Vel Tech High Tech

Dr.Rangarajan Dr.Sakunthala Engineering College

(AN AUTONOMOUS INSTITUTION)

(Approved by AICTE, New Delhi & Affiliated to Anna University)
No.60, Avadi – Vel Tech Road, Chennai-600 062.

21HC76P – FUNDAMENTALS OF CLOUD COMPUTING LABORATORY

NAME :

REGISTER NO :

ROLLNO :

BRANCH :

YEAR :

SEMESTER :

Vel Tech High Tech

Dr.Rangarajan Dr.Sakunthala Engineering College

(AN AUTONOMOUS INSTITUTION)

(Approved by AICTE, New Delhi & Affiliated to Anna University)
No.60, Avadi – Vel Tech Road, Chennai- 600 062.

BONAFIDE CERTIFICATE

Name: ____.

Year:__________Semester:_________Branch: **B.E – Computer Science and Engineering**

University Register……………………………….College Roll No: …………

Certified that this is the bonafide record of work done by the above student **21HC76P– FUNDAMENTALS OF CLOUD COMPUTING LABORATORY** during the academic year 2025 -2026.

Signature of Course In charge **Signature of Head of the Department**

Submitted for the University Practical Examination held on......................... at **VEL TECH HIGH TECH Dr.RANGARAJAN Dr.SAKUNTHALA ENGINEERING COLLEGE, No.60, AVADI – VEL TECH ROAD, AVADI, CHENNAI-600062.**

Signature of Examiners

Internal Examiner: …………………… **External Examiner: ………………**

Date: …………..……..

INDEX

VEL TECH HIGH TECH DR. RANGARAJAN DR. SAKUNTHALA ENGINEERINGCOLLEGE

INSTITUTION VISION

Pursuit of excellence in technical education to create civic responsibility with competency.

INSTITUTION MISSION

1. To impart the attributes of global engineers to face industrial challenges with social relevance.
2. To indoctrinate as front runners through moral practices.
3. To attain the skills through life long learning.

DEPARTMENT VISION

To blend academic learning process and innovative ideas producing self-confident graduates withskills and knowledge to compete in the changing world.

DEPARTMENT MISSION

M1: To provide strong basic knowledge in Computer Science and Engineering.

M2: To motivate the students to function as a team from their innovative ideas in collaboration withthe industries.

M3: To enable the students to lead and adapt to the growing environment.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO 1:

Embark upon successful professional practice in Computer Science and Engineering, displaying supportive and leadership roles.

PEO 2:

Engage in professional projects requiring teamwork and making valuable contributions to design, development, and production in the practice of Computer Science and Engineering or application areas.

PEO 3:

Equip to adapt and grow with changes in technology and globalization, and topursue higher studies and research activities.

PEO 4:

Be capable of productive employment in the field of Computer Science andEngineering with competing technical expertise, good interpersonal skill.

PEO 5:

Utilize their broad educational experience, ethics, and professionalism to make apositive impact on their local and professional communities.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

By the time of graduation, the undergraduate Computer Science and Engineeringstudents can have the ability of

PSO's	PROGRAMME SPECIFIC OUTCOMES (PSOs)
PSO1	Designing Computer/Electronic based components which would serve social environment.
PSO2	Applying the current and gained knowledge and modern techniquesnot only in the Computers but in all related fields.

PROGRAM OUTCOMES:

1. ***Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.*
2. ***Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.*
3. ***Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.*
4. ***Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesisof the information to provide valid conclusions.*
5. ***Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.*
6. ***The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilitiesrelevant to the professional engineering practice.*
7. ***Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.*
8. ***Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.*
9. ***Individual and team work**: Function effectively as an individual, and as a member or leaderin diverse teams, and in multi disciplinary settings.*
10. ***Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.*
11. ***Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi disciplinary environments.*
12. ***Life Long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.*

VEL TECH HIGHTECH Dr. RANGARAJAN Dr. SAKUNTHALA ENGINEERING COLLEGE

COURSE OBJECTIVES:

The student should be made to

- To develop Web applications in Cloud
- To learn the design and development process involved in creating a cloud based application
- To learn to implement and use parallel programming using Hadoop.
- To Run a Container from Docker Hub
- To Simulate Cloud Scenario using Cloud sim.
- To create virtualization in VMWARE or any equivalent Open Source Tool.

COURSE OUTCOMES:

CO. No.	Course Outcomes	Blooms level
On successful completion of this course, students will be able to		
C706. 1	***Configure*** various virtualization tools such as Virtual Box, VMware workstation.	K2
C706. 2	***Design*** and deploy a web application in a PaaS environment.	K3
C706. 3	***Learn*** how to simulate a cloud environment to implement new schedulers.	K2
C706. 4	***Install*** and use a generic cloud environment that can be used as a private cloud.	K3
C706. 5	***Manipulate*** large data sets in a parallel environment	K3

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

CO No.	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
C706. 1	2	1	1	1	1	-	-	-	-	-	-	2	2	2
C706. 2	2	1	1	1	1	-	-	-	-	-	-	2	2	2
C706. 3	2	1	1	1	1	-	-	-	-	-	-	2	2	2
C706. 4	3	2	2	1	2	-	-	-	-	-	-	2	3	2
C706. 5	2	1	1	1	1	-	-	-	-	-	-	2	2	2

Note:1:Slight,2: Moderate,3:Substantial

EXP.No:1 **DATE:**	**INSTALL VIRTUAL BOX/VMWARE EQUIVALENT OPEN-SOURCE CLOUD WORK STATION WITH DIFFERENT FLAVOURS OF LINUX OR WINDOWS OS ON TOP OF WINDOWS 8 AND ABOVE.**

Aim:

.

PROCEDURE TO INSTALL

Step 1- Download Link

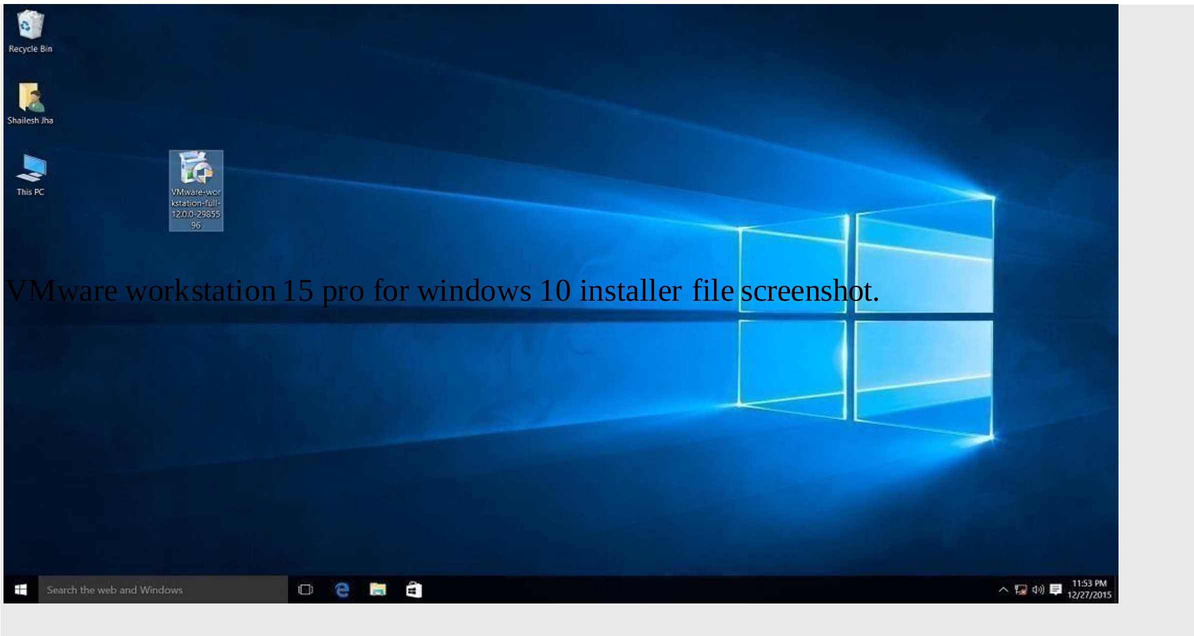
Link for downloading the software is https://www.vmware.com/products/workstation-pro/workstation-pro-evaluation.html. Download the software for windows. Good thing is that there is no signupprocess. Click and download begins. Software is around 541MB.

Step 2- Download the installer file

It should probably be in the download folder by default, if you have not changed the settings in your browser. File name should be something like VMware-workstation-full-15.5.1-15018445.exe. This file name can change depending on the version of the software currently available for download. But for now, till the next version is available, they will all be VMware Workstation 15 Pro.

Step 3- Locate the downloaded installer file

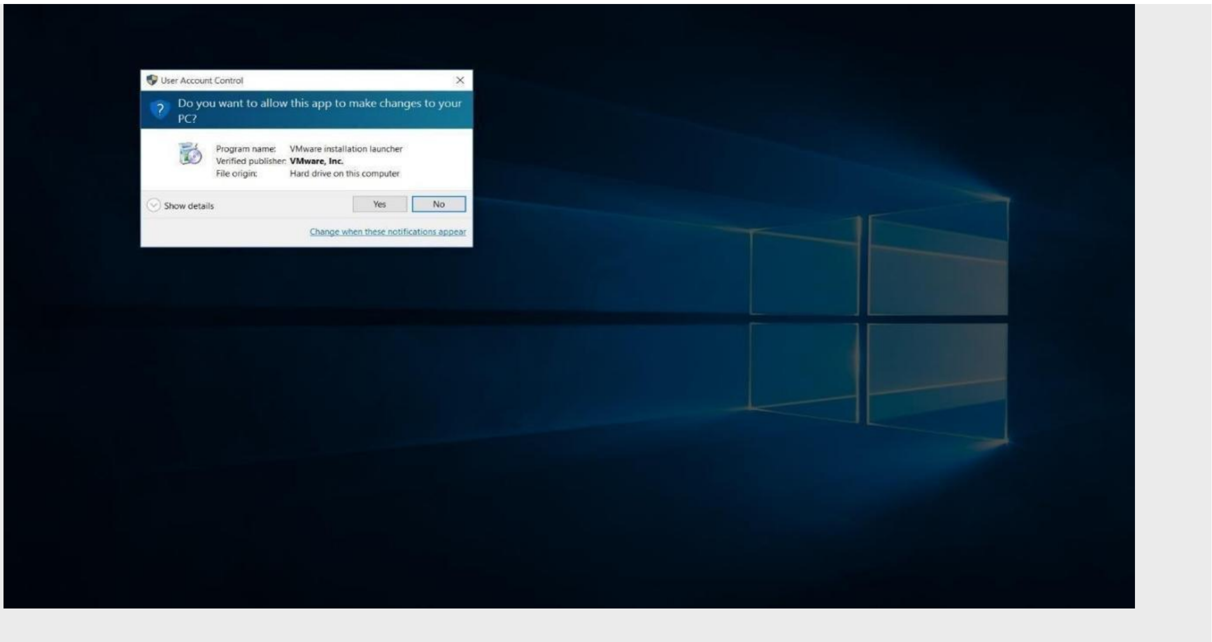
For demonstration purpose, I have placed the downloaded installer on my desktop. Find the installer on your system and double click to launch the application.


Recycle Bin
Shailesh Jha
This PC
VMware-workstation-full-12.0.0-2985596
Search the web and Windows
11:53 PM
12/27/2015

VMware workstation 15 pro for windows 10 installer file screenshot.

Step 4- User Access Control (UAC) Warning

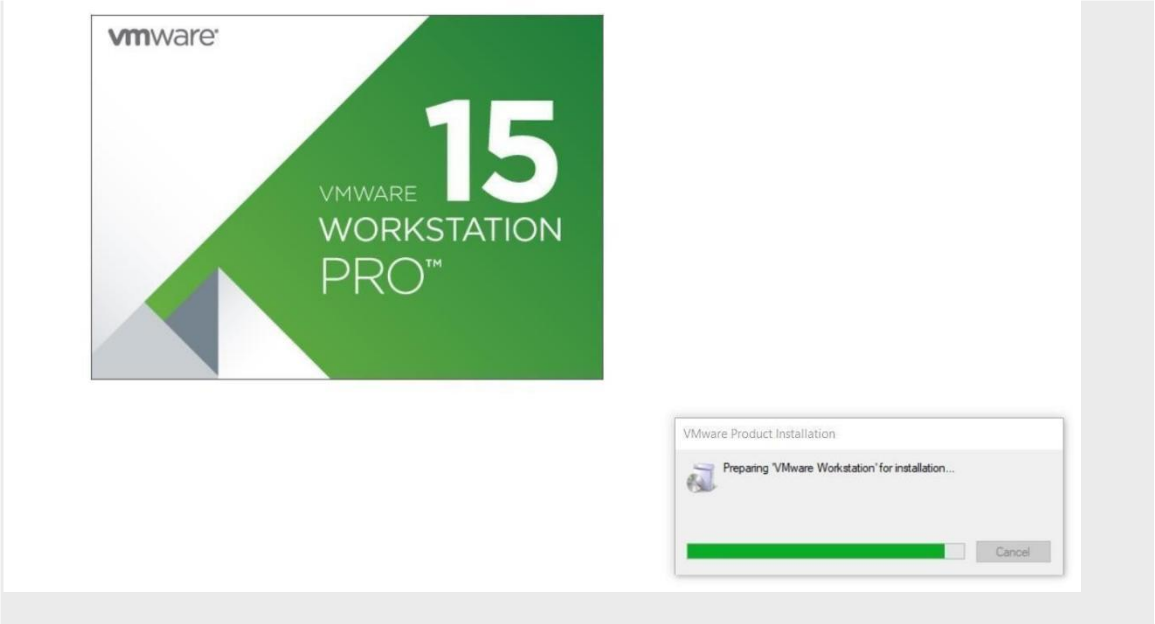
Now you should see User Access Control (UAC) dialog box. Click yes to continue.


User Account Control

Do you want to allow this app to make changes to your PC?

Program name: VMware installation launcher
Verified publisher: VMware, Inc.
File origin: Hard drive on this computer

Initial Splash screen will appear. Wait for the process to complete.

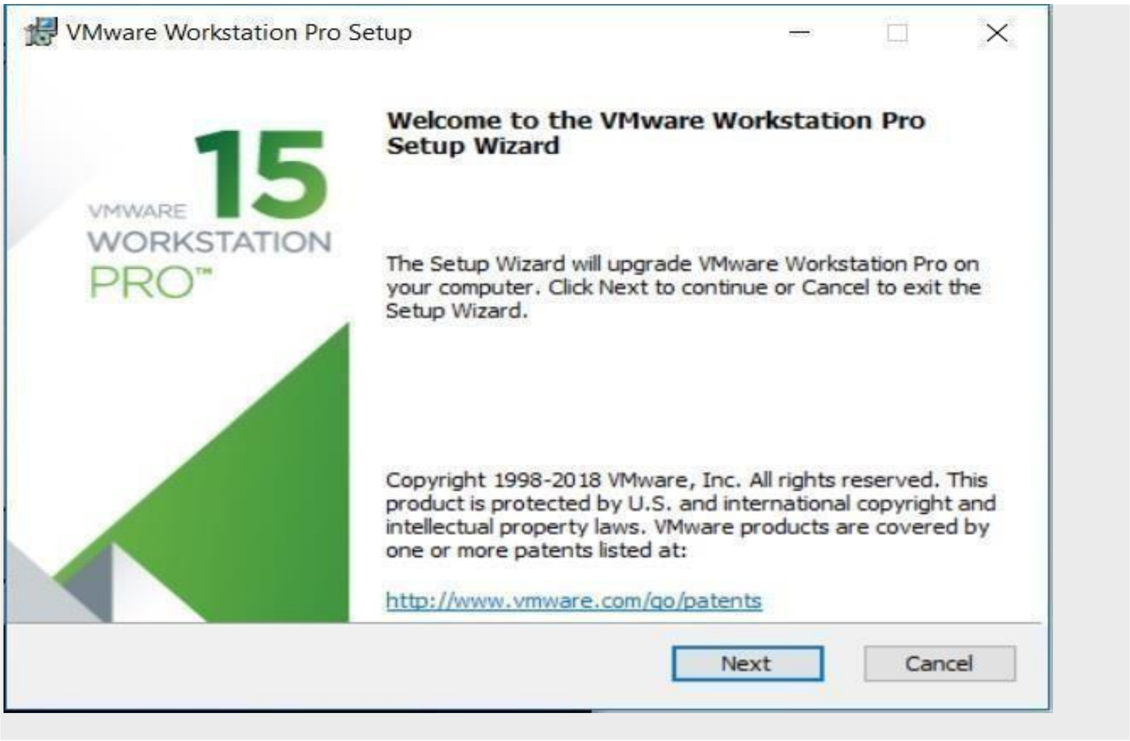


VMware Product Installation

Preparing 'VMware Workstation' for installation...

Step 5- VMware Workstation Setup wizard

Now you will see VMware Workstation setup wizard dialog box. Click next to continue.



VMware Workstation Pro Setup

Welcome to the VMware Workstation Pro Setup Wizard

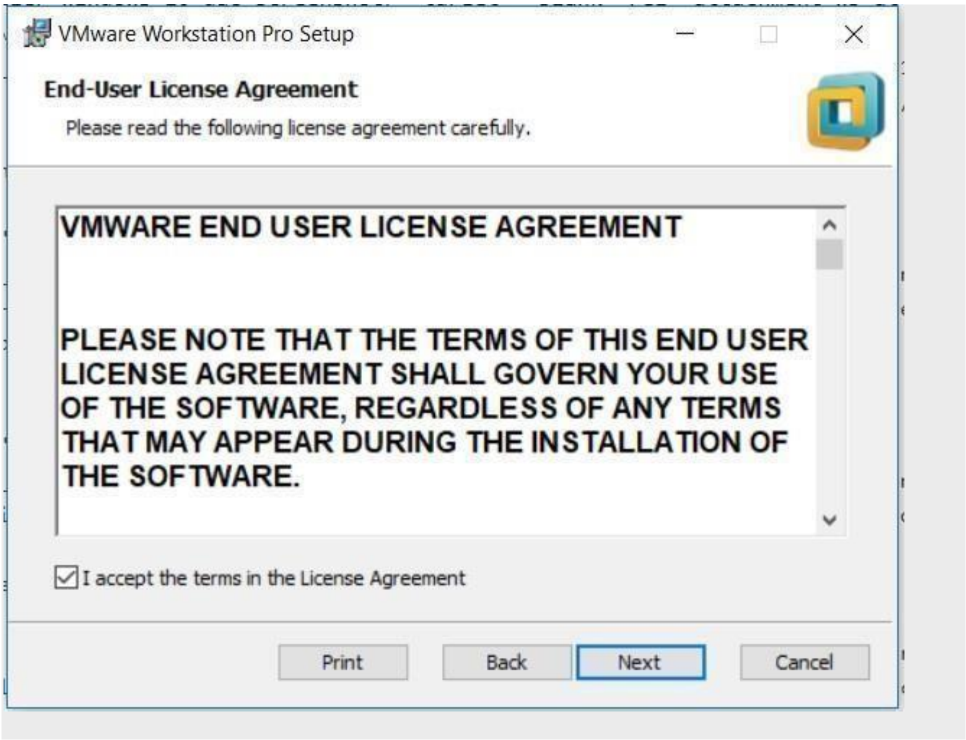
The Setup Wizard will upgrade VMware Workstation Pro on your computer. Click Next to continue or Cancel to exit the Setup Wizard.

Copyright 1998-2018 VMware, Inc. All rights reserved. This product is protected by U.S. and international copyright and intellectual property laws. VMware products are covered by one or more patents listed at:

http://www.vmware.com/go/patents

Step 6- End User Licence Agreement

This time you should see End User Licence Agreement dialog box. Check "I accept the terms in the Licence Agreement" box and press next to continue.



End-User License Agreement

Please read the following license agreement carefully.

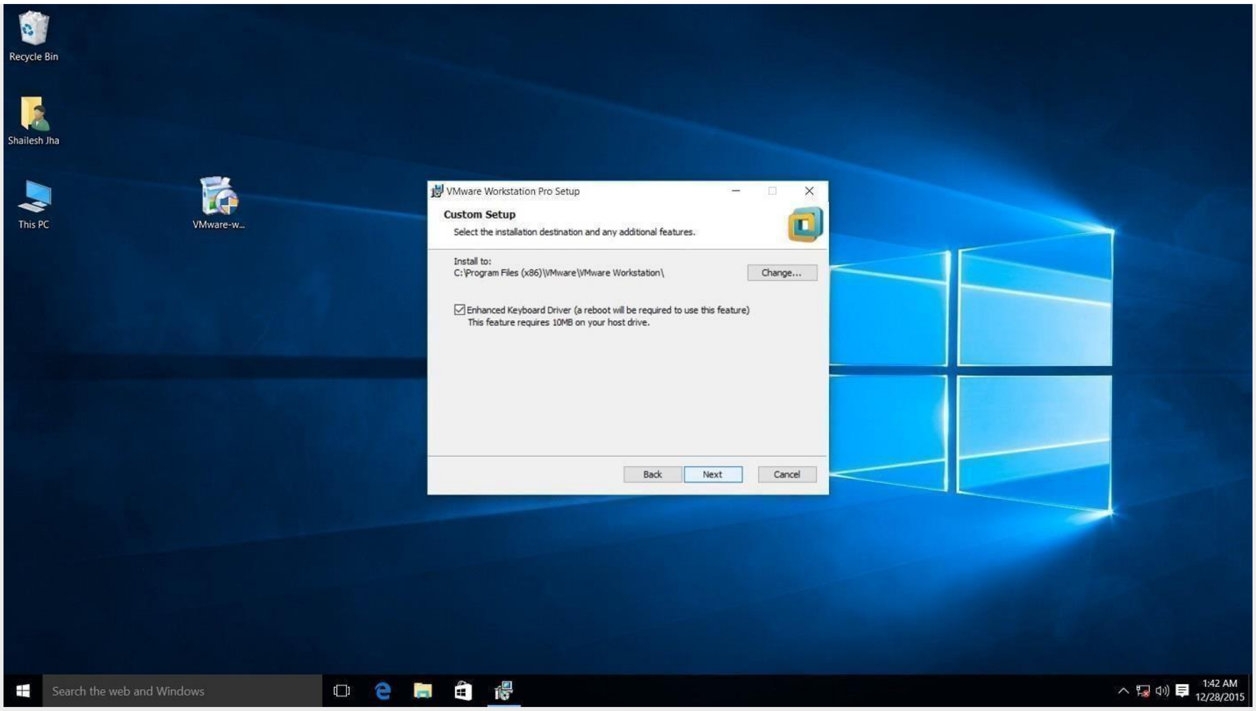
VMWARE END USER LICENSE AGREEMENT

PLEASE NOTE THAT THE TERMS OF THIS END USER LICENSE AGREEMENT SHALL GOVERN YOUR USE OF THE SOFTWARE, REGARDLESS OF ANY TERMS THAT MAY APPEAR DURING THE INSTALLATION OF THE SOFTWARE.

☑ I accept the terms in the License Agreement

Step 7- Custom Setup options

Select the folder in which you would like to install the application. There is no harm in leaving the defaults as it is. Also select Enhanced Keyboard Driver check box.



VMware Workstation Pro Setup

Custom Setup

Select the installation destination and any additional features.

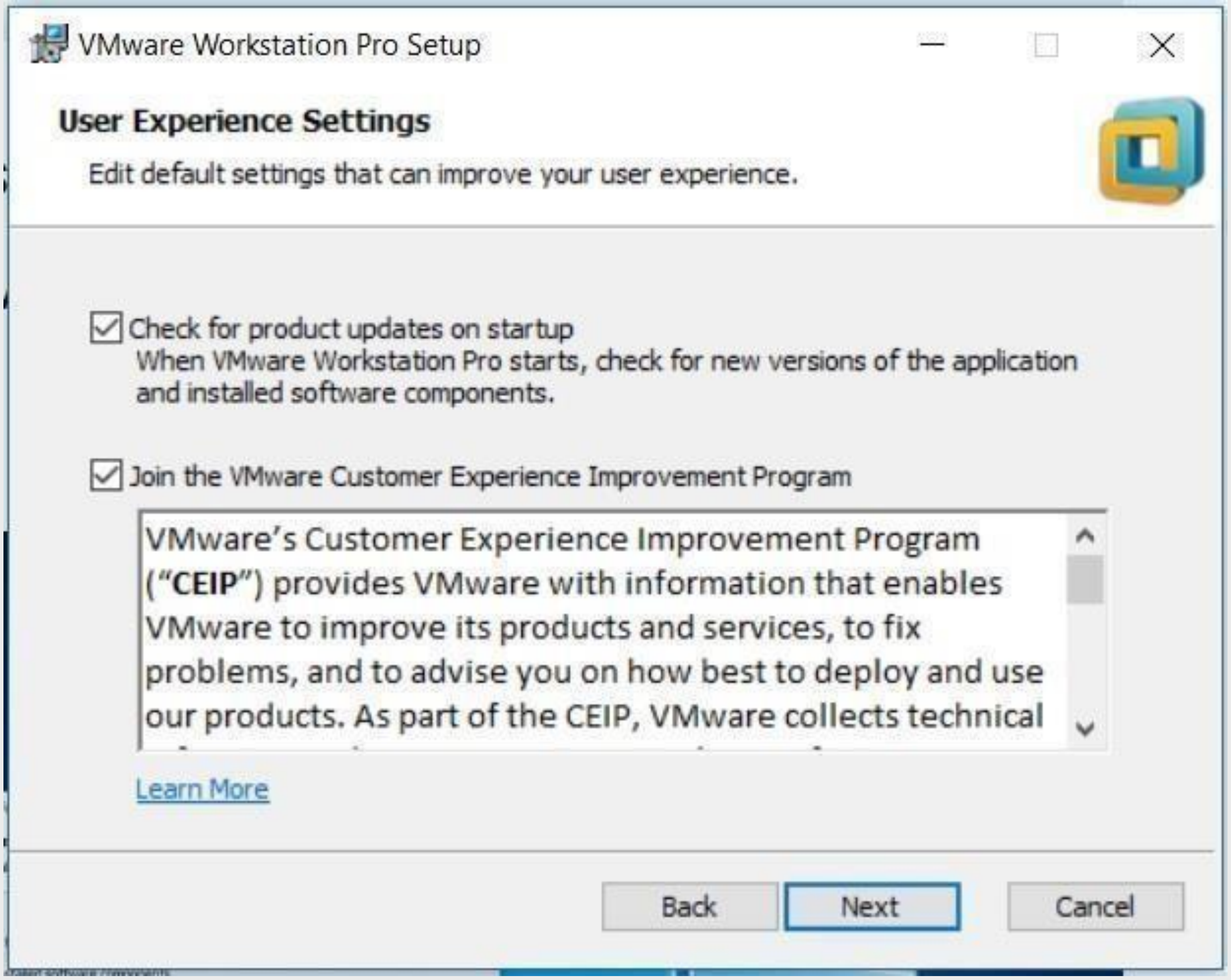
Install to:
C:\Program Files (x86)\VMware\VMware Workstation\

☑ Enhanced Keyboard Driver (a reboot will be required to use this feature)
This feature requires 10MB on your host drive.

VMware Workstation 15 Pro installation – select installation folder

Step 8- User Experience Settings

Next you are asked to select “Check for Updates” and “Help improve VMware Workstation Pro”. Do as you wish. I normally leave it to defaults that is unchecked.



User Experience Settings

Edit default settings that can improve your user experience.

☑ Check for product updates on startup
When VMware Workstation Pro starts, check for new versions of the application and installed software components.

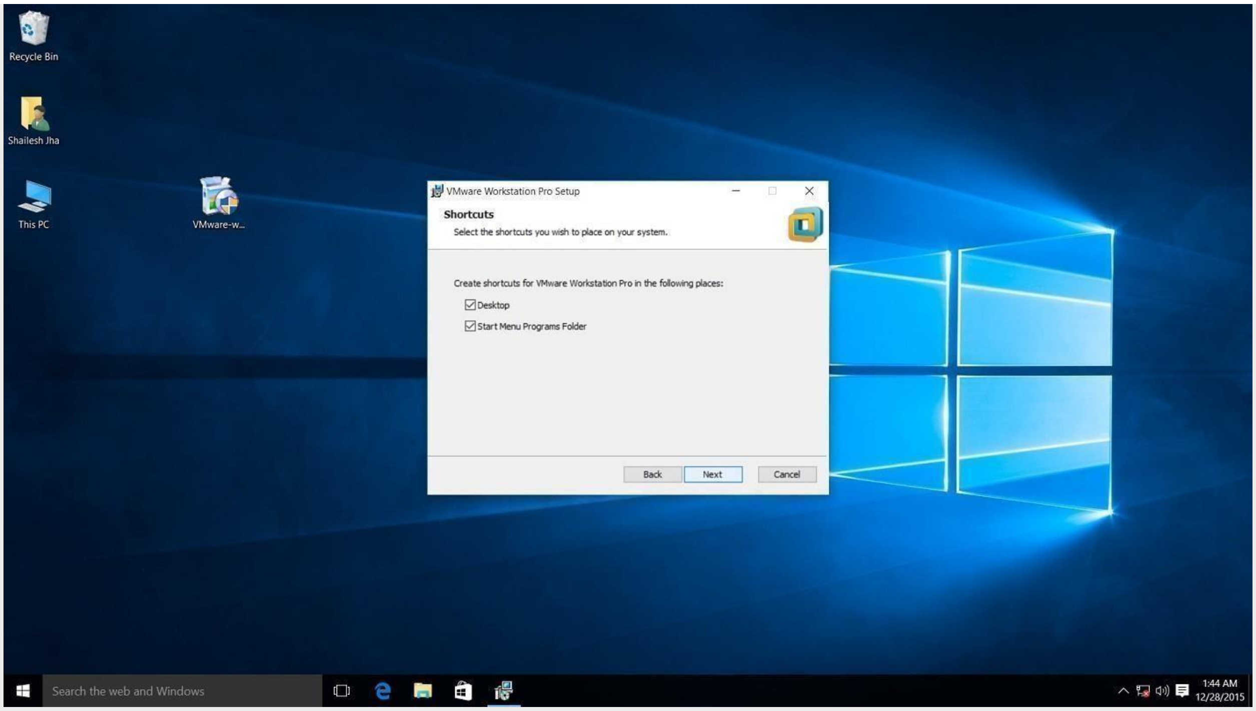
☑ Join the VMware Customer Experience Improvement Program

VMware’s Customer Experience Improvement Program (“**CEIP**”) provides VMware with information that enables VMware to improve its products and services, to fix problems, and to advise you on how best to deploy and use our products. As part of the CEIP, VMware collects technical

VMware Workstation 15 Installation – User Experience Settings

Step 9- Application Shortcuts preference

Next step is to select the place you want the shortcut icons to be placed on your system to launch the application. Please select both the options, desktop and start menu and click next.



Shortcuts

Select the shortcuts you wish to place on your system.

Create shortcuts for VMware Workstation Pro in the following places:

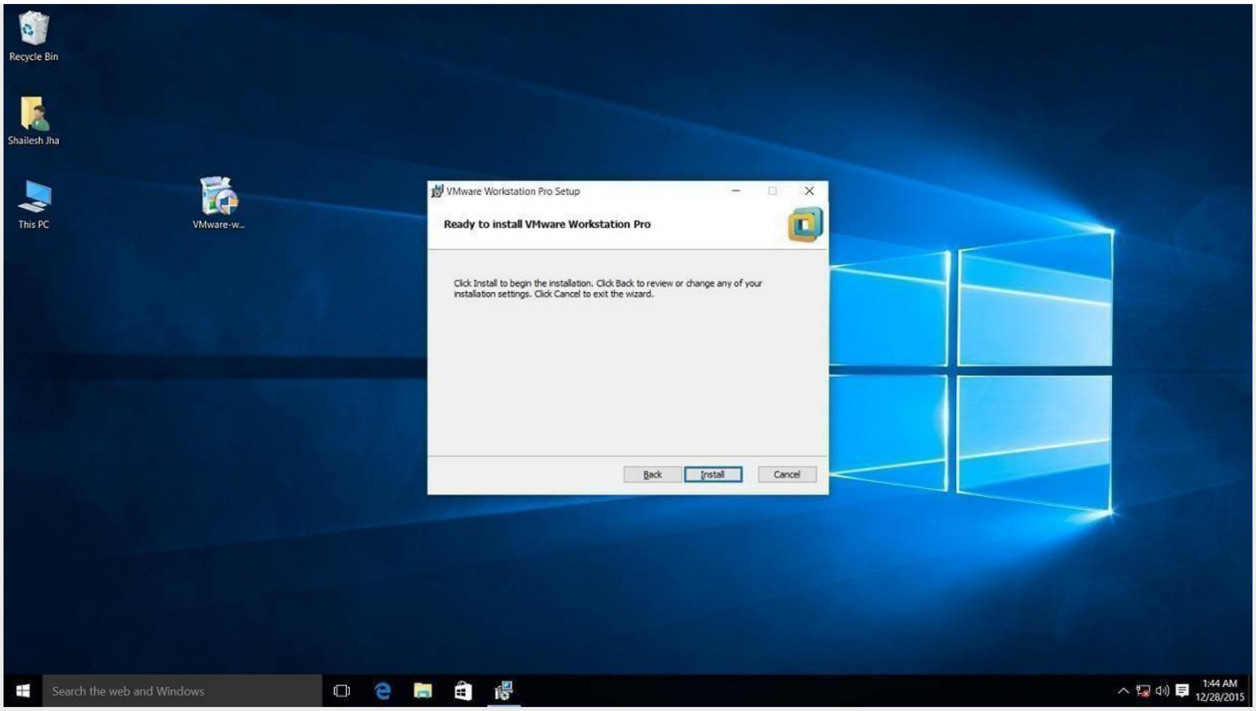
☑ Desktop

☑ Start Menu Programs Folder

VMware workstation 15 pro installation shortcut selection checkbox screenshot.

Step 10- Installation begins

Now you see the begin installation dialog box. Click install to start the installation process.

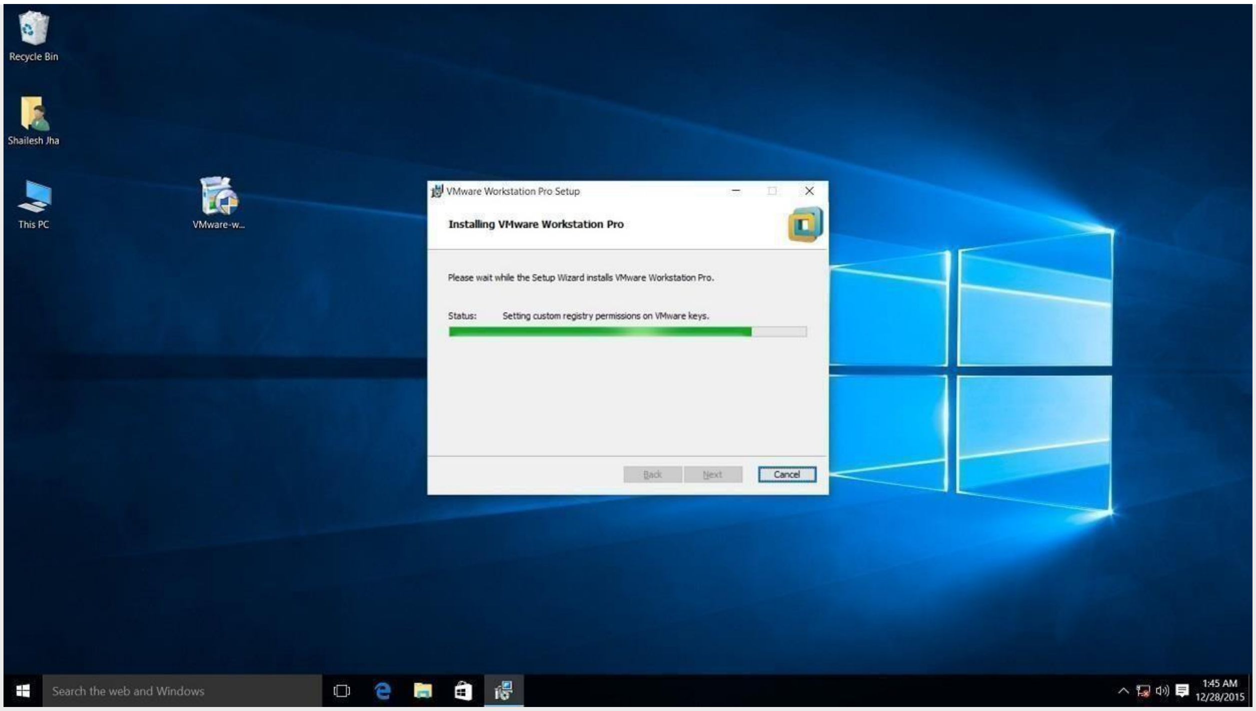


Ready to install VMware Workstation Pro

Click Install to begin the installation. Click Back to review or change any of your installation settings. Click Cancel to exit the wizard.

Screenshot for VMware Workstation 15 pro installation begin confirmation dialog box on windows 10.

Below screenshot shows Installation in progress. Wait for this to complete.



VMware Workstation Pro Setup

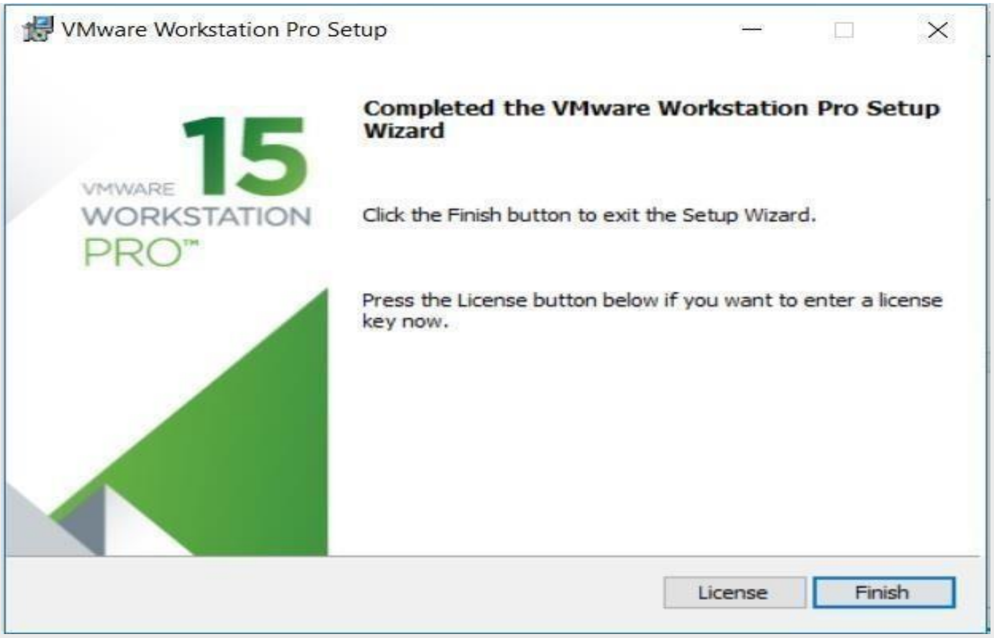
Installing VMware Workstation Pro

Please wait while the Setup Wizard installs VMware Workstation Pro.

Status: Setting custom registry permissions on VMware keys.

Screenshot for VMware Workstation 15 pro installation process.

At the end you will see installation complete dialog box. Click finish and you are done with the installation process. You may be asked to restart your computer. Click on Yes to restart.



VMware Workstation Pro Setup

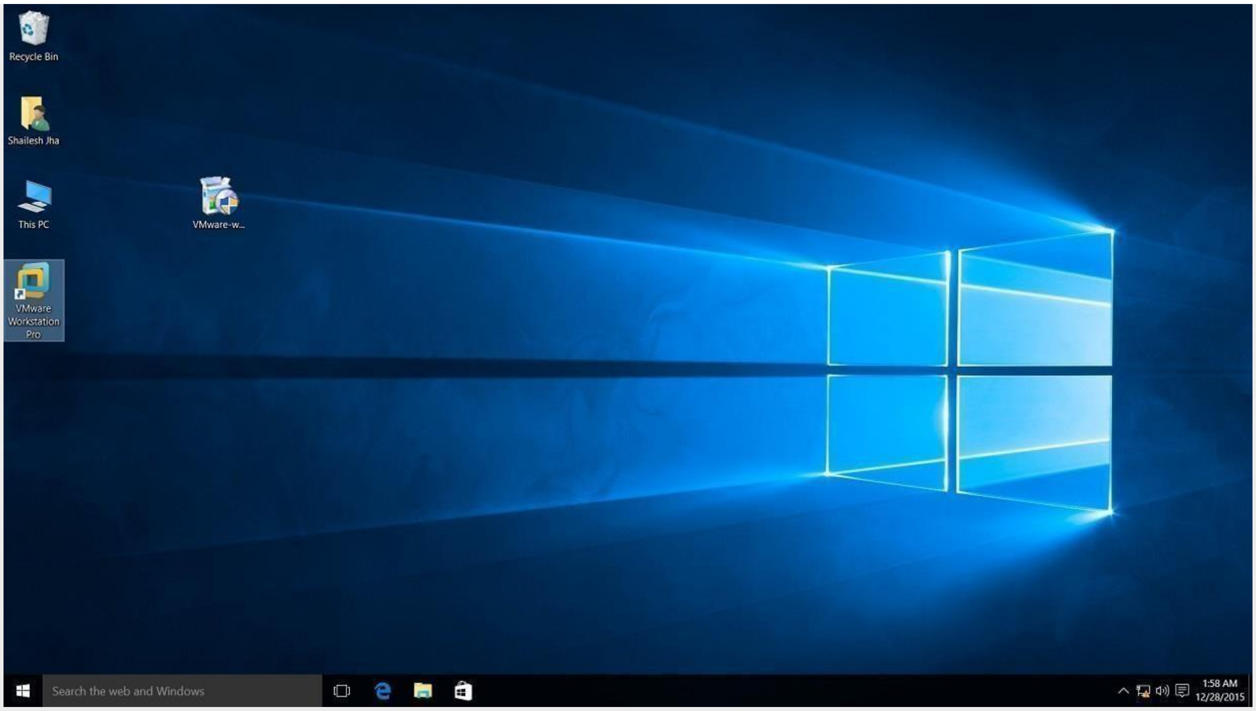
Completed the VMware Workstation Pro Setup Wizard

Click the Finish button to exit the Setup Wizard.

Press the License button below if you want to enter a license key now.

Step 11- Launch VMware Workstation

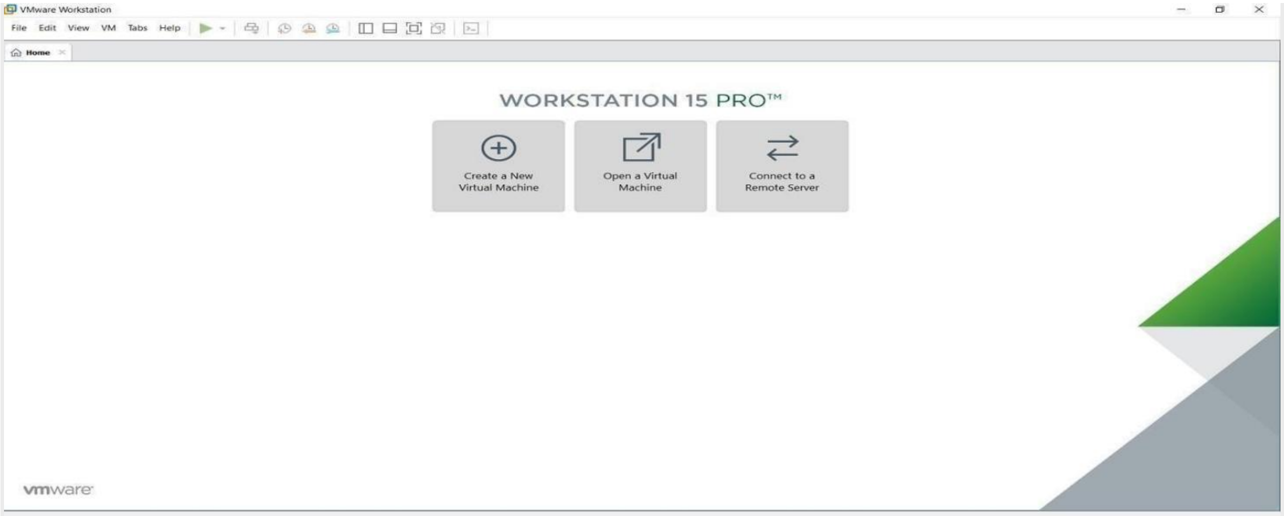
After the installation completes, you should see VMware Workstation icon on the desktop. Double click on it to launch the application.



Screenshot for VMware Workstation 15 Pro icon on windows 10 desktop.

Step 12- Licence Key

If you see the dialog box asking for licence key, click on trial or enter the licence key. Then what you have is the VMware Workstation 15 Pro running on your windows 10 desktop. If don't have thelicence key, you will have 30 daystrial.



VMware Workstation 15 Pro home screen

Step 13- At some point if you decide to buy

At some point of time if you decide to buy the Licence key, you can enter the Licence key by going to**Help->EnteraLicenceKey** You can enter the 25 character licence key in the dialog box shown below and click OK. Now you have the licence version of thesoftware.

Result:

EXP NO: 2 **DATE:**	**INSTALL A C COMPILER IN THE VIRTUAL MACHINE CREATED USING A VIRTUAL BOX AND EXECUTE SIMPLE PROGRAMS**

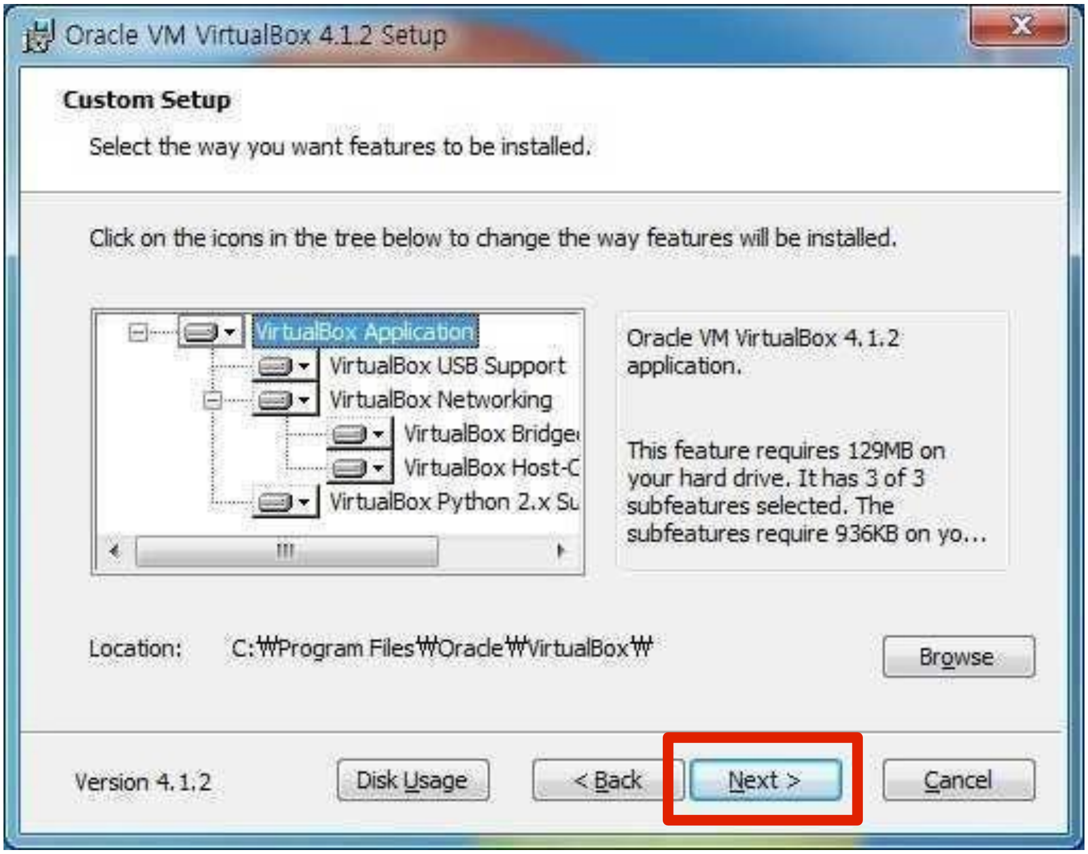
Aim:

1. A. Install VirtualBox

I.Visithttp://www.virtualbox.org/wiki/downloads

2. Download VirtualBox platform packages for yourOS

3. Open the Installation Package bydouble clicking



Custom Setup

Select the way you want features to be installed.

Click on the icons in the tree below to change the way features will be installed.

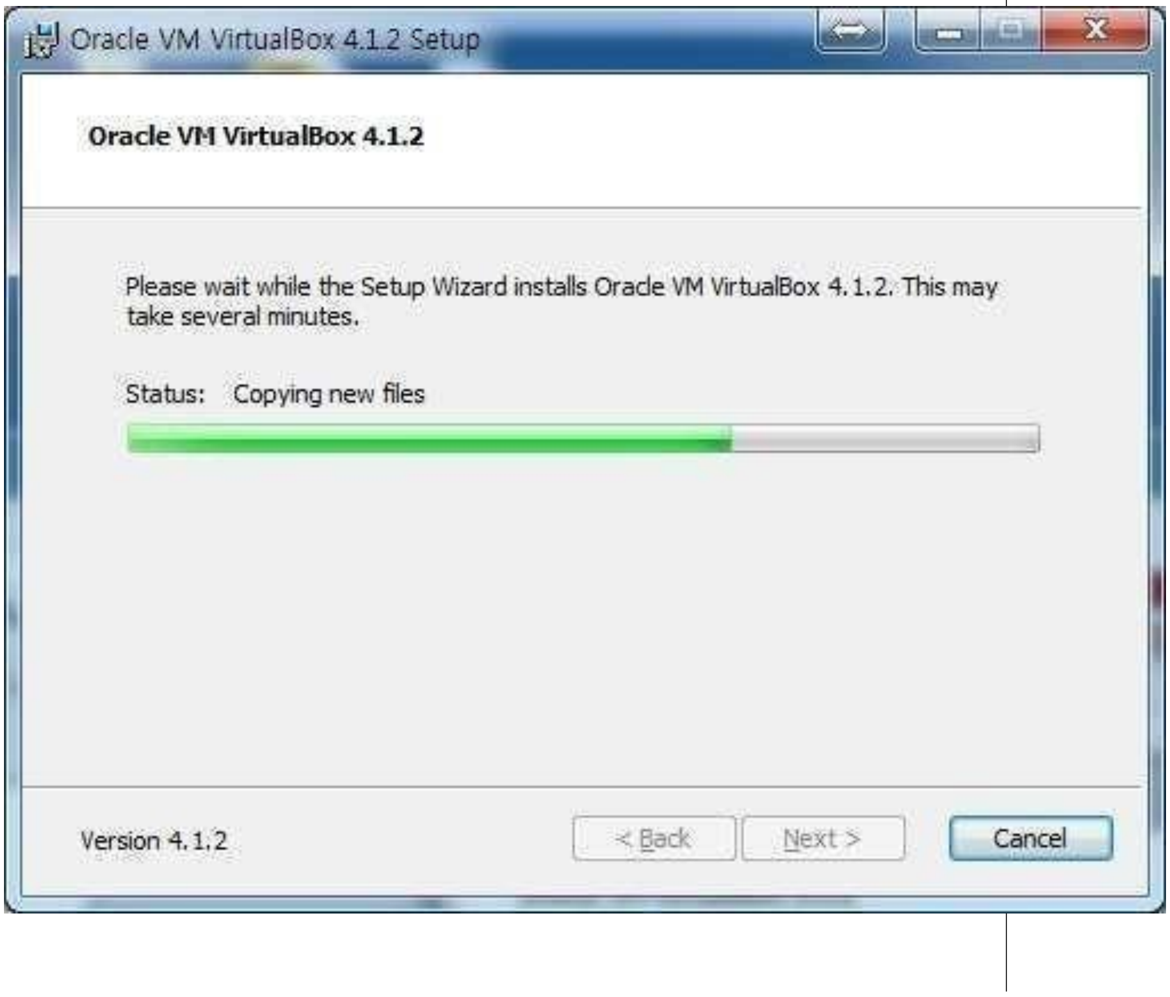
Oracle VM VirtualBox 4.1.2 application.

This feature requires 129MB on your hard drive. It has 3 of 3 subfeatures selected. The subfeatures require 936KB on yo...

Location: C:₩Program Files₩Oracle₩VirtualBox₩

4. Click continue and finish installingVirtualBox

PC



Oracle VM VirtualBox 4.1.2 Setup

Oracle VM VirtualBox 4.1.2

Please wait while the Setup Wizard installs Oracle VM VirtualBox 4.1.2. This may take several minutes.

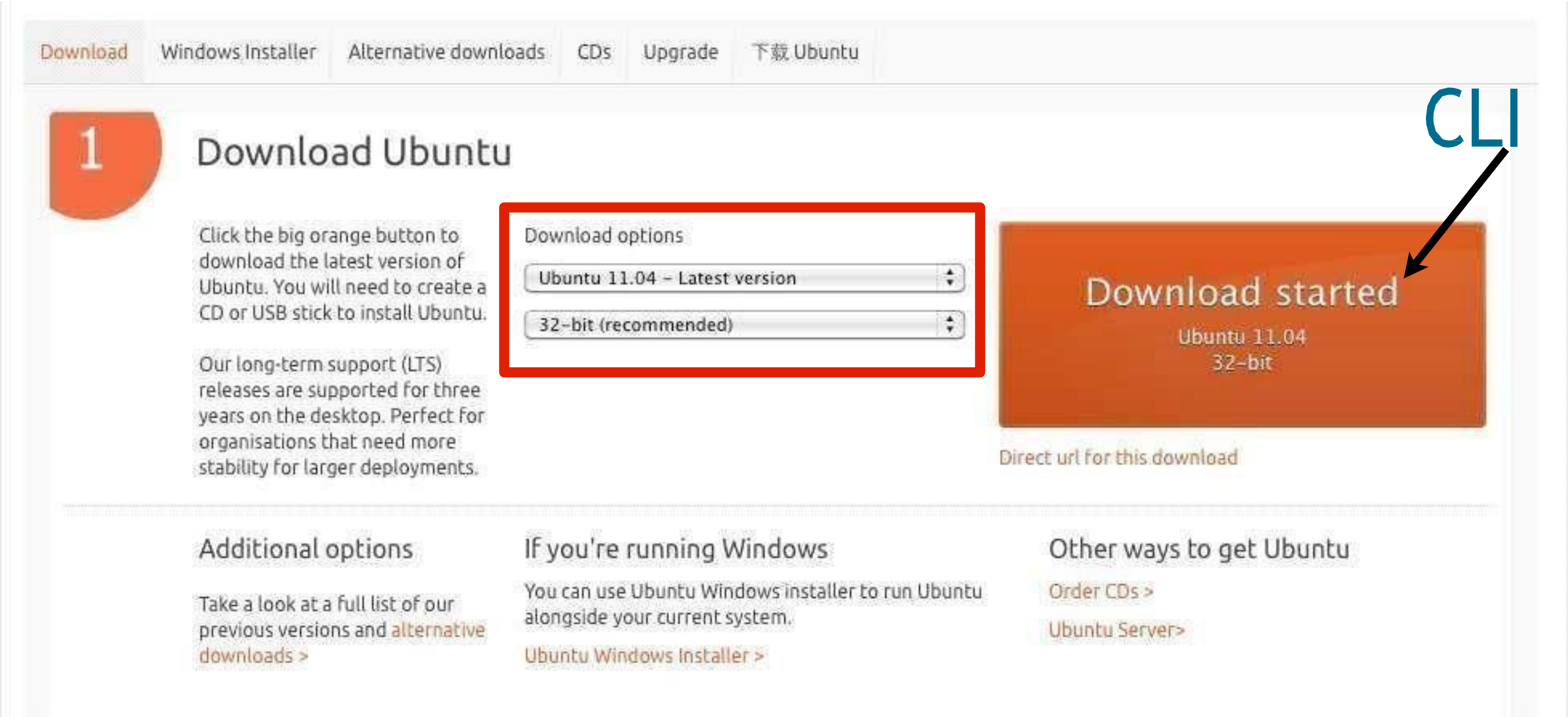
Status: Copying new files

Version 4.1.2

5. When finished installation, close thewindow.

2. Download Linux

- Visit the pagehttp://www.ubuntu.com/download/ubuntu/download
- Choose the Latest version of Ubuntu and32-bit and click “StartDownload”



Download Ubuntu

Click the big orange button to download the latest version of Ubuntu. You will need to create a CD or USB stick to install Ubuntu.

Our long-term support (LTS) releases are supported for three years on the desktop. Perfect for organisations that need more stability for larger deployments.

Download options

Ubuntu 11.04 – Latest version

32-bit (recommended)

Download started

Ubuntu 11.04
32-bit

Direct url for this download

Additional options

Take a look at a full list of our previous versions and alternative downloads >

If you're running Windows

You can use Ubuntu Windows installer to run Ubuntu alongside your current system.

Ubuntu Windows Installer >

Other ways to get Ubuntu

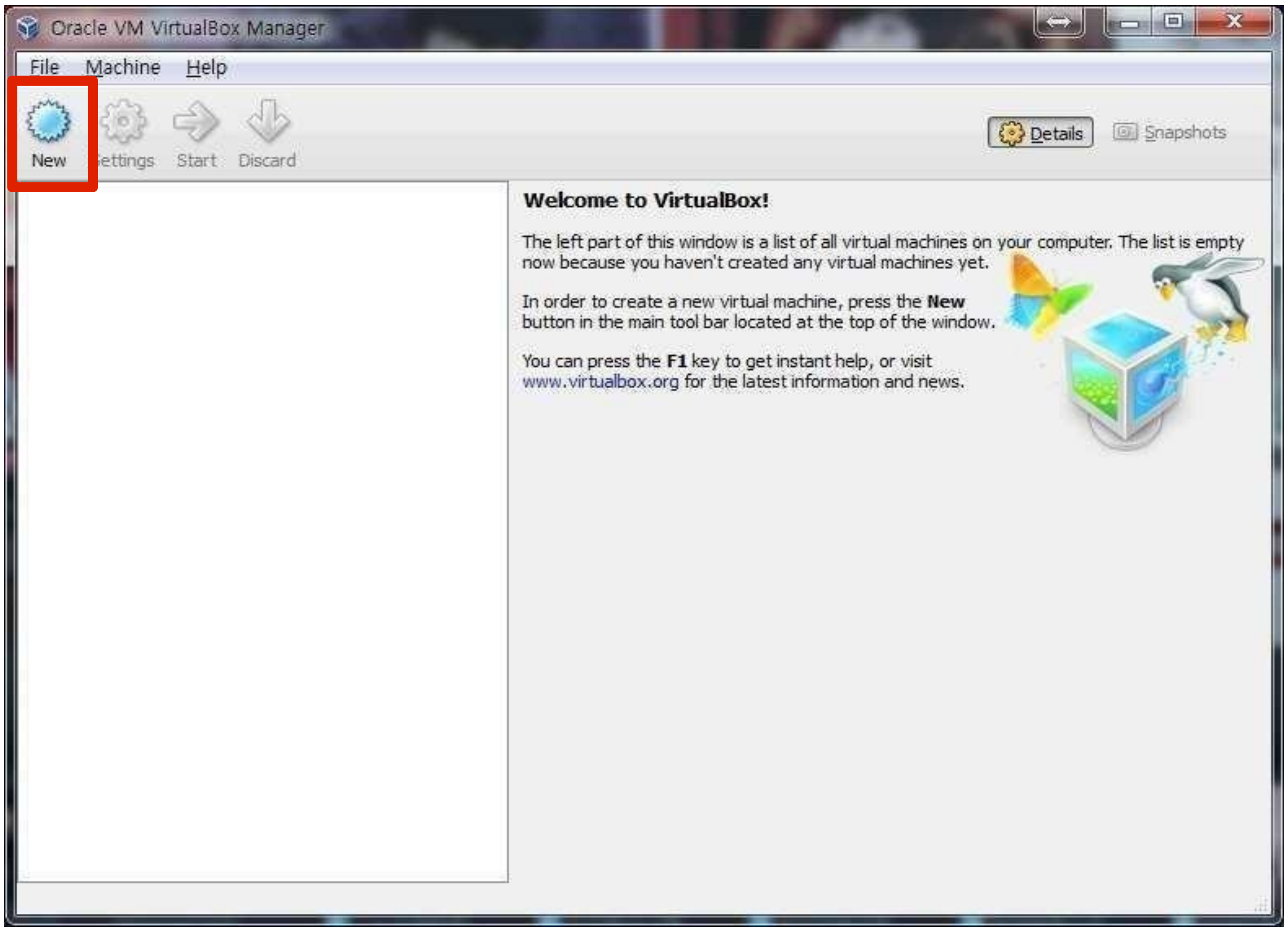
Order CDs >

Ubuntu Server>

I. Run VirtualBox by double-clicking theicon

2. Click “New” button on the top leftcorner

PC



Welcome to VirtualBox!

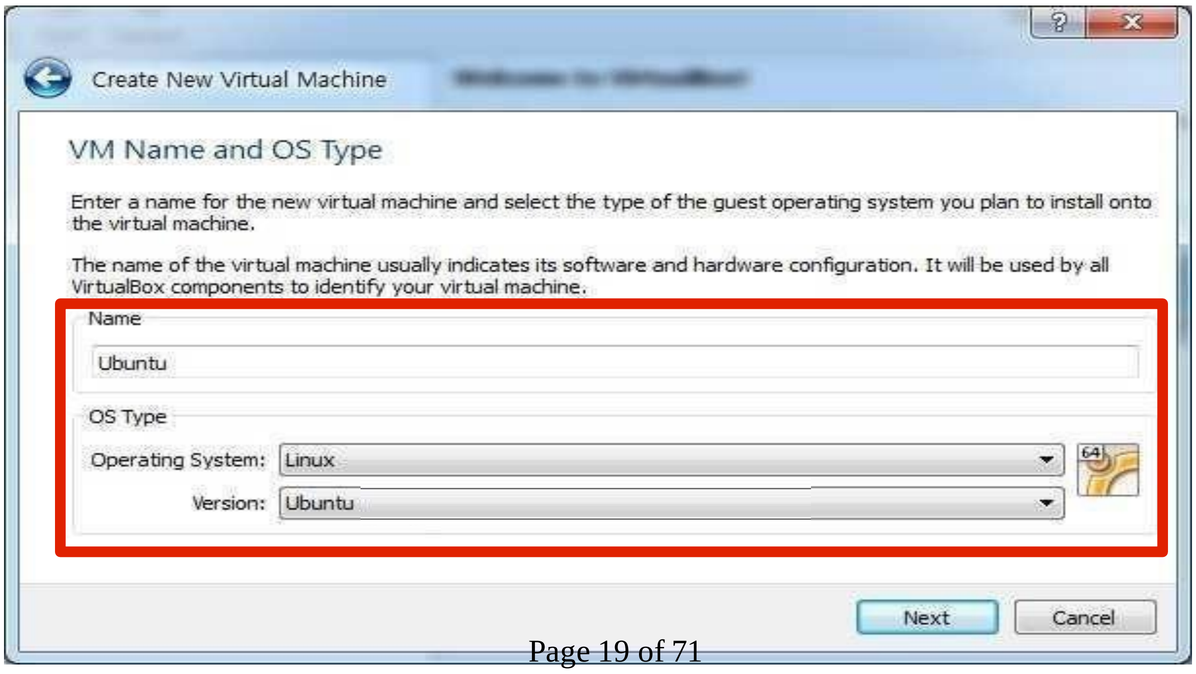
The left part of this window is a list of all virtual machines on your computer. The list is empty now because you haven't created any virtual machines yet.

In order to create a new virtual machine, press the **New** button in the main tool bar located at the top of the window.

You can press the **F1** key to get instant help, or visit www.virtualbox.org for the latest information and news.

3. Click “Continue” on the pop-upwindow

4. TypeVMname,select“Linux”fortheOSandchoose “Ubuntu” for theversion.



Create New Virtual Machine

VM Name and OS Type

Enter a name for the new virtual machine and select the type of the guest operating system you plan to install onto the virtual machine.

The name of the virtual machine usually indicates its software and hardware configuration. It will be used by all VirtualBox components to identify your virtual machine.

Name

Ubuntu

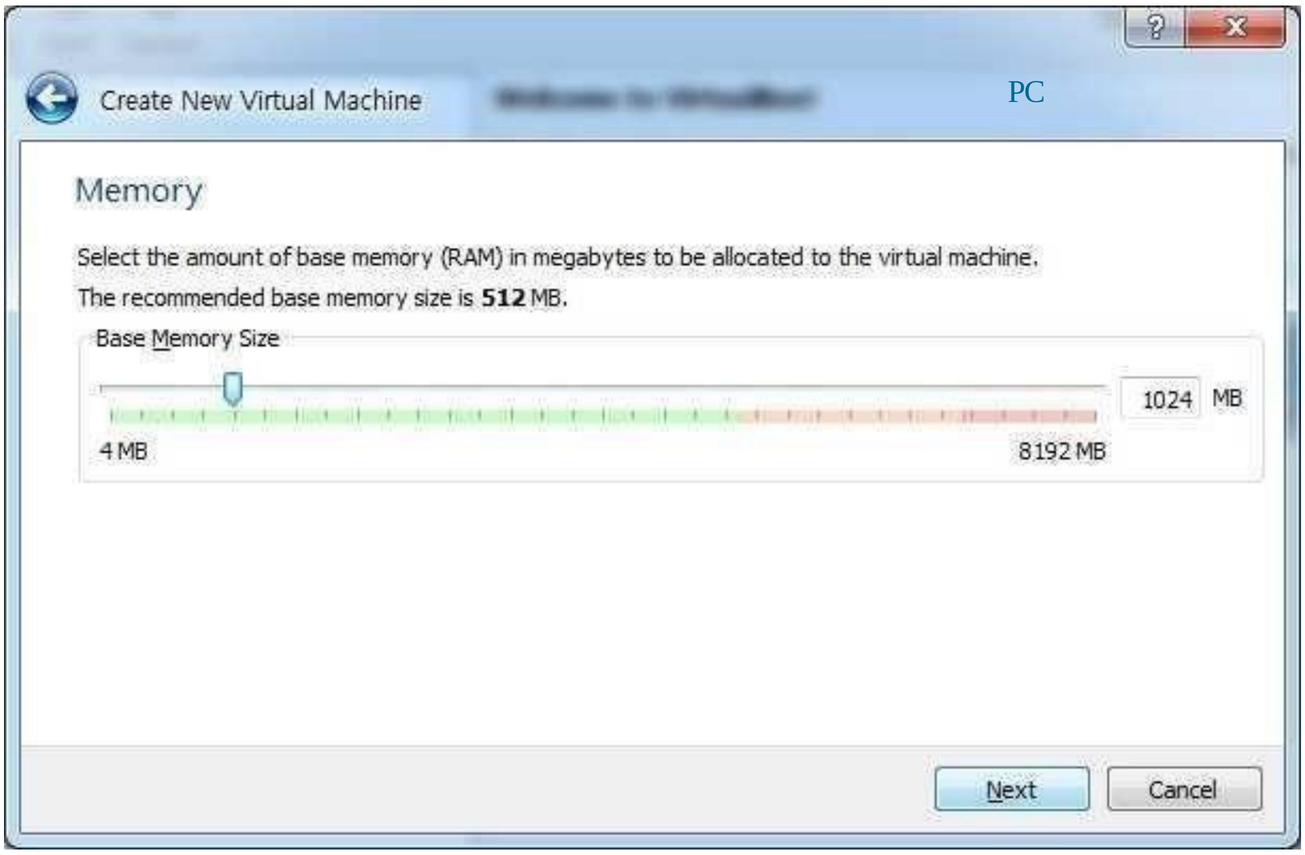
OS Type

Operating System: Linux

Version: Ubuntu

5. Choose the amount of memory to allocate (I suggest choosing between 5I2 MB to I024MB)

6. Click Continue orNext



Memory

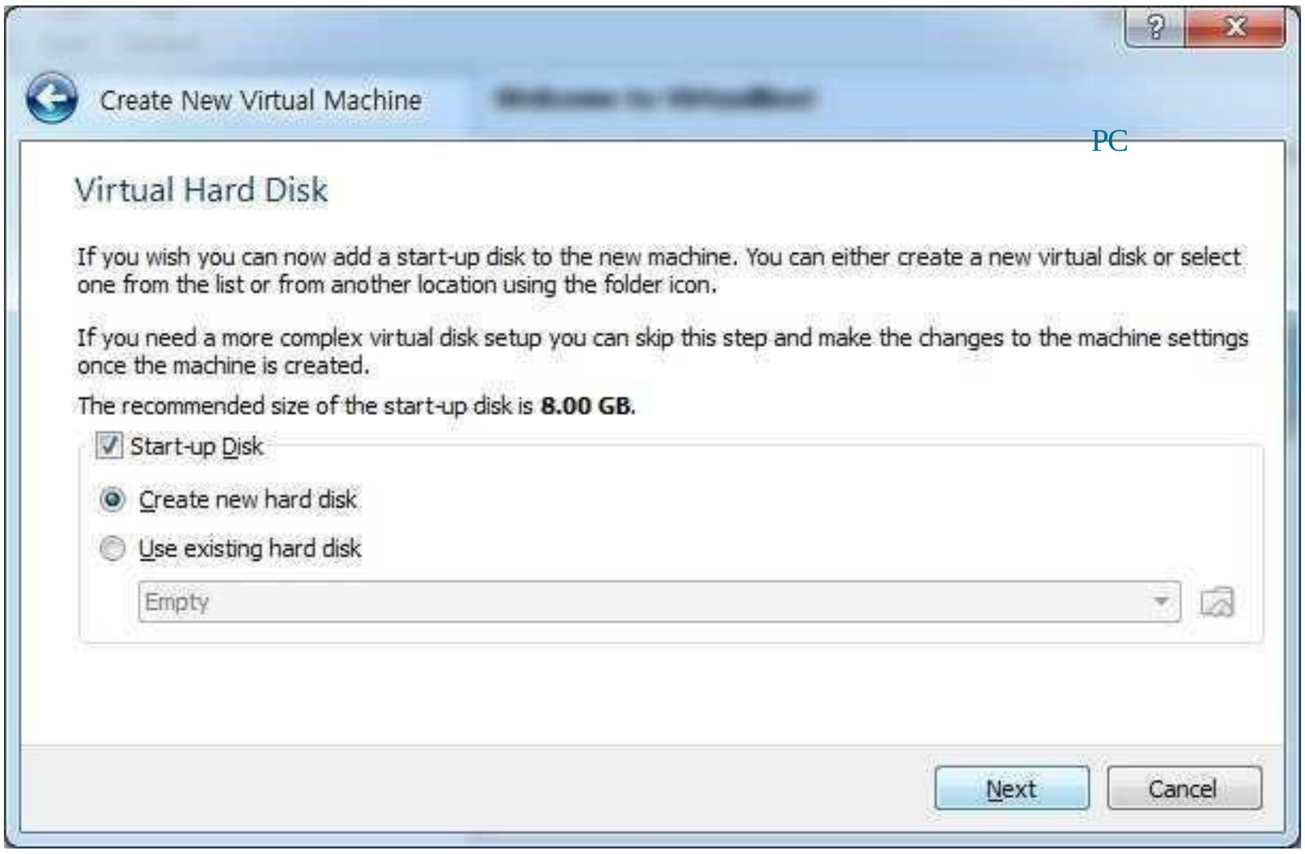
Select the amount of base memory (RAM) in megabytes to be allocated to the virtual machine.

The recommended base memory size is **512** MB.

Base Memory Size: 1024 MB (4 MB – 8192 MB)

7. Choose create a new virtual harddisk

8. Click Continue orNext



Virtual Hard Disk

If you wish you can now add a start-up disk to the new machine. You can either create a new virtual disk or select one from the list or from another location using the folder icon.

If you need a more complex virtual disk setup you can skip this step and make the changes to the machine settings once the machine is created.

The recommended size of the start-up disk is **8.00 GB**.

☑ Start-up Disk

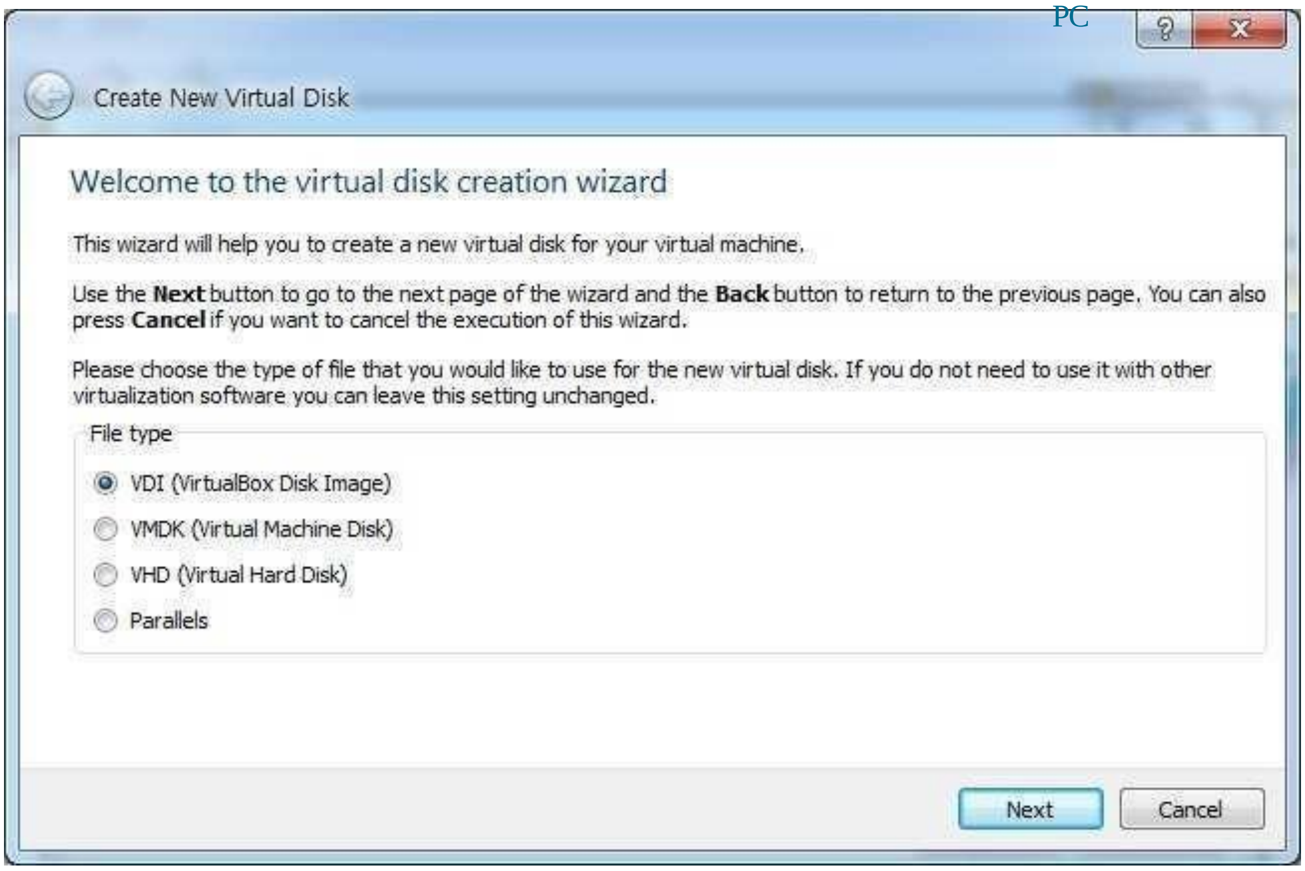
● Create new hard disk

○ Use existing hard disk

Empty

9. Choose VDI (VirtualBox DiskImage) I0. Click Continue orNext

PC



Create New Virtual Disk

Welcome to the virtual disk creation wizard

This wizard will help you to create a new virtual disk for your virtual machine.

Use the **Next** button to go to the next page of the wizard and the **Back** button to return to the previous page. You can also press **Cancel** if you want to cancel the execution of this wizard.

Please choose the type of file that you would like to use for the new virtual disk. If you do not need to use it with other virtualization software you can leave this setting unchanged.

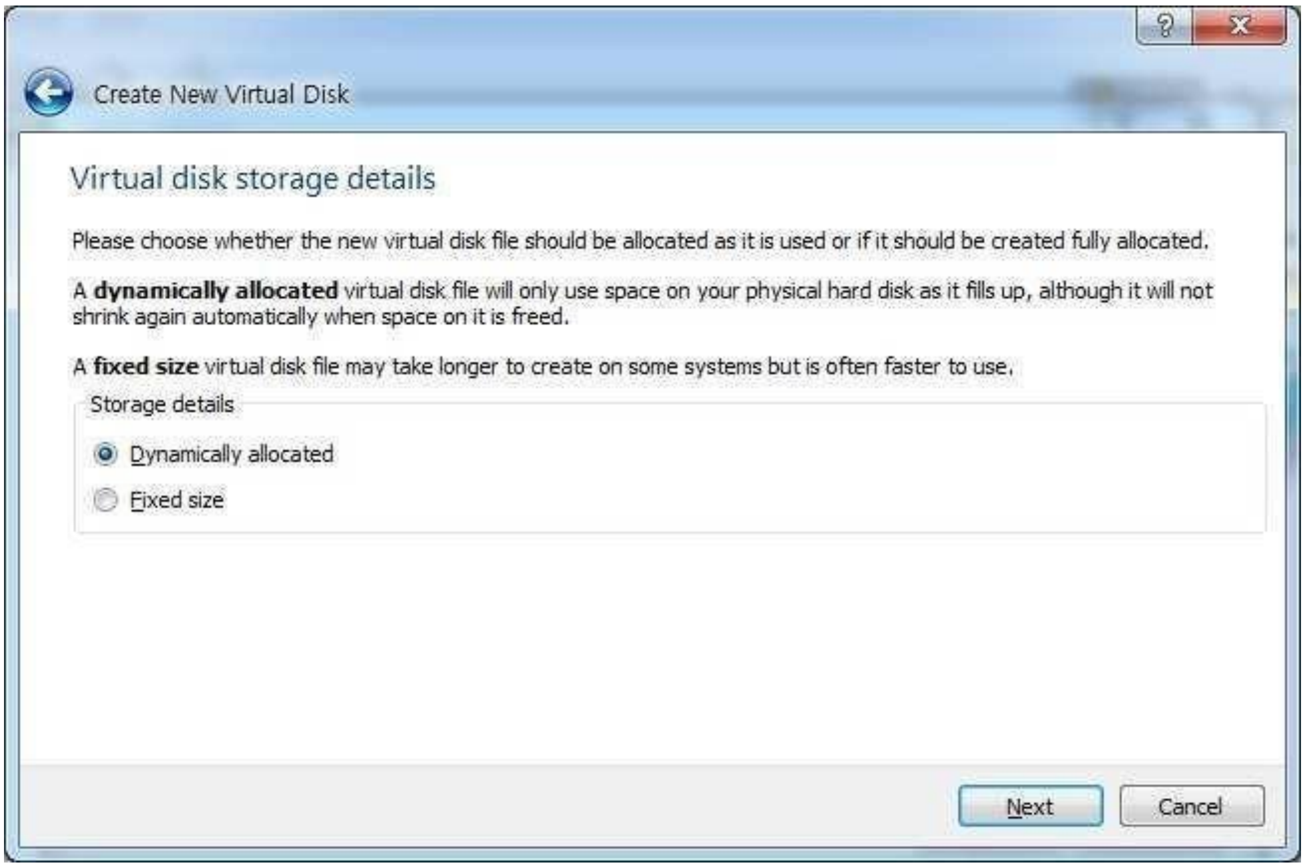
File type

● VDI (VirtualBox Disk Image)
○ VMDK (Virtual Machine Disk)
○ VHD (Virtual Hard Disk)
○ Parallels

II. Choose “DynamicallyAllocated” click continue.

This way,the size of yourVirtual Hard Disk will grow as you use.

PC



Create New Virtual Disk

Virtual disk storage details

Please choose whether the new virtual disk file should be allocated as it is used or if it should be created fully allocated.

A **dynamically allocated** virtual disk file will only use space on your physical hard disk as it fills up, although it will not shrink again automatically when space on it is freed.

A **fixed size** virtual disk file may take longer to create on some systems but is often faster to use.

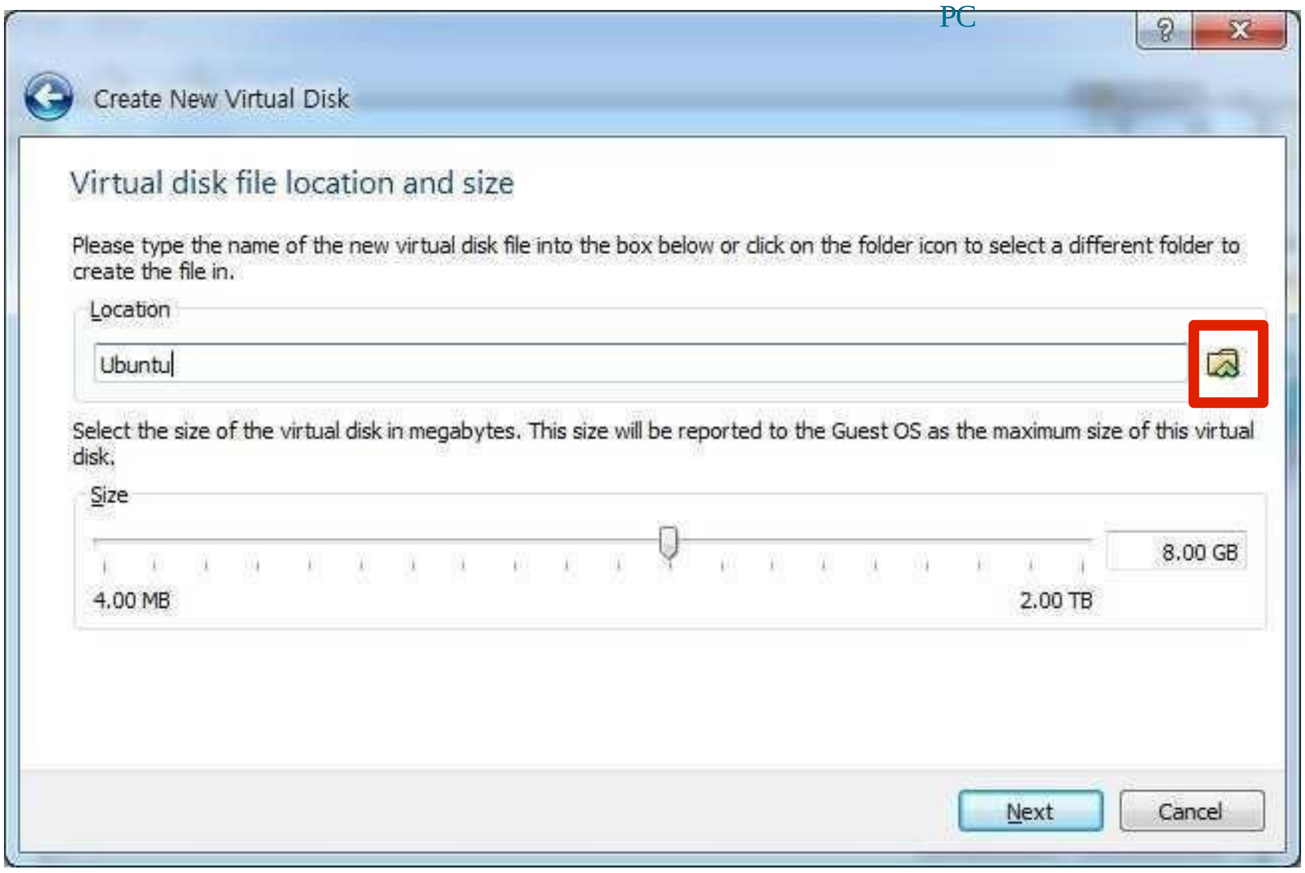
Storage details

● Dynamically allocated
○ Fixed size

I2. Click the folder icon and choose the ubuntu iso file you downloaded.

I3. Select the size of the Virtual Disk (I recommend choosing 8 GB) and click continue

PC



Create New Virtual Disk

Virtual disk file location and size

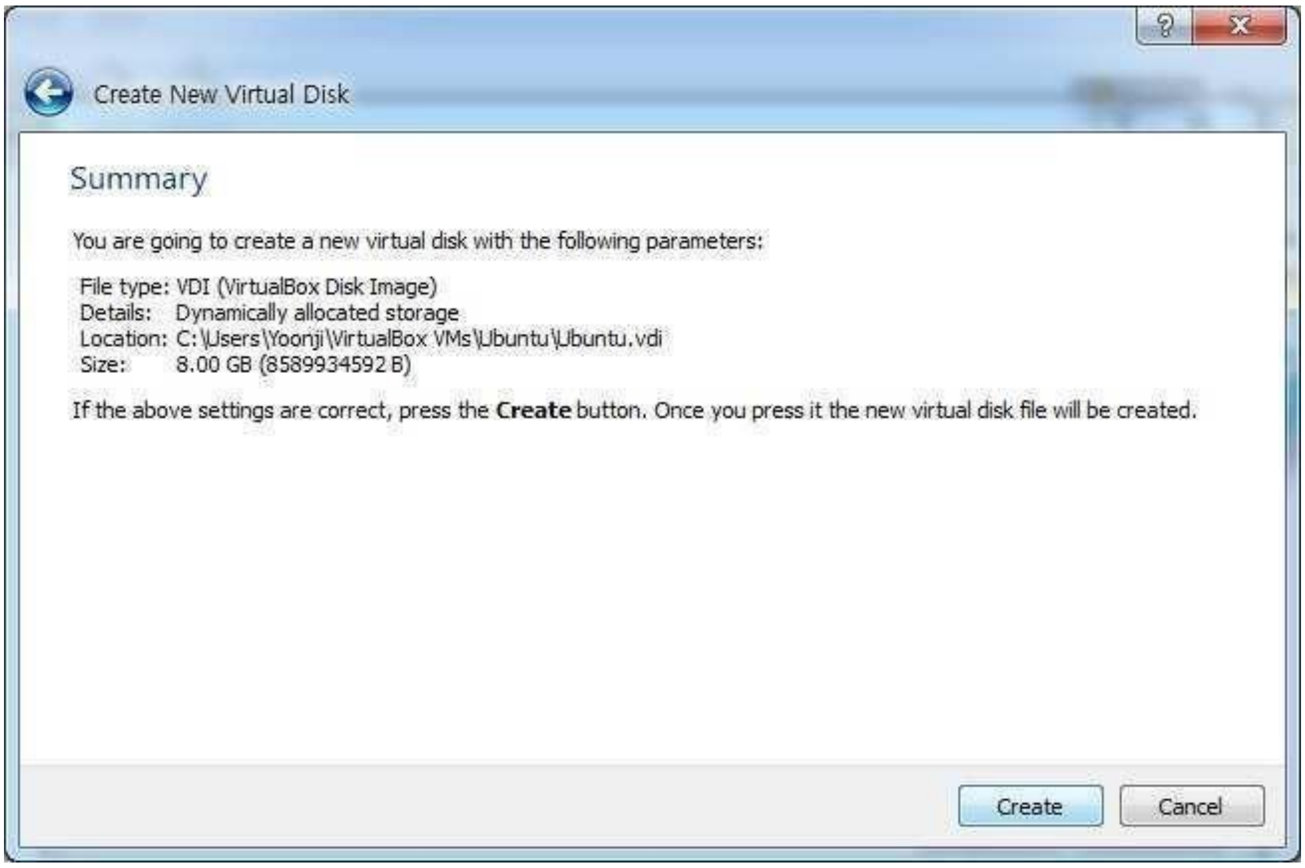
Please type the name of the new virtual disk file into the box below or click on the folder icon to select a different folder to create the file in.

Location: Ubuntu

Select the size of the virtual disk in megabytes. This size will be reported to the Guest OS as the maximum size of this virtual disk.

Size: 8.00 GB

I4. ClickCreate



Create New Virtual Disk

Summary

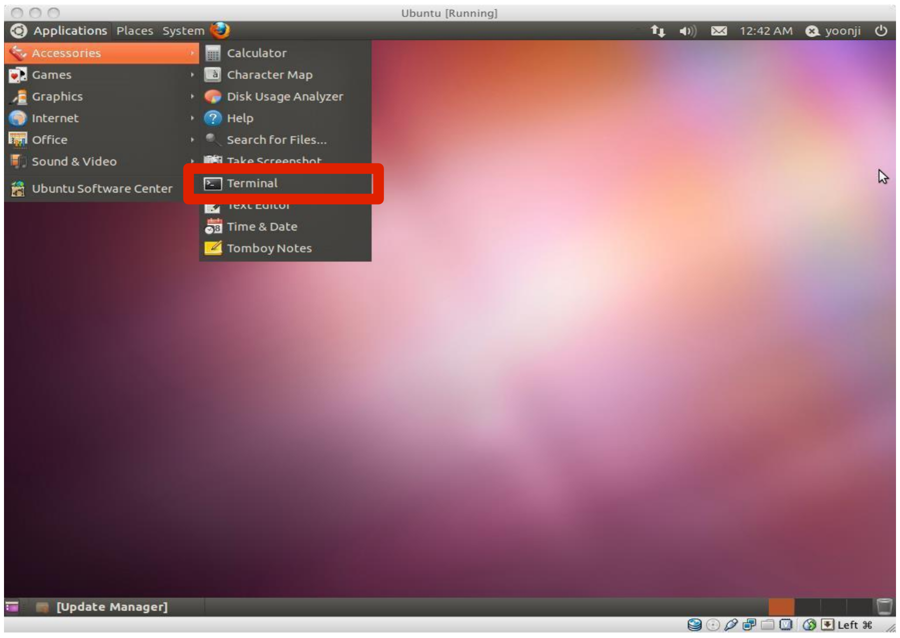
You are going to create a new virtual disk with the following parameters:

File type: VDI (VirtualBox Disk Image)
Details: Dynamically allocated storage
Location: C:\Users\Yoonji\VirtualBox VMs\Ubuntu\Ubuntu.vdi
Size: 8.00 GB (8589934592 B)

If the above settings are correct, press the **Create** button. Once you press it the new virtual disk file will be created.

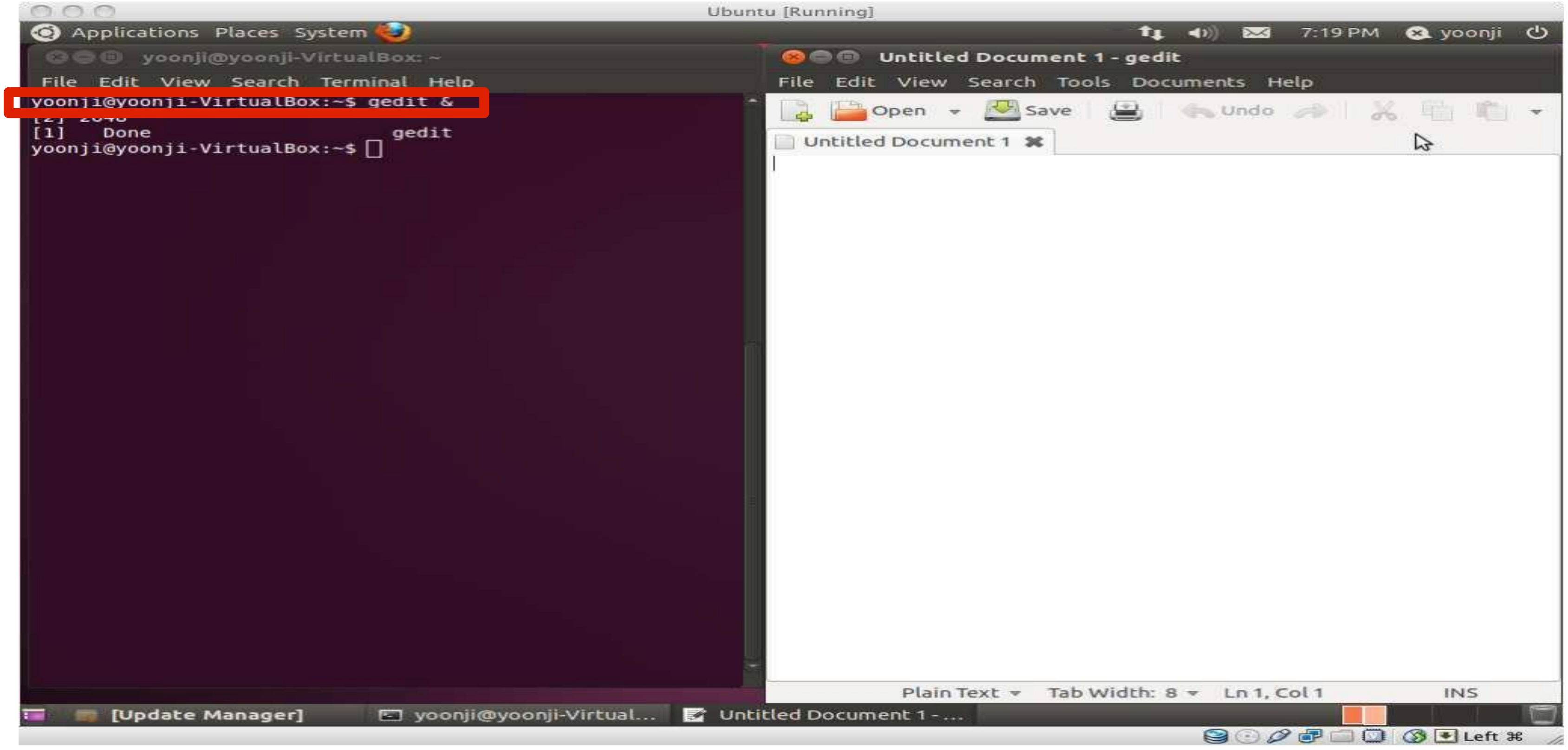
Exno.2.a : C Programming on Linux

I.O pen Terminal (Applications-Accessories-Terminal)



2. Open gedit by typing “gedit &” onterminal

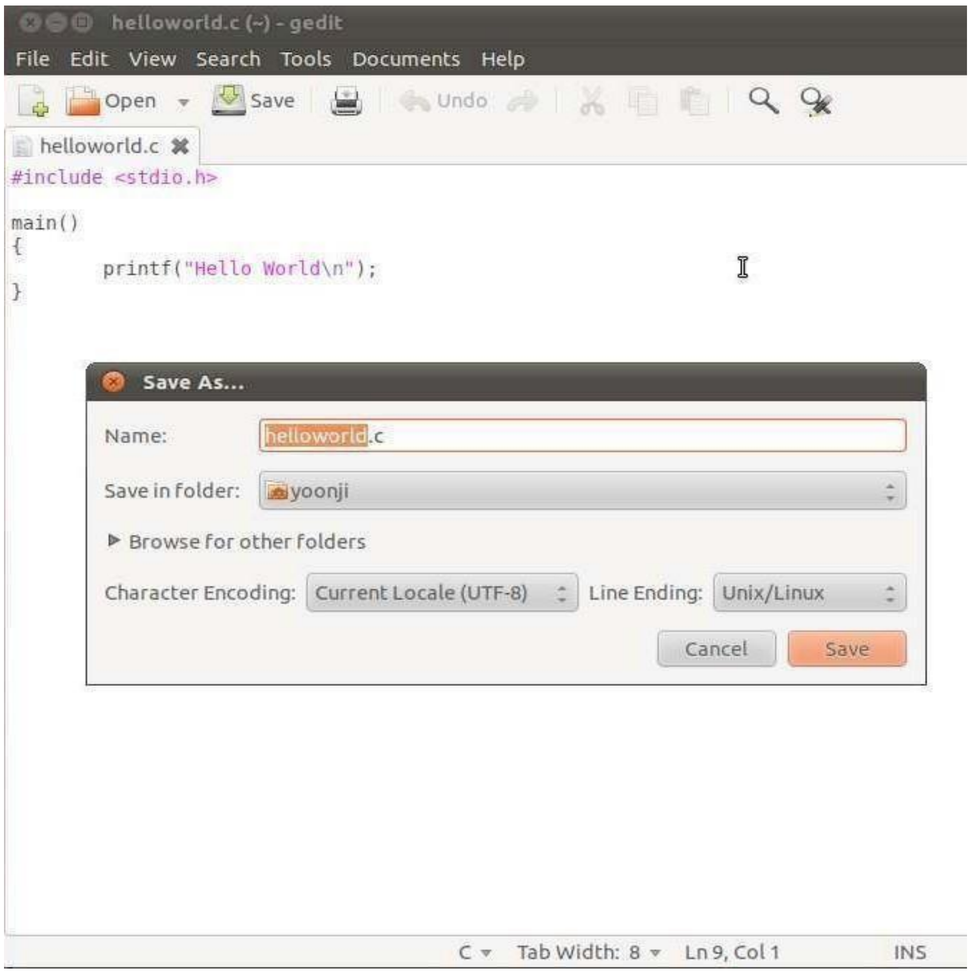
(You can also use any other Text Editor application)


Ubuntu [Running]
Applications Places System
7:19 PM yoonji
yoonji@yoonji-VirtualBox: ~
File Edit View Search Terminal Help
Untitled Document 1 - gedit
File Edit View Search Tools Documents Help
Open
Save
Undo
Untitled Document 1
Plain Text
Tab Width: 8
Ln 1, Col 1
INS
[Update Manager]
yoonji@yoonji-Virtual...
Untitled Document 1 - ...
Left ⌘

```
yoonji@yoonji-VirtualBox:~$ gedit &
[2] 2048
[1]    Done                    gedit
yoonji@yoonji-VirtualBox:~$ 
```

3. type program as

```
#include<stdio.h>
 Void main()
{ printf(“helloworld”);
    }
```



```
#include <stdio.h>

main()
{
        printf("Hello World\n");
}
```

Name: helloworld.c

Save in folder: yoonji

Character Encoding: Current Locale (UTF-8)

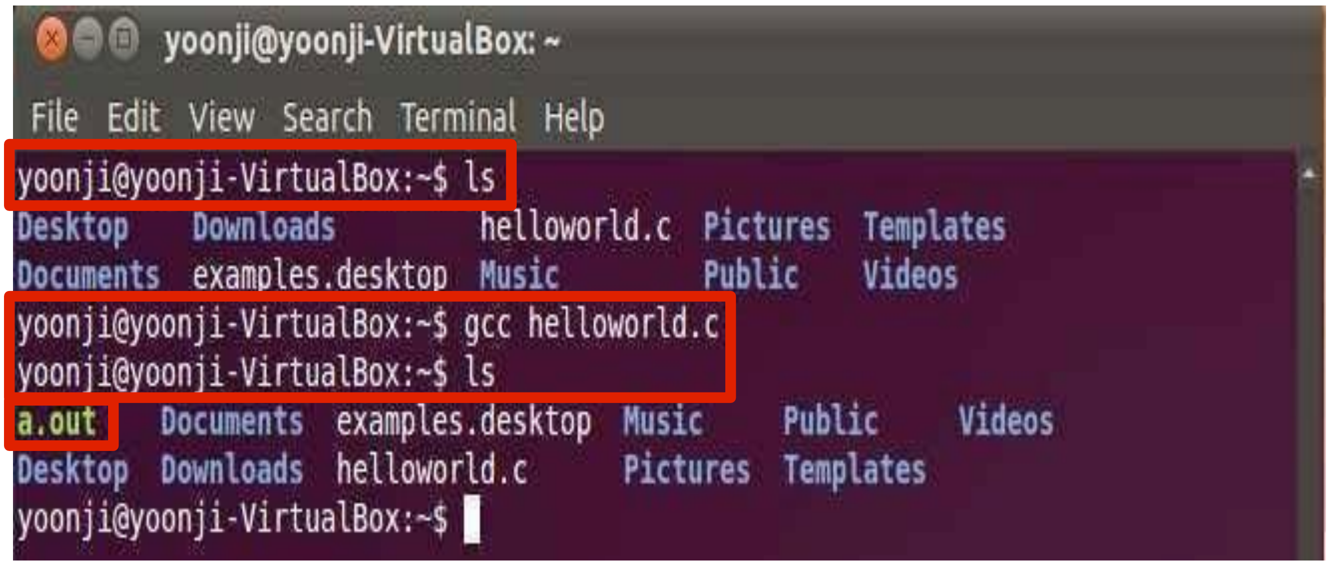
Line Ending: Unix/Linux

Save it as helloworld.c

Type“ls” on Terminalto see all files under currentfolder

4. Confirm that “helloworld.c” is in the currentdirectory. Ifnot,type cd DIRECTORY_PATHto go to the directory that has “helloworld.c”

5. Type“gcc helloworld.c” to compile, and type “ls” to confirm that a new executable file “a.out” iscreated



yoonji@yoonji-VirtualBox: ~
File Edit View Search Terminal Help

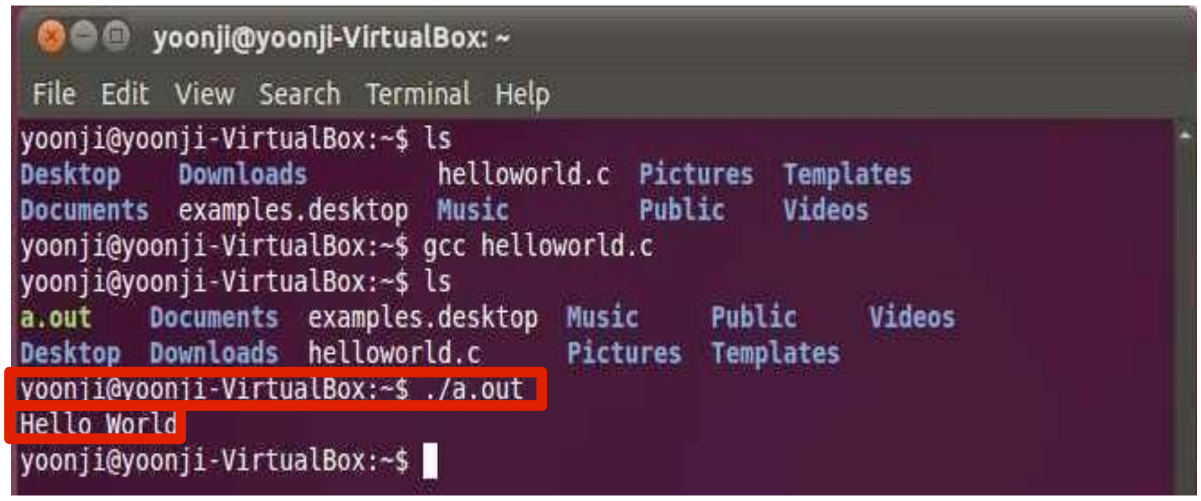
```
yoonji@yoonji-VirtualBox:~$ ls
Desktop    Downloads        helloworld.c  Pictures  Templates
Documents  examples.desktop Music         Public    Videos
yoonji@yoonji-VirtualBox:~$ gcc helloworld.c
yoonji@yoonji-VirtualBox:~$ ls
a.out    Documents  examples.desktop  Music     Public     Videos
Desktop  Downloads  helloworld.c      Pictures  Templates
yoonji@yoonji-VirtualBox:~$
```

6. Type“./a.out” on Terminalto run theprogram

7. If you see “HelloWorld” on the next line,

you just successfully ran your first C program!

8. Tryother codes from “A Shotgun Introduction to C” on professor Edwards’s webpage.You can also find many C programing guides online. (jusgoogleit!)



yoonji@yoonji-VirtualBox: ~
File Edit View Search Terminal Help

```
yoonji@yoonji-VirtualBox:~$ ls
Desktop    Downloads         helloworld.c  Pictures  Templates
Documents  examples.desktop  Music         Public    Videos
yoonji@yoonji-VirtualBox:~$ gcc helloworld.c
yoonji@yoonji-VirtualBox:~$ ls
a.out    Documents  examples.desktop  Music     Public     Videos
Desktop  Downloads  helloworld.c      Pictures  Templates
yoonji@yoonji-VirtualBox:~$ ./a.out
Hello World
yoonji@yoonji-VirtualBox:~$
```

Result:

EXP NO: 3 DATE:	INSTALL GOOGLE APP ENGINE : CREATE A HELLO WORLD APP AND OTHER SIMPLE WEB APPLICATIONS USING PYHTON / JAVA.

Aim:

Procedure:

- The App Engine SDK allows you to run Google App Engine Applications on your local computer. It simulates the run-•-time environment of the Google App Engine infrastructure.

Step1: To install python

Pre-•Requisites: Python 2.5.4

If you don't already have Python 2.5.4 installed in your computer, download and Install Python 2.5.4 from:

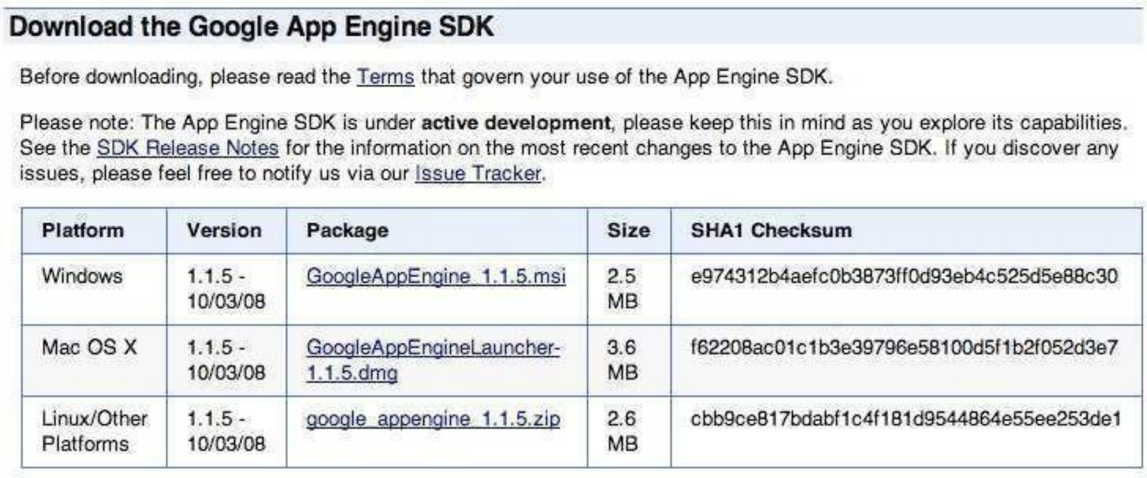
http://www.python.org/download/releases/2.5.4/

Step 2: to install Google App Engine

Download and Install

You can download the Google App Engine SDK by going to:

http://code.google.com/appengine/downloads.html and download the appropriate installpackage.



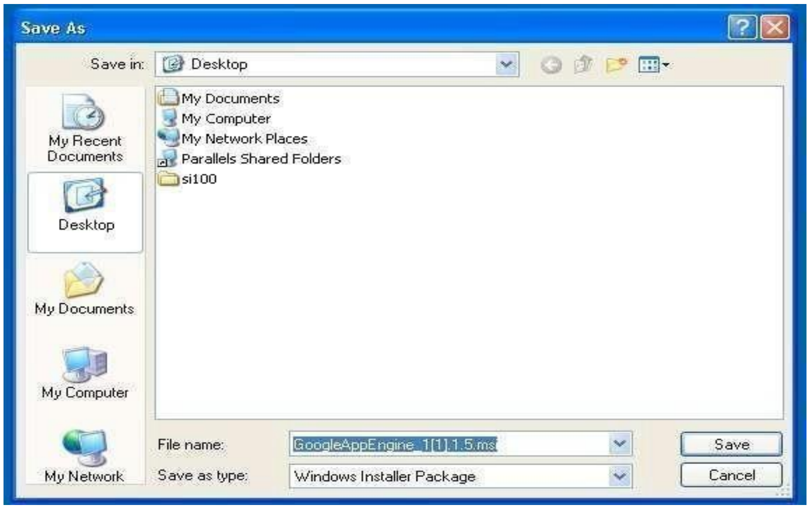
Download the Google App Engine SDK

Before downloading, please read the Terms that govern your use of the App Engine SDK.

Please note: The App Engine SDK is under **active development**, please keep this in mind as you explore its capabilities. See the SDK Release Notes for the information on the most recent changes to the App Engine SDK. If you discover any issues, please feel free to notify us via our Issue Tracker.

Platform	Version	Package	Size	SHA1 Checksum
Windows	1.1.5 - 10/03/08	GoogleAppEngine_1.1.5.msi	2.5 MB	e974312b4aefc0b3873ff0d93eb4c525d5e88c30
Mac OS X	1.1.5 - 10/03/08	GoogleAppEngineLauncher-1.1.5.dmg	3.6 MB	f62208ac01c1b3e39796e58100d5f1b2f052d3e7
Linux/Other Platforms	1.1.5 - 10/03/08	google_appengine_1.1.5.zip	2.6 MB	cbb9ce817bdabf1c4f181d9544864e55ee253de1

Download the Windows installer – the simplest thing is to download it to your Desktop or another folder that youremember.



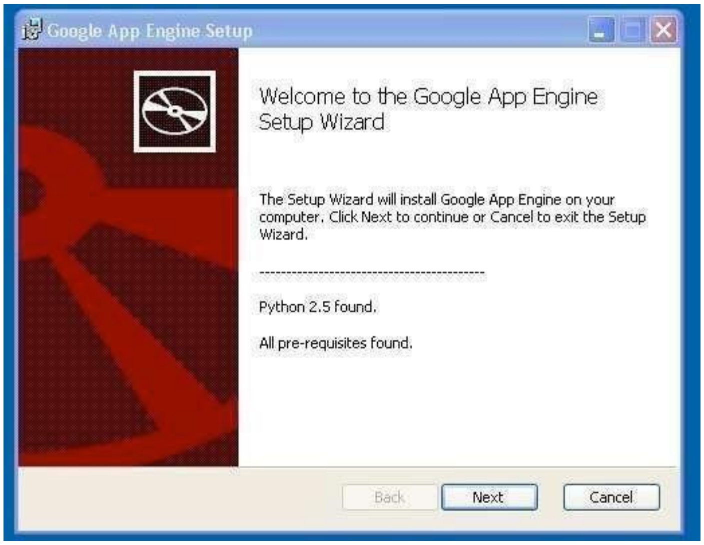
Save As

Save in: Desktop

File name: GoogleAppEngine_1[1].1.5.msi

Save as type: Windows Installer Package

Double Click on the **GoogleApplicationEngine** installer.



Google App Engine Setup

Welcome to the Google App Engine Setup Wizard

The Setup Wizard will install Google App Engine on your computer. Click Next to continue or Cancel to exit the Setup Wizard.

Python 2.5 found.

All pre-requisites found.

Click through the installation wizard, and it should install the App Engine. If you do not have Python 2.5, it will install Python 2.5 as well.

Once the install is complete you can discard the downloaded installer

After installation Google app engine looks that,

Step 3: Making of the FirstApplication

Now we need to create a simple application. We could use the "+" option to have the launcher make us an application – but instead we will do it by hand to get a better sense of what is goingon.

Make a folder for your Google App Engine applications. I am going to make the Folder on my Desktop called "**apps**" – the path to this folder is:

C:\Documents and Settings\csev\Desktop\apps

Andthenmakeasub•-folderinwit hin**apps**called“**ae-•01-•trivial**”–thepathtothis fo lder would be:

C:\ Documents and Settings \csev\Desktop\apps\ae-•01-•trivial

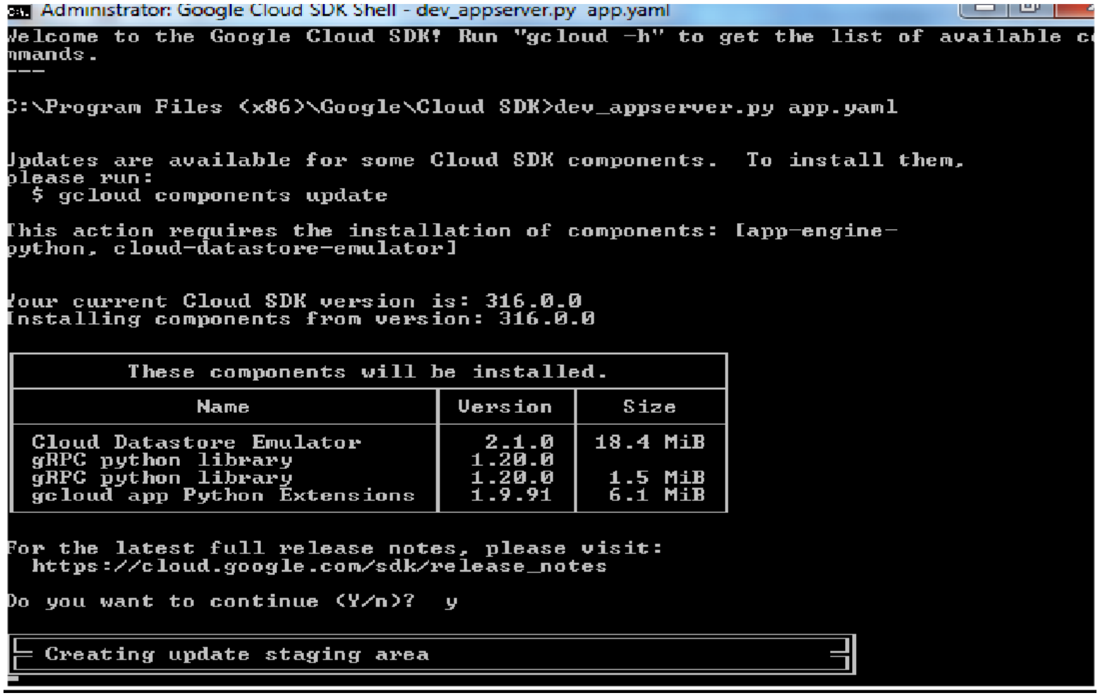
Using a text editor such as JEdit (www.jedit.org), create a file called **app.yaml** in the **ae-•01-•trivial** folder with the following contents:

```
application: ae-01-
trivial version: 1
runtime: python
api_version: 1
handlers:
- url: /.*
   script: index.py
```

Then create a file in the **ae-•01-•trivial** folder called **index.py** with three lines in it:

```
print 'Content-
Type:text/plain' print ' '
print 'Hello there Chuck'
```

Step 4: Run the program

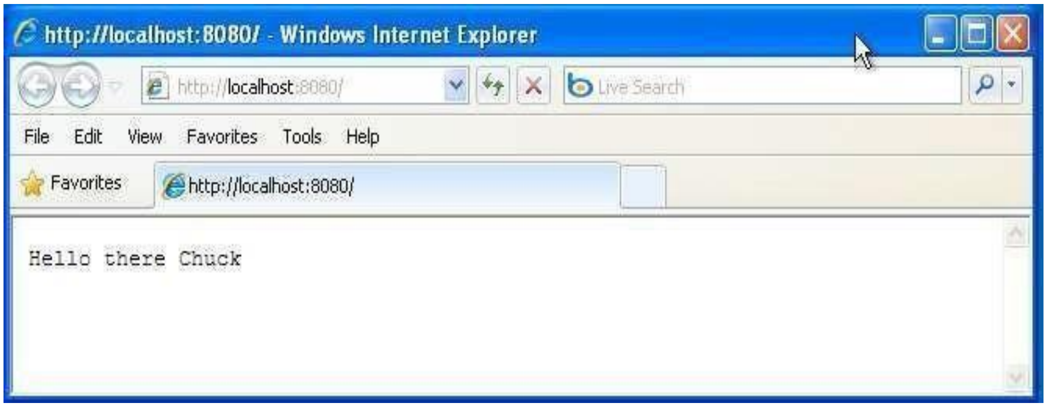


```
Administrator: Google Cloud SDK Shell - dev_appserver.py  app.yaml
Welcome to the Google Cloud SDK! Run "gcloud -h" to get the list of available c
mmands.
---

C:\Program Files (x86)\Google\Cloud SDK>dev_appserver.py app.yaml

Updates are available for some Cloud SDK components.  To install them,
please run:
  $ gcloud components update

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

Your current Cloud SDK version is: 316.0.0
Installing components from version: 316.0.0

┌──────────────────────────────────────────────────────┐
│          These components will be installed.          │
├────────────────────────────────┬──────────┬───────────┤
│              Name              │ Version  │   Size    │
├────────────────────────────────┼──────────┼───────────┤
│ Cloud Datastore Emulator       │   2.1.0  │ 18.4 MiB  │
│ gRPC python library            │  1.20.0  │           │
│ gRPC python library            │  1.20.0  │  1.5 MiB  │
│ gcloud app Python Extensions   │  1.9.91  │  6.1 MiB  │
└────────────────────────────────┴──────────┴───────────┘

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

Do you want to continue (Y/n)?  y

╠═ Creating update staging area                                ═╣
```

Output:

Once you have selected your application and press **Run**. After a few moments your application will start and the launcher will show a little green icon next to your application. Then press **Browse** to open a browser pointing at your application which is running at **http://localhost:8080/**

Paste **http://localhost:8080** into your browser and you should see your application as follows:


http://localhost:8080/ - Windows Internet Explorer
http://localhost:8080/
Live Search
File Edit View Favorites Tools Help
Favorites
http://localhost:8080/

```
Hello there Chuck
```

Result:

.

EXP NO: 4 **DATE:**	**USE THE GAE LAUNCHER TO LAUNGH THE WEB APPLICATIONS**

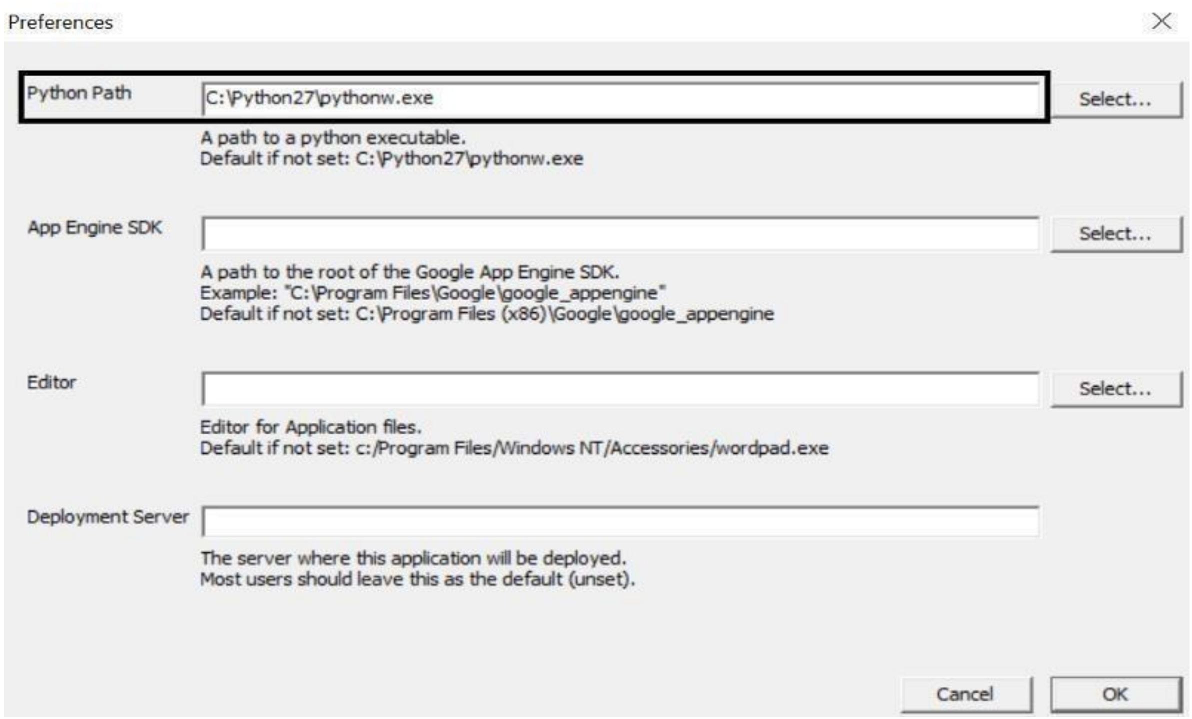
Aim:

Procedure:

Step 1. Download the basic housekeeping stuff

No matter what platform you build products on, there is always some housekeeping stuff you need to put in place before you can hit the ground running. And deploying apps within the Google App Engine is no exception.

1. Download Python 2.7
   As of when this article was written, the Google App Engine standard environment supports Python only upto version 2.7. However, it is only a matter of time before support for Python 3.x is added. You can check the App Engine docs for the latest info.
2. Download Google Cloud SDK
   This will allow you to fork apps onto your local machine, make changes (edit and develop the app), and deploy your app back to the cloud.
3. Set the Python path in the Google App Engine launcher
   After downloading the SDK, launch the App Engine launcher, go to Edit -> Preferences and make sure you set the path for where you installed Python in step 1 above.


Preferences

Python Path: C:\Python27\pythonw.exe

A path to a python executable.
Default if not set: C:\Python27\pythonw.exe

App Engine SDK:

A path to the root of the Google App Engine SDK.
Example: "C:\Program Files\Google\google_appengine"
Default if not set: C:\Program Files (x86)\Google\google_appengine

Editor:

Editor for Application files.
Default if not set: c:/Program Files/Windows NT/Accessories/wordpad.exe

Deployment Server:

The server where this application will be deployed.
Most users should leave this as the default (unset).

Set the Python path in Google App Engine launcher

That’s all you need. Your local machine should now be readyto build webapps.

Step 2. App Engine sign-up

This is often the most confusing part of the entire setup. Things you should know when you sign-up:

1. Currently, App Engine offers a free trial for one year.
2. The trial includes $300 of credit that can be used during the one year trial period.
3. You will need to add a credit card to sign-up (for verification purposes).
4. You will not be charged during the sign-up process.
5. You will not be charged during the trial period as long as you do not cross the credit limit offered.

Here are the steps you need to follow to sign-up:

1. Go to the Google Cloud landing page
2. Follow the sign-up process and go to your App Engine dashboard

Most of the hard work is complete after a successful sign-up.

Step 3. Create a new project

The next step is to create a new Python project that you can work on. Follow the screenshots below to create a new project.

Launch the new project wizard.

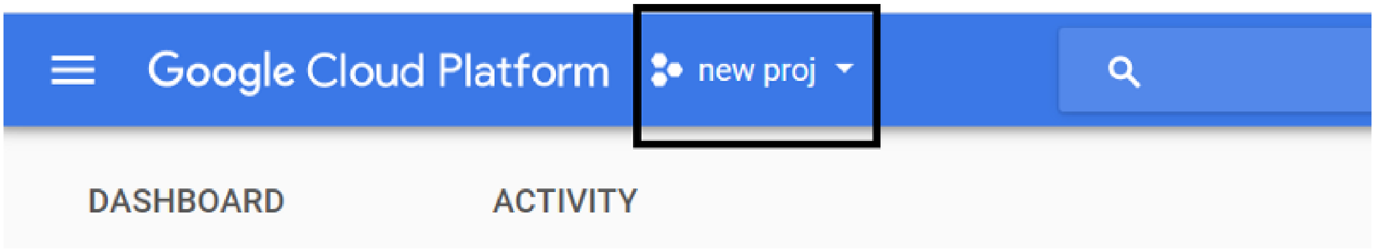


Image courtesy.

https://console.cloud.google.com/home

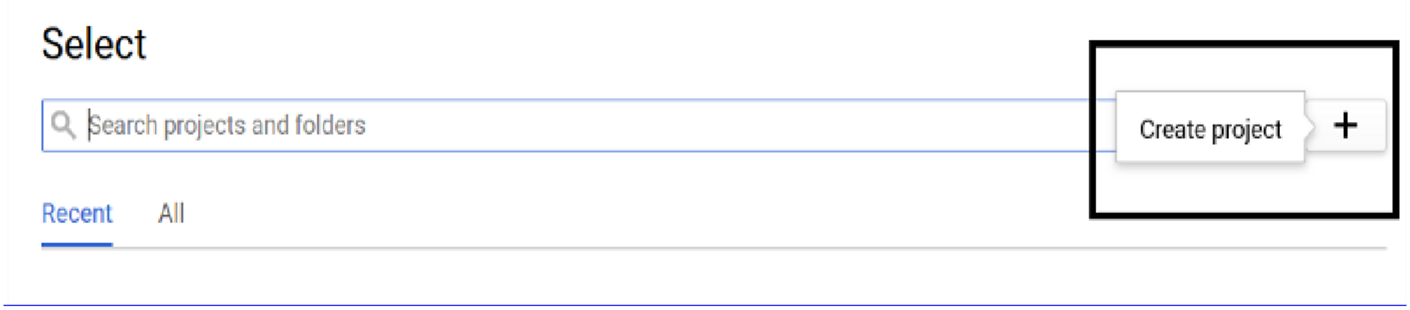
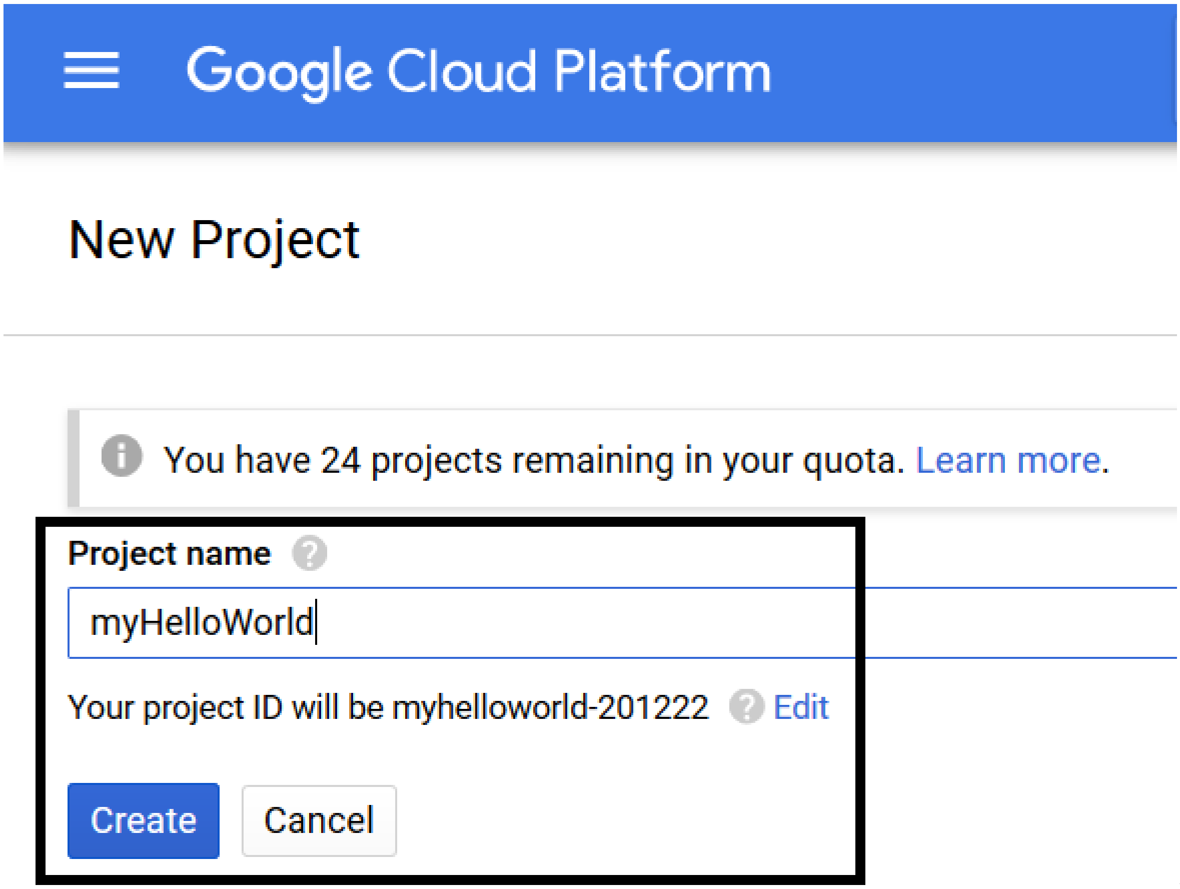


Image courtesy https://console.cloud.google.com/home

Give your app a name and make a note of your project ID.



New Project

You have 24 projects remaining in your quota. Learn more.

Project name

myHelloWorld

Your project ID will be myhelloworld-201222 Edit

Image courtesy.

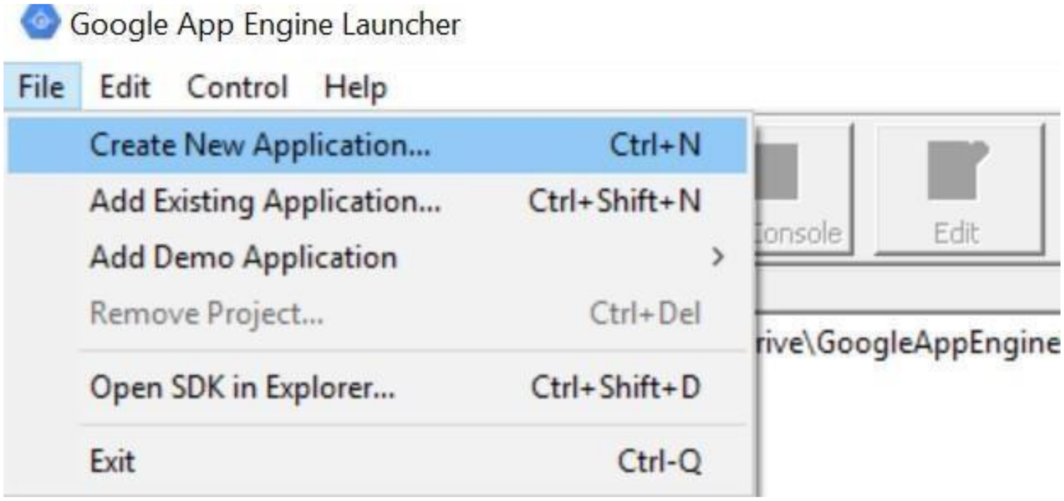
https://console.cloud.google.com/home

Hit the create button and Google should take a few minutes to set up all that is necessary for your newly created app.

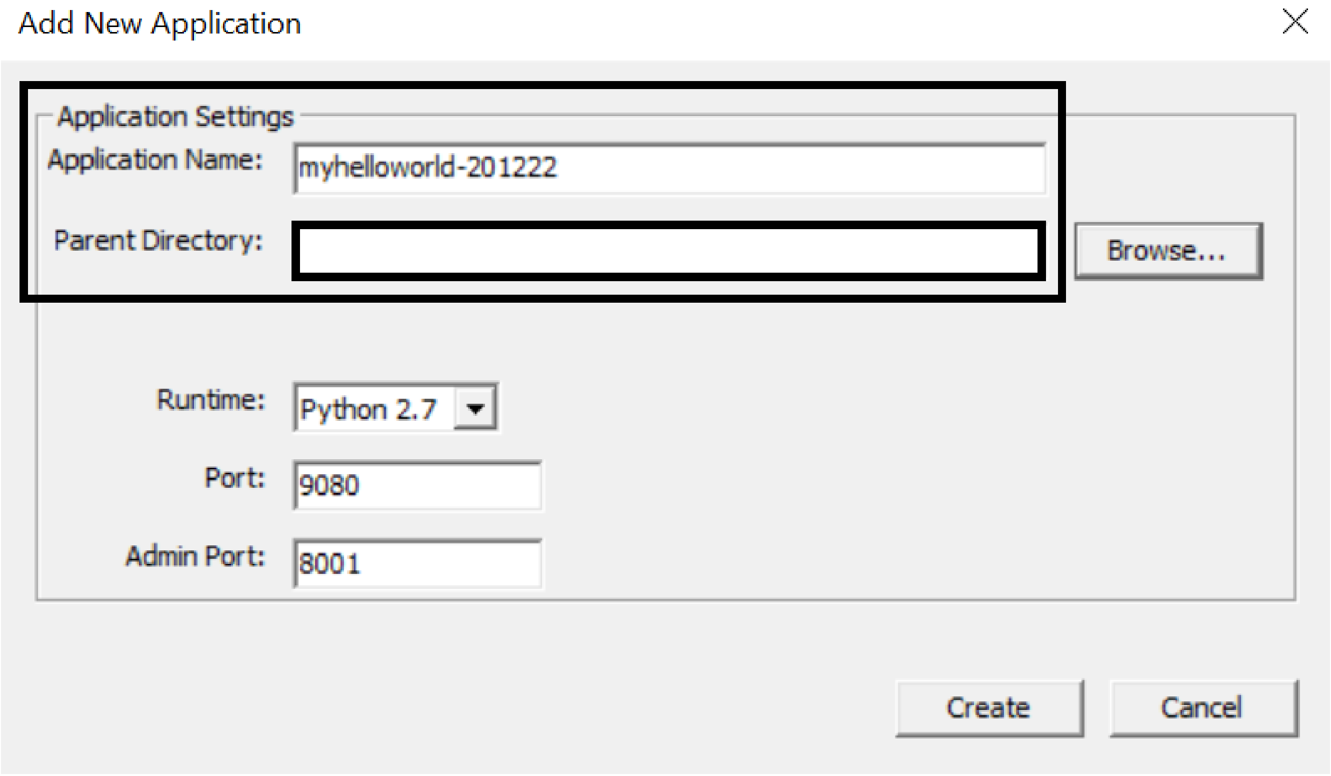
Step 4. Fork the app to develop it locally

The next step in the process is to fork the app on your local machine. This will allow you to make changes to the app locally and deploy it whenever you wish to.

Go to Google App Engine launcher and create a new application.


Google App Engine Launcher
File
Edit
Control
Help
Create New Application... Ctrl+N
Add Existing Application... Ctrl+Shift+N
Add Demo Application
Remove Project... Ctrl+Del
Open SDK in Explorer... Ctrl+Shift+D
Exit Ctrl-Q
onsole
Edit
rive\GoogleAppEngine

Enter the project ID of your newly created app. Also, provide the folder (local destination) where you wish to store the app locally. Make sure you select the Python 2.7 as your runtime engine.



Add New Application

Application Settings

Application Name: myhelloworld-201222

Parent Directory:

Runtime: Python 2.7

Port: 9080

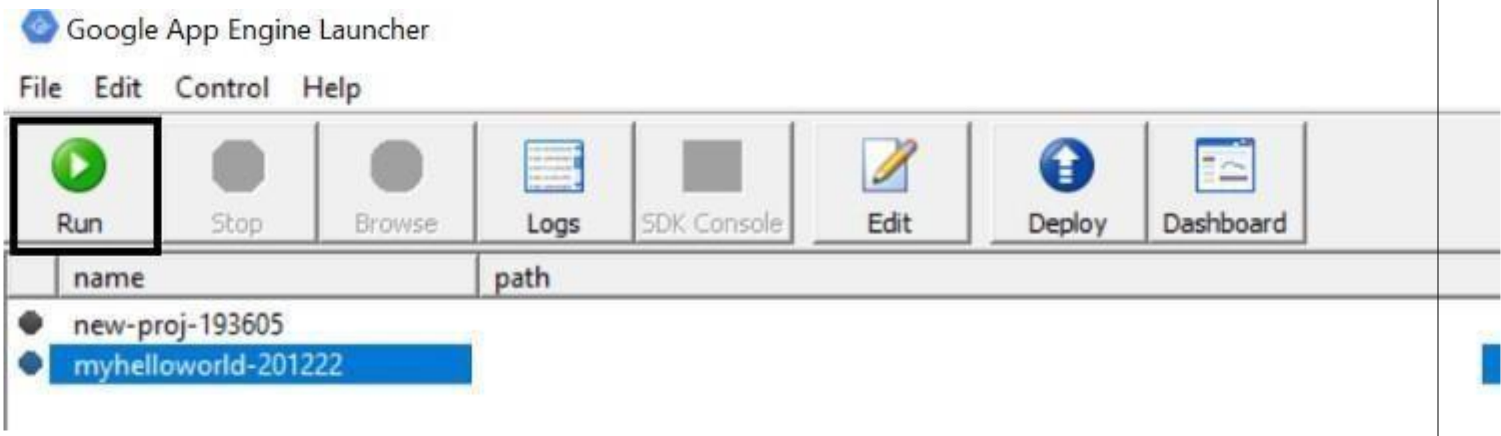
Admin Port: 8001

Hit the create button, and you should see your app listed on the window that follows. You should also check that you now see some files in your local storage (the directory you chose in the screenshot above) after this step.

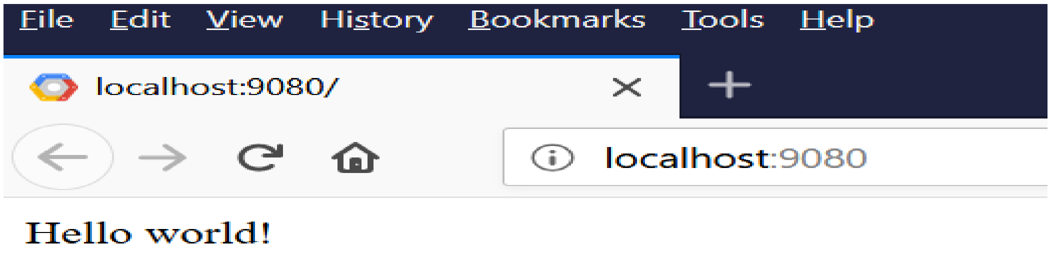
Step 5. Run the app locally

Before you go ahead and make some changes to the app, it is important to check whether or not you have executed all the above steps correctly. This can be done by simply running the app locally.

Select the app and hit the run button on the window.



Wait for a few seconds until you can hit the **Browse** button. Once the **Browse** button becomes clickable, click it. This should take you to the browser, and you should see the hello world text appear in your browser window. Alternatively, you can manually go to the browser and use the port specified to access the app.



Hello world!

As long as you see the above screen, you are all set.

Step 6. Understand the app structure

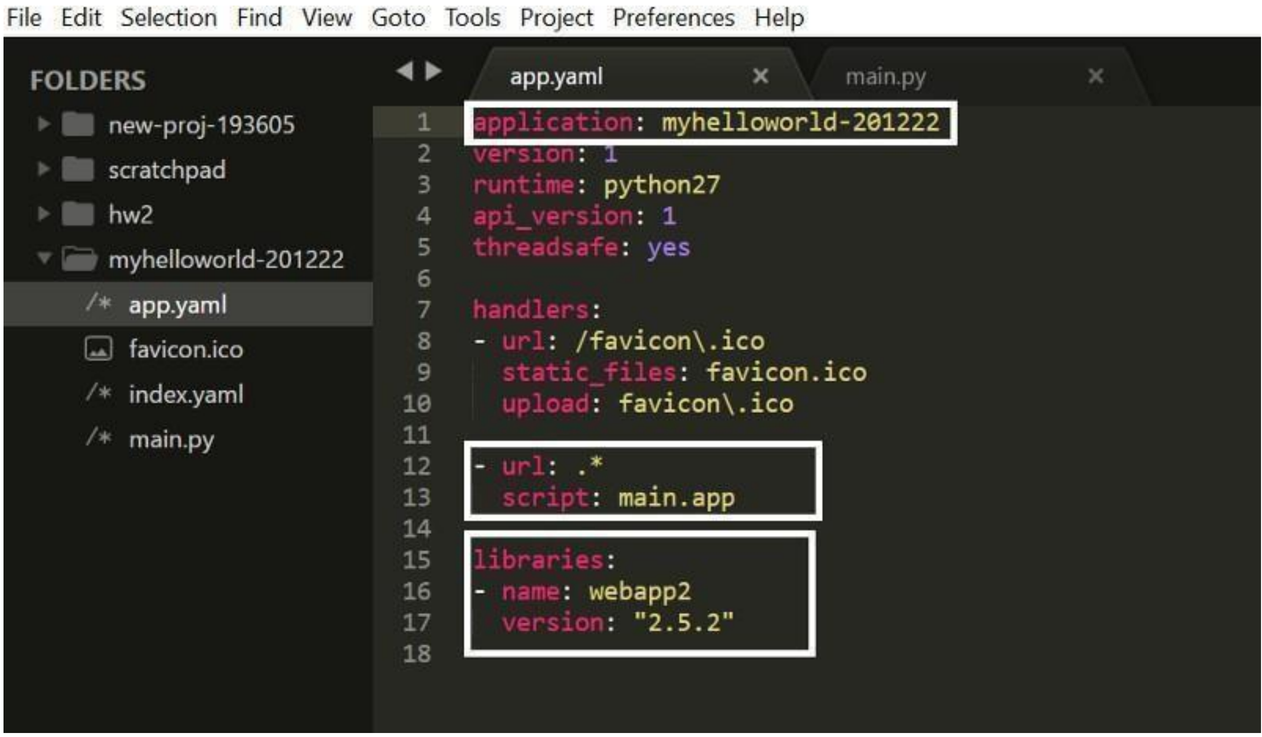
It is finally time to look at the lines of code which are running this webapp. Open your app folder in the text editor of your choice. I recommend Sublime text or VS Code. However, feel free to choose the one you prefer.

Here is a description of the various files.

app.yaml

This file is a basic markup file that stores information (some metadata) about the app. It is important to note the following crucial parts of the file.

1. **application**
   This is the project ID which you should never change. This is the unique identifier for the app
2. **url -> scr**ipt
   This is the homepage for the app. In other words, this file will be rendered in your browser when you launch the app
3. **libraries**
   This is where you can include external libraries to use within the webapp

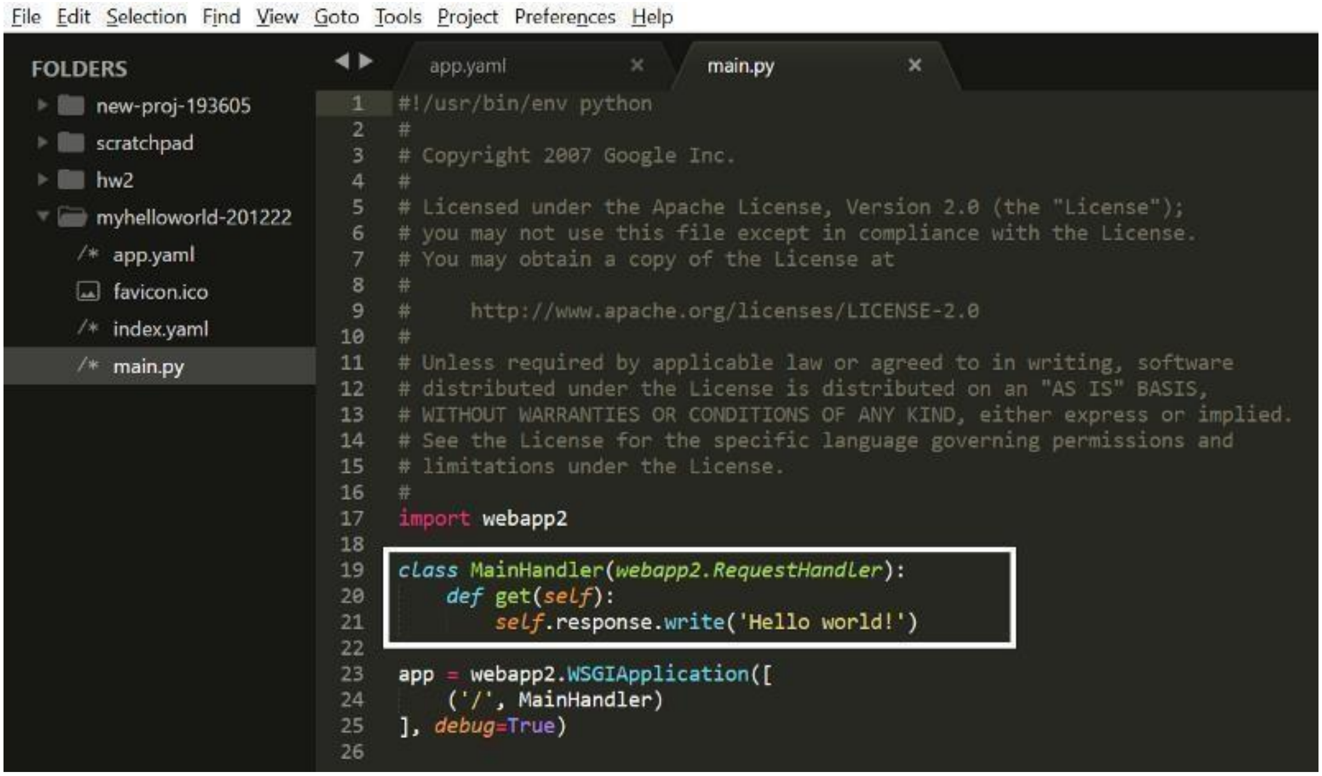


```yaml
application: myhelloworld-201222
version: 1
runtime: python27
api_version: 1
threadsafe: yes

handlers:
- url: /favicon\.ico
  static_files: favicon.ico
  upload: favicon\.ico

- url: .*
  script: main.app

libraries:
- name: webapp2
  version: "2.5.2"

```

app.yaml file in the webapp folder

main.py program

This is the homepage of the app (as discussed above). Note that the hello world text in the browser window (step 5) is due to the code you see highlighted below.



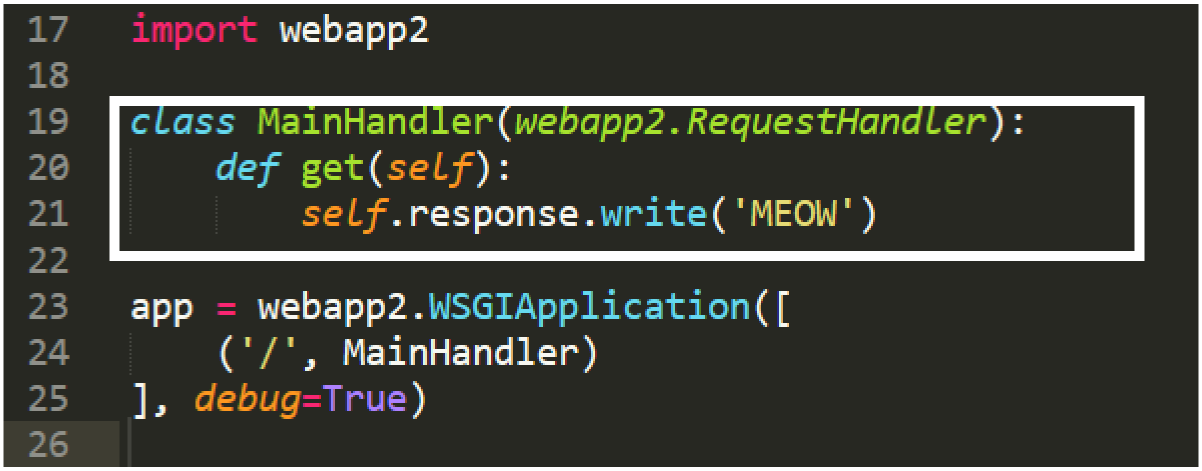
```
#!/usr/bin/env python
#
# Copyright 2007 Google Inc.
#
# Licensed under the Apache License, Version 2.0 (the "License");
# you may not use this file except in compliance with the License.
# You may obtain a copy of the License at
#
#     http://www.apache.org/licenses/LICENSE-2.0
#
# Unless required 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.
#
import webapp2

class MainHandler(webapp2.RequestHandler):
    def get(self):
        self.response.write('Hello world!')

app = webapp2.WSGIApplication([
    ('/', MainHandler)
], debug=True)

```

main.py file in the webapp folder

Step 7. Make your changes and deploy the new app

No hello world app is ever complete without the developer changing the hello world text to something else just to make sure that everything happening behind the scenes is working as it should.

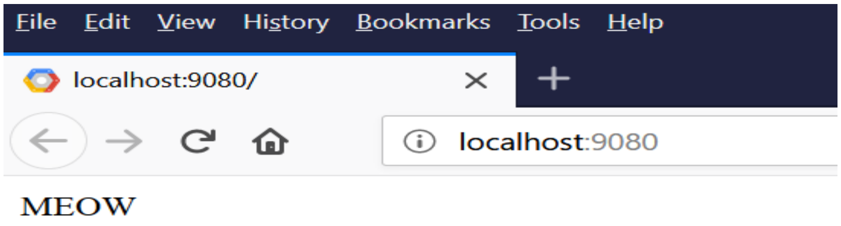
Go ahead and change the text in the above screenshot to something else.



```python
import webapp2

class MainHandler(webapp2.RequestHandler):
    def get(self):
        self.response.write('MEOW')

app = webapp2.WSGIApplication([
    ('/', MainHandler)
], debug=True)

```

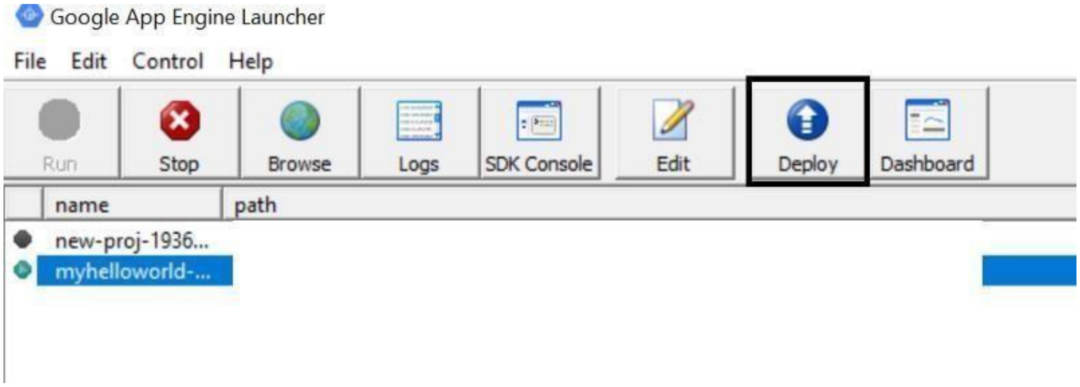
Output:

Save the changes, go to the browser and refresh the page. You should see the page with the text "MEOW" displayed.



MEOW

Finally, it is time to deploy your changes to the cloud to make them globally accessible via a URL. Go to the App Engine launcher, select the app, and hit the **Deploy** button.

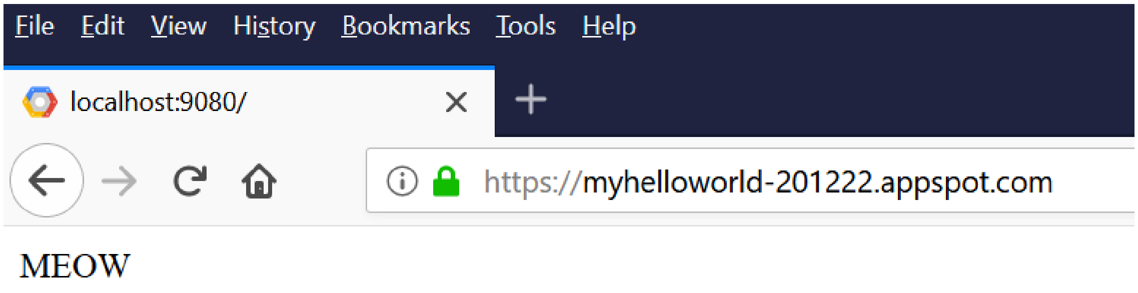


name	path
new-proj-1936...	
myhelloworld-...	

This will ensure your app gets deployed onto Google Cloud. To check whether or not everything worked just fine, go to the URL below:

https://<yourProjectID>.appspot.com/

You should see the exact same window as above, expect now, it is a URL that is globally accessible.



MEOW

Result:

.

EXP NO: 5 **DATE:**	**SIMULATE A CLOUD SCENARIO USING CLOUD SIM AND RUN A SCHEDULING ALGORITHM THAT IS NOT PRESENT IN CLOUD SIM**

Aim:

.

Procedure:

CloudSim is written in Java. The knowledge you need to use CloudSim is basic Java programming and some basics about cloud computing. Knowledge of programming IDEs such as Eclipse or NetBeans is also helpful. It is a library and, hence, CloudSim does not have to be installed. Normally, you can unpack the downloaded package in any directory, add it to the Java classpath and it is ready to be used. Please verify whether Java is available on your system.

To use CloudSim in Eclipse:

1. Download CloudSim installablefilesfrom *https://code.google.com/p/cloudsim/downloads/list and unzip*

2. OpenEclipse

3. Create a new Java Project: File ->New

4. Import an unpacked CloudSim project into the new JavaProject

5. The first step is to initialise the CloudSim package by initialising the CloudSim library,as follows:

CloudSim.init(num_user, calendar, trace_flag)

6. Data centres are the resource providers in CloudSim; hence, creation of data centres is a second step. To create Datacenter, you need the DatacenterCharacteristics object that stores the properties of a data centre such as architecture, OS, list of machines, allocation policy that covers the time or spaceshared, the time zone and itsprice:

Datacenter datacenter9883 = new Datacenter(name, characteristics,
 new VmAllocationPolicySimple(hostList),s

7. The third step is to create abroker:

DatacenterBroker broker = createBroker();

8. The fourth step is to create one virtual machine unique ID of the VM, userId ID of theVM's owner, mips, number Of Pes amount of CPUs, amount of RAM, amount of bandwidth, amount of storage, virtual machine monitor, and cloudletScheduler policy forcloudlets:

Vm vm = new Vm(vmid, brokerId, mips, pesNumber, ram, bw, size, vmm, new CloudletSchedulerTimeShared())

9. Submit the VM list to thebroker:

broker.submitVmList(vmlist)

10. Create a cloudlet with length, file size, output size, and utilisationmodel:

Cloudlet cloudlet = new Cloudlet(id, length, pesNumber, fileSize, outputSize, utilizationModel,
 utilizationMode

11. Submit the cloudlet list to thebroker:

broker.submitCloudletList(cloudletList)

12. Start
thesimulation:

CloudSim.startSimulation()

Sample Output from the Existing Example:

Starting

```
CloudSimExample1...
Initialising...
Starting CloudSim version 3.0 Datacenter_0 is starting...


>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>null
Broker is
starting...
Entities
started.
: Broker: Cloud Resource List received with
1resource(s) 0.0: Broker: Trying to Create VM #0
inDatacenter_0
   : Broker: VM #0 has been created in Datacenter #2, Host#0
0.1: Broker: Sending cloudlet  0 to VM #0
400.1: Broker: Cloudlet 0 received
: Broker: All Cloudlets
executed.Finishing.... 400.1: Broker:
Destroying VM#0
Broker is shutting down...
Simulation: No more
future events
CloudInformationService: Notify all CloudSim entities for
shutting down. Datacenter_0 is shutting down...
Broker is shutting
down...
Simulationcomplet
ed.
Simulation completed
```

OUTPUT :

```
Cloudlet ID  STATUS  Data center ID  VM ID  Time   Start Time FinishTime
 0   SUCCESS                    20          400 0.1                          400.1
*****Datacenter:Datacenter_0***** Userid      Debt
    3           35.6

CloudSimExample1 finished!
```

RESULT:

EXP NO: 6 **DATE:**	**FIND A PROCEDURE TO TRANSFER THE FILES FROM ONE VIRTUAL MACHINE TO ANOTHER VIRTUAL MACHINE**

Aim:

Procedure:

Method1: Creating a Shared Folder in VirtualBox

A shared folder is a folder which makes its files available on both the guest machine *and* the host machine **at the same time**. Creating a shared folder between the guest and the host allows you to easily manage files which should be present on both machines. The course virtual machines are ready to use sharedfolders right away, but if you are using the virtual machine on your personal computer you will need to specify which folder to use as shared storage.

Shared Folders on SCS Lab Computers using Course VMs:

If you are using a course VM on a lab computer, it is likely that a shared folder has already been setup for you. On the desktop of your course VM you should notice a folder titled *SharedFolders*. Inside of this you will find any folders that have been shared between the course VM and lab computers.

You should see two folders that have already been configured for you: **Z_DRIVE** and **Temp**.

Z_DRIVE gives you access to your Windows Account `Z:\` drive. This is storage that is persistent to your SCS account and available as a network drive on the lab computers.

Temp gives you access to the folder found at `D:\temp` on the lab computer. Files stored in this folder are local to the machine, meaning that they can be accessed **faster**, but will **delete** from the system when you log out.

If you are working with data that you will need to use again, use the *Z_DRIVE* for your shared folder. If you need faster read/write speed, use the *Temp* folder, but remember to backup your files or they will be deleted when you log off the computer.

Shared Folders on Personal Computers:

If you are using your own personal machine, you will need to configure VirtualBox to look in the right place for your shared files.

First, click on the guest machine you intend to share files with. From there, you can select the guest*Settings* and navigate to *Shared Folders* on the left side menu. To create a new shared folder, either click the *New Folder* icon on the right menu **or** right click the empty list of shared folders and click *Add Shared Folder*. From here, there are six options:

- **Folder Path:** The folder name on the **host** machine. Click the drop down menu and navigate to the folder you would like to share.
- **Folder Name:** This is the name of the folder as it will appear on the **guest** machine.
- **Read-Only:** If you check read-only, the **guest** machine will be unable to write changes to the folder. This is valuable when you only want to send files *to* the virtual machine, but do not want to risk having the files modified by the guest.
- **Auto-Mount:** When any external storage is connected to a computer it must be *mounted* in order to be used. It is recommended that you turn on auto-mounting, unless you are familiar with the process of mounting a drive yourself.
- **Mount Point:** Unless you already know about mount points, leave this blank.
- **Make Permanent:** If you check this, the shared folder will be a permanent **machine folder**. If it is not checked, the folder will not be shared after a shutdown.

On the course virtual machines, when you load into the desktop, you should see a folder labelled*SharedFolders*. In there you will see any folders that are currently mounted and being shared.

Steps:

1. Select the guest machine you wish to share files with

2. Click Settings > Shared Folders
3. Right-click and select Add Shared Folder and use the following settings:

Folder Path: Click the dropdown arrow, select ***Other***, and navigate to the folder you would like to share
Folder Name: Anything to identify it on the guest machine
Read-Only: Unchecked (Checked, if you are exclusively pulling files ***from the host***)
Auto-Mount: Checked
Mount Point: Leave blank

4. Click OK

Method 2: Dragging and Dropping Files in VirtualBox

If you only need to transfer a few files quickly, you can simply drag and drop the files in. On the top bar of the running guest machine, click on *Devices > Drag and Drop* and make sure that *Bidirectional* is selected. This means that you will be able to drag files from the host to the guest and from the guest to the host. Once bidirectional drag and drop is checked, you should be able to begin dragging and dropping files.

NOTE: Sometimes when dragging files ***into* the course VM**, you may not be able to drag into the file browser directly. If you encounter this issue, you should drag your files onto the *Desktop* and move the files around from there. You should see the cursor change when it is ready to drop files.

You can also drag files from the guest machine into the host. To do this, simply open the file browser on the host to where you would like to drop the files and drag the files from the virtual machine into the file browser of the host. File transfers should be pretty quick; if the virtual machine seems stuck when transferring, simply cancel the transfer and try again.

Method 3: Managing Files with NextCloud

On any virtual machine, including VirtualBox, VMWare, or the virtual machines hosted on the SCS OpenStack, you can access the SCS NextCloud services to move files between multiple machines and your SCS Windows Account storage. NextCloud offers you all of your SCS storage in one remote location, similar to how you might use other file hosting services like Dropbox or Google Drive. Before trying to use NextCloud, you should check that you can access the service by logging in here.

If you can access the NextCloud services, you can browse the various file storage services available to you:

- **Linux Home:** These are the files from your SCS Linux Account
- **Windows Home:** These are the files from your SCS Windows Account and your lab `Z:\` drive.
- **NextCloud:** In addition to the other storage accounts provided to you by the SCS, you can also upload up to 20GB of files directly to NextCloud.

  With NextCloud, you can upload your files from any machine with an internet connection and download them onto any other machine with an internet connection. For example, you can move project files off of your virtual machine, onto the NextCloud storage, and then download them on your personal laptop.

  Alternatively, you can upload files from your personal PC onto the NextCloud storage, place it into the*Windows Home* folder, and access those files from either the lab `Z:\` drive or download them on a virtual machine like VirtualBox or OpenStack.

Uploading Files to NextCloud from a Lab Computer:

If you would like to upload files from a lab computer, the easiest way to do this is to place the files you would like to transfer into your `Z:\` drive. These files will be automatically backup into your NextCloud storage under the *Windows Home* folder. After that, you can move them into the main NextCloud storage or choose to keep them in your `Z:\`drive.

Uploading Files to NextCloud from a VM or Other PC:

If you would like to upload files from either a VM or any other computer, you can login to the NextCloud service using any of the available interfaces, such as the web interface. Press the “+” icon in the top left of the file browser and select *Upload File*. From here, you can choose to keep it in the main NextCloud storage, move it into your Windows Account storage (the *Windows Home* folder), or into your Linux Account storage (the *Linux Home* folder).

Downloading NextCloud Files to a VM or Other PC:

Once your files are uploaded you will be able to download those files onto any machine which can connect to NextCloud. First, log in to your preferred NextCloud interface (eg. the web interface). N to the folder which contains the files you would like to download. Once you are in the target folder, click the checkbox next to each file you would like to download. Above the file listing you should notice the context bar changing to tell you how many files you have selected and a button labelled *Actions*. Click*Actions > Download*.

If you have selected a single file, it will prompt you to confirm the download. If you have chosen more than one file, NextCloud will place all of the selected files into a *zip archive*. Before you can use the files, you will need to extract them from the archive. Once you have downloaded your file, or extracted your archive, you are ready to use your files on your machine.

Result:

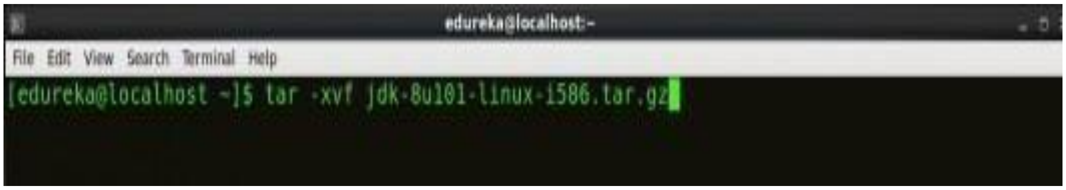
Exp No: 7(A) DATE:	INSTALL HADOOP SINGLE NODE CLUSTER AND RUN SIMPLEAPPLICATIONS LIKE WORD COUNT

Aim:

Step 1: To download the Java 8 Package. Save this file in your home directory.

Step 2: Extract the Java Tar File.

***Command*:** tar -xvf jdk-8u101-linux-i586.tar.gz

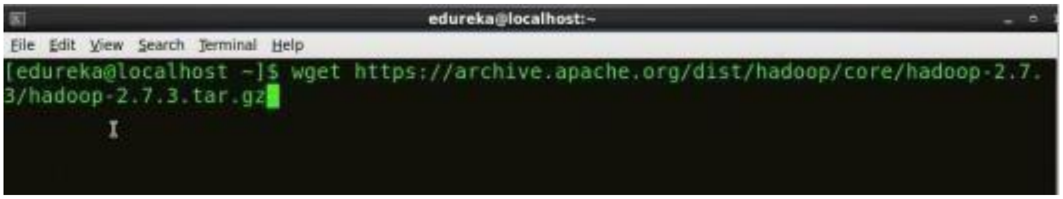


```
[edureka@localhost ~]$ tar -xvf jdk-8u101-linux-i586.tar.gz
```

Fig: Hadoop Installation – Extracting Java Files

Step 3: Download the Hadoop 2.7.3 Package.

***Command*:**wget https://archive.apache.org/dist/hadoop/core/hadoop-2.7.3/hadoop-2.7.3.tar.gz

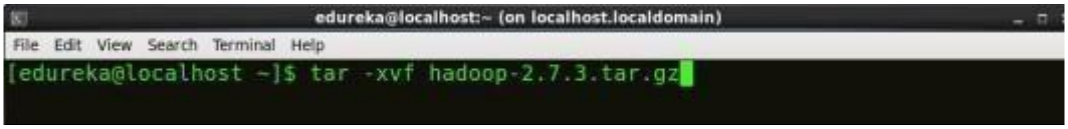


```
[edureka@localhost ~]$ wget https://archive.apache.org/dist/hadoop/core/hadoop-2.7.
3/hadoop-2.7.3.tar.gz
```

Fig: Hadoop Installation – Downloading Hadoop

Step 4: Extract the Hadoop tar File.

Command: tar -xvf hadoop-2.7.3.tar.gz

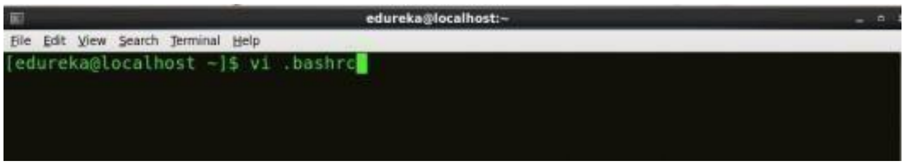

edureka@localhost:~ (on localhost.localdomain)
File Edit View Search Terminal Help

```
[edureka@localhost ~]$ tar -xvf hadoop-2.7.3.tar.gz
```

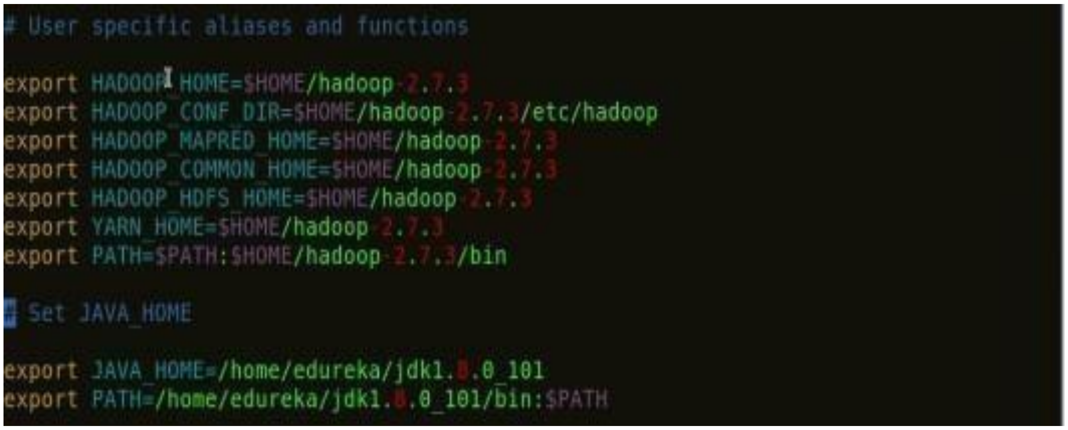
Fig: Hadoop Installation – Extracting Hadoop Files

Step 5: Add the Hadoop and Java paths in the bash file (.bashrc). Open**.** **bashrc** file. Now, add Hadoop and Java Path as shown below.

Command**:** vi .bashrc



```
[edureka@localhost ~]$ vi .bashrc
```



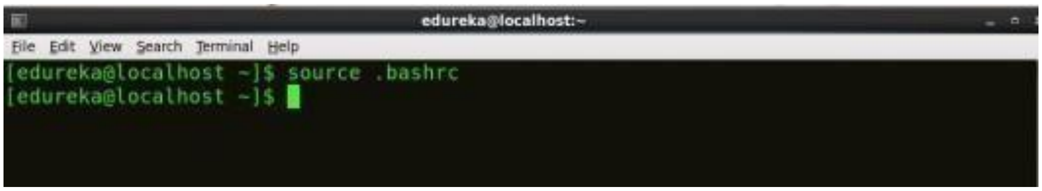
```
# User specific aliases and functions

export HADOOP_HOME=$HOME/hadoop-2.7.3
export HADOOP_CONF_DIR=$HOME/hadoop-2.7.3/etc/hadoop
export HADOOP_MAPRED_HOME=$HOME/hadoop-2.7.3
export HADOOP_COMMON_HOME=$HOME/hadoop-2.7.3
export HADOOP_HDFS_HOME=$HOME/hadoop-2.7.3
export YARN_HOME=$HOME/hadoop-2.7.3
export PATH=$PATH:$HOME/hadoop-2.7.3/bin

# Set JAVA_HOME

export JAVA_HOME=/home/edureka/jdk1.8.0_101
export PATH=/home/edureka/jdk1.8.0_101/bin:$PATH
```

Fig: Hadoop Installation – Setting Environment Variable

Then, save the bash file and close it.

For applying all these changes to the current Terminal, execute the source command.

Command**:** source .bashrc

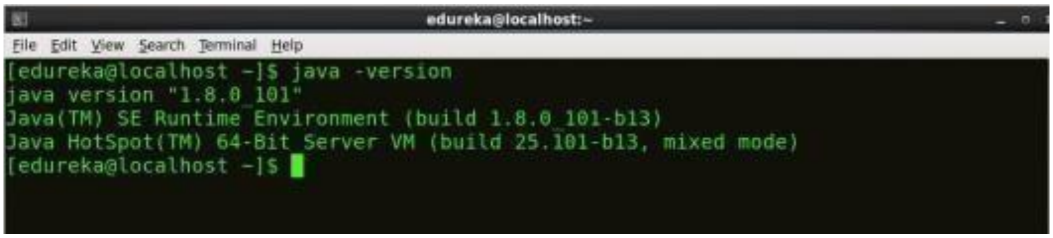


```
[edureka@localhost ~]$ source .bashrc
[edureka@localhost ~]$
```

Fig: Hadoop Installation – Refreshing environment variables

To make sure that Java and Hadoop have been properly installed on your system and can be accessed through the Terminal, execute the java -version and hadoop version commands.

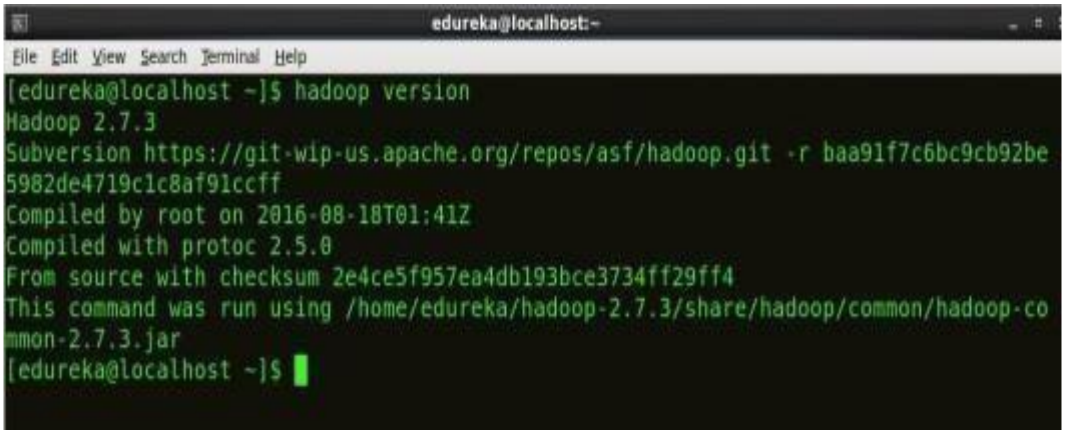
***Command*:** java -version



```
[edureka@localhost ~]$ java -version
java version "1.8.0_101"
Java(TM) SE Runtime Environment (build 1.8.0_101-b13)
Java HotSpot(TM) 64-Bit Server VM (build 25.101-b13, mixed mode)
[edureka@localhost ~]$
```

Fig: Hadoop Installation – Checking Java Version

***Command*:** hadoop version



```
[edureka@localhost ~]$ hadoop version
Hadoop 2.7.3
Subversion https://git-wip-us.apache.org/repos/asf/hadoop.git -r baa91f7c6bc9cb92be
5982de4719c1c8af91ccff
Compiled by root on 2016-08-18T01:41Z
Compiled with protoc 2.5.0
From source with checksum 2e4ce5f957ea4db193bce3734ff29ff4
This command was run using /home/edureka/hadoop-2.7.3/share/hadoop/common/hadoop-co
mmon-2.7.3.jar
[edureka@localhost ~]$
```

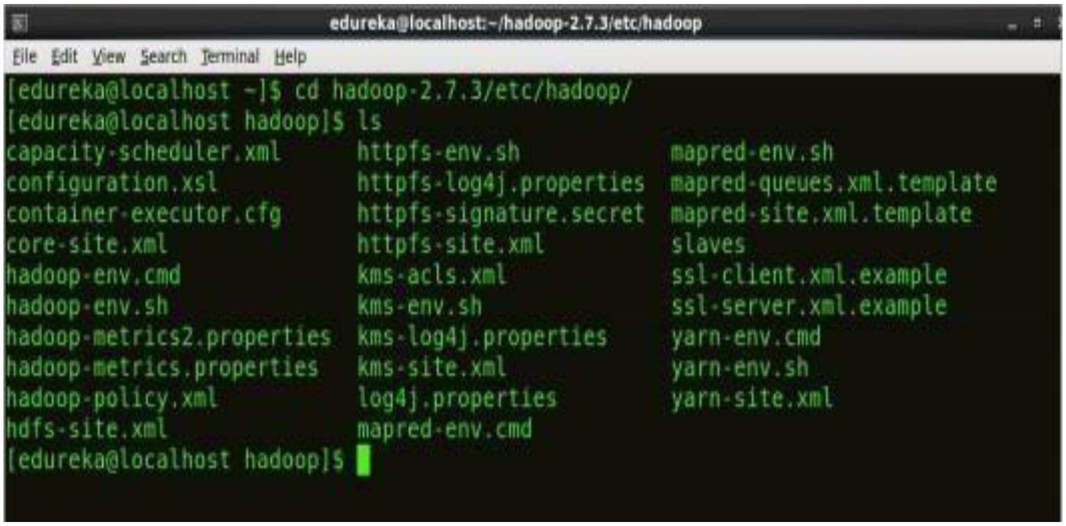
Fig: Hadoop Installation – Checking Hadoop Version

Step 6: Edit the **Hadoop Configuration files**.

Command: cd hadoop-2.7.3/etc/hadoop/

Command: ls

All the Hadoop configuration files are located in **hadoop-2.7.3/etc/hadoop** directory as you can see in the snapshot below:


edureka@localhost:~/hadoop-2.7.3/etc/hadoop
File Edit View Search Terminal Help

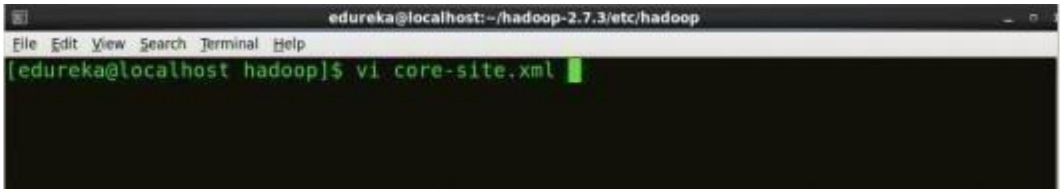
```
[edureka@localhost ~]$ cd hadoop-2.7.3/etc/hadoop/
[edureka@localhost hadoop]$ ls
capacity-scheduler.xml      httpfs-env.sh             mapred-env.sh
configuration.xsl           httpfs-log4j.properties   mapred-queues.xml.template
container-executor.cfg      httpfs-signature.secret   mapred-site.xml.template
core-site.xml               httpfs-site.xml           slaves
hadoop-env.cmd              kms-acls.xml              ssl-client.xml.example
hadoop-env.sh               kms-env.sh                ssl-server.xml.example
hadoop-metrics2.properties  kms-log4j.properties      yarn-env.cmd
hadoop-metrics.properties   kms-site.xml              yarn-env.sh
hadoop-policy.xml           log4j.properties          yarn-site.xml
hdfs-site.xml               mapred-env.cmd
[edureka@localhost hadoop]$
```

Fig: Hadoop Installation – Hadoop Configuration Files

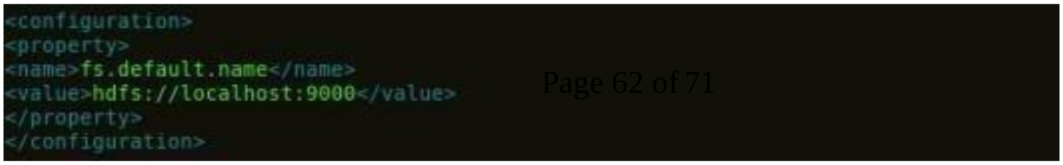
Step 7: Open *core-site.xml* and edit the property mentioned below inside configuration tag:

core-site.xml informs Hadoop daemon where NameNode runs in the cluster. It contains configuration settings of Hadoop core such as I/O settings that are common to HDFS & MapReduce.

***Command*:** vi core-site.xml


edureka@localhost:~/hadoop-2.7.3/etc/hadoop
File Edit View Search Terminal Help

```
[edureka@localhost hadoop]$ vi core-site.xml
```

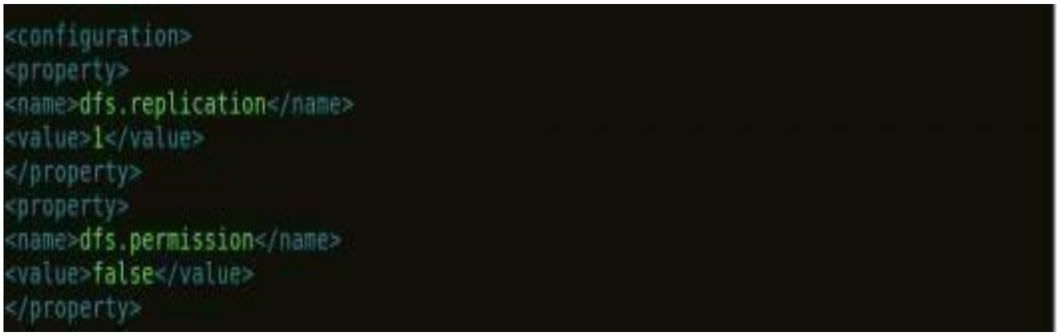


```
<configuration>
<property>
<name>fs.default.name</name>
<value>hdfs://localhost:9000</value>
</property>
</configuration>
```

Fig: Hadoop Installation – Configuring core-site.xml

```
<?xmlversion="1.0"encoding="UTF-8"?>
<?xml-stylesheettype="text/xsl"href="configuration.xsl"?>
<configuration>
<property>
<name>fs.default.name</name>
<value>hdfs://localhost:9000</value>
</property>
</configuration>
```

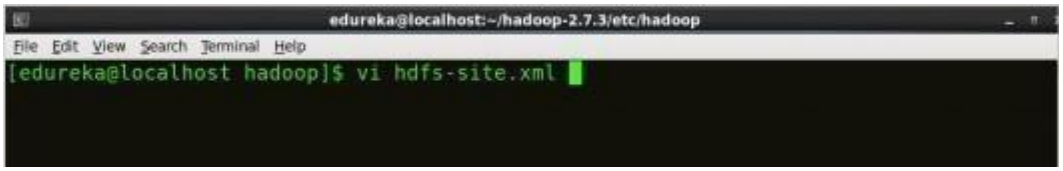
Step 8: Edit*hdfs-site.xml*andeditthepropertymentioned belowinside configuration tag:



```
<configuration>
<property>
<name>dfs.replication</name>
<value>1</value>
</property>
<property>
<name>dfs.permission</name>
<value>false</value>
</property>
```

hdfs-site.xml contains configuration settings of HDFS daemons (i.e. NameNode, DataNode, Secondary NameNode). It also includes the replication factor and block size of HDFS.

***Command*:** vi hdfs-site.xml



edureka@localhost:~/hadoop-2.7.3/etc/hadoop
File Edit View Search Terminal Help

```
[edureka@localhost hadoop]$ vi hdfs-site.xml
```

Fig: Hadoop Installation – Configuring hdfs-site.xml

```
<?xmlversion="1.0"encoding="UTF-8"?>
<?xml-stylesheettype="text/xsl"href="configuration.xsl"?>
<configuration>
<property>
<name>dfs.replication</name>
<value>1</value>
</property>
<property>
<name>dfs.permission</name>
```

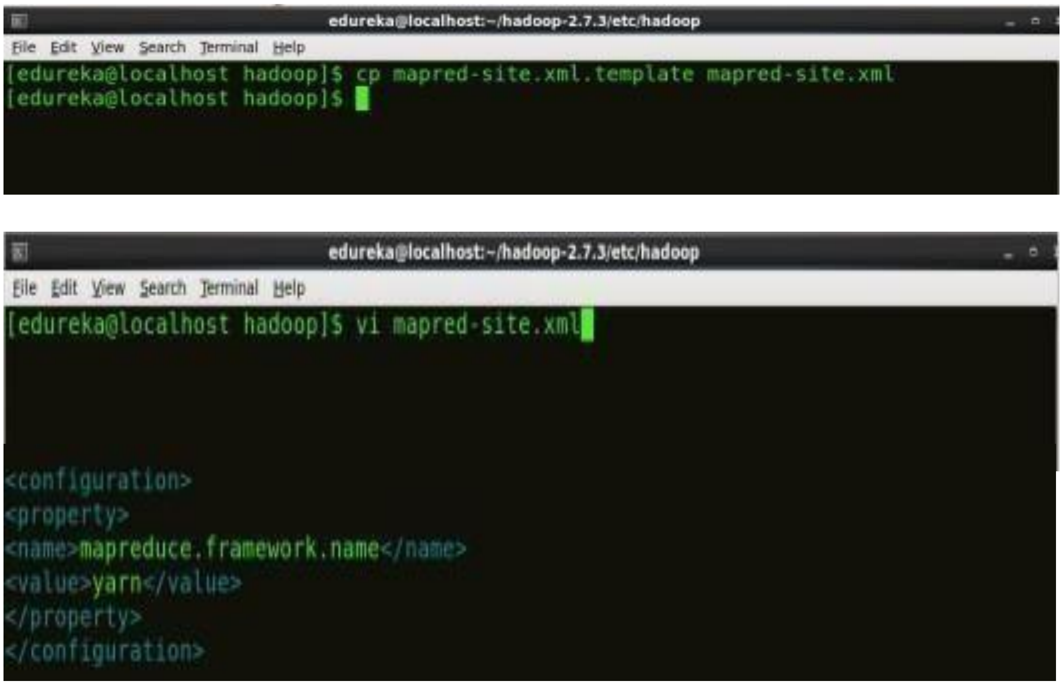
Step 9: Edit the *mapred-site.xml* file and edit the property mentionedbelow inside configuration tag:

mapred-site.xml contains configuration settings of MapReduce application like number of JVM that can run in parallel, the size of the mapper and the reducer process, CPU cores available for a process,etc.

In some cases, mapred-site.xml file is not available. So, we have to create the mapred-site.xml file using mapred-site.xml template.

***Command*:** cp mapred-site.xml.template mapred-site.xml

***Command*:** vi mapred-site.xml.



edureka@localhost:~/hadoop-2.7.3/etc/hadoop
File Edit View Search Terminal Help

```
[edureka@localhost hadoop]$ cp mapred-site.xml.template mapred-site.xml
[edureka@localhost hadoop]$
```

edureka@localhost:~/hadoop-2.7.3/etc/hadoop
File Edit View Search Terminal Help

```
[edureka@localhost hadoop]$ vi mapred-site.xml
```

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

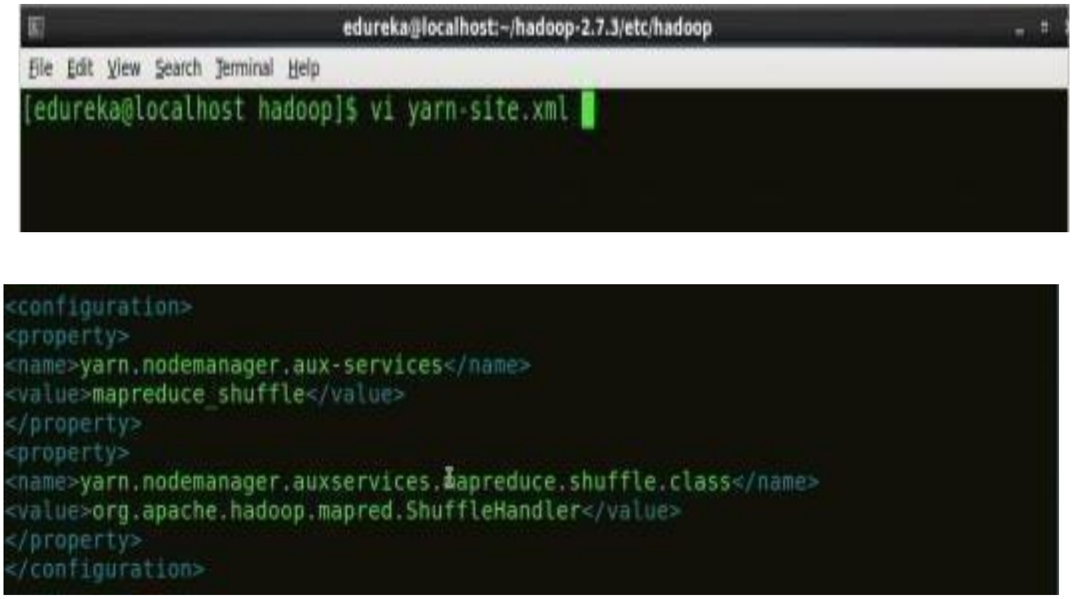
Fig: Hadoop Installation – Configuring mapred-site.xml

```
<?xmlversion="1.0"encoding="UTF-8"?>
<?xml-stylesheettype="text/xsl"href="configuration.xsl"?>
<configuration>
<property>
<name>mapreduce.framework.name</name>
<value>yarn</value>
</property>
</configuration>
```

Step 10: Edit *yarn-site.xml* and edit the property mentioned below inside configuration tag:

yarn-site.xml contains configuration settings of ResourceManager and NodeManager like application memory management size, the operation needed on program & algorithm, etc.

***Command*:** vi yarn-site.xml


edureka@localhost:~/hadoop-2.7.3/etc/hadoop
File Edit View Search Terminal Help

```
[edureka@localhost hadoop]$ vi yarn-site.xml
```

```
<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>
</configuration>
```

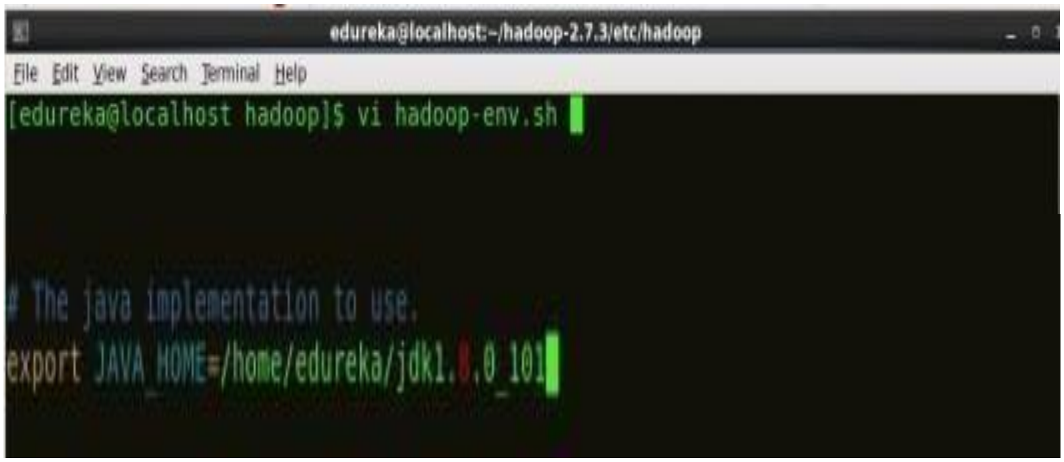
Fig: Hadoop Installation – Configuring yarn-site.xml

```
<?xmlversion="1.0">
<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>
</configuration>
```

Step 11: Edit *hadoop-env.sh* and add the Java Path as mentioned below:

hadoop-env.sh contains the environment variables that are used in the script to run Hadoop like Java home path, etc.

***Command*:** vi hadoop–env.sh


edureka@localhost:~/hadoop-2.7.3/etc/hadoop
File Edit View Search Terminal Help

```
[edureka@localhost hadoop]$ vi hadoop-env.sh

# The java implementation to use.
export JAVA_HOME=/home/edureka/jdk1.8.0_101
```

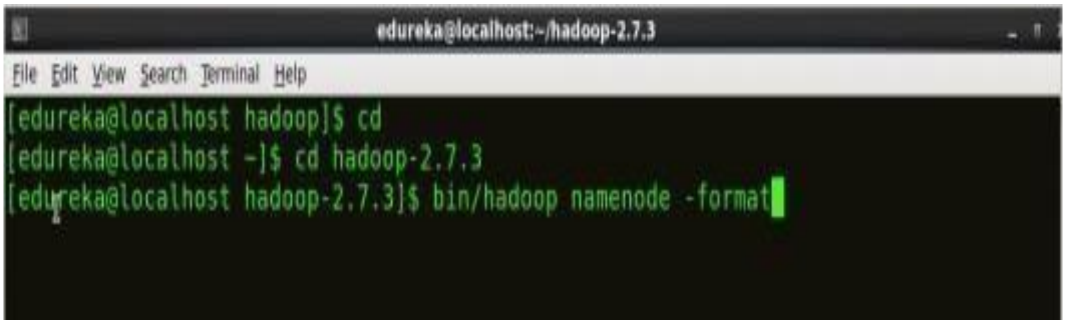
Fig: Hadoop Installation – Configuring hadoop-env.sh

Step 12: Go to Hadoop home directory and format the NameNode.

***Command*:** cd

***Command*:** cd hadoop-2.7.3

***Command*:** bin/hadoop namenode -format



edureka@localhost:~/hadoop-2.7.3
File Edit View Search Terminal Help

```
[edureka@localhost hadoop]$ cd
[edureka@localhost ~]$ cd hadoop-2.7.3
[edureka@localhost hadoop-2.7.3]$ bin/hadoop namenode -format
```

Fig: Hadoop Installation – Formatting NameNode

This formats the HDFS via NameNode. This command is only executed for the first time. Formatting the file system means initializing the directory specified by the dfs.name.dir variable.

Never format, up and running Hadoop filesystem. You will lose all your data stored in theHDFS.

Step 13: Once the NameNode is formatted, go to hadoop-2.7.3/sbin directory and start all the daemons.

Command: cd hadoop-2.7.3/sbin

Either you can start all daemons with a single command or do it individually.

Command: ./start-all.sh

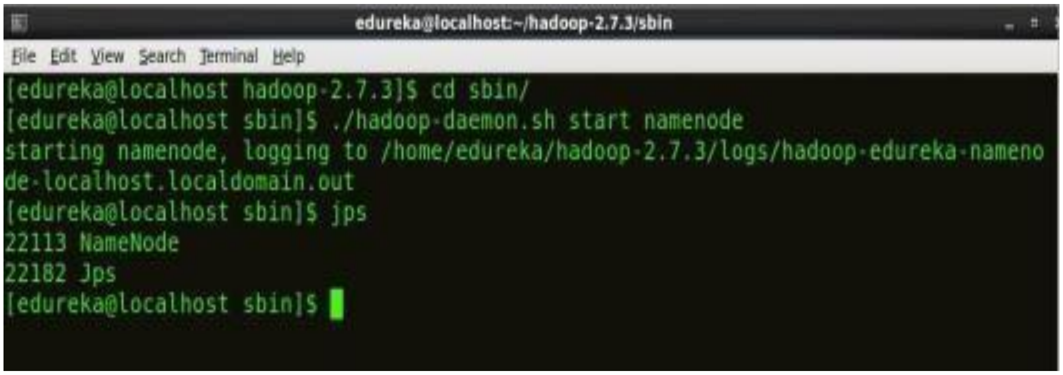
The above command is a combination of ***start-dfs.sh, start-yarn.sh*** &***mr-jobhistory-daemon.sh***

Or you can run all the services individually as below:

Start NameNode:

The NameNode is the centerpiece of an HDFS file system. It keeps the directory tree of all files stored in the HDFS and tracks all the file stored across the cluster.

Command: ./hadoop-daemon.sh start namenode



edureka@localhost:~/hadoop-2.7.3/sbin
File Edit View Search Terminal Help

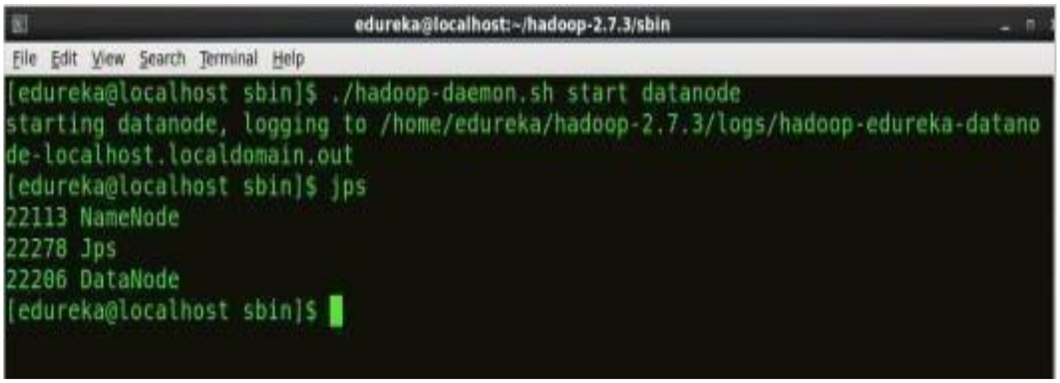
```
[edureka@localhost hadoop-2.7.3]$ cd sbin/
[edureka@localhost sbin]$ ./hadoop-daemon.sh start namenode
starting namenode, logging to /home/edureka/hadoop-2.7.3/logs/hadoop-edureka-nameno
de-localhost.localdomain.out
[edureka@localhost sbin]$ jps
22113 NameNode
22182 Jps
[edureka@localhost sbin]$
```

StartDataNode:

– Starting NameNode

On startup, a DataNode connects to the Namenode and it responds to the requests from the Namenode for differentoperations.

Command: ./hadoop-daemon.sh start datanode



edureka@localhost:~/hadoop-2.7.3/sbin
File Edit View Search Terminal Help

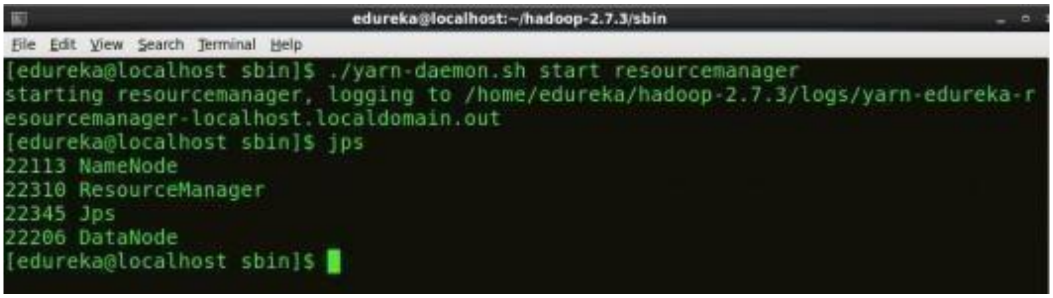
```
[edureka@localhost sbin]$ ./hadoop-daemon.sh start datanode
starting datanode, logging to /home/edureka/hadoop-2.7.3/logs/hadoop-edureka-datano
de-localhost.localdomain.out
[edureka@localhost sbin]$ jps
22113 NameNode
22278 Jps
22206 DataNode
[edureka@localhost sbin]$
```

Fig: Hadoop Installation – Starting DataNode

Start ResourceManager:

ResourceManager is the master that arbitrates all the available cluster resources and thus helps in managing the distributed applications running on the YARN system. Its work is to manage each NodeManagers and the each application’s ApplicationMaster.

Command: ./yarn-daemon.sh start resourcemanager



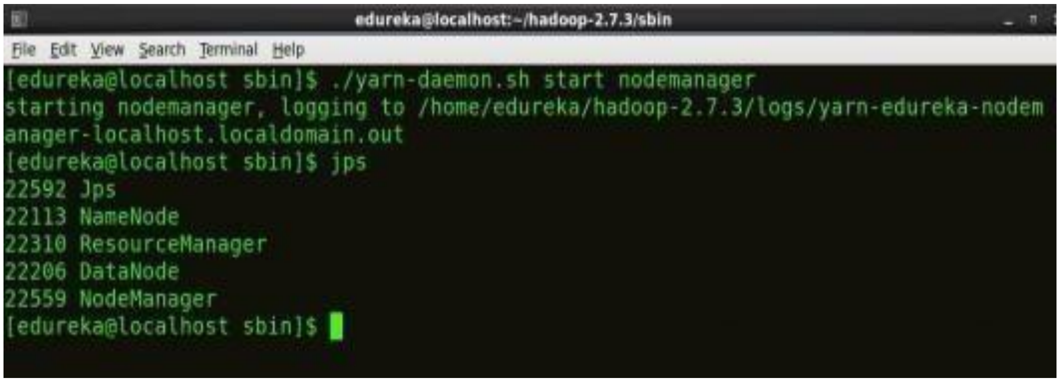
```
[edureka@localhost sbin]$ ./yarn-daemon.sh start resourcemanager
starting resourcemanager, logging to /home/edureka/hadoop-2.7.3/logs/yarn-edureka-r
esourcemanager-localhost.localdomain.out
[edureka@localhost sbin]$ jps
22113 NameNode
22310 ResourceManager
22345 Jps
22206 DataNode
[edureka@localhost sbin]$
```

Fig: Hadoop Installation – Starting ResourceManager

Start NodeManager:

The NodeManager in each machine framework is the agent which is responsible for managing containers, monitoring their resource usage and reporting the same to the ResourceManager.

Command: ./yarn-daemon.sh start nodemanager



```
[edureka@localhost sbin]$ ./yarn-daemon.sh start nodemanager
starting nodemanager, logging to /home/edureka/hadoop-2.7.3/logs/yarn-edureka-nodem
anager-localhost.localdomain.out
[edureka@localhost sbin]$ jps
22592 Jps
22113 NameNode
22310 ResourceManager
22206 DataNode
22559 NodeManager
[edureka@localhost sbin]$
```

Fig: Hadoop Installation – Starting NodeManager

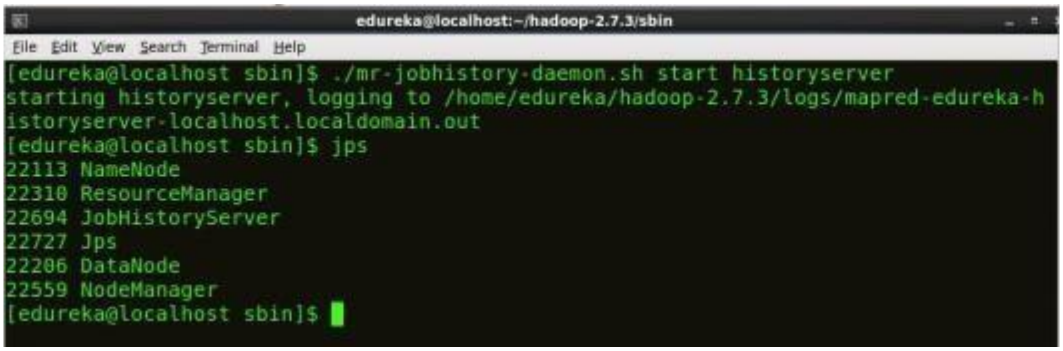
Start JobHistoryServer:

JobHistoryServer is responsible for servicing all job history related requests from client.

Command**:** ./mr-jobhistory-daemon.sh start historyserver

Step 14: To check that all the Hadoop services are up and running, run the below command.

Command: jps

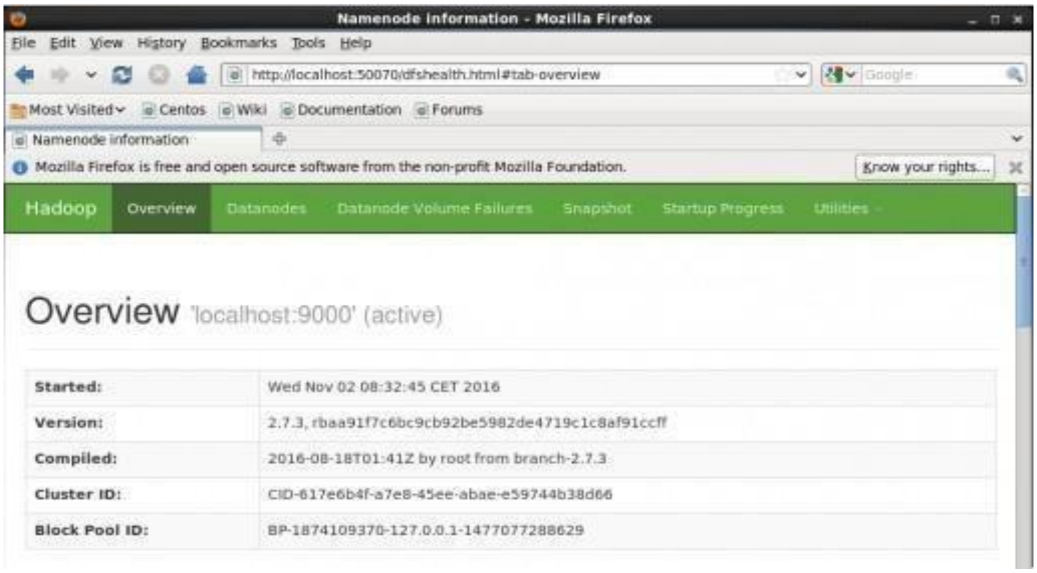


edureka@localhost:~/hadoop-2.7.3/sbin
File Edit View Search Terminal Help

```
[edureka@localhost sbin]$ ./mr-jobhistory-daemon.sh start historyserver
starting historyserver, logging to /home/edureka/hadoop-2.7.3/logs/mapred-edureka-h
istoryserver-localhost.localdomain.out
[edureka@localhost sbin]$ jps
22113 NameNode
22310 ResourceManager
22694 JobHistoryServer
22727 Jps
22206 DataNode
22559 NodeManager
[edureka@localhost sbin]$ 
```

Fig: Hadoop Installation – Checking Daemons

Step 15: Now open the Mozilla browser and go to **localhost**:**50070/dfshealth.html** to check the NameNode interface.



Namenode information - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://localhost:50070/dfshealth.html#tab-overview
Google
Most Visited
Centos
Wiki
Documentation
Forums
Namenode information
Mozilla Firefox is free and open source software from the non-profit Mozilla Foundation.
Know your rights...
Hadoop
Overview
Datanodes
Datanode Volume Failures
Snapshot
Startup Progress
Utilities

Overview 'localhost:9000' (active)

Started:	Wed Nov 02 08:32:45 CET 2016
Version:	2.7.3, rbaa91f7c6bc9cb92be5982de4719c1c8af91ccff
Compiled:	2016-08-18T01:41Z by root from branch-2.7.3
Cluster ID:	CID-617e6b4f-a7e8-45ee-abae-e59744b38d66
Block Pool ID:	BP-1874109370-127.0.0.1-1477077288629

Fig: Hadoop Installation – Starting WebUI

- Congratulations, you have successfully installed a single node Hadoop cluster

Result:

.

EXP NO 7B) **DATE:**	**WORD COUNT PROGRAM TO DEMONSTRATE THE USE OF MAP AND REDUCE TASKS**

Aim:

Procedure:

step1

```
hduser@nspublin:/usr/local/hadoop/sbin$ mkdir /home/hduser/wc
```

step2:Compiling the java file - WordCount.java

```
hduser@nspublin:/usr/local/hadoop/sbin$  sudo  /usr/lib/jvm/java-8-oracle/bin/javac  -classpath
/home/hduser/hadoop-core-1.2.1.jar  -d /home/hduser/wc /home/hduser/WordCount.java
```

step3:Creating jar file for wordCount.java:

```
hduser@nspublin:/usr/local/hadoop/sbin$ jar -cvf /home/hduser/wc.jar -C /home/hduser/wc/ .
added manifest
adding: WordCount$IntSumReducer.class(in = 1739) (out= 739)(deflated 57%)
adding: WordCount$TokenizerMapper.class(in = 1736) (out= 753)(deflated 56%)
adding: WordCount.class(in = 1491) (out= 814)(deflated 45%)
```

step4.Executing jar file for WordCount.java

```
hduser@ksrietcsevb:/usr/local/hadoop/sbin$ hadoop jar /home/hduser/wc.jar WordCount /user/input
/user/output
Picked up JAVA_TOOL_OPTIONS: -javaagent:/usr/share/java/jayatanaag.jar
16/09/12 10:52:53 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform...
using builtin-java classes where applicable
```

Step5: to check the file in Output file

```
hduser@ksrietcsevb:/usr/local/hadoop/sbin$ hadoop fs -ls /user/output
Picked up JAVA_TOOL_OPTIONS: -javaagent:/usr/share/java/jayatanaag.jar
16/09/12 10:56:22 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform...
using builtin-java classes where applicable
```

```
-rw-r--r--   1 hdusersupergroup          0 2016-09-12 10:56 /user/output/_SUCCESS
-rw-r--r--   1 hdusersupergroup        182 2016-09-12 10:56 /user/output/part-r-00000
```

Program:

/home/hduser/WordCount.java:

```
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 {
StringTokenizeritr = 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 (IntWritableval : 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); }
}
```

Input:

hai i am in gcc lab

Output

```
hduser@ksrietcsevb:/usr/local/hadoop/sbin$ hadoop fs -cat /user/output/*
Picked up JAVA_TOOL_OPTIONS: -javaagent:/usr/share/java/jayatanaag.jar
16/09/12 10:56:32 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform...
using builtin-java classes where applicable
am      1
gcc     1
hai     1
i       1
in      1
lab     1
hduser@ksrietcsevb:/usr/local/hadoop/sbin$
```

Result:

EXP NO: 8	**CREATING AND EXECUTING YOUR FIRST CONTAINER USING DOCKER**
DATE:	

Aim:

Description: Creating and executing your first container using Docker is a fundamental step in understanding containerization. Here’s a step-by-step guide to help you through the process.

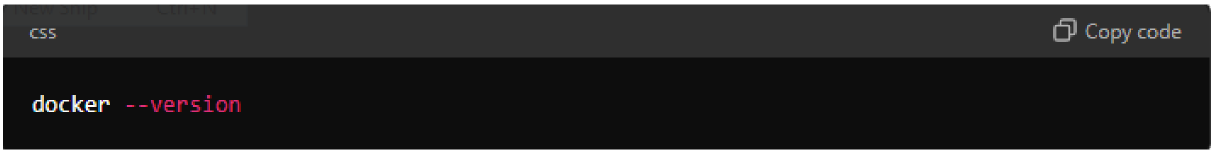
Steps:

Step 1: Install Docker

First, you need to install Docker on your system. Docker provides installers for various operating systems. You can find the installation instructions on the Docker website.

Step 2: Verify Installation

After installing Docker, verify that it's properly installed by running the following command in your terminal or command prompt:

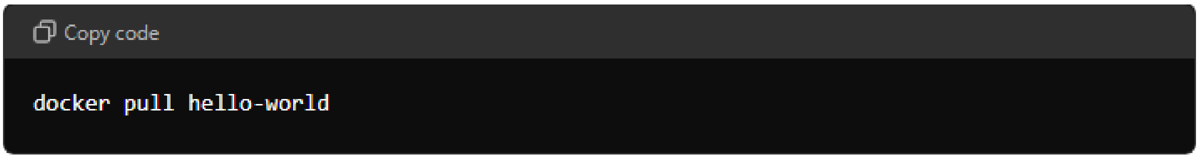


```
docker --version
```

This command should display the Docker version if it has been installed correctly.

Step 3: Pull a Docker Image

Docker containers are created based on Docker images. To create your first container, you need to pull an image from Docker Hub. Docker Hub is a repository of Docker images maintained by Docker. As an example, let's pull the official hello-world image, which is a simple image that prints a message:

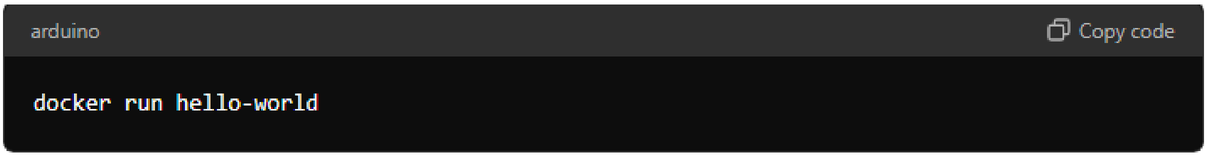


```
docker pull hello-world
```

This command downloads the hello-world image from Docker Hub to your local machine.

Step 4: Run a Docker Container

Once you have pulled the image, you can run a container based on that image using the following command:

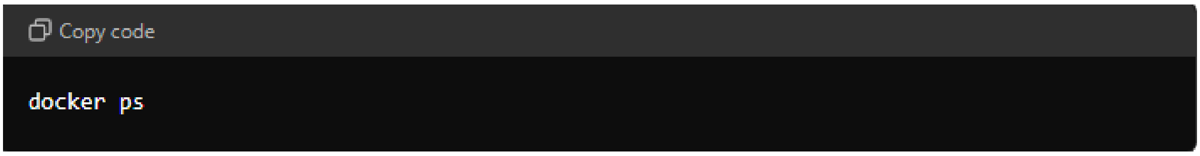


```
docker run hello-world
```

When you run this command, Docker executes the hello-world container. The container will print a "Hello from Docker!" message, indicating that your installation appears to be working correctly.

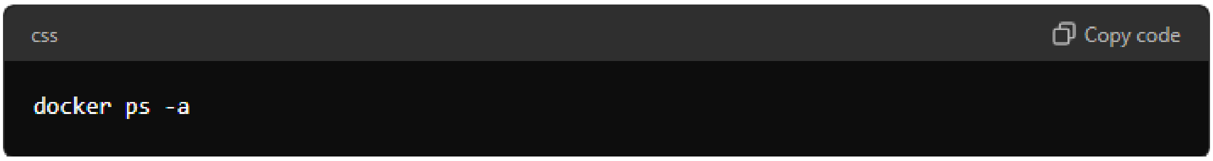
Step 5: Explore Docker Containers

To see the list of running containers, you can use:



```
docker ps
```

This command shows all running containers. Since the hello-world container completes its execution quickly, you might not see it in the list if you run docker ps after it has finished running. To see all containers, including the ones that have exited, use:

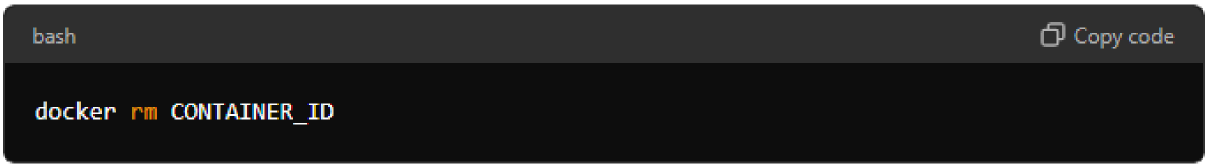


```
docker ps -a
```

Step 6: Cleanup (Optional)

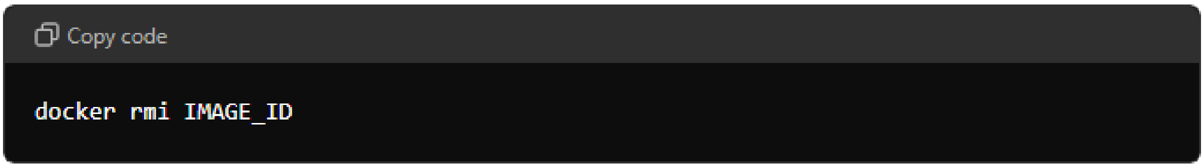
After you've run your first container, you may want to clean up unused containers and images from your system to free up space. Use the following commands to remove containers and images:

- To remove a specific container:



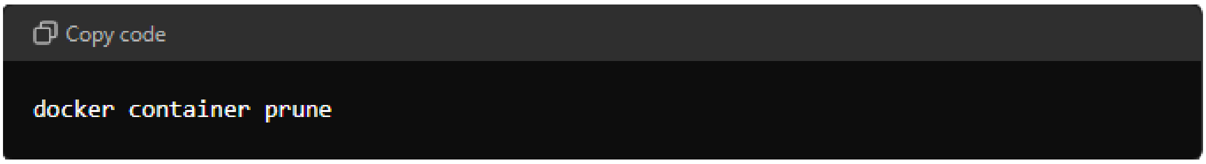
```
docker rm CONTAINER_ID
```

To remove a specific image:



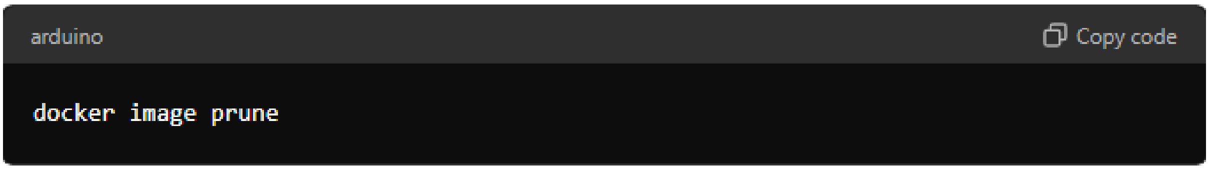
```
docker rmi IMAGE_ID
```

To remove all stopped containers:



```
docker container prune
```

To remove all unused images



```
docker image prune
```

Hints:

- **Docker Images**: Explore more Docker images on Docker Hub (hub.docker.com). There are images for various applications and services that you can use to create containers.
- **Docker file**: For more complex setups, learn about Docker files, which are text files that contain instructions to build a Docker image automatically.

By following these steps, you have successfully created and executed your first Docker container. Docker provides a powerful way to package and deploy applications in a consistent and reproducible environment. Experiment with different images and explore Docker's capabilities to further enhance your understanding of containerization.

Result:

EXP NO: 9 **DATE:**	**RUN A CONTAINER FROM DOCKER HUB**

Aim:

Description: Running a container from Docker Hub is a straightforward process using the Docker command-line interface (CLI). Docker Hub is a repository of Docker images maintained by Docker, Inc., and the community. Here’s a step-by-step guide to running a container from Docker Hub

Steps:

1. **Install Docker**:

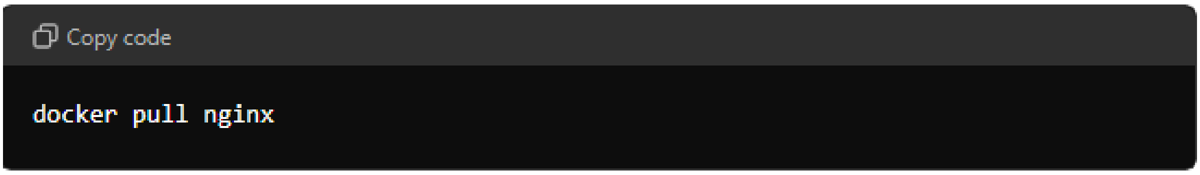
Ensure Docker is installed on your system. You can download Docker Desktop for Windows or Mac from Docker's official website or install Docker Engine on Linux by following the instructions for your specific distribution.

2. **Search for an Image**:

- If you haven't decided on an image yet, you can explore Docker Hub at hub.docker.com. Docker Hub provides a search bar where you can find various Docker images for different applications and services.

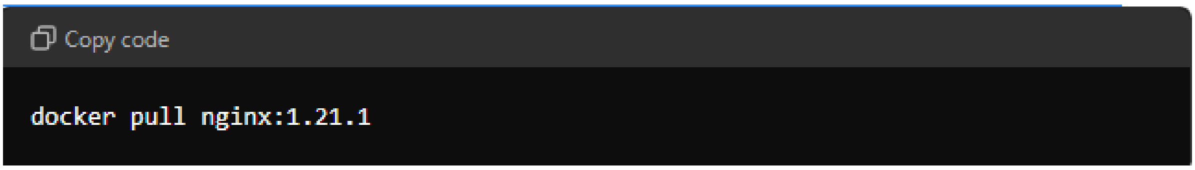
3. **Pull the Docker Image**:

- Open your terminal or command prompt.
- Use the docker pull command to download the desired Docker image from Docker Hub. Replace image_name with the name of the image you want to pull. For example,to pull the official Nginx web server image:



```
docker pull nginx
```

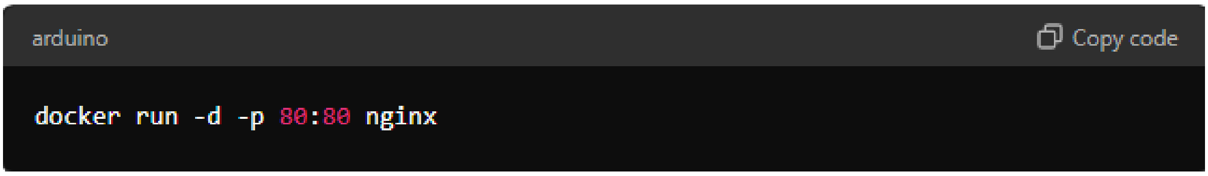
If you want a specific version of an image, you can specify the version tag. For example



```
docker pull nginx:1.21.1
```

4. **Run the Docker Container**:

- Once the image is pulled, you can run a container based on that image using the docker run command. Replace image_name with the image you pulled earlier. For example, to run a container from the Nginx image:



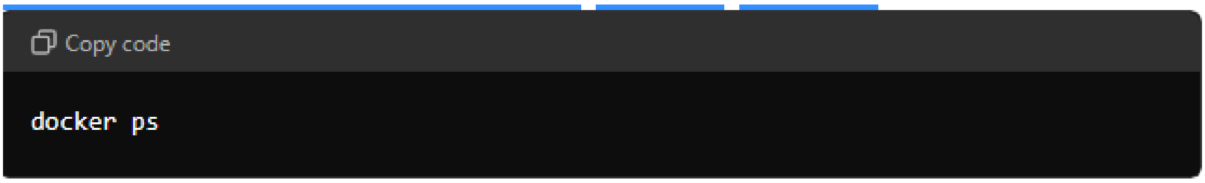
```
docker run -d -p 80:80 nginx
```

□ -d flag runs the container in detached mode (in the background).
□ -p 80:80 publishes port 80 of the container to port 80 on the host (your local machine). This allows you to access the Nginx web server running inside the container from your web browser.

□ nginx is the name of the image you pulled.

5. **Verify the Container is Running**:

To see the list of running containers, use the docker ps command.



```
docker ps
```

□ This command lists all containers that are currently running. You should see the Nginx container (or any other container you started) listed here.

6. **Access the Containerized Application**:

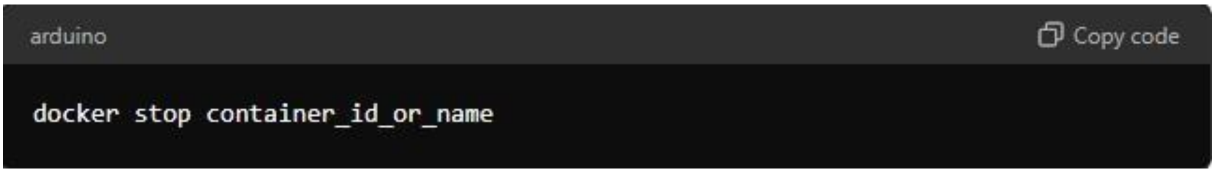
□ Open a web browser and go to http://localhost or http://127.0.0.1 (depending on your operating system) to see the default Nginx welcome page if you ran an Nginx container. If you mapped a different port, use http://localhost:your_port.

7. **Interact with the Container** (Optional):

- You can interact with a running container using various Docker CLI commands, such as docker exec to execute commands inside the container, docker logs to view container logs, etc.

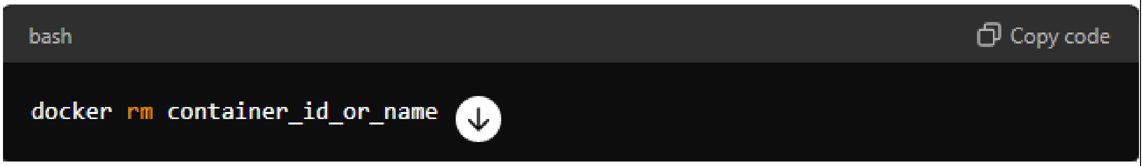
8. **Stop and Remove the Container** (Optional):

- To stop a running container, use docker stop followed by the container ID or name:



```
docker stop container_id_or_name
```

To remove a stopped container, use docker rm followed by the container ID or name



```bash
docker rm container_id_or_name
```

Hints:

- Docker Hub provides a vast repository of images for different applications and services, including databases, web servers, development environments, and more.
- Make sure to review the documentation or README file associated with the Docker image you're pulling for specific instructions or configurations.
- Always consider security implications and configure container security appropriately, especially when running containers from third-party sources.

By following these steps, you can easily run a container from Docker Hub and start utilizing various applications and services in a containerized environment on your local machine.

Result:

.

EXP NO 10 **DATE:**	**CREATE A VIRTUALIZATION IN VMWARE OR ANY EQUIVALENT OPEN SOURCE TOOL TO ALLOCATE MEMORY AND STORAGE SPACE AS PER REQUIREMENT AND INSTALL GUEST OS ON THAT VMWARE**

Aim:

.

Description:

Creating a virtual machine (VM) using VMware or an equivalent open-source tool involves several steps, including setting up the VM configuration, allocating memory and storage, and installing a guest operating system (OS). Here’s a detailed guide using VMware Workstation as an example.

Steps:

Step 1: Install VMware Workstation

1. **Download VMware Workstation**:
   - Go to the VMware website and download the latest version of VMware Workstation.
2. **Install VMware Workstation**:
   - Run the installer and follow the on-screen instructions to complete the installation.

Step 2: Create a New Virtual Machine

1. **Open VMware Workstation**:
   - Launch VMware Workstation from your desktop or start menu.
2. **Start the New VM Wizard**:
   - Click on “Create a New Virtual Machine” or go to File > New Virtual Machine.
3. **Choose Configuration Type**:
   - Select "Typical (recommended)" for the configuration type and click “Next”.

Step 3: Select the Installation Media

1. **Choose Installation Media**:
   - You have three options:
     - Install from a disc.
     - Install from an ISO image file.
     - Install later.
   - Select the appropriate option based on your installation media and click “Next”.

Step 4: Select the Guest Operating System

1. **Choose OS Type**:
   - Select the guest operating system you plan to install (e.g., Windows, Linux) and the version. Click “Next”.

Step 5: Name the Virtual Machine

1. **Name Your VM**:
   - Enter a name for your virtual machine and specify the location where you want to store the VM files. Click “Next”.

Step 6: Specify Disk Capacity

1. **Set Disk Size**:
   - Specify the maximum disk size for the VM. You can also choose whether to store the virtual disk as a single file or split it into multiple files. Click “Next”.

Step 7: Customize Hardware (Optional)

1. **Customize Hardware Settings**:
   - You can customize the VM hardware settings by clicking on “Customize Hardware”. Here, you can adjust the amount of memory, number of processors, network settings, and more.
   - After customizing, click “Close” to return to the main wizard.

Step 8: Complete the VM Creation

1. **Finish**:
   - Review your settings and click “Finish” to create the virtual machine.

Step 9: Install the Guest Operating System

1. **Start the VM**:
   - Select your newly created VM and click on “Power on this virtual machine”.
2. **Follow OS Installation Process**:
   - Follow the on-screen instructions to install the guest operating system just as you would on a physical machine.

Step 10: Install VMware Tools

1. **Install VMware Tools**:
   - After the guest OS installation is complete, it’s recommended to install VMware Tools. This improves the VM’s performance and enhances its usability.

- To install VMware Tools, go to VM > Install VMware Tools and follow the instructions within the guest OS.

Hints:

- **Snapshots**: Take snapshots of your VM at different points in time to easily revert to a previous state if needed. This can be done from the VM > Snapshot menu.
- **Backups**: Regularly back up your VM files to prevent data loss.
- **Updates**: Keep both VMware Workstation and VMware Tools up to date for the best performance and security.

By following these steps, you can create and manage a virtual machine using VMware Workstation effectively. If you prefer using an open-source alternative, you can follow similar steps with tools like Virtual Box or KVM.

Result:

EXP NO: 11 DATE:	TO HOST A WEB PAGE IN EC2 USING AWS.

Aim:.

Description: Hosting a web page on an Amazon EC2 instance involves several steps. Here's a detailed guide to help you set up and deploy a simple web page using AWS EC2:

Steps:

Step 1: Set Up an AWS Account

1. **Create an AWS Account**:
   - Go to the AWS Management Console and sign up for a new account if you don't already have one.
   - Follow the on-screen instructions to complete the registration process.

Step 2: Launch an EC2 Instance

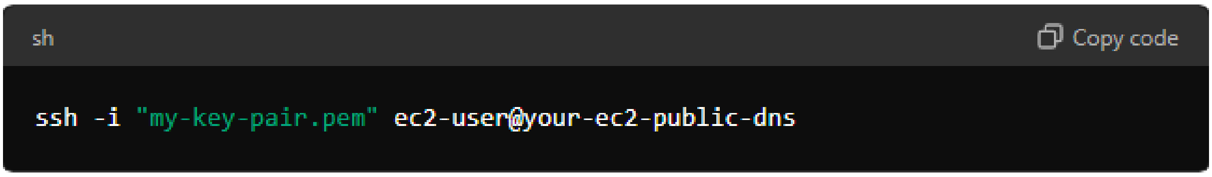
1. **Open EC2 Dashboard**:
   - Sign in to the AWS Management Console.
   - Navigate to the EC2 Dashboard by searching for "EC2" in the services search bar and selecting it.
2. **Launch an Instance**:
   - Click on the "Launch Instance" button.
   - Select an Amazon Machine Image (AMI). For this guide, you can choose the Amazon Linux 2 AMI (Free Tier eligible).
3. **Choose an Instance Type**:
   - Select an instance type. The t2.micro instance type is free-tier eligible and sufficient for hosting a simple web page. Click "Next: Configure Instance Details".
4. **Configure Instance Details**:
   - You can accept the default settings here. Click "Next: Add Storage".
5. **Add Storage**:
   - The default 8 GB storage is sufficient. Click "Next: Add Tags".
6. **Add Tags**:
   - Add a tag to name your instance (optional). For example, you can use Key: Name, Value: MyWebServer. Click "Next: Configure Security Group".
7. **Configure Security Group**:
   - Create a new security group. Add rules to allow HTTP (port 80) and SSH (port 22) traffic:
     - Type: HTTP, Protocol: TCP, Port Range: 80, Source: Anywhere (0.0.0.0/0)
     - Type: SSH, Protocol: TCP, Port Range: 22, Source: Anywhere (0.0.0.0/0)
   - Click "Review and Launch".
8. **Review and Launch**:

- Review your instance settings. Click "Launch".

- When prompted, create a new key pair (or use an existing one). Download the key pair file (e.g., my-key-pair.pem) and keep it secure. Click “Launch Instances”.

Step 3: Connect to Your EC2 Instance

1. **Access Your Instance**:
   - ○ Go to the “Instances” section in the EC2 Dashboard.
   - ○ Select your instance and click on the “Connect” button.
   - ○ Follow the instructions to connect to your instance using SSH. Typically, you will use a terminal or an SSH client with the following command:

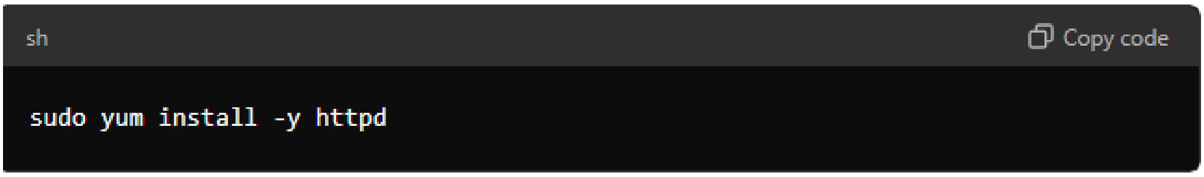


```sh
ssh -i "my-key-pair.pem" ec2-user@your-ec2-public-dns
```

Step 4: Set Up a Web Server

1. **Update Your Instance**:
   - ○ Once connected, update the package list
2. **Install Apache Web Server**:

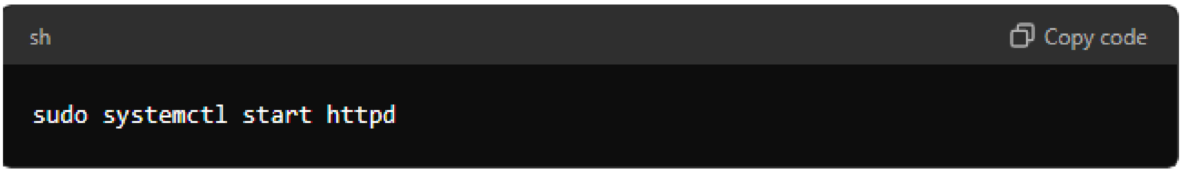
- Install Apache (httpd)



```sh
sudo yum install -y httpd
```

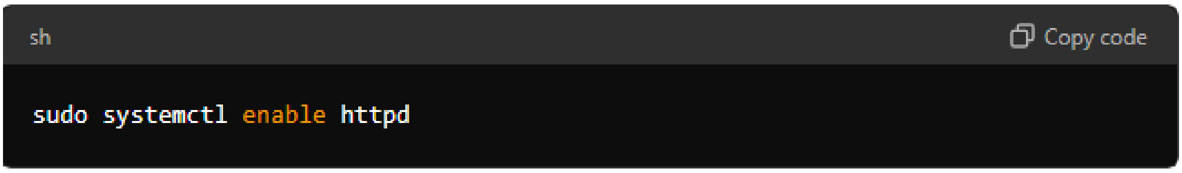
Start Apache:

Start the Apache service



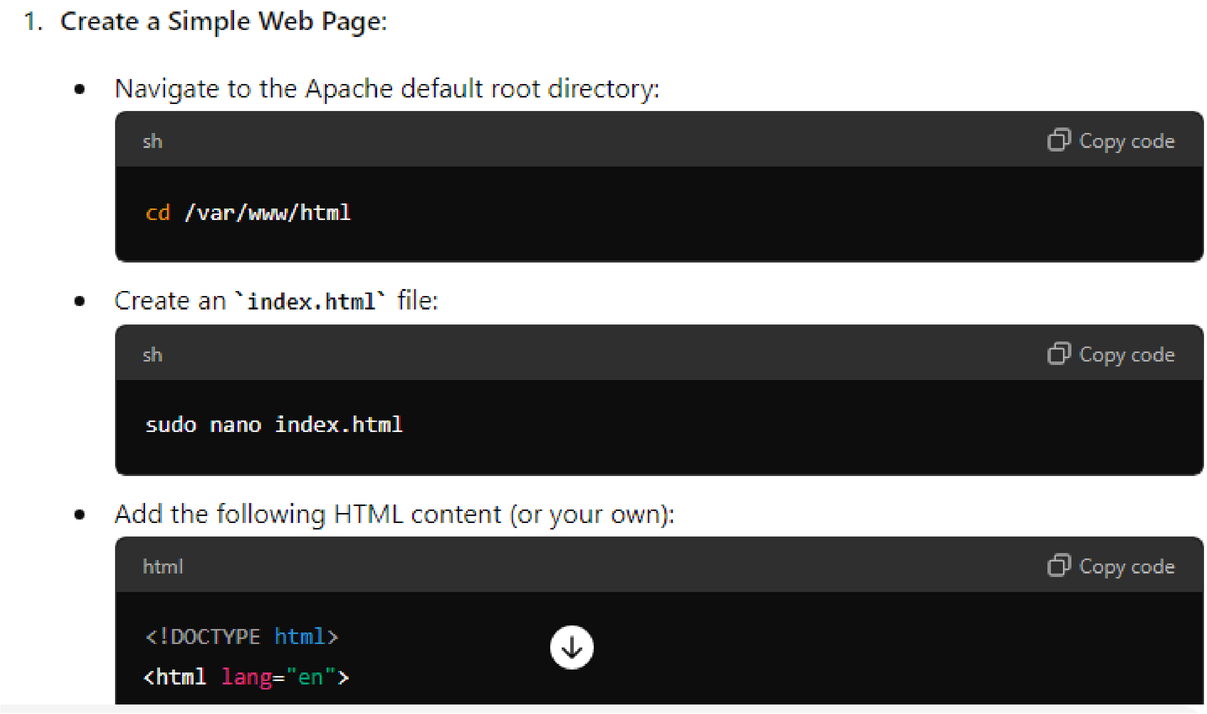
```sh
sudo systemctl start httpd
```

Enable Apache to start on boot:



```sh
sudo systemctl enable httpd
```

Step 5: Deploy Your Web Page



1. Create a Simple Web Page:

- Navigate to the Apache default root directory:

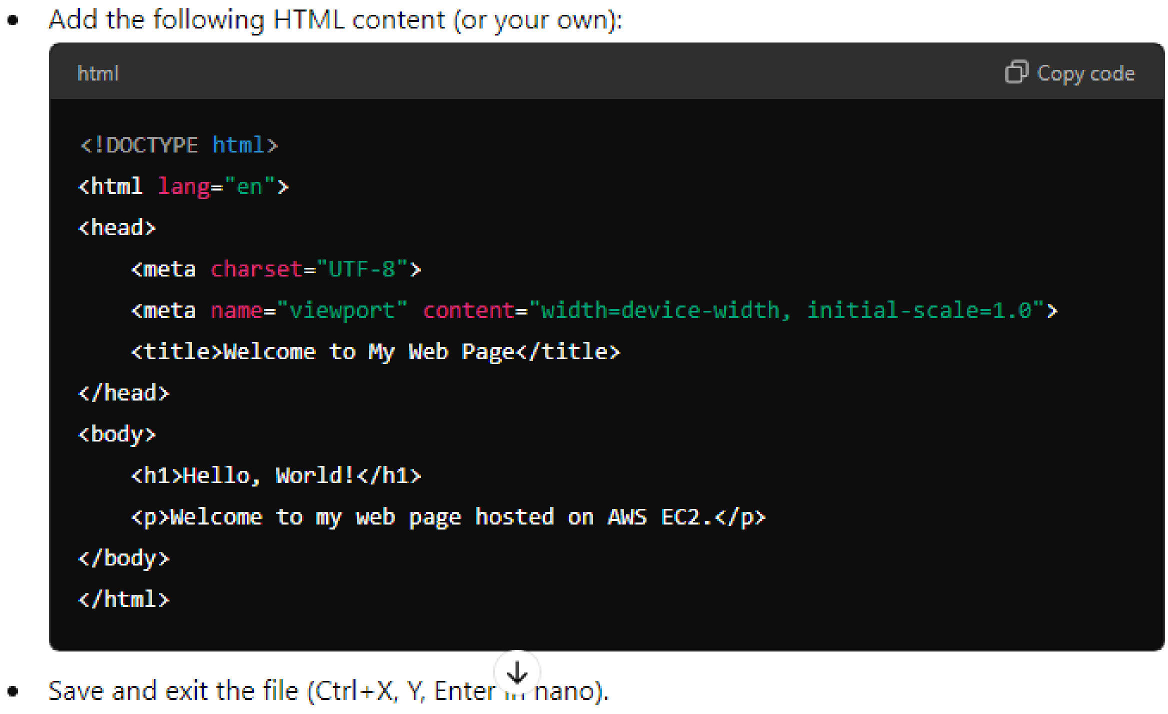
```sh
cd /var/www/html
```

- Create an `index.html` file:

```sh
sudo nano index.html
```

- Add the following HTML content (or your own):

```html
<!DOCTYPE html>
<html lang="en">
```



- Add the following HTML content (or your own):

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Welcome to My Web Page</title>
</head>
<body>
    <h1>Hello, World!</h1>
    <p>Welcome to my web page hosted on AWS EC2.</p>
</body>
</html>
```

- Save and exit the file (Ctrl+X, Y, Enter in nano).

Step 6: Access Your Web Page

1. **Open Your Web Page**:
   - Open a web browser and enter your EC2 instance's public DNS or public IP address (found in the EC2 Dashboard).
   - You should see your web page with the content you added to index.html.

Step 7: Manage and Secure Your Instance

1. **Monitor Your Instance**:
   - Use the EC2 Dashboard to monitor the status and performance of your instance.
2. **Secure Your Instance**:
   - Regularly update your instance.
   - Use a strong password for SSH access or consider using key pairs exclusively.
   - Configure a firewall and other security best practices as needed.

By following these steps, you can successfully host a web page on an EC2 instance using AWS.

Result:

EXP NO: 12 DATE:	TO CREATE BILLING ALARM USING AWS ACCOUNT.

Aim:

Description: Creating a billing alarm in your AWS account helps you monitor your costs and ensure that you don't exceed your budget. Here's a step-by-step guide to set up a billing alarm using AWS Cloud Watch.

Step 1: Sign In to the AWS Management Console

1. **Go to the AWS Management Console**:
   - Open your web browser and navigate to the AWS Management Console.
   - Sign in with your AWS account credentials.

Step 2: Open the Cloud Watch Console

1. **Navigate to Cloud Watch**:
   - In the AWS Management Console, type "CloudWatch" in the search bar and select it from the list of services.

Step 3: Access the Billing Section

1. **Go to the Billing Dashboard**:
   - In the Cloud Watch console, on the left navigation pane, expand "Alarms" and click on "Billing".
   - If you don't see the billing option, ensure your AWS account is using a region that supports billing alarms (preferably the US East (N. Virginia) region).

Step 4: Create a Billing Alarm

1. **Create Alarm**:
   - Click the "Create Alarm" button.

Step 5: Specify Alarm Conditions

1. **Specify Metric and Conditions**:
   - In the "Create Alarm" wizard, under "Select Metric", click on the "Select metric" button.
   - In the "Browse" tab, choose "Billing" and then select "Total Estimated Charge".
   - Click on "Select metric" to proceed.
2. **Set Conditions**:
   - In the "Specify metric and conditions" step, set the "Threshold type" to "Static".
   - Define the threshold value for your alarm (e.g., 100 USD). This is the amount at which you want to be notified.
   - Choose the "Whenever the estimated charges is..." option and set it to "Greater/Equal" to your threshold value.

Step 6: Configure Actions

1. **Set Notification**:
   - In the “Configure actions” step, choose to “Select an existing SNS topic” or “Create a new topic”.
   - If creating a new topic, provide a topic name and enter the email addressesthat should receive the notifications. Confirm the subscription by checkingyour email and clicking the confirmation link sent by AWS.
   - Select the SNS topic you created or chose for notification.

Step 7: Add a Name and Description

1. **Name Your Alarm**:
   - Provide a name and a description for your alarm in the “Add name and description” step (e.g., “Monthly Billing Alarm”).
   - Click “Next” to review your alarm settings.

Step 8: Review and Create the Alarm

1. **Review Your Settings**:
   - Review all the settings you have configured for the billing alarm.
   - Click “Create Alarm” to finish the setup.

Step 9: Confirm Email Subscription

1. **Confirm Subscription**:
   - If you created a new SNS topic and added email addresses, make sure the recipients confirm their subscriptions by clicking the link in the email sent from AWS Notifications.

Step 10: Monitor Your Alarm

1. **Monitor the Alarm**:
   - The alarm will now be listed under the “Alarms” section in CloudWatch.
   - You will receive an email notification when your AWS charges exceed the threshold you set.

Additional Tips:

- **Budget Reports**: For more detailed cost management, consider using AWS Budgetsto track your costs and usage against your budget.
- **Threshold Adjustment**: You can adjust the threshold or settings of your billing alarm anytime from the Cloud Watch console.
- **Multiple Alarms**: Create multiple billing alarms if you need to monitor different services or different thresholds.

By following these steps, you can create and manage billing alarms to keep track of yourAWS spending effectively.

Result

CONTENT BEYOND THE SYLLABUS

EX.NO: 13	WORDMAPPER PROGRAM TO DEMONSTRATE THE USE OF WINDOWS 7 OR 8.
DATE:	

AIM :

To Develop Word Mapper program for demonstrating the use of Map and Reduce tasks

PROCEDURE :

1. Prepare the example input CSV file with English words from a dictionary and all translations in other languages added to it, separated by a '|' symbol.
2. Create the Java Map Reduce project
3. Implement the Map Reduce classes

i) The first class is the "Mapper" : Word Mapper

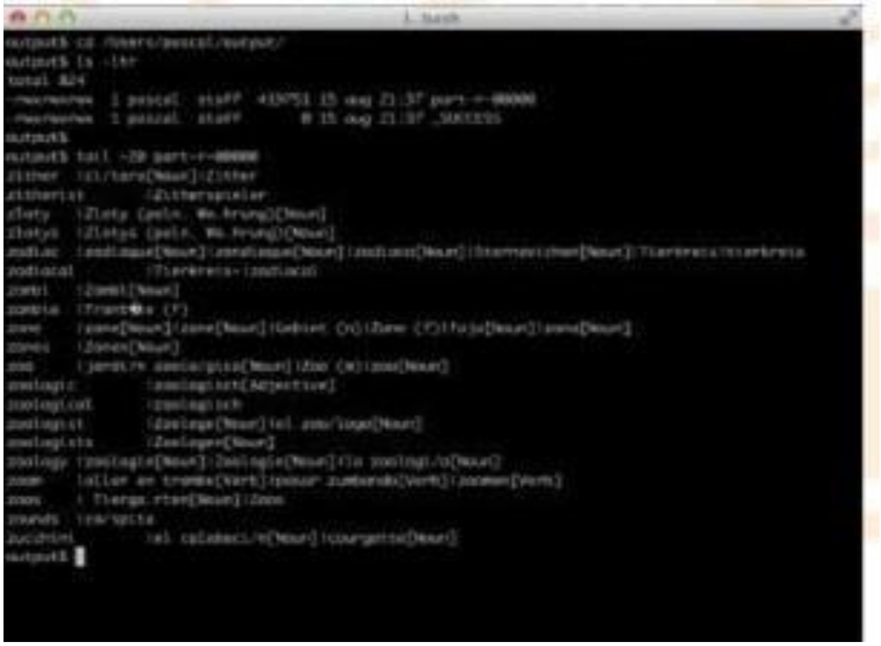
ii) The next class is the "Reducer" which reduces the map to the wanted output.

: All Translations Reducer

This Reduce steps collects all values for a given key and put them after each other separated with a'|' symbol.

4. The applications using Java by using Grid API is successfully complete

SAMPLE OUTPUT:



```
output$ cd /Users/pascal/output/
output$ ls -ltr
total 824
-rwxrwxrwx  1 pascal  staff  419751 15 aug 21:37 part-r-00000
-rwxrwxrwx  1 pascal  staff       0 15 aug 21:37 _SUCCESS
output$
output$ tail -20 part-r-00000
zither  |cítara[Noun]|Zither
zitherist       |Zitherspieler
zloty   |Zloty (poln. Währung)[Noun]
zlotys  |Zlotys (poln. Währung)[Noun]
zodiac  |zodiaque[Noun]|zodiaque[Noun]|zodíaco[Noun]|Sternzeichen[Noun]|Tierkreis|tierkreis
zodiacal        |Tierkreis-|zodiacal
zombi   |Zombi[Noun]
zombie  |[illegible] (f)
zone    |zone[Noun]|zone[Noun]|Gebiet (n)|Zone (f)|faja[Noun]|zona[Noun]
zones   |Zonen[Noun]
zoo     |jardín zoológico[Noun]|Zoo (m)|zoo[Noun]
zoologic        |zoologisch[Adjective]
zoological      |zoologisch
zoologist       |Zoologe[Noun]|el zoo/logo[Noun]
zoologists      |Zoologen[Noun]
zoology |zoologie[Noun]|Zoologie[Noun]|la zoologí/a[Noun]
zoom    |aller en trombe[Verb]|pasar zumbando[Verb]|zoomen[Verb]
zoos    | Tiergärten[Noun]|Zoos
zounds  |[illegible]
zucchini        |el calabací/n[Noun]|courgette[Noun]
output$ █
```

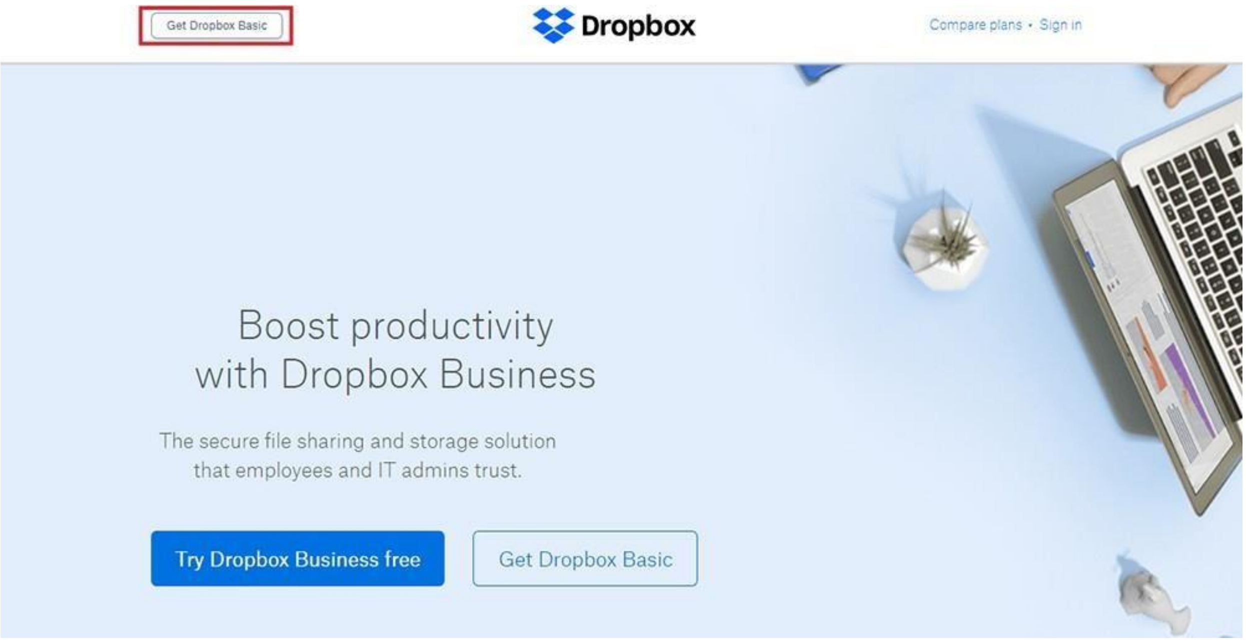
Result:

Thus the word mapper program was successfully implemented

CONTENT BEYOND THE SYLLABUS

EX.NO: 14 **DATE:**	**CLOUD STORAGE IN DROP BOX**

The cloud storage provider and simple ways you can start interacting with it on your desktop and easy-to use low cost cloud storage platform.



Boost productivity with Dropbox Business

The secure file sharing and storage solution that employees and IT admins trust.

Dropbox is a cloud storage service, which means you can copy your files to the cloud and access them later, even if you’re using a different device.

DropboxSyncing

That doesn’t free space on your hard drive, though. A copy of the file you save to Dropbox will remain on your hard drive.

If you change the file locally, it will be updated in the cloud.

It’s unfortunate that Dropbox doesn’t free up hard drive space, at least on its free plan. That comes with an upside, though. Dropbox syncs your data across all devices. As long as you canaccess your Dropbox account, you can download any file stored in your Dropbox folder on yourlocal machine.

This system keeps files secure against technical problems you may have with your computer. For instance, if your hard drive fails, your photos and other important documents won’t be lost forever if they’re stored in the cloud. Although you may think your computer is secure, there’s always a small chance it will be damaged, die of its own accord or even get stolen.

Dropbox makes it easy to transfer those important files, photos and folders to a new computer,which saves you a lot of time and frustration, as well.

It also makes it easy if you want to share a file with colleagues and family members. In additionto sharing, you can also use Dropbox to view files on multiple devices. For example, you can move pictures you took on your phone to Dropbox and look at the images on your computer later.

You can use Dropbox as pure cloud storage, too. As long as you use the web client, you can addfiles to your Dropbox account and store them only in the cloud.

Dropbox Pricing & Account Tiers

Basic only comes with 2GB of free storage, which is enough to start using Dropbox, but not much else. We'll show you how to sign up for the free Dropbox account in the next section.

Dropbox has multiple paid tiers for personal accounts, as well.

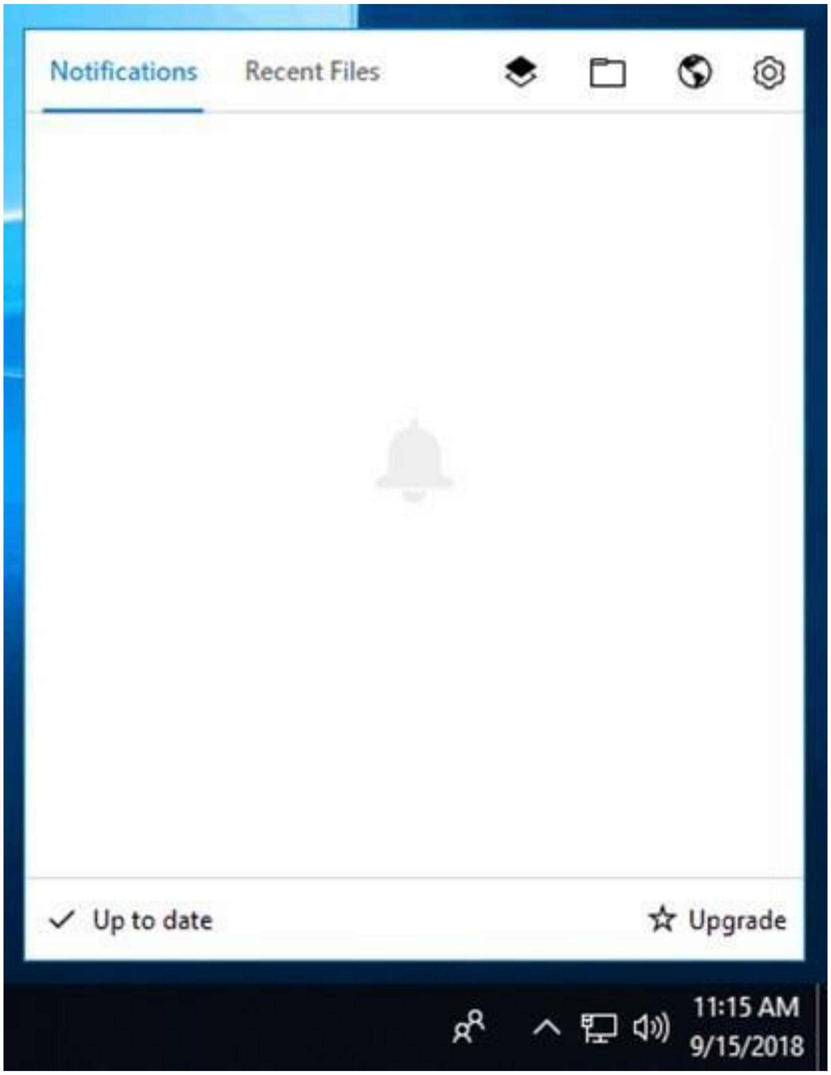
Setting UpDropbox

One of the first things you will notice after you've installed Dropbox is that it added an icon to your system tray. The tray icon is the easiest and fastest way to access Dropbox from your computer.

Left-click once or right-click to open Dropbox.

There are two tabs in the upper-left corner and four buttons in the upper right.

The first tab is "notifications," which will show you the notifications you want, as well as occasional messages from Dropbox.



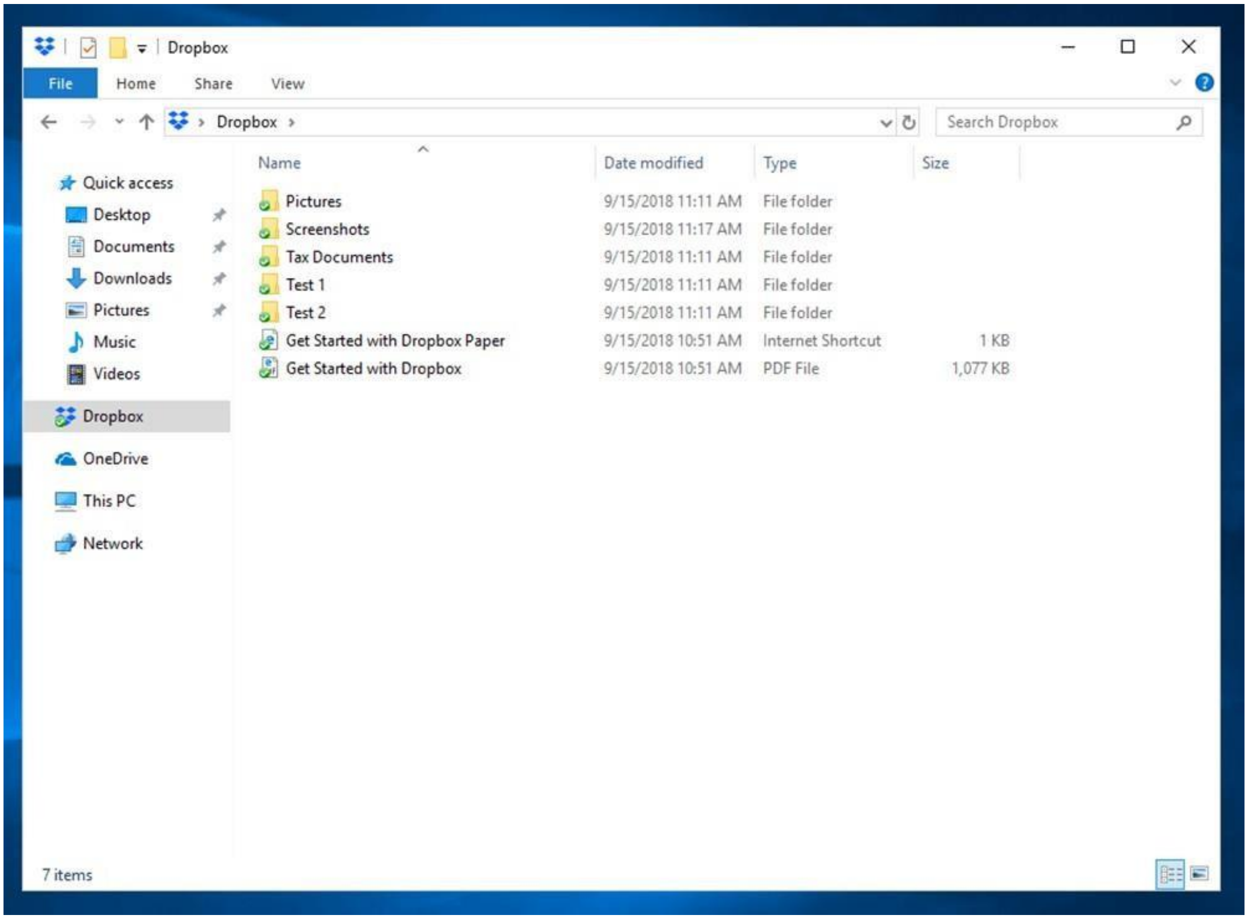
How to Use Dropbox on Desktop

Dropbox on your desktop is easy. Downloading the client adds a folder under your username titled "Dropbox," and the files you add to that folder are automatically copied to your Dropbox account.

You can find the folder by opening File Explorer and navigating to the section called "This PC" on Windows. Then, you'll double-click on the drive you installed Dropbox on. That will usually beyour C: drive.

Next, double-click on the folder called "Users," then the folder with your username. In that folder,you'll find Dropbox. Double-clicking on its icon or name opens the Dropbox folder. This folder isthe same one you access when you click the second button in the icon menu mentioned above.

In Windows, you will likely also find the Dropbox folder under "quick access."



Name	Date modified	Type	Size
Pictures	9/15/2018 11:11 AM	File folder	
Screenshots	9/15/2018 11:17 AM	File folder	
Tax Documents	9/15/2018 11:11 AM	File folder	
Test 1	9/15/2018 11:11 AM	File folder	
Test 2	9/15/2018 11:11 AM	File folder	
Get Started with Dropbox Paper	9/15/2018 10:51 AM	Internet Shortcut	1 KB
Get Started with Dropbox	9/15/2018 10:51 AM	PDF File	1,077 KB

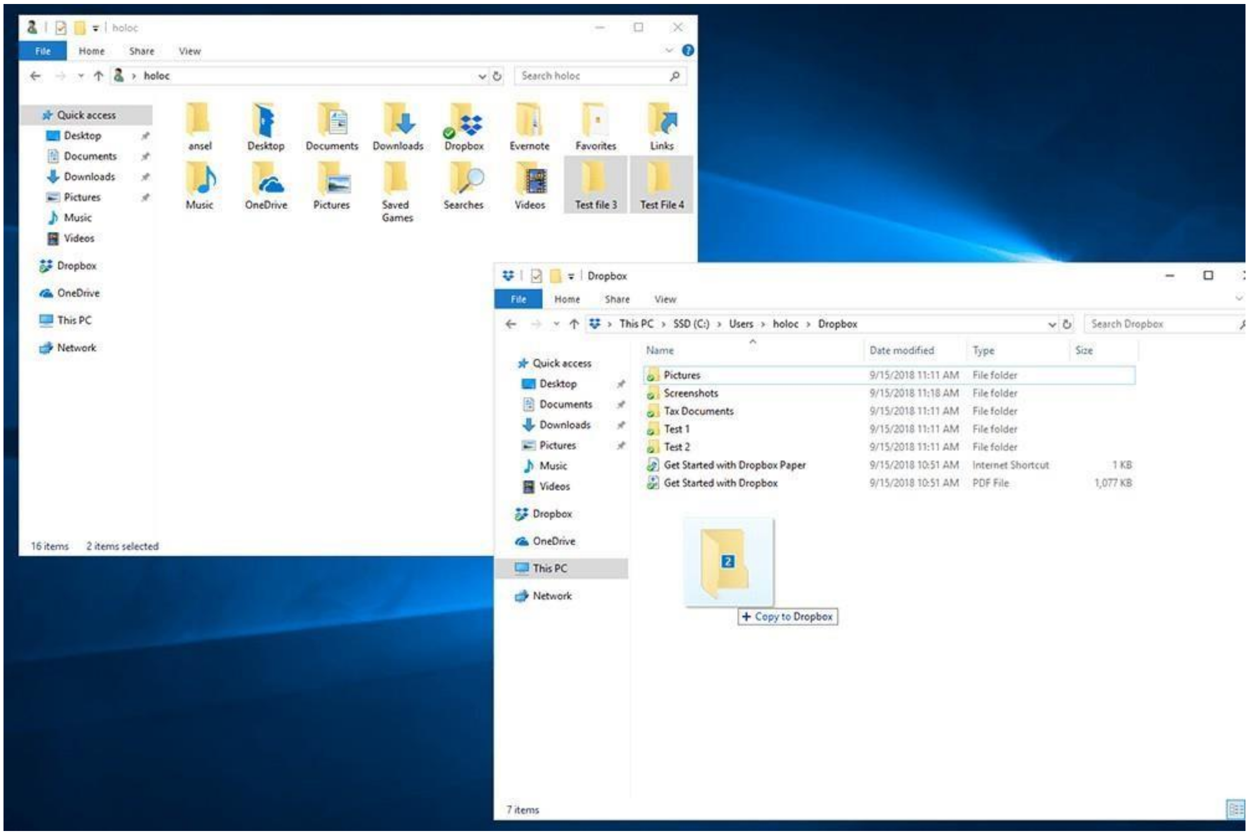
Transferring Files With Dropbox

If you want to move old files to Dropbox, navigate to them in a second window. Once you've found them, simply highlight the file you want to move, then click and drag it over to your Dropbox folder.

You can also copy and paste files or folders to Dropbox if you find that easier.

It may take a second or two to transfer files to the Dropbox folder. Once they're done, Dropbox will show a blue icon in the lower left with arrows on it. The icon means it is copying the file anduploading it to the cloud. Once it's done, the icon will turn green and display a checkmark.

If you wish to transfer multiple files at once, hold the "ctrl" button and click on each file you want to move. You'll know you've done it right if the files you click on remain highlighted. Then,click and drag one of the files to move all those selected into the Dropbox folder.

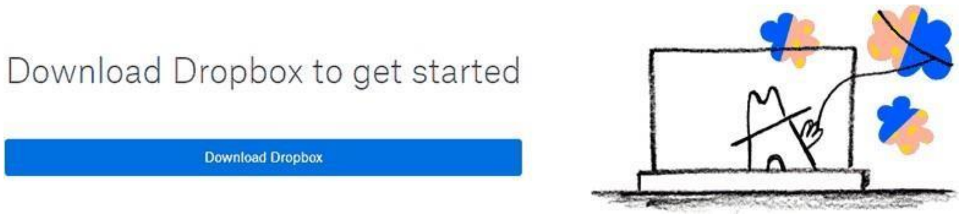


Name	Date modified	Type	Size
Pictures	9/15/2018 11:11 AM	File folder	
Screenshots	9/15/2018 11:18 AM	File folder	
Tax Documents	9/15/2018 11:11 AM	File folder	
Test 1	9/15/2018 11:11 AM	File folder	
Test 2	9/15/2018 11:11 AM	File folder	
Get Started with Dropbox Paper	9/15/2018 10:51 AM	Internet Shortcut	1 KB
Get Started with Dropbox	9/15/2018 10:51 AM	PDF File	1,077 KB

How to Use Dropbox on Mobile and Web

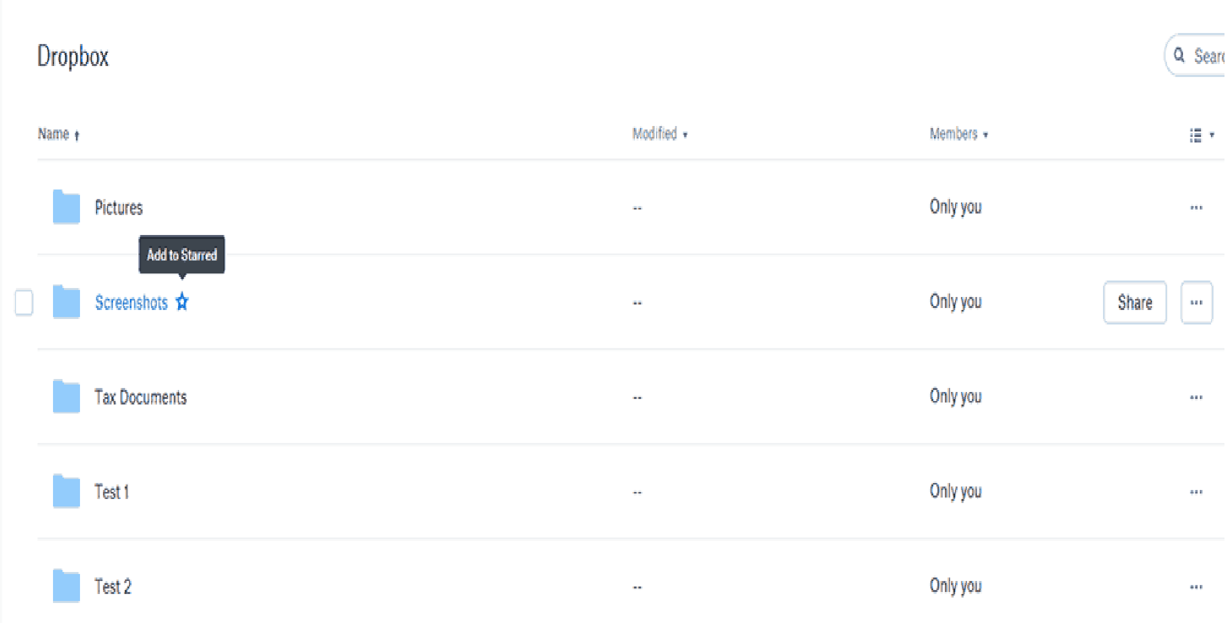
Using Dropbox from the web client is a similar experience to using it on the desktop. When you log in to your Dropbox account, you're presented with the files recently changed on your desktop.

It is the same list you'd find by clicking on the "recent files" tab in the icon menu.



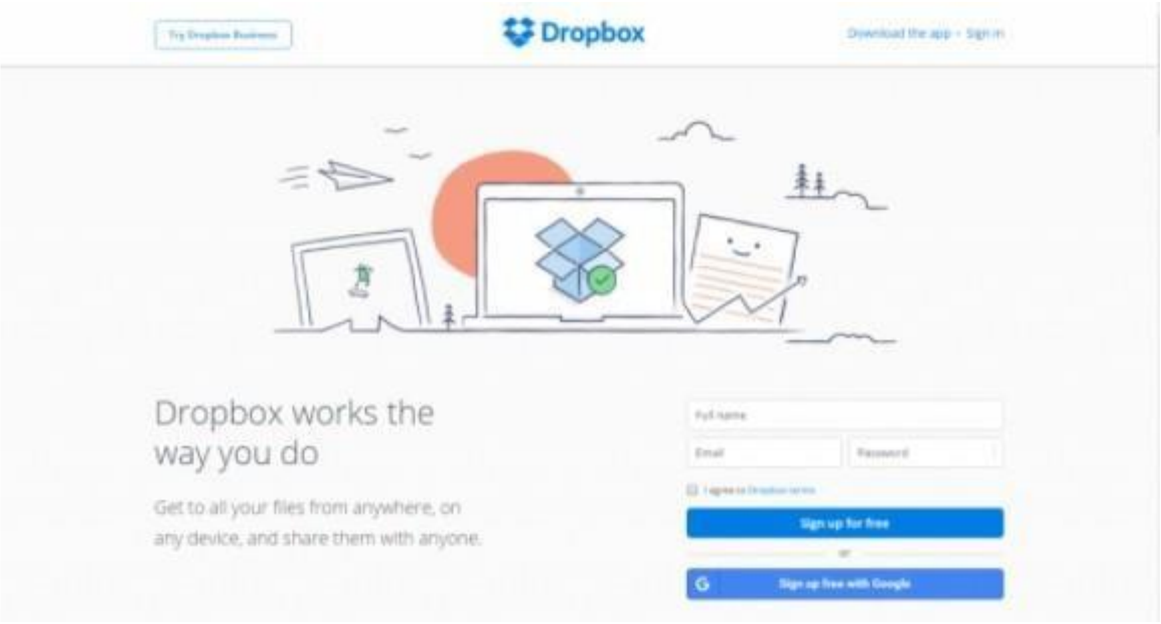
Download Dropbox to get started

SAMPLE OUTPUT:



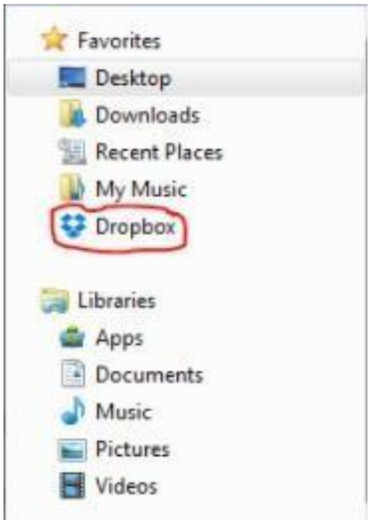
Dropbox

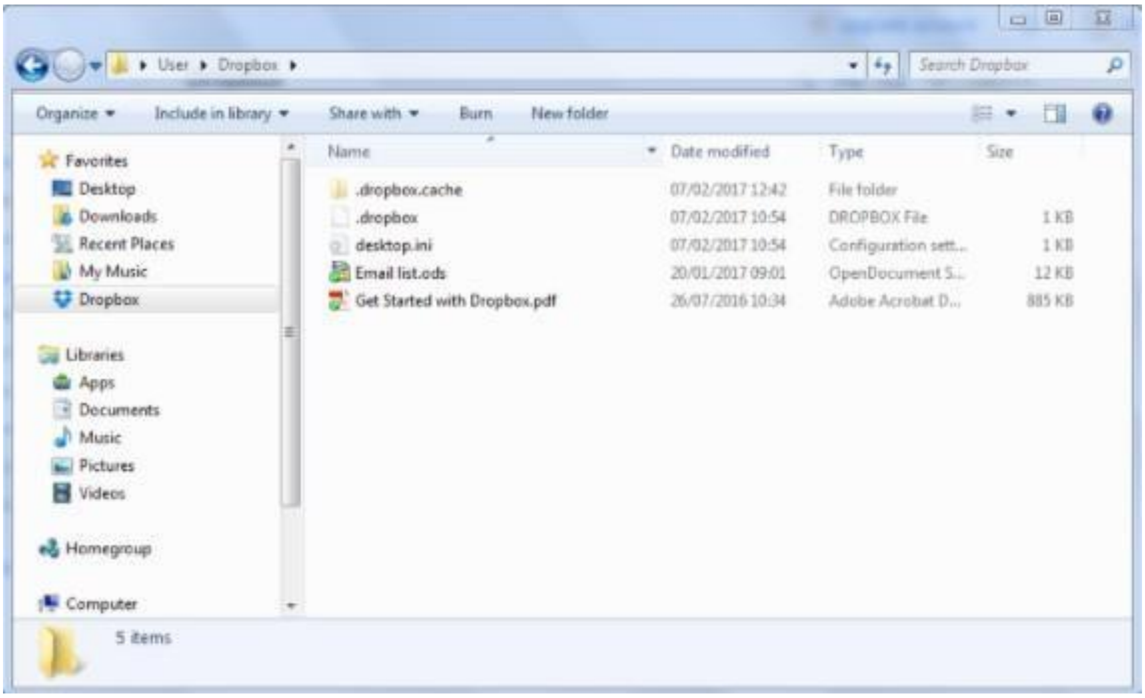
Name ↑	Modified ▾	Members ▾
Pictures	--	Only you
Screenshots ☆	--	Only you
Tax Documents	--	Only you
Test 1	--	Only you
Test 2	--	Only you



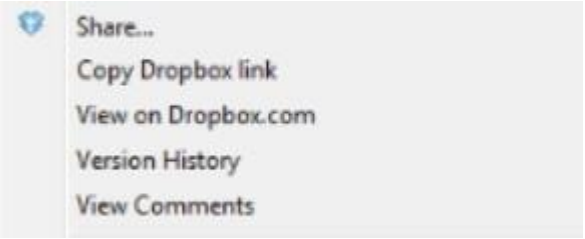
Dropbox works the way you do

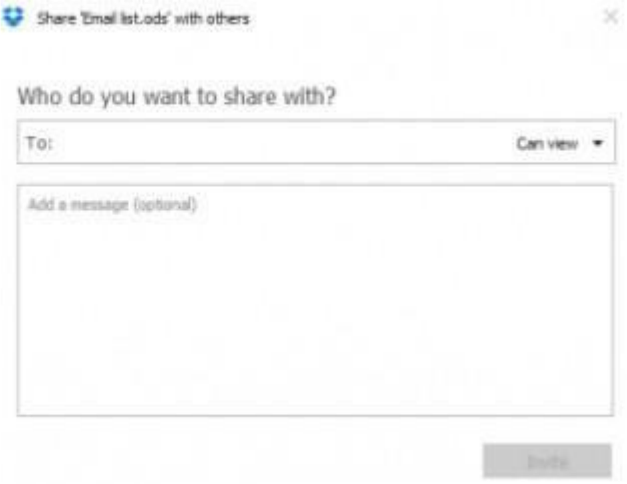
Get to all your files from anywhere, on any device, and share them with anyone.





Name	Date modified	Type	Size
.dropbox.cache	07/02/2017 12:42	File folder	
.dropbox	07/02/2017 10:54	DROPBOX File	1 KB
desktop.ini	07/02/2017 10:54	Configuration sett...	1 KB
Email list.ods	20/01/2017 09:01	OpenDocument S...	12 KB
Get Started with Dropbox.pdf	26/07/2016 10:34	Adobe Acrobat D...	885 KB




Share 'Email list.ods' with others
Who do you want to share with?
To:
Can view
Add a message (optional)
Invite

Result:

Thus the usage of cloud storage in drop box is learned successfully