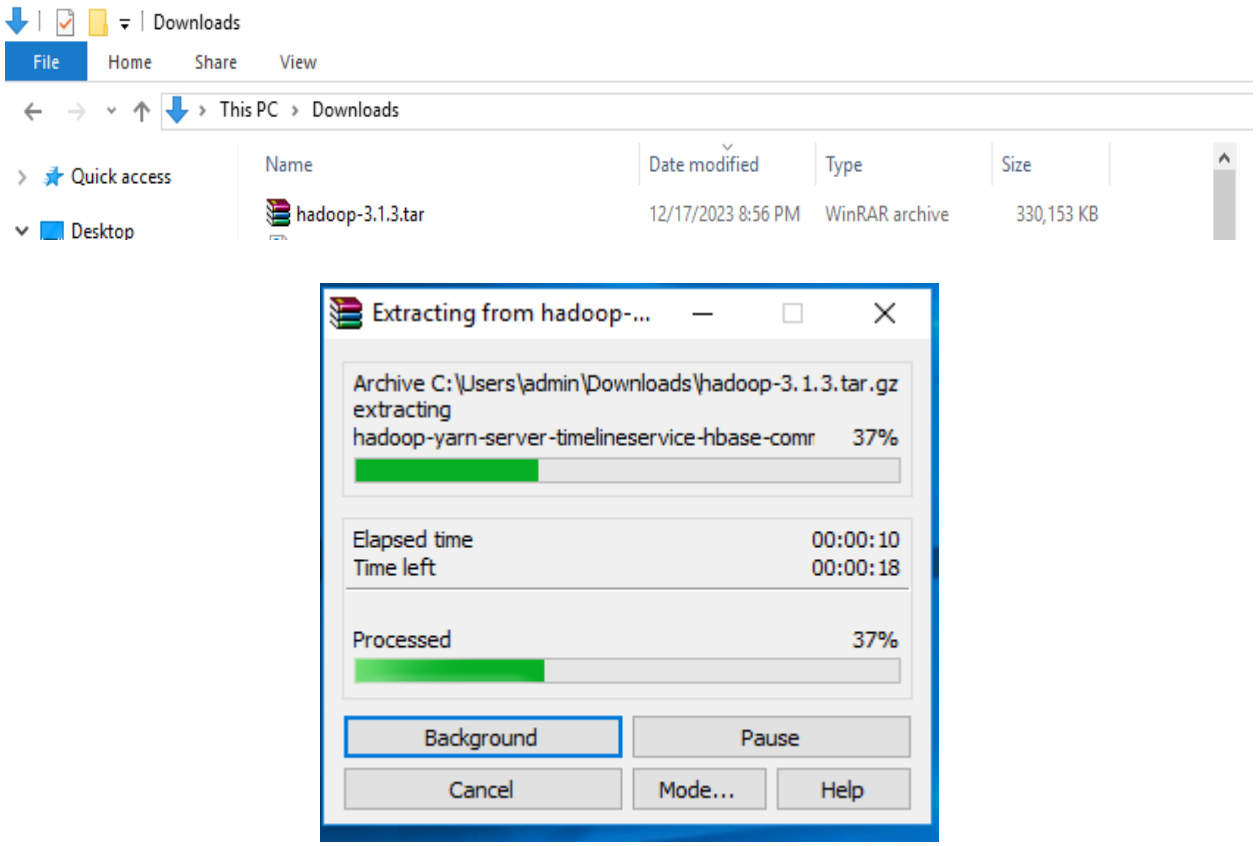
Then, under System Variables, locate the “Path” variable and click “Edit.” Click “New” in the Edit Environment Variable window and enter “%HADOOP_HOME%bin” as the variable value. To close all the windows, use the “OK” button.

Step 4: Setup Hadoop

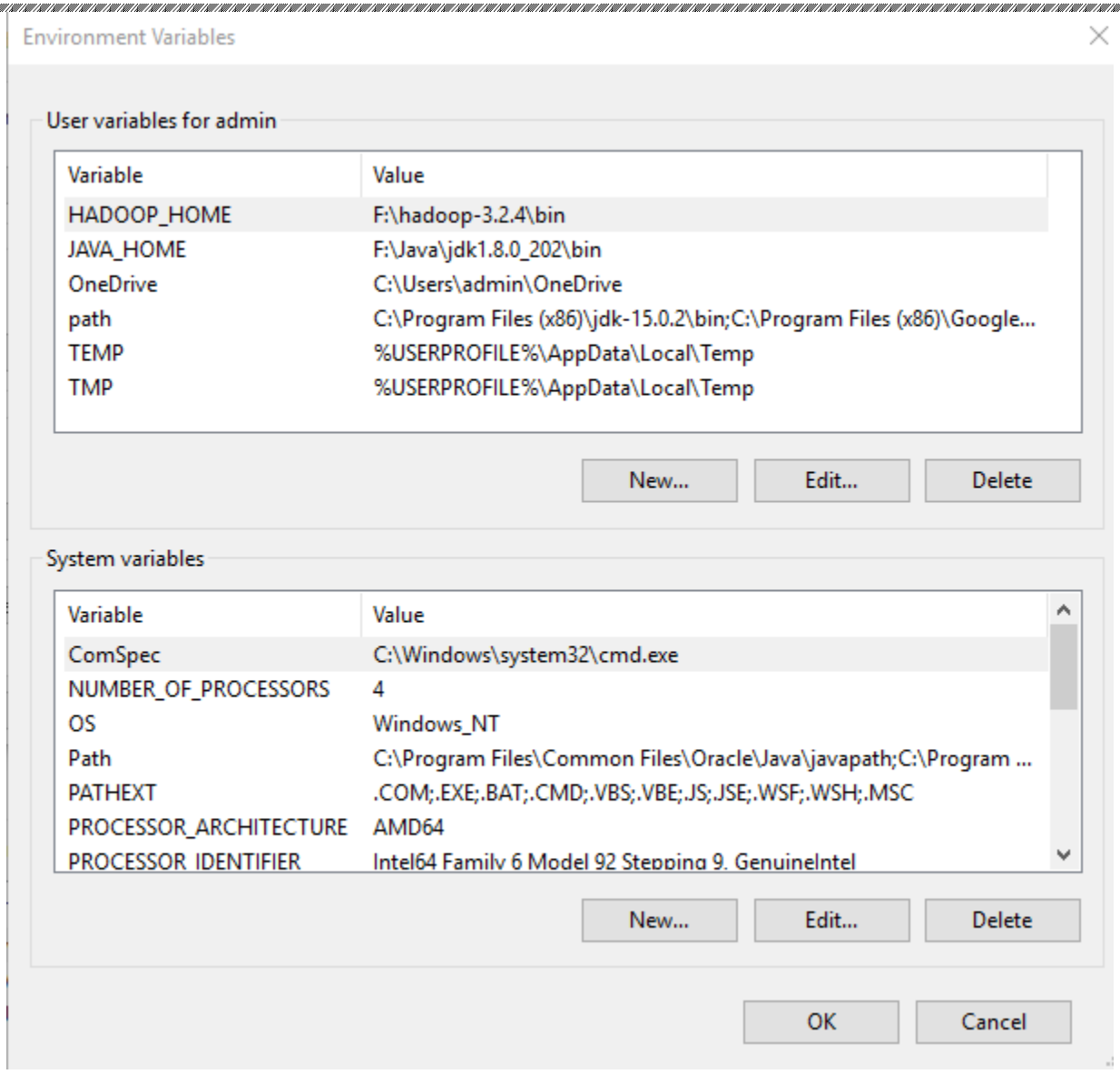
You must configure Hadoop in this phase by modifying several configuration files. Navigate to the “etc/hadoop” folder in the Hadoop folder. You must make changes to three files:

- core-site.xml
- hdfs-site.xml
- mapred-site.xml

Open each file in a text editor and edit the following properties:



Extracting Hadoop Files



Set Environment Variables for Java

Environment Variables

User variables for admin

Variable	Value
HADOOP_HOME	F:\hadoop-3.2.4\bin
JAVA_HOME	F:\Java\jdk1.8.0_202\bin
OneDrive	C:\Users\admin\OneDrive
path	C:\Program Files (x86)\jdk-15.0.2\bin;C:\Program Files (x86)\Google...
TEMP	%USERPROFILE%\AppData\Local\Temp
TMP	%USERPROFILE%\AppData\Local\Temp

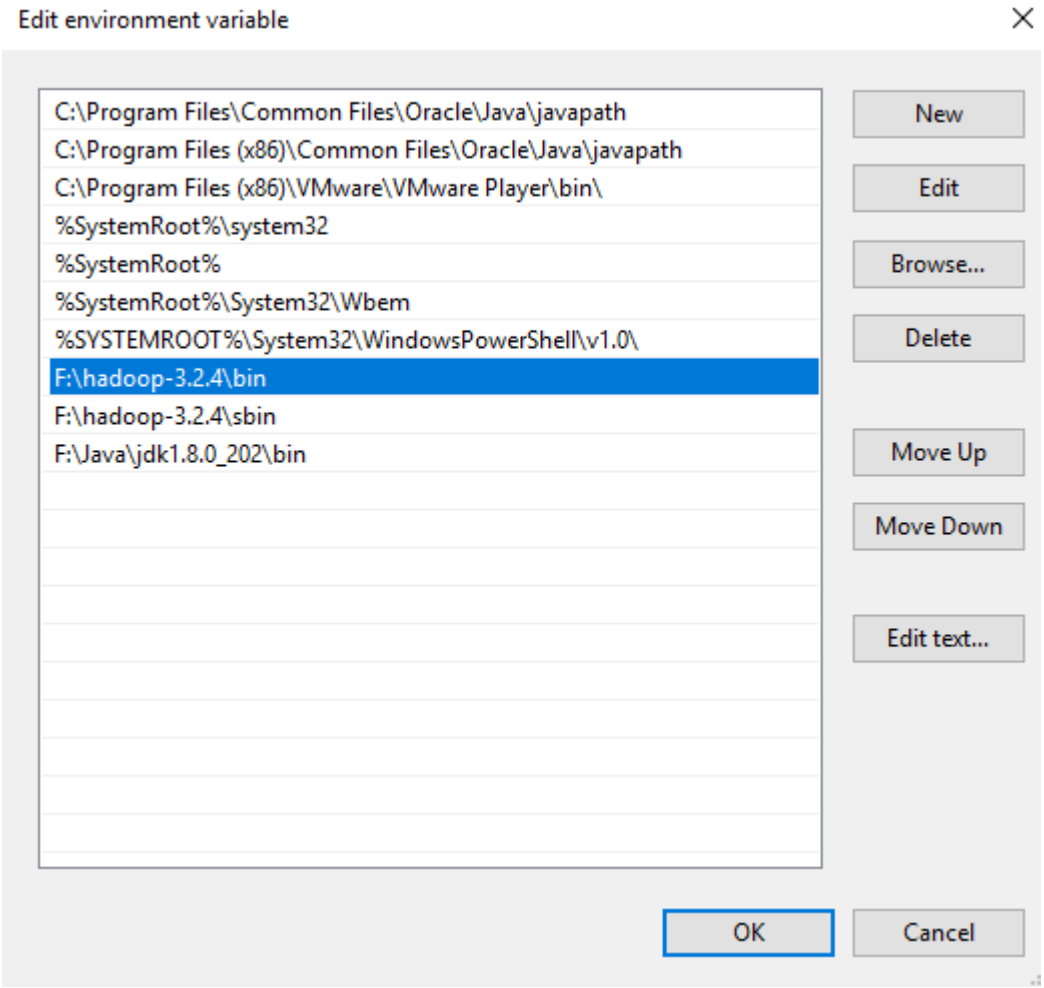
New... Edit... Delete

System variables

Variable	Value
ComSpec	C:\Windows\system32\cmd.exe
NUMBER_OF_PROCESSORS	4
OS	Windows_NT
Path	C:\Program Files\Common Files\Oracle\Java\javapath;C:\Program ...
PATHEXT	.COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;.JSE;.WSF;.WSH;.MSC
PROCESSOR_ARCHITECTURE	AMD64
PROCESSOR_IDENTIFIER	Intel64 Family 6 Model 92 Stepping 9, GenuineIntel

New... Edit... Delete

OK Cancel

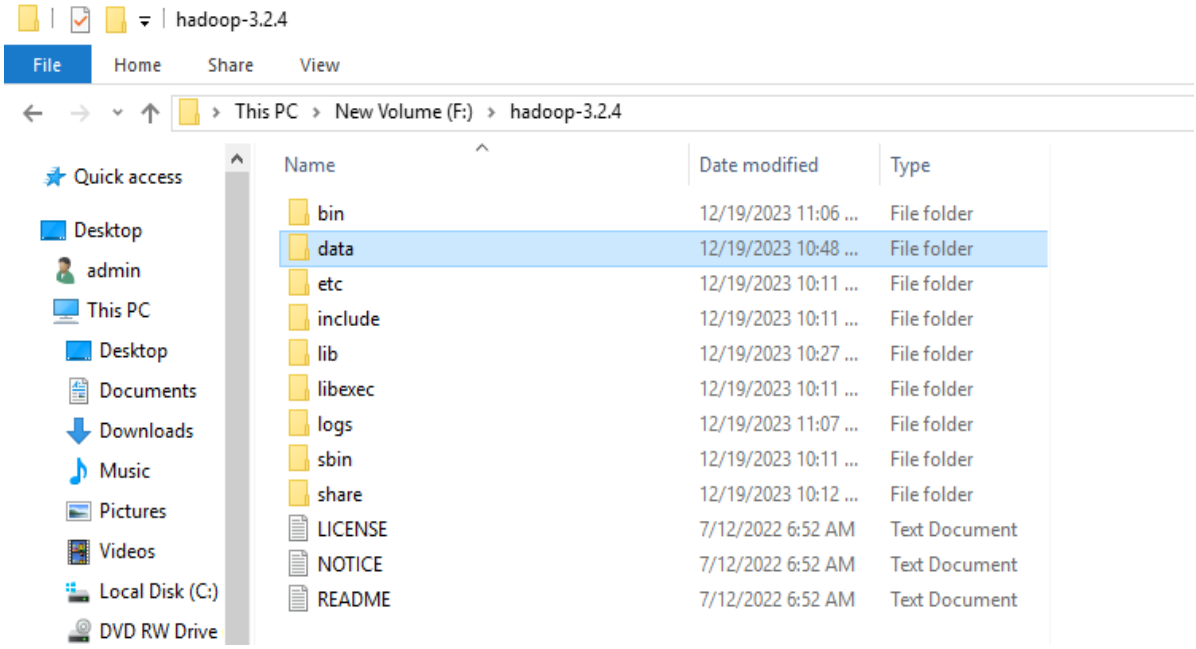


Set Environment Variables for Hadoop

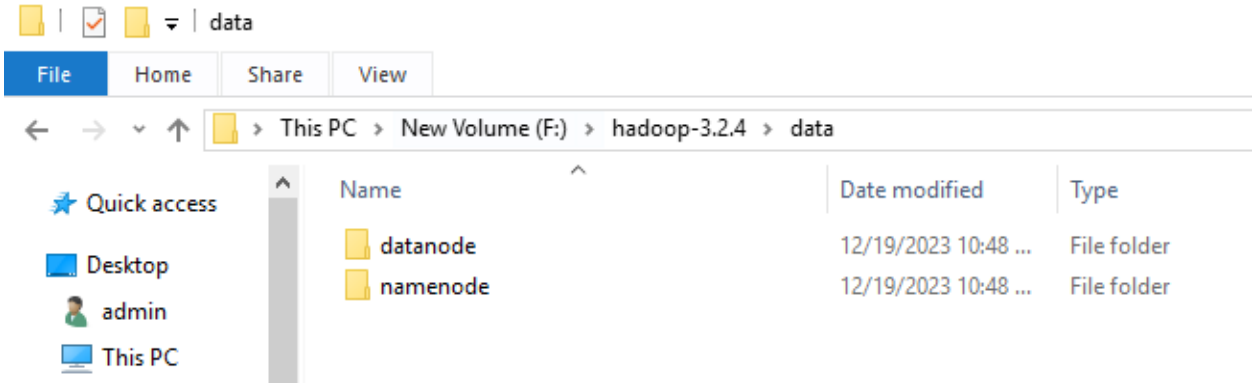
Creating Folders

We need to create a folder data in the hadoop directory, and 2 sub folders namenode and datanode.

Create **DATA folder** in the Hadoop directory



- Once DATA folder is created, we need to create 2 new folders namely, **namenode and datanode** inside the data folder
- These folders are important because files on HDFS reside inside the datanode.



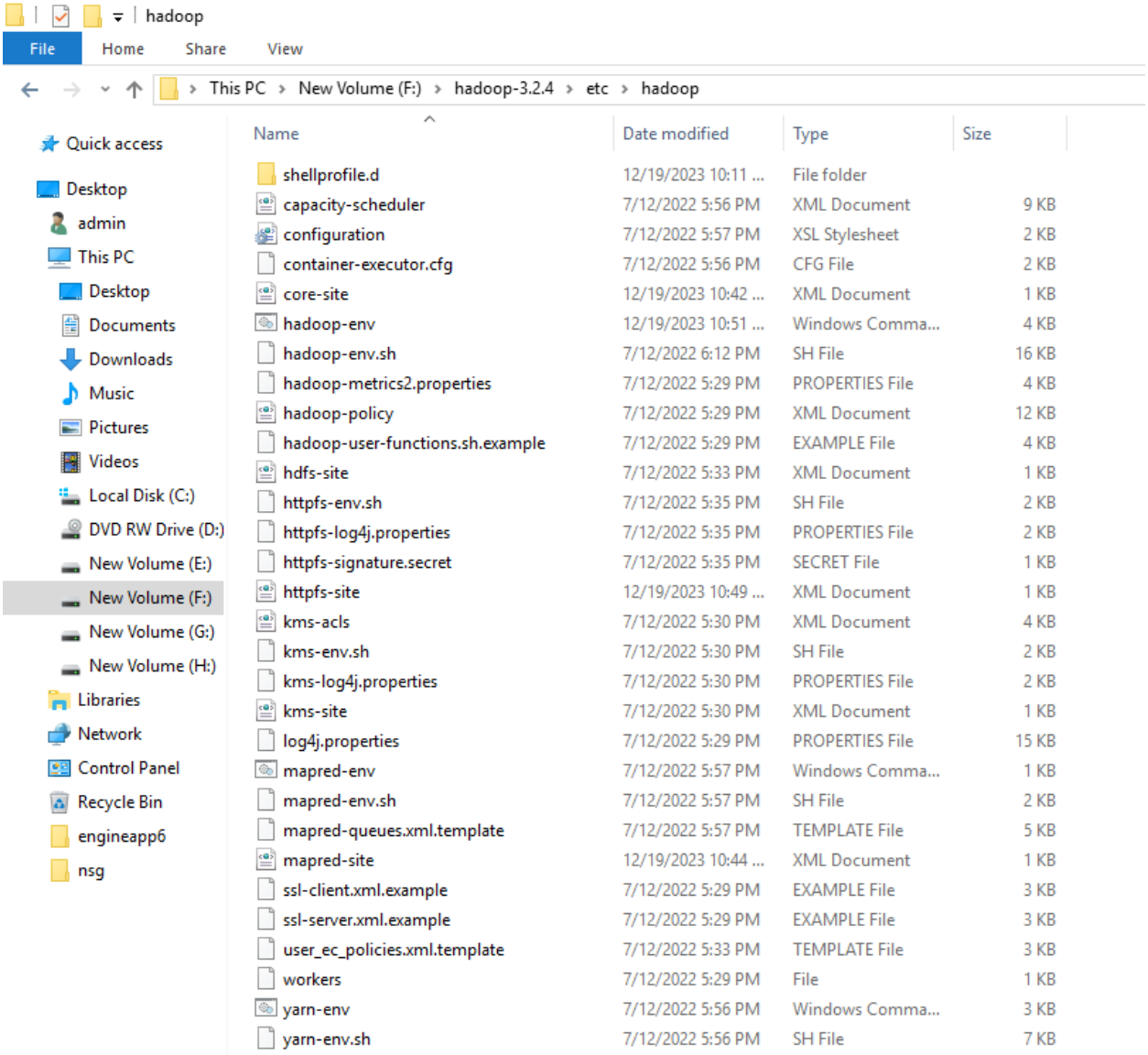
Create datanode and namenode

Editing Configuration Files

Now we need to edit the following config files in hadoop for configuring it :-

(We can find these files in Hadoop -> etc -> hadoop)

* core-site.xml
* hdfs-site.xml
* mapred-site.xml
* yarn-site.xml
* hadoop-env.cmd



Editing core-site.xml

Right click on the file, select edit and paste the following content within <configuration> </configuration> tags.

```
<configuration>
<property>
 <name>fs.defaultFS</name>
 <value>hdfs://localhost:9000</value>
</property>
</configuration>
```

core-site - Notepad

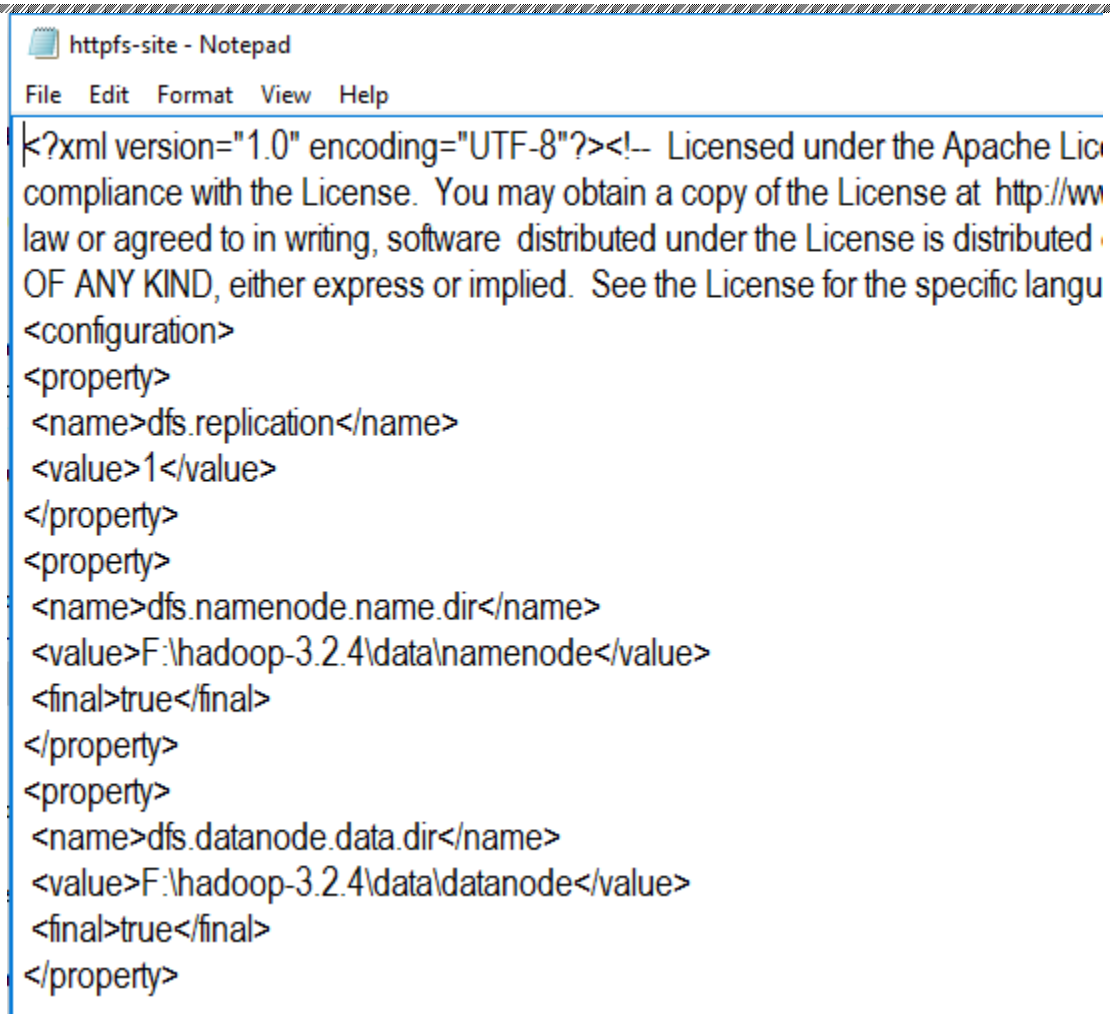
File Edit Format View Help

```
<?xml version="1.0" encoding="UTF-8"?>
<?xml-stylesheet type="text/xsl" href="configuration.xsl"?>
<!--
  Licensed under the Apache License, Version 2.0 (the "License");
  you may not use this file except in compliance with the License.
  You may obtain a copy of the License at

    http://www.apache.org/licenses/LICENSE-2.0

  Unless required by applicable law or agreed to in writing, software
  distributed under the License is distributed on an "AS IS" BASIS,
  WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
  See the License for the specific language governing permissions and
  limitations under the License. See accompanying LICENSE file.
-->

<!-- Put site-specific property overrides in this file. -->

<configuration>
<property>
                <name>fs.defaultFS</name>
                <value>hdfs://localhost:9000</value>

        </property>
</configuration>
```

Editing hdfs-site.xml

Right click on the file, select edit and paste the following content within <configuration></configuration>tags.

```
<configuration>
<property>
 <name>dfs.replication</name>
 <value>1</value>
</property>
<property>
 <name>dfs.namenode.name.dir</name>
 <value>F:\hadoop-3.2.4\data\namenode</value>
 <final>true</final>
</property>
<property>
 <name>dfs.datanode.data.dir</name>
 <value>F:\hadoop-3.2.4\data\datanode</value>
 <final>true</final>
</property>
</configuration>
```



Editing mapred-site.xml

Right click on the file, select edit and paste the following content within <configuration> </configuration> tags.

```
<configuration>
 <property>
  <name>mapreduce.framework.name</name>
  <value>yarn</value>
 </property>
</configuration>
```

*mapred-site - Notepad

File Edit Format View Help

```
<?xml version="1.0"?>
<?xml-stylesheet type="text/xsl" href="configuration.xsl"?>
<!--
  Licensed under the Apache License, Version 2.0 (the "License");
  you may not use this file except in compliance with the License.
  You may obtain a copy of the License at

    http://www.apache.org/licenses/LICENSE-2.0

  Unless required by applicable law or agreed to in writing, software
  distributed under the License is distributed on an "AS IS" BASIS,
  WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
  See the License for the specific language governing permissions and
  limitations under the License. See accompanying LICENSE file.
-->

<!-- Put site-specific property overrides in this file. -->

<configuration>
 <property>
  <name>mapreduce.framework.name</name>
  <value>yarn</value>
 </property>
</configuration>
```

Editing yarn-site.xml

Right click on the file, select edit and paste the following content within <configuration> </configuration> tags.

```
<configuration>
<property>
  <name>yarn.nodemanager.aux-services</name>
  <value>mapreduce_shuffle</value>
 </property>
 <property>
  <name>yarn.nodemanager.auxservices.mapreduce.shuffle.class</name>
  <value>org.apache.hadoop.mapred.ShuffleHandler</value>
 </property>
<!-- Site specific YARN configuration properties →
</configuration>
```

*yarn-site - Notepad

File Edit Format View Help

```
<?xml version="1.0"?>
<!--
  Licensed under the Apache License, Version 2.0 (the "License");
  you may not use this file except in compliance with the License.
  You may obtain a copy of the License at

    http://www.apache.org/licenses/LICENSE-2.0

  Unless required by applicable law or agreed to in writing, software
  distributed under the License is distributed on an "AS IS" BASIS,
  WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
  See the License for the specific language governing permissions and
  limitations under the License. See accompanying LICENSE file.
-->
<configuration>
<property>
  <name>yarn.nodemanager.aux-services</name>
  <value>mapreduce_shuffle</value>
 </property>
 <property>
  <name>yarn.nodemanager.auxservices.mapreduce.shuffle.class</name>
  <value>org.apache.hadoop.mapred.ShuffleHandler</value>
 </property>
<!-- Site specific YARN configuration properties -->
</configuration>
```

Verifying hadoop-env.cmd

Right click on the file, select edit and check if the JAVA_HOME is set correctly or not. We can replace the JAVA_HOME variable in the file with your actual JAVA_HOME that we configured in the System Variable.

hadoop-env - Notepad

File Edit Format View Help

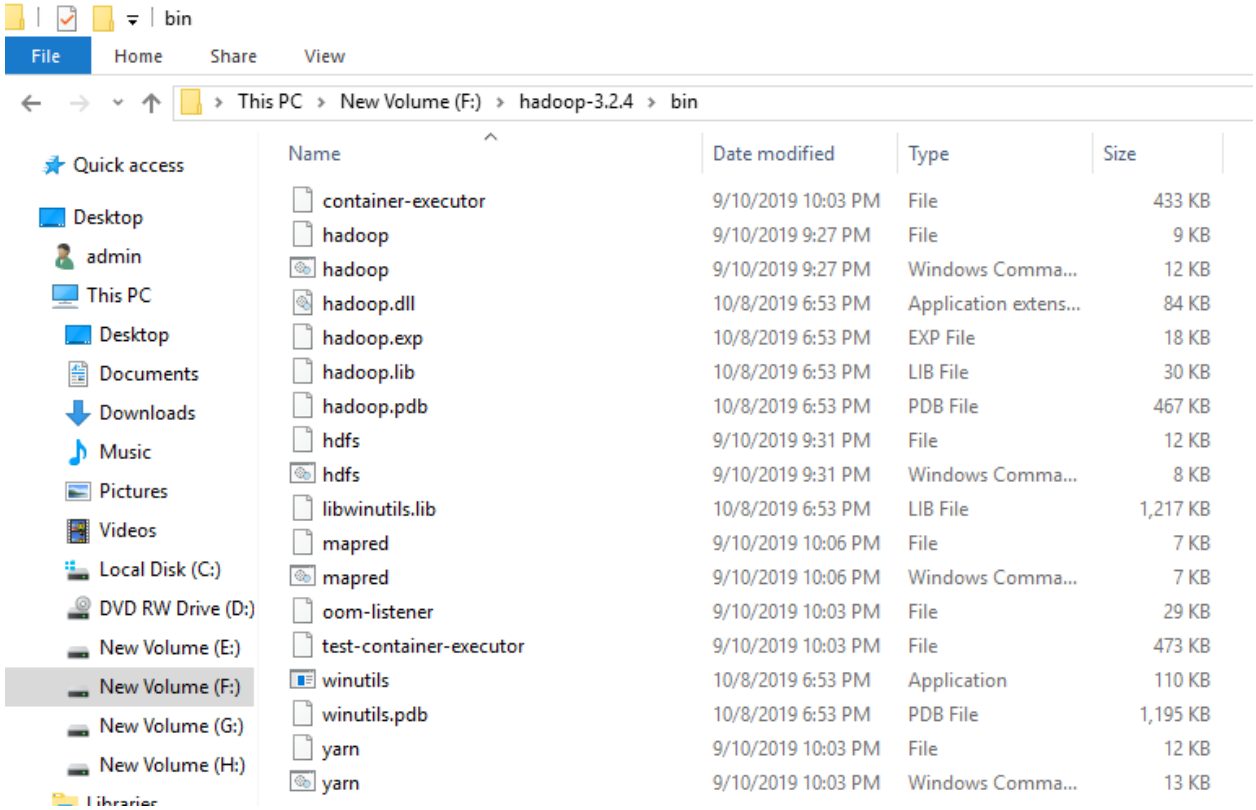
```
@rem Unless required by applicable law or agreed to in writing, software
@rem distributed under the License is distributed on an "AS IS" BASIS,
@rem WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
@rem See the License for the specific language governing permissions and
@rem limitations under the License.

@rem Set Hadoop-specific environment variables here.

@rem The only required environment variable is JAVA_HOME.  All others are
@rem optional.  When running a distributed configuration it is best to
@rem set JAVA_HOME in this file, so that it is correctly defined on
@rem remote nodes.

@rem The java implementation to use.  Required.
set JAVA_HOME=F:\Java\jdk1.8.0_202

@rem The jsvc implementation to use. Jsvc is required to run secure datanodes.
@rem set JSVC_HOME=%JSVC_HOME%
```

Configuration files
Download from
https://drive.google.com/file/d/1zuT8G3D2JFkbkdv6fMhnhBOj8YSsgJc-/view

hadoop 3.2.1 configuration files.zip 1 item

Name	Last modified	File size
hadoop 3.2.1 configuration files	-	4 MB

Replace old bin with new bin



Command Prompt

```
C:\Users\admin>hdfs namenode -format
2023-12-19 23:07:40,354 INFO namenode.NameNode: STARTUP_MSG:
/************************************************************
STARTUP_MSG: Starting NameNode
STARTUP_MSG:   host = DESKTOP-KH0H8U6/192.168.40.1
STARTUP_MSG:   args = [-format]
STARTUP_MSG:   version = 3.2.4
STARTUP_MSG:   classpath = F:\hadoop-3.2.4\etc\hadoop;F:\hadoop-3.2.4\share\hadoop\common;F:\hadoop-3.2.4\share\hadoop\c
ommon\lib\accessors-smart-2.4.7.jar;F:\hadoop-3.2.4\share\hadoop\common\lib\animal-sniffer-annotations-1.17.jar;F:\hadoo
p-3.2.4\share\hadoop\common\lib\asm-5.0.4.jar;F:\hadoop-3.2.4\share\hadoop\common\lib\audience-annotations-0.5.0.jar;F:\
hadoop-3.2.4\share\hadoop\common\lib\avro-1.7.7.jar;F:\hadoop-3.2.4\share\hadoop\common\lib\checker-qual-2.5.2.jar;F:\ha
doop-3.2.4\share\hadoop\common\lib\commons-beanutils-1.9.4.jar;F:\hadoop-3.2.4\share\hadoop\common\lib\commons-cli-1.2.j
ar;F:\hadoop-3.2.4\share\hadoop\common\lib\commons-codec-1.11.jar;F:\hadoop-3.2.4\share\hadoop\common\lib\commons-collec
tions-3.2.2.jar;F:\hadoop-3.2.4\share\hadoop\common\lib\commons-compress-1.21.jar;F:\hadoop-3.2.4\share\hadoop\common\li
b\commons-configuration2-2.1.1.jar;F:\hadoop-3.2.4\share\hadoop\common\lib\commons-io-2.8.0.jar;F:\hadoop-3.2.4\share\ha
doop\common\lib\commons-lang3-3.7.jar;F:\hadoop-3.2.4\share\hadoop\common\lib\commons-logging-1.1.3.jar;F:\hadoop-3.2.4\
share\hadoop\common\lib\commons-math3-3.1.1.jar;F:\hadoop-3.2.4\share\hadoop\common\lib\commons-net-3.6.jar;F:\hadoop-3.
2.4\share\hadoop\common\lib\commons-text-1.4.jar;F:\hadoop-3.2.4\share\hadoop\common\lib\curator-client-2.13.0.jar;F:\ha
doop-3.2.4\share\hadoop\common\lib\curator-framework-2.13.0.jar;F:\hadoop-3.2.4\share\hadoop\common\lib\curator-recipes-
2.13.0.jar;F:\hadoop-3.2.4\share\hadoop\common\lib\dnsjava-2.1.7.jar;F:\hadoop-3.2.4\share\hadoop\common\lib\error_prone
_annotations-2.2.0.jar;F:\hadoop-3.2.4\share\hadoop\common\lib\failureaccess-1.0.jar;F:\hadoop-3.2.4\share\hadoop\common
\lib\gson-2.9.0.jar;F:\hadoop-3.2.4\share\hadoop\common\lib\guava-27.0-jre.jar;F:\hadoop-3.2.4\share\hadoop\common\lib\h
adoop-annotations-3.2.4.jar;F:\hadoop-3.2.4\share\hadoop\common\lib\hadoop-auth-3.2.4.jar;F:\hadoop-3.2.4\share\hadoop\c
ommon\lib\htrace-core4-4.1.0-incubating.jar;F:\hadoop-3.2.4\share\hadoop\common\lib\httpclient-4.5.13.jar;F:\hadoop-3.2.
4\share\hadoop\common\lib\httpcore-4.4.13.jar;F:\hadoop-3.2.4\share\hadoop\common\lib\j2objc-annotations-1.1.jar;F:\hado
op-3.2.4\share\hadoop\common\lib\jackson-annotations-2.10.5.jar;F:\hadoop-3.2.4\share\hadoop\common\lib\jackson-core-2.1
0.5.jar;F:\hadoop-3.2.4\share\hadoop\common\lib\jackson-core-asl-1.9.13.jar;F:\hadoop-3.2.4\share\hadoop\common\lib\jack
son-databind-2.10.5.1.jar;F:\hadoop-3.2.4\share\hadoop\common\lib\jackson-jaxrs-1.9.13.jar;F:\hadoop-3.2.4\share\hadoop\
common\lib\jackson-mapper-asl-1.9.13.jar;F:\hadoop-3.2.4\share\hadoop\common\lib\jackson-xc-1.9.13.jar;F:\hadoop-3.2.4\s
hare\hadoop\common\lib\javax.activation-api-1.2.0.jar;F:\hadoop-3.2.4\share\hadoop\common\lib\javax.servlet-api-3.1.0.ja
```

Command Prompt

```
op\mapreduce\hadoop-mapreduce-client-jobclient-3.2.4.jar;F:\hadoop-3.2.4\share\hadoop\mapreduce\hadoop-mapreduce-client-
nativetask-3.2.4.jar;F:\hadoop-3.2.4\share\hadoop\mapreduce\hadoop-mapreduce-client-shuffle-3.2.4.jar;F:\hadoop-3.2.4\sh
are\hadoop\mapreduce\hadoop-mapreduce-client-uploader-3.2.4.jar;F:\hadoop-3.2.4\share\hadoop\mapreduce\hadoop-mapreduce-
examples-3.2.4.jar
STARTUP_MSG:   build = Unknown -r 7e5d9983b388e372fe640f21f048f2f2ae6e9eba; compiled by 'ubuntu' on 2022-07-12T11:58Z
STARTUP_MSG:   java = 1.8.0_202
************************************************************/
2023-12-19 23:07:40,823 INFO namenode.NameNode: createNameNode [-format]
Formatting using clusterid: CID-268adbbd-987c-4512-b356-f41b18a3b0c0
2023-12-19 23:07:45,466 INFO namenode.FSEditLog: Edit logging is async:true
2023-12-19 23:07:45,622 INFO namenode.FSNamesystem: KeyProvider: null
2023-12-19 23:07:45,638 INFO namenode.FSNamesystem: fsLock is fair: true
2023-12-19 23:07:45,638 INFO namenode.FSNamesystem: Detailed lock hold time metrics enabled: false
2023-12-19 23:07:45,825 INFO namenode.FSNamesystem: fsOwner             = admin (auth:SIMPLE)
2023-12-19 23:07:45,825 INFO namenode.FSNamesystem: supergroup          = supergroup
2023-12-19 23:07:45,825 INFO namenode.FSNamesystem: isPermissionEnabled = true
2023-12-19 23:07:45,825 INFO namenode.FSNamesystem: HA Enabled: false
2023-12-19 23:07:46,044 INFO common.Util: dfs.datanode.fileio.profiling.sampling.percentage set to 0. Disabling file IO
profiling
2023-12-19 23:07:46,091 INFO blockmanagement.DatanodeManager: dfs.block.invalidate.limit: configured=1000, counted=60, e
ffected=1000
2023-12-19 23:07:46,091 INFO blockmanagement.DatanodeManager: dfs.namenode.datanode.registration.ip-hostname-check=true
2023-12-19 23:07:46,122 INFO blockmanagement.BlockManager: dfs.namenode.startup.delay.block.deletion.sec is set to 000:0
0:00:00.000
2023-12-19 23:07:46,122 INFO blockmanagement.BlockManager: The block deletion will start around 2023 Dec 19 23:07:46
2023-12-19 23:07:46,122 INFO util.GSet: Computing capacity for map BlocksMap
2023-12-19 23:07:46,122 INFO util.GSet: VM type       = 64-bit
2023-12-19 23:07:46,138 INFO util.GSet: 2.0% max memory 889 MB = 17.8 MB
2023-12-19 23:07:46,138 INFO util.GSet: capacity      = 2^21 = 2097152 entries
```

Command Prompt

```
2023-12-19 23:07:46,560 INFO util.GSet: VM type       = 64-bit
2023-12-19 23:07:46,560 INFO util.GSet: 0.25% max memory 889 MB = 2.2 MB
2023-12-19 23:07:46,560 INFO util.GSet: capacity      = 2^18 = 262144 entries
2023-12-19 23:07:46,606 INFO metrics.TopMetrics: NNTop conf: dfs.namenode.top.window.num.buckets = 10
2023-12-19 23:07:46,606 INFO metrics.TopMetrics: NNTop conf: dfs.namenode.top.num.users = 10
2023-12-19 23:07:46,606 INFO metrics.TopMetrics: NNTop conf: dfs.namenode.top.windows.minutes = 1,5,25
2023-12-19 23:07:46,622 INFO namenode.FSNamesystem: Retry cache on namenode is enabled
2023-12-19 23:07:46,622 INFO namenode.FSNamesystem: Retry cache will use 0.03 of total heap and retry cache entry expiry
 time is 600000 millis
2023-12-19 23:07:46,622 INFO util.GSet: Computing capacity for map NameNodeRetryCache
2023-12-19 23:07:46,622 INFO util.GSet: VM type       = 64-bit
2023-12-19 23:07:46,638 INFO util.GSet: 0.029999999329447746% max memory 889 MB = 273.1 KB
2023-12-19 23:07:46,638 INFO util.GSet: capacity      = 2^15 = 32768 entries
2023-12-19 23:07:51,329 INFO namenode.FSImage: Allocated new BlockPoolId: BP-662208048-192.168.40.1-1703007471313
2023-12-19 23:07:51,579 INFO common.Storage: Storage directory \tmp\hadoop-admin\dfs\name has been successfully formatte
d.
2023-12-19 23:07:51,719 INFO namenode.FSImageFormatProtobuf: Saving image file \tmp\hadoop-admin\dfs\name\current\fsimag
e.ckpt_0000000000000000000 using no compression
2023-12-19 23:07:52,021 INFO namenode.FSImageFormatProtobuf: Image file \tmp\hadoop-admin\dfs\name\current\fsimage.ckpt_
0000000000000000000 of size 400 bytes saved in 0 seconds .
2023-12-19 23:07:52,146 INFO namenode.NNStorageRetentionManager: Going to retain 1 images with txid >= 0
2023-12-19 23:07:52,208 INFO namenode.FSNamesystem: Stopping services started for active state
2023-12-19 23:07:52,208 INFO namenode.FSNamesystem: Stopping services started for standby state
2023-12-19 23:07:52,224 INFO namenode.FSImage: FSImageSaver clean checkpoint: txid=0 when meet shutdown.
2023-12-19 23:07:52,224 INFO namenode.NameNode: SHUTDOWN_MSG:
/************************************************************
SHUTDOWN_MSG: Shutting down NameNode at DESKTOP-KH0H8U6/192.168.40.1
************************************************************/
```

Command Prompt

```
Microsoft Windows [Version 10.0.14393]
(c) 2016 Microsoft Corporation. All rights reserved.

C:\Users\admin>cd..

C:\Users>cd..

C:\>f:

F:\>cd hadoop-3.2.4

F:\hadoop-3.2.4>cd sbin

F:\hadoop-3.2.4\sbin>start-all.cmd
This script is Deprecated. Instead use start-dfs.cmd and start-yarn.cmd
starting yarn daemons

F:\hadoop-3.2.4\sbin>
```

Apache Hadoop Distribution

Apache Hadoop Distribution - hadoop datanode

Apache Hadoop Distribution - yarn resourcemanager

Apache Hadoop Distribution - yarn nodemanager

```
2023-12-19 23:27:38,123 INFO event.AsyncDispatcher: Registering class org.apache.hadoop.yarn.server.nodemanager.containe
rmanager.loghandler.event.LogHandlerEventType for class org.apache.hadoop.yarn.server.nodemanager.containermanager.logha
ndler.NonAggregatingLogHandler
2023-12-19 23:27:38,128 INFO event.AsyncDispatcher: Registering class org.apache.hadoop.yarn.server.nodemanager.containe
rmanager.localizer.sharedcache.SharedCacheUploadEventType for class org.apache.hadoop.yarn.server.nodemanager.containerm
anager.localizer.sharedcache.SharedCacheUploadService
2023-12-19 23:27:38,128 INFO containermanager.ContainerManagerImpl: AMRMProxyService is disabled
2023-12-19 23:27:38,129 INFO localizer.ResourceLocalizationService: per directory file limit = 8192
2023-12-19 23:27:39,398 WARN nativeio.NativeIO: NativeIO.getStat error (3): The system cannot find the path specified.
 -- file path: tmp/hadoop-admin/nm-local-dir/filecache
2023-12-19 23:27:39,601 WARN nativeio.NativeIO: NativeIO.getStat error (3): The system cannot find the path specified.
 -- file path: tmp/hadoop-admin/nm-local-dir/usercache
2023-12-19 23:27:39,695 WARN nativeio.NativeIO: NativeIO.getStat error (3): The system cannot find the path specified.
 -- file path: tmp/hadoop-admin/nm-local-dir/nmPrivate
2023-12-19 23:27:39,867 INFO event.AsyncDispatcher: Registering class org.apache.hadoop.yarn.server.nodemanager.containe
rmanager.localizer.event.LocalizerEventType for class org.apache.hadoop.yarn.server.nodemanager.containermanager.localiz
er.ResourceLocalizationService$LocalizerTracker
2023-12-19 23:27:39,898 INFO resources.ResourceHandlerModule: Using traffic control bandwidth handler
2023-12-19 23:27:40,101 INFO containermanager.AuxServices: Adding auxiliary service mapreduce_shuffle, "mapreduce_shuffl
e"
2023-12-19 23:27:40,289 INFO monitor.ContainersMonitorImpl:  Using ResourceCalculatorPlugin : org.apache.hadoop.yarn.uti
l.ResourceCalculatorPlugin@4a3631f8
2023-12-19 23:27:40,304 INFO monitor.ContainersMonitorImpl:  Using ResourceCalculatorProcessTree : null
2023-12-19 23:27:40,304 INFO monitor.ContainersMonitorImpl: Physical memory check enabled: true
2023-12-19 23:27:40,304 INFO monitor.ContainersMonitorImpl: Virtual memory check enabled: true
2023-12-19 23:27:40,320 INFO monitor.ContainersMonitorImpl: Elastic memory control enabled: false
2023-12-19 23:27:40,320 INFO monitor.ContainersMonitorImpl: Strict memory control enabled: true
2023-12-19 23:27:40,320 INFO monitor.ContainersMonitorImpl: ContainersMonitor enabled: true
2023-12-19 23:27:40,320 INFO monitor.ContainersMonitorImpl: Container Log Monitor Enabled: false
```

Apache Hadoop Distribution - yarn resourcemanager

```
2023-12-19 23:34:02,163 INFO placement.MultiNodeSortingManager: Starting NodeSortingService=MultiNodeSortingManager
2023-12-19 23:34:02,212 INFO ipc.CallQueueManager: Using callQueue: class java.util.concurrent.LinkedBlockingQueue, queu
eCapacity: 5000, scheduler: class org.apache.hadoop.ipc.DefaultRpcScheduler, ipcBackoff: false.
2023-12-19 23:34:02,231 INFO pb.RpcServerFactoryPBImpl: Adding protocol org.apache.hadoop.yarn.server.api.ResourceTracke
rPB to the server
2023-12-19 23:34:02,246 INFO ipc.Server: IPC Server Responder: starting
2023-12-19 23:34:02,246 INFO ipc.Server: IPC Server listener on 8031: starting
2023-12-19 23:34:02,256 INFO ipc.Server: Starting Socket Reader #1 for port 8031
2023-12-19 23:34:02,280 INFO util.JvmPauseMonitor: Starting JVM pause monitor
2023-12-19 23:34:02,320 INFO ipc.CallQueueManager: Using callQueue: class java.util.concurrent.LinkedBlockingQueue, queu
eCapacity: 5000, scheduler: class org.apache.hadoop.ipc.DefaultRpcScheduler, ipcBackoff: false.
2023-12-19 23:34:02,346 INFO ipc.Server: Starting Socket Reader #1 for port 8030
2023-12-19 23:34:02,383 INFO pb.RpcServerFactoryPBImpl: Adding protocol org.apache.hadoop.yarn.api.ApplicationMasterProt
ocolPB to the server
2023-12-19 23:34:02,392 INFO ipc.Server: IPC Server Responder: starting
2023-12-19 23:34:02,393 INFO ipc.Server: IPC Server listener on 8030: starting
2023-12-19 23:34:02,724 INFO ipc.CallQueueManager: Using callQueue: class java.util.concurrent.LinkedBlockingQueue, queu
eCapacity: 5000, scheduler: class org.apache.hadoop.ipc.DefaultRpcScheduler, ipcBackoff: false.
2023-12-19 23:34:02,741 INFO pb.RpcServerFactoryPBImpl: Adding protocol org.apache.hadoop.yarn.api.ApplicationClientProt
ocolPB to the server
2023-12-19 23:34:02,766 INFO resourcemanager.ResourceManager: Transitioned to active state
2023-12-19 23:34:02,742 INFO ipc.Server: Starting Socket Reader #1 for port 8032
2023-12-19 23:34:02,798 INFO ipc.Server: IPC Server listener on 8032: starting
2023-12-19 23:34:02,803 INFO ipc.Server: IPC Server Responder: starting
2023-12-19 23:34:14,369 INFO resourcemanager.ResourceTrackerService: NodeManager from node DESKTOP-KH0H8U6(cmPort: 50873
 httpPort: 8042) registered with capability: <memory:8192, vCores:8>, assigned nodeId DESKTOP-KH0H8U6:50873
2023-12-19 23:34:14,380 INFO rmnode.RMNodeImpl: DESKTOP-KH0H8U6:50873 Node Transitioned from NEW to RUNNING
2023-12-19 23:34:14,447 INFO capacity.CapacityScheduler: Added node DESKTOP-KH0H8U6:50873 clusterResource: <memory:8192,
 vCores:8>
```

Apache Hadoop Distribution - yarn nodemanager

```
INFO: Registering org.apache.hadoop.yarn.server.nodemanager.webapp.JAXBContextResolver as a provider class
Dec 19, 2023 11:34:10 PM com.sun.jersey.server.impl.application.WebApplicationImpl _initiate
INFO: Initiating Jersey application, version 'Jersey: 1.19 02/11/2015 03:25 AM'
Dec 19, 2023 11:34:10 PM com.sun.jersey.guice.spi.container.GuiceComponentProviderFactory getComponentProvider
INFO: Binding org.apache.hadoop.yarn.server.nodemanager.webapp.JAXBContextResolver to GuiceManagedComponentProvider with
 the scope "Singleton"
Dec 19, 2023 11:34:11 PM com.sun.jersey.guice.spi.container.GuiceComponentProviderFactory getComponentProvider
INFO: Binding org.apache.hadoop.yarn.webapp.GenericExceptionHandler to GuiceManagedComponentProvider with the scope "Sin
gleton"
Dec 19, 2023 11:34:12 PM com.sun.jersey.guice.spi.container.GuiceComponentProviderFactory getComponentProvider
INFO: Binding org.apache.hadoop.yarn.server.nodemanager.webapp.NMWebServices to GuiceManagedComponentProvider with the s
cope "Singleton"
2023-12-19 23:34:13,064 INFO handler.ContextHandler: Started o.e.j.w.WebAppContext@11a8042c{node,/,file:///C:/Users/admi
n/AppData/Local/Temp/jetty-0_0_0_0-8042-hadoop-yarn-common-3_2_4_jar-_-any-5266565803813321089/webapp/,AVAILABLE}{jar:fi
le:/F:/hadoop-3.2.4/share/hadoop/yarn/hadoop-yarn-common-3.2.4.jar!/webapps/node}
2023-12-19 23:34:13,096 INFO server.AbstractConnector: Started ServerConnector@2484f433{HTTP/1.1, (http/1.1)}{0.0.0.0:80
42}
2023-12-19 23:34:13,103 INFO server.Server: Started @44136ms
2023-12-19 23:34:13,106 INFO webapp.WebApps: Web app node started at 8042
2023-12-19 23:34:13,110 INFO nodemanager.NodeStatusUpdaterImpl: Node ID assigned is : DESKTOP-KH0H8U6:50873
2023-12-19 23:34:13,195 INFO util.JvmPauseMonitor: Starting JVM pause monitor
2023-12-19 23:34:13,208 INFO client.RMProxy: Connecting to ResourceManager at /0.0.0.0:8031
2023-12-19 23:34:13,587 INFO nodemanager.NodeStatusUpdaterImpl: Registering with RM using containers :[]
2023-12-19 23:34:14,450 INFO security.NMContainerTokenSecretManager: Rolling master-key for container-tokens, got key wi
th id 646949562
2023-12-19 23:34:14,456 INFO security.NMTokenSecretManagerInNM: Rolling master-key for container-tokens, got key with id
 -83022197
2023-12-19 23:34:14,459 INFO nodemanager.NodeStatusUpdaterImpl: Registered with ResourceManager as DESKTOP-KH0H8U6:50873
 with total resource of <memory:8192, vCores:8>
```

Apache Hadoop Distribution - hadoop datanode

```
2023-12-19 23:35:43,208 INFO ipc.Client: Retrying connect to server: localhost/127.0.0.1:9000. Already tried 0 time(s);
retry policy is RetryUpToMaximumCountWithFixedSleep(maxRetries=10, sleepTime=1000 MILLISECONDS)
2023-12-19 23:35:45,255 INFO ipc.Client: Retrying connect to server: localhost/127.0.0.1:9000. Already tried 1 time(s);
retry policy is RetryUpToMaximumCountWithFixedSleep(maxRetries=10, sleepTime=1000 MILLISECONDS)
2023-12-19 23:35:47,282 INFO ipc.Client: Retrying connect to server: localhost/127.0.0.1:9000. Already tried 2 time(s);
retry policy is RetryUpToMaximumCountWithFixedSleep(maxRetries=10, sleepTime=1000 MILLISECONDS)
2023-12-19 23:35:49,293 INFO ipc.Client: Retrying connect to server: localhost/127.0.0.1:9000. Already tried 3 time(s);
retry policy is RetryUpToMaximumCountWithFixedSleep(maxRetries=10, sleepTime=1000 MILLISECONDS)
2023-12-19 23:35:51,319 INFO ipc.Client: Retrying connect to server: localhost/127.0.0.1:9000. Already tried 4 time(s);
retry policy is RetryUpToMaximumCountWithFixedSleep(maxRetries=10, sleepTime=1000 MILLISECONDS)
2023-12-19 23:35:53,334 INFO ipc.Client: Retrying connect to server: localhost/127.0.0.1:9000. Already tried 5 time(s);
retry policy is RetryUpToMaximumCountWithFixedSleep(maxRetries=10, sleepTime=1000 MILLISECONDS)
2023-12-19 23:35:55,373 INFO ipc.Client: Retrying connect to server: localhost/127.0.0.1:9000. Already tried 6 time(s);
retry policy is RetryUpToMaximumCountWithFixedSleep(maxRetries=10, sleepTime=1000 MILLISECONDS)
2023-12-19 23:35:57,413 INFO ipc.Client: Retrying connect to server: localhost/127.0.0.1:9000. Already tried 7 time(s);
retry policy is RetryUpToMaximumCountWithFixedSleep(maxRetries=10, sleepTime=1000 MILLISECONDS)
2023-12-19 23:35:59,435 INFO ipc.Client: Retrying connect to server: localhost/127.0.0.1:9000. Already tried 8 time(s);
retry policy is RetryUpToMaximumCountWithFixedSleep(maxRetries=10, sleepTime=1000 MILLISECONDS)
2023-12-19 23:36:01,466 INFO ipc.Client: Retrying connect to server: localhost/127.0.0.1:9000. Already tried 9 time(s);
retry policy is RetryUpToMaximumCountWithFixedSleep(maxRetries=10, sleepTime=1000 MILLISECONDS)
2023-12-19 23:36:02,475 WARN datanode.DataNode: Problem connecting to server: localhost/127.0.0.1:9000
2023-12-19 23:36:09,500 INFO ipc.Client: Retrying connect to server: localhost/127.0.0.1:9000. Already tried 0 time(s);
retry policy is RetryUpToMaximumCountWithFixedSleep(maxRetries=10, sleepTime=1000 MILLISECONDS)
2023-12-19 23:36:11,534 INFO ipc.Client: Retrying connect to server: localhost/127.0.0.1:9000. Already tried 1 time(s);
retry policy is RetryUpToMaximumCountWithFixedSleep(maxRetries=10, sleepTime=1000 MILLISECONDS)
2023-12-19 23:36:13,581 INFO ipc.Client: Retrying connect to server: localhost/127.0.0.1:9000. Already tried 2 time(s);
retry policy is RetryUpToMaximumCountWithFixedSleep(maxRetries=10, sleepTime=1000 MILLISECONDS)
2023-12-19 23:36:15,615 INFO ipc.Client: Retrying connect to server: localhost/127.0.0.1:9000. Already tried 3 time(s);
retry policy is RetryUpToMaximumCountWithFixedSleep(maxRetries=10, sleepTime=1000 MILLISECONDS)
```

Apache Hadoop Distribution - yarn nodemanager

```
2023-12-19 23:34:13,106 INFO webapp.WebApps: Web app node started at 8042
2023-12-19 23:34:13,110 INFO nodemanager.NodeStatusUpdaterImpl: Node ID assigned is : DESKTOP-KH0H8U6:50873
2023-12-19 23:34:13,195 INFO util.JvmPauseMonitor: Starting JVM pause monitor
2023-12-19 23:34:13,208 INFO client.RMProxy: Connecting to ResourceManager at /0.0.0.0:8031
2023-12-19 23:34:13,587 INFO nodemanager.NodeStatusUpdaterImpl: Registering with RM using containers :[]
2023-12-19 23:34:14,450 INFO security.NMContainerTokenSecretManager: Rolling master-key for container-tokens, got key wi
th id 646949562
2023-12-19 23:34:14,456 INFO security.NMTokenSecretManagerInNM: Rolling master-key for container-tokens, got key with id
 -83022197
2023-12-19 23:34:14,459 INFO nodemanager.NodeStatusUpdaterImpl: Registered with ResourceManager as DESKTOP-KH0H8U6:50873
 with total resource of <memory:8192, vCores:8>
2023-12-19 23:36:08,516 INFO retry.RetryInvocationHandler: java.io.IOException: DestHost:destPort 0.0.0.0:8031 , LocalHo
st:localPort DESKTOP-KH0H8U6/192.168.56.1:0. Failed on local exception: java.io.IOException: An existing connection was
forcibly closed by the remote host, while invoking ResourceTrackerPBClientImpl.nodeHeartbeat over null. Retrying after s
leeping for 30000ms. Current retry count: 0.
2023-12-19 23:36:40,538 INFO ipc.Client: Retrying connect to server: 0.0.0.0/0.0.0.0:8031. Already tried 0 time(s); retr
y policy is RetryUpToMaximumCountWithFixedSleep(maxRetries=10, sleepTime=1000 MILLISECONDS)
2023-12-19 23:36:42,551 INFO ipc.Client: Retrying connect to server: 0.0.0.0/0.0.0.0:8031. Already tried 1 time(s); retr
y policy is RetryUpToMaximumCountWithFixedSleep(maxRetries=10, sleepTime=1000 MILLISECONDS)
2023-12-19 23:36:44,572 INFO ipc.Client: Retrying connect to server: 0.0.0.0/0.0.0.0:8031. Already tried 2 time(s); retr
y policy is RetryUpToMaximumCountWithFixedSleep(maxRetries=10, sleepTime=1000 MILLISECONDS)
2023-12-19 23:36:46,603 INFO ipc.Client: Retrying connect to server: 0.0.0.0/0.0.0.0:8031. Already tried 3 time(s); retr
y policy is RetryUpToMaximumCountWithFixedSleep(maxRetries=10, sleepTime=1000 MILLISECONDS)
2023-12-19 23:36:48,619 INFO ipc.Client: Retrying connect to server: 0.0.0.0/0.0.0.0:8031. Already tried 4 time(s); retr
y policy is RetryUpToMaximumCountWithFixedSleep(maxRetries=10, sleepTime=1000 MILLISECONDS)
2023-12-19 23:36:50,648 INFO ipc.Client: Retrying connect to server: 0.0.0.0/0.0.0.0:8031. Already tried 5 time(s); retr
y policy is RetryUpToMaximumCountWithFixedSleep(maxRetries=10, sleepTime=1000 MILLISECONDS)
2023-12-19 23:36:52,663 INFO ipc.Client: Retrying connect to server: 0.0.0.0/0.0.0.0:8031. Already tried 6 time(s); retr
y policy is RetryUpToMaximumCountWithFixedSleep(maxRetries=10, sleepTime=1000 MILLISECONDS)
```

Result

Thus Hadoop was installed and configured.

Ex.No 7 Create simple application like wordcount using hadoop

Aim

To create simple application like word count using hadoop.

Softwares Required

- hadoop
- eclipse
- hadoop jar files

Word count

Hadoop MapReduce is a software framework for easily writing applications which process vast amounts of data (multi-terabyte data-sets) in-parallel on large clusters (thousands of nodes) of commodity hardware in a reliable, fault-tolerant manner.

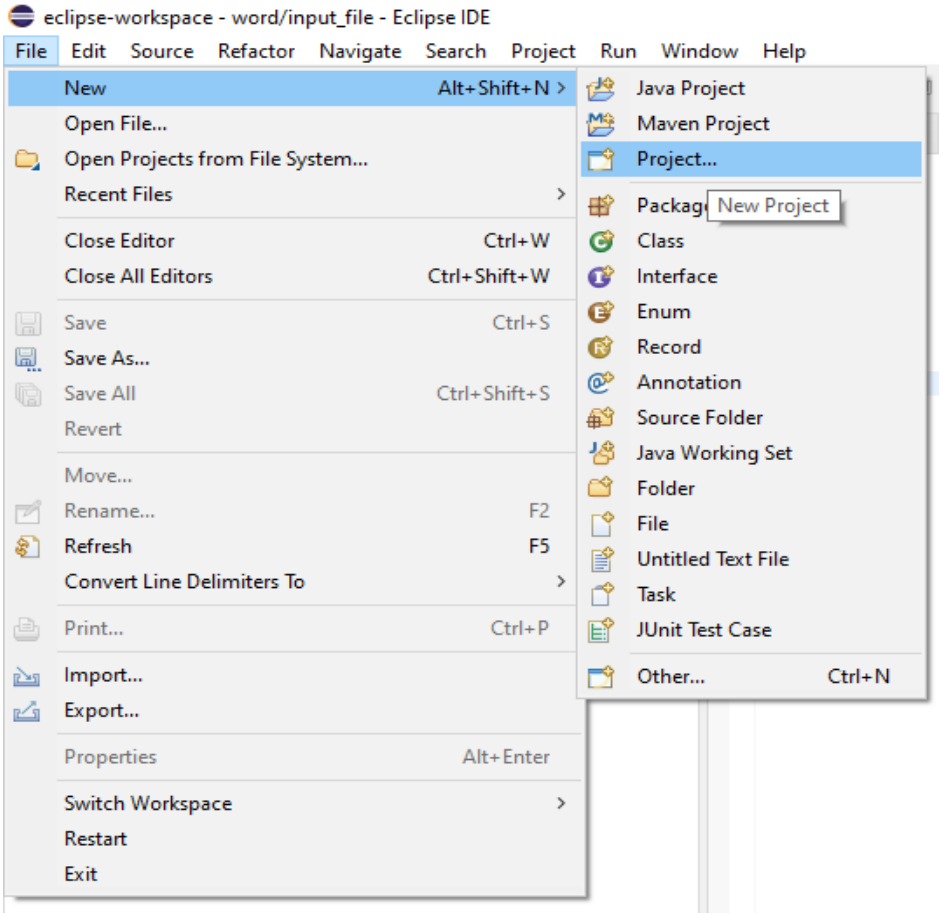
A MapReduce job usually splits the input data-set into independent chunks which are processed by the map tasks in a completely parallel manner. The framework sorts the outputs of the maps, which are then input to the reduce tasks. Typically both the input and the output of the job are stored in a file-system. The framework takes care of scheduling tasks, monitoring them and re-executes the failed tasks.

WordCount is a simple application that counts the number of occurrences of each word in a given input set.

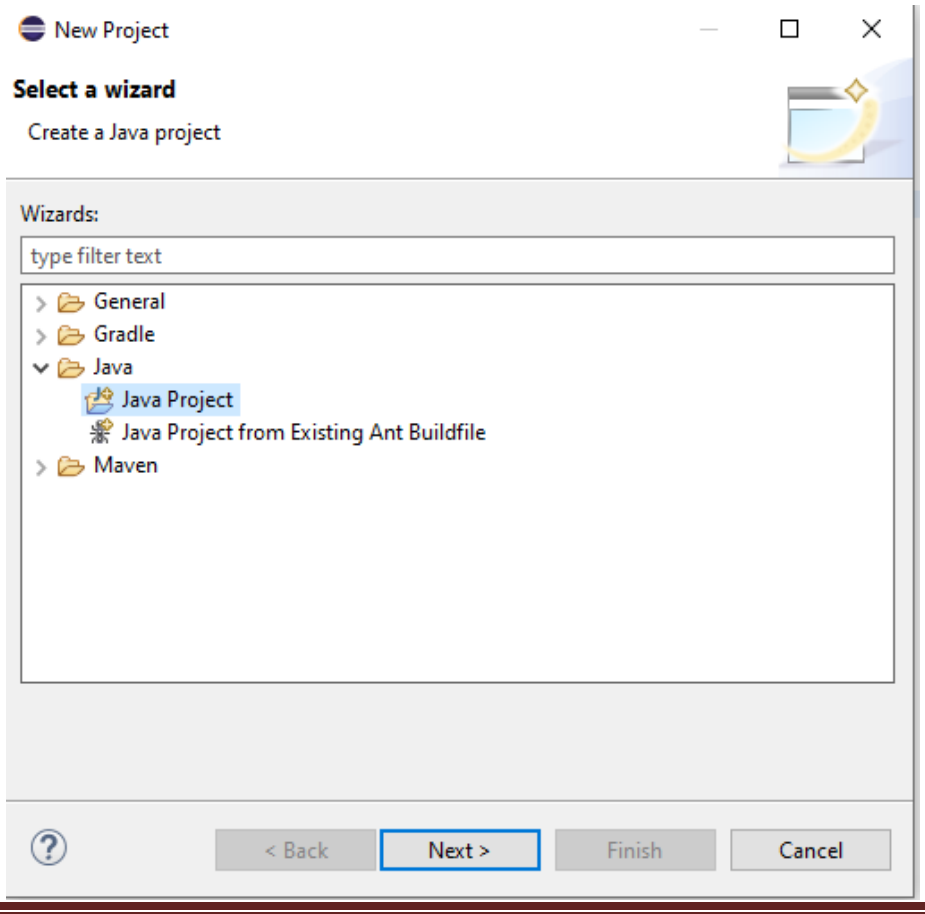
Program

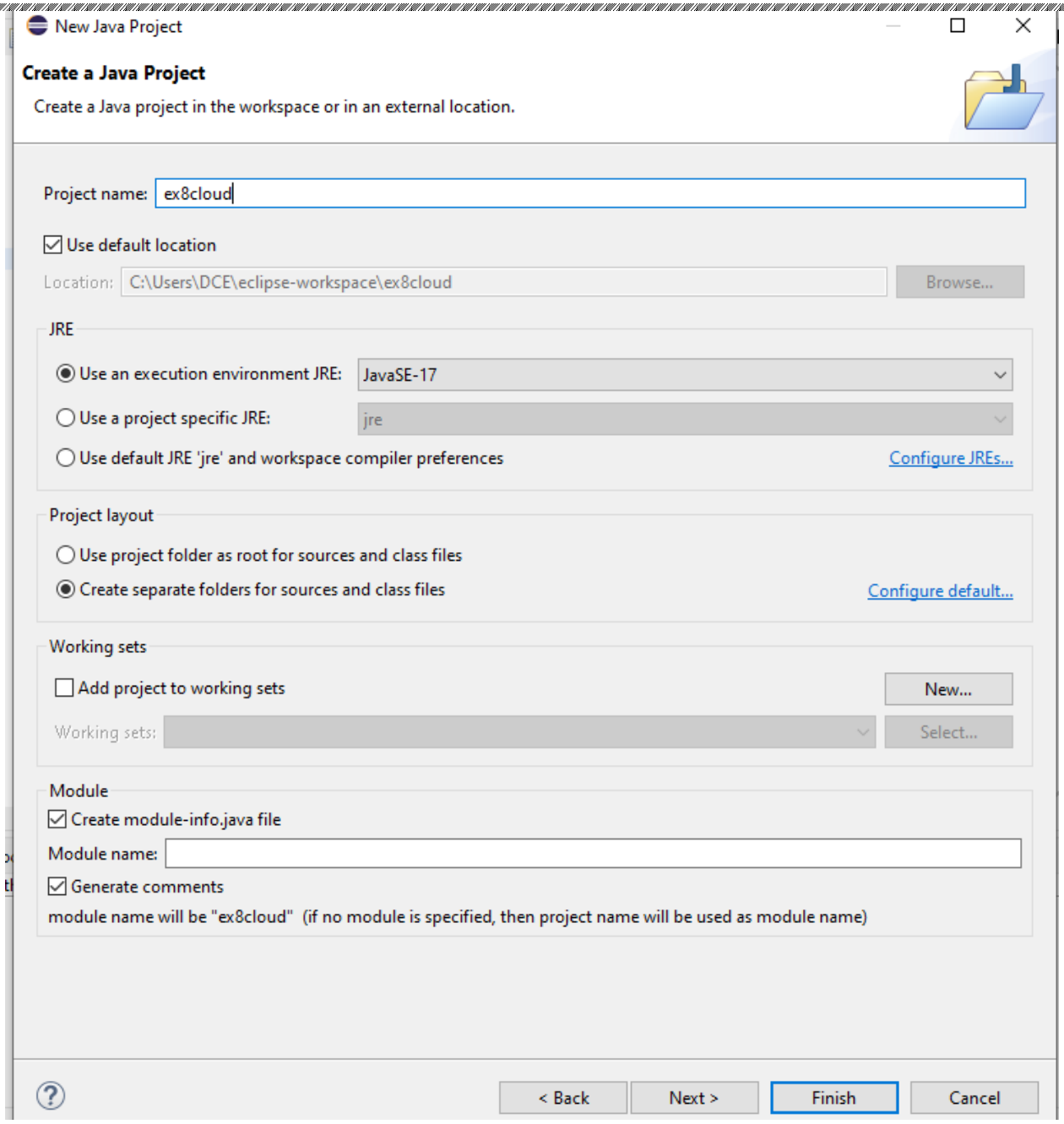
```
import java.io.IOException;
import java.util.StringTokenizer;
import org.apache.hadoop.conf.Configuration;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.io.IntWritable;
import org.apache.hadoop.io.Text;
import org.apache.hadoop.mapreduce.Job;
import org.apache.hadoop.mapreduce.Mapper;
import org.apache.hadoop.mapreduce.Reducer;
import org.apache.hadoop.mapreduce.lib.input.FileInputFormat;
import org.apache.hadoop.mapreduce.lib.output.FileOutputFormat;

public class wordcount {

  public static class TokenizerMapper
      extends Mapper<Object, Text, Text, IntWritable>{

    private final static IntWritable one = new IntWritable(1);
    private Text word = new Text();

    public void map(Object key, Text value, Context context
                    ) throws IOException, InterruptedException {
      StringTokenizer itr = new StringTokenizer(value.toString());
      while (itr.hasMoreTokens()) {
        word.set(itr.nextToken());
```

```
        context.write(word, one);
      }
    }
  }

  public static class IntSumReducer
      extends Reducer<Text,IntWritable,Text,IntWritable> {
    private IntWritable result = new IntWritable();

    public void reduce(Text key, Iterable<IntWritable> values,
                       Context context
                       ) throws IOException, InterruptedException {
      int sum = 0;
      for (IntWritable val : values) {
        sum += val.get();
      }
      result.set(sum);
      context.write(key, result);
    }
  }

  public static void main(String[] args) throws Exception {
    Configuration conf = new Configuration();
    Job job = Job.getInstance(conf, "word count");
    job.setJarByClass(wordcount.class);
    job.setMapperClass(TokenizerMapper.class);
    job.setCombinerClass(IntSumReducer.class);
    job.setReducerClass(IntSumReducer.class);
    job.setOutputKeyClass(Text.class);
    job.setOutputValueClass(IntWritable.class);
    FileInputFormat.addInputPath(job, new Path(args[0]));
    FileOutputFormat.setOutputPath(job, new Path(args[1]));
    System.exit(job.waitForCompletion(true) ? 0 : 1);
  }
}
```

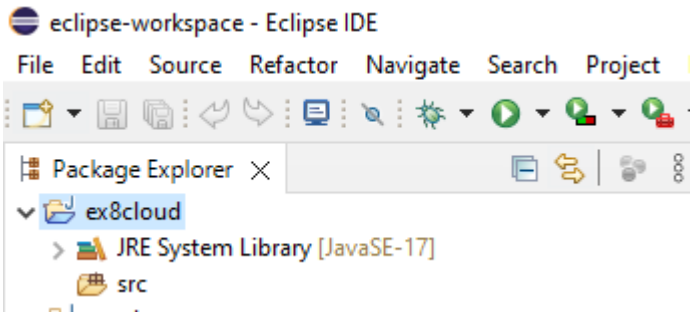


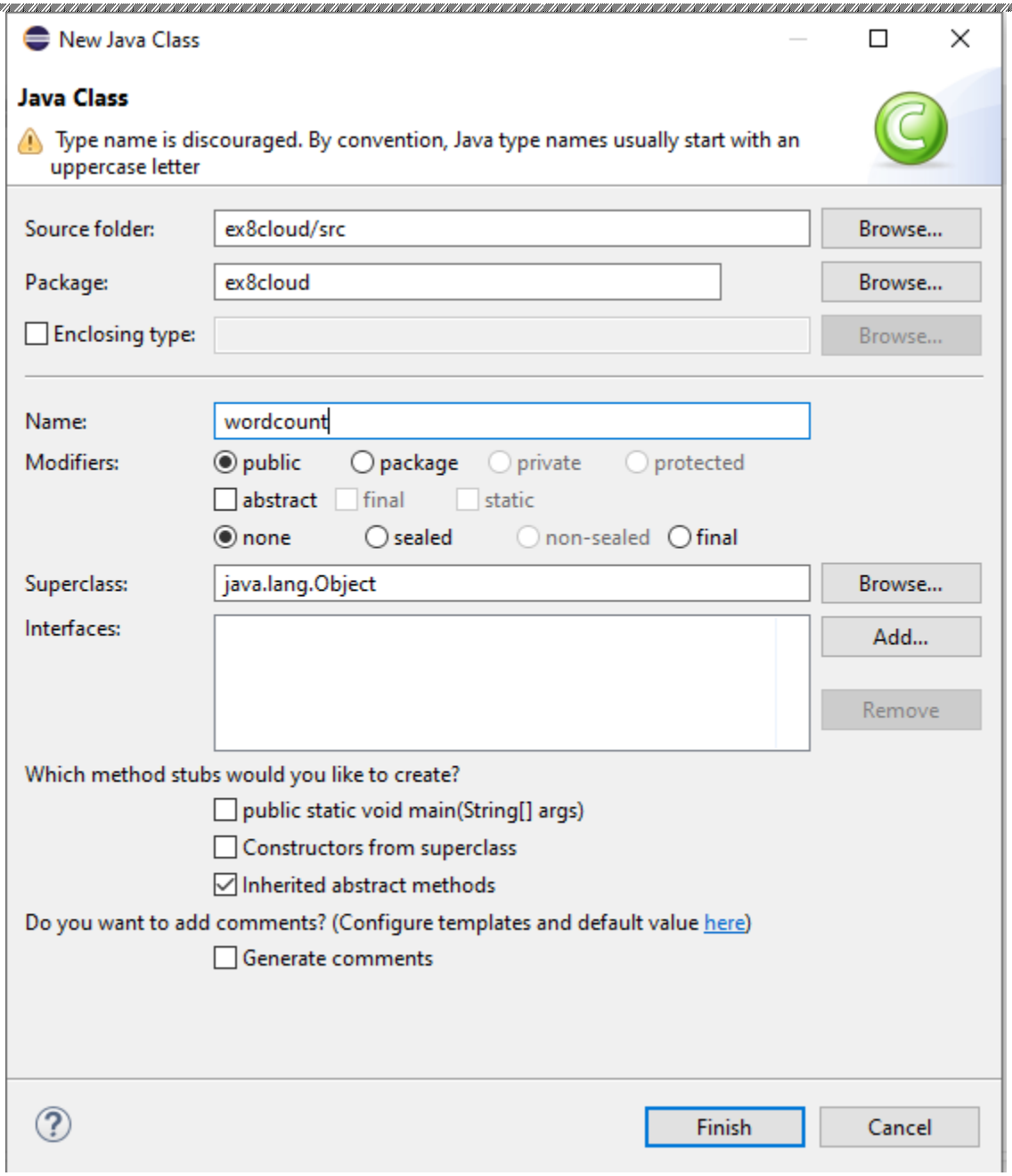
Open New Project



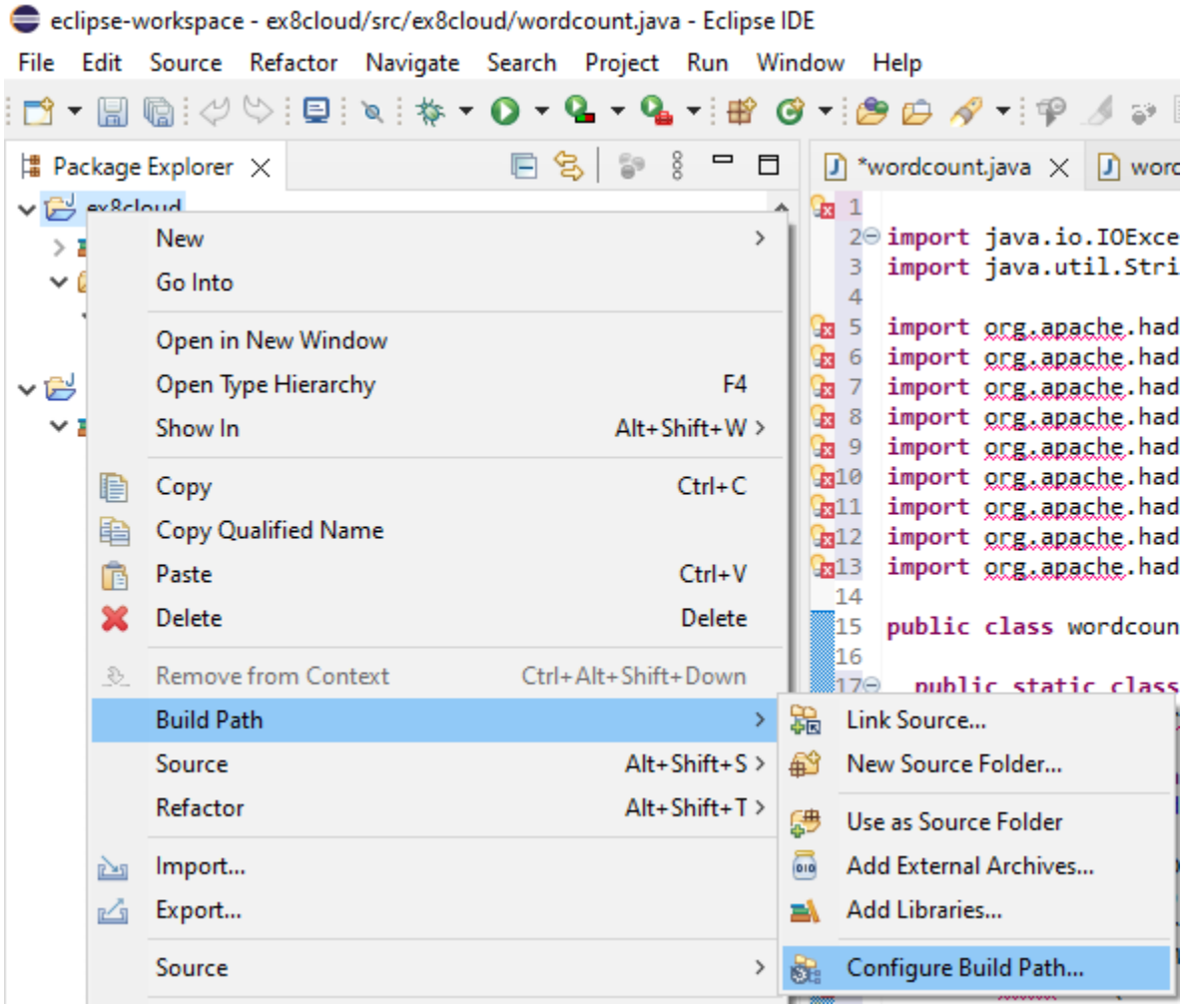


Type Project Name



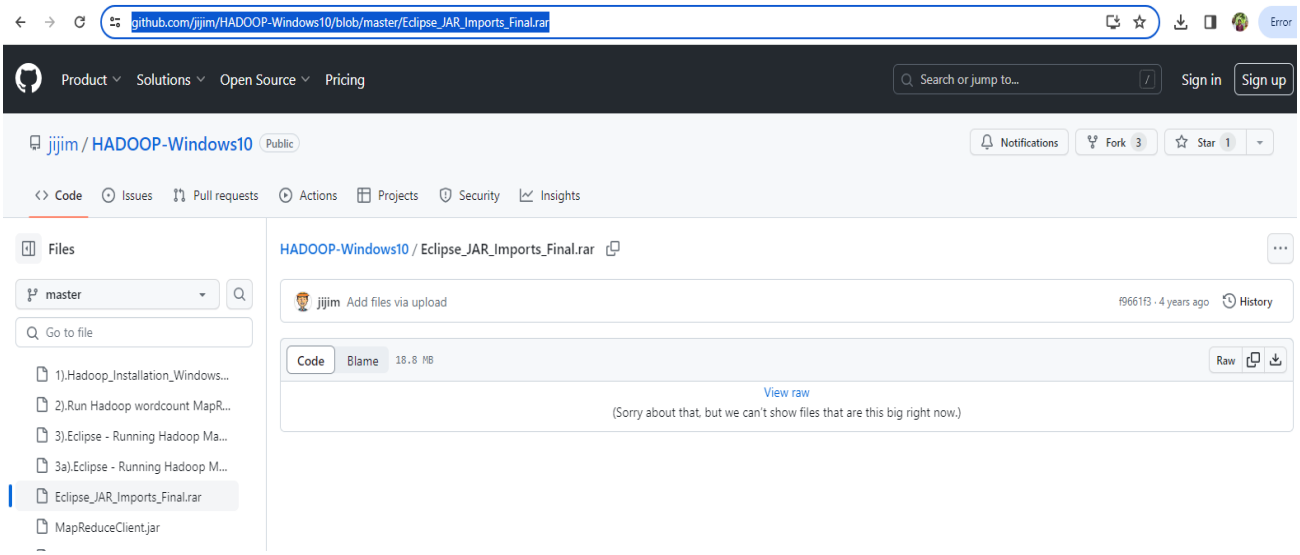


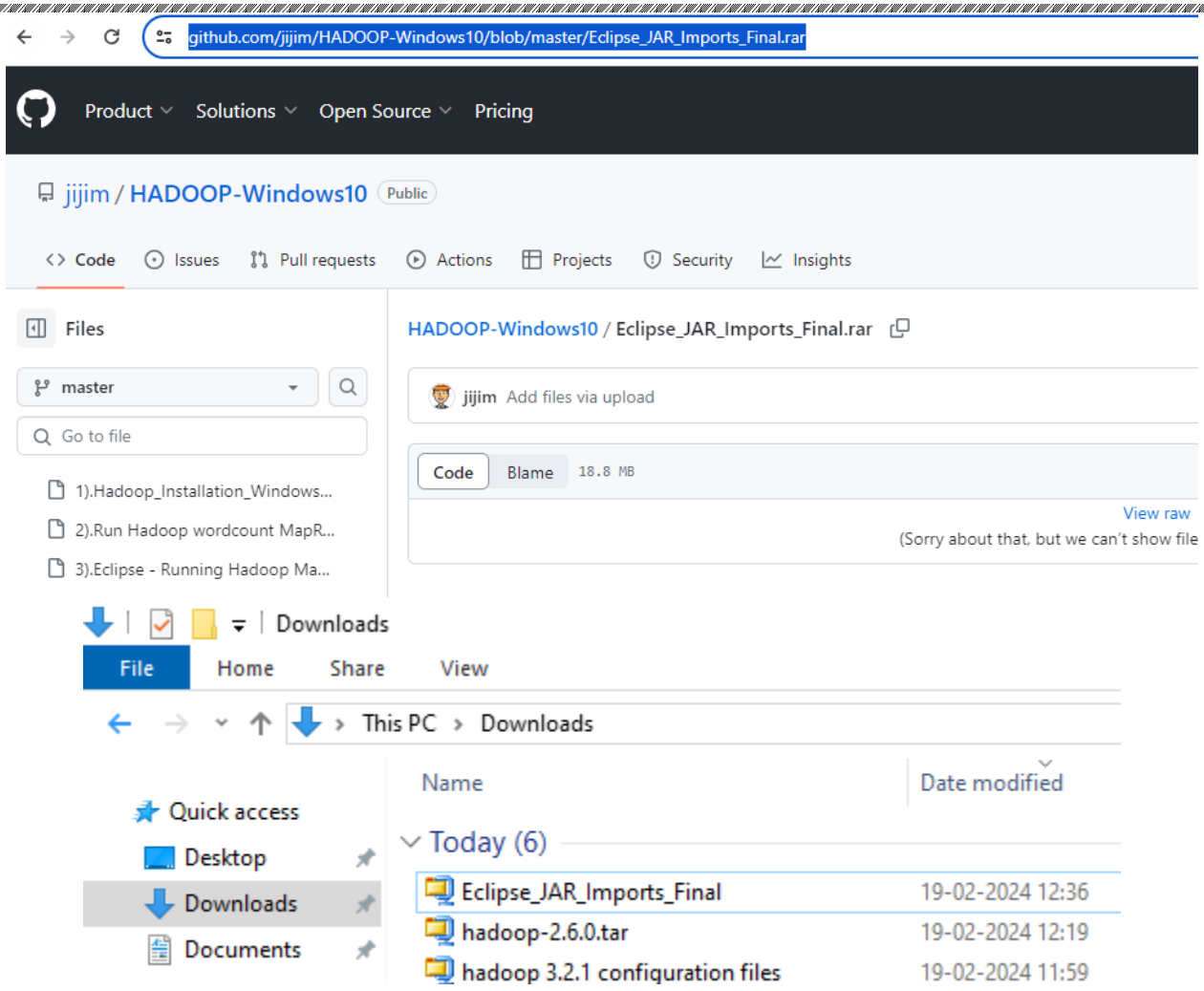
Give Class name



Add JAR Files

https://github.com/jijim/HADOOP-Windows10/blob/master/Eclipse_JAR_Imports_Final.rar




github.com/jijim/HADOOP-Windows10/blob/master/Eclipse_JAR_Imports_Final.rar
Product
Solutions
Open Source
Pricing
jijim / HADOOP-Windows10
Public
Code
Issues
Pull requests
Actions
Projects
Security
Insights
Files
master
Go to file
1).Hadoop_Installation_Windows...
2).Run Hadoop wordcount MapR...
3).Eclipse - Running Hadoop Ma...
HADOOP-Windows10 / Eclipse_JAR_Imports_Final.rar
jijim Add files via upload
Code
Blame
18.8 MB
View raw
(Sorry about that, but we can't show file
Downloads
File
Home
Share
View
This PC
Downloads
Quick access
Desktop
Downloads
Documents
Name
Date modified
Today (6)
Eclipse_JAR_Imports_Final
19-02-2024 12:36
hadoop-2.6.0.tar
19-02-2024 12:19
hadoop 3.2.1 configuration files
19-02-2024 11:59

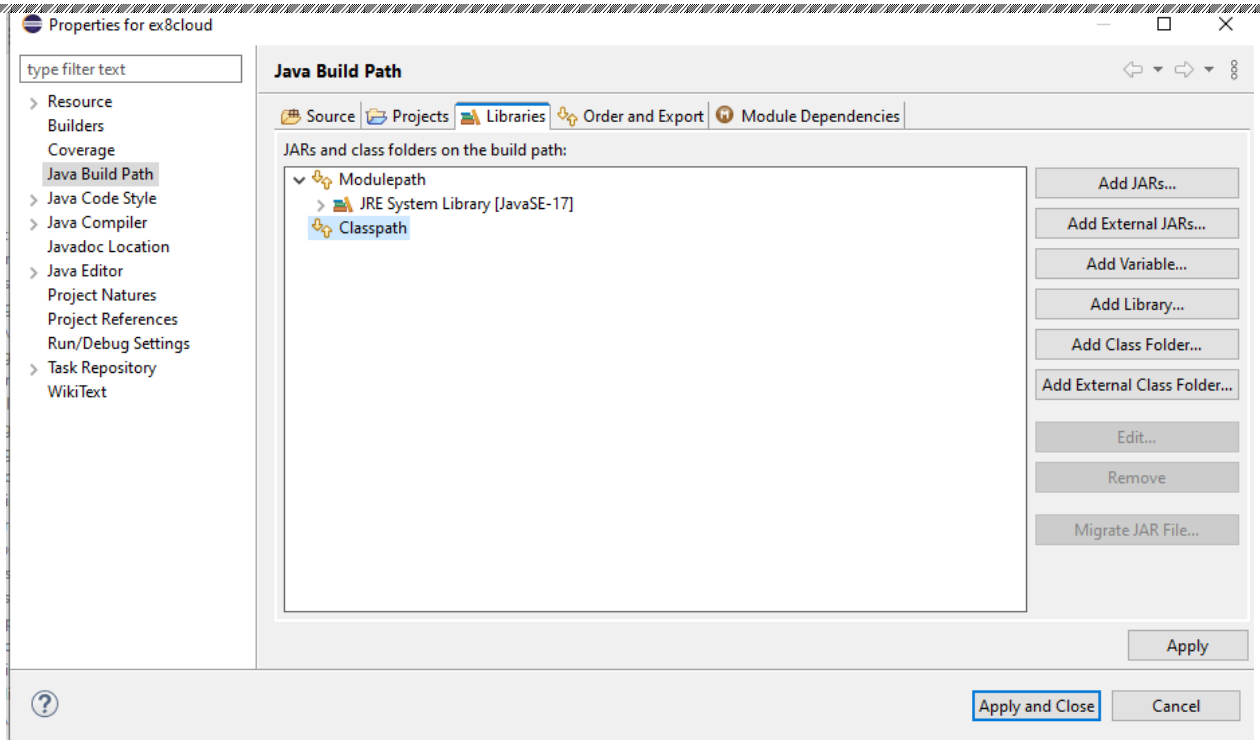
Eclipse_JAR_Imports_Final

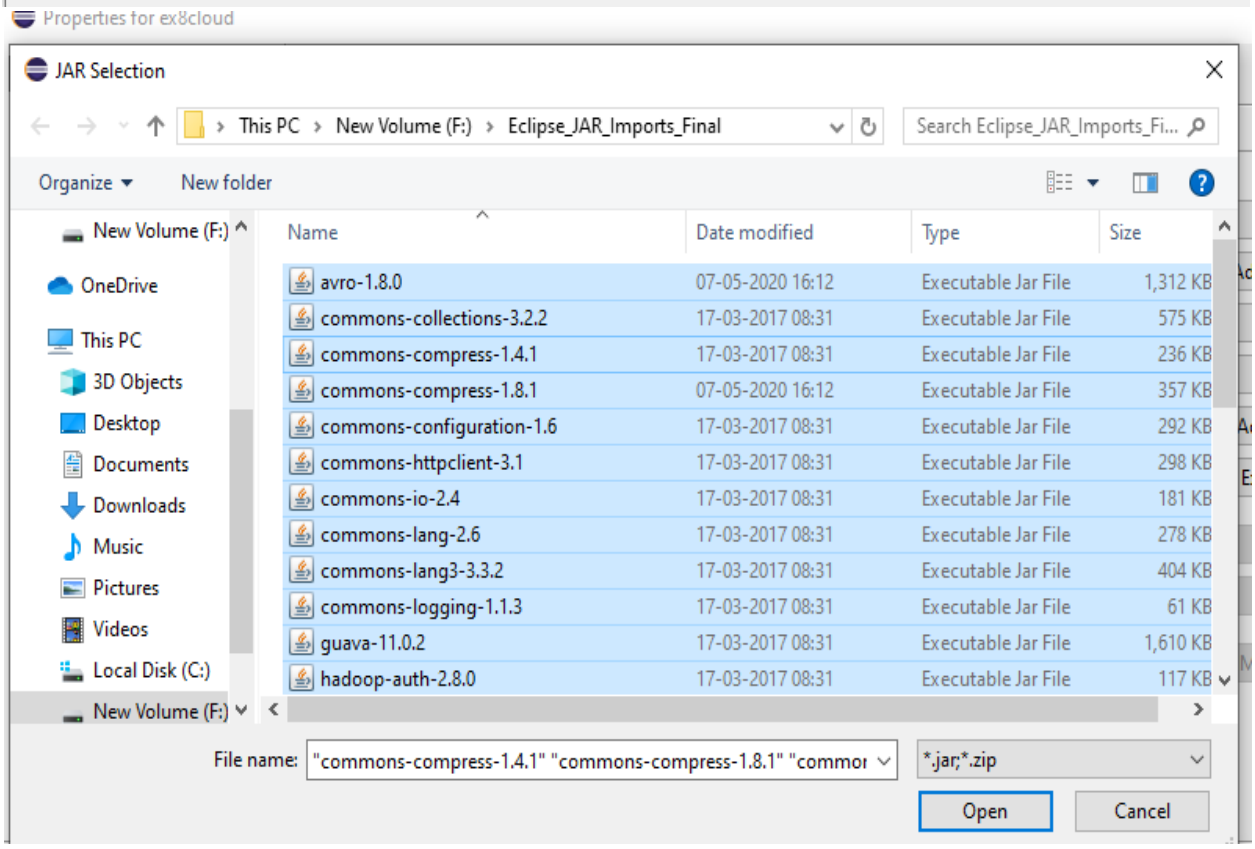
File Home Share View

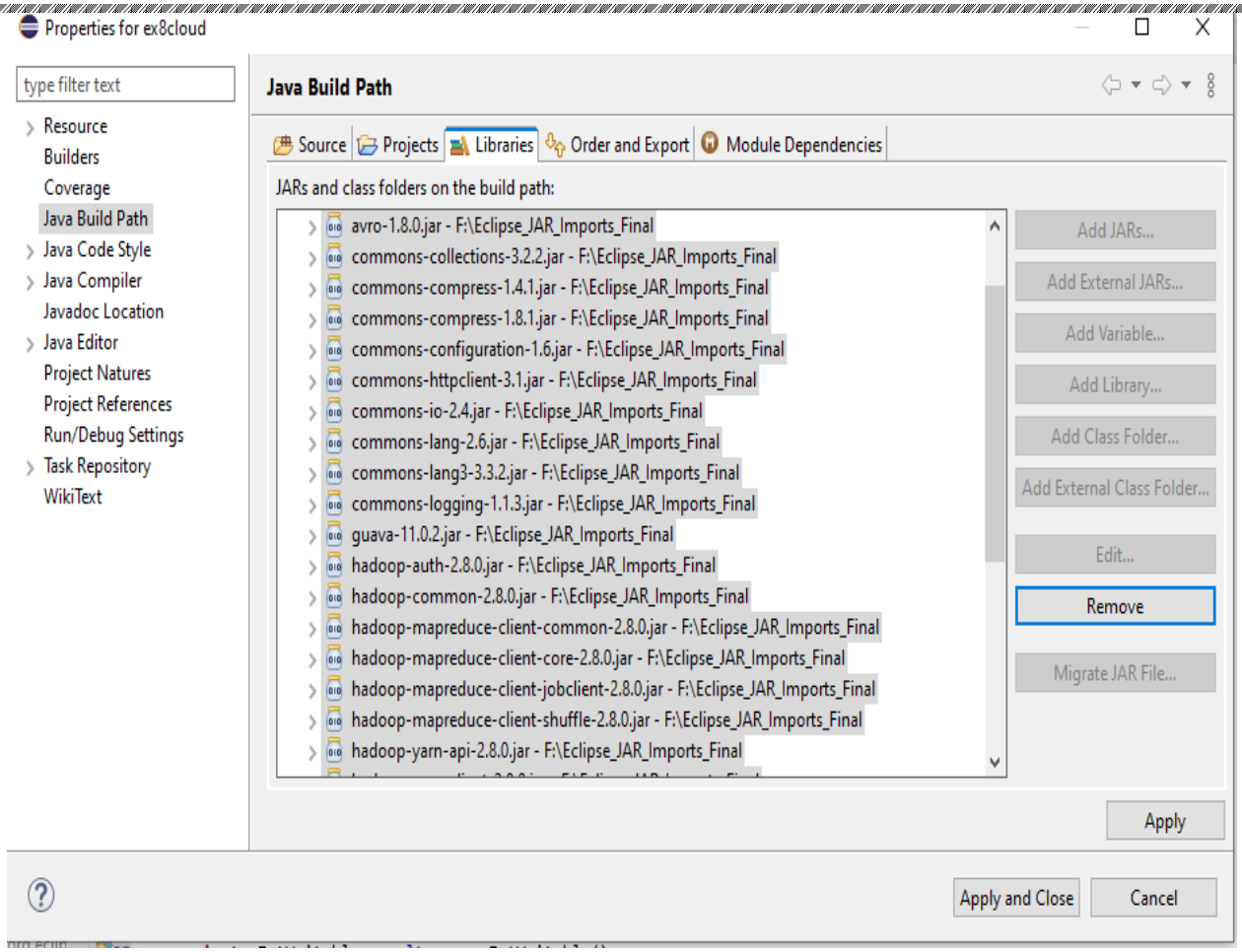
This PC › New Volume (F:) › Eclipse_JAR_Imports_Final

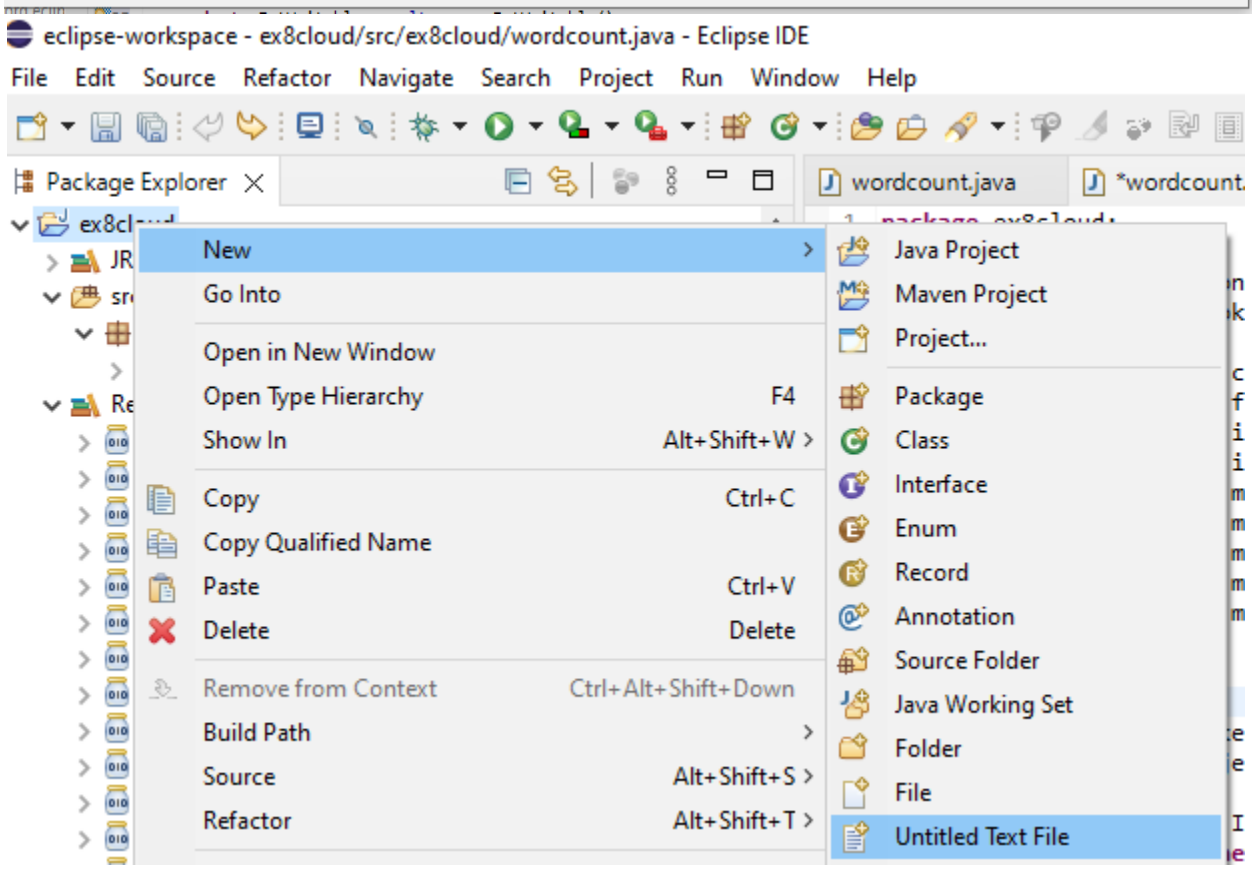
Quick access
Desktop
Downloads
Documents
Pictures
hadoop
hadoop
hadoop-3.3.0
New Volume (F:)
OneDrive
This PC
3D Objects
Desktop
Documents
Downloads
Music
Pictures
Videos
Local Disk (C:)
New Volume (F:)
Network
CE-LAB11
DESKTOP-00IO8P6
DESKTOP-3NN2NR9

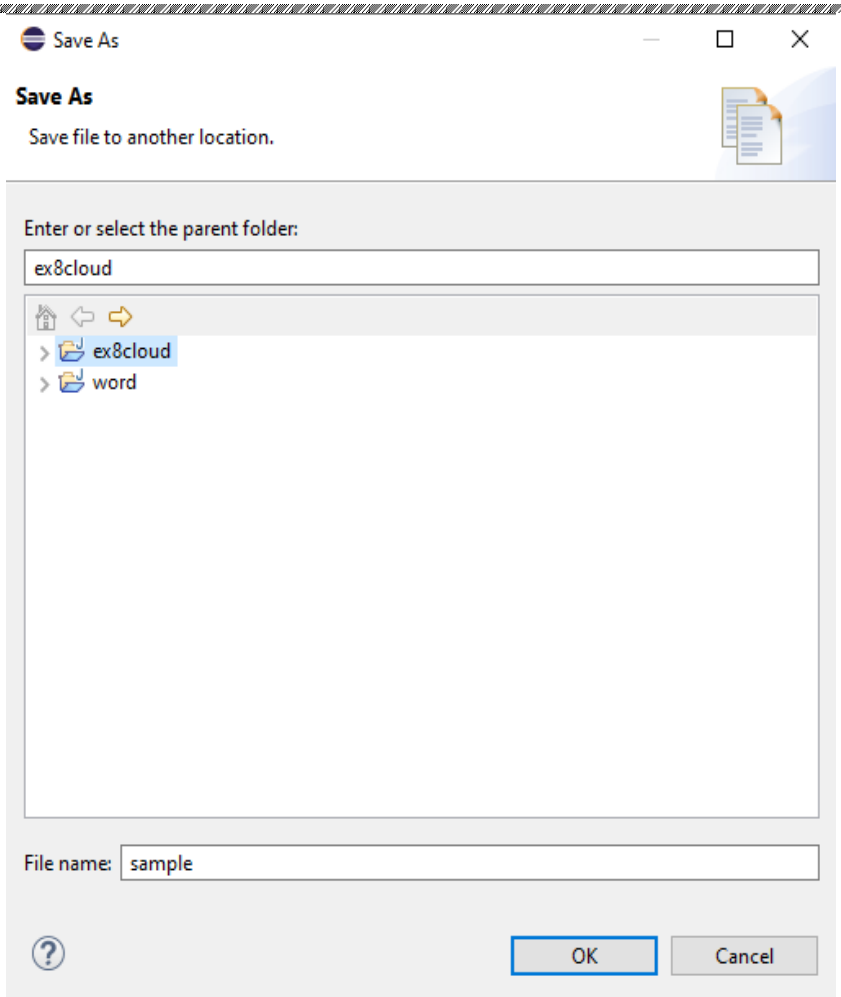
Name	Date modified	Type	Size
avro-1.8.0	07-05-2020 16:12	Executable Jar File	1,312 KB
commons-collections-3.2.2	17-03-2017 08:31	Executable Jar File	575 KB
commons-compress-1.4.1	17-03-2017 08:31	Executable Jar File	236 KB
commons-compress-1.8.1	07-05-2020 16:12	Executable Jar File	357 KB
commons-configuration-1.6	17-03-2017 08:31	Executable Jar File	292 KB
commons-httpclient-3.1	17-03-2017 08:31	Executable Jar File	298 KB
commons-io-2.4	17-03-2017 08:31	Executable Jar File	181 KB
commons-lang-2.6	17-03-2017 08:31	Executable Jar File	278 KB
commons-lang3-3.3.2	17-03-2017 08:31	Executable Jar File	404 KB
commons-logging-1.1.3	17-03-2017 08:31	Executable Jar File	61 KB
guava-11.0.2	17-03-2017 08:31	Executable Jar File	1,610 KB
hadoop-auth-2.8.0	17-03-2017 08:31	Executable Jar File	117 KB
hadoop-common-2.8.0	17-03-2017 11:11	Executable Jar File	3,647 KB
hadoop-mapreduce-client-common-2.8.0	17-03-2017 08:31	Executable Jar File	765 KB
hadoop-mapreduce-client-core-2.8.0	17-03-2017 08:31	Executable Jar File	1,535 KB
hadoop-mapreduce-client-jobclient-2.8.0	17-03-2017 08:31	Executable Jar File	66 KB
hadoop-mapreduce-client-shuffle-2.8.0	17-03-2017 08:31	Executable Jar File	74 KB
hadoop-yarn-api-2.8.0	17-03-2017 08:31	Executable Jar File	2,386 KB
hadoop-yarn-client-2.8.0	17-03-2017 08:31	Executable Jar File	225 KB
hadoop-yarn-common-2.8.0	17-03-2017 08:31	Executable Jar File	1,762 KB
htrace-core4-4.0.1-incubating	11-05-2020 20:41	Executable Jar File	1,451 KB
httpclient-4.5.2	11-05-2020 20:40	Executable Jar File	720 KB
httpcore	20-12-2012 04:35	Executable Jar File	169 KB
httpcore-4.4.1	11-05-2020 20:40	Executable Jar File	315 KB
jackson-core-asl-1.9.13	17-03-2017 08:31	Executable Jar File	227 KB
jackson-mapper-asl-1.9.13	11-05-2020 20:50	Executable Jar File	763 KB
log4j-1.2.17	07-05-2020 17:21	Executable Jar File	479 KB
log4j-api-2.5	07-05-2020 16:15	Executable Jar File	144 KB
log4j-core-2.5	07-05-2020 16:15	Executable Jar File	1,081 KB
slf4j-api-1.7.20	07-05-2020 16:18	Executable Jar File	40 KB


Properties for ex8cloud
type filter text
Resource
Builders
Coverage
Java Build Path
Java Code Style
Java Compiler
Javadoc Location
Java Editor
Project Natures
Project References
Run/Debug Settings
Task Repository
WikiText
Java Build Path
Source
Projects
Libraries
Order and Export
Module Dependencies
JARs and class folders on the build path:
Modulepath
JRE System Library [JavaSE-17]
Classpath
Add JARs...
Add External JARs...
Add Variable...
Add Library...
Add Class Folder...
Add External Class Folder...
Edit...
Remove
Migrate JAR File...
Apply
Apply and Close
Cancel

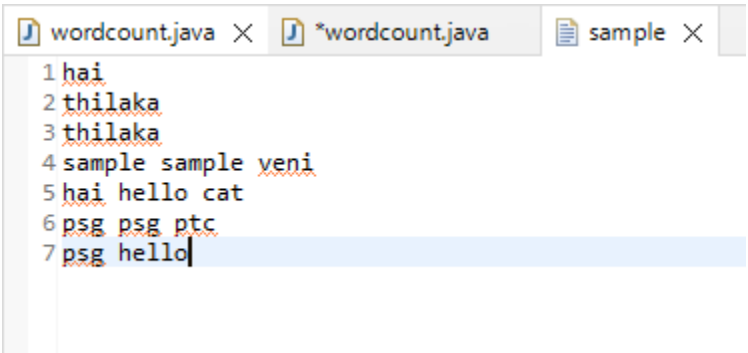

Properties for ex8cloud
JAR Selection
This PC
New Volume (F:)
Eclipse_JAR_Imports_Final
Search Eclipse_JAR_Imports_Fi...
Organize
New folder
New Volume (F:)
OneDrive
This PC
3D Objects
Desktop
Documents
Downloads
Music
Pictures
Videos
Local Disk (C:)
New Volume (F:)
Name
Date modified
Type
Size
avro-1.8.0 07-05-2020 16:12 Executable Jar File 1,312 KB
commons-collections-3.2.2 17-03-2017 08:31 Executable Jar File 575 KB
commons-compress-1.4.1 17-03-2017 08:31 Executable Jar File 236 KB
commons-compress-1.8.1 07-05-2020 16:12 Executable Jar File 357 KB
commons-configuration-1.6 17-03-2017 08:31 Executable Jar File 292 KB
commons-httpclient-3.1 17-03-2017 08:31 Executable Jar File 298 KB
commons-io-2.4 17-03-2017 08:31 Executable Jar File 181 KB
commons-lang-2.6 17-03-2017 08:31 Executable Jar File 278 KB
commons-lang3-3.3.2 17-03-2017 08:31 Executable Jar File 404 KB
commons-logging-1.1.3 17-03-2017 08:31 Executable Jar File 61 KB
guava-11.0.2 17-03-2017 08:31 Executable Jar File 1,610 KB
hadoop-auth-2.8.0 17-03-2017 08:31 Executable Jar File 117 KB
File name: "commons-compress-1.4.1" "commons-compress-1.8.1" "commor
.jar;.zip
Open
Cancel


Properties for ex8cloud
type filter text
Resource
Builders
Coverage
Java Build Path
Java Code Style
Java Compiler
Javadoc Location
Java Editor
Project Natures
Project References
Run/Debug Settings
Task Repository
WikiText
Java Build Path
Source
Projects
Libraries
Order and Export
Module Dependencies
JARs and class folders on the build path:
avro-1.8.0.jar - F:\Eclipse_JAR_Imports_Final
commons-collections-3.2.2.jar - F:\Eclipse_JAR_Imports_Final
commons-compress-1.4.1.jar - F:\Eclipse_JAR_Imports_Final
commons-compress-1.8.1.jar - F:\Eclipse_JAR_Imports_Final
commons-configuration-1.6.jar - F:\Eclipse_JAR_Imports_Final
commons-httpclient-3.1.jar - F:\Eclipse_JAR_Imports_Final
commons-io-2.4.jar - F:\Eclipse_JAR_Imports_Final
commons-lang-2.6.jar - F:\Eclipse_JAR_Imports_Final
commons-lang3-3.3.2.jar - F:\Eclipse_JAR_Imports_Final
commons-logging-1.1.3.jar - F:\Eclipse_JAR_Imports_Final
guava-11.0.2.jar - F:\Eclipse_JAR_Imports_Final
hadoop-auth-2.8.0.jar - F:\Eclipse_JAR_Imports_Final
hadoop-common-2.8.0.jar - F:\Eclipse_JAR_Imports_Final
hadoop-mapreduce-client-common-2.8.0.jar - F:\Eclipse_JAR_Imports_Final
hadoop-mapreduce-client-core-2.8.0.jar - F:\Eclipse_JAR_Imports_Final
hadoop-mapreduce-client-jobclient-2.8.0.jar - F:\Eclipse_JAR_Imports_Final
hadoop-mapreduce-client-shuffle-2.8.0.jar - F:\Eclipse_JAR_Imports_Final
hadoop-yarn-api-2.8.0.jar - F:\Eclipse_JAR_Imports_Final
Add JARs...
Add External JARs...
Add Variable...
Add Library...
Add Class Folder...
Add External Class Folder...
Edit...
Remove
Migrate JAR File...
Apply
Apply and Close
Cancel

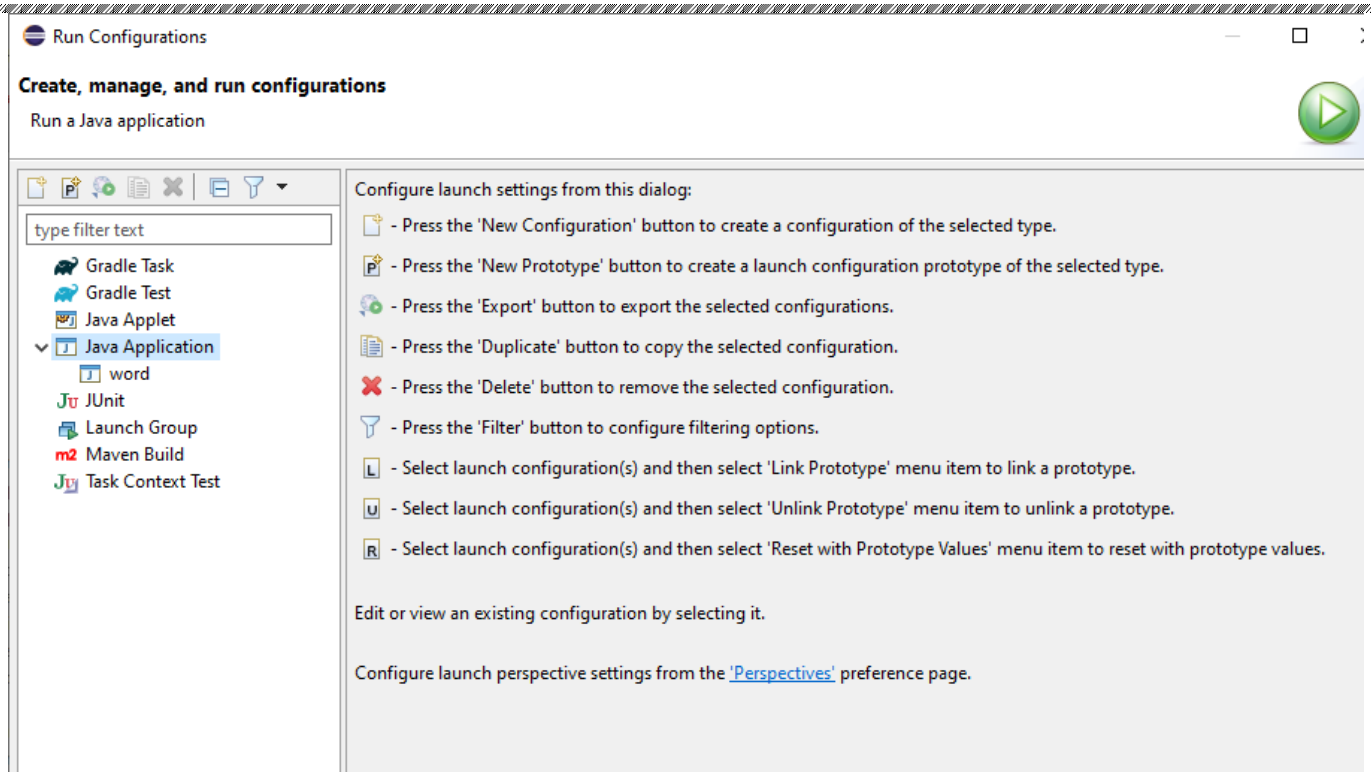

eclipse-workspace - ex8cloud/src/ex8cloud/wordcount.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer
wordcount.java
*wordcount.
New
Go Into
Open in New Window
Open Type Hierarchy F4
Show In Alt+Shift+W
Copy Ctrl+C
Copy Qualified Name
Paste Ctrl+V
Delete Delete
Remove from Context Ctrl+Alt+Shift+Down
Build Path
Source Alt+Shift+S
Refactor Alt+Shift+T
Java Project
Maven Project
Project...
Package
Class
Interface
Enum
Record
Annotation
Source Folder
Java Working Set
Folder
File
Untitled Text File

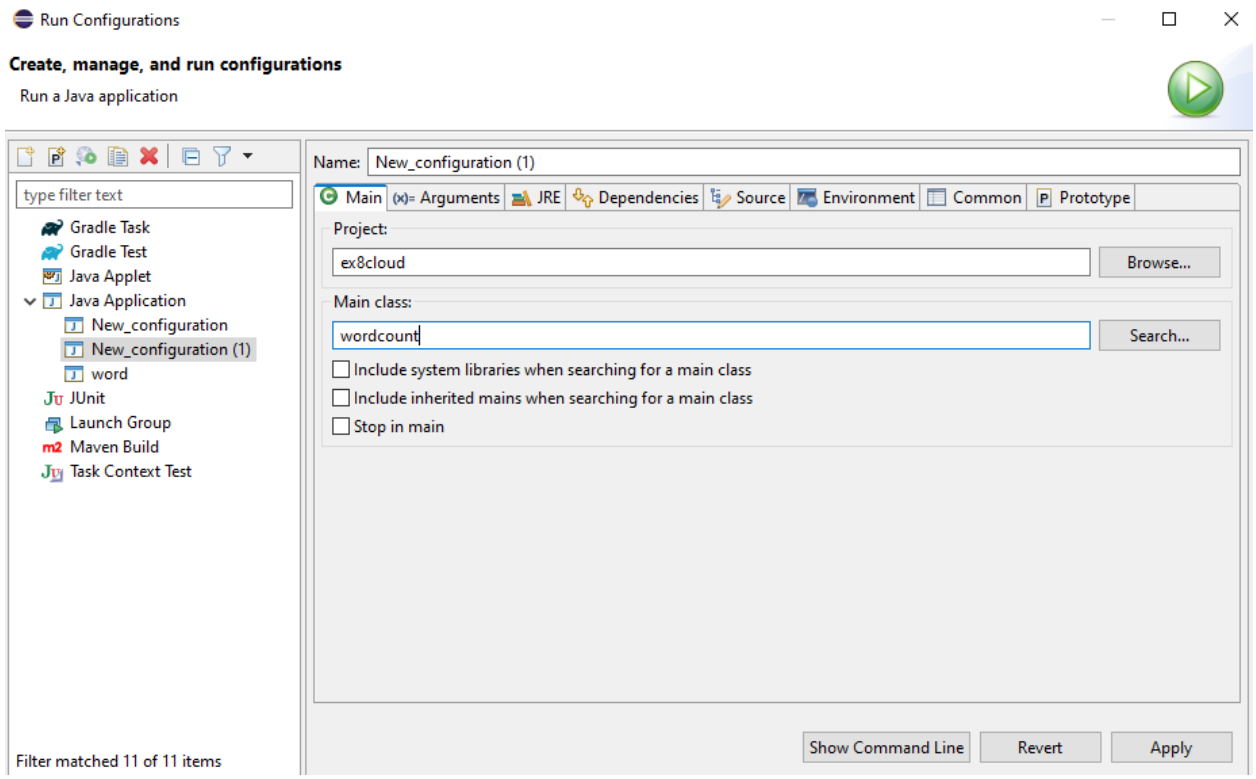


Create New Text file

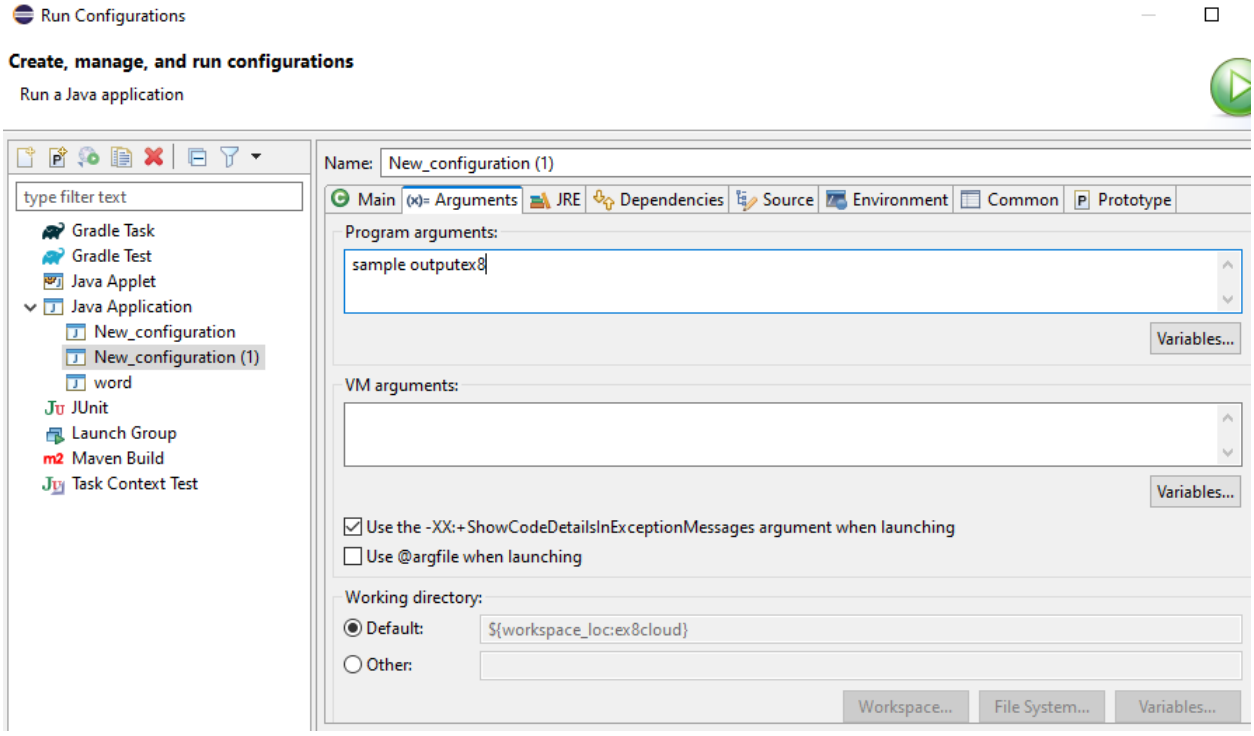


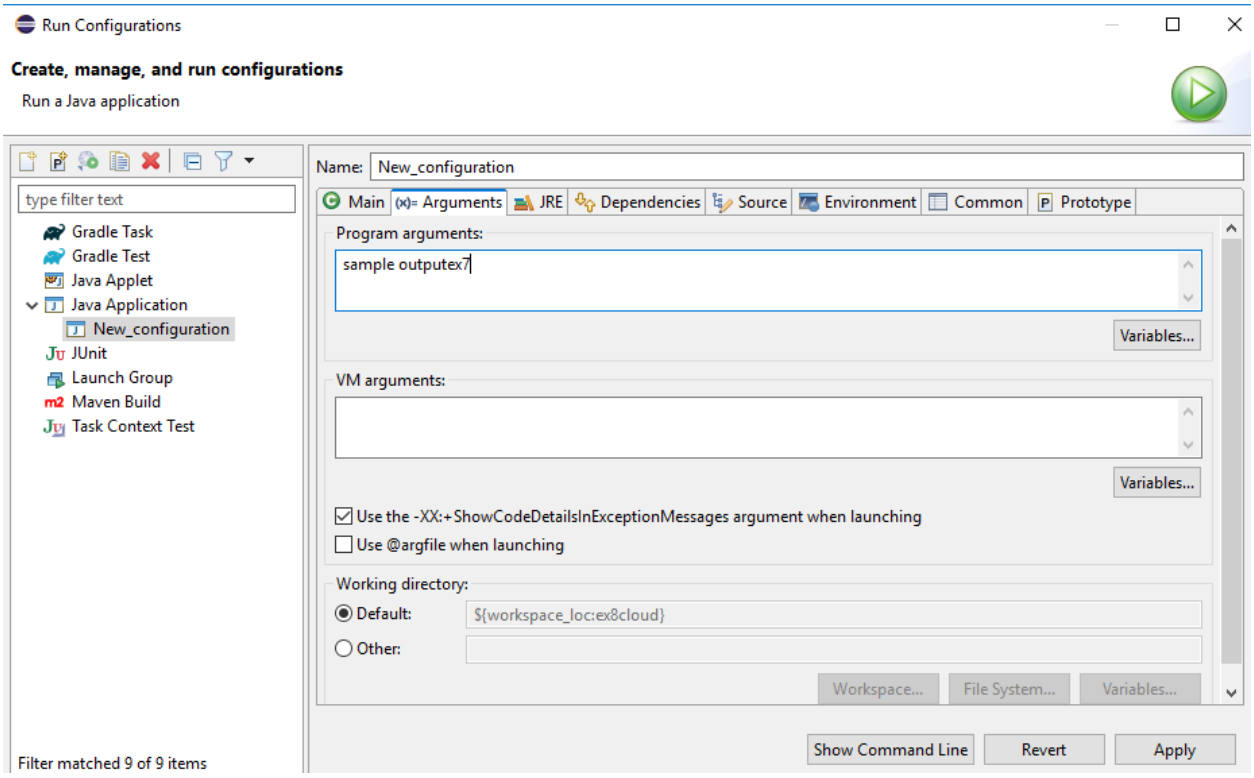
Type Words





Run Java Configuration


Run Configurations
Create, manage, and run configurations
Run a Java application
type filter text
Gradle Task
Gradle Test
Java Applet
Java Application
New_configuration
New_configuration (1)
word
JUnit
Launch Group
Maven Build
Task Context Test
Name: New_configuration (1)
Main
Arguments
JRE
Dependencies
Source
Environment
Common
Prototype
Program arguments:
sample outputex8
Variables...
VM arguments:
Variables...
Use the -XX:+ShowCodeDetailsInExceptionMessages argument when launching
Use @argfile when launching
Working directory:
Default:
${workspace_loc:ex8cloud}
Other:
Workspace...
File System...
Variables...


Run Configurations
Create, manage, and run configurations
Run a Java application
type filter text
Gradle Task
Gradle Test
Java Applet
Java Application
New_configuration
JUnit
Launch Group
Maven Build
Task Context Test
Filter matched 9 of 9 items
Name: New_configuration
Main
Arguments
JRE
Dependencies
Source
Environment
Common
Prototype
Program arguments:
sample outputex7
Variables...
VM arguments:
Variables...
Use the -XX:+ShowCodeDetailsInExceptionMessages argument when launching
Use @argfile when launching
Working directory:
Default:
${workspace_loc:ex8cloud}
Other:
Workspace...
File System...
Variables...
Show Command Line
Revert
Apply

ex8cloud

Home Share View

This PC › Local Disk (C:) › Users › DCE › eclipse-workspace › ex8cloud

Name	Date modified	Type	Size
.settings	19-02-2024 16:06	File folder	
bin	19-02-2024 16:12	File folder	
src	19-02-2024 16:12	File folder	
.classpath	19-02-2024 16:11	CLASSPATH File	4 KB
.project	19-02-2024 16:06	PROJECT File	1 KB
sample	19-02-2024 16:15	File	1 KB

ex8cloud

Share View

This PC › Local Disk (C:) › Users › admin › eclipse-workspace › ex8cloud

Name	Date modified	Type
.settings	2/19/2024 8:53 PM	File folder
bin	2/19/2024 8:59 PM	File folder
outputex7	2/19/2024 9:00 PM	File folder
src	2/19/2024 8:54 PM	File folder
.classpath	2/19/2024 8:55 PM	CLASSPATH File
.project	2/19/2024 8:53 PM	PROJECT File
sample	2/19/2024 8:57 PM	File

outputex7

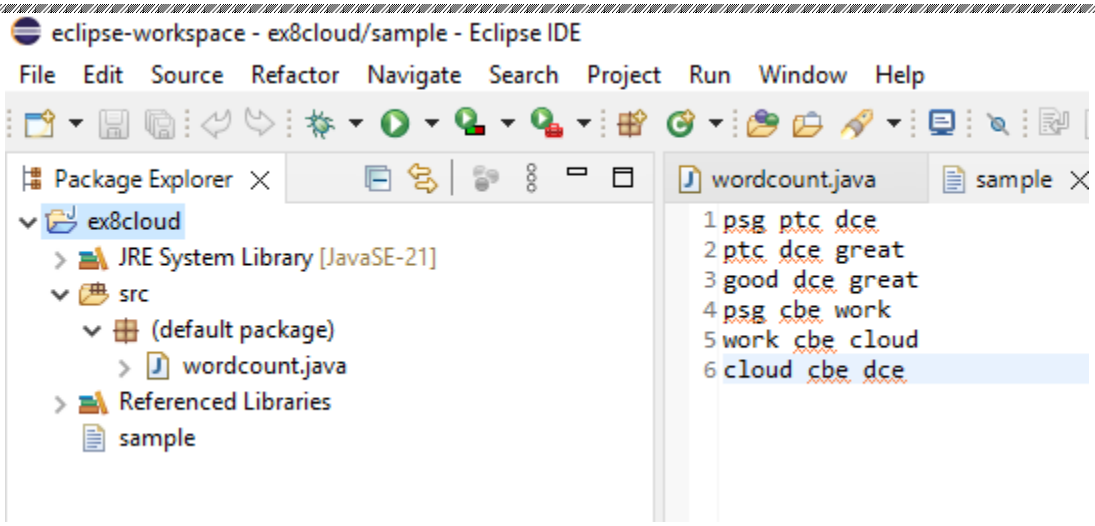
Share View

This PC › Local Disk (C:) › Users › admin › eclipse-workspace › ex8cloud › outputex7

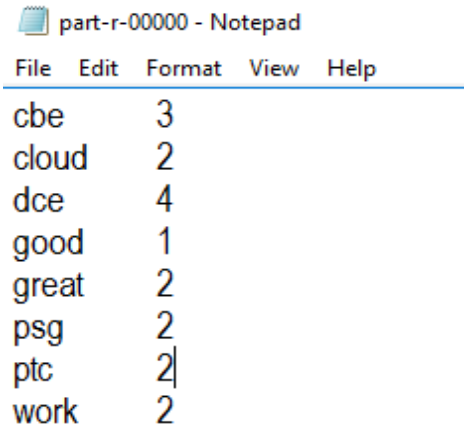
Name	Date modified	Type
._SUCCESS.crc	2/19/2024 9:00 PM	CRC File
.part-r-00000.crc	2/19/2024 9:00 PM	CRC File
_SUCCESS	2/19/2024 9:00 PM	File
part-r-00000	2/19/2024 9:00 PM	File

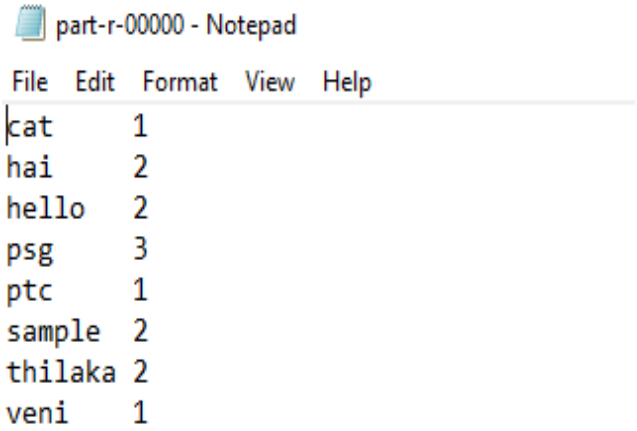
wordcount.java | sample

```
psg ptc dce
ptc dce great
good dce great
psg cbe work
work cbe cloud
cloud cbe dce
```



Output





Result

Thus the application like word count was created using hadoop.

Ex.No 8 **Build the own private cloud using Eucalyptus**

Aim

To Build the own private cloud using Eucalyptus.

Softwares Required

- faststart-3.4.1
- VMware workstation Pro

Eucalyptus

Eucalyptus is a Linux-based open-source software architecture for cloud computing and also a storage platform that implements Infrastructure a Service (IaaS). It provides quick and efficient computing services. Eucalyptus was designed to provide services compatible with Amazon's EC2 cloud and Simple Storage Service (S3).

The Eucalyptus cloud platform primarily comprises of five main components, each briefly explained below:

Cloud controller (CLC): The cloud controller is essentially a Web-based interface between Eucalyptus and the outside world. It provides cloud administrators an interface with which they can configure and manage the cloud's underlying compute, storage and network resources. It also handles high-level user authentication, quota management along with a few basic accounting and reporting mechanisms. Users can also query the CLC using Eucalyptus's command line tools called Euca2ools.

Walrus: Walrus provides persistent storage capabilities to all of the virtual machines in the Eucalyptus cloud. It is basically a large storage container where users can upload data from any file type using simple HTTP put-get queries.

Cluster controller (CC): A typical Eucalyptus cloud set-up can comprise multiple nodes, which are actually hypervisors on which virtual machines are provisioned. These nodes can be collectively grouped and managed by using the cluster controller, which primarily looks after the inter-node communications and Service Level Agreements (SLAs) of each cluster.

Storage controller (SC): The storage controller provides persistent block-level storage for virtual machines that are launched within a Eucalyptus cloud. The SC interfaces with a wide variety of storage systems including local file systems, NFS, SAN and even iSCSI.

Node controller (NC): Node controllers or nodes are hypervisor-based virtualised servers that host virtual machines which are provisioned by the Eucalyptus cloud. Eucalyptus additionally provides an optional add-in component that even supports VMware ESXi hypervisor as a node, called a VMware broker.

Features

The latest release of Eucalyptus (Version 3.3.2) introduces many new features, some of which are explained below.

Auto-scaling: Mirrored on the concept of auto-scaling by AWS, Eucalyptus too provides similar APIs that help cloud administrators set rules and policies that enable applications running on virtual machines to scale-up and scale-down dynamically, based on fluctuating workloads.

Elastic load balancing: This is basically a service that provides better availability and scalability for applications running atop the Eucalyptus cloud. It automatically senses and distributes incoming application traffic and service calls across multiple running instances, thus improving the performance and uptime of the application.

CloudWatch: This provides monitoring for virtual machines and applications hosted on the Eucalyptus cloud. Using CloudWatch, users can programmatically track, collect and analyse metrics, set alarms to troubleshoot performance issues and take automated action as well, based on the state of the cloud environment.

Resource tagging: This allows users and cloud administrators to assign meaningful metadata to cloud resources. This helps in tracking, as well as eases management and monitoring of specific resource collections used across the cloud.

Maintenance mode: This feature enables cloud administrators to perform maintenance activities on the Eucalyptus cloud without any potential downtime. This helps make sure that the applications hosted on the cloud are always running and that they meet the required SLA levels as well.

Launching your first instance

To launch your first instance, all you need to do is follow these simple steps:
1) Create a security group: A security group is similar to a firewall that protects your instance against network-related attacks. By default, all inbound traffic to the instance is blocked.

Once your group is created, open the necessary ports such as SSH port 22 to obtain access to the instance.

2) Create a key pair: A key pair acts as an authentication token between the users and their instances.

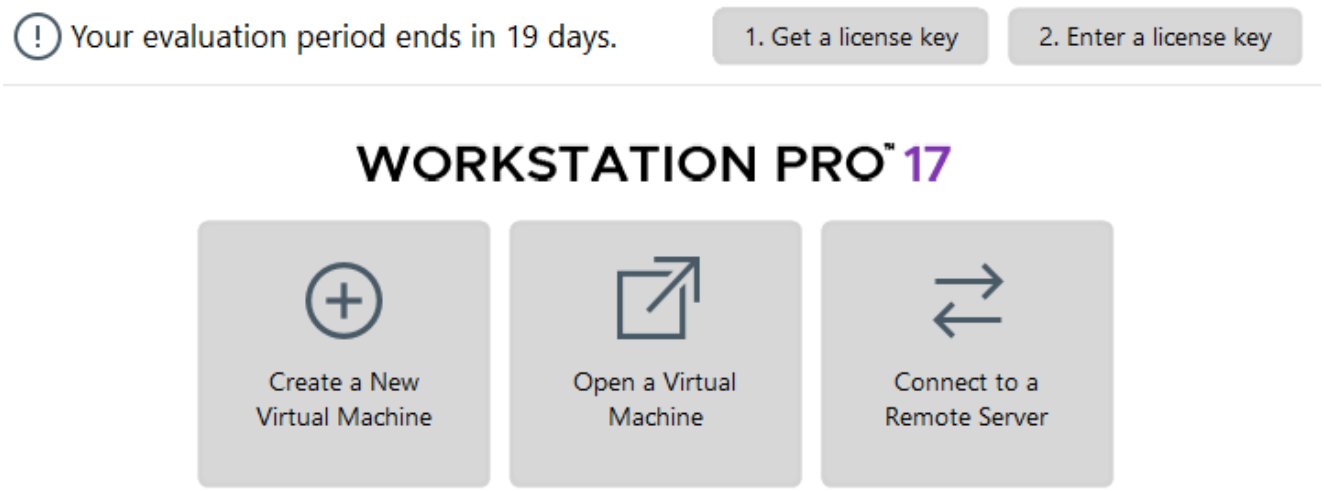
3) Launch the instance: An instance is launched from a machine image (in this case, EMI). You will require an EMI ID to launch your first instance. This can be obtained from the Eucalyptus cloud user console.

The instance can take a couple of seconds to launch. You need to note down the instance IP address either from the terminal or by using the Eucalyptus cloud user console.

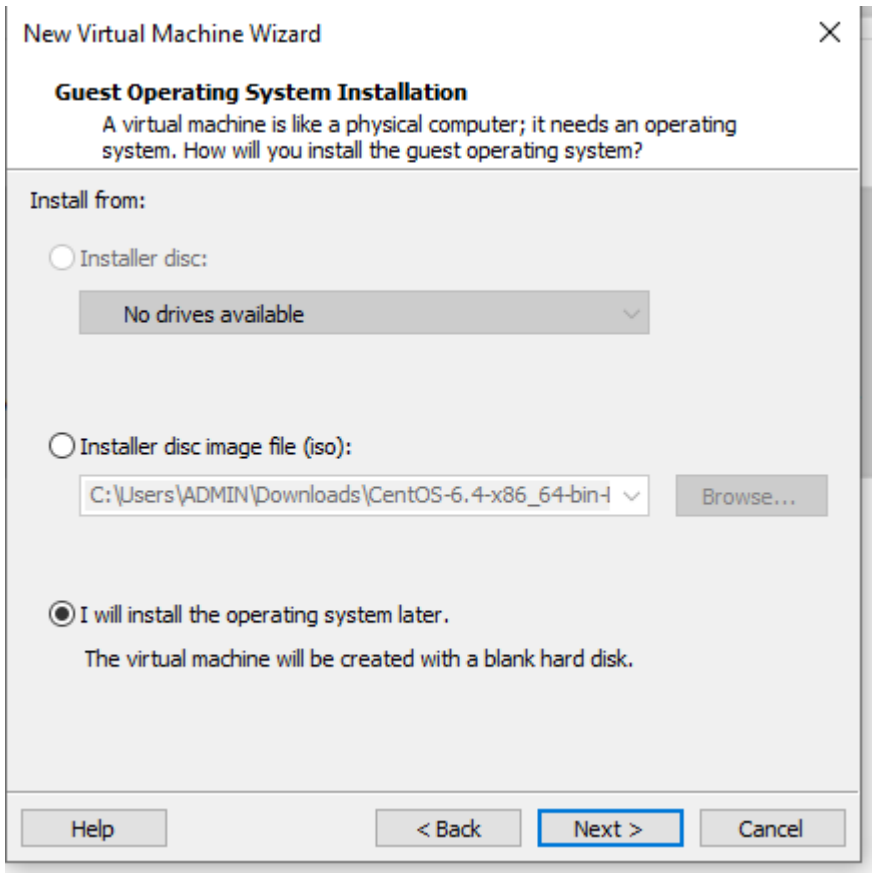
To install Cloud-in-a-Box:

1. Boot the target system from the Eucalyptus Faststart media. Wait for the boot screen to load. When the boot screen loads, select "Install CentOS 6 with Eucalyptus Cloud-in-a-box"
2. You may be asked to check the media, to ensure that there are no data issues. You may check the media, or you may Skip to move on to the next step. You will then be asked to select language and keyboard options. (Note that Faststart instructions are currently available in English only.)

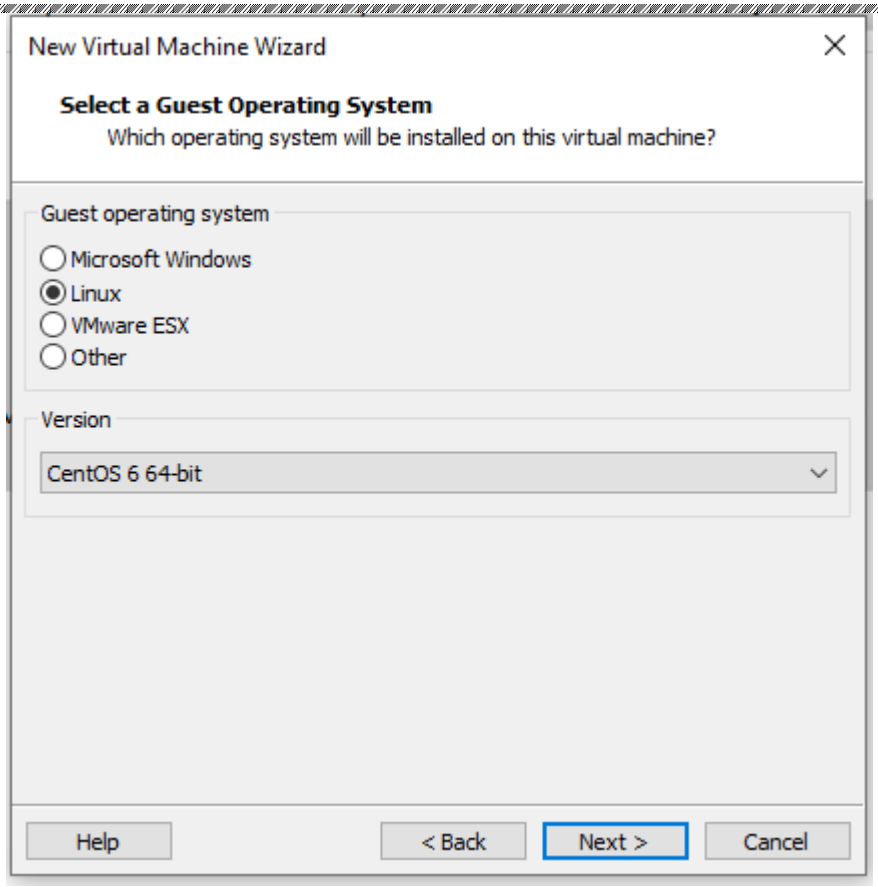
3. Next, you will be asked for network information. For Network Interface, select your ethernet interface (usually eth0). For Mode, Static is recommended; DHCP will work in many cases, but if DHCP leases change, your Eucalyptus cloud will no longer be functional. Also enter IP address, Netmask, Default Gateway, and a comma-delimited list of DNS servers.
4. Next, you will be asked to select timezone, and after that you will be asked to enter the root password for the system.
5. Next, you will be asked for cloud configuration options. Most are defaults that you should not touch unless you are an experienced Eucalyptus administrator; see the Administration Guide for details. The one parameter you must enter here is the range of public IP addresses. New virtual instances created by Eucalyptus will receive IP addresses from within this specified range. Enter the lower and higher range of available public IP addresses, a dash between them (e.g.: 192.168.1.200-192.168.1.240).
6. Next, you will be asked for disk install options. Eucalyptus is intended to be the primary application on the system; by default, it will take up all disk space on the system. Experienced Linux admins can set up a separate partition for Eucalyptus here.
7. At this point, the Eucalyptus installation will begin. Software will be installed, and a default Eucalyptus machine image (EMI) will be built. When this process is completed, you will be prompted to reboot the system.
8. When the system reboots, you will be prompted for a series of questions during the firstboot process. You will be asked to accept the license, create a non-root login, and turn on NTP.



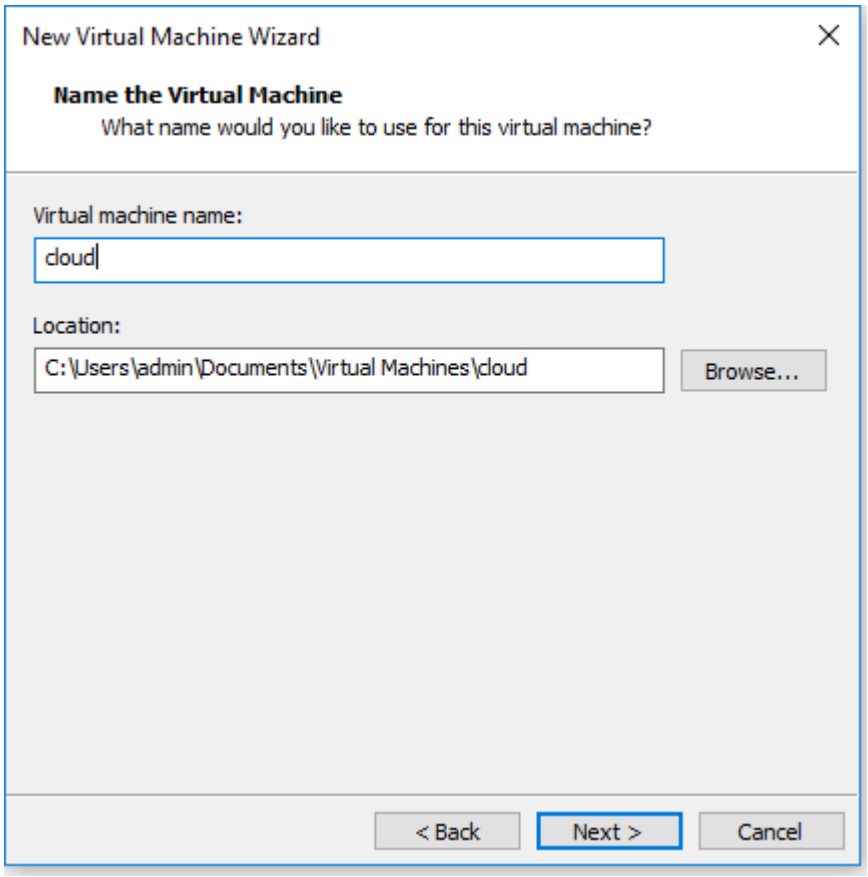
Create New virtual Machine



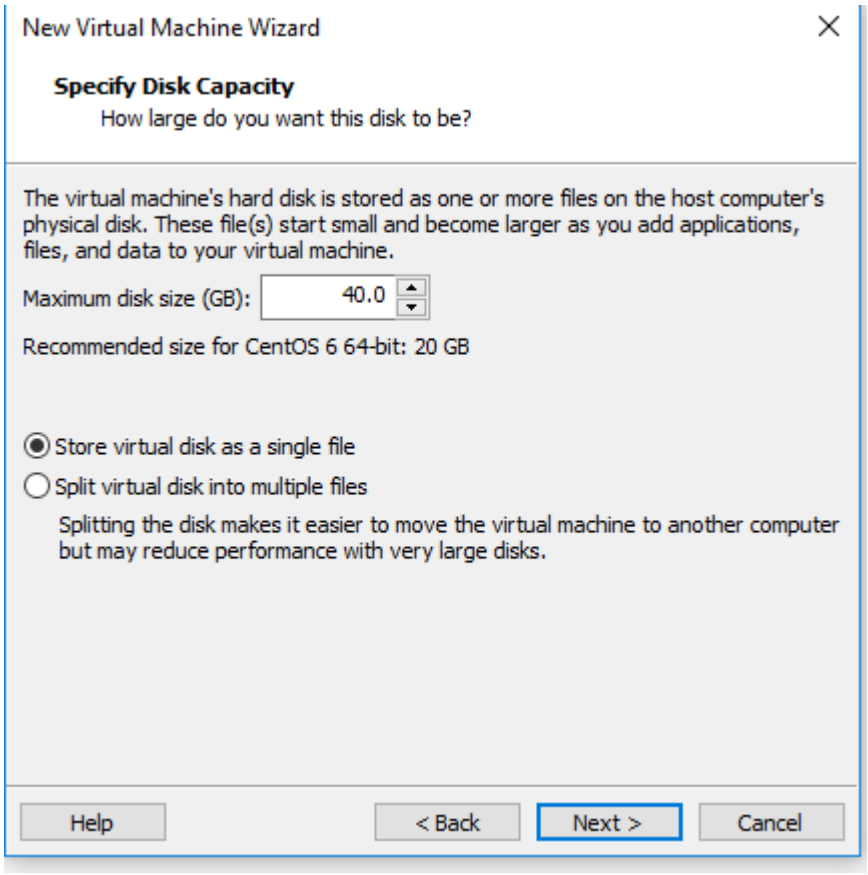
Select Guest Operating System



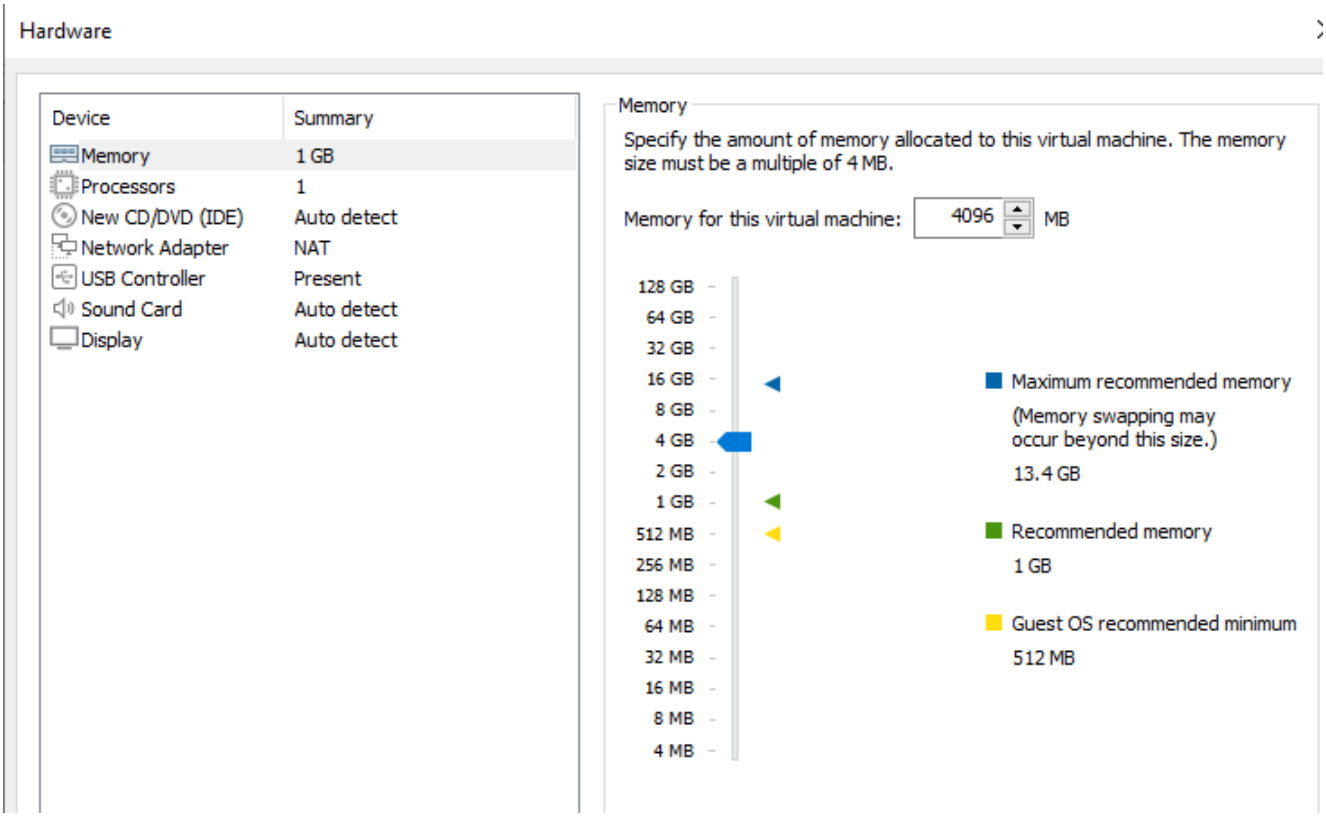
Select Guest OS as Linux

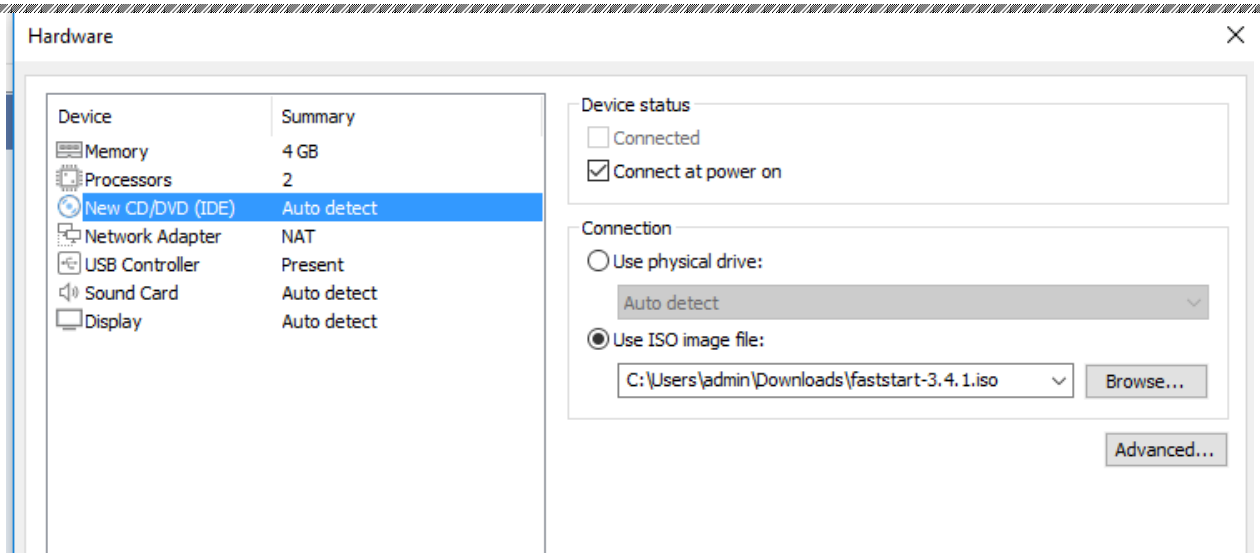


Give Virtual Machine Name

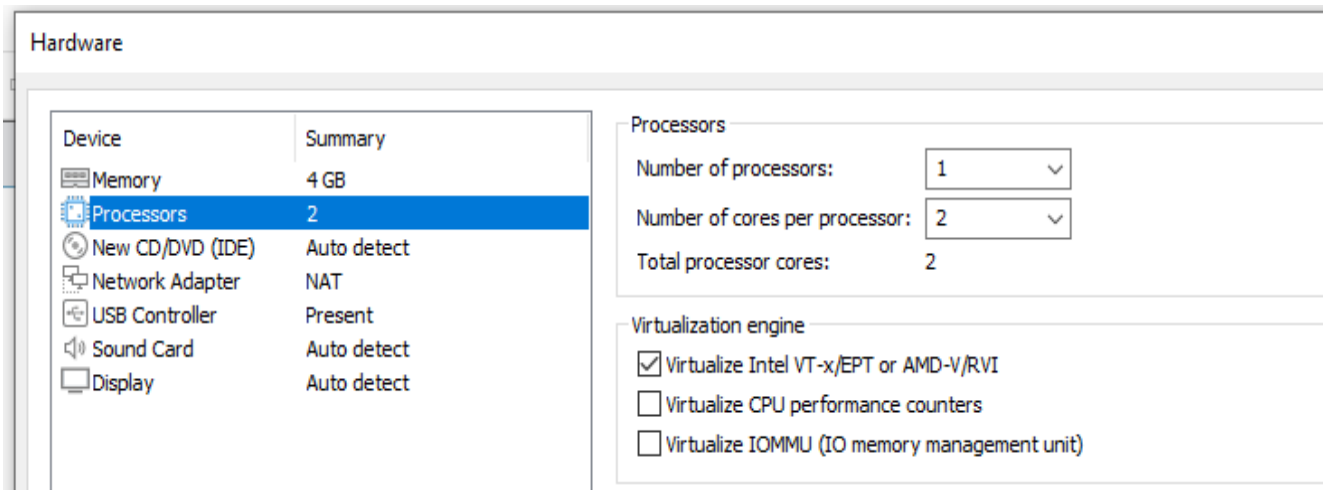


Select Disk Capacity

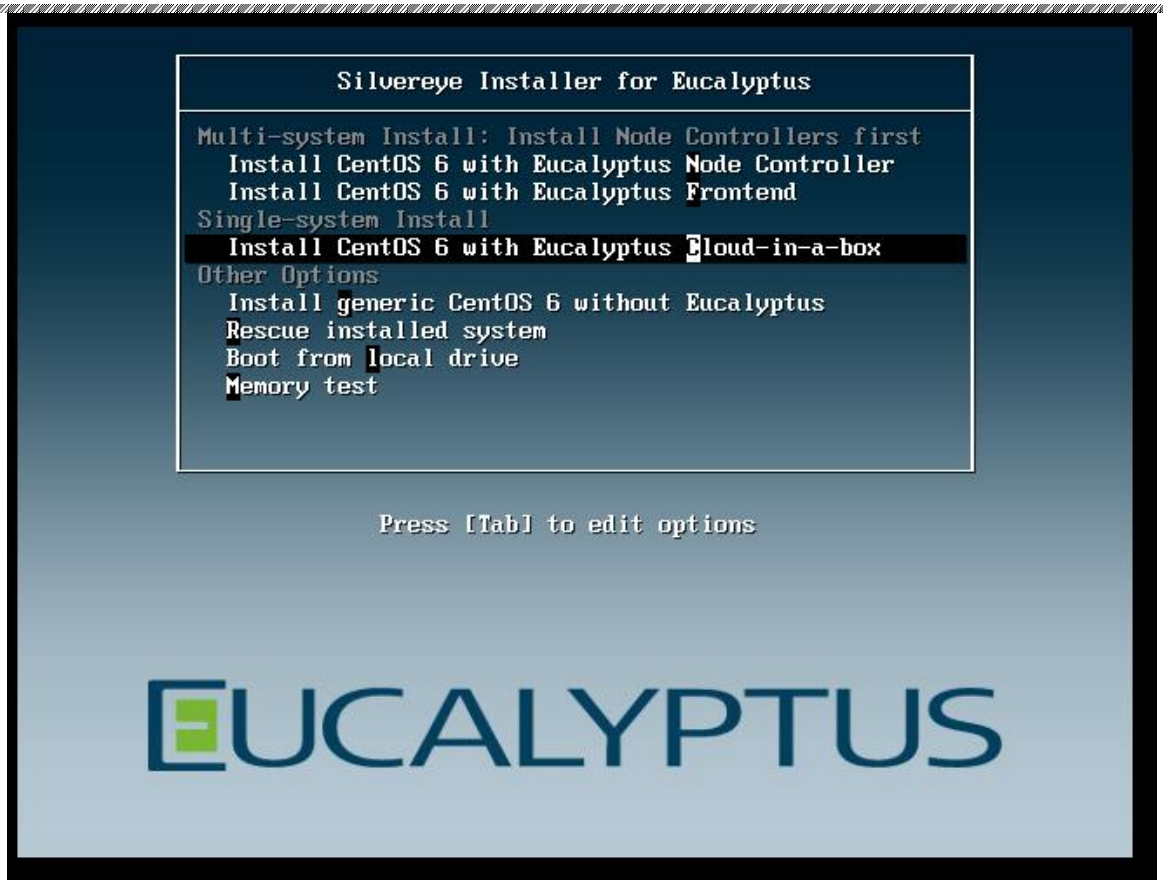




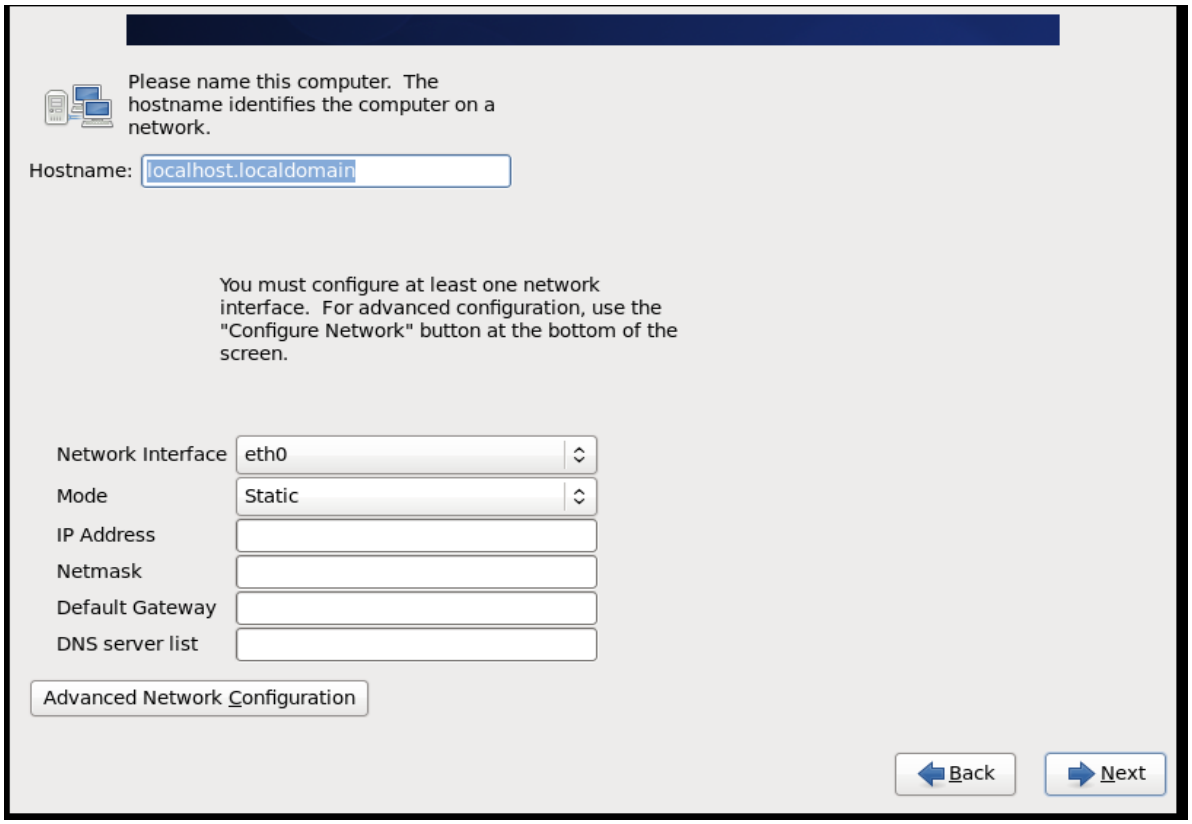
Select iso file



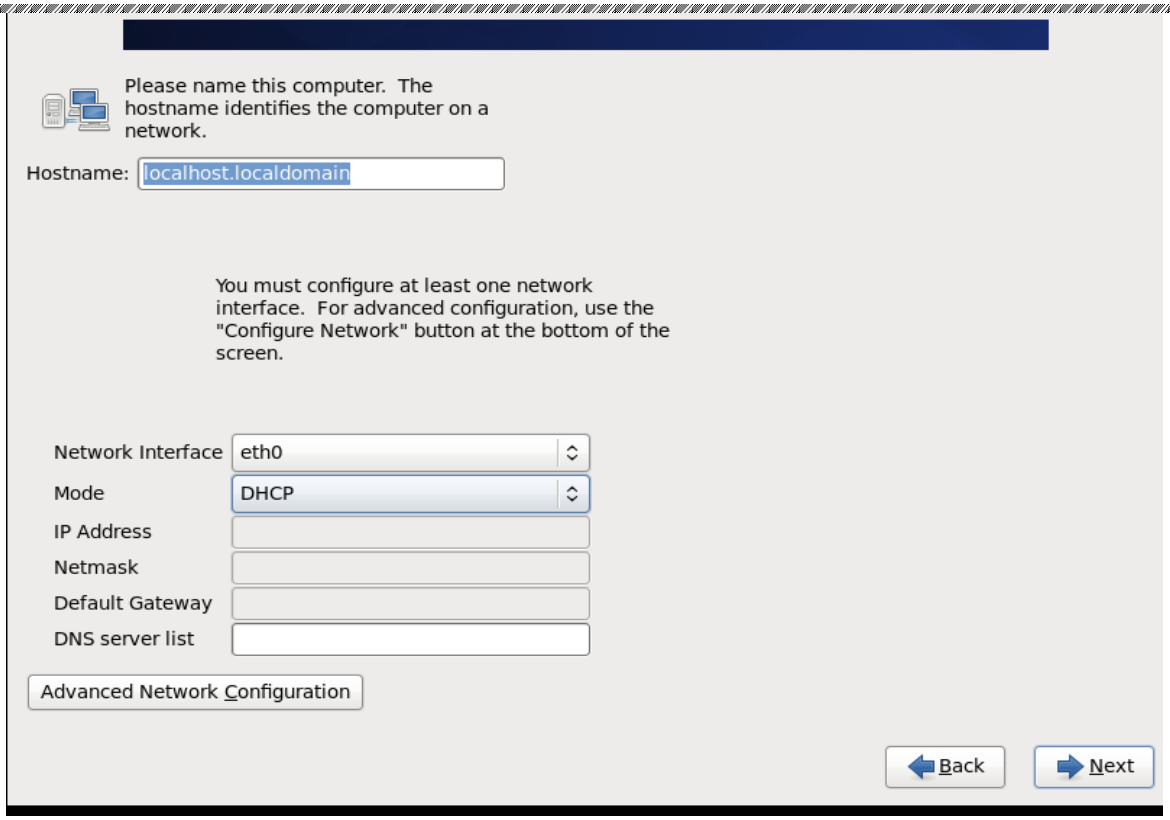
Enable Intel VT



Choose CentOS with Eucalyptus

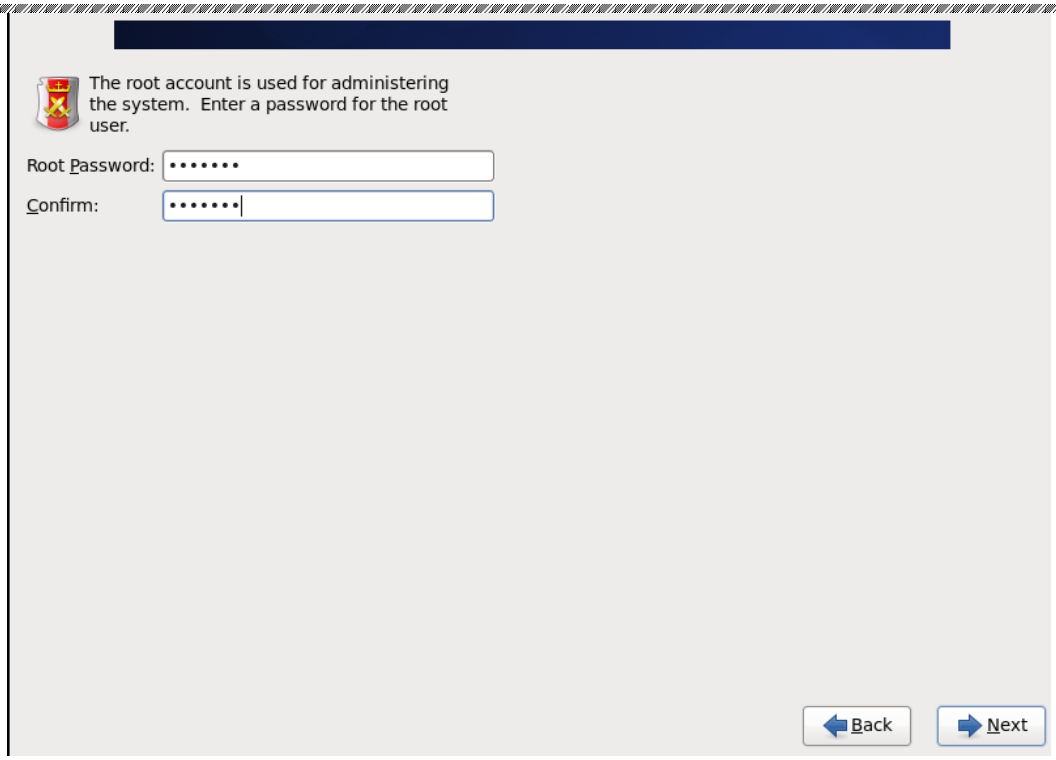


Configure Network Interface

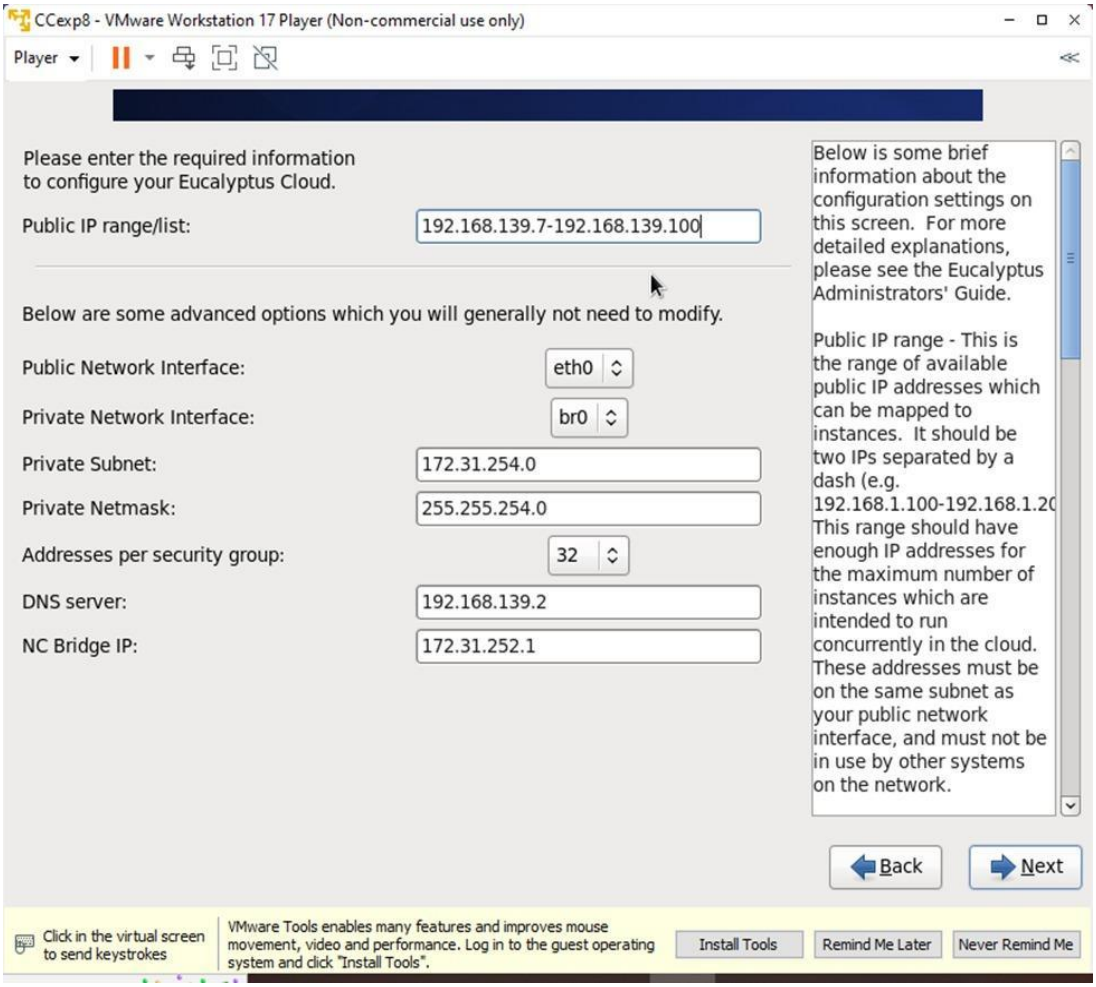


Select DHCP

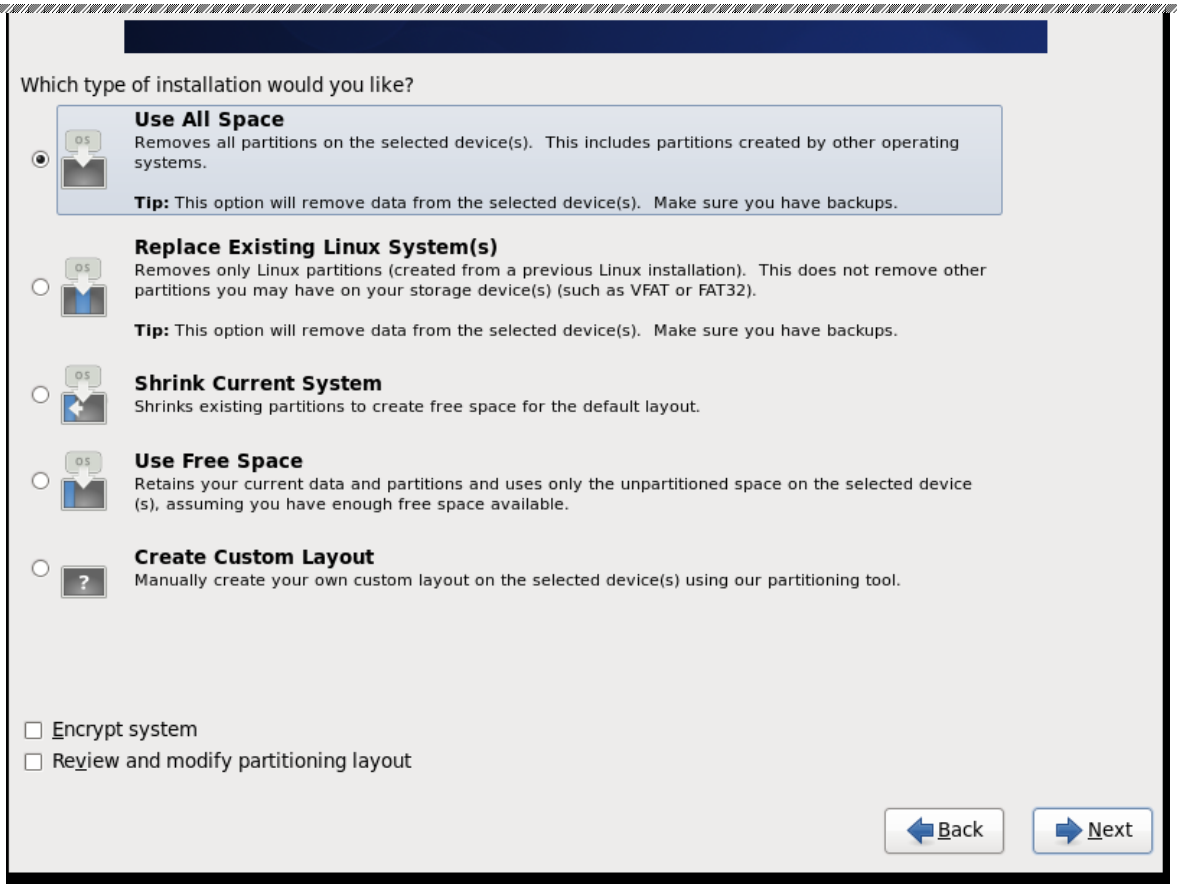
Select City



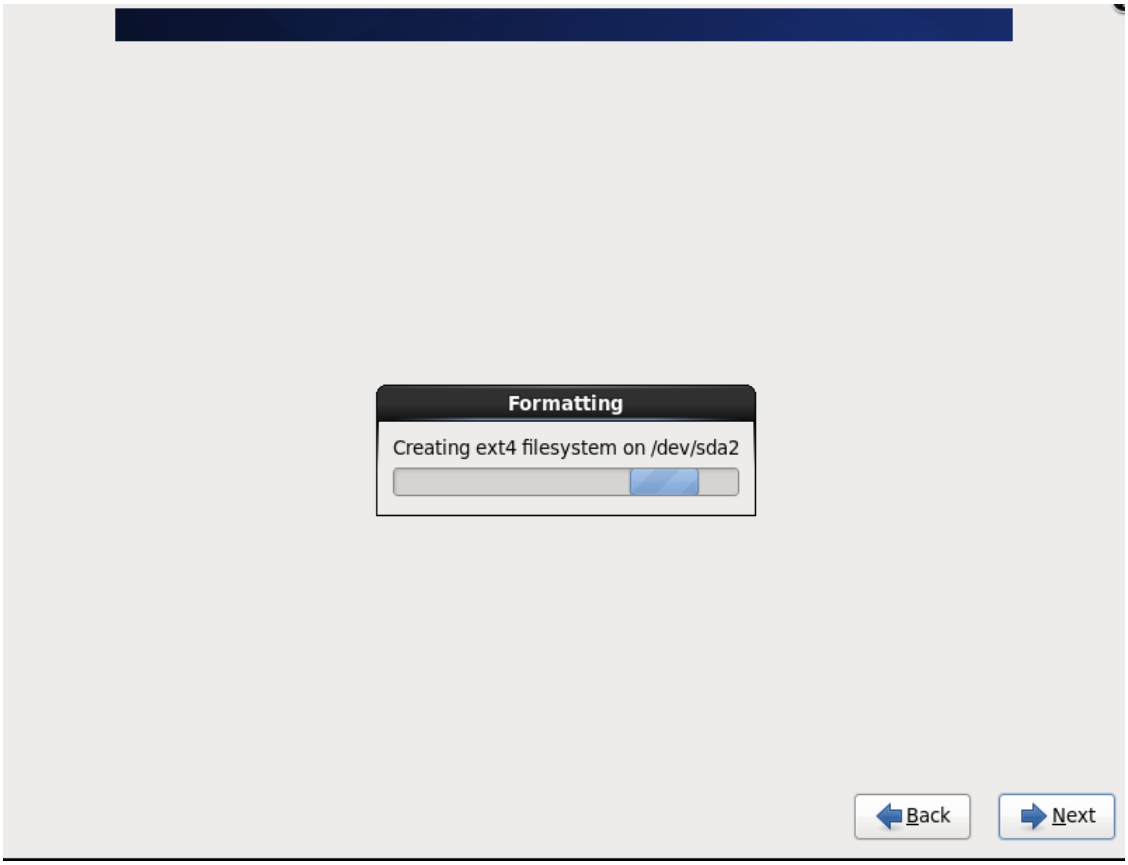
Type Root Password



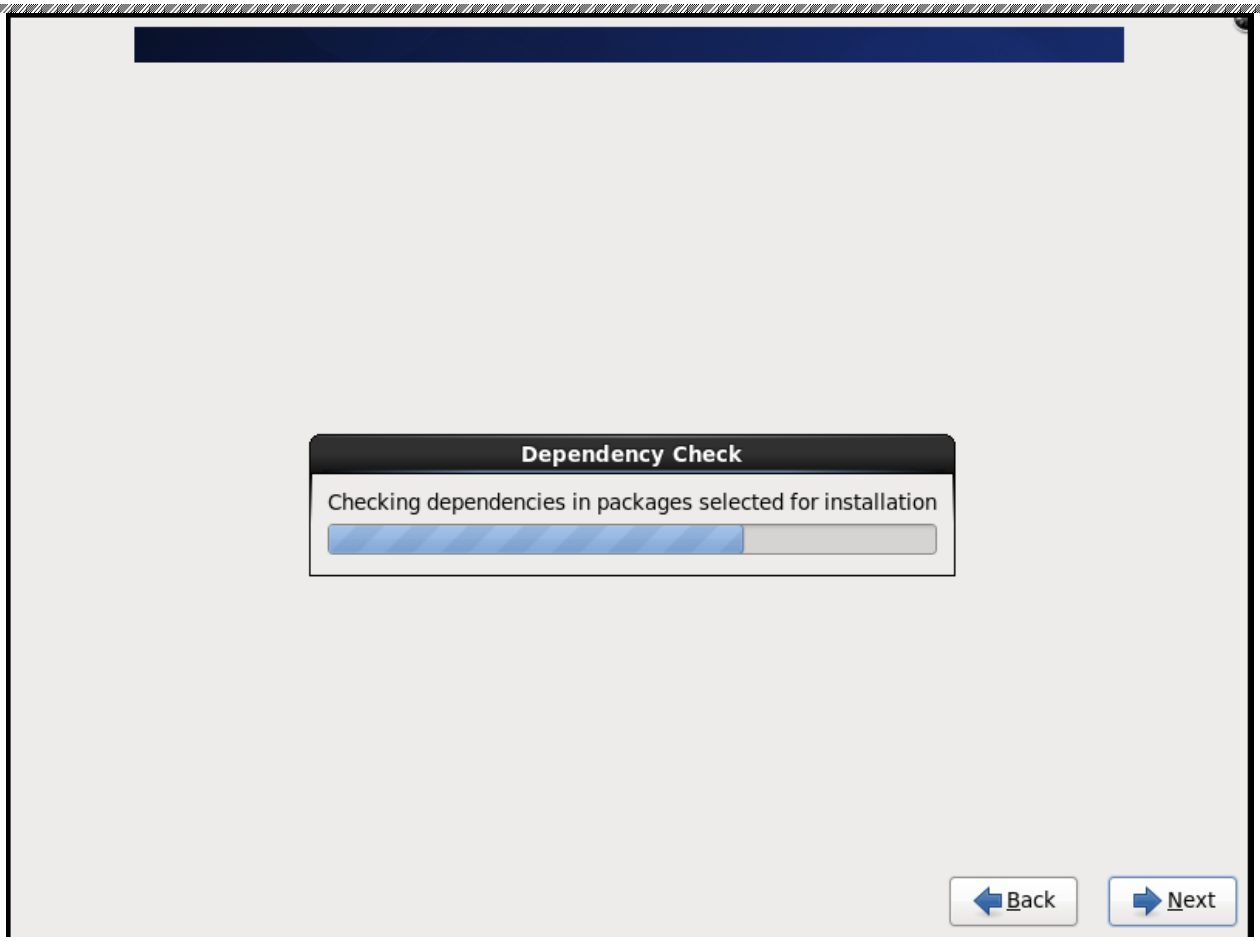
Give IP range

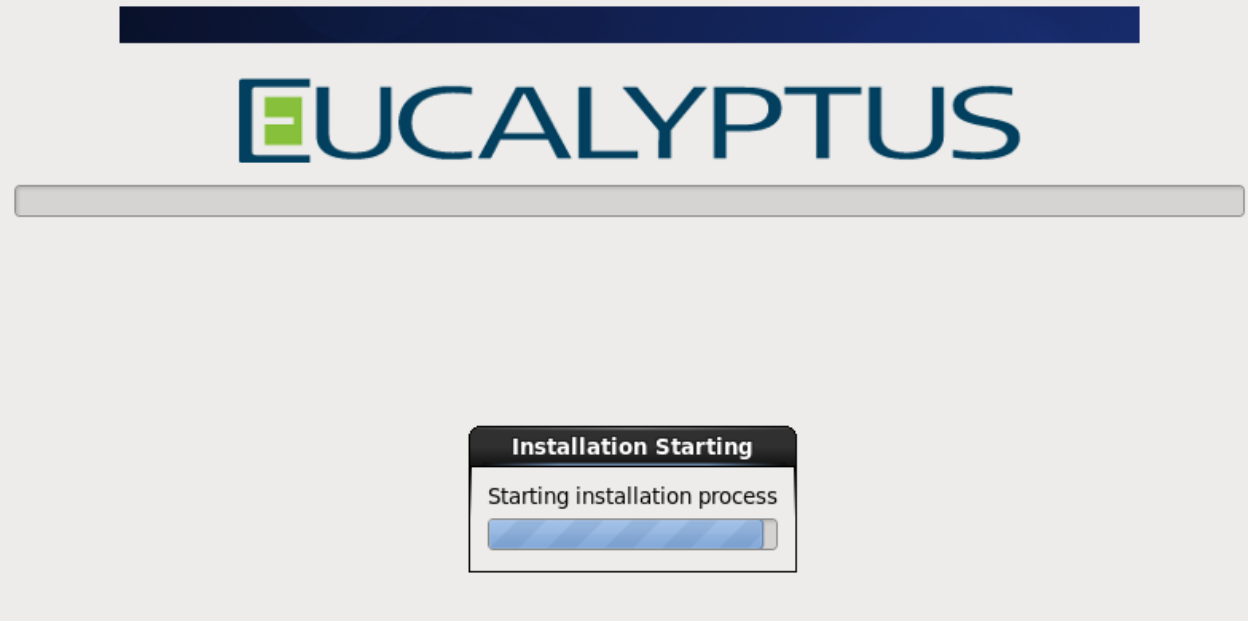


Select the type of installation

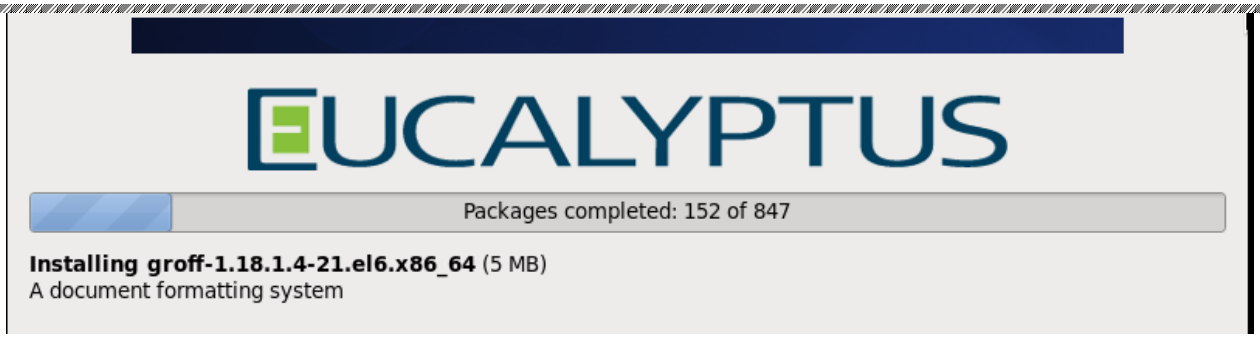


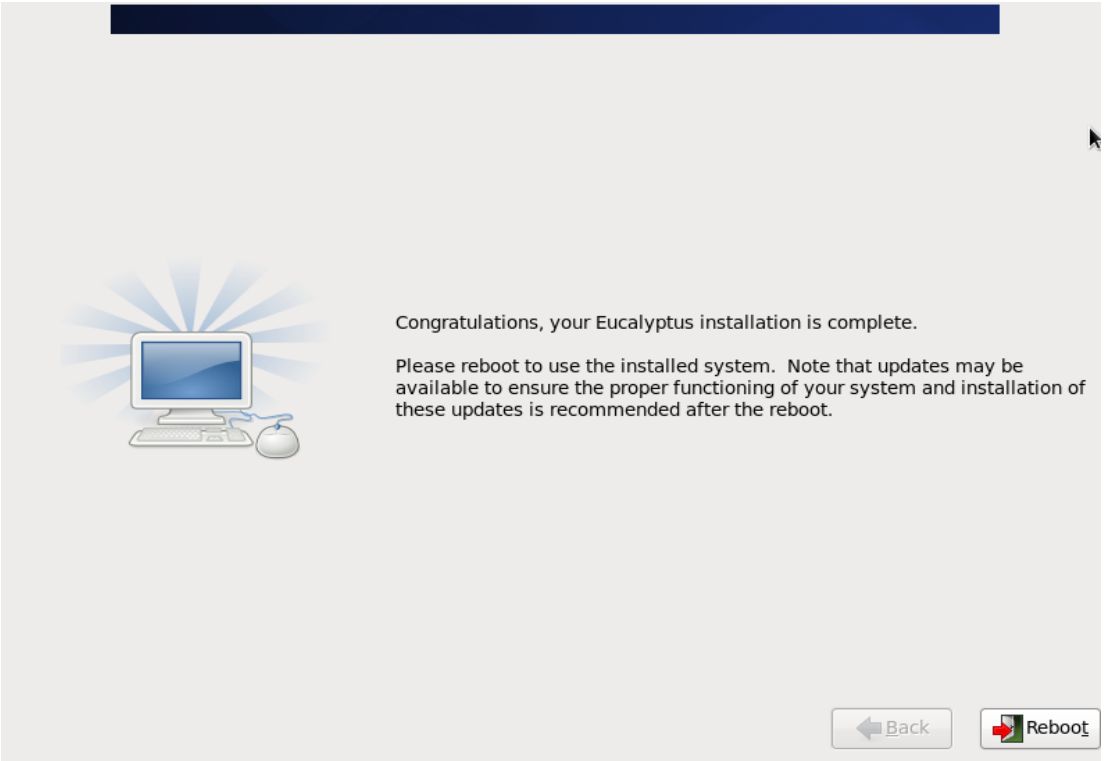
Creating filesystem





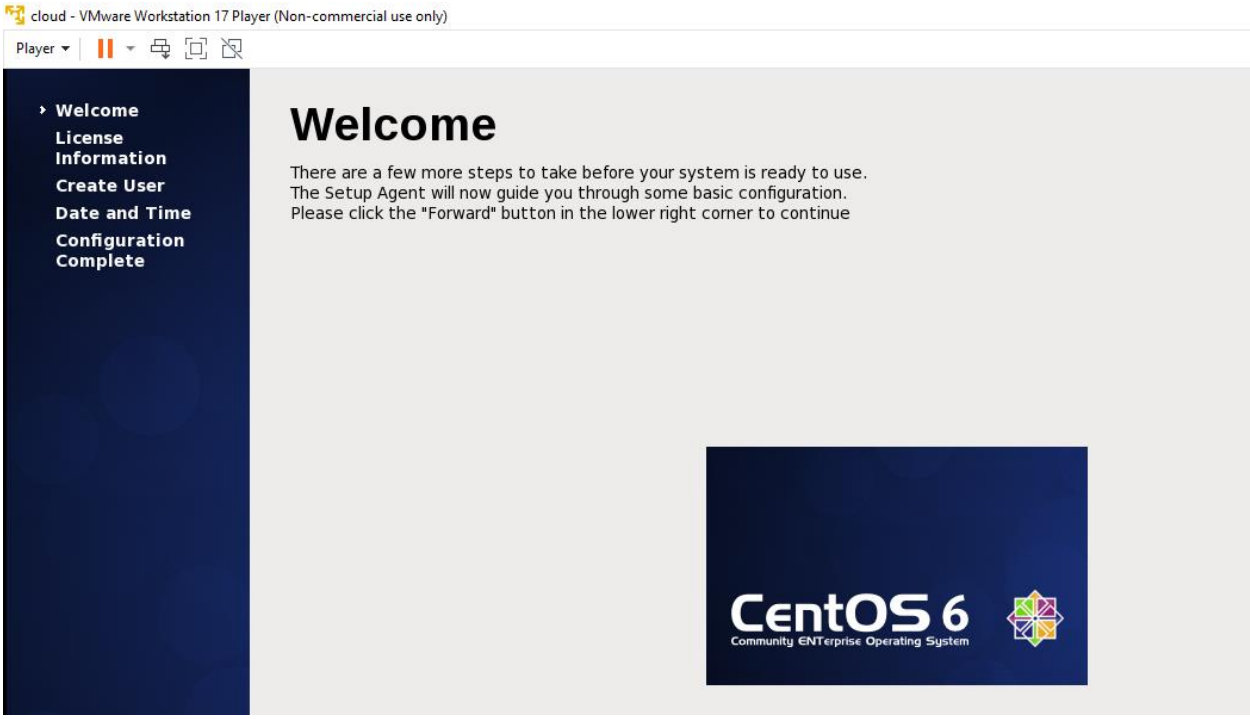
Installation starting

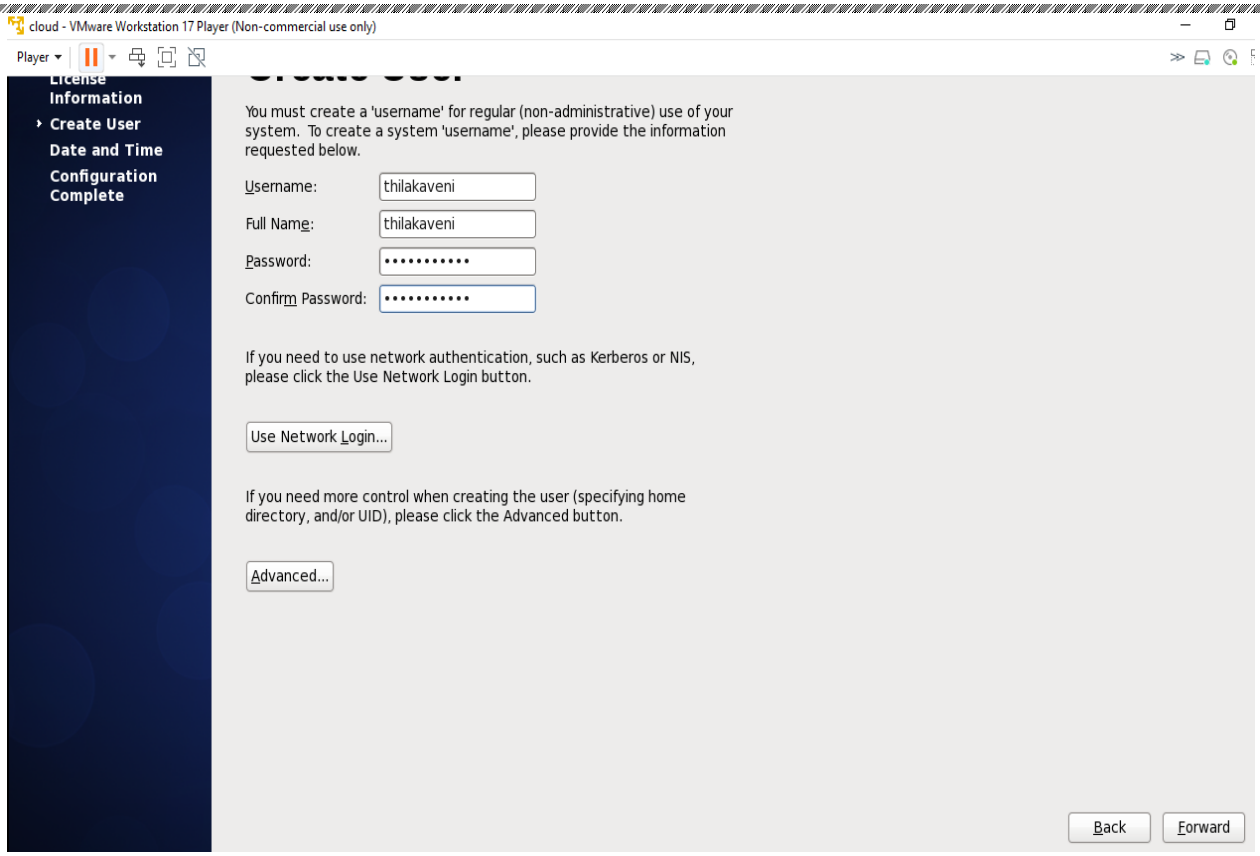




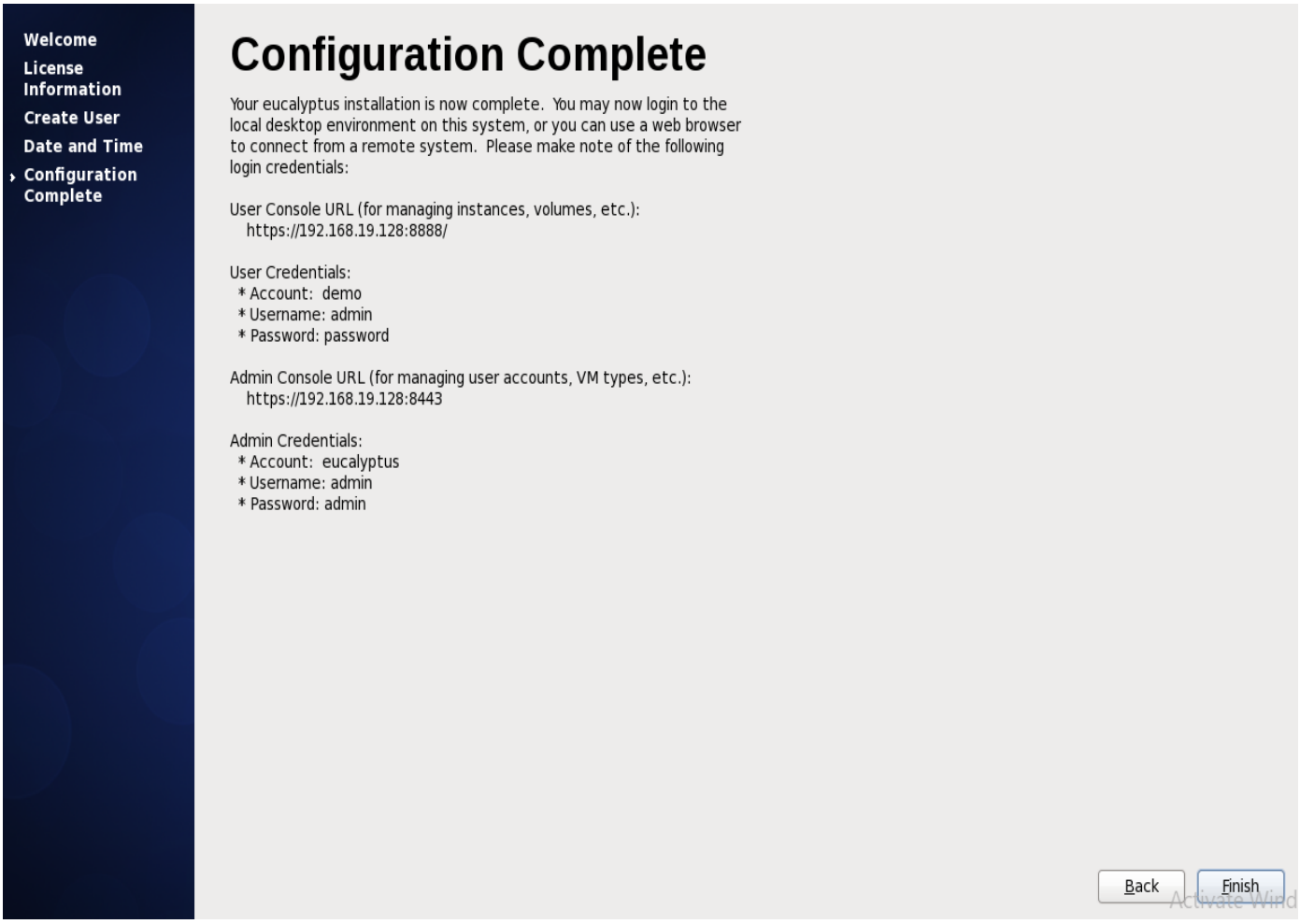
Reboot the Guest OS

```
Starting crond:                                            [  OK  ]
Generating public/private rsa key pair.
Created directory '/root/.ssh'.
Your identification has been saved in /root/.ssh/id_rsa.
Your public key has been saved in /root/.ssh/id_rsa.pub.
The key fingerprint is:
ed:41:81:e8:d8:78:70:63:2a:06:71:86:fe:04:b2:fc root@localhost.localdomain
The key's randomart image is:
+--[ RSA 2048]----+
|.oo    . ..      |
|++  . = .  .     |
|+o.  X .  .      |
|.oo.+ +  o       |
| .+. .  S o      |
|   E     . .     |
|          .      |
|                 |
|                 |
+-----------------+
Sun Feb  4 11:21:28 IST 2024- Generated root's SSH keys
Sun Feb  4 11:21:28 IST 2024- Appended root's public key to authorized_keys
Warning: Permanently added '192.168.40.128' (RSA) to the list of known hosts.
Warning: Permanently added '172.31.252.1' (RSA) to the list of known hosts.
Sun Feb  4 11:21:31 IST 2024- Initializing Cloud Controller
_
```

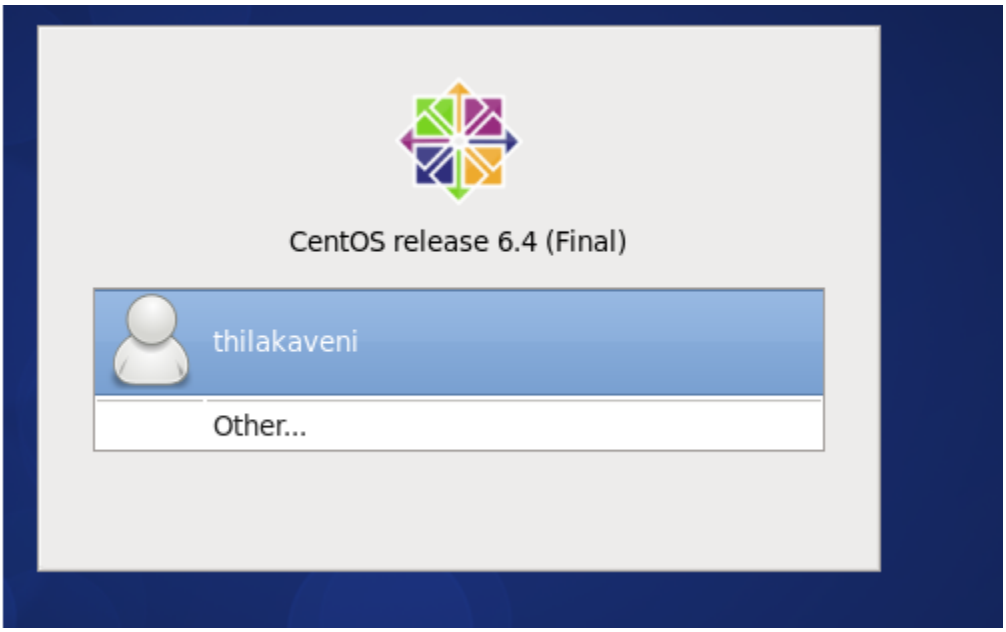


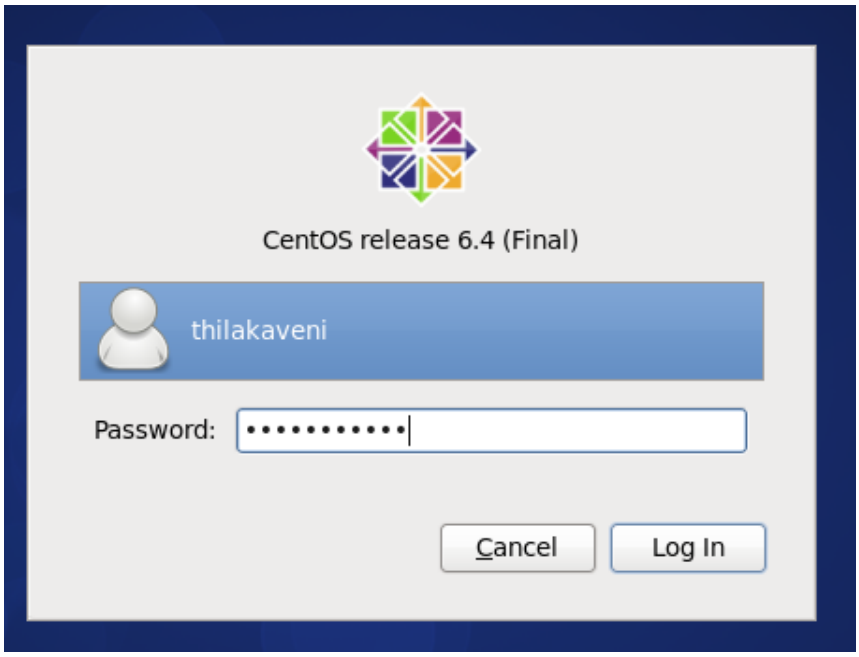


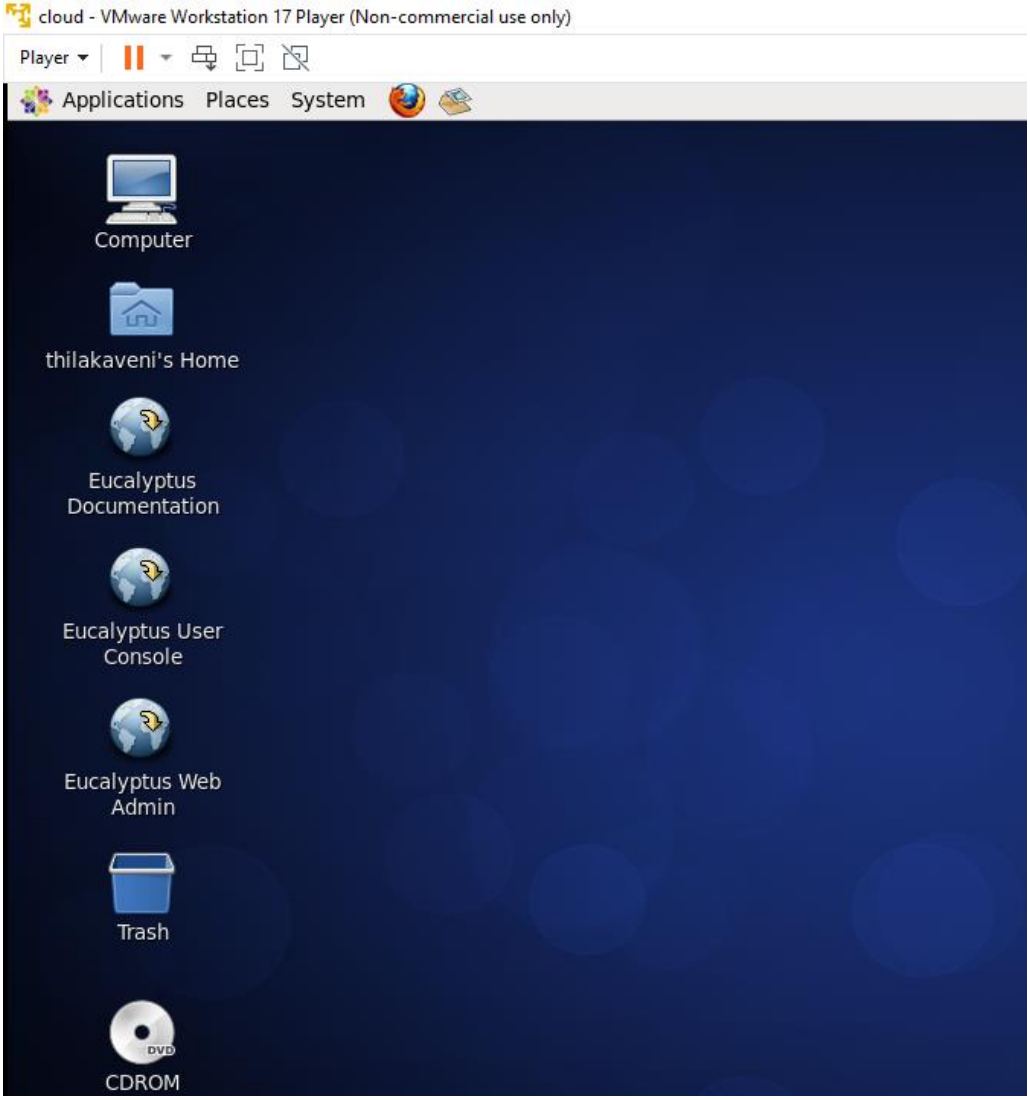
Set Username and Password



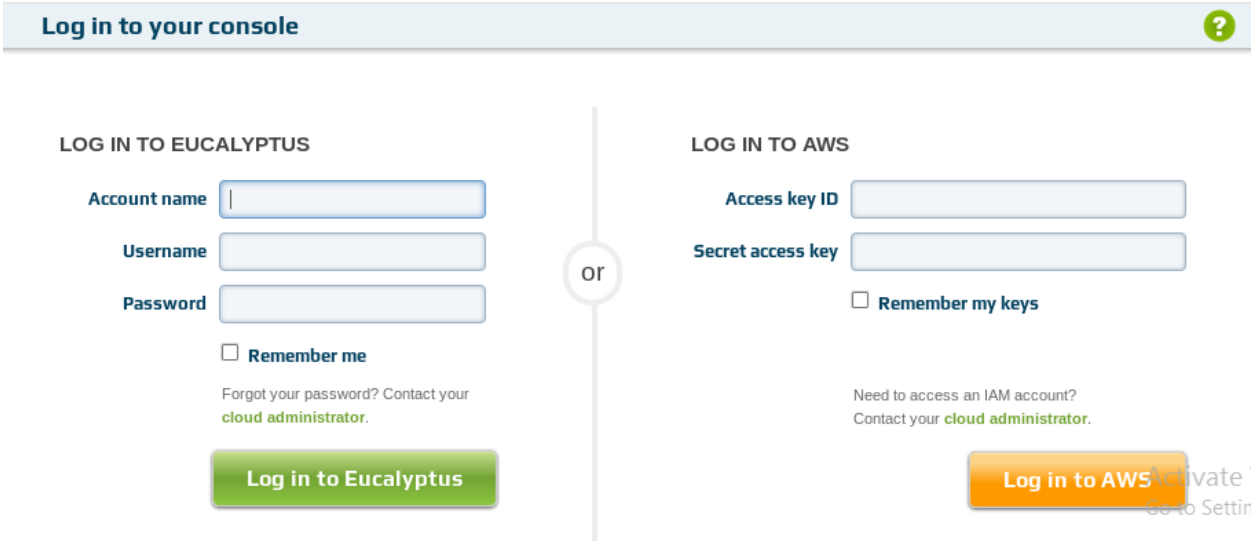
Configuration Completed. Click Finish

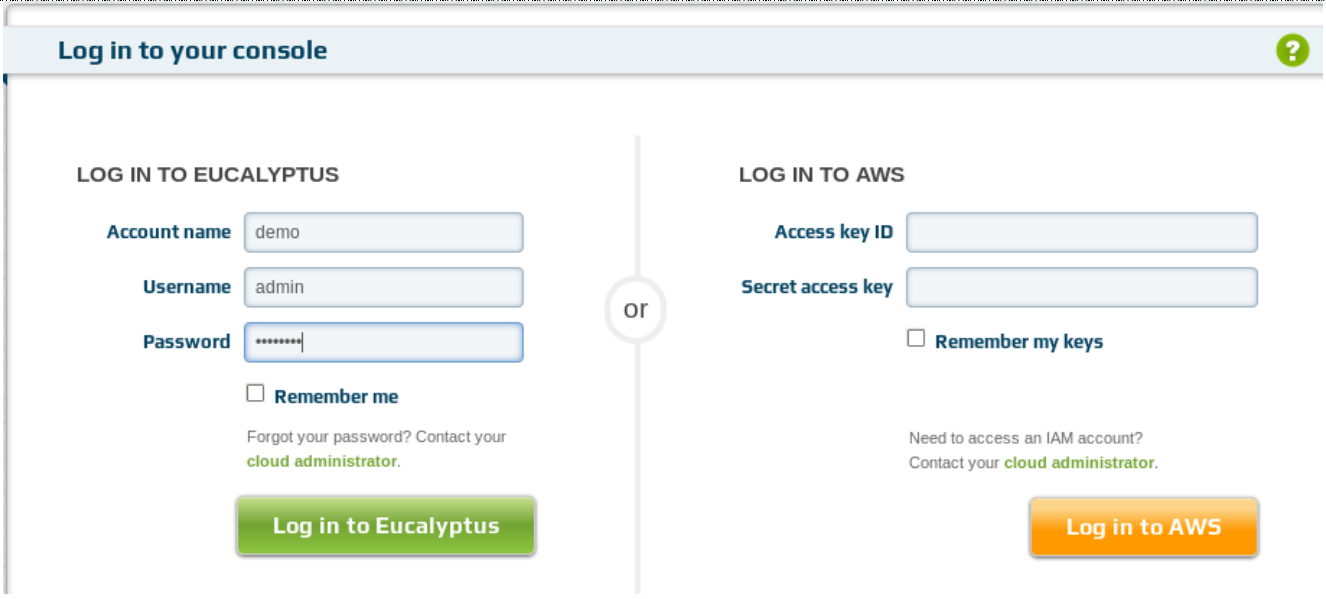




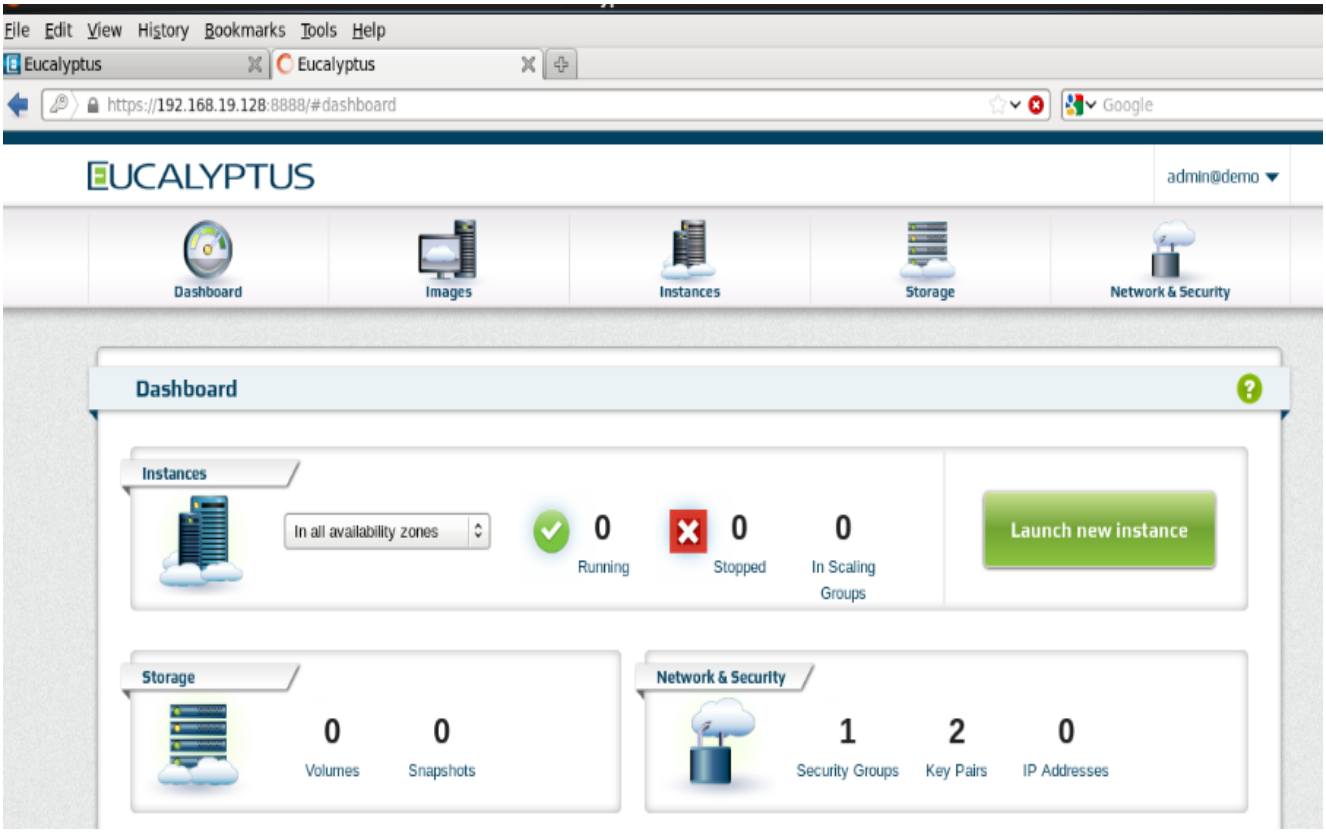


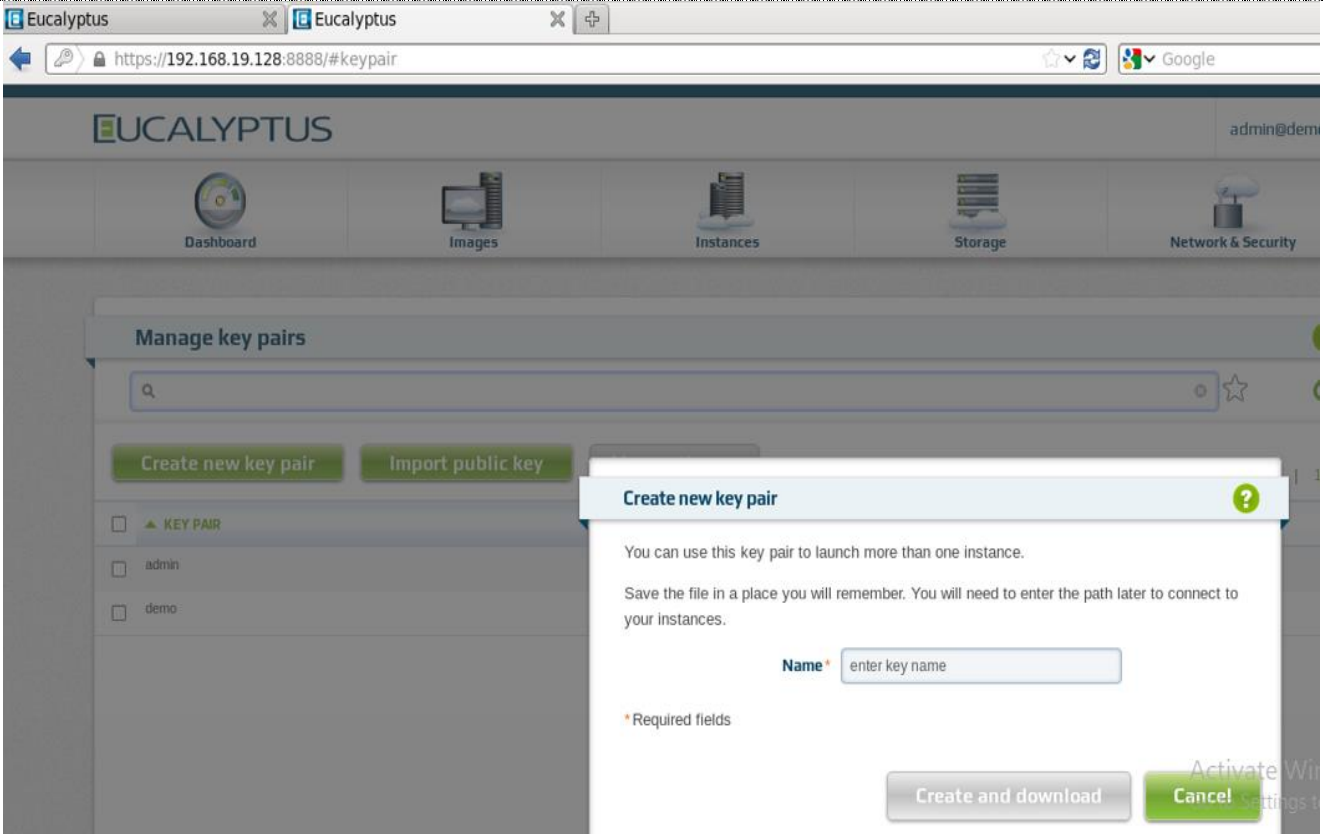
Eucalyptus Home Screen



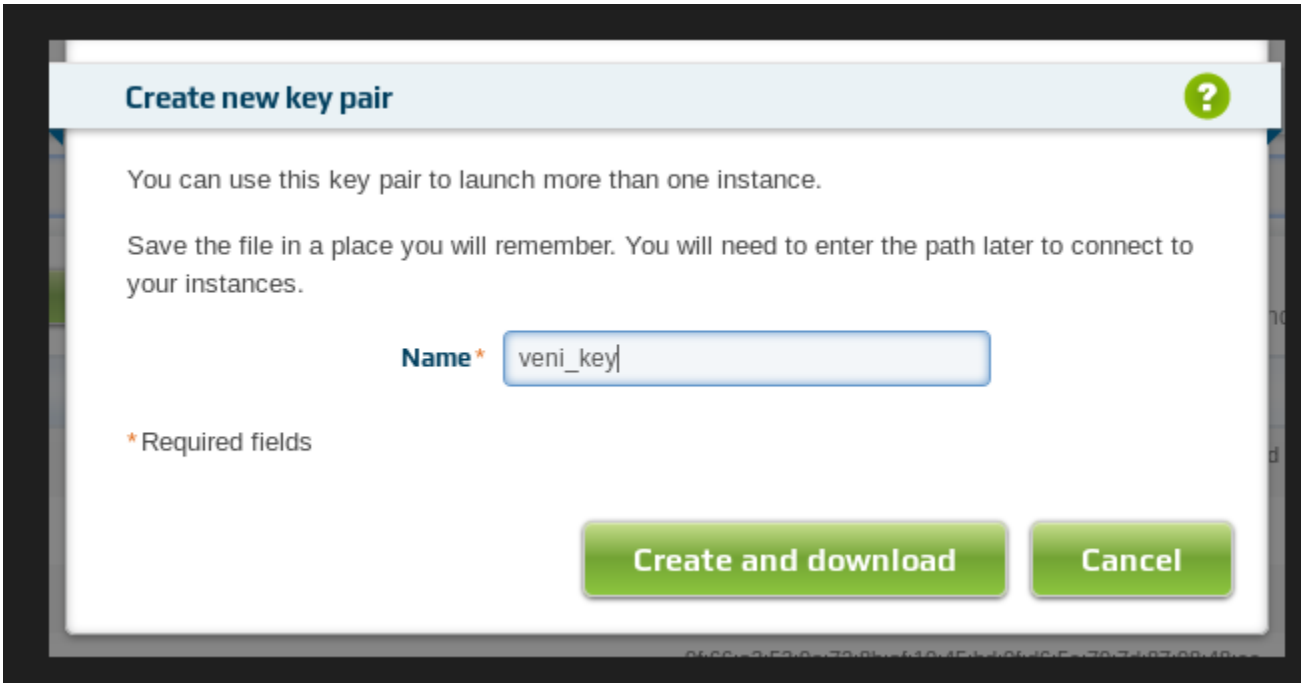


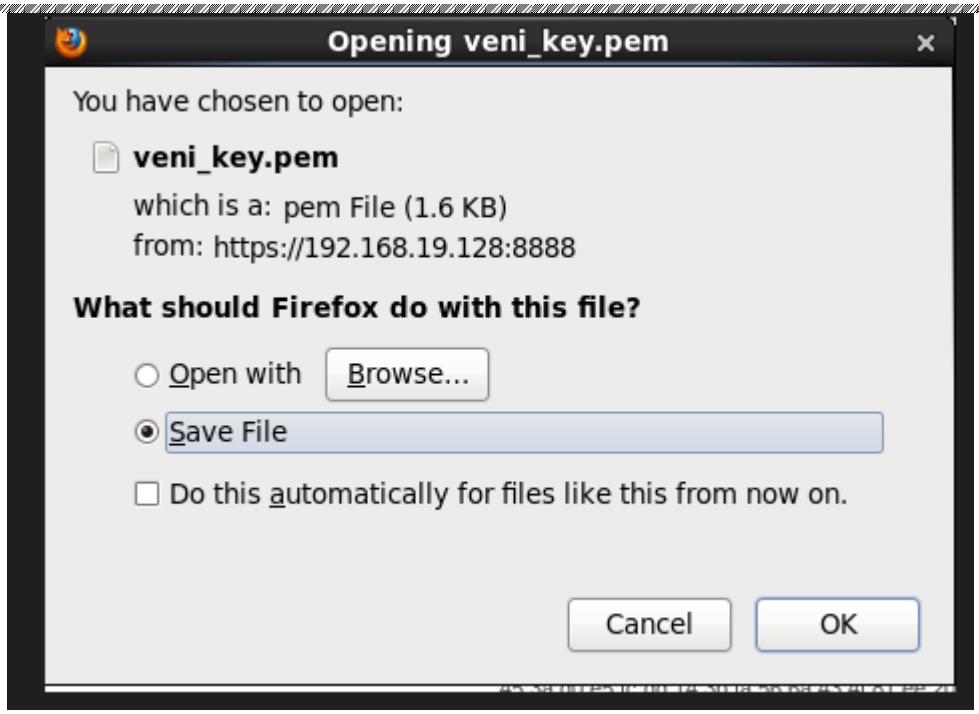
Login to Eucalyptus



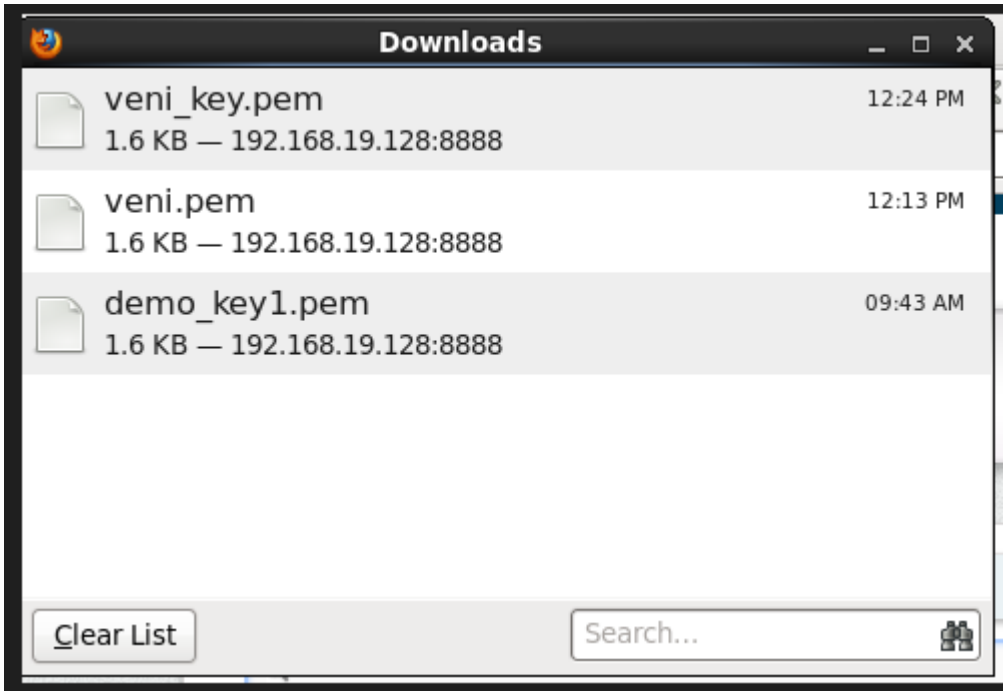


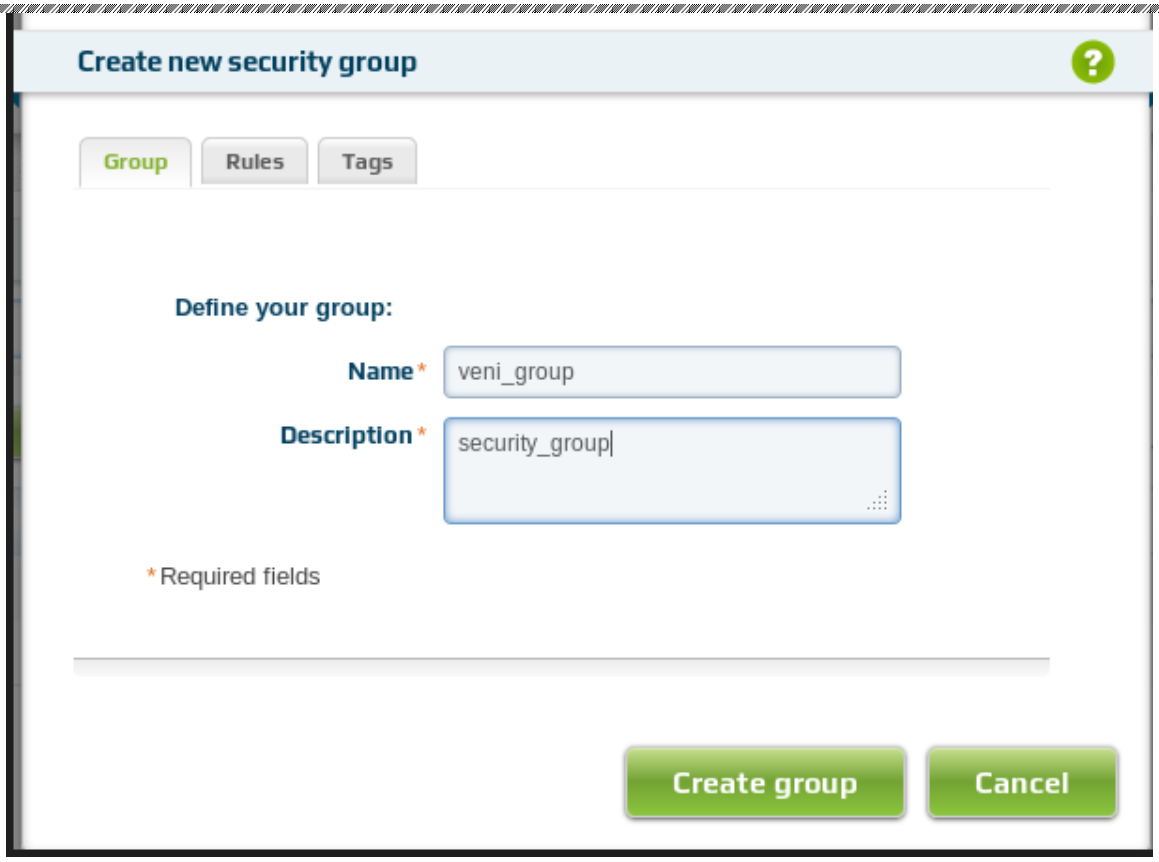
Create Key Pair



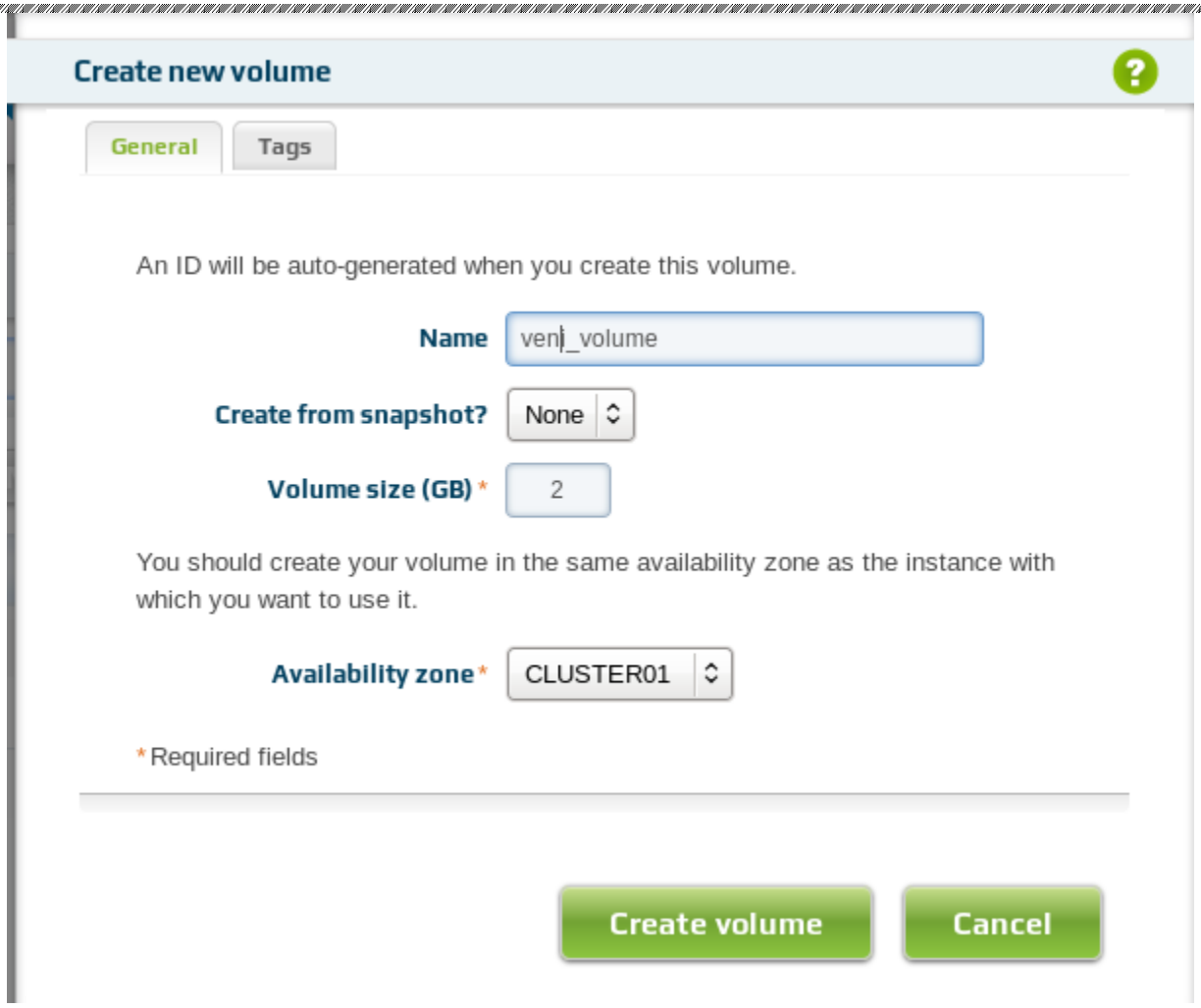


Pem file created

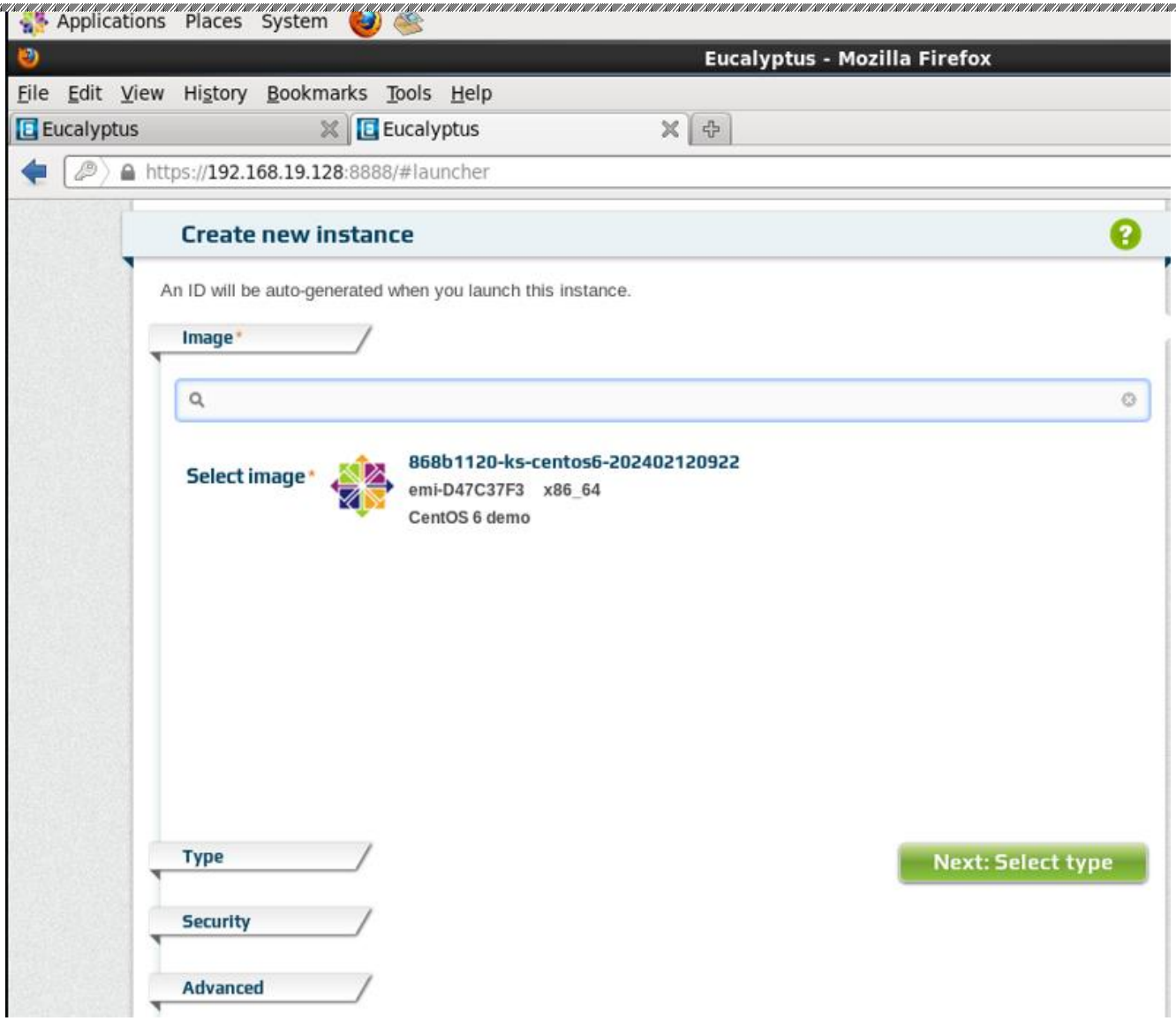




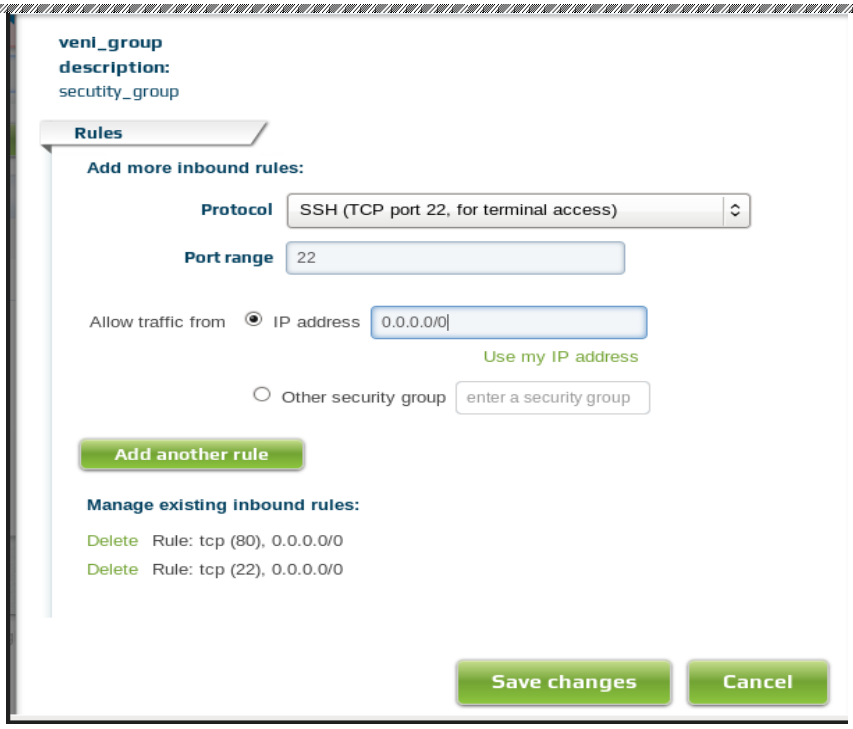
Create security Group



Create Volume



Create new instance


veni_group
description:
secutity_group
Rules
Add more inbound rules:
Protocol
SSH (TCP port 22, for terminal access)
Port range
22
Allow traffic from
IP address
0.0.0.0/0
Use my IP address
Other security group
enter a security group
Add another rule
Manage existing inbound rules:
Delete Rule: tcp (80), 0.0.0.0/0
Delete Rule: tcp (22), 0.0.0.0/0
Save changes
Cancel

veni_group
description:
secutity_group
Rules
Add more inbound rules:
Protocol
HTTP (TCP port 80, for web servers)
Port range
80
Allow traffic from
IP address
0.0.0.0/0
Use my IP address
Other security group
enter a security group
Add another rule
Manage existing inbound rules:
Delete Rule: tcp (80), 0.0.0.0/0
Delete Rule: tcp (22), 0.0.0.0/0
Delete Rule: tcp (22), 0.0.0.0/0
Save changes
Cancel

Image *

Type *

Security *

Select security options:

Key name * veni

Or: Create new key pair

Security group * veni_group

Or: Create new security group

Security group veni_group incoming traffic rules

Rule tcp 80 0.0.0.0/0

Rule tcp 22 0.0.0.0/0

Advanced

Launch instance(s)

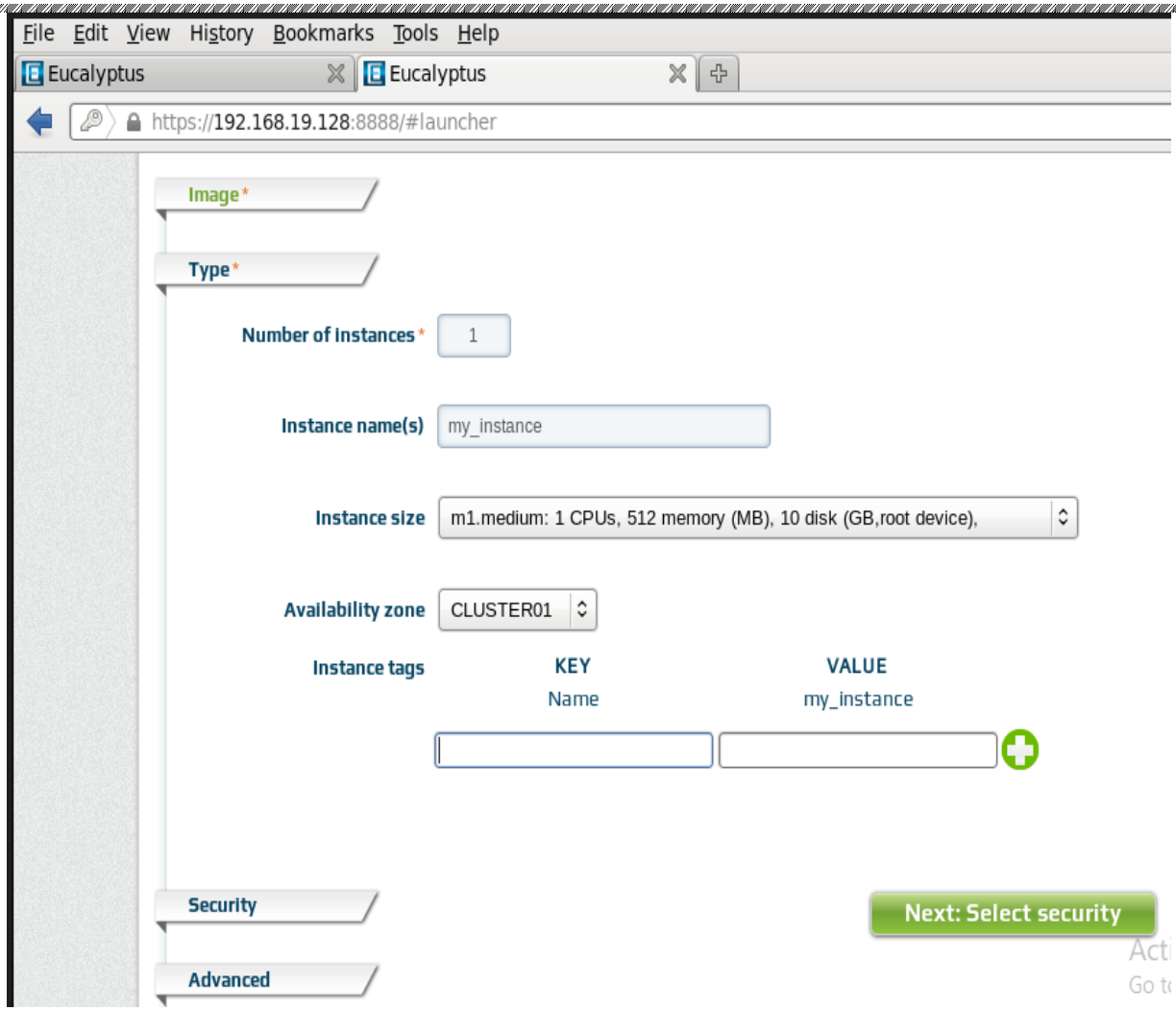
Summary

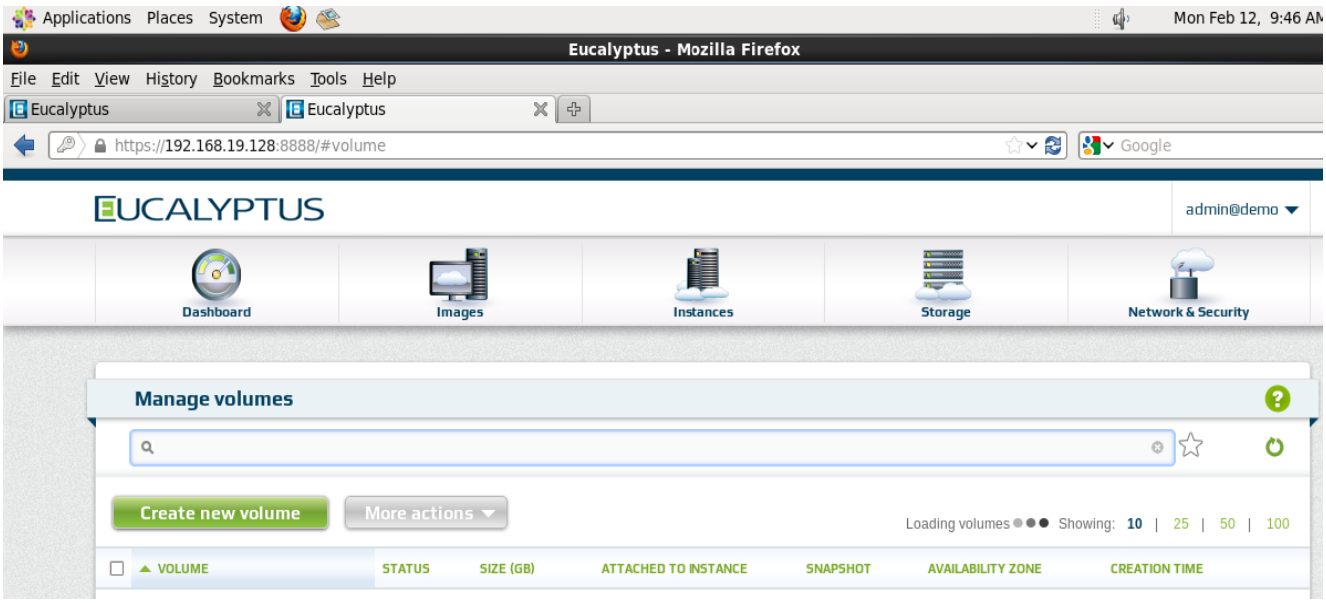
Image:
emi-D47C37F3
Platform:
centos6

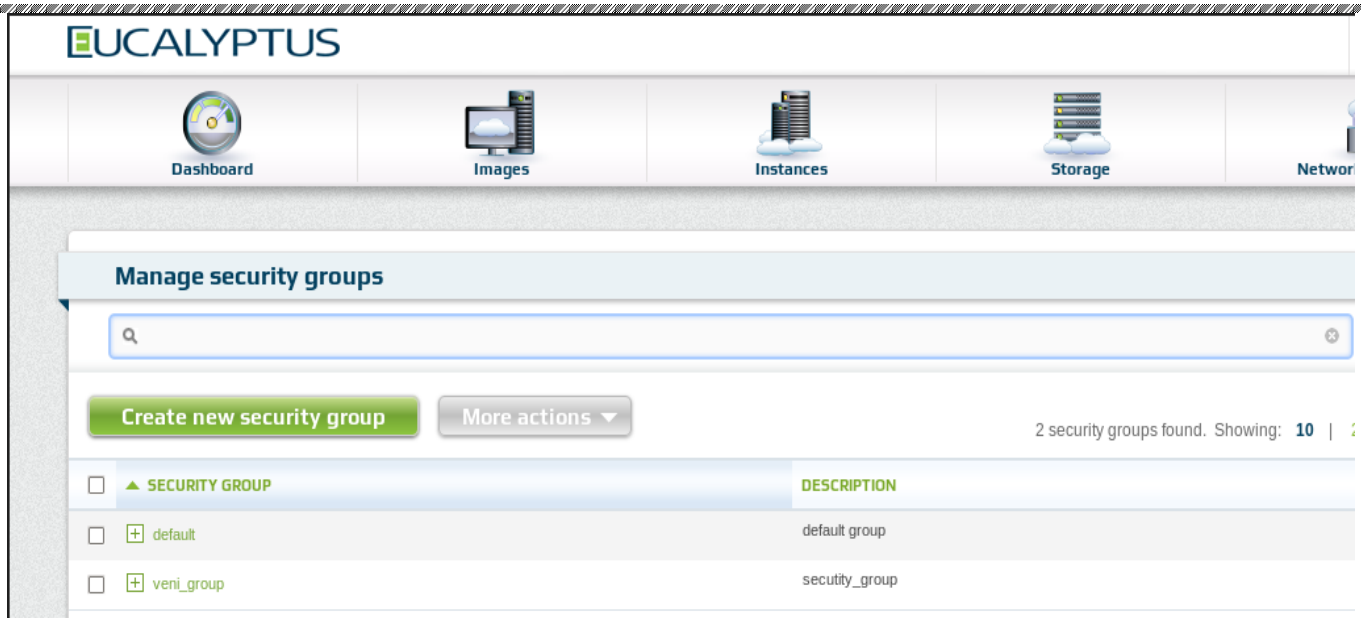
Type:
m1.small
Instances:
1
Zone:
Any

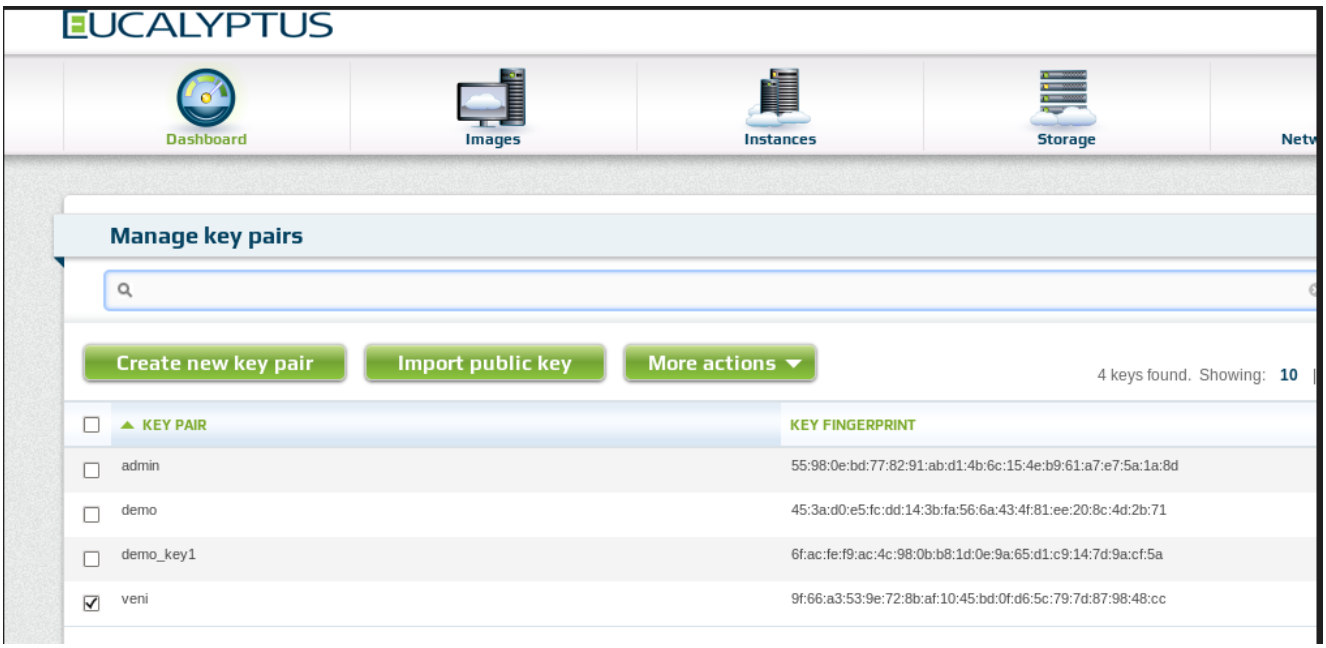
Key pair:
veni
Security group:
veni_group

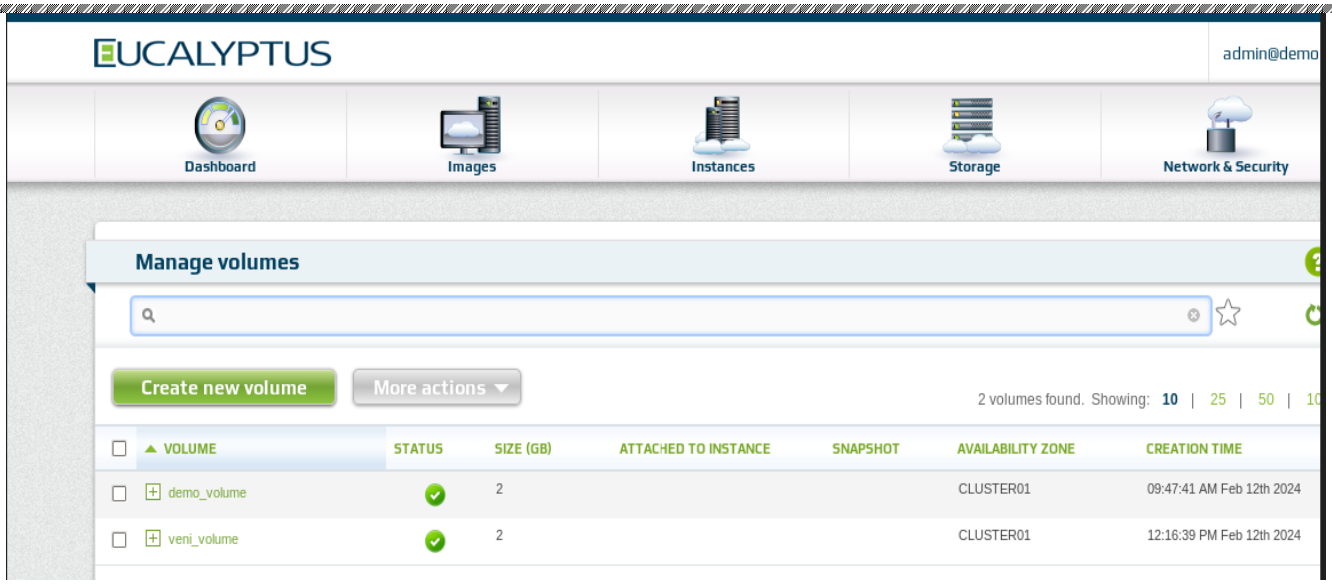
[Cancel this instance]

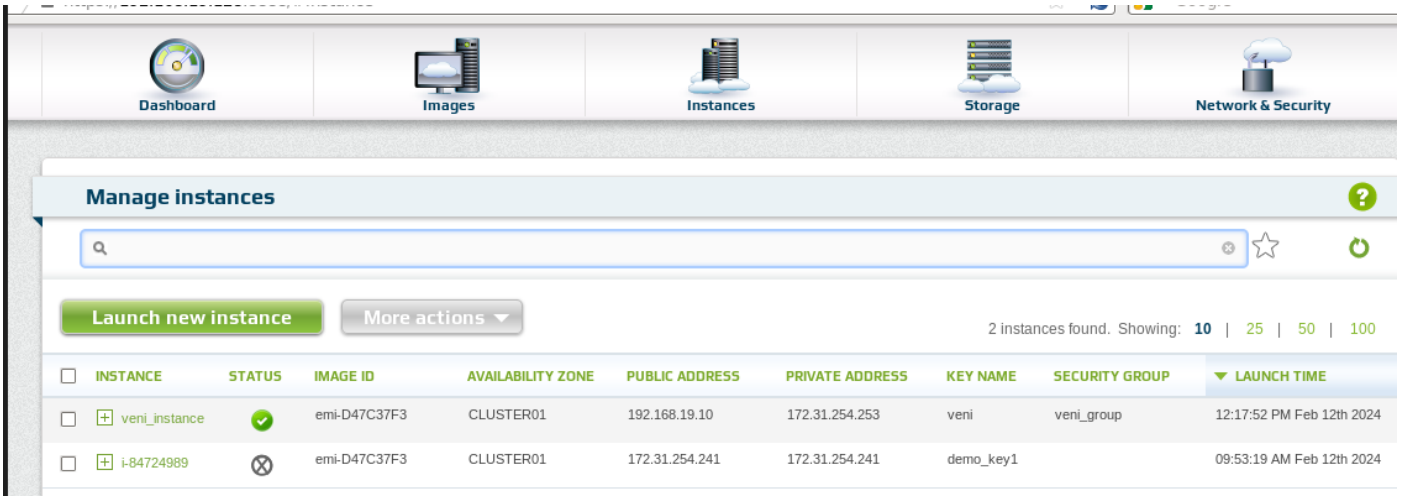

File Edit View History Bookmarks Tools Help
Eucalyptus
Eucalyptus
https://192.168.19.128:8888/#launcher
Image *
Type *
Number of instances *
1
Instance name(s)
my_instance
Instance size
m1.medium: 1 CPUs, 512 memory (MB), 10 disk (GB,root device),
Availability zone
CLUSTER01
Instance tags
KEY
VALUE
Name
my_instance
Security
Advanced
Next: Select security

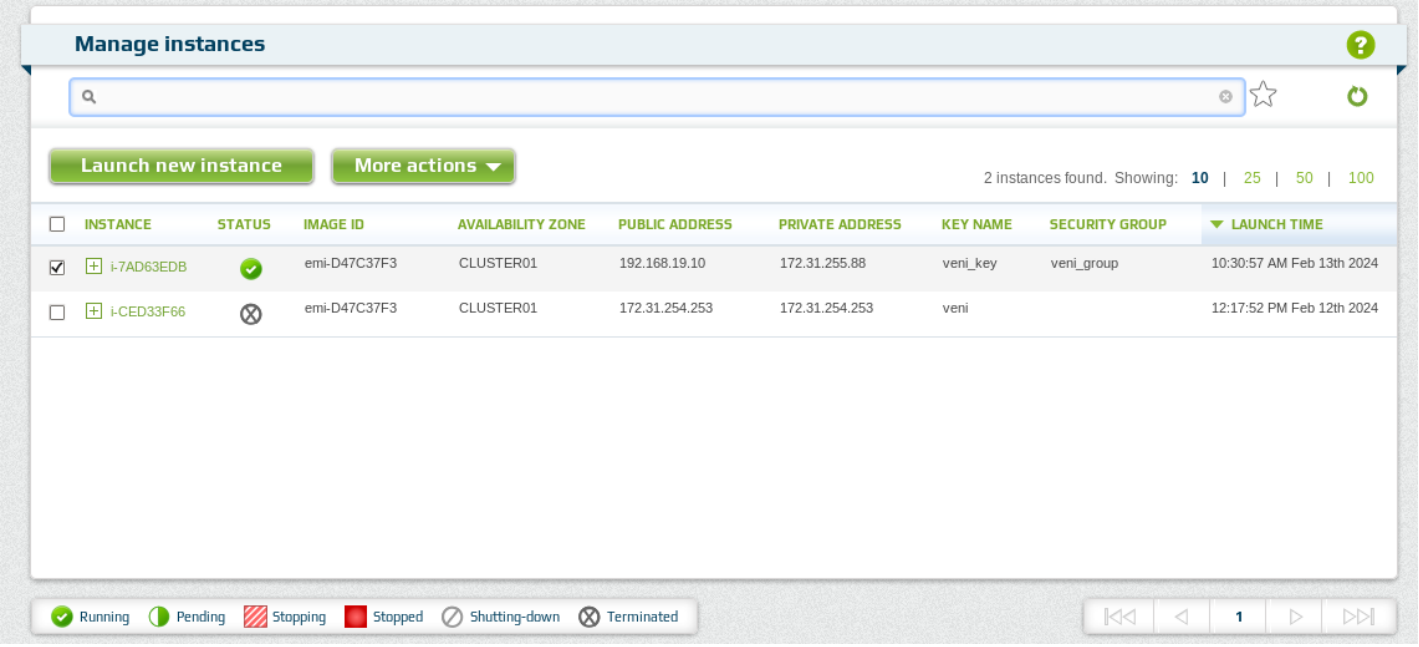

Applications Places System
Mon Feb 12, 9:46 AM
Eucalyptus - Mozilla Firefox
File Edit View History Bookmarks Tools Help
Eucalyptus
Eucalyptus
https://192.168.19.128:8888/#volume
Google
EUCALYPTUS
admin@demo
Dashboard
Images
Instances
Storage
Network & Security
Manage volumes
Create new volume
More actions
Loading volumes
Showing: 10 | 25 | 50 | 100
VOLUME
STATUS
SIZE (GB)
ATTACHED TO INSTANCE
SNAPSHOT
AVAILABILITY ZONE
CREATION TIME

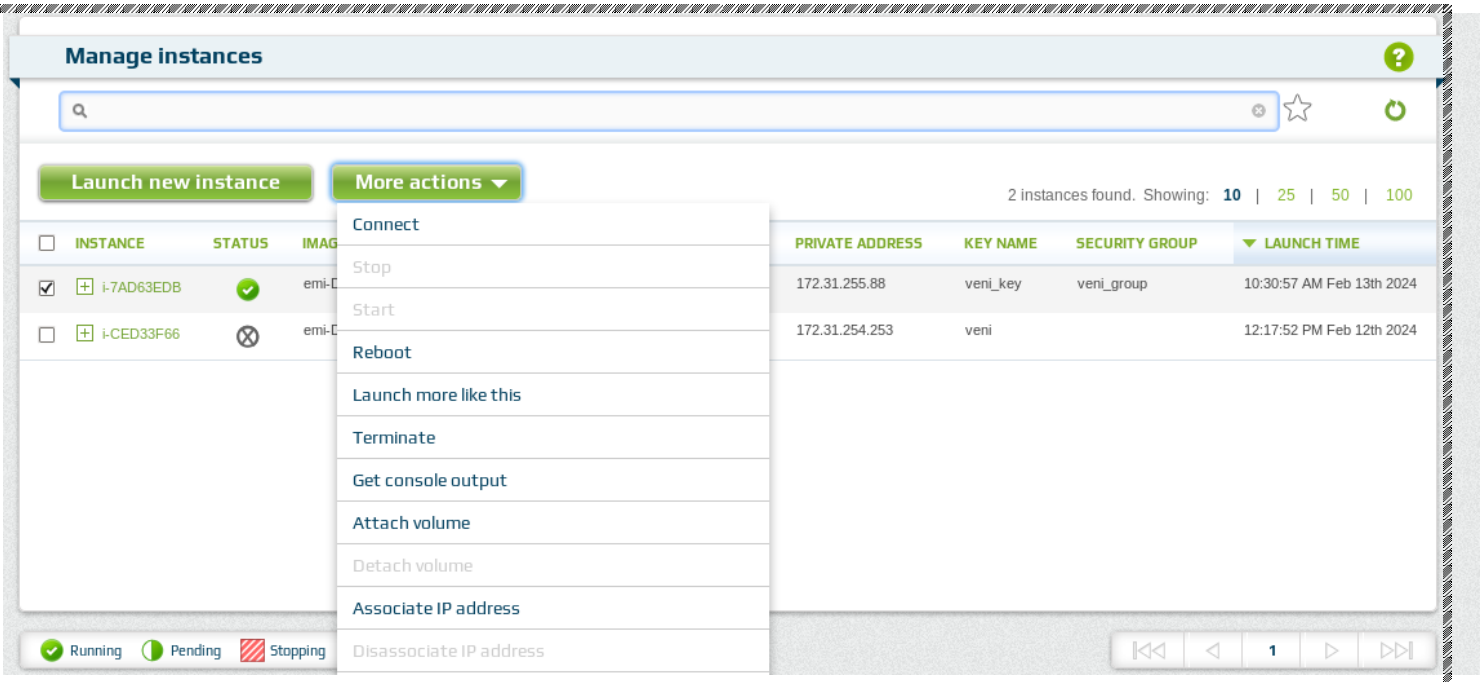

EUCALYPTUS
Dashboard
Images
Instances
Storage
Manage security groups
Create new security group
More actions
2 security groups found. Showing: 10
SECURITY GROUP
DESCRIPTION
default
default group
veni_group
secutity_group

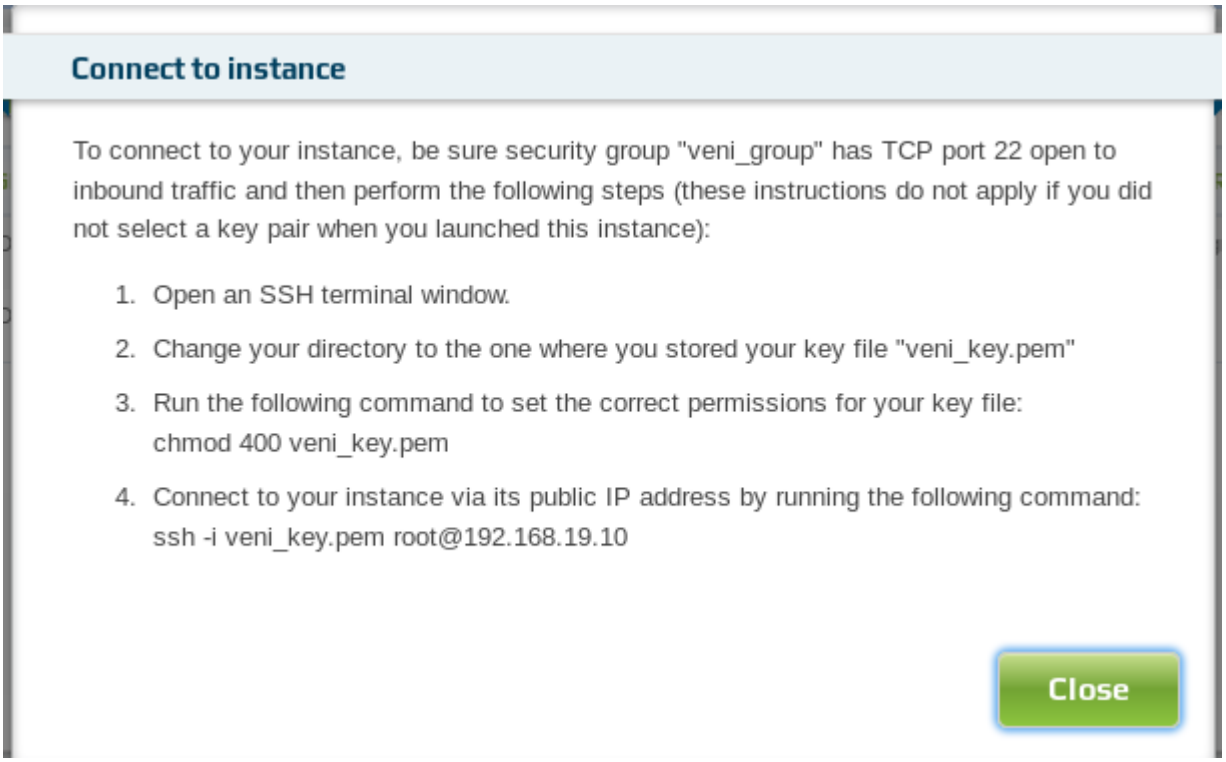

EUCALYPTUS
Dashboard
Images
Instances
Storage
Manage key pairs
Create new key pair
Import public key
More actions
4 keys found. Showing: 10
KEY PAIR
KEY FINGERPRINT
admin
55:98:0e:bd:77:82:91:ab:d1:4b:6c:15:4e:b9:61:a7:e7:5a:1a:8d
demo
45:3a:d0:e5:fc:dd:14:3b:fa:56:6a:43:4f:81:ee:20:8c:4d:2b:71
demo_key1
6f:ac:fe:f9:ac:4c:98:0b:b8:1d:0e:9a:65:d1:c9:14:7d:9a:cf:5a
veni
9f:66:a3:53:9e:72:8b:af:10:45:bd:0f:d6:5c:79:7d:87:98:48:cc

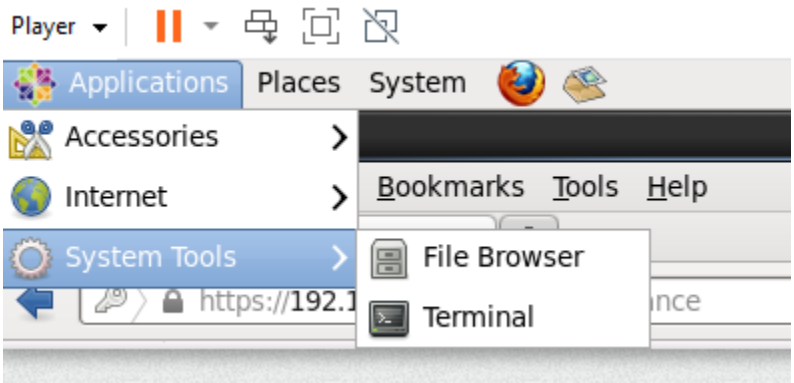

EUCALYPTUS
admin@demo
Dashboard
Images
Instances
Storage
Network & Security
Manage volumes
Create new volume
More actions
2 volumes found. Showing: 10 | 25 | 50 | 10
VOLUME
STATUS
SIZE (GB)
ATTACHED TO INSTANCE
SNAPSHOT
AVAILABILITY ZONE
CREATION TIME
demo_volume
2
CLUSTER01
09:47:41 AM Feb 12th 2024
veni_volume
2
CLUSTER01
12:16:39 PM Feb 12th 2024

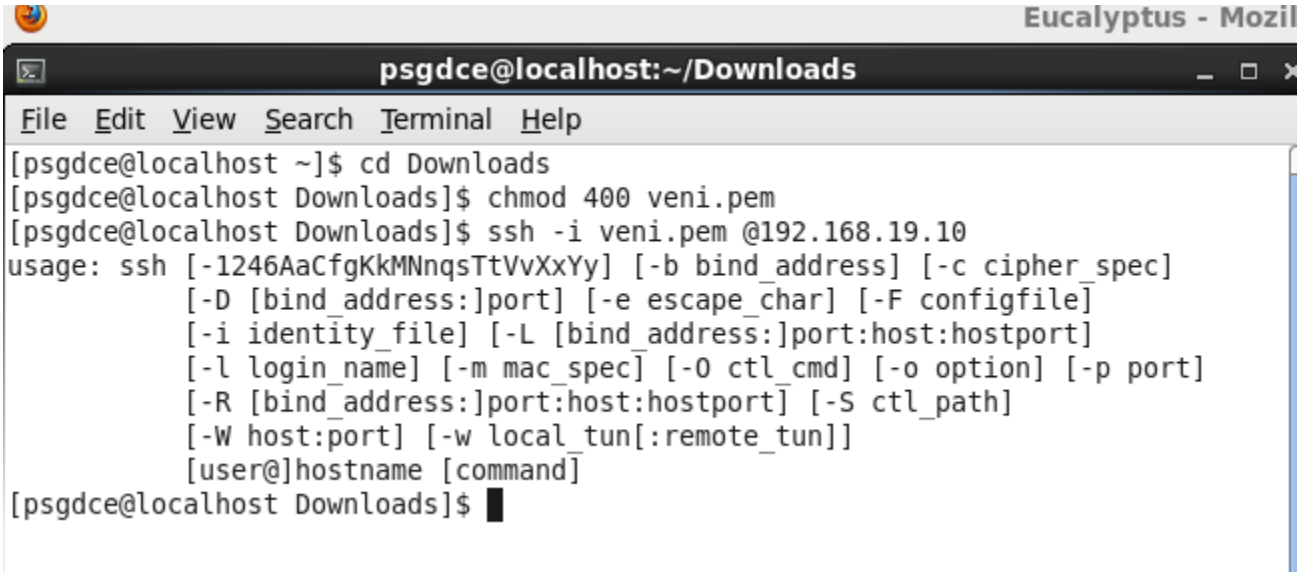

Dashboard
Images
Instances
Storage
Network & Security
Manage instances
Launch new instance
More actions
2 instances found. Showing: 10 | 25 | 50 | 100
INSTANCE
STATUS
IMAGE ID
AVAILABILITY ZONE
PUBLIC ADDRESS
PRIVATE ADDRESS
KEY NAME
SECURITY GROUP
LAUNCH TIME
veni_instance
emi-D47C37F3
CLUSTER01
192.168.19.10
172.31.254.253
veni
veni_group
12:17:52 PM Feb 12th 2024
i-84724989
emi-D47C37F3
CLUSTER01
172.31.254.241
172.31.254.241
demo_key1
09:53:19 AM Feb 12th 2024

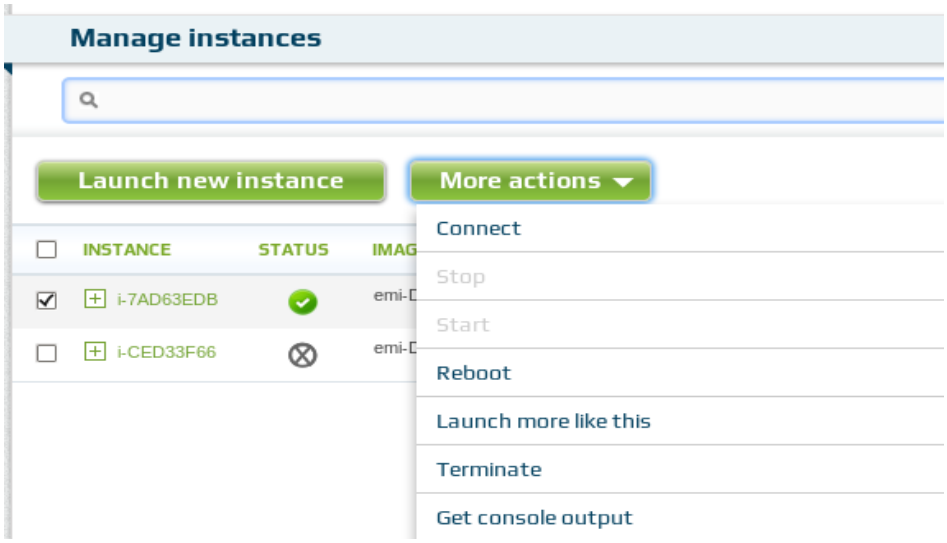

Manage instances
Launch new instance
More actions
2 instances found. Showing: 10 | 25 | 50 | 100
INSTANCE
STATUS
IMAGE ID
AVAILABILITY ZONE
PUBLIC ADDRESS
PRIVATE ADDRESS
KEY NAME
SECURITY GROUP
LAUNCH TIME
i-7AD63EDB
emi-D47C37F3
CLUSTER01
192.168.19.10
172.31.255.88
veni_key
veni_group
10:30:57 AM Feb 13th 2024
i-CED33F66
emi-D47C37F3
CLUSTER01
172.31.254.253
172.31.254.253
veni
12:17:52 PM Feb 12th 2024
Running
Pending
Stopping
Stopped
Shutting-down
Terminated
1

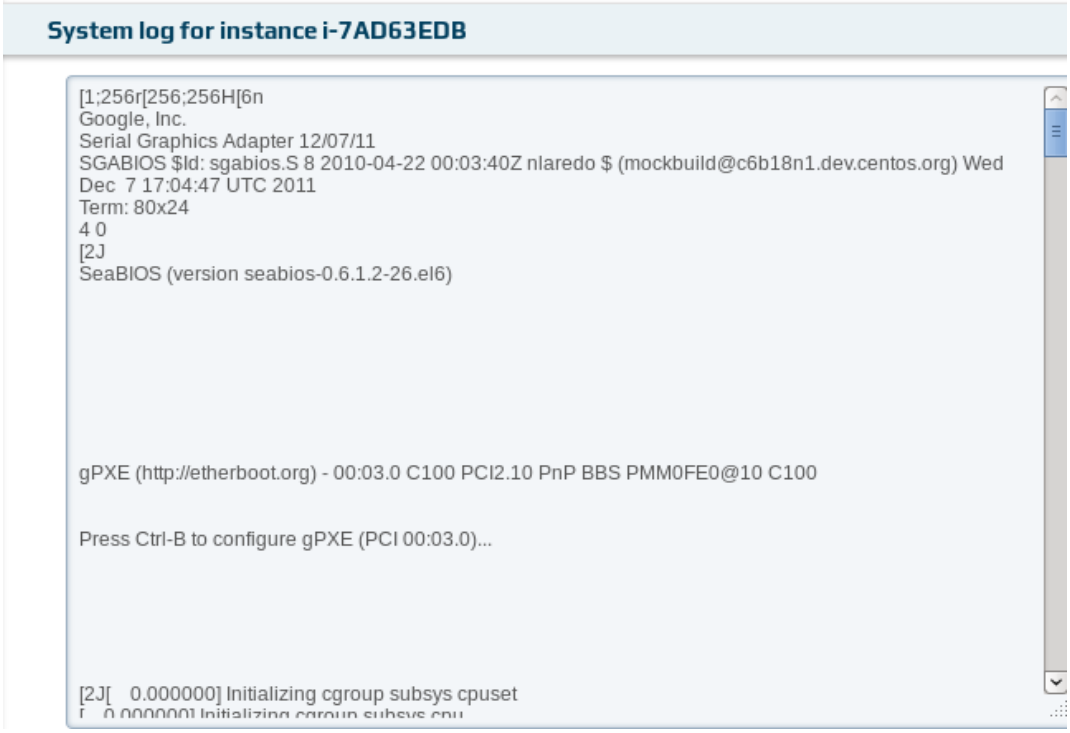

Manage instances
Launch new instance
More actions
2 instances found. Showing: 10 | 25 | 50 | 100
INSTANCE
STATUS
PRIVATE ADDRESS
KEY NAME
SECURITY GROUP
LAUNCH TIME
i-7AD63EDB
172.31.255.88
veni_key
veni_group
10:30:57 AM Feb 13th 2024
i-CED33F66
172.31.254.253
veni
12:17:52 PM Feb 12th 2024
Connect
Stop
Start
Reboot
Launch more like this
Terminate
Get console output
Attach volume
Detach volume
Associate IP address
Disassociate IP address
Running
Pending
Stopping


Connect to instance
To connect to your instance, be sure security group "veni_group" has TCP port 22 open to inbound traffic and then perform the following steps (these instructions do not apply if you did not select a key pair when you launched this instance):
1. Open an SSH terminal window.
2. Change your directory to the one where you stored your key file "veni_key.pem"
3. Run the following command to set the correct permissions for your key file:
chmod 400 veni_key.pem
4. Connect to your instance via its public IP address by running the following command:
ssh -i veni_key.pem root@192.168.19.10
Close


Player
Applications
Places
System
Accessories
Internet
System Tools
Bookmarks
Tools
Help
File Browser
Terminal


Eucalyptus - Mozil
psgdce@localhost:~/Downloads
File Edit View Search Terminal Help
[psgdce@localhost ~]$ cd Downloads
[psgdce@localhost Downloads]$ chmod 400 veni.pem
[psgdce@localhost Downloads]$ ssh -i veni.pem @192.168.19.10
usage: ssh [-1246AaCfgKkMNnqsTtVvXxYy] [-b bind_address] [-c cipher_spec]
[-D [bind_address:]port] [-e escape_char] [-F configfile]
[-i identity_file] [-L [bind_address:]port:host:hostport]
[-l login_name] [-m mac_spec] [-O ctl_cmd] [-o option] [-p port]
[-R [bind_address:]port:host:hostport] [-S ctl_path]
[-W host:port] [-w local_tun[:remote_tun]]
[user@]hostname [command]
[psgdce@localhost Downloads]$


Manage instances
Launch new instance
More actions
INSTANCE
STATUS
i-7AD63EDB
i-CED33F66
Connect
Stop
Start
Reboot
Launch more like this
Terminate
Get console output



Result

Thus the eucalyptus private cloud was built and instance created.

Ex.No 9 **Create an AWS account and activate**

Aim

To create an AWS account and activate.

AWS

AWS (Amazon Web Services) is a comprehensive, evolving cloud computing platform provided by Amazon. It includes a mixture of infrastructure-as-a-service (IaaS), platform-as-a-service (PaaS) and packaged software-as-a-service (SaaS) offerings. AWS offers tools such as compute power, database storage and content delivery services.

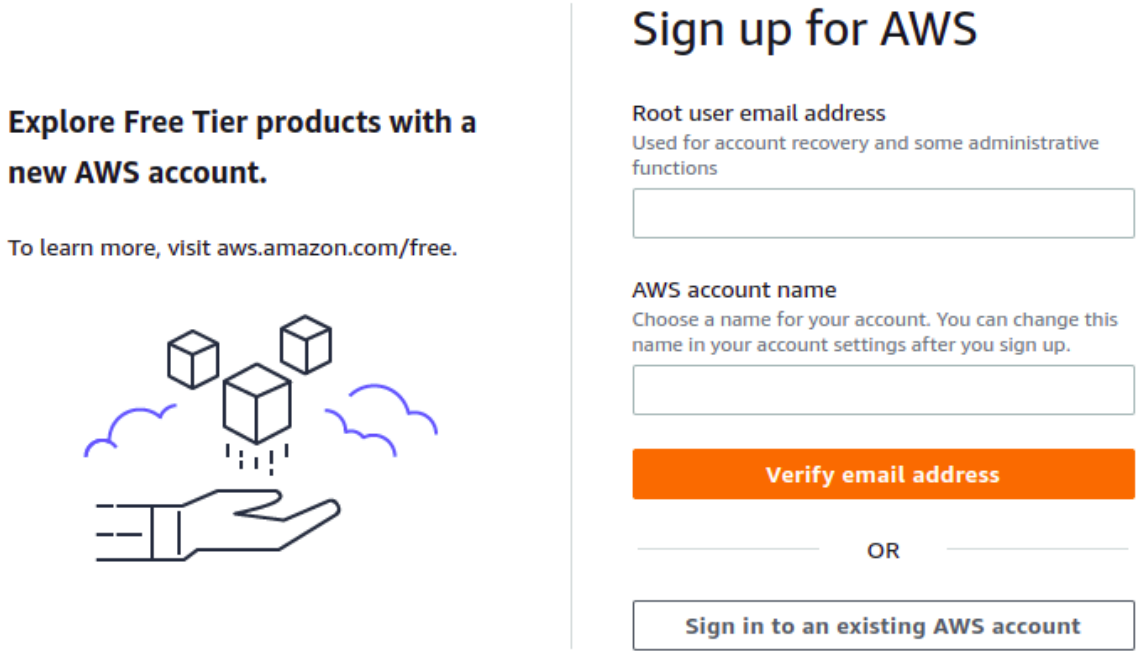
AWS offers many different tools and products for enterprises and software developers in 245 countries and territories. Government agencies, education institutions, nonprofits and private organizations use AWS services.

Amazon Web Services offers a broad set of global cloud-based products including compute, storage, databases, analytics, networking, mobile, developer tools, management tools, IoT, security, and enterprise applications: on-demand, available in seconds, with pay-as-you-go pricing.

Steps to Creating a Free Tier AWS Account

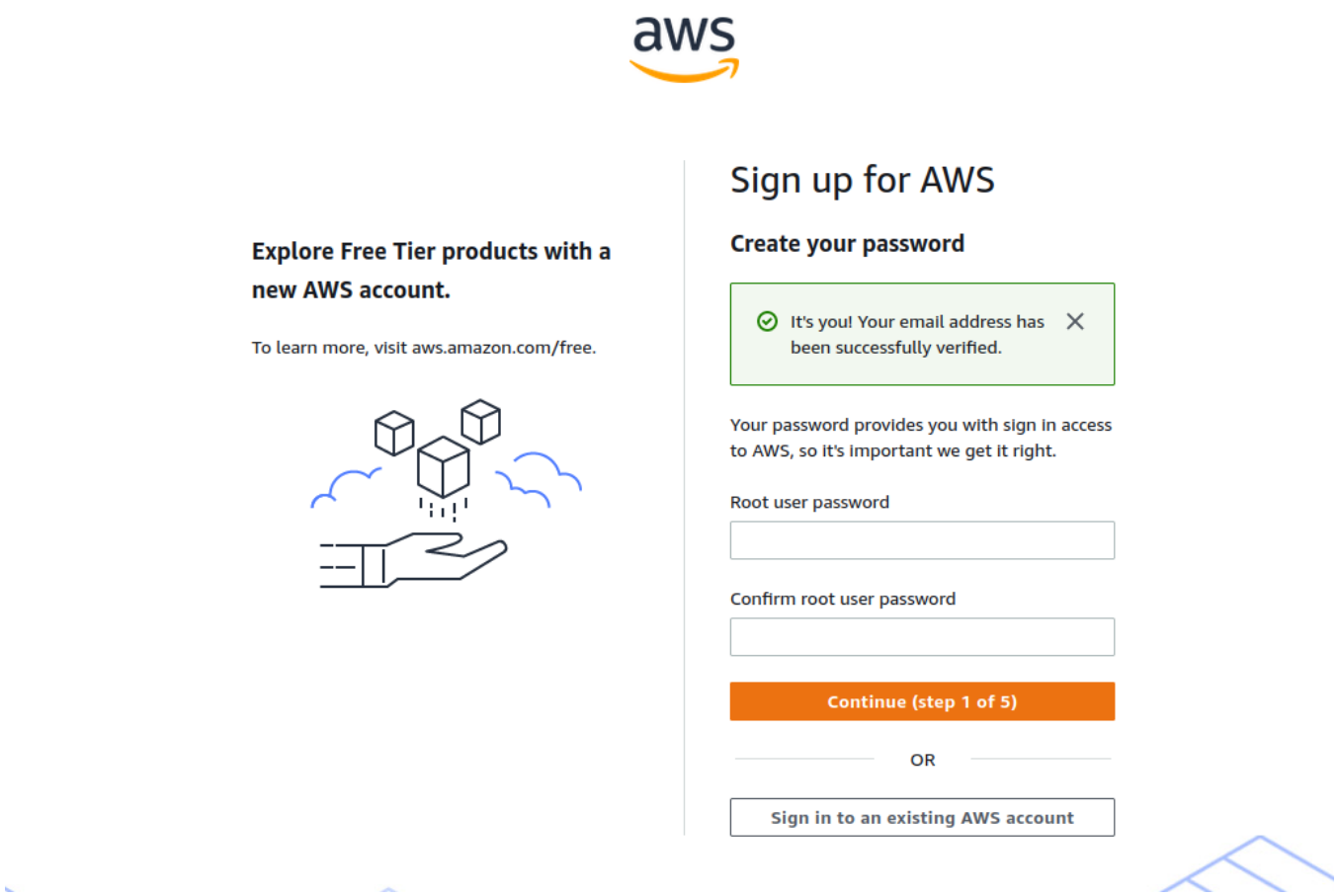
Sign Up for an AWS Account

Step 1: Open https://portal.aws.amazon.com/billing/signup#/start/email in any browser, then enter your mail address and AWS account name. Click on “Verify Email Address”.



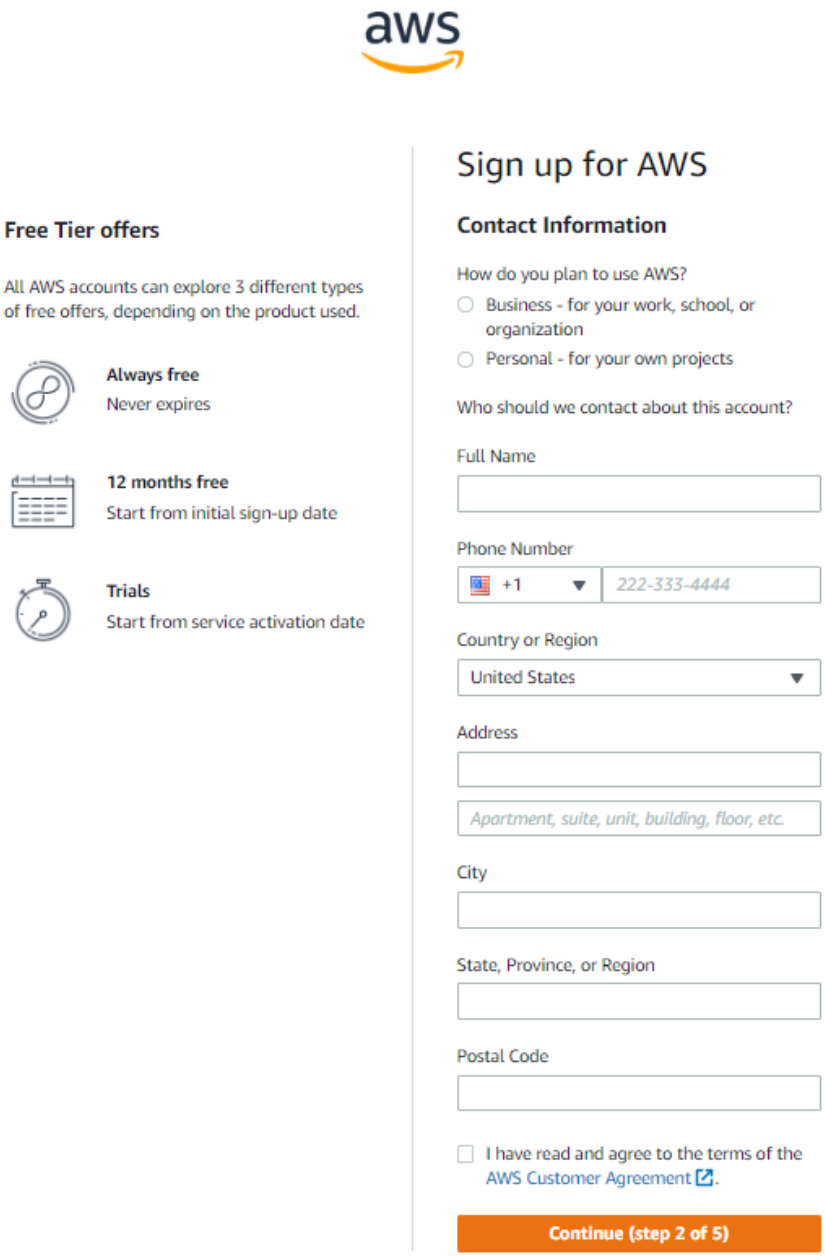
Step 2: Enter the verification code received in the email address entered and click on **‘Verify’.**

Step 3: Enter the **Root user Password** and **Confirm the Root user Password**, then click on **'Continue (step 1 of 5)'.**



Give Password

Step 4: Select **'Personal – for your own projects'** and fill in the details including the full name, contact number, country or region, and address for communication, and then click on **'Continue (Step 2 of 5)'.**



Type User Details

Step 5: Now in this step enter the Billing Information and then click on **'Verify and Continue.**

Step 6: Confirm your identity by entering your mobile number or email address. You will receive a verification code which you have to enter to confirm your identity.

Step 7: Select the support plan. For Free Tier, we have to select **'Basic Support: Free'.** Finally, the AWS account has been created and is ready for implementation.

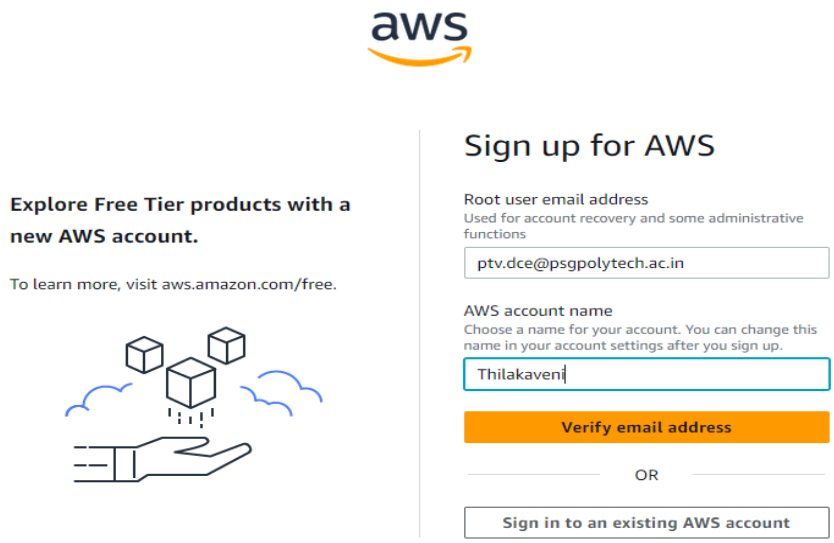
Benefits of AWS Free Tier Account

- **Hands-On Experience:** Users can experience cloud services firsthand in a risk-free and realistic setting with the AWS Free Tier. This is very helpful for people who are just learning about AWS and cloud computing.
- **Cost-Efficient Learning:** New users can expose to new services of AWS without thinking about the cost
- **Wide Range of Services:** AWS offers wide range of services where a new user can explore different services can experience the real use of cloud computing.
- **Scalability Testing:** Users can test their applications by deploying it in AWS. They can test the application in different environments and in different conditions.
- **Hosting Small Applications:** Small applications can hosted on AWS for free as long as they adhere to the Free Tier usage restrictions.

Applications of AWS Free Tier Limit

Following are some of the applications of AWS free tier limit.

- **Learning and Training:** Students and the professionals who are new to AWS can learn using AWS free tier. Through practical experience with cloud services, it enables users to investigate and comprehend AWS services, infrastructure, and best practices.
- **Development and Testing:** Developers can use AWS free tier account to test their application in different environments without incurring cost.
- **Startup and MVP Development:** The AWS Free Tier is a useful tool for startups and entrepreneurs to create early-stage prototypes or minimal viable products (MVPs).
- **Technical Certifications:** The students who want to attend aws solution architect associate exam can use AWS free tier account fully fledged to prepare for the exam.
- **AWS account creation**



Verification Process

aws

Sign in

Root user
Account owner that performs tasks requiring unrestricted access. Learn more

IAM user
User within an account that performs daily tasks. Learn more

Root user email address

ptv.dce@psgpolytech.ac.in

Next

By continuing, you agree to the AWS Customer Agreement or other agreement for AWS services, and the Privacy Notice. This site uses essential cookies. See our Cookie Notice for more information.

New to AWS?

Create a new AWS account

Root user sign in

Email: ptv.dce@psgpolytech.ac.in

Password Forgot password?

••••••••••••

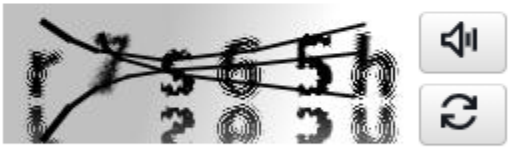
Sign in

Sign in to a different account

Create a new AWS account

Security check

Type the characters seen in the image below



7s65h

Submit

Confirm you're you

We sent an email with a verification code to
ptv.dce@psgpolytech.ac.in

To continue, confirm your identity using the code below.

Verification code

523160

Verify and continue

Resend code (48)

aws

Free Tier offers

All AWS accounts can explore 3 different types of free offers, depending on the product used.

Always free
Never expires

12 months free
Start from initial sign-up date

Trials
Start from service activation date

Sign up for AWS

Contact Information

How do you plan to use AWS?

- Business - for your work, school, or organization
- Personal - for your own projects

Who should we contact about this account?

Full Name
pragadeeshMadhumithran

Phone Number
+91 7598686706

Country or Region
India

Address
Sowripalayam Road, Coimbatore
GV Residency, NO 80

City
Coimbatore

State, Province, or Region
Tamil Nadu

Postal Code
641028

Customers with an Indian contact address are served by Amazon Web Services India Private Limited, the local seller for AWS services in India.

☐ I have read and agree to the terms of the AWS Customer Agreement.

Continue (step 2 of 5)

Billing Information

Credit or Debit card number

370000000000002

AWS accepts most major credit and debit cards. To learn more about payment options, review our FAQ

Expiration date

August | 2027

Security code

••••

Cardholder's name

Thilakaveni

☐ Save card information for faster future payments

Securely save card information payments as per RBI guidelines. Learn more.

Billing address

◉ Use my contact address

Coimbatore
Coimbatore Tamil Nadu 641004
IN

○ Use a new address

Do you have a PAN?

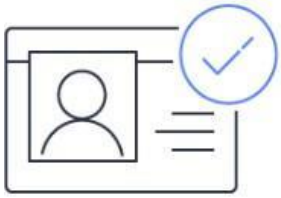
Permanent Account Number (PAN) is a ten-digit alphanumeric number issued by the Indian Income Tax Department. This 10-digit number is printed on the front of your PAN card.

○ Yes

◉ No

You can go on the Tax Settings Page on Billing and Cost Management Console to update your PAN information.

Verify and Continue (step 3 of 5)



Sign up for AWS

Confirm your identity Info

Name Info

Choose the name that you want to use for identity verification.

pragadeeshMadhumithran

Primary purpose of account registration

Choose one that best applies to you. If your account is tied to a business, select the one that applies to your business.

Personal use

Ownership type

Individual

India document type Info

To verify your identity, the name on the document must match the name that you chose.

Permanent Account Number (PAN)

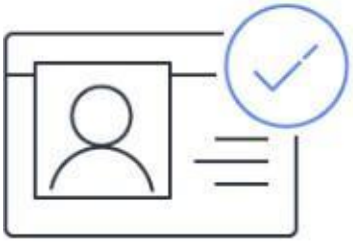
Permanent Account Number (PAN)

ICAPP0949H

The PAN is 10 alphanumeric characters without spaces or tabs. Example: AAAAA1111B

I consent to allowing AWS to use and send the information above to a third-party service for identity verification purposes.

Continue (step 4 of 5)



Sign up for AWS

Confirm your identity

Before you can use your AWS account, you must verify your phone number. When you continue, the AWS automated system will contact you with a verification code.

How should we send you the verification code?

- (●) Text message (SMS)
- ( ) Voice call

Country or region code

India (+91)

Mobile phone number

9865646806

Security check

Type the characters as shown above

27csc2

Send SMS (step 4 of 5)

Sign up for AWS

Select a support plan

Choose a support plan for your business or personal account. Compare plans and pricing examples. You can change your plan anytime in the AWS Management Console.

Basic support - Free

- Recommended for new users just getting started with AWS
- 24x7 self-service access to AWS resources
- For account and billing issues only
- Access to Personal Health Dashboard & Trusted Advisor

Developer support - From $29/month

- Recommended for developers experimenting with AWS
- Email access to AWS Support during business hours
- 12 (business)-hour response times

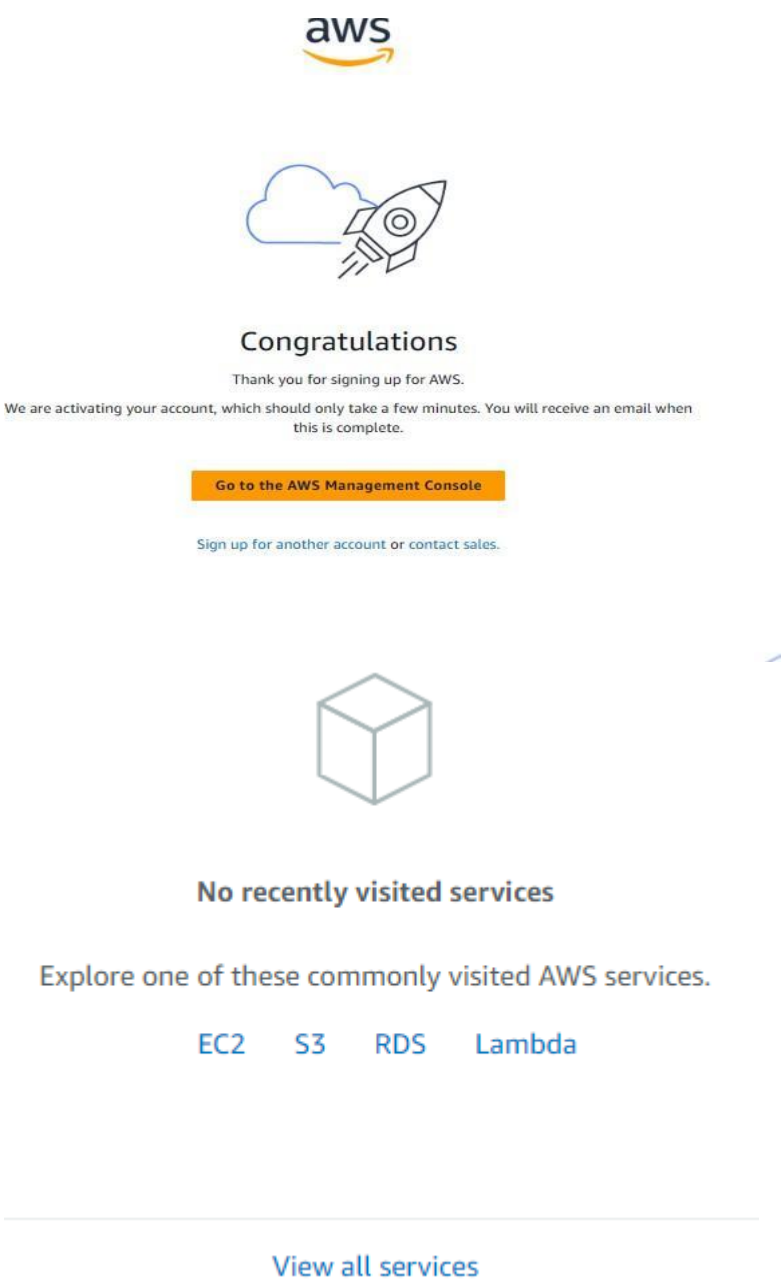
Business support - From $100/month

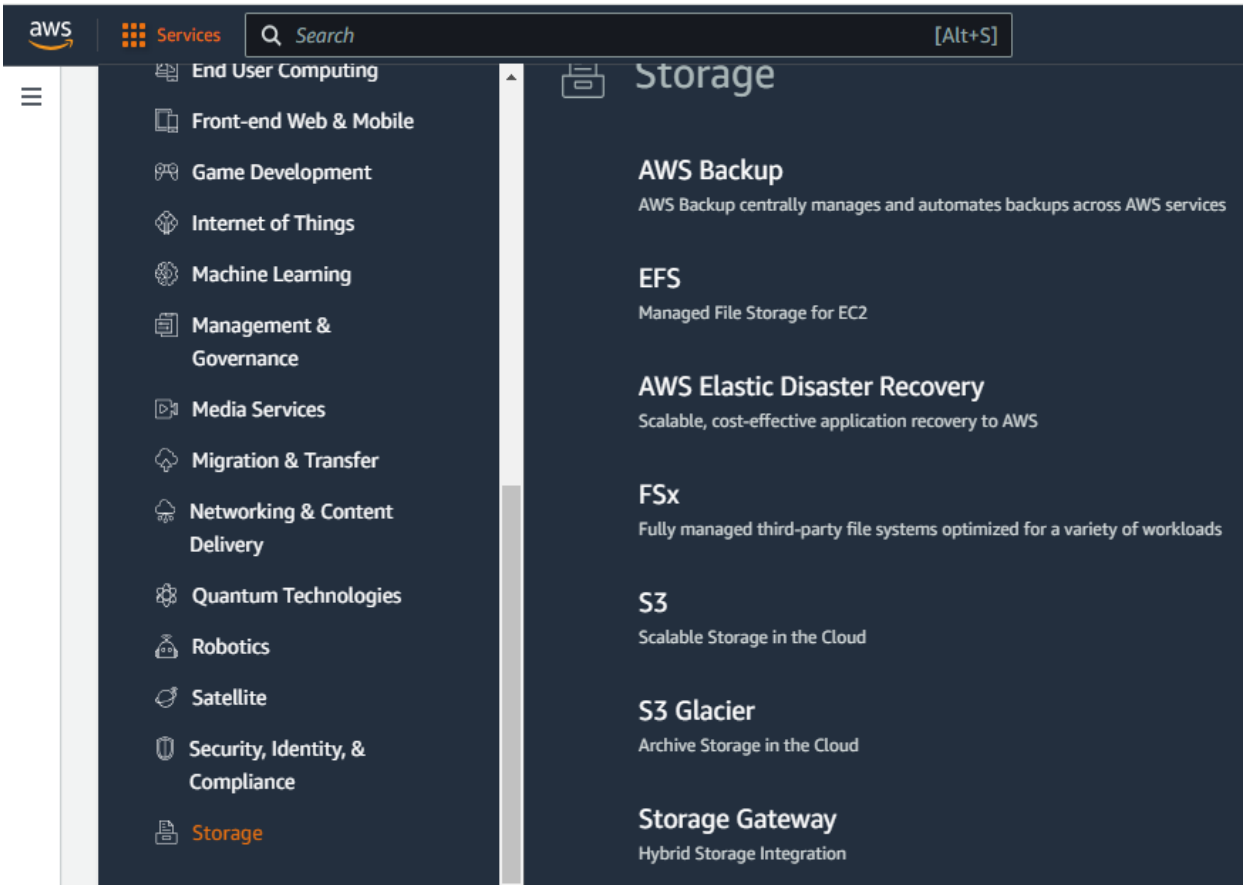
- Recommended for running production workloads on AWS
- 24x7 tech support via email, phone, and chat
- 1-hour response times
- Full set of Trusted Advisor best-practice recommendations

Need Enterprise level support?

From $15,000 a month you will receive 15-minute response times and concierge-style experience with an assigned Technical Account Manager. Learn more

Complete sign up


aws
Congratulations
Thank you for signing up for AWS.
We are activating your account, which should only take a few minutes. You will receive an email when this is complete.
Go to the AWS Management Console
Sign up for another account or contact sales.
No recently visited services
Explore one of these commonly visited AWS services.
EC2
S3
RDS
Lambda
View all services



Result

Thus the AWS account was created and activated.

Ex.No 10 **Install storage controller and interact with it**

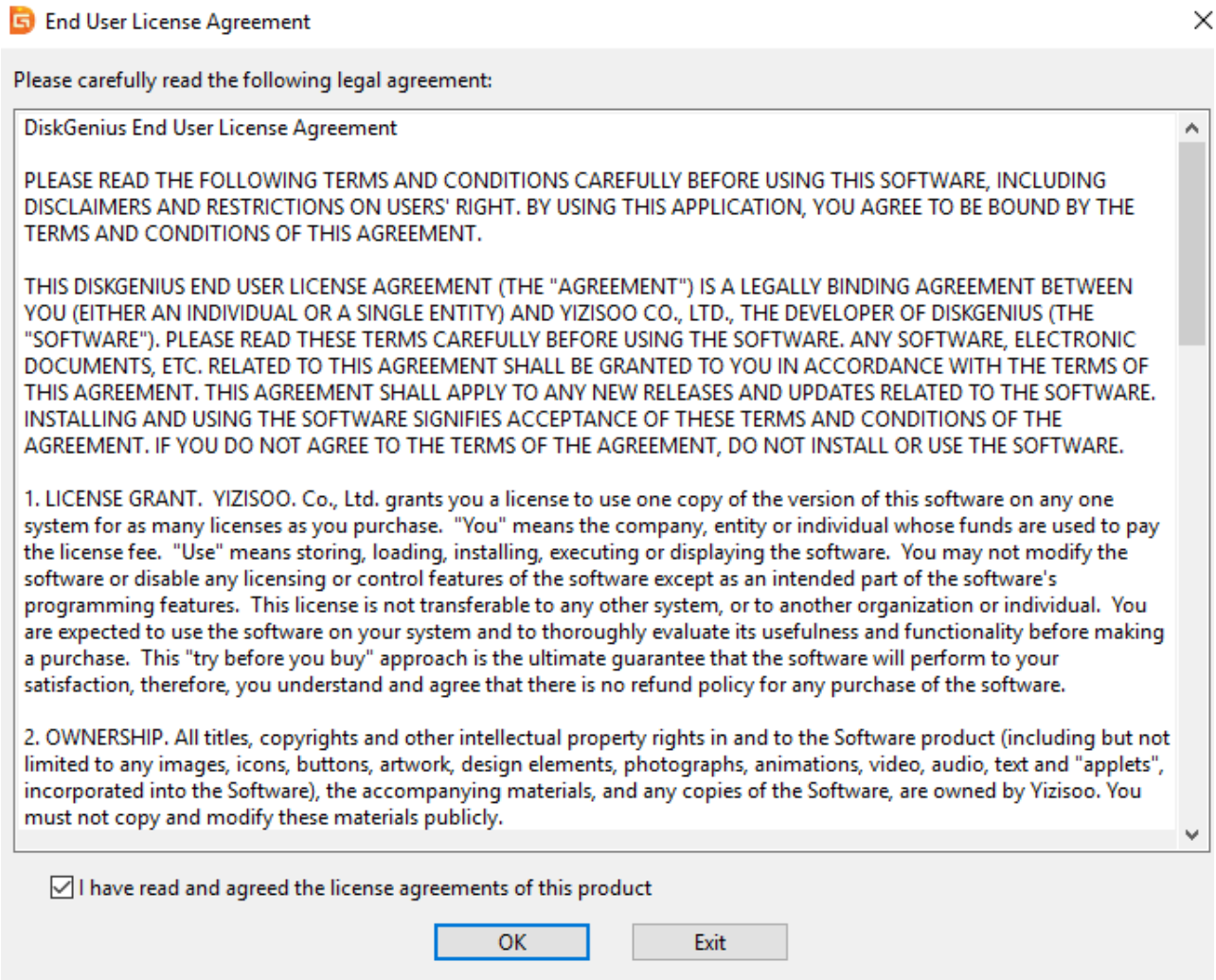
Aim

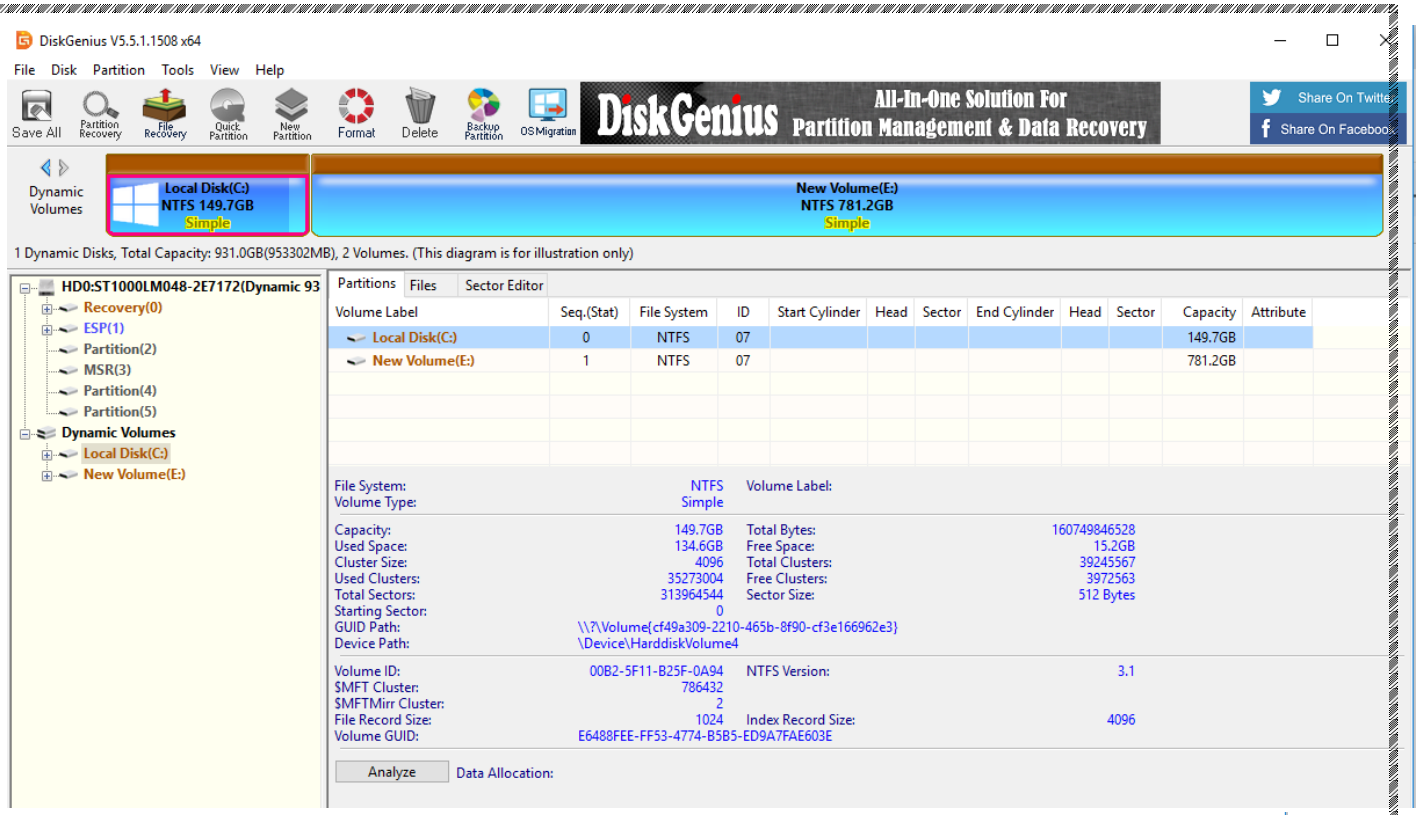
To install storage controller and interact with it.

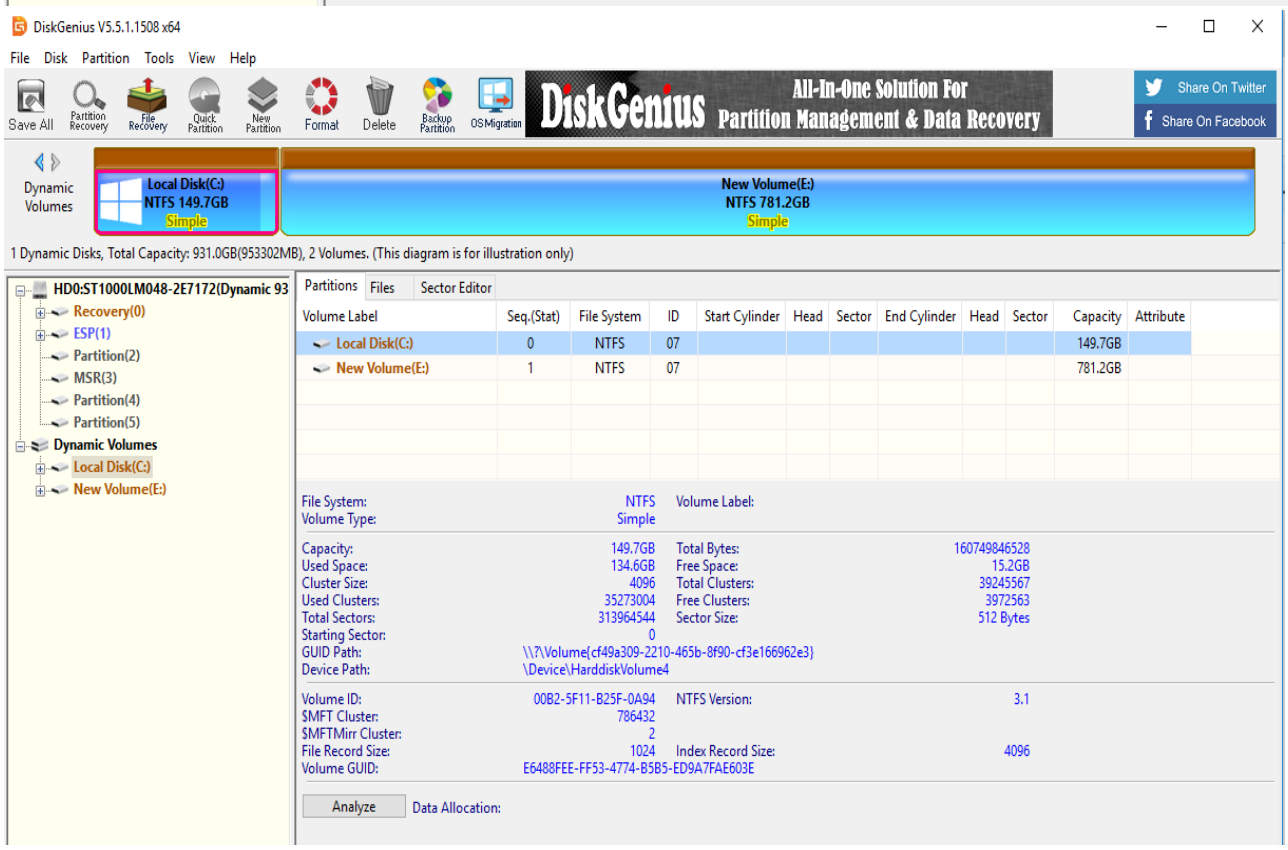
Software Required

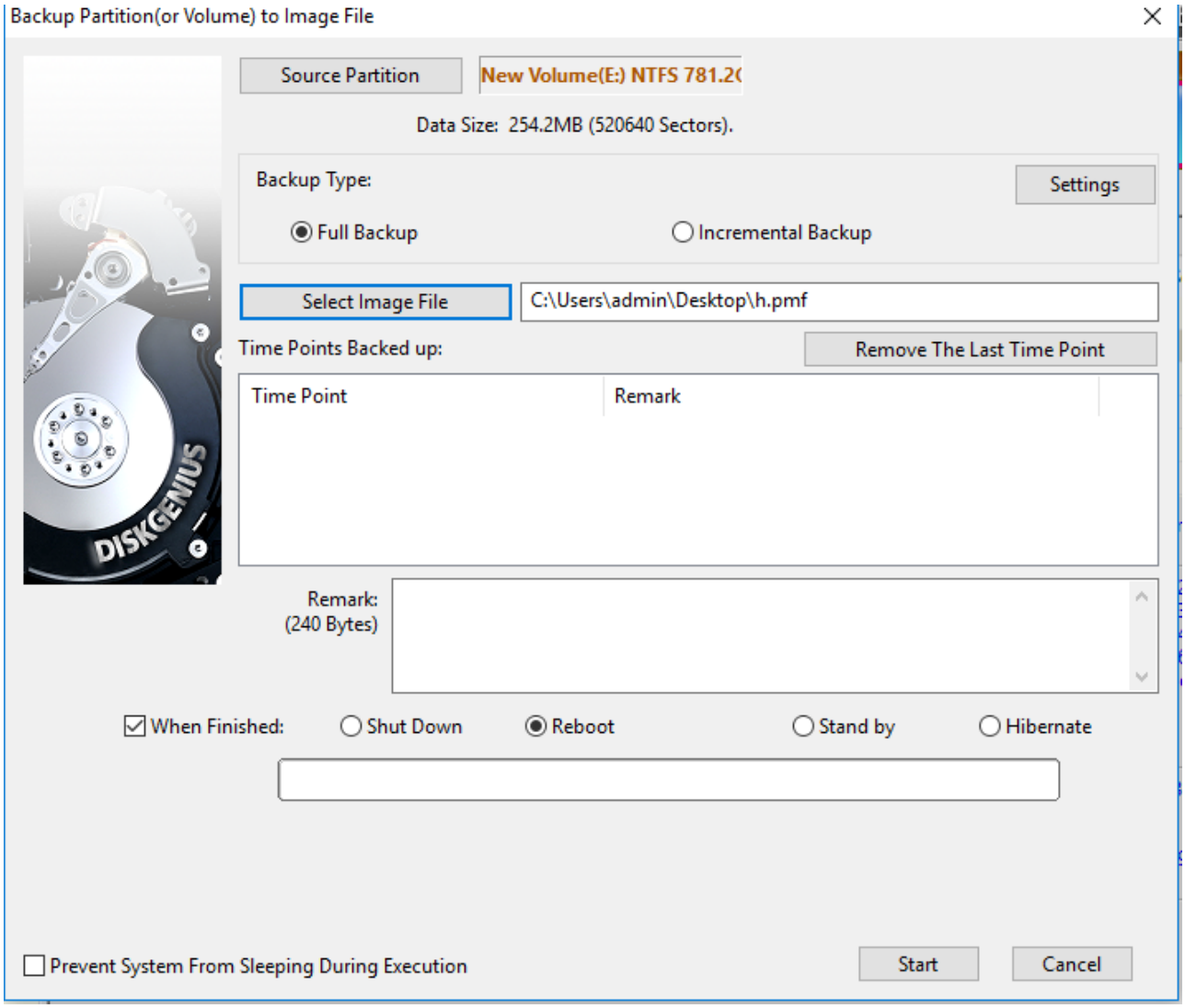
DiskGenius

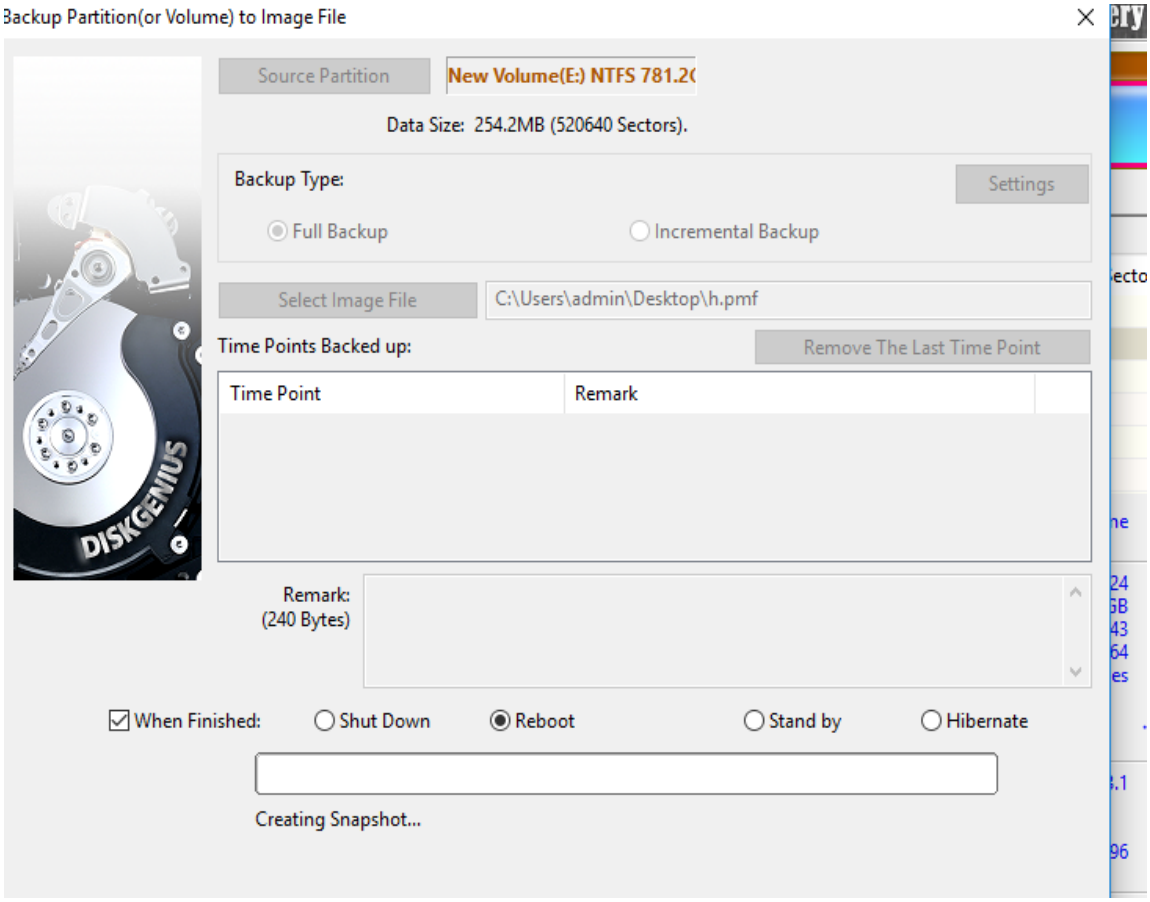
A storage controller is a device that controls storage arrays, and mainly comprises the three types of components—"CPU" (central processing unit), "cache memory" and "connection interface with the network and memory devices." It is otherwise called "storage processor" or "array controller," Storage arrays all have some form of a processor embedded into a controller. As a result, a storage array's controller is essentially a server that's responsible for performing a range of functions for the storage system.



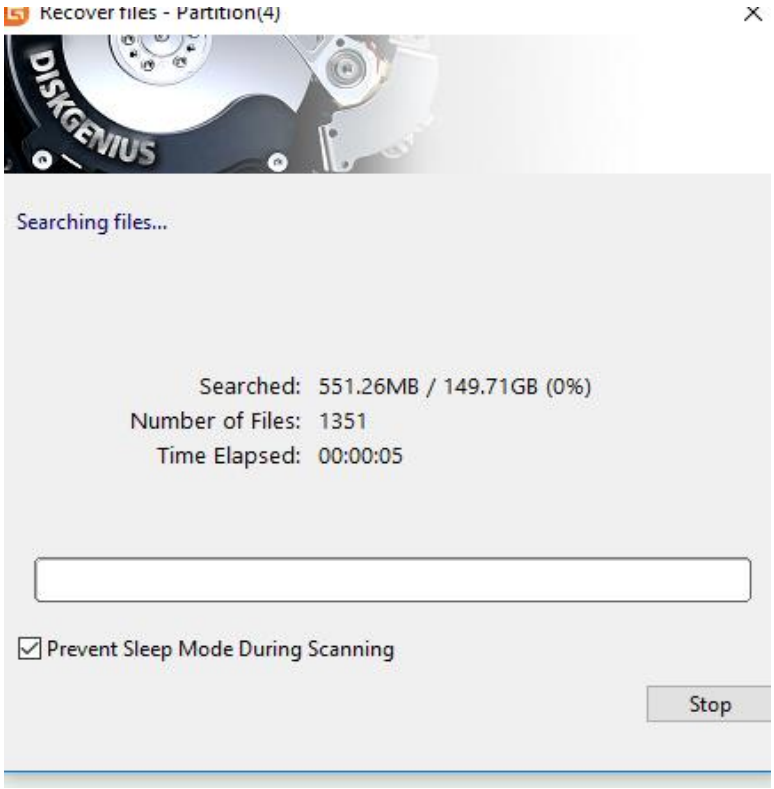

DiskGenius V5.5.1.1508 x64
File Disk Partition Tools View Help
Save All
Partition Recovery
File Recovery
Quick Partition
New Partition
Format
Delete
Backup Partition
OS Migration
DiskGenius
All-In-One Solution For
Partition Management & Data Recovery
Share On Twitter
Share On Facebook
Dynamic Volumes
Local Disk(C:)
NTFS 149.7GB
Simple
New Volume(E:)
NTFS 781.2GB
Simple
1 Dynamic Disks, Total Capacity: 931.0GB(953302MB), 2 Volumes. (This diagram is for illustration only)
HD0:ST1000LM048-2E7172(Dynamic 93
Recovery(0)
ESP(1)
Partition(2)
MSR(3)
Partition(4)
Partition(5)
Dynamic Volumes
Local Disk(C:)
New Volume(E:)
Partitions Files Sector Editor
Volume Label Seq.(Stat) File System ID Start Cylinder Head Sector End Cylinder Head Sector Capacity Attribute
Local Disk(C:) 0 NTFS 07 149.7GB
New Volume(E:) 1 NTFS 07 781.2GB
File System: NTFS
Volume Type: Simple
Volume Label:
Capacity: 149.7GB
Used Space: 134.6GB
Cluster Size: 4096
Used Clusters: 35273004
Total Sectors: 313964544
Starting Sector: 0
GUID Path: \\?\Volume{cf49a309-2210-465b-8f90-cf3e166962e3}
Device Path: \Device\HarddiskVolume4
Total Bytes: 160749846528
Free Space: 15.2GB
Total Clusters: 39245567
Free Clusters: 3972563
Sector Size: 512 Bytes
Volume ID: 00B2-5F11-B25F-0A94
$MFT Cluster: 786432
$MFTMirr Cluster: 2
File Record Size: 1024
Volume GUID: E6488FEE-FF53-4774-B5B5-ED9A7FAE603E
NTFS Version: 3.1
Index Record Size: 4096
Analyze
Data Allocation:

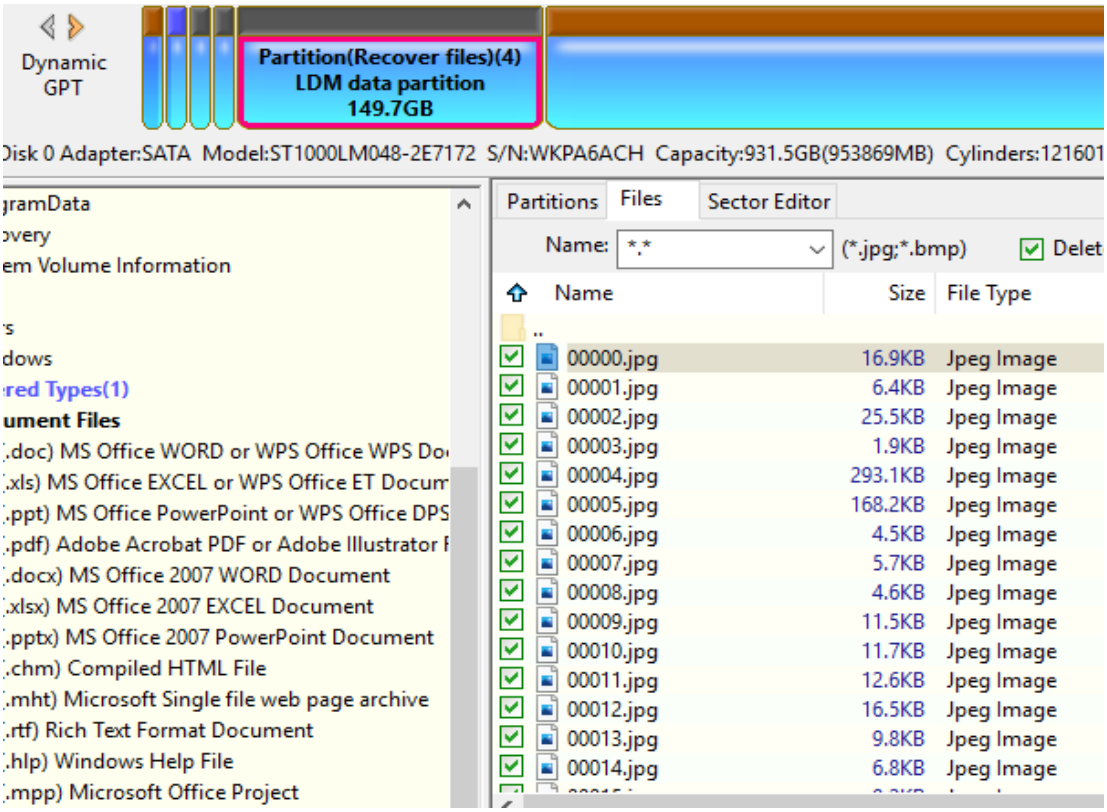

DiskGenius V5.5.1.1508 x64
File Disk Partition Tools View Help
Save All
Partition Recovery
File Recovery
Quick Partition
New Partition
Format
Delete
Backup Partition
OS Migration
DiskGenius
All-In-One Solution For
Partition Management & Data Recovery
Share On Twitter
Share On Facebook
Dynamic Volumes
Local Disk(C:)
NTFS 149.7GB
Simple
New Volume(E:)
NTFS 781.2GB
Simple
1 Dynamic Disks, Total Capacity: 931.0GB(953302MB), 2 Volumes. (This diagram is for illustration only)
HD0:ST1000LM048-2E7172(Dynamic 93
Recovery(0)
ESP(1)
Partition(2)
MSR(3)
Partition(4)
Partition(5)
Dynamic Volumes
Local Disk(C:)
New Volume(E:)
Partitions Files Sector Editor
Volume Label Seq.(Stat) File System ID Start Cylinder Head Sector End Cylinder Head Sector Capacity Attribute
Local Disk(C:) 0 NTFS 07 149.7GB
New Volume(E:) 1 NTFS 07 781.2GB
File System: NTFS
Volume Type: Simple
Volume Label:
Capacity: 149.7GB
Used Space: 134.6GB
Cluster Size: 4096
Used Clusters: 35273004
Total Sectors: 313964544
Starting Sector: 0
GUID Path: \\?\Volume{cf49a309-2210-465b-8f90-cf3e166962e3}
Device Path: \Device\HarddiskVolume4
Total Bytes: 160749846528
Free Space: 15.2GB
Total Clusters: 39245567
Free Clusters: 3972563
Sector Size: 512 Bytes
Volume ID: 00B2-5F11-B25F-0A94
$MFT Cluster: 786432
$MFTMirr Cluster: 2
File Record Size: 1024
Volume GUID: E6488FEE-FF53-4774-B5B5-ED9A7FAE603E
NTFS Version: 3.1
Index Record Size: 4096
Analyze
Data Allocation:

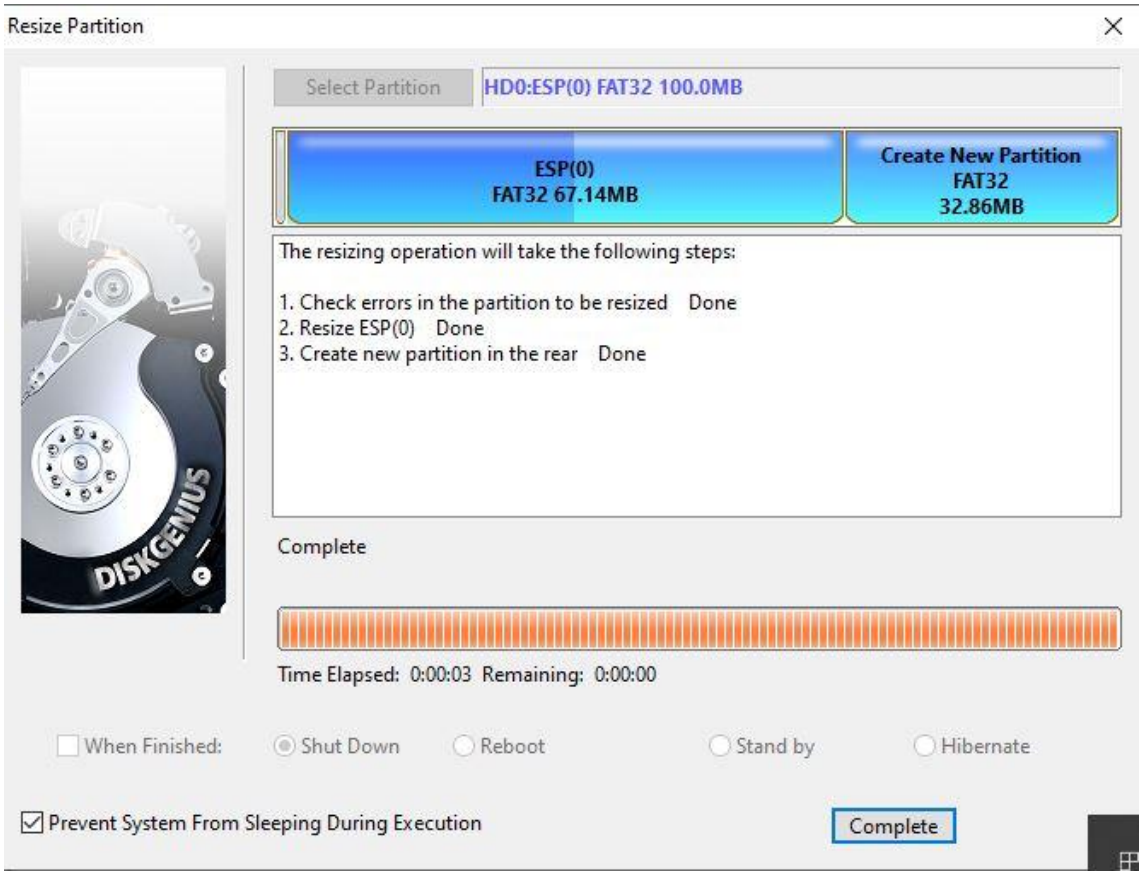

Backup Partition(or Volume) to Image File
Source Partition
New Volume(E:) NTFS 781.2(
Data Size: 254.2MB (520640 Sectors).
Backup Type:
Settings
Full Backup
Incremental Backup
Select Image File
C:\Users\admin\Desktop\h.pmf
Time Points Backed up:
Remove The Last Time Point
Time Point
Remark
Remark:
(240 Bytes)
When Finished:
Shut Down
Reboot
Stand by
Hibernate
Prevent System From Sleeping During Execution
Start
Cancel
DISKGENIUS


Backup Partition(or Volume) to Image File
Source Partition
New Volume(E:) NTFS 781.2(
Data Size: 254.2MB (520640 Sectors).
Backup Type:
Settings
Full Backup
Incremental Backup
Select Image File
C:\Users\admin\Desktop\h.pmf
Time Points Backed up:
Remove The Last Time Point
Time Point
Remark
Remark:
(240 Bytes)
When Finished:
Shut Down
Reboot
Stand by
Hibernate
Creating Snapshot...
DISKGENIUS

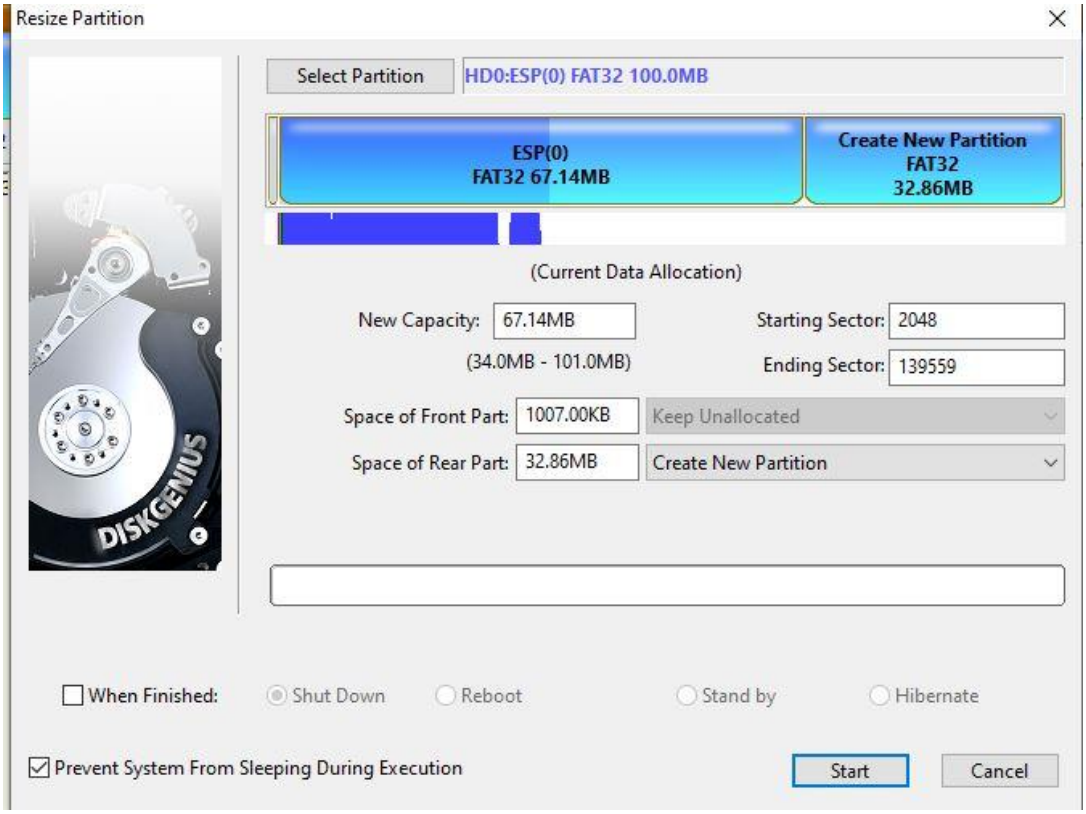
Backup

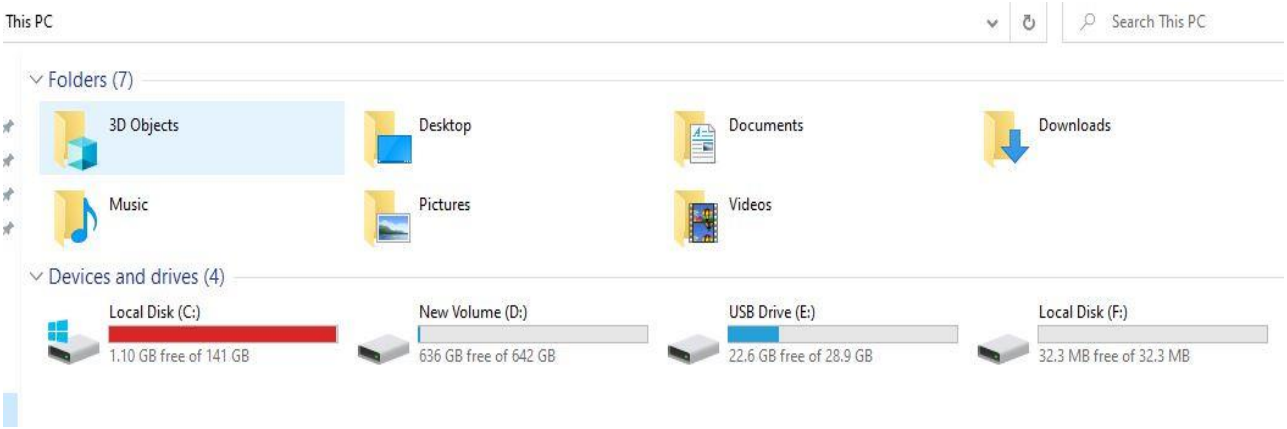

Recover files - Partition(4)
DISKGENIUS
Searching files...
Searched: 551.26MB / 149.71GB (0%)
Number of Files: 1351
Time Elapsed: 00:00:05
Prevent Sleep Mode During Scanning
Stop



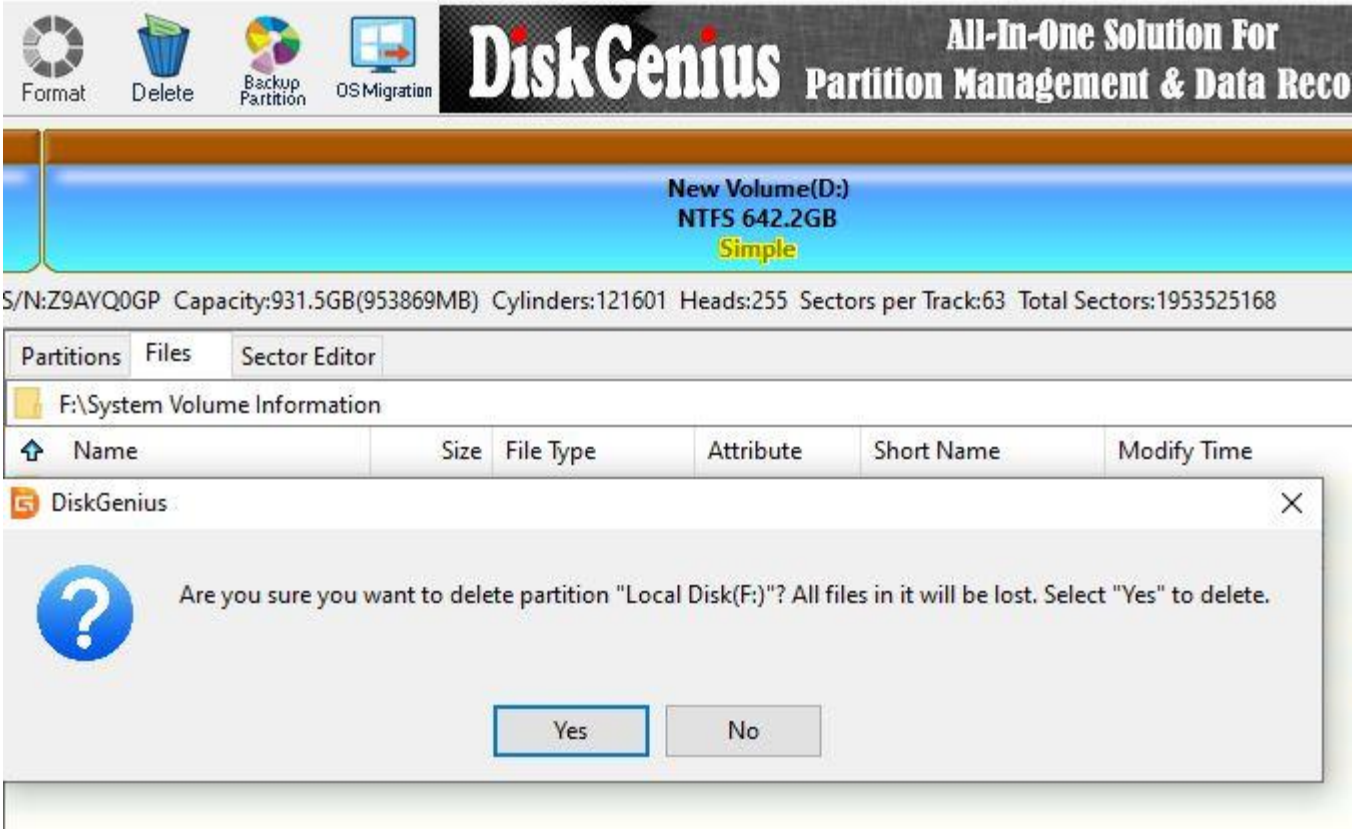


Resize Partition





New Partition



Delete Partition

Result

Thus the storage controller was installed.