

M.Sc C.S - II

SEM III

Journal

Roll No.	057
Name	SAIMA ANSARI
Subject	CLOUD COMPUTING - II

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CERTIFICATE

This is here to certify that Mr. **Saima Ansari**, Seat Number **057** M.Sc. II Computer Science, has satisfactorily completed the required number of experiments prescribed by the syllabus during the academic year 2022 – 2023.

Date: 22-09-2022

Place: Mumbai

Teacher In-Charge

Head of Department

External Examiner

Practical No : 1

Aim : Execute & check the performance of existing algorithms using CloudSim.

Theory:

CloudSim is an open-source framework, which is used to simulate cloud computing infrastructure and services. It is developed by the CLOUDS Lab organization and is written entirely in Java. It is used for modelling and simulating a cloud computing environment as a means for evaluating a hypothesis prior to software development in order to reproduce tests and results.

For example, if you were to deploy an application or a website on the cloud and wanted to test the services and load that your product can handle and also tune its performance to overcome bottlenecks before risking deployment, then such evaluations could be performed by simply coding a simulation of that environment with the help of various flexible and scalable classes provided by the CloudSim package, free of cost.

Download CloudSim:

<http://code.google.com/p/cloudsim/downloads>

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{P} cloudsim

File	Summary + Labels	Uploaded	Size
cloudsim-3.0.3.tar.gz	CloudSim 3.0.3: bug fix release Featured Type-Package OpSys-All	May 3, 2013	9.9MB
cloudsim-3.0.3.zip	CloudSim 3.0.3: bug fix release Featured Type-Package OpSys-All	May 3, 2013	13.05MB
cloudsim-3.0.2.tar.gz	CloudSim 3.0.2: bug fix release Type-Package OpSys-All	Nov 7, 2012	9.9MB
cloudsim-3.0.2.zip	CloudSim 3.0.2: bug fix release Type-Package OpSys-All	Nov 7, 2012	13.05MB
cloudsim-3.0.1.tar.gz	CloudSim 3.0.1: bug fix release Type-Package OpSys-All	Oct 17, 2012	9.89MB
cloudsim-3.0.1.zip	CloudSim 3.0.1: bug fix release Type-Package OpSys-All	Oct 17, 2012	13.04MB
cloudsim-3.0.tar.gz	CloudSim 3.0 Type-Package OpSys-All	Jan 11, 2012	9.89MB

<https://storage.googleapis.com/google-code-archive-downloads/v2/code.google.com/cloudsim/cloudsim-3.0.3.tar.gz>

Select 1st option

Google Code Archive

Projects Search About

Project {P} clouds

Source

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Wikis

Downloads

cloudsim-3.0.3.tar.gz

cloudsim-3.0.3.zip

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cloudsim-3.0.2.zip

cloudsim-3.0.1.tar.gz

cloudsim-3.0.1.zip

cloudsim-3.0.tar.gz

Opening cloudsim-3.0.3.tar.gz

You have chosen to open:

cloudsim-3.0.3.tar.gz which is: WinRAR archive (9.9 MB) from: https://storage.googleapis.com

What should Firefox do with this file?

Open with WinRAR archiver (default)
 Save File
 Do this automatically for files like this from now on.

OK Cancel

Uploaded	Size
May 3, 2013	9.9MB
May 3, 2013	13.05MB
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Projects Files Services Start Page

New Project

Steps

1. Choose Project
2. ...

<No Projects>

Choose Project

Filter:

Categories:

- Java
- JavaFX
- Java Web
- Java EE
- HTML5
- Java Card
- Java ME
- Maven
- PHP
- Groovy
- C/C++

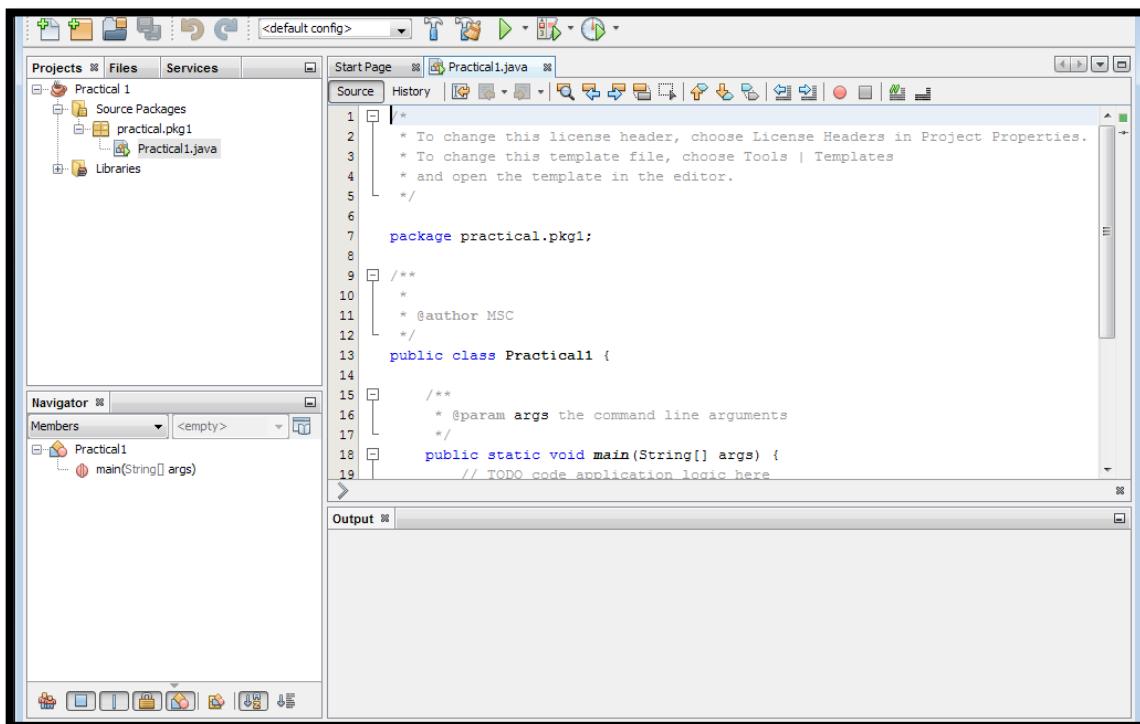
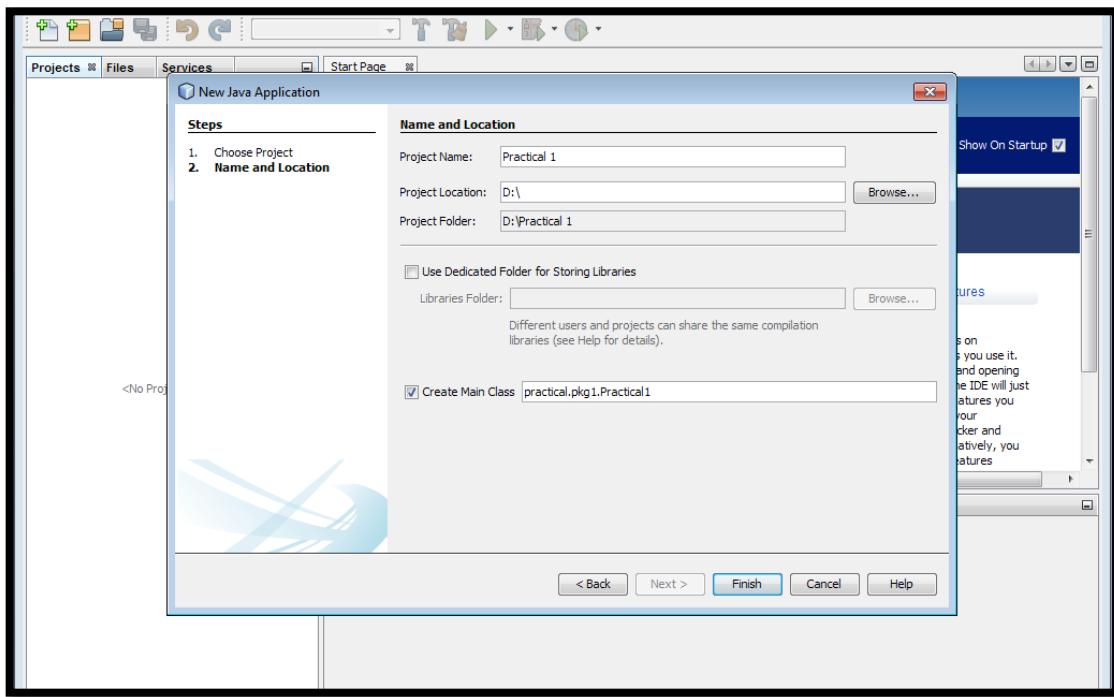
Projects:

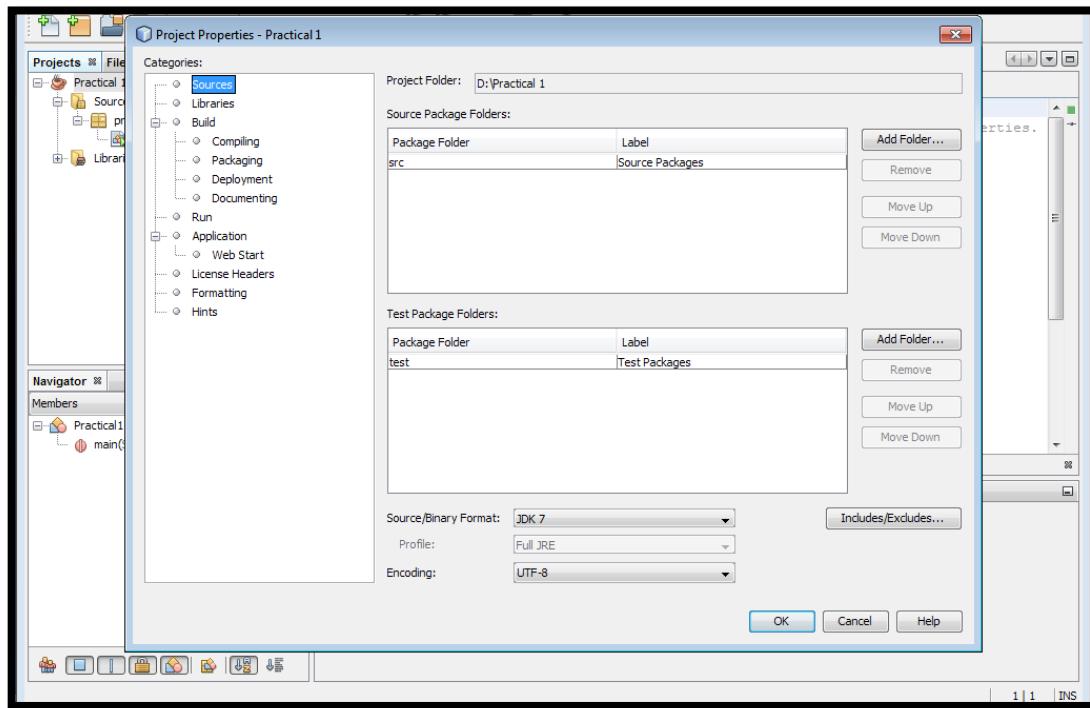
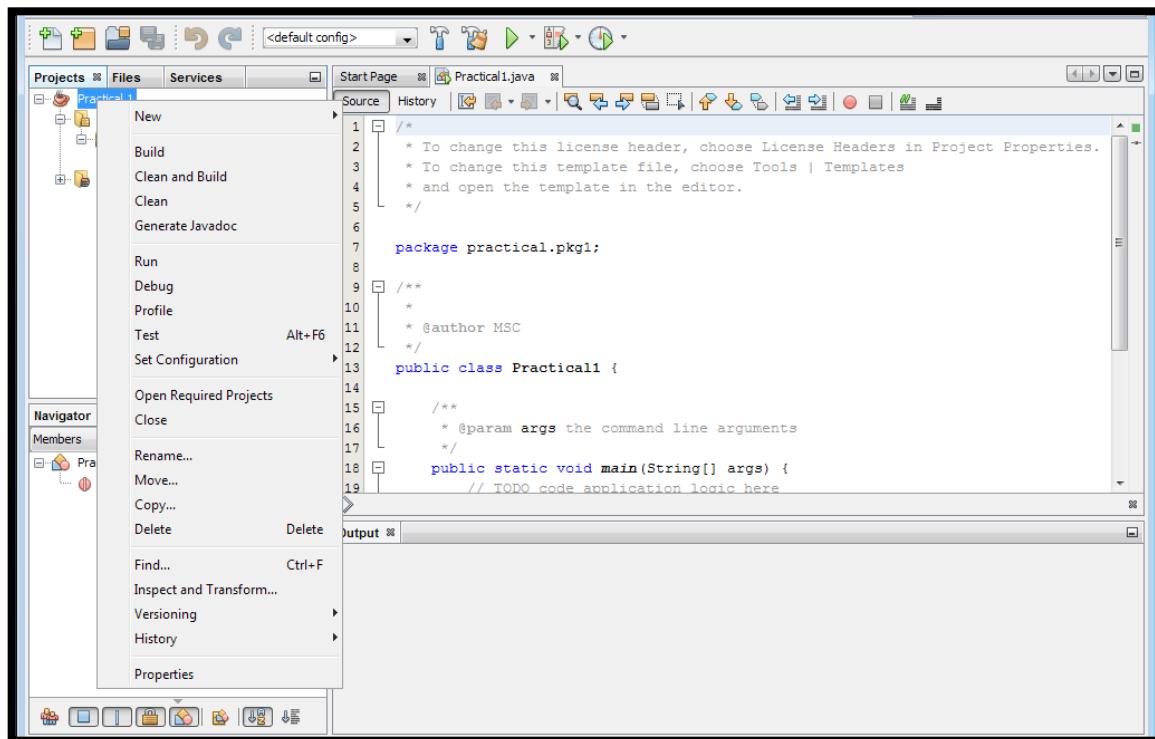
- Java Application
- Java Class Library
- Java Project with Existing Sources
- Java Free-Form Project

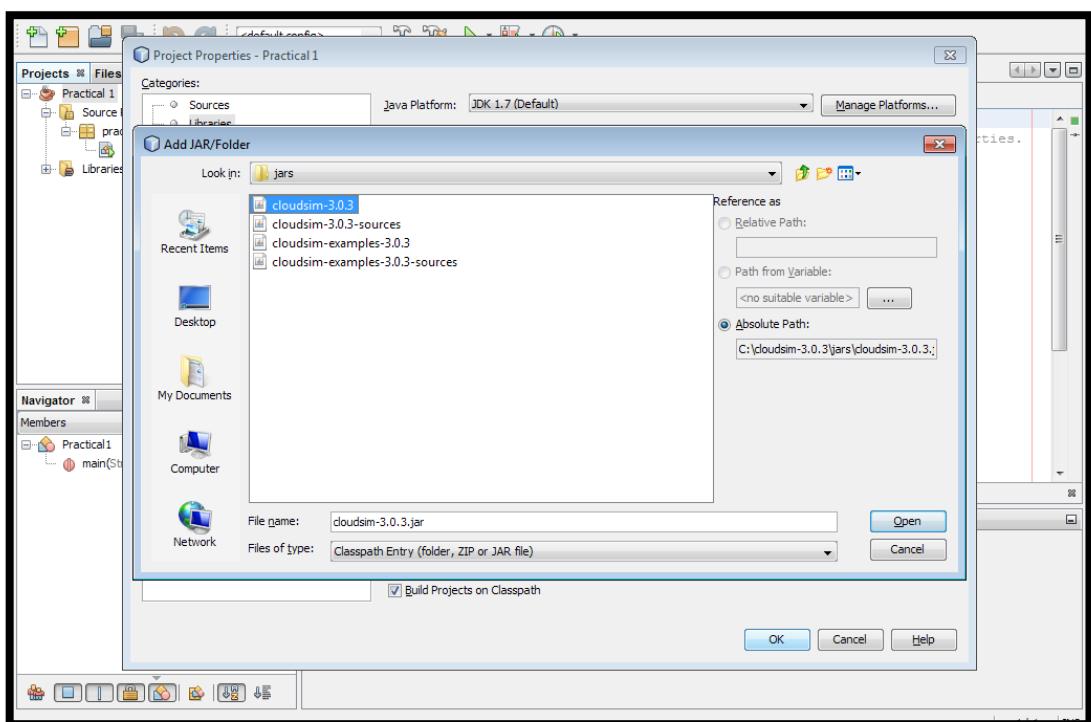
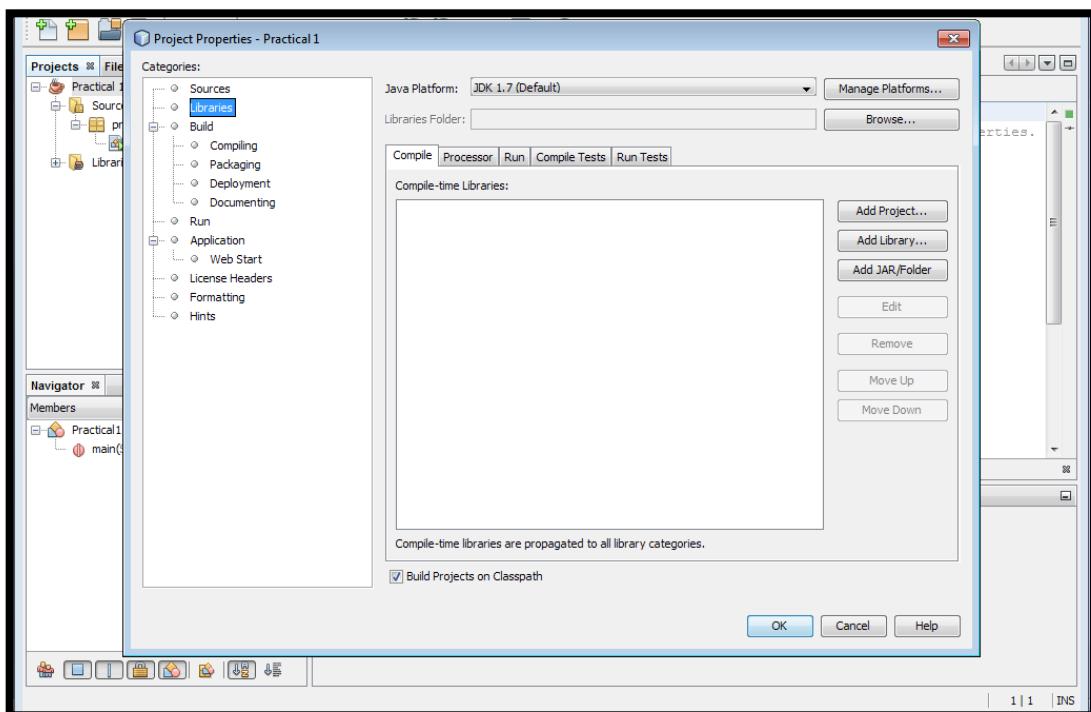
Description:

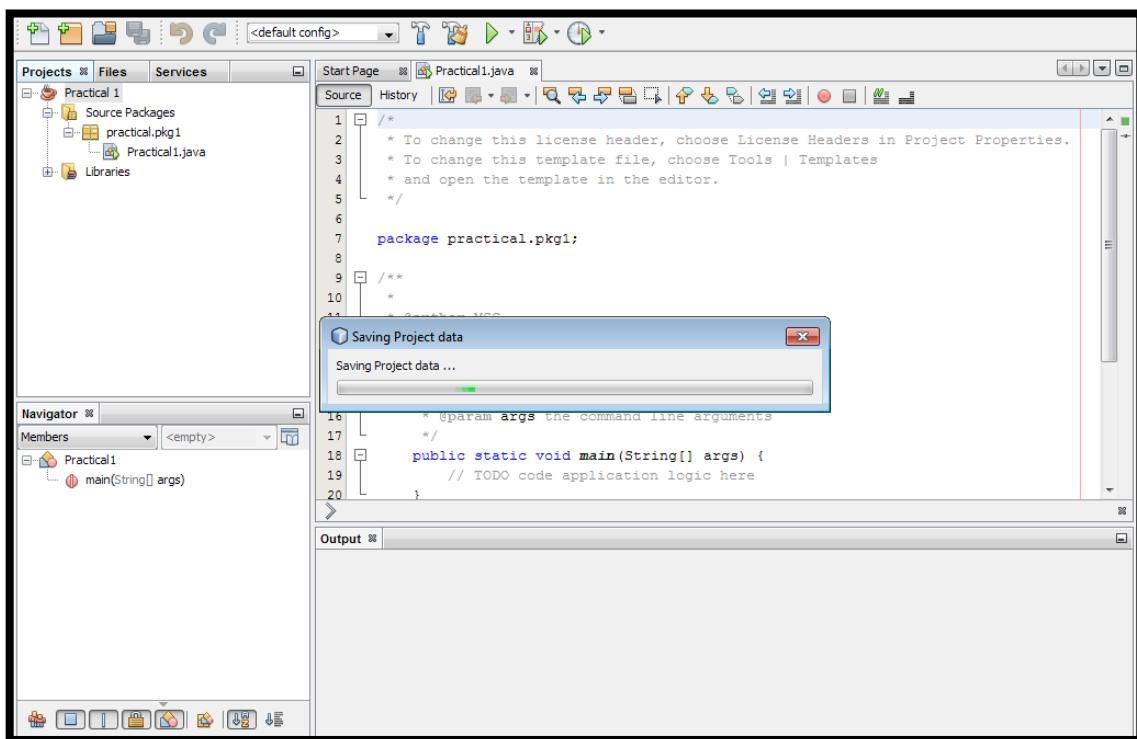
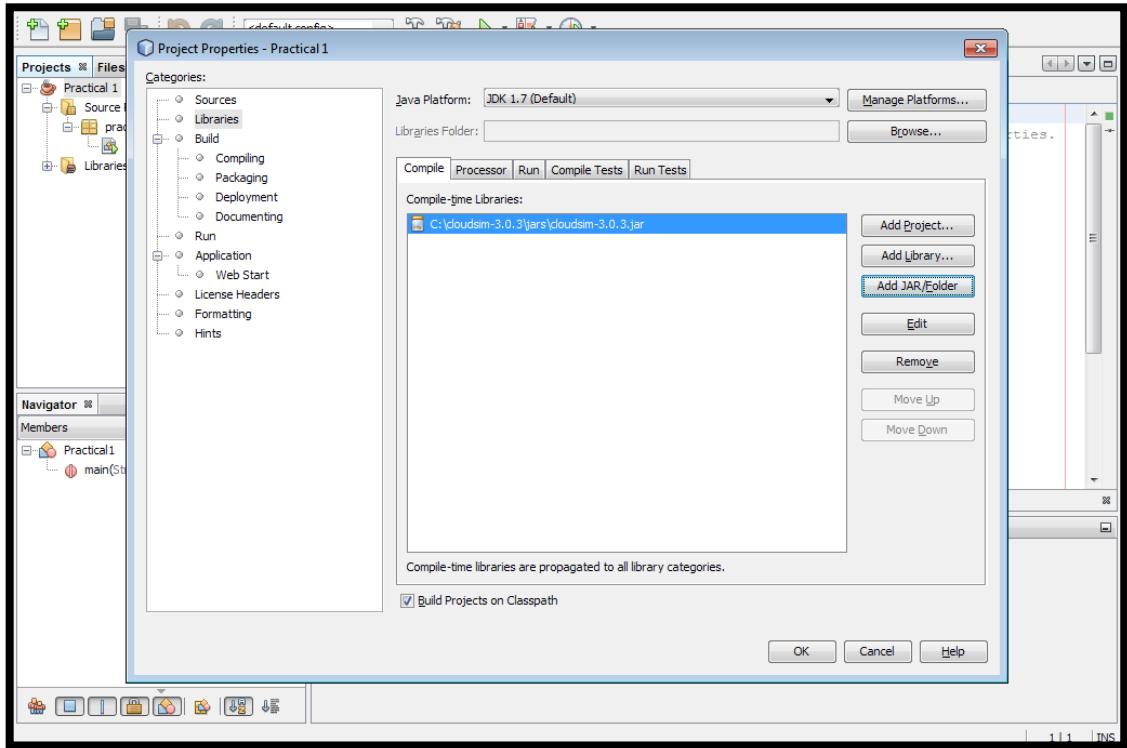
Creates a new Java SE application in a standard IDE project. You can also generate a main class in the project. Standard projects use an IDE-generated Ant build script to build, run, and debug your project.

< Back Next > Finish Cancel Help









Code:

```
package practical.pkg1;

import java.text.DecimalFormat;
```

```

import java.util.ArrayList;
import java.util.Calendar;
import java.util.LinkedList;
import java.util.List;
import org.cloudbus.cloudsim.Cloudlet;
import org.cloudbus.cloudsim.CloudletSchedulerTimeShared;
import org.cloudbus.cloudsim.Datacenter;
import org.cloudbus.cloudsim.DatacenterBroker;
import org.cloudbus.cloudsim.DatacenterCharacteristics;
import org.cloudbus.cloudsim.Host;
import org.cloudbus.cloudsim.Log;
import org.cloudbus.cloudsim.Pe;
import org.cloudbus.cloudsim.Storage;
import org.cloudbus.cloudsim.UtilizationModel;
import org.cloudbus.cloudsim.UtilizationModelFull;
import org.cloudbus.cloudsim.Vm;
import org.cloudbus.cloudsim.VmAllocationPolicySimple;
import org.cloudbus.cloudsim.VmSchedulerTimeShared;
import org.cloudbus.cloudsim.core.CloudSim;
import org.cloudbus.cloudsim.provisioners.BwProvisionerSimple;
import org.cloudbus.cloudsim.provisioners.PeProvisionerSimple;
import org.cloudbus.cloudsim.provisioners.RamProvisionerSimple;

/**
 * A simple example showing how to create a datacenter with one host and run one
 * cloudlet on it.
 */
public class Practical1 {

    /**
     * The cloudlet list.
     */
    private static List<Cloudlet> cloudletList;
}

```

```

/** The vmlist. */
private static List<Vm> vmlist;

/**
 * Creates main() to run this example.
 *
 * @param args the args
 */

@SuppressWarnings("unused")
public static void main(String[] args) {
    Log.printLine("Starting CloudSimExample1...");
    try {
        // First step: Initialize the CloudSim package. It should be called
        // before creating any entities.
        int num_user = 1; // number of cloud users
        Calendar calendar = Calendar.getInstance();
        boolean trace_flag = false; // mean trace events
        // Initialize the CloudSim library
        CloudSim.init(num_user, calendar, trace_flag);
        // Second step: Create Datacenters
        // Datacenters are the resource providers in CloudSim. We need at
        // list one of them to run a CloudSim simulation
        Datacenter datacenter0 = createDatacenter("Datacenter_0");
        // Third step: Create Broker
        DatacenterBroker broker = createBroker();
        int brokerId = broker.getId();
        // Fourth step: Create one virtual machine
        vmlist = new ArrayList<Vm>();
        // VM description
        int vmid = 0;
        int mips = 1000;
        long size = 10000; // image size (MB)
    }
}

```

```

int ram = 512; // vm memory (MB)

long bw = 1000;

int pesNumber = 1; // number of cpus

String vmm = "Xen"; // VMM name

// create VM

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

// add the VM to the vmList

vmlist.add(vm);

// submit vm list to the broker

broker.submitVmList(vmlist);

// Fifth step: Create one Cloudlet

cloudletList = new ArrayList<Cloudlet>();

// Cloudlet properties

int id = 0;

long length = 400000;

long fileSize = 300;

long outputSize = 300;

UtilizationModel utilizationModel = new UtilizationModelFull();

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

cloudlet.setUserId(brokerId);

cloudlet.setVmId(vmid);

// add the cloudlet to the list

cloudletList.add(cloudlet);

// submit cloudlet list to the broker

broker.submitCloudletList(cloudletList);

// Sixth step: Starts the simulation

CloudSim.startSimulation();

CloudSim.stopSimulation();

//Final step: Print results when simulation is over

List<Cloudlet> newList = broker.getCloudletReceivedList();

printCloudletList(newList);

```

```

        Log.println("CloudSimExample1 finished!");

    } catch (Exception e) {

        e.printStackTrace();

        Log.println("Unwanted errors happen");

    }

}

/**

 * Creates the datacenter.

 *

 * @param name the name

 *

 * @return the datacenter

 */

private static Datacenter createDatacenter(String name) {

    // Here are the steps needed to create a PowerDatacenter:

    // 1. We need to create a list to store

    // our machine

    List<Host> hostList = new ArrayList<Host>();

    // 2. A Machine contains one or more PEs or CPUs/Cores.

    // In this example, it will have only one core.

    List<Pe> peList = new ArrayList<Pe>();

    int mips = 1000;

    // 3. Create PEs and add these into a list.

    peList.add(new Pe(0, new PeProvisionerSimple(mips))); // need to store Pe id and MIPS Rating

    // 4. Create Host with its id and list of PEs and add them to the list

    // of machines

    int hostId = 0;

    int ram = 2048; // host memory (MB)

    long storage = 1000000; // host storage

    int bw = 10000;

```

```

hostList.add(
    new Host(
        hostId,
        new RamProvisionerSimple(ram),
        new BwProvisionerSimple(bw),
        storage,
        peList,
        new VmSchedulerTimeShared(peList)
    )
); // This is our machine

// 5. Create a DatacenterCharacteristics object that stores the
// properties of a data center: architecture, OS, list of
// Machines, allocation policy: time- or space-shared, time zone
// and its price (G$/Pe time unit).

String arch = "x86"; // system architecture

String os = "Linux"; // operating system

String vmm = "Xen";

double time_zone = 10.0; // time zone this resource located

double cost = 3.0; // the cost of using processing in this resource

double costPerMem = 0.05; // the cost of using memory in this resource

double costPerStorage = 0.001; // the cost of using storage in this

                                            // resource

double costPerBw = 0.0; // the cost of using bw in this resource

LinkedList<Storage> storageList = new LinkedList<Storage>(); // we are not adding SAN
                                                               // devices by now

DatacenterCharacteristics characteristics = new DatacenterCharacteristics(
    arch, os, vmm, hostList, time_zone, cost, costPerMem,
    costPerStorage, costPerBw);

// 6. Finally, we need to create a PowerDatacenter object.

Datacenter datacenter = null;

try {
    datacenter = new Datacenter(name, characteristics, new VmAllocationPolicySimple(hostList), storageList, 0);
}

```

```

        } catch (Exception e) {
            e.printStackTrace();
        }
        return datacenter;
    }

    // We strongly encourage users to develop their own broker policies, to
    // submit vms and cloudlets according
    // to the specific rules of the simulated scenario
    /**
     * Creates the broker.
     *
     * @return the datacenter broker
     */
}

private static DatacenterBroker createBroker() {
    DatacenterBroker broker = null;
    try {
        broker = new DatacenterBroker("Broker");
    } catch (Exception e) {
        e.printStackTrace();
        return null;
    }
    return broker;
}

// Prints the Cloudlet objects.
//@param list list of Cloudlets

private static void printCloudletList(List<Cloudlet> list) {
    int size = list.size();
    Cloudlet cloudlet;
    String indent = "    ";
    Log.printLine();
    Log.printLine("===== OUTPUT =====");
    Log.printLine("Cloudlet ID" + indent + "STATUS" + indent

```

```

        + "Data center ID" + indent + "VM ID" + indent + "Time" + indent
        + "Start Time" + indent + "Finish Time");

DecimalFormat dft = new DecimalFormat("###.##");

for (int i = 0; i < size; i++) {

    cloudlet = list.get(i);

    Log.print(indent + cloudlet.getCloudletId() + indent + indent);

    if (cloudlet.getCloudletStatus() == Cloudlet.SUCCESS) {

        Log.print("SUCCESS");

        Log.printLine(indent + indent + cloudlet.getResourceId()

                    + indent + indent + indent + cloudlet.getVmId()

                    + indent + indent

                    + dft.format(cloudlet.getActualCPUTime()) + indent

                    + indent + dft.format(cloudlet.getExecStartTime())

                    + indent + indent

                    + dft.format(cloudlet.getFinishTime()));

    }
}
}
}
```

Output:

```
Output - CloudSim1 (run) x
run:
Starting CloudSimExample1...
Initialising...
Starting CloudSim version 3.0
Datacenter_0 is starting...
Broker is starting...
Entities started.
0.0: Broker: Cloud Resource List received with 1 resource(s)
0.0: Broker: Trying to Create VM #0 in Datacenter_0
0.1: 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
400.1: 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...
Simulation completed.
Simulation completed.

===== OUTPUT =====
Cloudlet ID      STATUS      Data center ID      VM ID      Time      Start Time      Finish Time
      0          SUCCESS           2              0        400         0.1        400.1
CloudSimExample1 finished!
BUILD SUCCESSFUL (total time: 0 seconds)
```

Conclusion: Successfully executed and checked the performance of algorithm using CloudSim.

Practical No 2

Aim : Install a Cloud Analyst and Integrate with Eclipse/Netbeans. Monitor the performance of an Existing Algorithms.

Theory:

CloudAnalyst

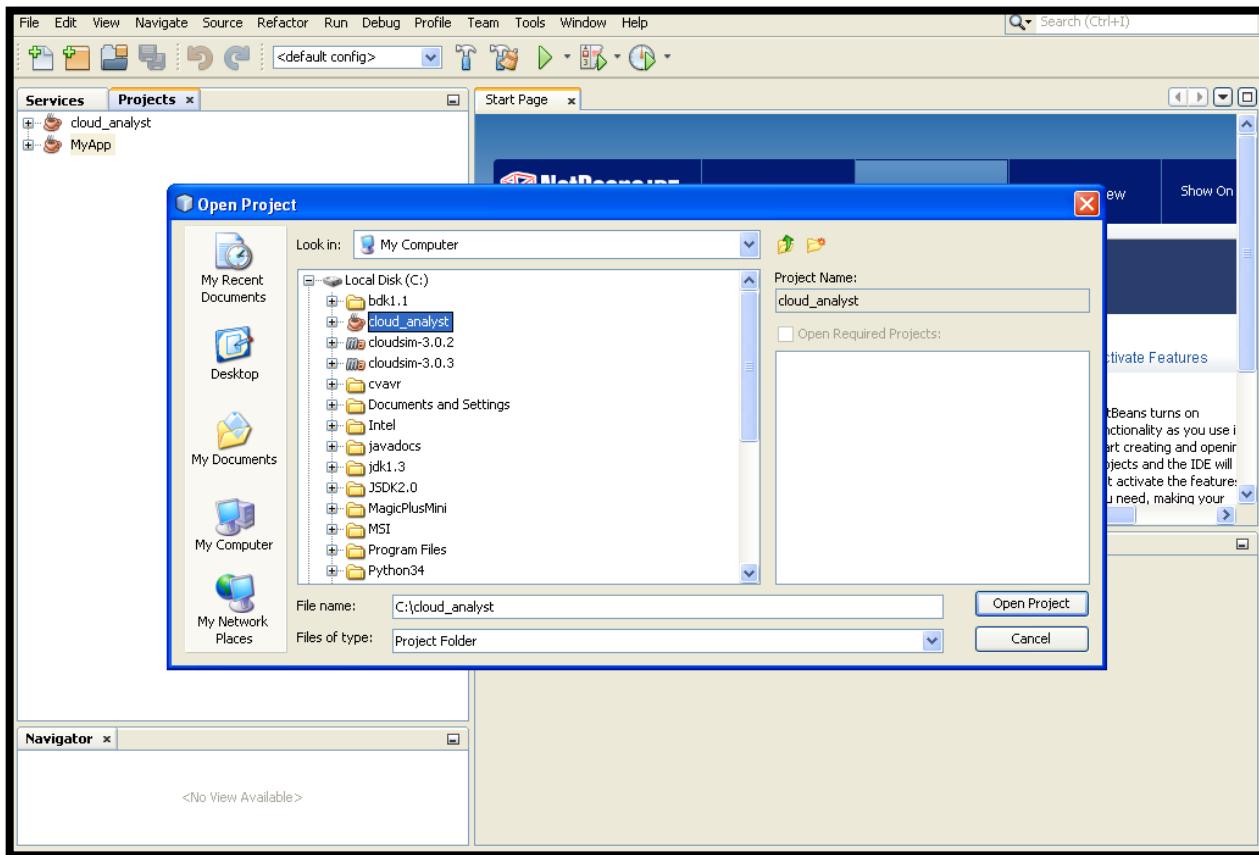
Cloud Analyst is a tool developed at the University of Melbourne whose goal is to support evaluation of social networks tools according to geographic distribution of users and data centers. In this tool, communities of users and data centers supporting the social networks are characterized and, based on their location; parameters such as user experience while using the social network application and load on the data center are obtained/logged

Installation is just download cloud_analyst from

<https://sourceforge.net/projects/clouданалystnetbeans/>

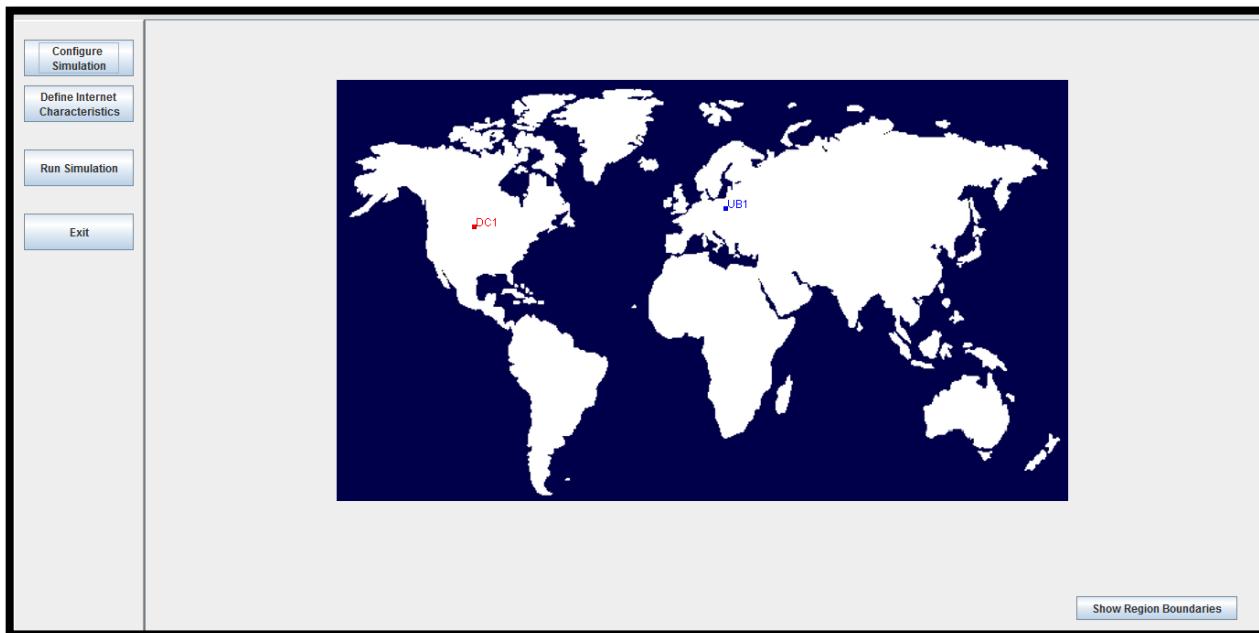
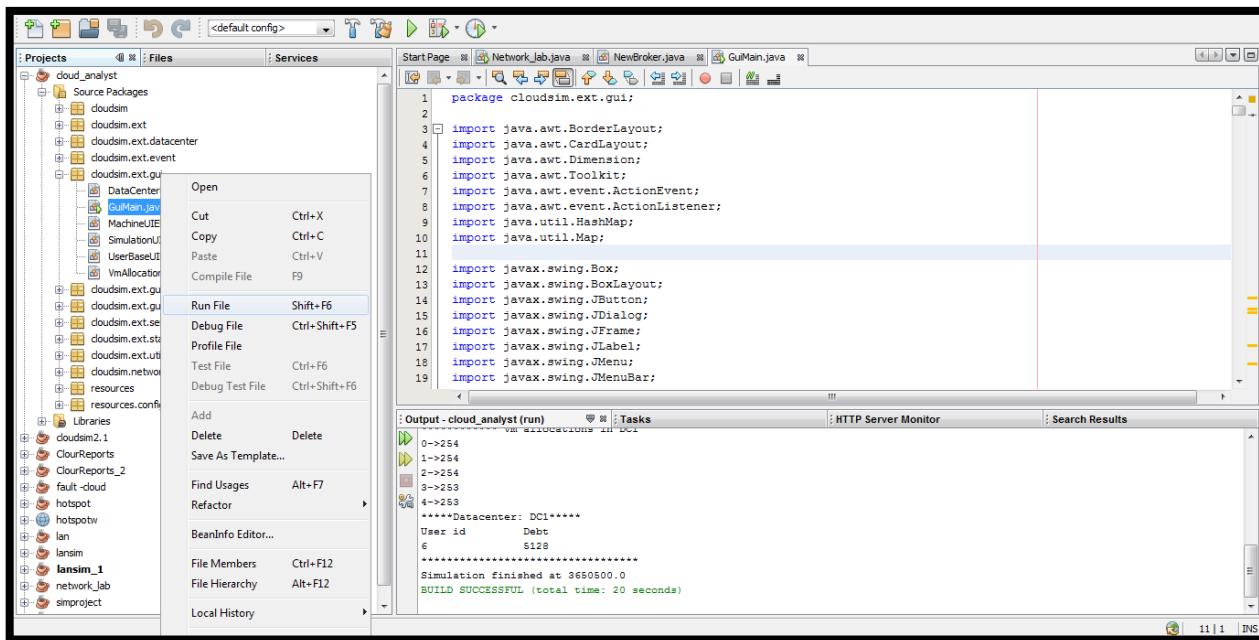
and copy in drivethen unzip it to use

After installation.....In netbeans7.4.....To run it simply go to file->open project --> simply browse the unzipped folder



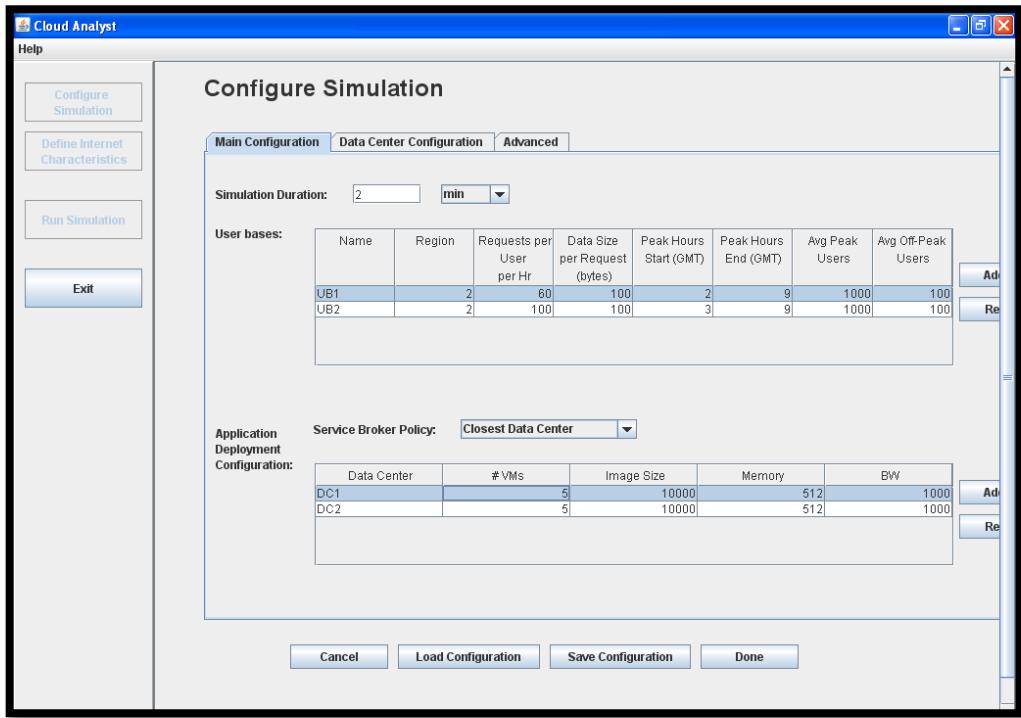
Expand source package folder inside which open cloudsim.ext.gui

right click on the GuiMain.java and click run

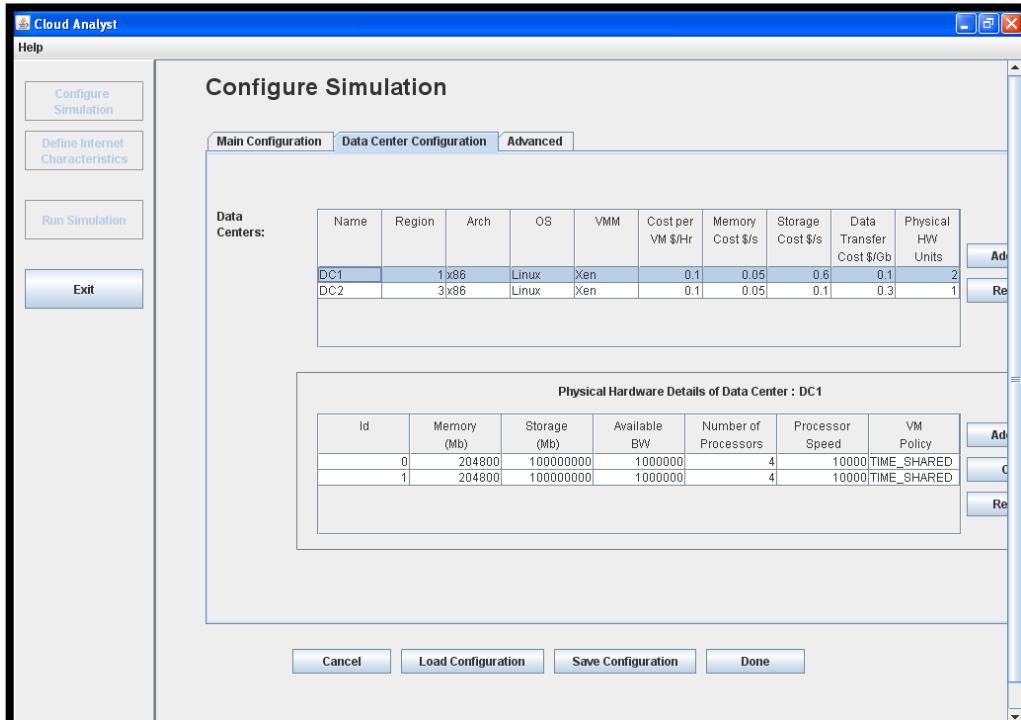


Now we are ready for checking algorithm performance

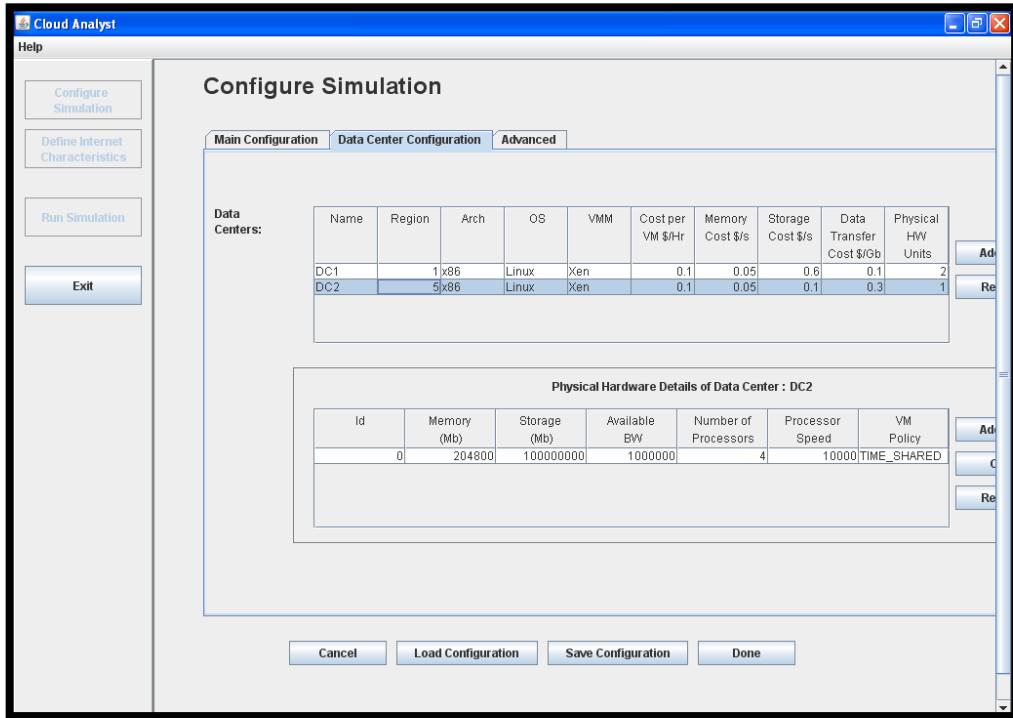
In Configure simulation window -> Main configuration tab set the values to



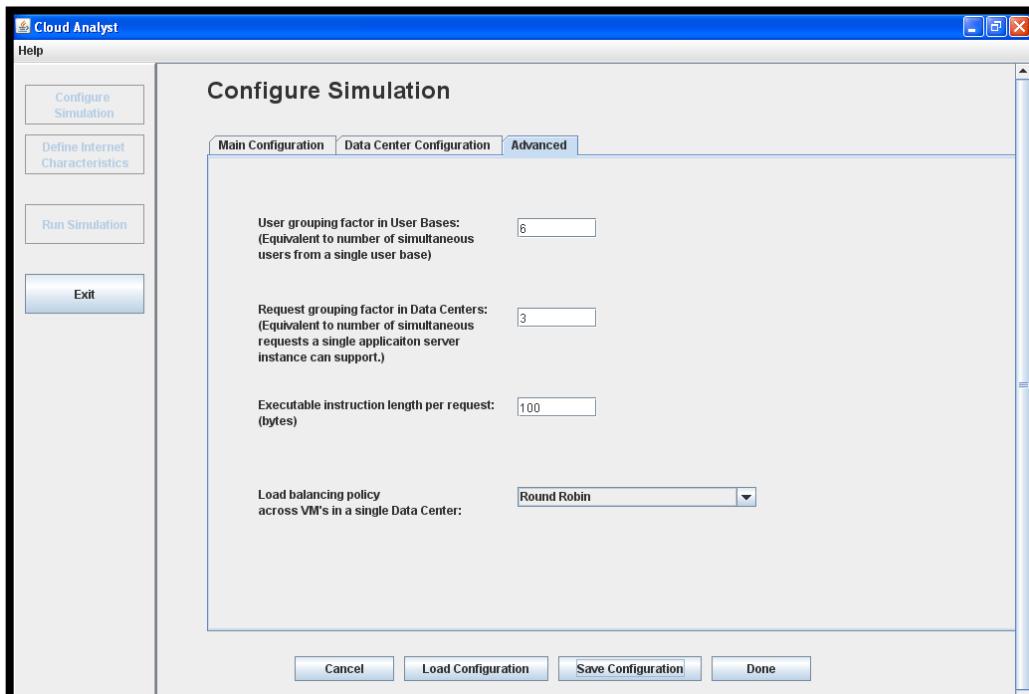
In data center configuration tab

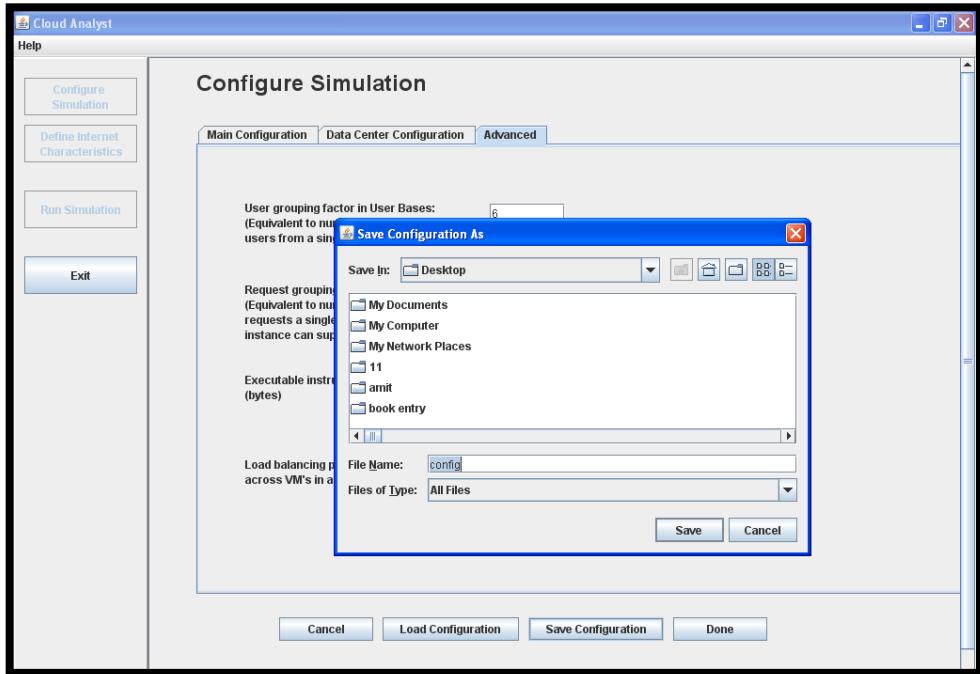


and

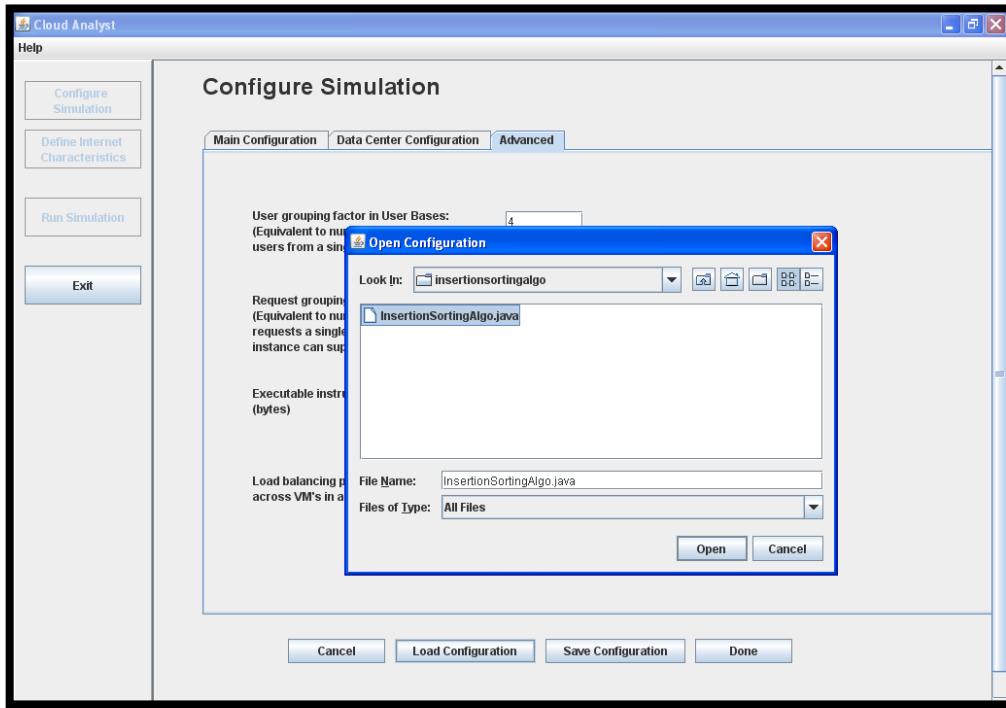


In advanced tab

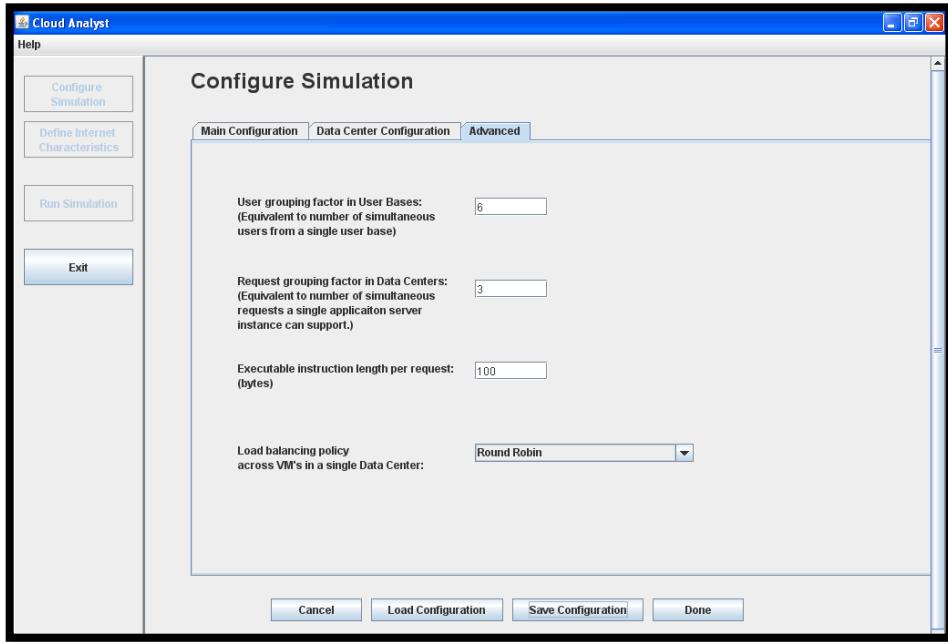




then click on load configuration button and select algorithm as

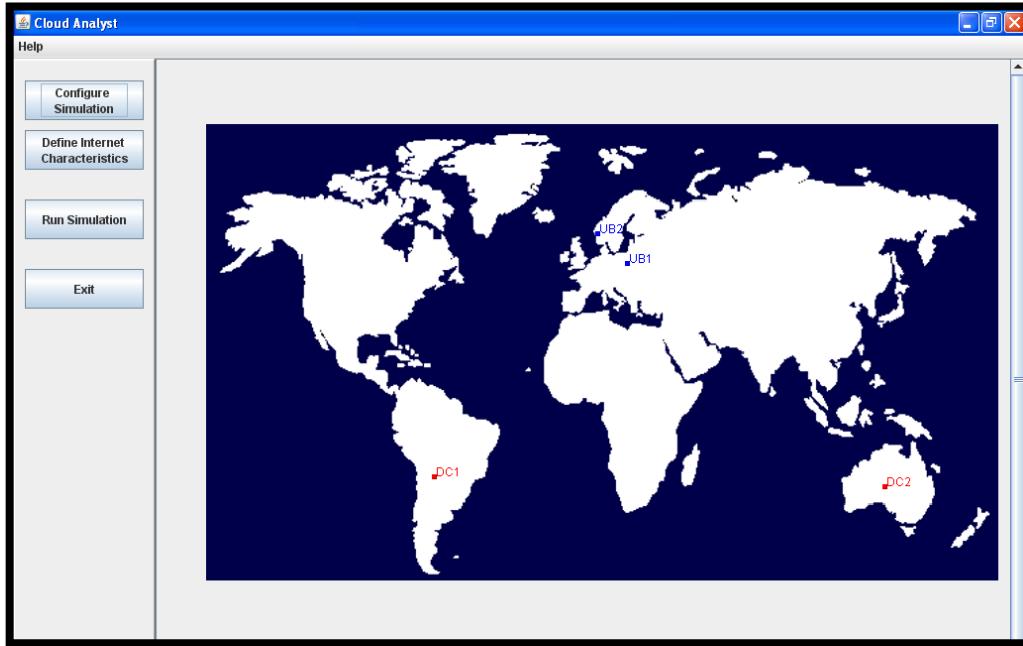


then save configuration as

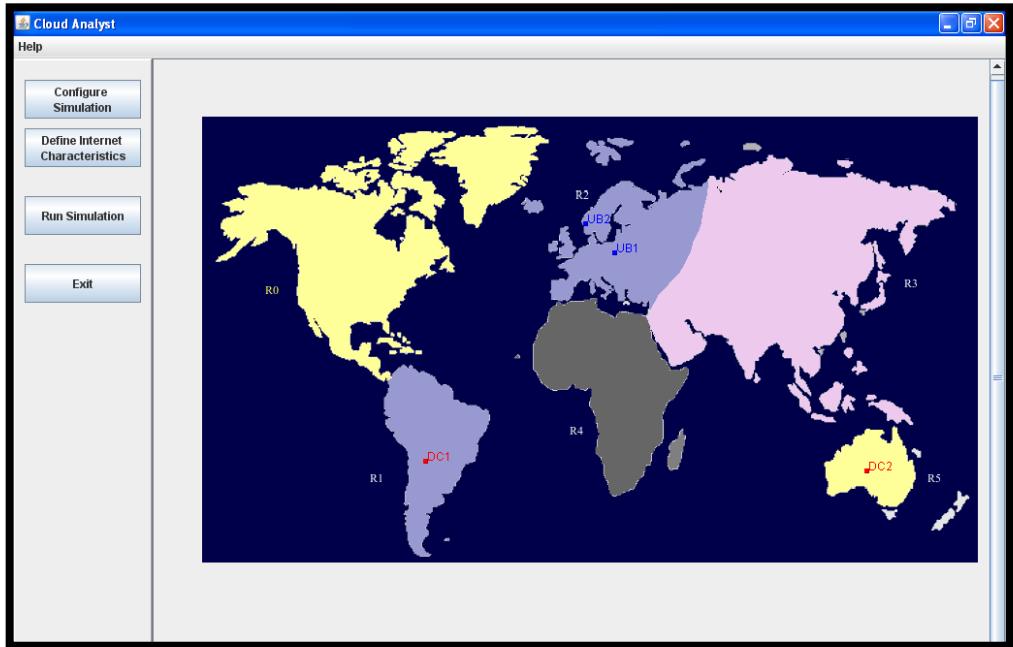


.sim file will be saved to given location

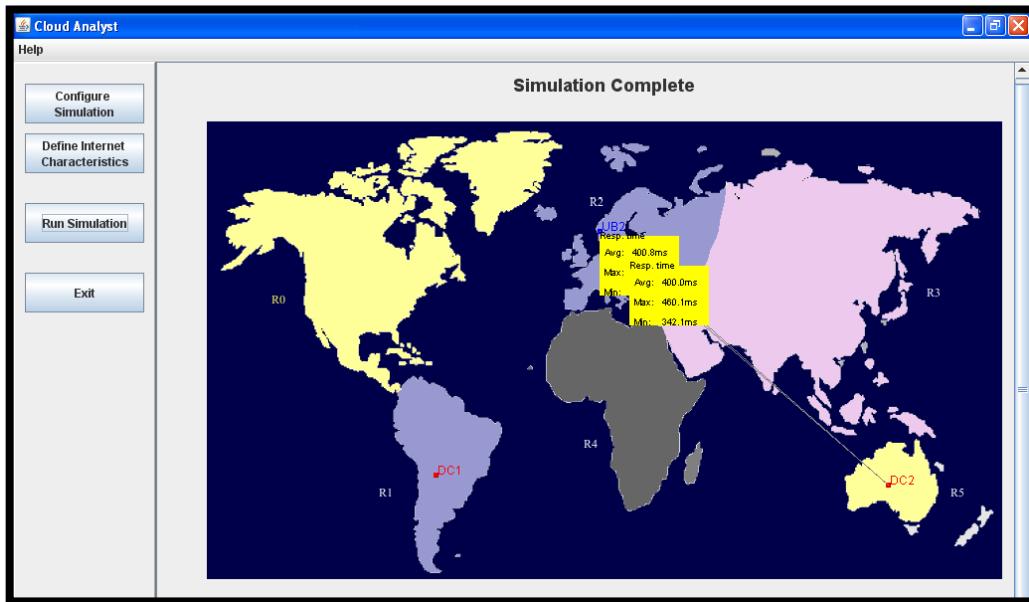
then click on done

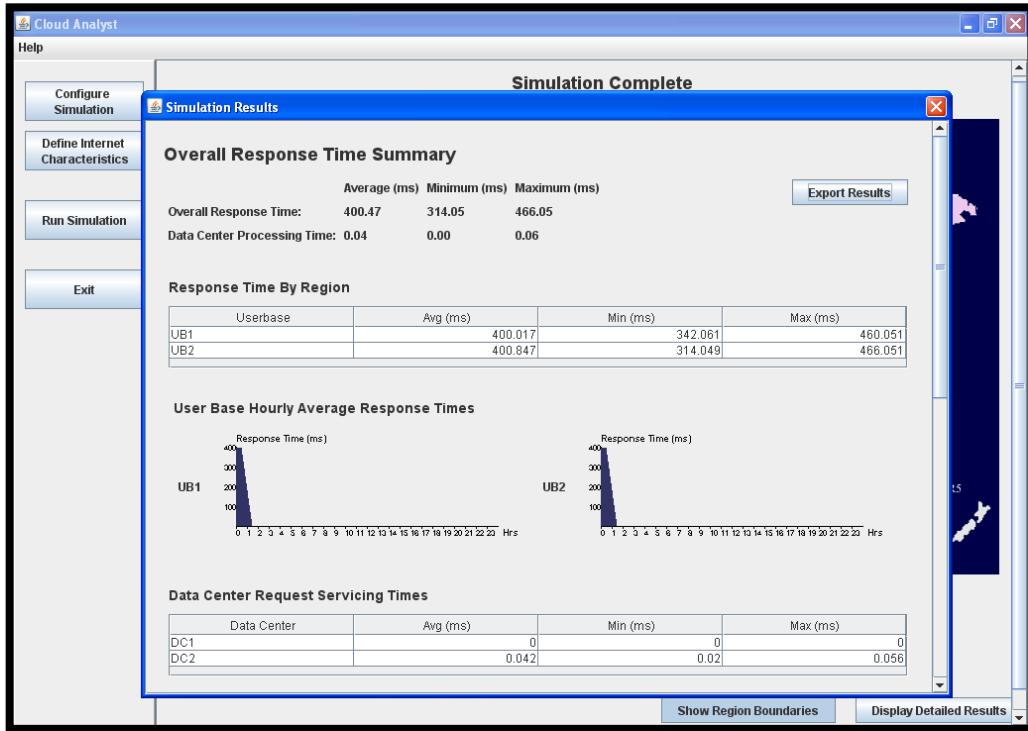


click on show region boundaries



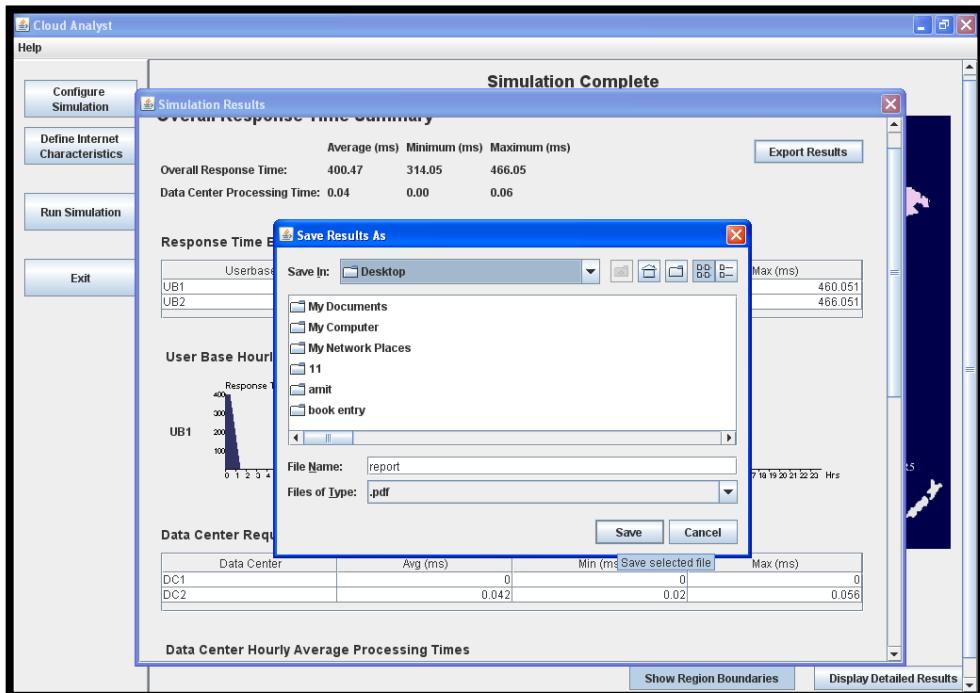
then click run simulation





then click on export result

pdf will be saved to given location



Output:

simulation time =120000.0ms

Starting Simulation...

Initialising...

Creating new broker DC1-Broker

Creating new broker DC2-Broker

0.0 Creating new user base UB1

0.0 Creating new user base UB2

Starting GridSim version 4.2

Entities started.

Starting user base 9 UB1

Starting broker 8 name=DC2-Broker

Starting user base 11 UB2

Starting broker 6 name=DC1-Broker

Starting internet 13

5.0: DC1-Broker: Cloud Resource List received with 2 resource(s)

5.0: DC2-Broker: Cloud Resource List received with 2 resource(s)

5.0: DC2-Broker: Trying to Create VM #0

5.0: DC2-Broker: Trying to Create VM #1

5.0: DC2-Broker: Trying to Create VM #2

5.0: DC2-Broker: Trying to Create VM #3

5.0: DC2-Broker: Trying to Create VM #4

5.0: DC1-Broker: Trying to Create VM #0

5.0: DC1-Broker: Trying to Create VM #1

5.0: DC1-Broker: Trying to Create VM #2

5.0: DC1-Broker: Trying to Create VM #3

5.0: DC1-Broker: Trying to Create VM #4

Gathering simulation data.

DC1-Broker finalizing, submitted cloudlets=0 processing cloudlets=0 ,allRequestsProcessed=0

Got response for 900047 but it seems to be completed.

DC2-Broker finalizing, submitted cloudlets=226 processing cloudlets=0 ,allRequestsProcessed=670

UB1 finalizing. Messages sent:52, Received:52

UB1 requests sent=302 , received=302

UB2 finalizing. Messages sent:63, Received:63

UB2 requests sent=368 , received=368

Simulation completed.

***** Vm allocations in DC1

0->2

1->1

2->1

3->1

4->1

***** Vm allocations in DC2

0->92

1->92

2->92

3->91

4->91

****Datacenter: DC1****

User id	Debt
6	30128

****Datacenter: DC2****

User id	Debt
8	5128

Simulation finished at 145540.0

BUILD SUCCESSFUL (total time: 37 minutes 1 second)

Conclusion: Successfully executed and checked the performance of algorithm using CloudSim.

Practical No : 3

Aim : Build an application on private cloud.

Note :

1. Internet Connectivity Required
2. Preferably use Mozilla Firefox as browser
3. Install putty and puttygen and then start with practical
4. AWS Demo Account is required

Login to the aws manager account at link <https://aws.amazon.com/>

Select EC2

The screenshot shows the AWS Management Console homepage. The top navigation bar includes links for AWS Services, Edit, and Support, along with user information (rahulyagi@9440-1333-9674, Mumbai). The main content area is titled "Amazon Web Services" and lists various services under categories like Compute, Storage & Content Delivery, Database, and others. The "Compute" category is expanded, showing services such as EC2, Lambda, and Step Functions. The "EC2" service is highlighted with an orange background and has a tooltip "Virtual Servers in the Cloud". To the right of the service list, there's a "Resource Groups" section with a "Create a Group" button and a "Tag Editor". Below the service list, there are sections for "Additional Resources" (Getting Started, AWS Console Mobile App, AWS Marketplace, AWS re:Invent Announcements) and "AWS News" (Explore the next generation of AWS cloud capabilities. See what's new).

Click on EC2 and open it ,then select Launch INSTANCE

The screenshot shows the AWS EC2 Dashboard. On the left, there's a sidebar with links for EC2 Dashboard, Events, Tags, Reports, Limits, Instances (Instances, Spot Requests, Reserved Instances), Images (AMIs, Bundle Tasks), Elastic Block Store (Volumes, Snapshots), Network & Security (Security Groups, Elastic IPs, Placement Groups, Key Pairs). The main area has sections for Resources (0 Running Instances, 0 Dedicated Hosts, 0 Volumes, 1 Key Pairs, 0 Placement Groups) and Account Attributes (Supported Platforms: VPC, Default VPC: vpc-7ada3913, Resource ID length management). Below these are links for Getting Started Guide, Documentation, All EC2 Resources, Forums, Pricing, and Contact Us. A central box says "Build and run distributed, fault-tolerant applications in the cloud with Amazon Simple Workflow Service." A "Create Instance" section with a "Launch Instance" button is also present.

Select Linux AMI

The screenshot shows the "Step 1: Choose an Amazon Machine Image (AMI)" wizard. The top navigation bar includes links for 1. Choose AMI, 2. Choose Instance Type, 3. Configure Instance, 4. Add Storage, 5. Tag Instance, 6. Configure Security Group, and 7. Review. A "Cancel and Exit" link is also present. The main content area is titled "Step 1: Choose an Amazon Machine Image (AMI)". It says: "An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. You can select an AMI provided by AWS, our user community, or the AWS Marketplace; or you can select one of your own AMIs." A "Quick Start" sidebar on the left lists categories: My AMIs, AWS Marketplace (selected), Community AMIs, and a checkbox for Free tier only. The main list shows three AMIs:

- Amazon Linux AMI 2016.03.3 (HVM), SSD Volume Type - ami-fbdd790**
Amazon Linux (Free tier eligible)
The Amazon Linux AMI is an EBS-backed, AWS-supported image. The default image includes AWS command line tools, Python, Ruby, Perl, and Java. The repositories include Docker, PHP, MySQL, PostgreSQL, and other packages.
Root device type: ebs Virtualization type: hvm
Select button (64-bit)
- Red Hat Enterprise Linux 7.2 (HVM), SSD Volume Type - ami-cdbdd7a2**
Red Hat (Free tier eligible)
Red Hat Enterprise Linux version 7.2 (HVM), EBS General Purpose (SSD) Volume Type
Root device type: ebs Virtualization type: hvm
Select button (64-bit)
- SUSE Linux Enterprise Server 12 SP1 (HVM), SSD Volume Type - ami-cebed4a1**
SUSE Linux (Free tier eligible)
SUSE Linux Enterprise Server 12 Service Pack 1 (HVM), EBS General Purpose (SSD) Volume Type. Public Cloud, Advanced Systems Management, Web and Scripting, and Legacy modules enabled.
Select button (64-bit)

Chose the instance type

Step 2: Choose an Instance Type

Amazon EC2 provides a wide selection of instance types optimized to fit different use cases. Instances are virtual servers that can run applications. They have varying combinations of CPU, memory, storage, and networking capacity, and give you the flexibility to choose the appropriate mix of resources for your applications. [Learn more](#) about instance types and how they can meet your computing needs.

Filter by: All instance types ▾ Current generation ▾ Show/Hide Columns

Currently selected: t2.micro (Variable ECUs, 1 vCPUs, 2.5 GHz, Intel Xeon Family, 1 GiB memory, EBS only)

Family	Type	vCPUs	Memory (GiB)	Instance Storage (GiB)	EBS-Optimized Available	Network Performance
General purpose	t2.nano	1	0.5	EBS only	-	Low to Moderate
General purpose	t2.micro	1	1	EBS only	-	Low to Moderate
General purpose	t2.small	1	2	EBS only	-	Low to Moderate
General purpose	t2.medium	2	4	EBS only	-	Low to Moderate
General purpose	t2.large	2	8	EBS only	-	Low to Moderate

Cancel **Previous** **Review and Launch** **Next: Configure Instance Details**

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Configure the Instance

Step 3: Configure Instance Details

Configure the instance to suit your requirements. You can launch multiple instances from the same AMI, request Spot instances to take advantage of the lower pricing, assign an access management role to the instance, and more.

Number of instances	<input type="text" value="1"/> Launch into Auto Scaling Group
Purchasing option	<input checked="" type="checkbox"/> Request Spot instances
Network	vpc-7ada3913 (172.31.0.0/16) DEFAULT-VPC (def) <input type="button" value="C Create new VPC"/>
Subnet	No preference (default subnet in any Availability Zone) <input type="button" value="Create new subnet"/>
Auto-assign Public IP	<input type="button" value="Use subnet setting (Enable)"/>
IAM role	<input type="button" value="None"/> <input type="button" value="C Create new IAM role"/>
Shutdown behavior	<input type="button" value="Stop"/>
Enable termination protection	<input type="checkbox"/> Protect against accidental termination
Monitoring	<input type="checkbox"/> Enable CloudWatch detailed monitoring

Cancel **Previous** **Review and Launch** **Next: Add Storage**

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Add the Storage type .according to the Requirement

Step 4: Add Storage

Your instance will be launched with the following storage device settings. You can attach additional EBS volumes and instance store volumes to your instance, or edit the settings of the root volume. You can also attach additional EBS volumes after launching an instance, but not instance store volumes. [Learn more about storage options in Amazon EC2.](#)

Volume Type	Device	Snapshot	Size (GiB)	Volume Type	IOPS	Throughput (MB/s)	Delete on Termination	Encrypted
Root	/dev/xvda	snap-0a1185f01a129db23	8	General Purpose SSD (GP2)	100 / 3000	N/A	<input checked="" type="checkbox"/>	Not Encrypted

Add New Volume

Free tier eligible customers can get up to 30 GB of EBS General Purpose (SSD) or Magnetic storage. [Learn more about free usage tier eligibility and usage restrictions.](#)

Cancel Previous Review and Launch Next: Tag Instance

Tag Instance .key and the value

Step 5: Tag Instance

A tag consists of a case-sensitive key-value pair. For example, you could define a tag with key = Name and value = Webserver. [Learn more about tagging your Amazon EC2 resources.](#)

Key	(127 characters maximum)	Value	(255 characters maximum)
RJCollege		DEFAULT-VPC	

Create Tag (Up to 10 tags maximum)

Cancel Previous Review and Launch Next: Configure Security Group

Configure the security group by adding some rule..

Step 6: Configure Security Group

A security group is a set of firewall rules that control the traffic for your instance. On this page, you can add rules to allow specific traffic to reach your instance. For example, if you want to set up a web server and allow Internet traffic to reach your instance, add rules that allow unrestricted access to the HTTP and HTTPS ports. You can create a new security group or select from an existing one below. [Learn more about Amazon EC2 security groups.](#)

Assign a security group:

Create a new security group
 Select an existing security group

Security group name:

Description:

Type	Protocol	Port Range	Source
SSH	TCP	22	Anywhere

Add Rule

Warning
Rules with source of 0.0.0.0 allow all IP addresses to access your instance. We recommend setting security group rules to allow access from known IP addresses only.

Cancel Previous Review and Launch

Add the first rule Http.

Custom TCP Rule

Custom UDP Rule

Custom ICMP Rule

Custom Protocol

All TCP

All UDP

All ICMP

All traffic

SSH

SMTP

DNS (UDP)

DNS (TCP)

HTTP

POP3

IMAP

LDAP

HTTPS

SMTPS

IMAPS

POP3S

Custom TCP Rule

Configure Security Group

of firewall rules that control the traffic for your instance. On this page, you can add rules to allow specific traffic to reach your instance. For example, if you want to set up a web server to reach your instance, add rules that allow unrestricted access to the HTTP and HTTPS ports. You can create a new security group or select from an existing one below. [Learn more about Amazon EC2 security groups.](#)

Assign a security group:

Create a new security group
 Select an existing security group

Security group name:

Description:

Protocol	Port Range	Source
TCP	22	Anywhere
TCP	0	Custom CIDR, IP or Security Group

Add Rule

Warning
Rules with source of 0.0.0.0 allow all IP addresses to access your instance. We recommend setting security group rules to allow access from known IP addresses only.

Cancel Previous Review and Launch

Add the second rule Https

Step 6: Configure Security Group

A security group is a set of firewall rules that control the traffic for your instance. On this page, you can add rules to allow specific traffic to reach your instance. For example, if you want to set up a web server and allow Internet traffic to reach your instance, add rules that allow unrestricted access to the HTTP and HTTPS ports. You can create a new security group or select from an existing one below. [Learn more about Amazon EC2 security groups.](#)

Assign a security group: Create a new security group Select an existing security group

Security group name:

Description: launch-wizard-1 created 2016-08-05T13:46:37.164+05:30

Type	Protocol	Port Range	Source
SSH	TCP	22	Anywhere <input type="button" value="X"/>
HTTP	TCP	80	Anywhere <input type="button" value="X"/>
HTTPS	TCP	443	Anywhere <input type="button" value="X"/>

Add Rule

Warning:

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Review the Instance before launch

Step 7: Review Instance Launch

Instance Type

Instance Type	ECUs	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance
t2.micro	Variable	1	1	EBS only	-	Low to Moderate

Security Groups

Security group name: launch-wizard-1
Description: launch-wizard-1 created 2016-08-05T13:46:37.164+05:30

Type	Protocol	Port Range	Source
SSH	TCP	22	0.0.0.0
HTTP	TCP	80	0.0.0.0
HTTPS	TCP	443	0.0.0.0

Launch

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Once by Launching instance.the dialog box is pop up.by the message select key creating option.
And Download it.

Step 7: Review Instance Launch

Select an existing key pair or create a new key pair

A key pair consists of a public key that AWS stores, and a private key file that you store. Together, they allow you to connect to your instance securely. For Windows AMIs, the private key file is required to obtain the password used to log into your instance. For Linux AMIs, the private key file allows you to securely SSH into your instance.

Note: The selected key pair will be added to the set of keys authorized for this instance. Learn more about removing existing key pairs from a public AMI.

Create a new key pair

Key pair name: RJKey

You have to download the private key file (*.pem file) before you can continue. Store it in a secure and accessible location. You will not be able to download the file again after it's created.

Cancel Launch Instances

Your instances are now launching

The following instance launches have been initiated: i-03d80b93e822d529f Hide launch log

Creating security groups	Successful (sg-4c22e325)
Authorizing inbound rules	Successful
Initiating launches	Successful
Applying tags	Successful
Launch initiation complete	

Get notified of estimated charges
Create billing alerts to get an email notification when estimated charges on your AWS bill exceed an amount you define (for example, if you exceed the free usage tier).

How to connect to your instances

Your instances are launching, and it may take a few minutes until they are in the running state, when they will be ready for you to use. Usage hours on your new instances will start immediately and continue to accrue until you stop or terminate your instances.

Click [View Instances](#) to monitor your instances' status. Once your instances are in the running state, you can connect to them from the Instances screen. Find out how to connect to your instances.

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Once you launch the instance it will take some minutes to Launch it...the Public DNS address will be launch

The screenshot shows the AWS EC2 Dashboard. On the left sidebar, under the 'Instances' section, 'Instances' is selected. The main content area displays a table of instances. One instance is listed: **i-03d80b93e822d529f**. The details for this instance are shown in the expanded view below:

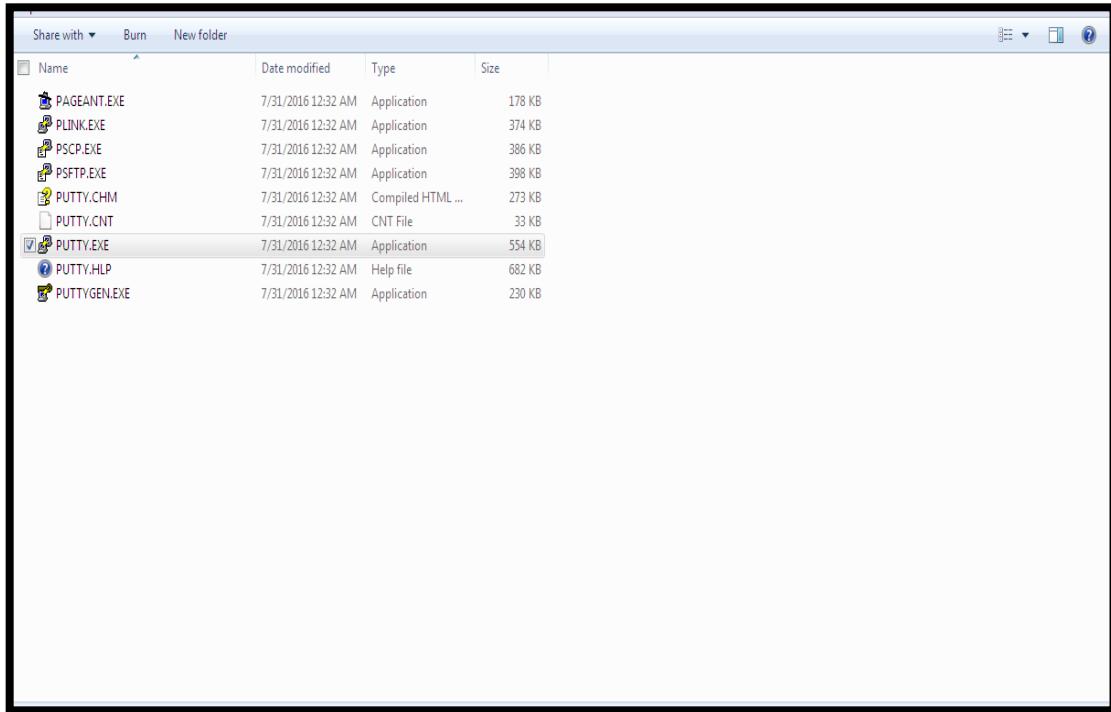
	Description	Value		
Instance ID	Instance ID	i-03d80b93e822d529f	Public DNS	ec2-52-66-122-231.ap-south-1.compute.amazonaws.com
Instance state	Instance state	running	Public IP	52.66.122.231
Instance type	Instance type	t2.micro	Elastic IPs	
Private DNS	Private DNS	ip-172-31-29-235.ap-south-1.compute.internal	Availability zone	ap-south-1a
Private IPs	Private IPs	172.31.29.235	Security groups	launch-wizard-1, view rules
Secondary private IPs	VPC ID	vpc-7ada3913	Scheduled events	No scheduled events
			AMI ID	amzn-ami-hvm-2016.03.3.x86_64-ov2 (ami-)

Here we have completed with instance creation.....

Now we have to connect this created instance with LAMP Server.....

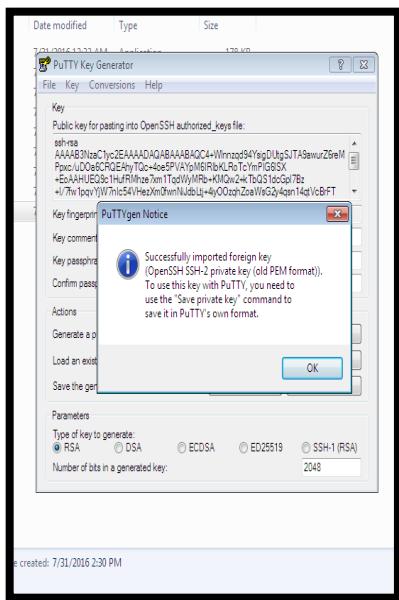
Download the puttygen

and putty for the key configuration..

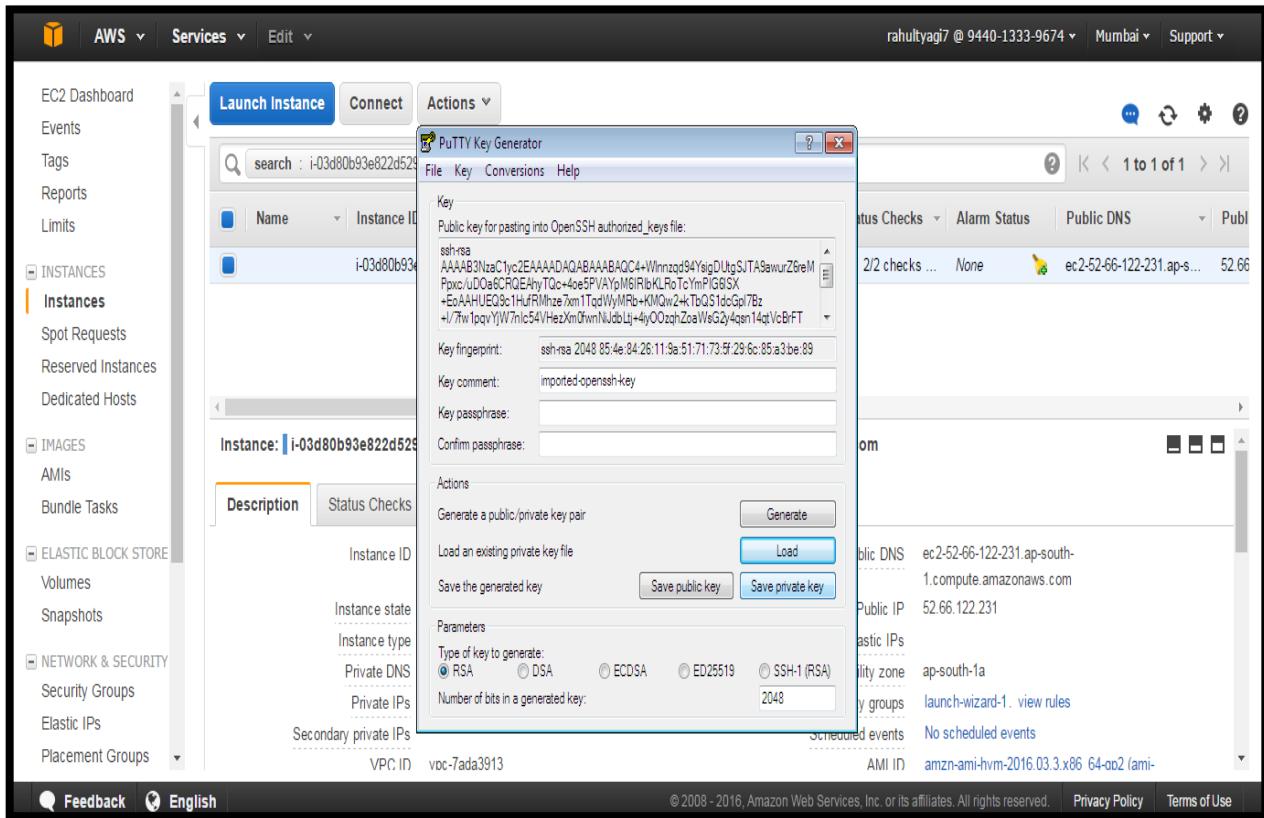


Open the puttygen-> load-><go to address of public key> -> open the public key you had save..

After that save the Private key which is use for verification for secure connection.



Save the private key.



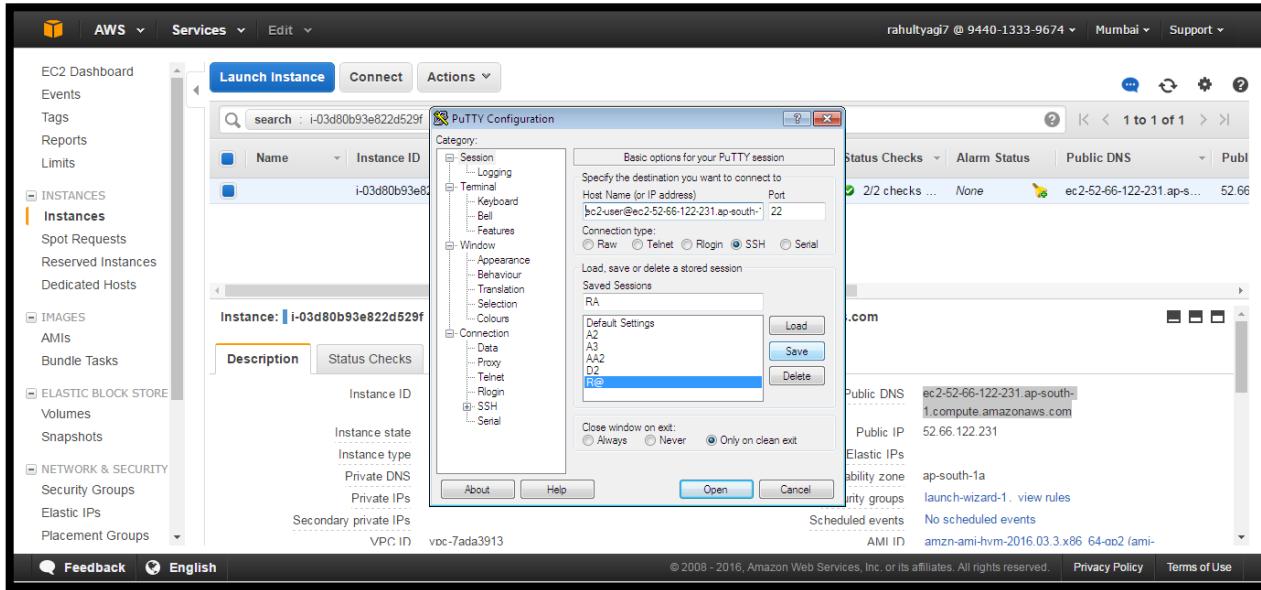
Now open the putty for the key configuration.

In Host Name(Or IP address) write

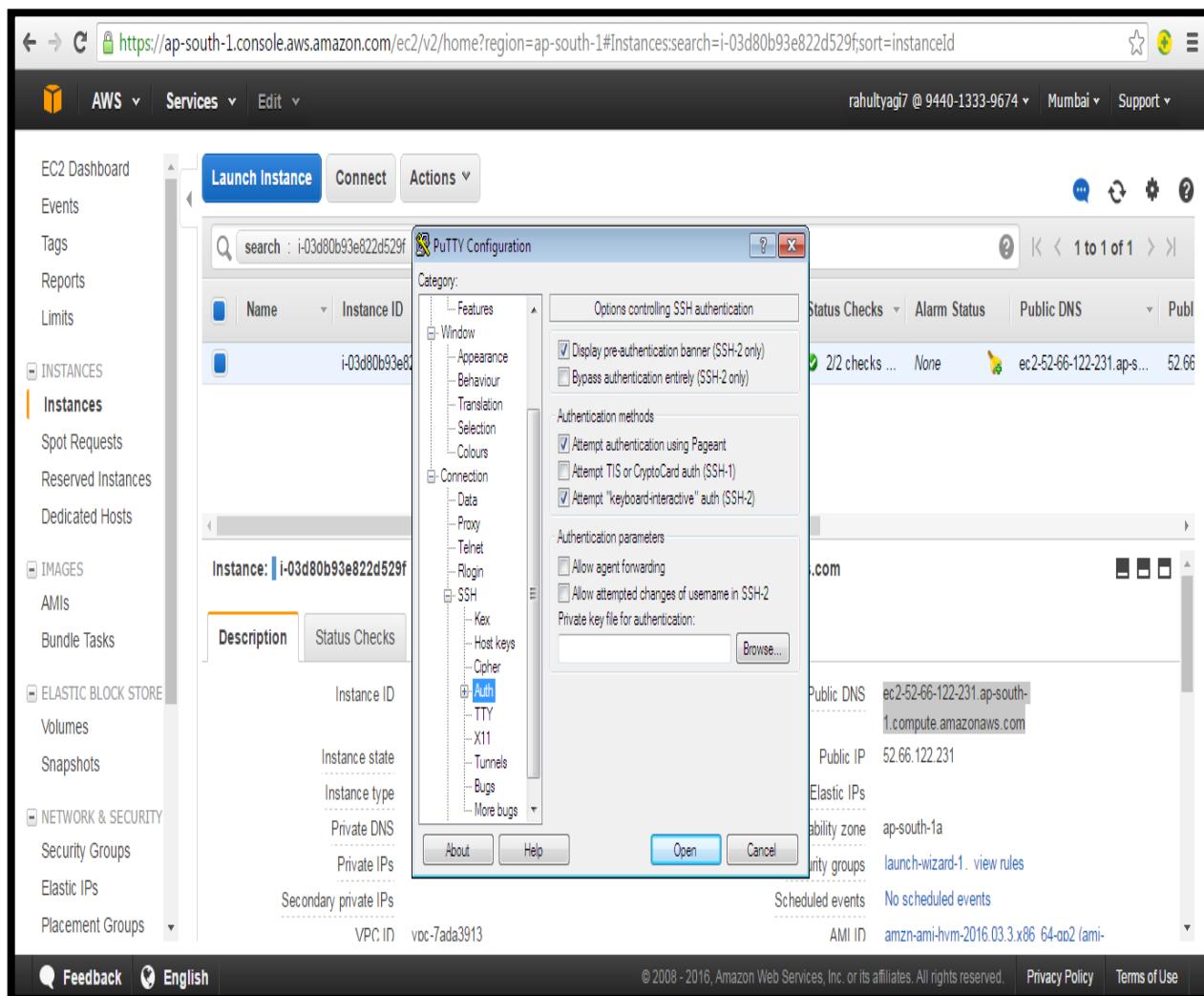
Ec2-user@public DNS.

In saved Session option provide the name and save it.

Now at left side select SSH ->Auth ->Browse(Right side)->select private key from where had it saved.....

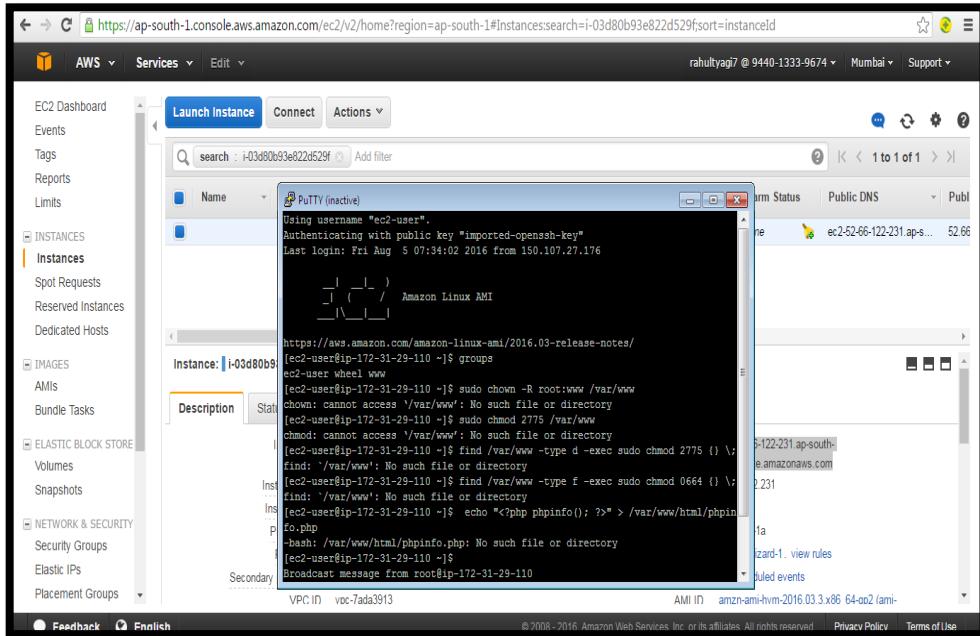


Now select the private key you have save.



By clicking on the open, the Ec2 Amazon Linux will be launch...

For the configuration use the Command provided in putty.....



Command for launching Lamp server.

```

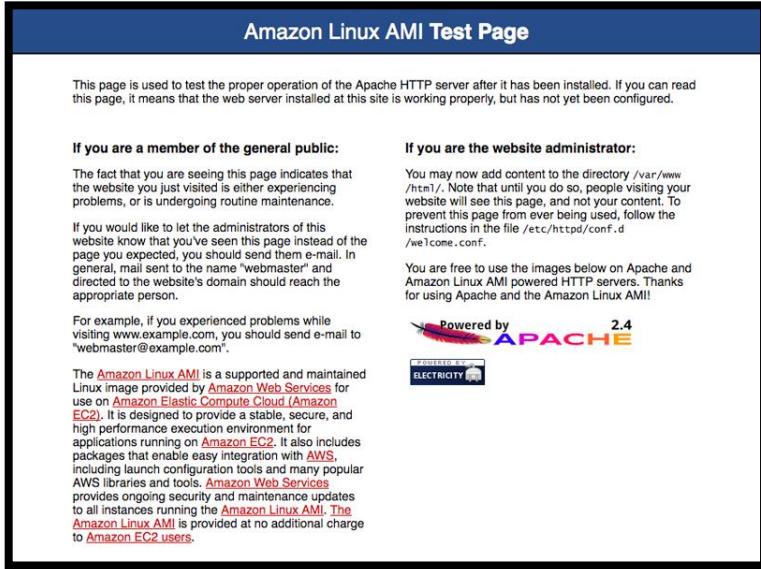
new1 - Notepad++
File Edit Search View Encoding Language Settings Macro Run Plugins Window ?
new1
1 1 Connect to your instance.
-----
2
3
4 2 software packages are up to date
-----
5
6
7 ----> $ sudo yum update -y
8
9
10 3 yum install
11 -----
12
13 ----> $ sudo yum install -y httpd24 php56 mysql55-server php56-mysqld
14
15 4 Start the Apache web server.
16 -----
17 ---->$ sudo service httpd start
18
19
20 5 Use the chkconfig command to configure the Apache web
21
22 server to start at each system boot.
23 -----
24
25 --->$ sudo chkconfig httpd on
26
27
28 6 verify that httpd is on
29
30 --->$ chkconfig --list httpd
31

```

Now minimize putty.....

Copy Public DNS in new tab of browser.....

If the following page appears means LAMP server is on.....



Minimize it and go to putty to Configure Apache server for PHP

A screenshot of a terminal window titled "new1" showing a series of command-line steps to configure Apache for PHP. The steps include navigating to /var/www, changing file permissions, adding the www group, adding the user to the www group, and logging out. The terminal window has a standard Windows-style interface with a toolbar at the top and status bars at the bottom.

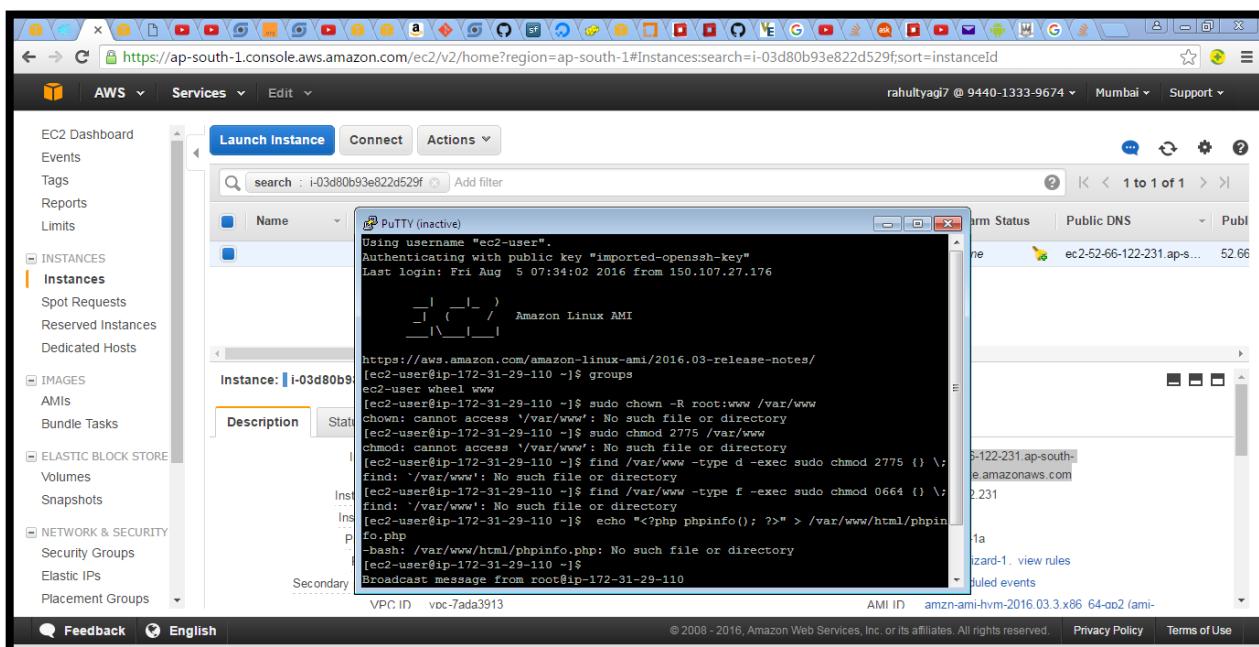
```

1 =====
2 Reconnect to your instance, and then run the following
3 command to verify your membership in the www group.
4 =====
5 3->8 groups
6
7 4 Change the group ownership of /var/www and its contents to the www group.
8
9 --> sudo chown -R root:www /var/www
10
11 5 Change the directory permissions of /var/www and its subdirectories to add group
12 write permissions and to set the group ID on future subdirectories.
13
14 ==>$ sudo chmod 2775 /var/www
15
16 ==>$ find /var/www -type d -exec sudo chmod 2775 {} \;
17
18 =====
19 6 Recursively change the file permissions of /var/www and its subdirectories to add group write permissions.
20
21 1 find /var/www -type f -exec sudo chmod 0664 {} \;
22
23 =====
24 To test and execute php file on LAMP Server
25
26 ==> echo "<?php phpinfo(); ?>" > /var/www/html/phpinfo.php
27
28 =====
29 In a web browser, enter the URL of the file you just created. This URL is the public DNS address
30 of your instance followed by a forward slash and the file name. For example:
31
32 ==>http://my-public-dns.amazonaws.com/phpinfo.php
33

```

Now test php file.....

```
$ echo "<?phpphpinfo(); ?>" > /var/www/html/phpinfo.php
```



Now

In a web browser, enter the URL of the file you just created. This URL is the public DNS address of your instance followed by a forward slash and the file name. For example:

<http://my.public.dns.amazonaws.com/phpinfo.php>

PHP Version 5.6.6	
System	Linux ip-172-31-7-35 3.14.35-28.38.amzn1.x86_64 #1 SMP Wed Mar 11 22:50:37 UTC 2015 x86_64
Build Date	Mar 5 2015 23:26:53
Server API	Apache 2.0 Handler
Virtual Directory Support	disabled
Configuration File (php.ini) Path	/etc
Loaded Configuration File	/etc/php.ini
Scan this dir for additional .ini files	/etc/php-5.6.d
Additional .ini files parsed	/etc/php-5.6.d20-bz2.ini, /etc/php-5.6.d20-calendar.ini, /etc/php-5.6.d20-ctype.ini, /etc/php-5.6.d20-curl.ini, /etc/php-5.6.d20-dom.ini, /etc/php-5.6.d20-exif.ini, /etc/php-5.6.d20-fileinfo.ini, /etc/php-5.6.d20-fp.ini, /etc/php-5.6.d20-gettext.ini, /etc/php-5.6.d20-iconv.ini, /etc/php-5.6.d20-mysqlind.ini, /etc/php-5.6.d20-pdo.ini, /etc/php-5.6.d20-phar.ini, /etc/php-5.6.d20-posix.ini, /etc/php-5.6.d20-shmop.ini, /etc/php-5.6.d20-simplexml.ini, /etc/php-5.6.d20-sockets.ini, /etc/php-5.6.d20-sqlite3.ini, /etc/php-5.6.d20-sysmsg.ini, /etc/php-5.6.d20-system.ini, /etc/php-5.6.d20-sysvshm.ini, /etc/php-5.6.d20-tokenizer.ini, /etc/php-5.6.d20-xml.ini, /etc/php-5.6.d20-xmwriter.ini, /etc/php-5.6.d20-xsl.ini, /etc/php-5.6.d20-zip.ini, /etc/php-5.6.d30-mysqli.ini, /etc/php-5.6.d30-pdo_sqlite.ini, /etc/php-5.6.d30-wddx.ini, /etc/php-5.6.d30-xmlreader.ini, /etc/php-5.6.d40-json.ini, /etc/php-5.6.d.php.ini
PHP API	20131106
PHP Extension	20131226
Zend Extension	220131226
Zend Extension Build	API220131226,NTS
PHP Extension Build	API20131226,NTS

Now execute php file as....

```
echo "<?php echo 'Hello from Zeeshan ' ; ?>" > /var/www/html/RJ.php
```

Hello from Zeeshan

Conclusion: Successfully built an application on private cloud.

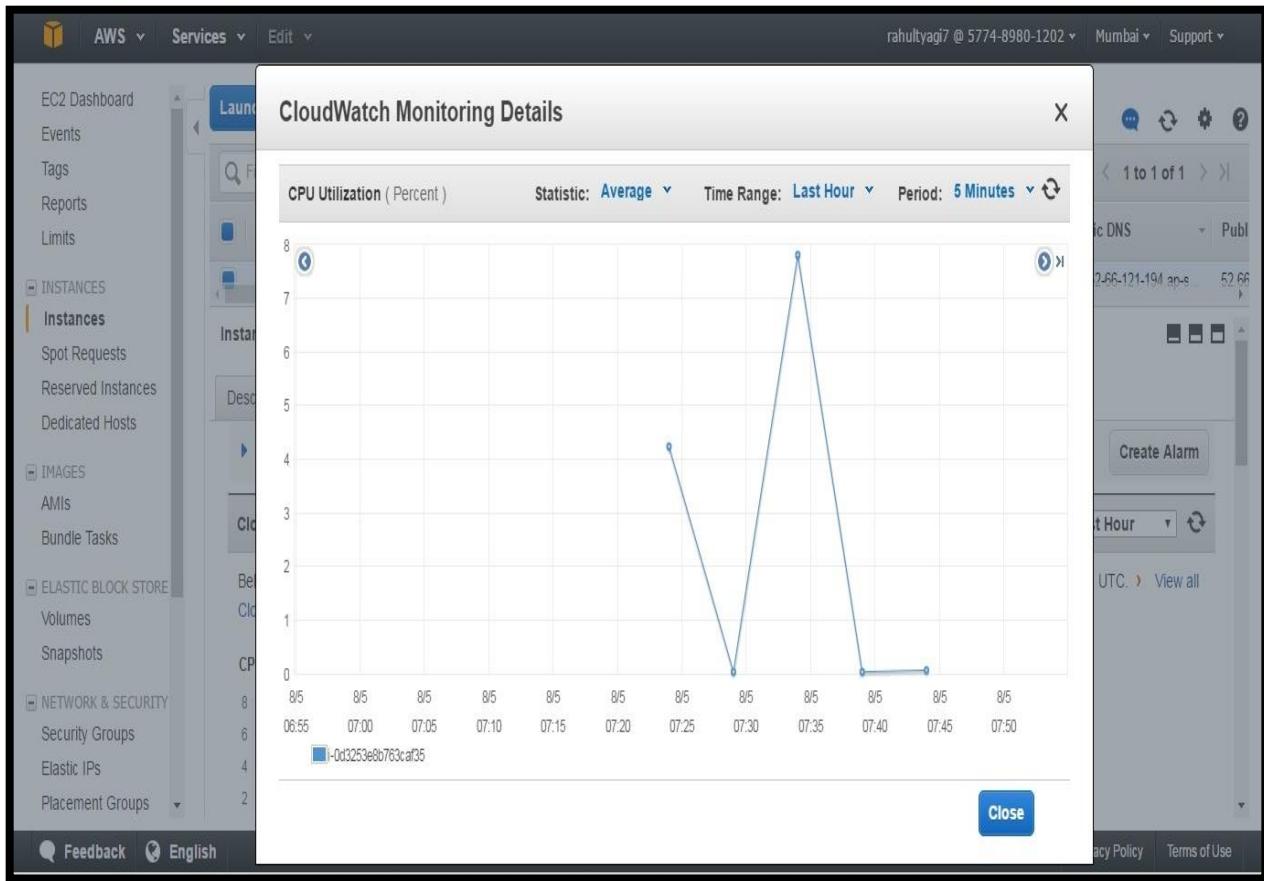
Practical No : 4

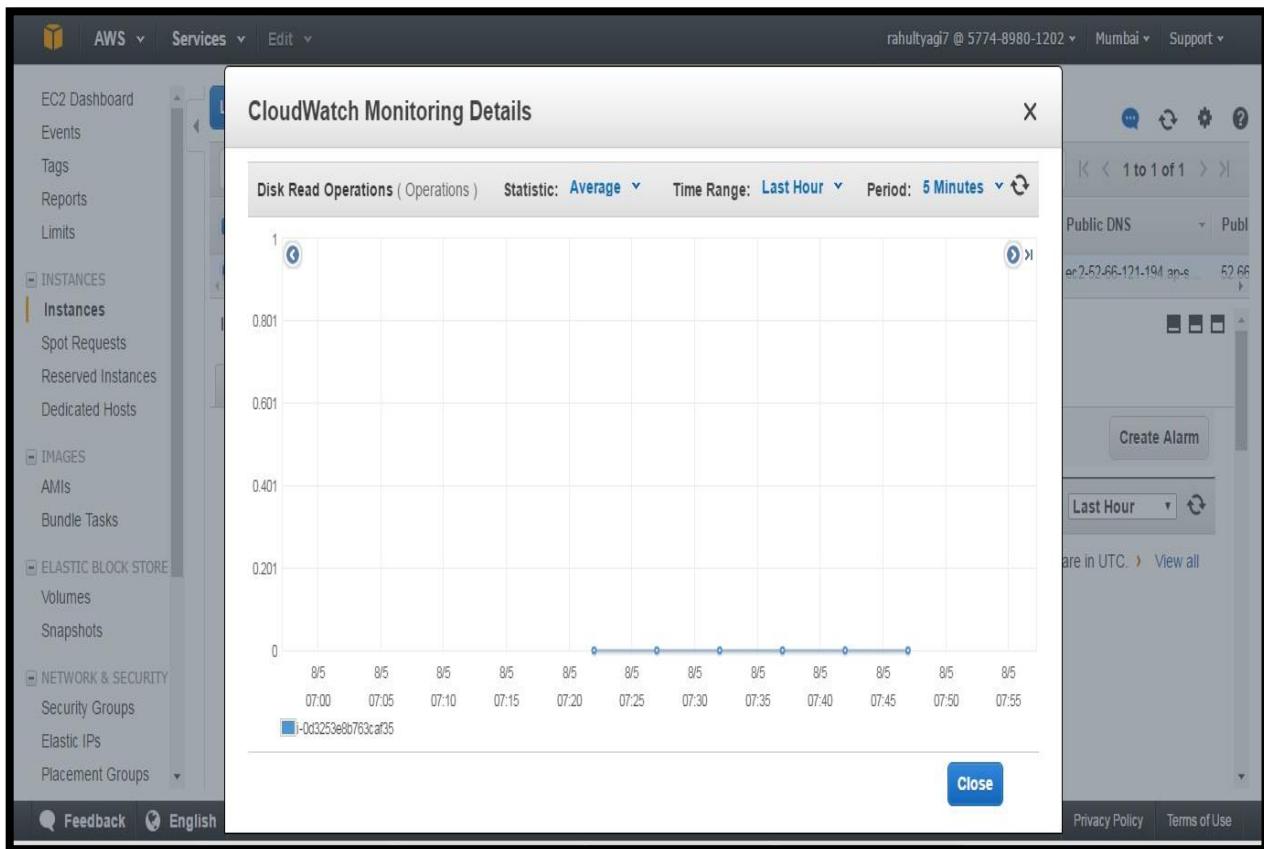
Aim : Demonstrate any Cloud Monitoring tool.

Theory:

Amazon CloudWatch is a monitoring and observability service built for DevOps engineers, developers, site reliability engineers (SREs), IT managers, and product owners. CloudWatch provides you with data and actionable insights to monitor your applications, respond to system-wide performance changes, and optimize resource utilization. CloudWatch collects monitoring and operational data in the form of logs, metrics, and events. You get a unified view of operational health and gain complete visibility of your AWS resources, applications, and services running on AWS and on-premises. You can use CloudWatch to detect anomalous behavior in your environments, set alarms, visualize logs and metrics side by side, take automated actions, troubleshoot issues, and discover insights to keep your applications running smoothly.

Now Monitor the graph of CPU..





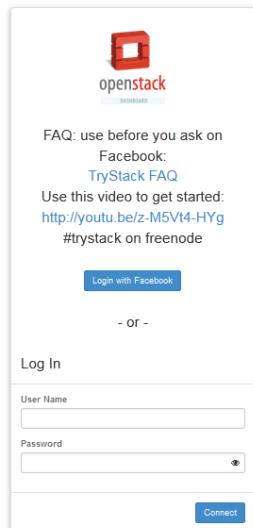
Practical 5

Aim : Evaluate a Private IAAS Cloud using TryStack

Note :

1. Install cygwin and then start with practical.

Go to link <https://x86.trystack.org/dashboard/auth/login/?next=/dashboard/>



Login with facebook account....

After login.....

The screenshot shows the OpenStack Compute (Nova) dashboard under the 'Compute' project. The left sidebar has 'Compute' selected. The main area is titled 'Overview' and contains two sections: 'Limit Summary' and 'Usage Summary'.
Limit Summary: Five pie charts show usage against limits: Instances (Used 1 of 3), VCPUs (Used 1 of 6), RAM (Used 512 of 8,192), Floating IPs (Used 0 of 1), and Security Groups (Used 1 of 10).
Usage Summary: A form allows selecting a time range from 'From: 2016-07-26' to 'To: 2016-07-27' with a 'Submit' button. Below it, a table shows usage statistics: Active Instances: 0, Active RAM: 0Bytes, This Period's VCPU-Hours: 0.00, This Period's GB-Hours: 0.00, This Period's RAM-Hours: 0.00. A 'Download CSV Summary' link is also present.

Go to Network(left side) ->

The screenshot shows the OpenStack Compute (Nova) dashboard under the 'Compute' project. The left sidebar has 'Network' selected. The main area is titled 'Networks' and displays a table of networks.
Table Headers: Name, Subnets Associated, Shared, Status, Admin State, Actions.
Table Content: A message 'No items to display.' and 'Displaying 0 items'.

Click on Create Network(Right side tab)

Create Network

Network Subnet Subnet Details

Network Name: RJC

Admin State: UP

Create Subnet

Cancel Back Next »

Create a new network. In addition, a subnet associated with the network can be created in the next panel.

At Subnet tab

Create Network

Network Subnet Subnet Details

Subnet Name: RJCSub

Network Address: 192.168.27.0/24

IP Version: IPv4

Gateway IP:

Disable Gateway

Cancel Back Next »

Create a subnet associated with the network. Advanced configuration is available by clicking on the "Subnet Details" tab.

At subnet Details

Specify additional attributes for the subnet.

Enable DHCP

Allocation Pools ?

DNS Name Servers ?

Host Routes ?

[Cancel](#) [« Back](#) [Create](#)

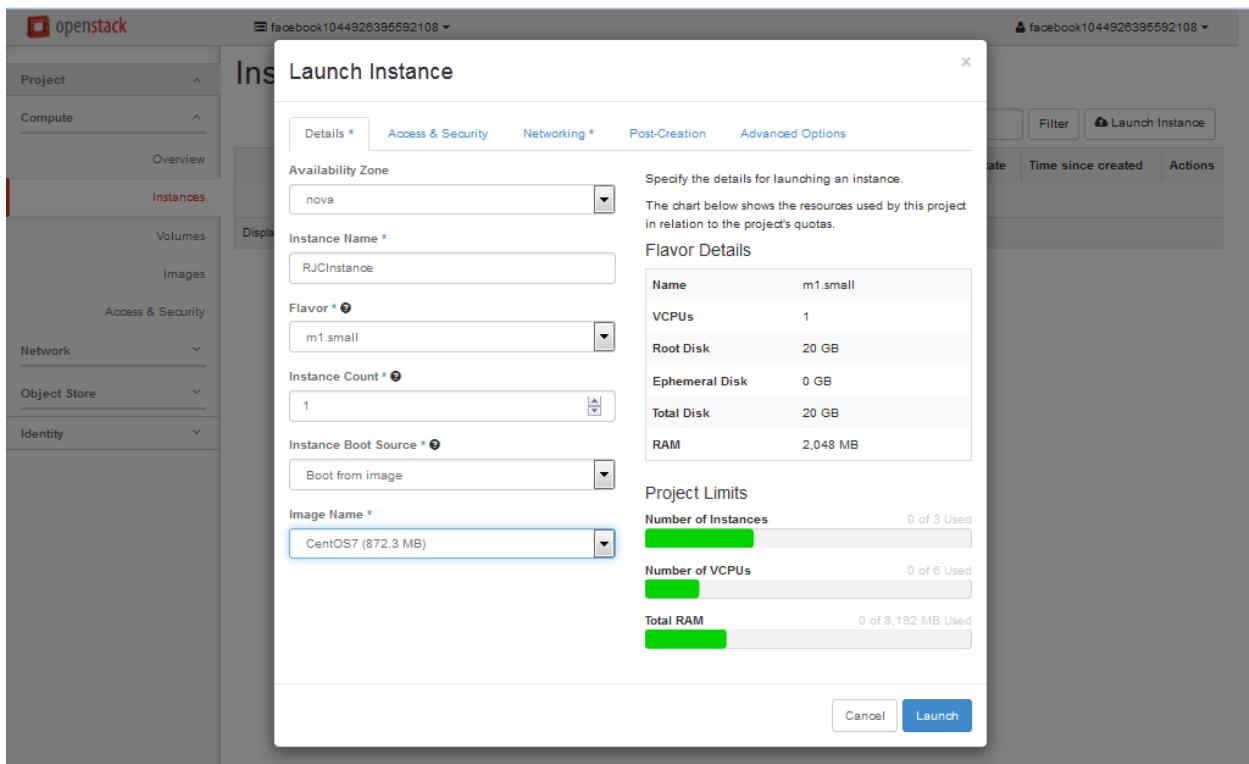
8.8.8.8 google's DNS.....Click on create

So we have created network

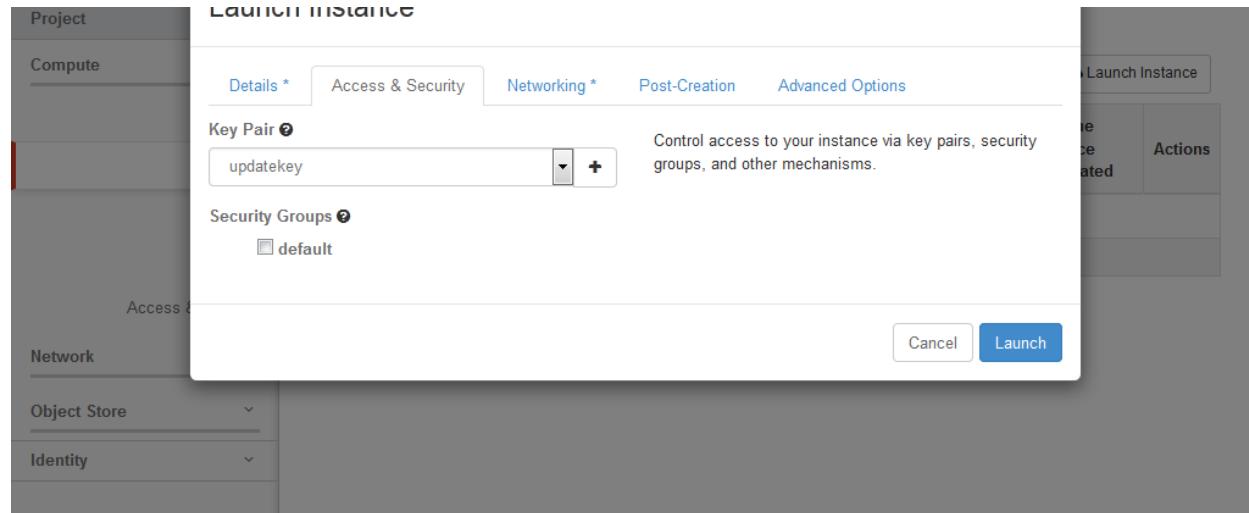
<input type="checkbox"/>	Name	Subnets Associated	Shared	Status	Admin State	Actions
<input type="checkbox"/>	RJC Sub 192.168.27.0/24		No	Active	UP	Edit Network

Displaying 1 item

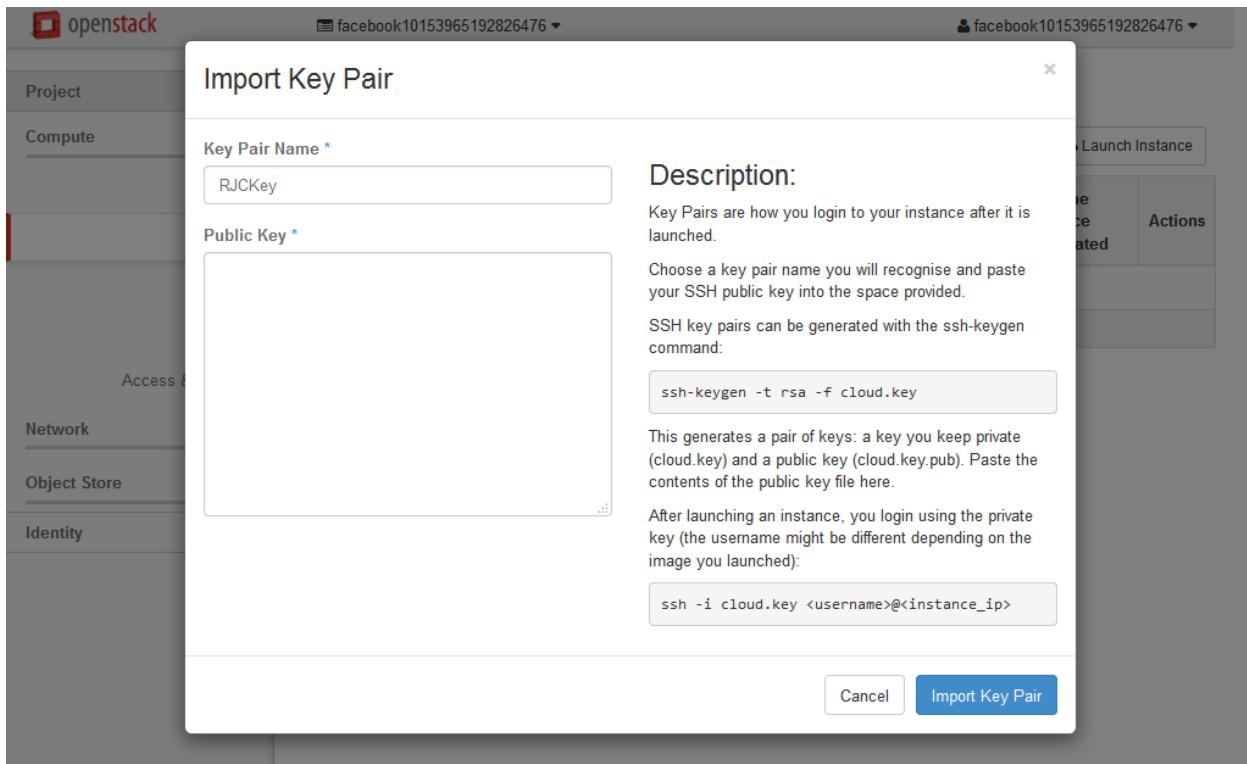
Go to compute(left side) -> Instance-> Launch Instance(Right Side)



Go to Access & security



Click on “+” Sign



Install SSH Package of cygwin terminal for creating SSH key

Execute given command in cygwin

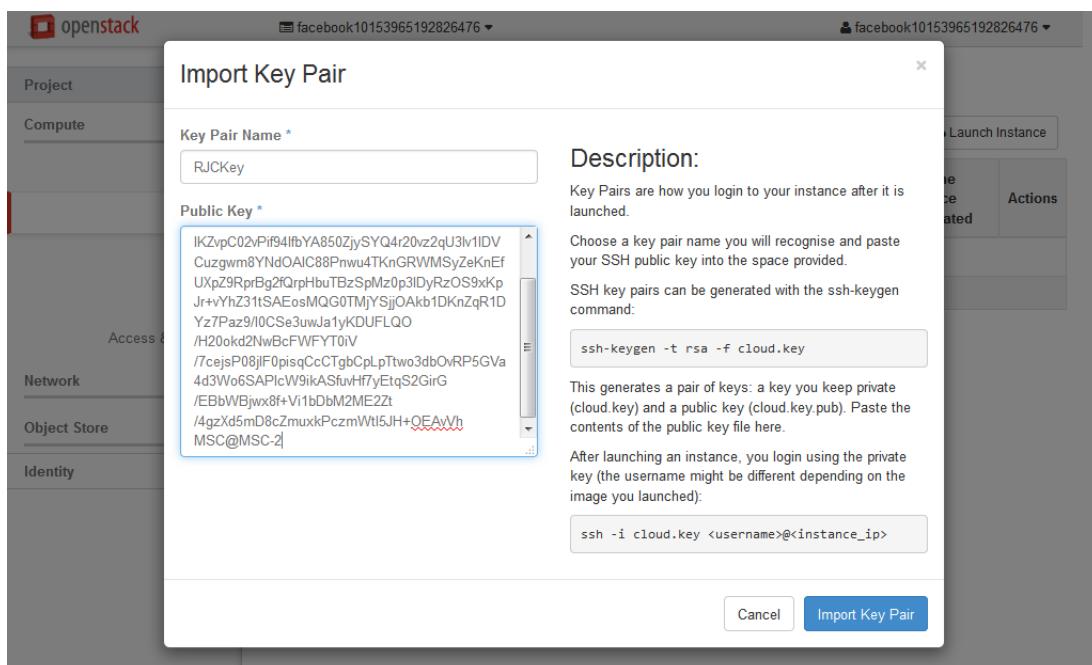
Two keys will be generated (1 Public & 1 Private).....import the public key

```
MSC@MSC-2 ~
$ ssh-keygen -t rsa -f cloud.key
Generating public/private rsa key pair.
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in cloud.key.
Your public key has been saved in cloud.key.pub.
The key fingerprint is:
SHA256:qviacoNhcaR9R8/Y9YkIIPyprdufMBoPfBklial++v8 MSC@MSC-2
The key's randomart image is:
+--[RSA 2048]----+
 . . . ooo.
 o . . . o..
 o . . + . o.
 . o . . *o=+
 + . . So.B*o.
 o . . o =ooo.
 . o . . = . .
 + = . o .
 =o+ . . . E
+---[SHA256]----+
MSC@MSC-2 ~
$ ls
cloud.key  cloud.key.pub
MSC@MSC-2 ~
$ cat cloud.key.pub
ssh-rsa AAAAB3NzaC1yc2EAAAQABAAQCoVdIKZvpC02vPif941fbYA850zjysYQ4r20vz2qu3iv1IDVCuzgw
m8YNdoATC88Pnwu4TKnGRwMsyZeKnEfUxpZ9Rpr8g2fQrpHbuTBzSpMz0p3lDyrz0S9xKpJr+vYhZ3ltsAEosMQG0TM
jYSjj0Akb1DKnZqR1DYz7PaZ9/i0cSe3uwJalyKDUFLQQ/H20okd2NwBcFwFY70iv/7cejsP08jlF0pisqCcCTgbCpL
pTtw3dbovRP5GVa4d3wo6SAPlcw9ikAsfvhF7yEtqS2GirG/EbbwBjwx8f+Vi1bDbM2ME2zt/4gzXd5mD8cZmuxkP
czmwt15JH+0EAvVh MSC@MSC-2
MSC@MSC-2 ~
```

Select public key from terminal as shown below

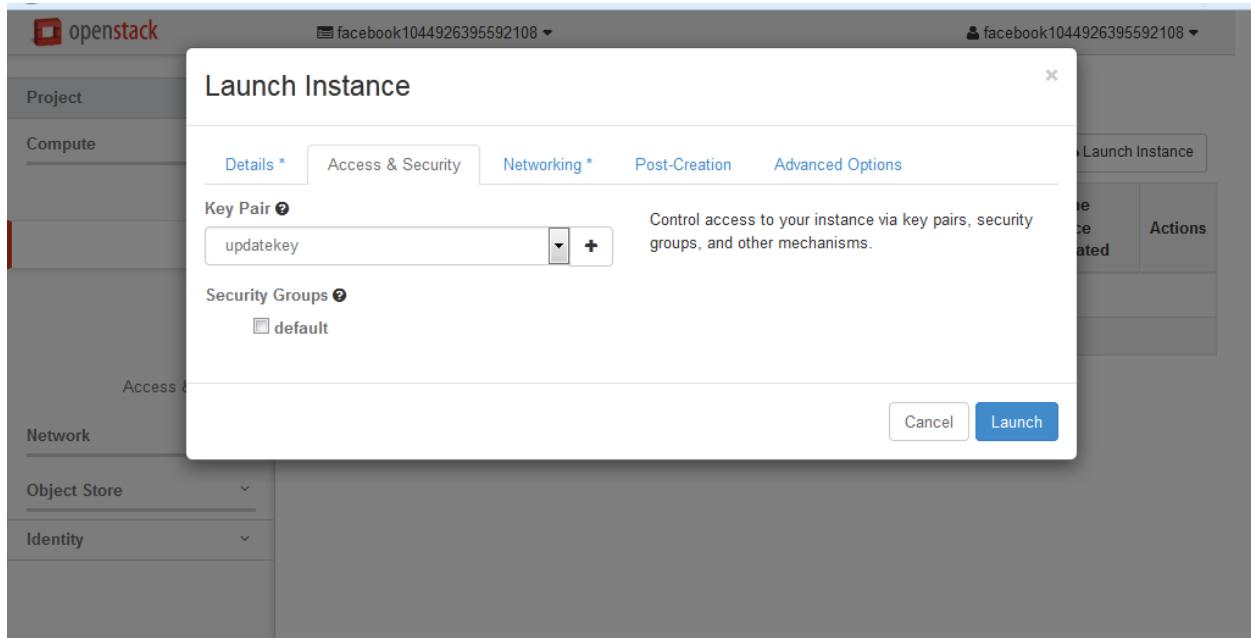
```
MSC@MSC-2 ~
$ ssh-keygen -t rsa -f cloud.key
Generating public/private rsa key pair.
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in cloud.key.
Your public key has been saved in cloud.key.pub.
The key fingerprint is:
SHA256:qviac0lNhcaR9R8/Y9YkIPyprdUfMB0Pfbklial++v8 MSC@MSC-2
The key's randomart image is:
+---[RSA 2048]---+
|   . . . ooo. |
|   o . . . o.. |
|   o . +...o. |
|   . o .. *o=+ |
|   + ..So.B*o. |
|   o . .o =ooo. |
|   . o . . = . . |
|   + = . o . . |
|   =o+ . . . . E |
+---[SHA256]---+
MSC@MSC-2 ~
$ ls
cloud.key  cloud.key.pub
MSC@MSC-2 ~
$ cat cloud.key.pub
ssh-rsa AAAAB3NzaC1yc2EAAAQABAAQCoVdIKZvpC02vPif941fbYA850ZjSYQ4r20vz2qu3Iv1IDVCuzgw
m8YNd0AIC88Pnwu4TKnGRWMSyZeKnEfUxpZ9RpBg2fQrpHbuTBzSpMz0p31DyRzOS9xKpJr+vYhZ31tSAEosMQG0TM
jYSjjOAk1DKnZqR1Dyz7Paz9/I0CSe3uwJa1yKDULQO/H20okd2NwBcFWFYTOiv/7cejsP08jlF0pisqCcCTgbCpL
pTtwo3db0vRP5GVa4d3Wo6SAP1cw9ikASfvuHF7yEtqS2GirG/EBbWBjwx8f+Vi1bdbM2ME2zt/4gzxd5mD8czmuxkP
czmwt15JH+OEAvVh  MSC@MSC-2
MSC@MSC-2 ~
```

Now copy it as shown below

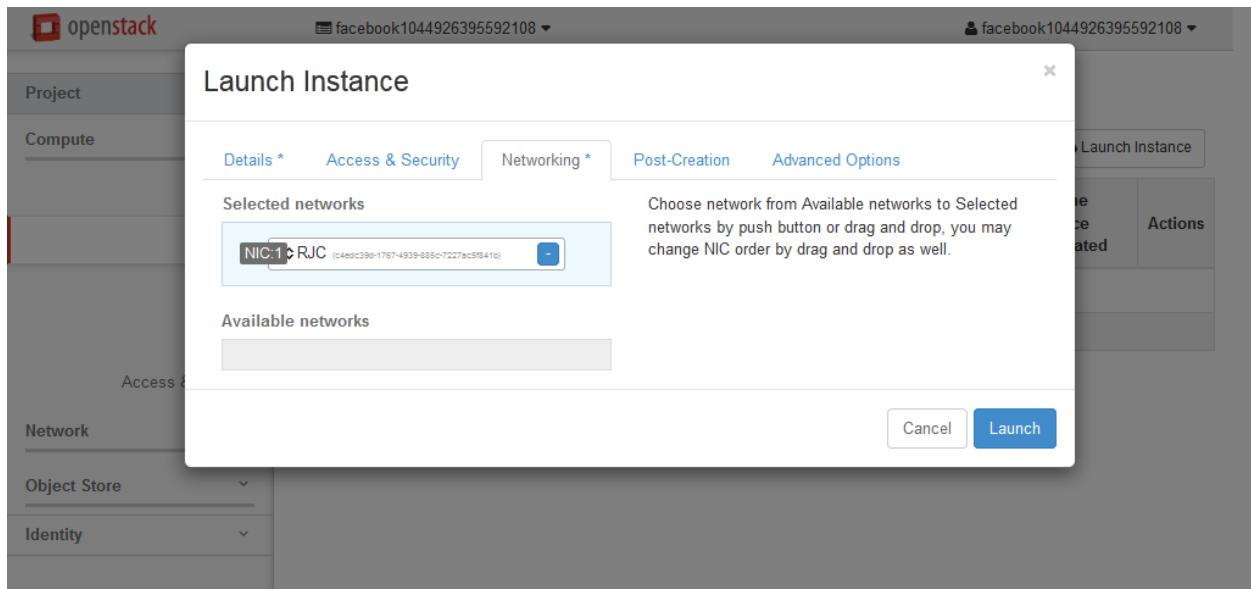


Click on Import key pair.....

Select name of the key from dropdown.....



At networking tab



Click on Launch

The screenshot shows the OpenStack Instances page. The left sidebar is collapsed, and the main area displays a table of instances. The table has columns for Instance Name, Image Name, IP Address, Size, Key Pair, Status, Availability Zone, Task, Power State, and Time since created. One instance, 'RJCInstance', is listed with the following details: Image Name: CentOS7, IP Address: 192.168.27.3, Size: m1.small, Key Pair: updatekey, Status: Active, Availability Zone: nova, Task: None, Power State: Running, and Time since created: 0 minutes.

Go to Network -> Routers -> Create Routers

The screenshot shows the 'Create Router' dialog box. It contains fields for Router Name (set to 'RJCRouter'), Admin State (set to 'UP'), and External Network (set to 'public'). A description below the fields states: 'Creates a router with specified parameters.' At the bottom right of the dialog are 'Cancel' and 'Create Router' buttons. The background shows the Network section of the OpenStack dashboard.

Click on Create Router

The screenshot shows the OpenStack interface for managing routers. The left sidebar has sections for Project, Compute, Network, Object Store, and Identity. The 'Routers' section is selected and highlighted in red. The main content area is titled 'Routers' and displays a table with one item. The table columns are Name, Status, External Network, Admin State, and Actions. The single row shows 'RJCRouter' as the Name, 'Active' as the Status, 'public' as the External Network, 'UP' as the Admin State, and a red 'Clear Gateway' button in the Actions column. A message at the top right says '+ Create Router (Quota exceeded)'.

Click on Name of Router (RJCRouter)

The screenshot shows the 'Router Details' page for the router 'RJCRouter'. The left sidebar is identical to the previous screenshot. The main content area is titled 'Router Details' and shows the router's configuration. It includes tabs for Overview, Interfaces, and Static Routes, with 'Overview' selected. Under 'Overview', the router's details are listed: Name (RJCRouter), ID (9349d0cb-6b1a-4a44-b46c-3b4461738b92), Project ID (106610f9a1f242bbb62c6ac8db2a96ff), Status (Active), and Admin State (UP). Below this, the 'External Gateway' section shows the external network configuration: Network Name (public), Network ID (1fd0a21e-e700-46ae-9f05-0b3164daafcc), External Fixed IPs (Subnet ID 7913ade1-01e3-44fa-9863-91867c0d23ab, IP Address 8.43.87.39), and SNAT (Enabled). A red 'Clear Gateway' button is located in the top right corner of the main content area.

Go to Interfaces->

Router Details

Project ▾

Compute ▾

Network ▾

Network Topology

Networks

Routers

Object Store ▾

Identity ▾

Clear Gateway ▾

Overview Interfaces Static Routes

+ Add Interface

	Name	Fixed IPs	Status	Type	Admin State	Actions
No items to display.						

Displaying 0 items

Add Interface

Add Interface

Subnet *

RJC: 192.168.27.0/24 (RJCSUB)

IP Address (optional) ?

Router Name *

RJCRouter

Router ID *

9349d0cb-6b1a-4a44-b46c-3b4461738b92

Description:

You can connect a specified subnet to the router.

The default IP address of the interface created is a gateway of the selected subnet. You can specify another IP address of the interface here. You must select a subnet to which the specified IP address belongs from the above list.

Cancel Add interface

Click on Add Interface

The screenshot shows the openstack interface with the title "Router Details". The left sidebar has sections for Project, Compute, Network, Object Store, and Identity. The "Routers" section is currently selected. The main content area displays a table of router interfaces. The table has columns: Name, Fixed IPs, Status, Type, Admin State, and Actions. One row is shown: (8dd6b037-6bf0) with IP 192.168.27.1, Status Build, Type Internal Interface, Admin State UP. Buttons for "+ Add Interface" and "Delete Interfaces" are at the top right of the table.

	Name	Fixed IPs	Status	Type	Admin State	Actions
<input type="checkbox"/>	(8dd6b037-6bf0)	192.168.27.1	Build	Internal Interface	UP	<button>Delete Interface</button>

Go to Compute -> Acess & Security

The screenshot shows the openstack interface with the title "Access & Security". The left sidebar has sections for Project, Compute, Network, Object Store, and Identity. The "Access & Security" section is currently selected. The main content area displays a table of security groups. The table has columns: Name, Description, and Actions. One row is shown: default with Description Default security group. A button for "Manage Rules" is at the top right of the table.

	Name	Description	Actions
<input type="checkbox"/>	default	Default security group	<button>Manage Rules</button>

Click on Manage Rules

Manage Security Group Rules: default
(f75cb1d2-2f94-4e2b-902c-aa9b6cae607)

	Direction	Ether Type	IP Protocol	Port Range	Remote IP Prefix	Remote Security Group	Actions
<input type="checkbox"/>	Ingress	IPv6	Any	Any	-	default	<button>Delete Rule</button>
<input type="checkbox"/>	Egress	IPv6	Any	Any	::/0	-	<button>Delete Rule</button>
<input type="checkbox"/>	Ingress	IPv4	Any	Any	-	default	<button>Delete Rule</button>
<input type="checkbox"/>	Egress	IPv4	Any	Any	0.0.0.0/0	-	<button>Delete Rule</button>
<input type="checkbox"/>	Ingress	IPv4	ICMP	Any	0.0.0.0/0	-	<button>Delete Rule</button>
<input type="checkbox"/>	Ingress	IPv4	TCP	22 (SSH)	0.0.0.0/0	-	<button>Delete Rule</button>

Displaying 6 items

Click on AddRule & select following options

Add Rule

Rule *

Direction

Type

Code

Remote *

Description:

Rules define which traffic is allowed to instances assigned to the security group. A security group rule consists of three main parts:

Rule: You can specify the desired rule template or use custom rules, the options are Custom TCP Rule, Custom UDP Rule, or Custom ICMP Rule.

Open Port/Port Range: For TCP and UDP rules you may choose to open either a single port or a range of ports. Selecting the "Port Range" option will provide you with space to provide both the starting and ending ports for the range. For ICMP rules you instead specify an ICMP type and code in the spaces provided.

Remote: You must specify the source of the traffic to be allowed via this rule. You may do so either in the form of an IP address block (CIDR) or via a source group (Security Group). Selecting a security group as the source will allow any other instance in that security group access to any other instance via this rule.

Again click on AddRule & now insert following options

openstack

facebook1044926395592108

Project

Compute

Access & Security

Network

Object Store

Identity

Add Rule

Rule *

Custom TCP Rule

Direction

Ingress

Open Port *

Port

Port ?

22

Remote *

CIDR

CIDR ?

0.0.0.0/0

Description:

Rules define which traffic is allowed to instances assigned to the security group. A security group rule consists of three main parts:

Rule: You can specify the desired rule template or use custom rules, the options are Custom TCP Rule, Custom UDP Rule, or Custom ICMP Rule.

Open Port/Port Range: For TCP and UDP rules you may choose to open either a single port or a range of ports. Selecting the "Port Range" option will provide you with space to provide both the starting and ending ports for the range. For ICMP rules you instead specify an ICMP type and code in the spaces provided.

Remote: You must specify the source of the traffic to be allowed via this rule. You may do so either in the form of an IP address block (CIDR) or via a source group (Security Group). Selecting a security group as the source will allow any other instance in that security group access to any other instance via this rule.

Cancel Add

Actions

Delete Rule

After adding 2 rules

openstack

facebook1044926395592108

Project

Compute

Overview

Instances

Volumes

Images

Access & Security

Network

Object Store

Identity

Manage Security Group Rules: default
(f75cb1d2-2f94-4e2b-902c-aa9b6caee607)

+ Add Rule × Delete Rules

	Direction	Ether Type	IP Protocol	Port Range	Remote IP Prefix	Remote Security Group	Actions
<input type="checkbox"/>	Ingress	IPv6	Any	Any	-	default	<button>Delete Rule</button>
<input type="checkbox"/>	Egress	IPv6	Any	Any	::/0	-	<button>Delete Rule</button>
<input type="checkbox"/>	Ingress	IPv4	Any	Any	-	default	<button>Delete Rule</button>
<input type="checkbox"/>	Egress	IPv4	Any	Any	0.0.0.0/0	-	<button>Delete Rule</button>
<input type="checkbox"/>	Ingress	IPv4	ICMP	Any	0.0.0.0/0	-	<button>Delete Rule</button>
<input type="checkbox"/>	Ingress	IPv4	TCP	22 (SSH)	0.0.0.0/0	-	<button>Delete Rule</button>

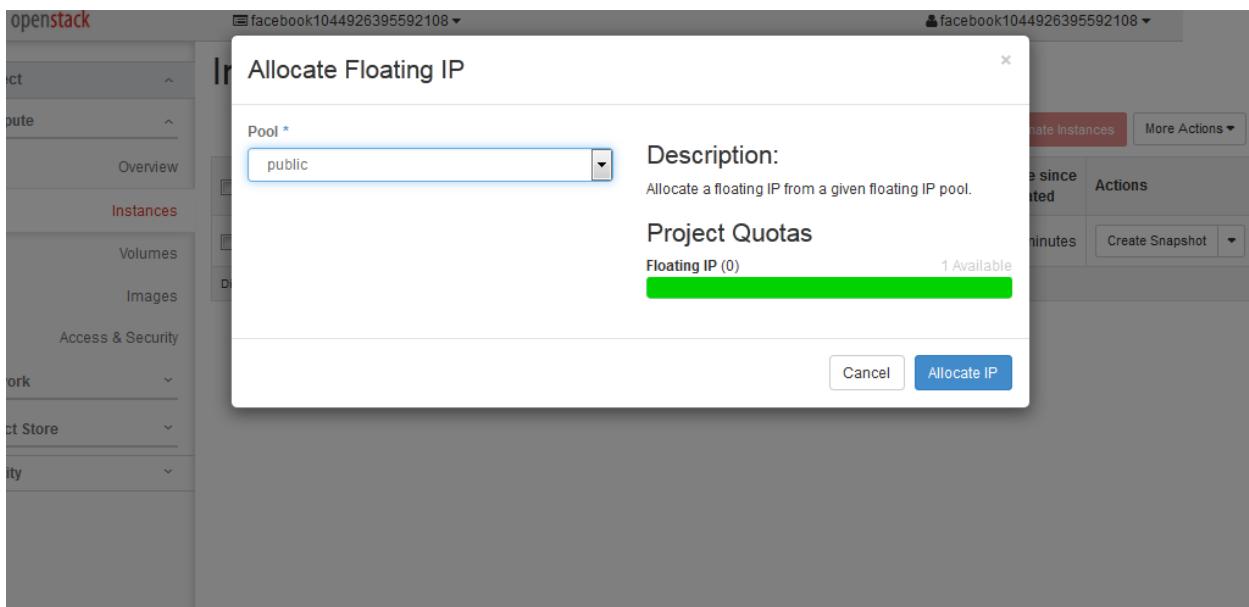
Displaying 6 items

Go to Instancedrop down create snapshot & select Associate floating IP

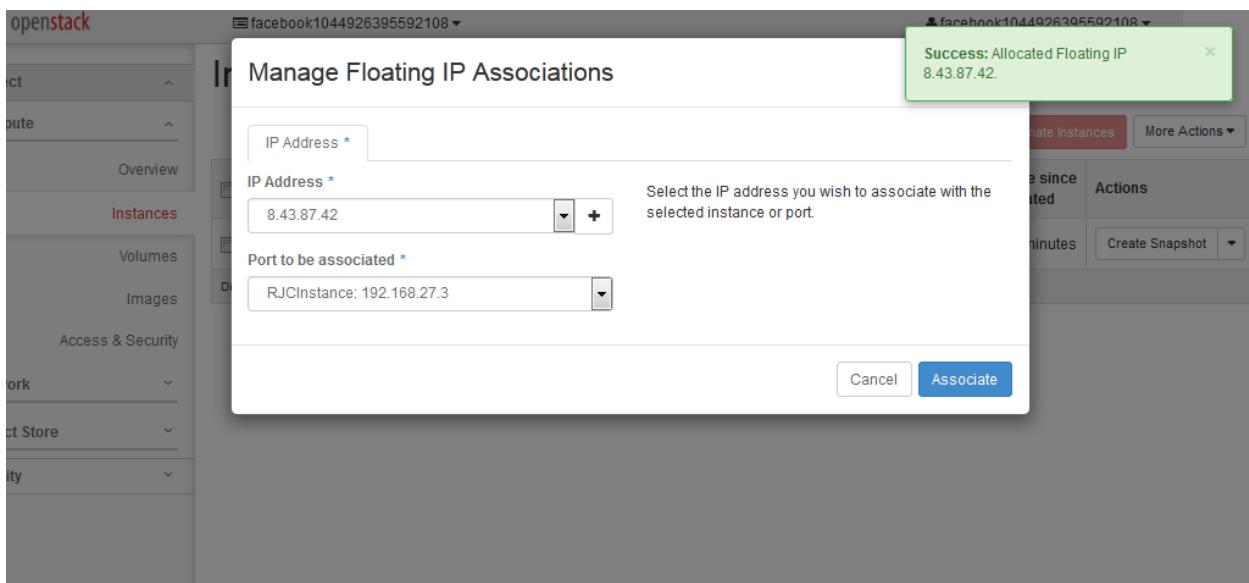
The screenshot shows the OpenStack Instances page. On the left, there's a sidebar with links for Overview, Instances (which is selected), Volumes, Images, Access & Security, and Store. The main area has a table titled "Instances" with columns: Instance Name, Image Name, IP Address, Size, Key Pair, Status, Availability Zone, Task, Power State, Time since created, and Actions. A single row is selected for "RJInstance". A context menu is open over this row, listing various actions: Associate Floating IP, Attach Interface, Detach Interface, Edit Instance, Edit Security Groups, Console, View Log, Pause Instance, Suspend Instance, Shelve Instance, Resize Instance, Lock Instance, Unlock Instance, Soft Reboot Instance, Hard Reboot Instance, Shut Off Instance, and Rebuild Instance.

The screenshot shows a modal dialog titled "Manage Floating IP Associations". It has fields for "IP Address *" (dropdown menu showing "No floating IP addresses allocated" with a "+" sign) and "Port to be associated *" (dropdown menu showing "RJInstance: 192.168.27.3"). A message box at the top right says "Success: Allocated Floating IP 8.43.87.42". The background is dimmed, and there are "Associate" and "Cancel" buttons at the bottom of the dialog.

Click on “+” sign



Click on Allocate IP



Click on Associate

openstack

Project ▾

Compute ▾

- Overview
- Instances**
- Volumes
- Images

Access & Security

Network ▾

Object Store ▾

Identity ▾

Instances

facebook1044926395592108 ▾

Instances

Instance Name	Image Name	IP Address	Size	Key Pair	Status	Availability Zone	Task	Power State	Time since created	Actions
RJCinstance	CentOS7	192.168.27.3 Floating IPs: 8.43.87.42	m1.small	updatekey	Active	nova	None	Running	25 minutes	Create Snapshot

Displaying 1 item

Go to Network -> Network Topology

openstack

Project ▾

Compute ▾

Network ▾

- Network Topology**
- Networks
- Routers

Object Store ▾

Identity ▾

Network Topology

facebook1044926395592108 ▾

Network Topology

Resize the canvas by scrolling up/down with your mouse/trackpad on the topology. Pan around the canvas by clicking and dragging the space behind the topology.

[Toggle labels](#) [Toggle Network Collapse](#) [Launch Instance](#) [Create Network](#) [Create Router \(Quota exceeded\)](#)

```

graph LR
    Cloud((Cloud)) --- Switch((Switch))
    Monitor((Monitor)) --- Switch
  
```

Conclusion : Successfully evaluated a private cloud.

Practical 6:

Implement FOSS-Cloud Functionality - VDI (Virtual Desktop Infrastructure)

FOSS-Cloud (FOSS-Cloud software and hardware) is an integrated and redundant server infrastructure to provide virtualization- and cloud-services, Windows or Linux based SaaS-, Terminal Server-, Virtual Desktop Infrastructure (VDI) or virtual server environments.

FOSS-Cloud covers all aspects of a virtualized IT environment. FOSS-Cloud is a pure Open Source solution, is licensed under [EUPL](#) and is available on the sourceforge.net. FOSS-Cloud is the most advanced Open Source Cloud.

FOSS-Cloud is a cost-effective alternative to Citrix and VMware.

We can Build our own private- or public-Cloud!

Functionality

- VDI (Virtual Desktop Infrastructure)
- VSI (Virtual Server Infrastructure)
 - Infrastructure as a Service (IaaS)
 - Platform as a Service (PaaS)
 - Software as a Service (SaaS)
- Storage Cloud

Features

- Full integration into existing Windows and Linux environments
- Cloud for server- and desktop virtualization
- Powerful virtualization for Windows and Linux 32/64bit
- Published Desktop
- Persistent virtual machines including session transfer to other devices
- Dynamic desktop with Golden Image to serve user groups
- Application streaming
- Published application support with RDS
- Video streaming (M-Jpeg)
- High resolution display
- Pools of network- and hardware-resources or virtual machines
- VDI access through Windows and Linux, PXE boot and handhelds
- Bi-directional audio and video
- Smartcard authentication (including pass through)
- USB redirection

- Web-based management console
- Multi-tenancy

Minimal Requirements

Your server should fulfill the following minimal requirements on each node:

- Dedicated hardware
- 64-Bit Intel with VT-Technology
- 4 Gigabyte memory
- 320 Gigabyte disk space

The **Demo System** is really just a playing environment and not for professional use. It is very easy to [install](#). The Demo System is made to get a feeling of the possibilities of the FOSS-Cloud.

Limitation of Demo System

There is no access to the [VMs](#) from outside of FOSS-Cloud. That means, for example, pinging a VM is not possible.

Steps to implement FOSS Cloud Demo System

Linux

First download the appropriate iso image from sourceforge:

```
root # wget http://sourceforge.net/projects/foss-cloud/files/X.X.X/foss-cloud-installer-X.X.X.iso
```

Most modern LiveCD's, like Gentoo are already in hybrid mode. If your LiveUSB doesn't boot then you have to convert it to hybrid mode. Hybrid mode means image that can be booted from either DVD or USB drive.

```
root # isohybrid foss-cloud-installer-X.X.X.iso
```

Write the LiveCD image to the USB drive

```
root # dd if=foss-cloud-installer-X.X.X.iso of=/dev/sdb bs=4M
```

Check the USB device. In our case it

To create a live DVD on a Windows-PC, is /dev/sdb.

Windows

1. Do a right-click on the ISO-image and burn the DVD. To create a liveUSB-stick, download a tool like "liveUSB creator"
2. In the BIOS setup, enable VT technology for the CPU Options
3. Insert the FOSS-Cloud CD and boot the server.

Answer the questions as follows (the bold values are examples can be set through the administrator and are variable, according to the local setup):

Warning: ALL DATA WILL BE LOST!

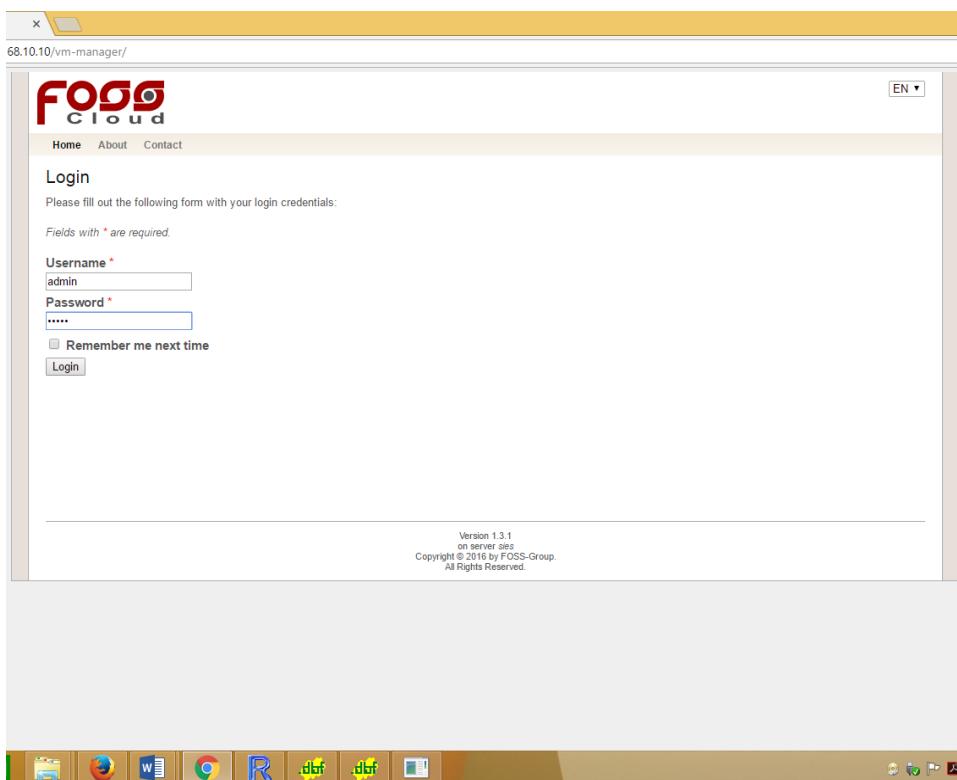
1. Choose your keymap

1 azerty	2 be	3 bg
4 br-a	5 br-l	6 by
7 cf	8 croat	9 cz
10 de	11 dk	12 dvorak
13 es	14 et	15 fi
16 fr	17 gr	18 hu
19 il	20 is	21 it
22 jp	23 la	24 lt
25 mk	26 nl	27 no
28 pl	29 pt	30 ro
31 ru	32 se	33 sg
34 sk-y	35 sk-z	36 slovene
37 trf	39 ua	40 uk
41 us	42 wangbe	43 fr_CH
44 speakup	45 cs_CZ	46 de_CH
47 sg-lat1	48 fr-bepo	49 colemak

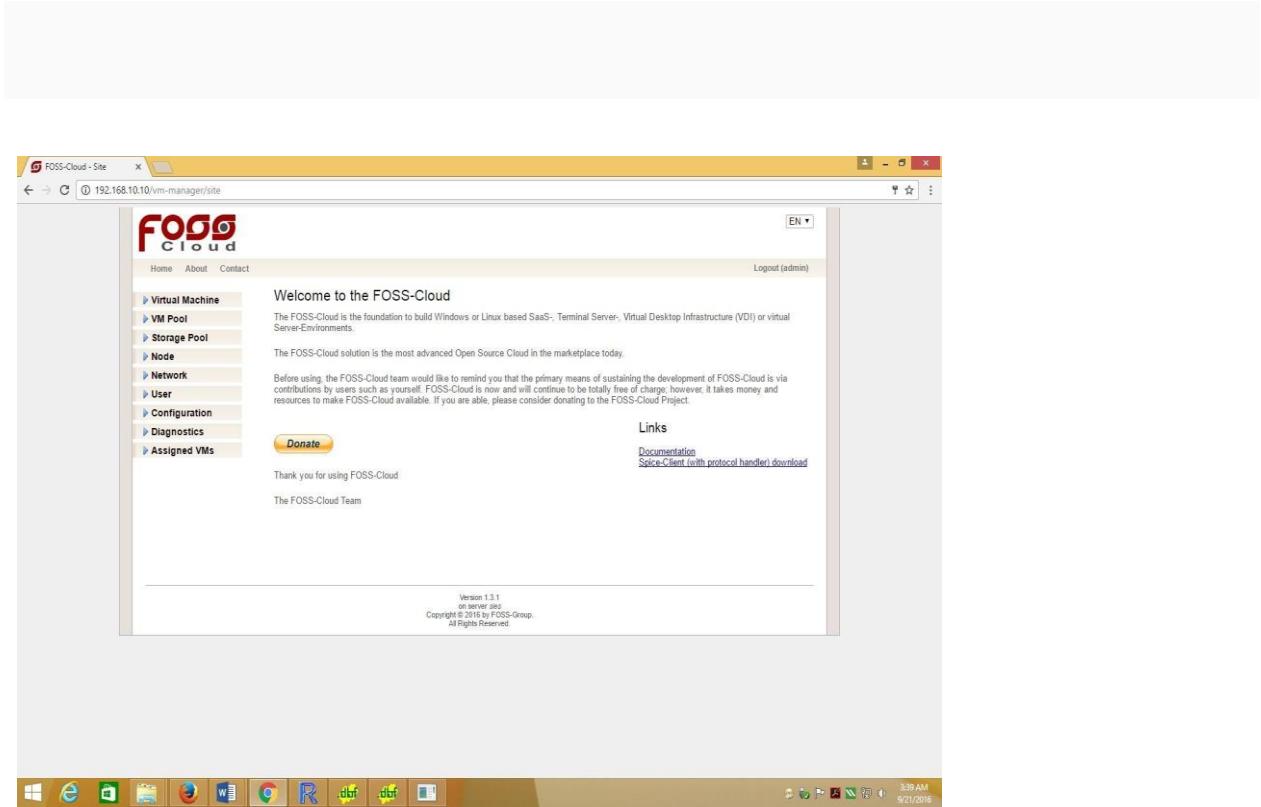
2. Confirm that you want to start: yes
3. Choose Single-Server: 1

- 4. Choose a Block-Device: **sda****
5. Confirm that you want to continue: yes
6. Confirm that you want to continue: yes
- 7. Choose the network interface: **eth0****
8. Choose if you want to use automatic network configuration: no
9. Choose hostname: e.g. foss-cloud
10. Choose domain name: e.g. foss-cloud.org
- 11. Choose a free IP address in your home network: **192.168.10.10****
- 12. Choose the network mask in CIDR format: **24****
- 13. Choose the broadcast IP address: **192.168.1.255****
14. Confirm your entries: yes
- 15. Enter the IP address of your gateway: **192.168.1.1****
- 16. Enter the IP address of your DNS resolver: **192.168.1.1****
17. Do you like another DNS resolver: no
18. Confirm your entries: yes
19. Reboot your system: yes
20. Install [Patch: Missing_roles_of_VM-User](#)

Access your IP **192.168.10.10** with a web browser and login with *admin* and the password *admin*



Home page of FOSS Cloud at Client



Uploading ISO files to foss cloud

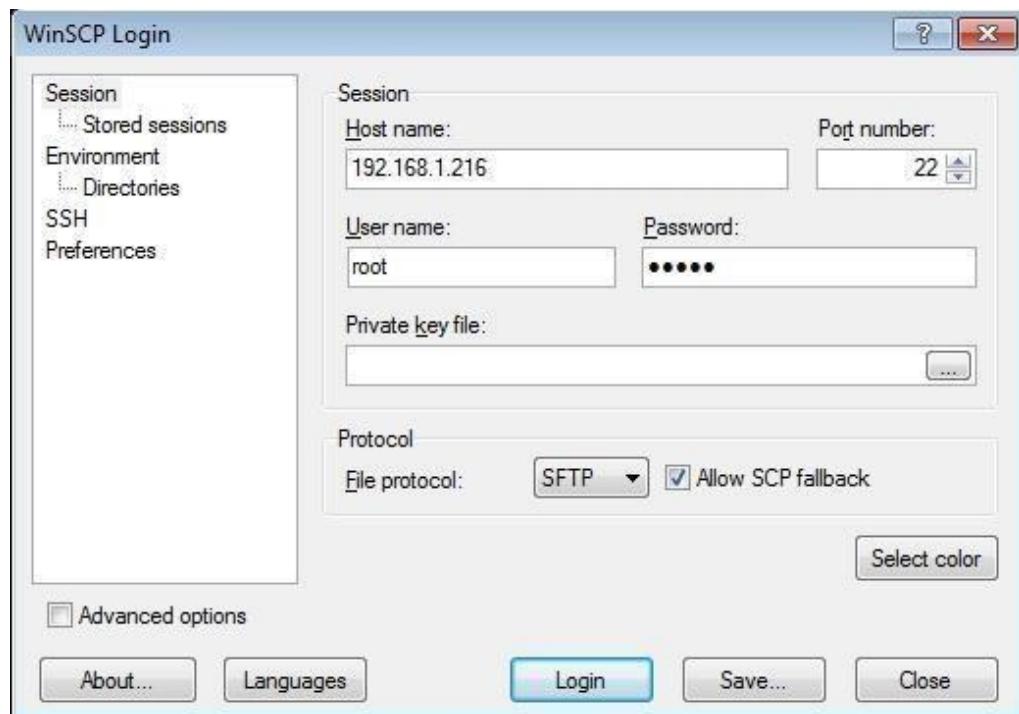
ISO files need to be uploaded manually.

Windows

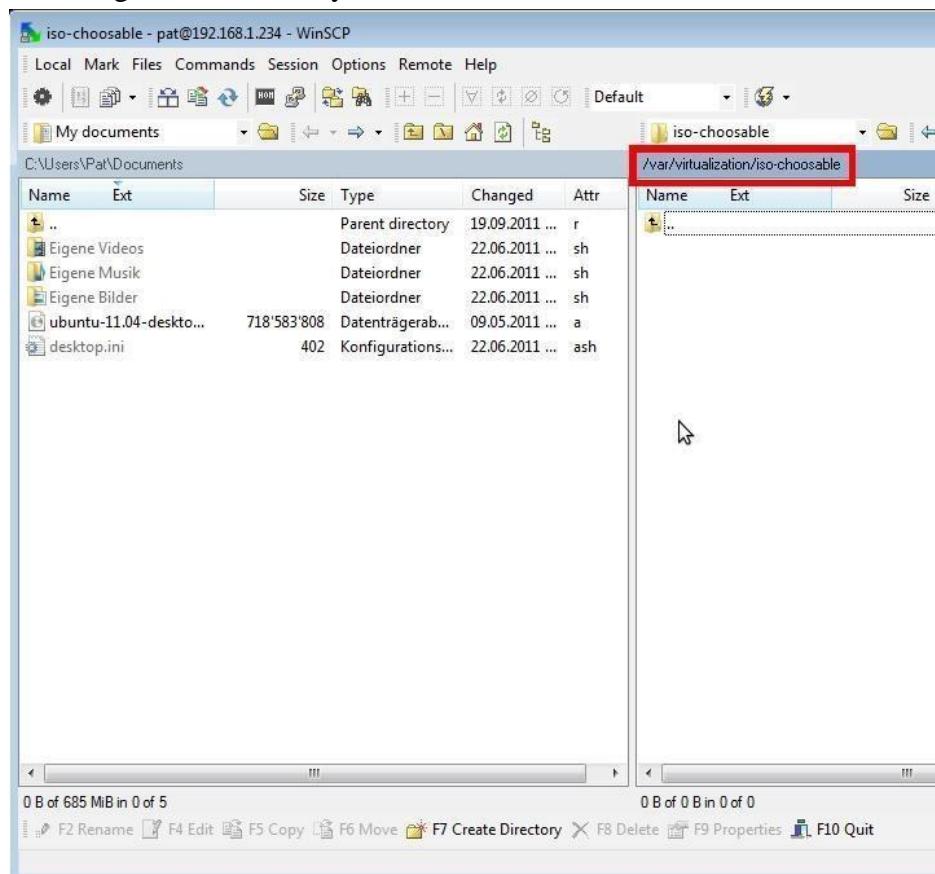
- Local Windows computer with WinSCP installed ([Download WinSCP](#))
- You've downloaded a ISO-File to your computer. This example is done with: ubuntu-11.04-desktop-i386.iso
- The IP-address of the FOSS-Cloud Node. This example is done with: 192.168.1.216

Run WinSCP and establish a connection to the FOSS-Cloud Node:

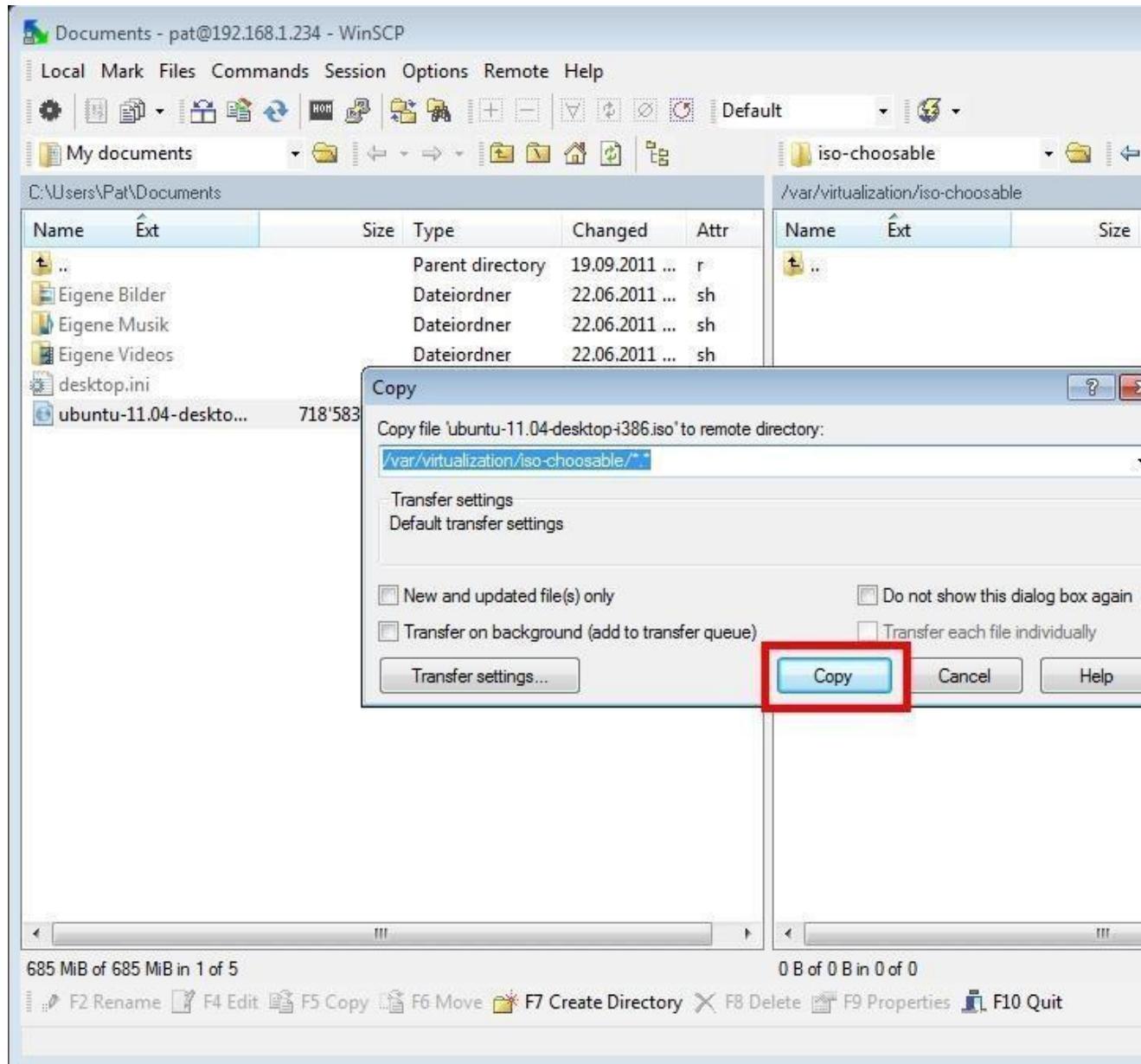
username: root password: admin:



On the guest machine change to the '/var/virtualization/iso-choosable' direcotry. On the host, change to the directory the ISO-file is located:

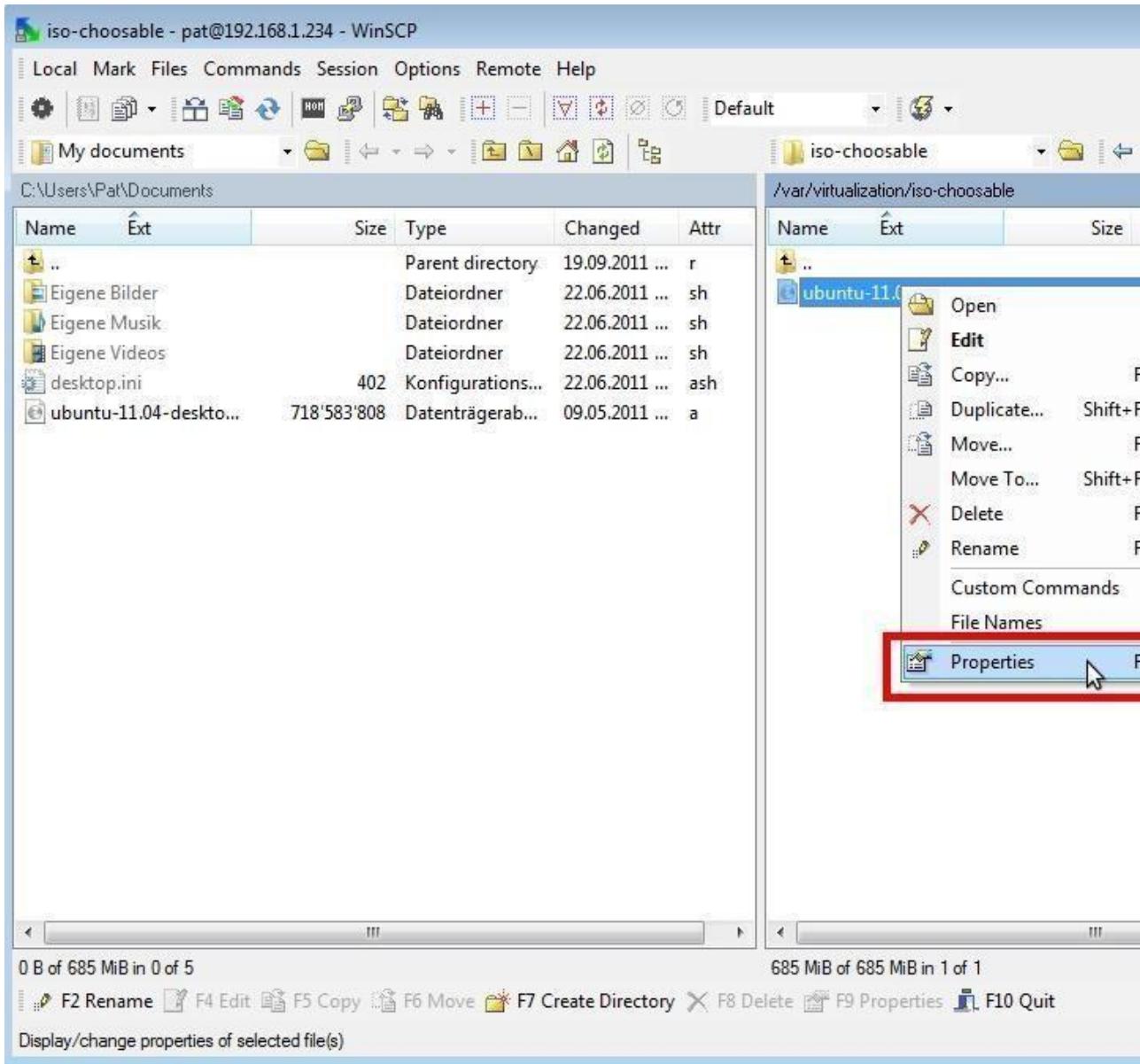


Drag (Drag & Drop) the ISO-file in the '/var/virtualization/iso-choosable' directory and commit the copy:



After the copy, right-click on the ubuntu-11.04-desktop-i386.iso file in the '/var/virtualization/iso-choosable' directory and select 'properties'.

Or simply select the ISO-file and press 'F9':



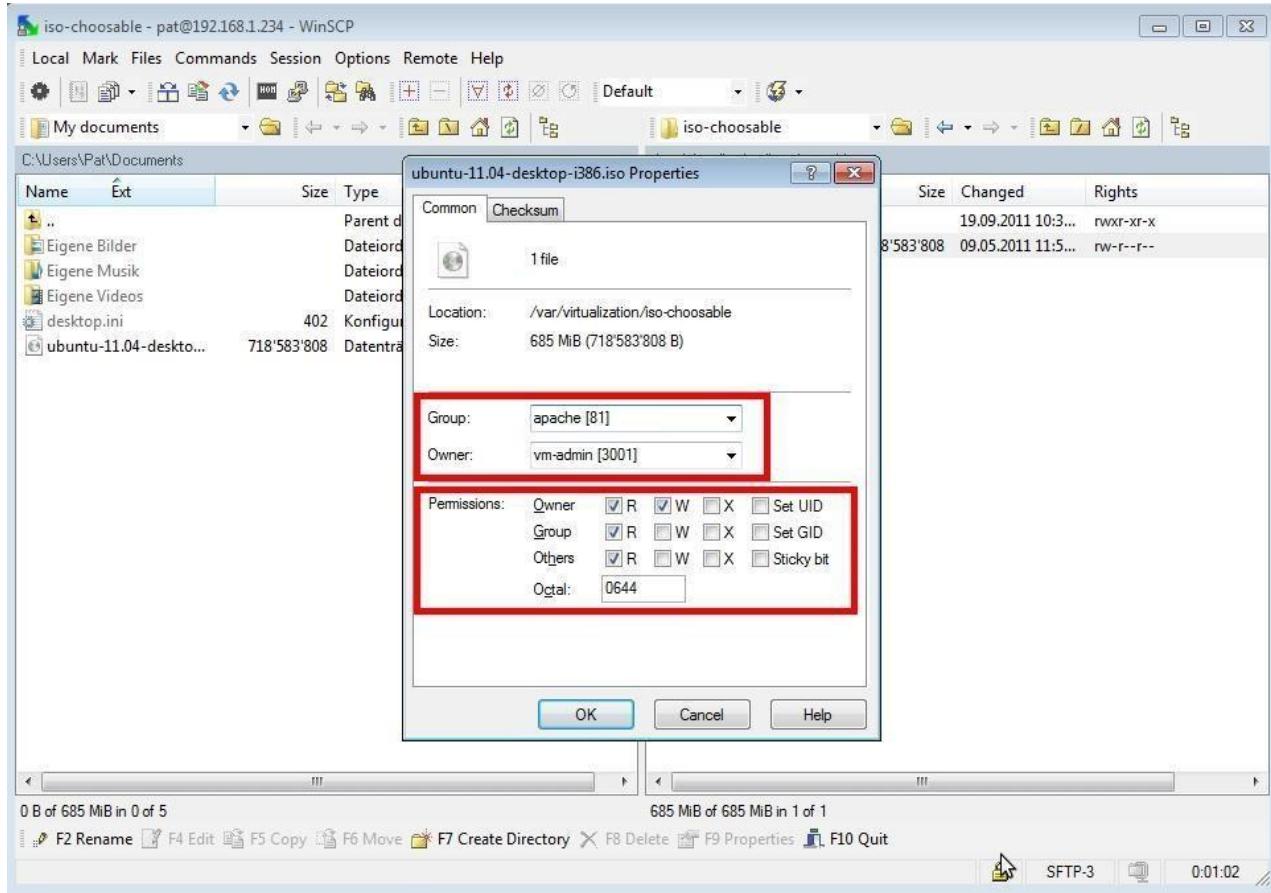
Set the files ownership as follows:

- Group: root
- Owner vm-storage **Caution the UID may be different to 3000**

And the rights:

- Owner: R and W
- Group: R

- Other: R Or octal: 0644



When you create a new **Virtual Machine Profile**, the uploaded ISO-file will be listed.

Linux

Upload ISO with scp

- Local Linux computer with shell access.
- You've downloaded a ISO-File to your computer. This example is done with openSUSE-11.3-KDE4-LiveCD-i686.iso
- The IP-address of the FOSS-Cloud Node is 192.168.1.216.

Upload the ISO-file with Secure Copy (scp). The root password is admin:

```
root# scp openSUSE-11.3-KDE4-LiveCD-i686.iso
root@192.168.1.216:/var/virtualization/iso-choosable/.
```

Make sure, that you have the correct permissions on the newly uploaded file:

```
root# cd /var/virtualization/iso-choosable
```

```
ls -al
```

```
-rw-r--r-- 1 root vm-storage 728760320 Mär 24 17:54 openSUSE-11.4-KDE-LiveCD-x86_64.iso
```

If not, you can set them as follows:

```
root# chown root:vm-storage openSUSE-11.4-KDE-LiveCD-x86_64.iso
```

```
root# chmod 644 openSUSE-11.4-KDE-LiveCD-x86_64.iso
```

When you create a new **Virtual Machine Profile**, the uploaded ISO-file will be listed. **Upload ISO with wget**

Login to a VM node as root, then execute the following command

```
root# cd /var/virtualization/iso-choosable/  
root# wget http://<your\_download\_Link/>  
root# chown apache:vm-storage <your_image.iso>  
root# chmod 644 <your_image.iso>
```

Examples:

```
root# wget http://download.fedoraproject.org/pub/fedora/linux/releases/19/Live/x86\_64/Fe\_dora-Live-Desktop-x86\_64-19-1.iso
```

```
root# wget http://mirror.switch.ch/ftp/mirror/centos/6.5/isos/x86\_64/CentOS-6.5-x86\_64-netinstall.iso
```

Practical 7

Implement FOSS-Cloud Functionality VSI (Virtual Server Infrastructure)

Infrastructure as a Service (IaaS)

Creating Virtual Machines

Step 1.Create a Profile

FOSS-Cloud - Create VM

192.168.10.10/vm-manager/vmProfile/create.html

Create VM Profile

Fields with * are required.

Step I
Please select a profile first!

Step II
Overwrite the default values if necessary!

BaseProfile

- linux
 - default
 - 16bit
 - x86_64
 - multi
 - de-DE
 - de-AT
 - de-CH
 - en-US
 - en-GB
 - fr-CH
 - fr-FR
 - it-CH
 - it-IT
 - ubuntu
 - Fedora
 - windows

Isofile *
ubuntu-11.04-desktop-i386.iso
Fedora-Workstation-Live-x86_64-24-1.2.iso

Name *

Description *

Memory *
128 MB 128 GB

Volume Capacity *
10 GB 2048 GB 157 GB

CPU *

Clock Offset *

Create

Version 1.3.1
on server ses

2. Create VM Template

The screenshot shows the 'Create VmTemplate' page in the FOSS-Cloud interface. The left sidebar has a 'Virtual Machine' section with 'Create' selected, and other options like 'Persistent VMs', 'Dynamic VMs', and 'VM Templates'. Below that are sections for 'VM Pool', 'Storage Pool', 'Node', 'Network', 'User', 'Configuration', 'Diagnostics', and 'Assigned VMs'. The main area is titled 'Create VmTemplate' and includes a note: 'Fields with * are required.' It has two steps: Step I ('Please select a profile first!') and Step II ('Please choose a node and overwrite the default values if necessary!'). Step I shows a 'Profile' dropdown menu with 'linux', 'ubuntu', 'i386', 'multi' (selected), 'Fedora', and 'windows'. Step II shows a 'Vmpool *' dropdown, a 'Node *' dropdown, and input fields for 'Name *' (set to 'ubuntu'), 'Description *' (set to 'Ubuntu workstation'), 'Memory *' (set to 2 GB), and 'Volume Capacity *' (set to 15 GB). It also shows 'CPU *' (set to 1) and 'Clock Offset *' (set to 'utc'). At the bottom is a 'Number of displays' dropdown set to 1. The status bar at the bottom shows various icons and the date/time '3:46 AM 9/21/2016'.

3. Manage VM Templates

The screenshot shows a web-based management interface for a virtual machine pool. The title bar reads "FOSS-Cloud - VmTempla" and the address bar shows "192.168.10.10/vm-manager/vmTemplate/index.html". The main content area is titled "Manage VM Templates" and displays a table of VM templates. The table has columns: No., DisplayName, Status, Run Action, Memory, Node, and Action. There are two entries:

No.	DisplayName	Status	Run Action	Memory	Node	Action
1	ubuntu	stopped	→ ↴ ✎	---	sies.sies.org	
2	Fedora	stopped	→ ↴ ✎	---	sies.sies.org	

The left sidebar contains navigation links under "Virtual Machine" such as Persistent VMs, Dynamic VMs, VM Templates (selected), Create, Profiles, Create, and Upload ISO File. Other sections include VM Pool, Storage Pool, Node, Network, User, Configuration, Diagnostics, Assigned VMs, and Links (Download Spice Client). The bottom right corner shows the system tray with icons for network, battery, volume, and date/time (3:46 AM, 9/21/2016).

Implement FOSS-Cloud Functionality – VDI (Virtual Desktop Infrastructure)

Today, Linux distributions like Ubuntu, Suse, Fedora etc. contains the spice protocol in their distribution. The client is named virt- or remote-viewer. FOSS-Cloud needs the remote viewer which is part of the virt-viewer package. In general the client is working out of the box.

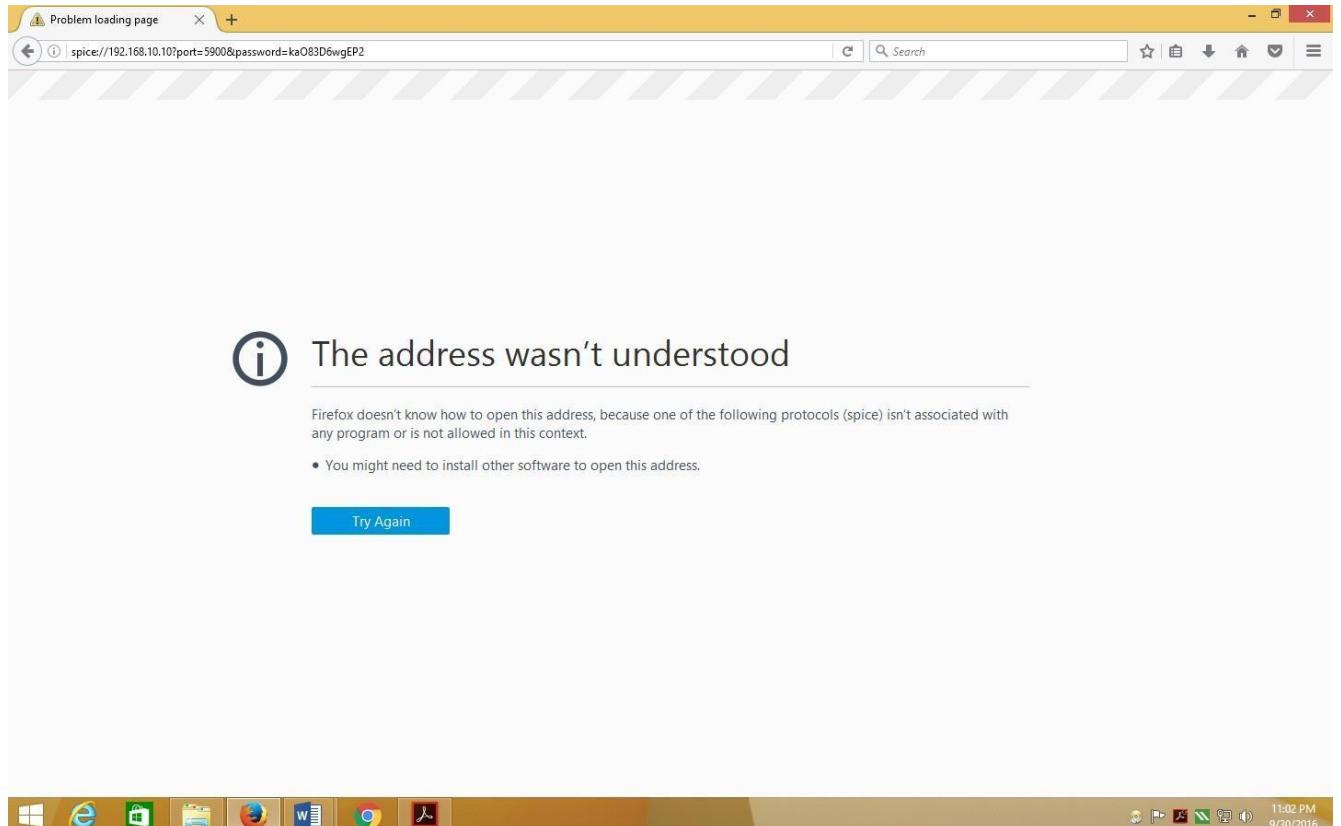
The screenshot shows the FOSS-Cloud VM Template management interface. The title bar reads "FOSS-Cloud - VmTemplis". The address bar shows the URL "192.168.10.10/vm-manager/vmTemplate/index.html". The main content area is titled "Manage VM Templates" and displays a table of VM templates. The table has columns: No., DisplayName, Status, Run Action, Memory, Node, and Action. There are two entries:

No.	DisplayName	Status	Run Action	Memory	Node	Action
1	Fedora	running	⇒ ⬇ ✎	2 GB / 2 GB	sies.sies.org	use VM Template
2	ubuntu	stopped	⇒ ⬇ ✎	...	sies.sies.org	

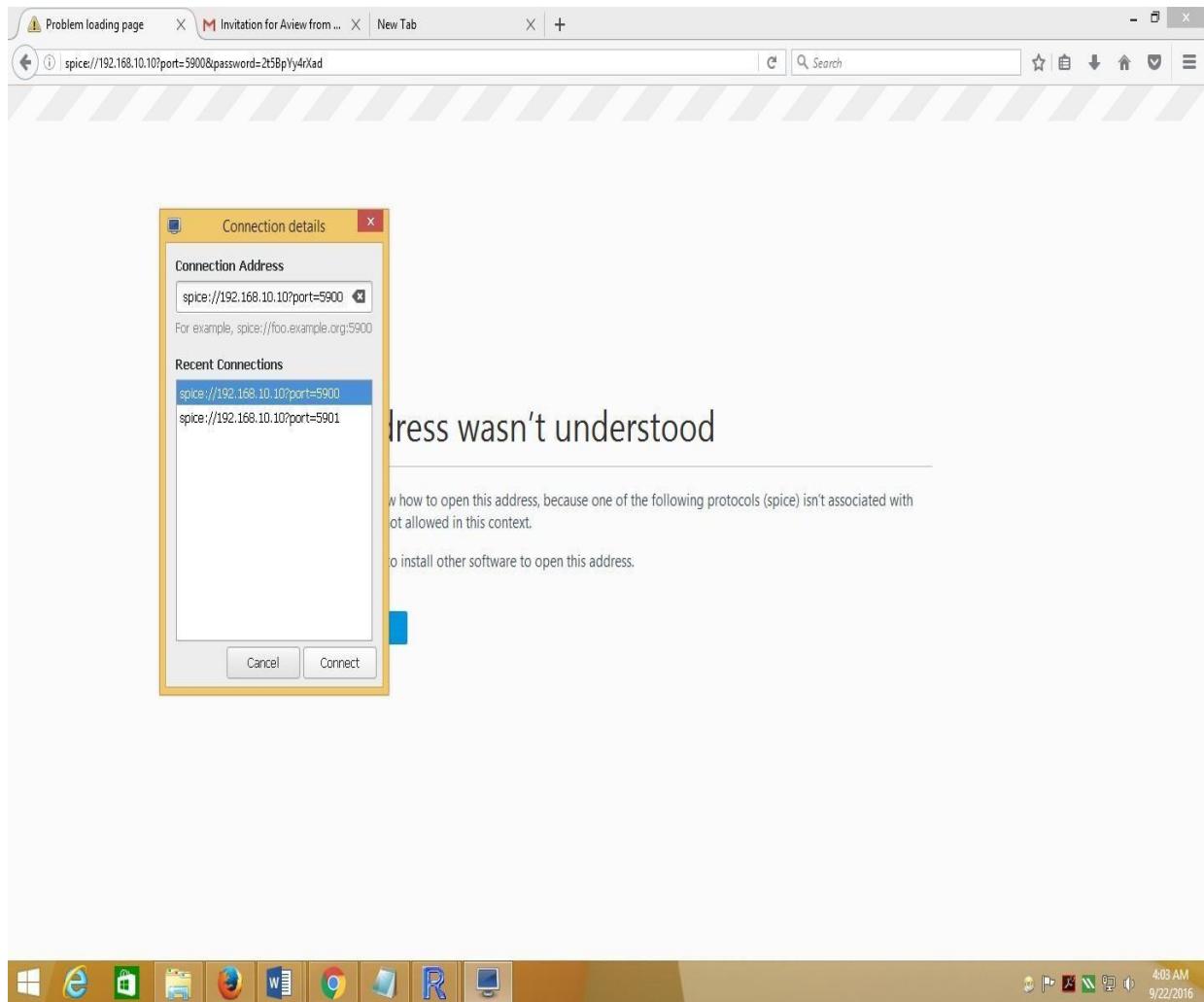
The left sidebar contains navigation links: Home, About, Contact, Virtual Machine (selected), Persistent VMs, Dynamic VMs, VM Templates (selected), Create, Profiles, Create, Upload ISO File, VM Pool, Storage Pool, Node, Network, User, Configuration, Diagnostics, Assigned VMs, and Links (Download Spice Client). The bottom right corner shows the system tray with icons for battery, signal, volume, and date/time (4:01 AM, 9/22/2016).

The Browser window opens up with following content in the address bar

spice://192.168.10.10?port=5900&password=kaO83D6wgEP2

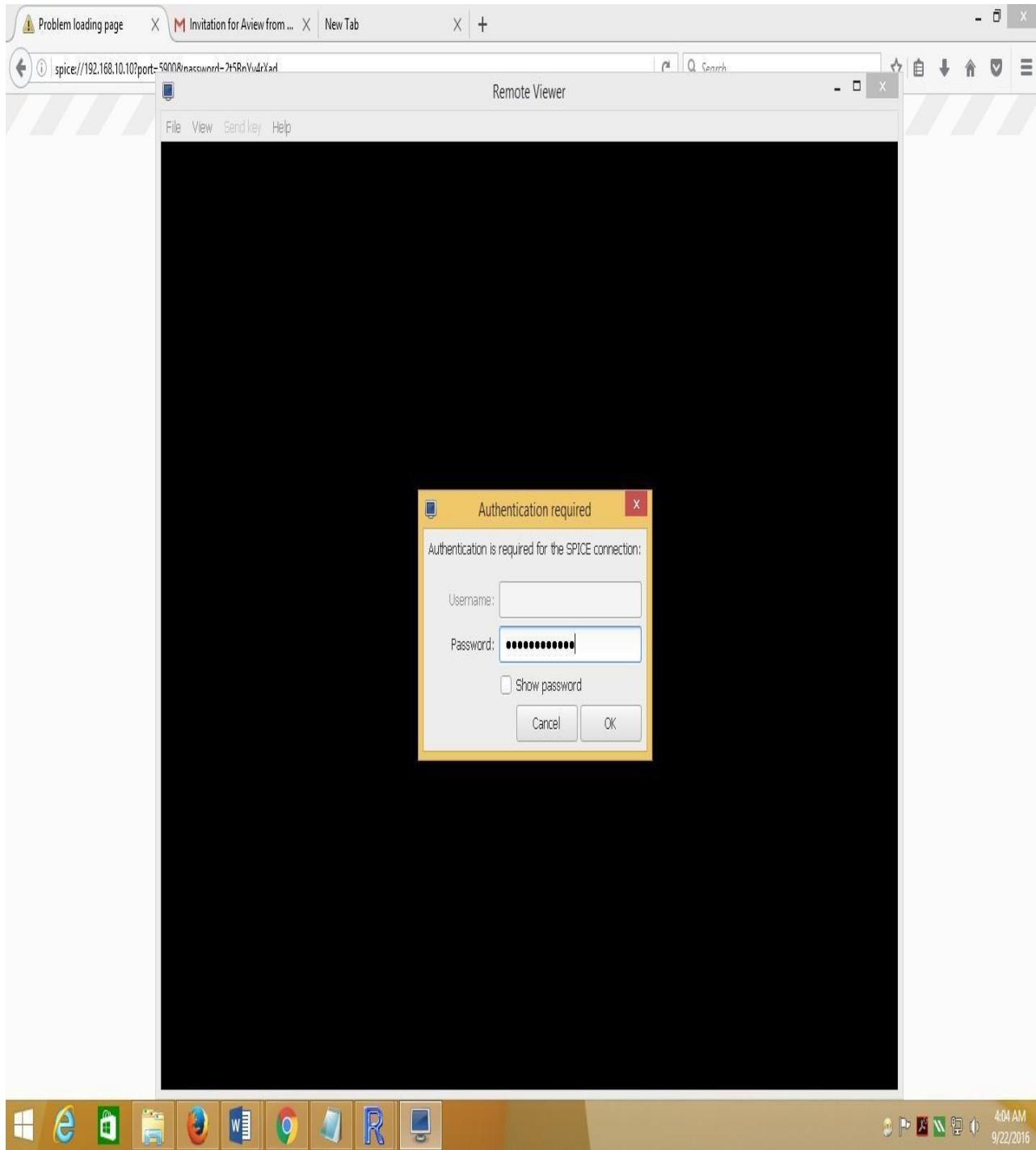


Open the Remote Viewer put the spice address in Connection Address as
spice://192.168.10.10?port=5900



Enter the password

password=kaO83D6wgEP2



The Virtual Desktop Interface opens up for that Virtual Machine as follows:

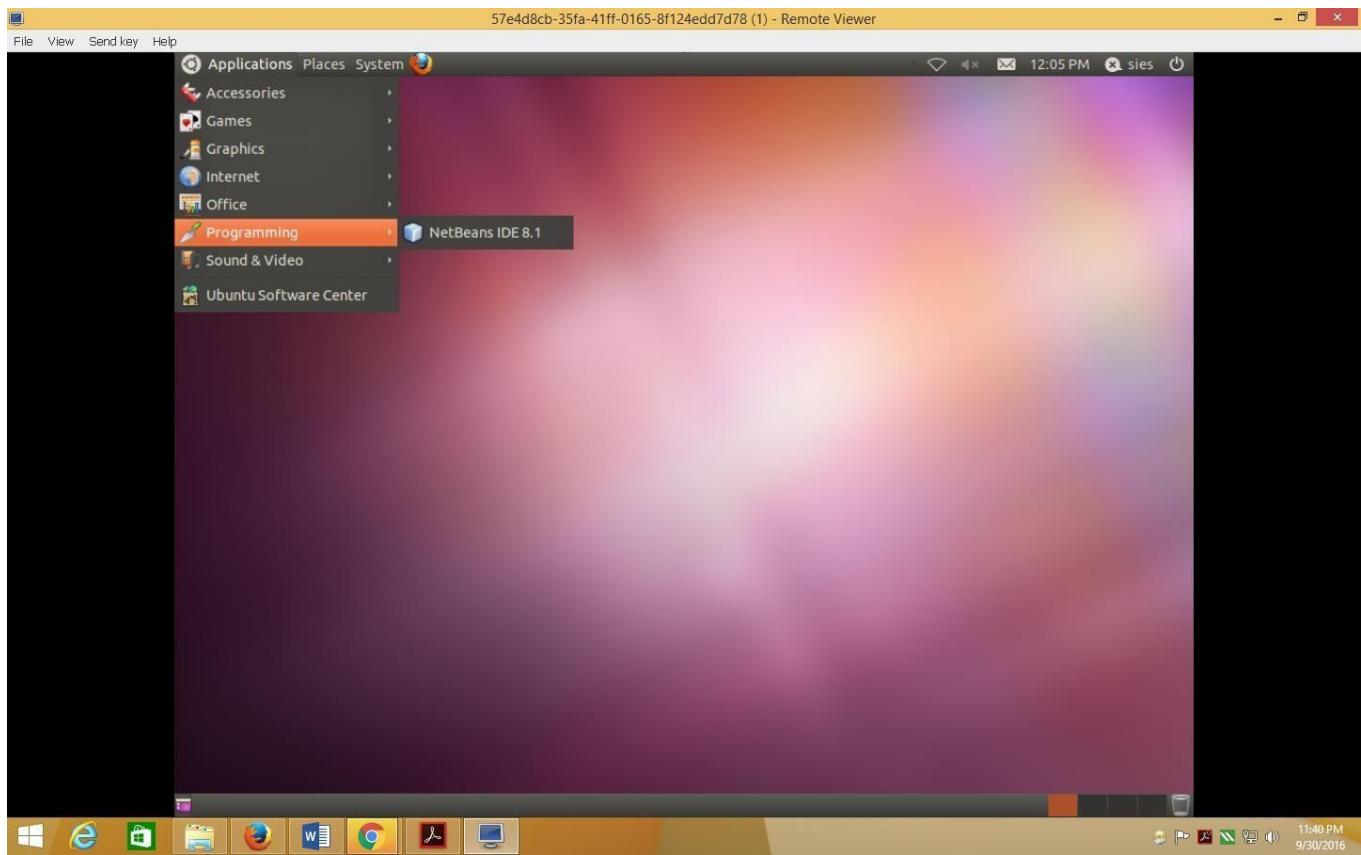


Practical 8

Implement FOSS-Cloud Functionality VSI (Virtual Server Infrastructure) Platform as a Service (PaaS)

Software development Kits can be made available in the Virtual Machines that can be implemented as Platform as a Service.

Installation of Netbeans, Eclipse, Visual Studio and DBMS can be done in the appropriate Virtual Machines.



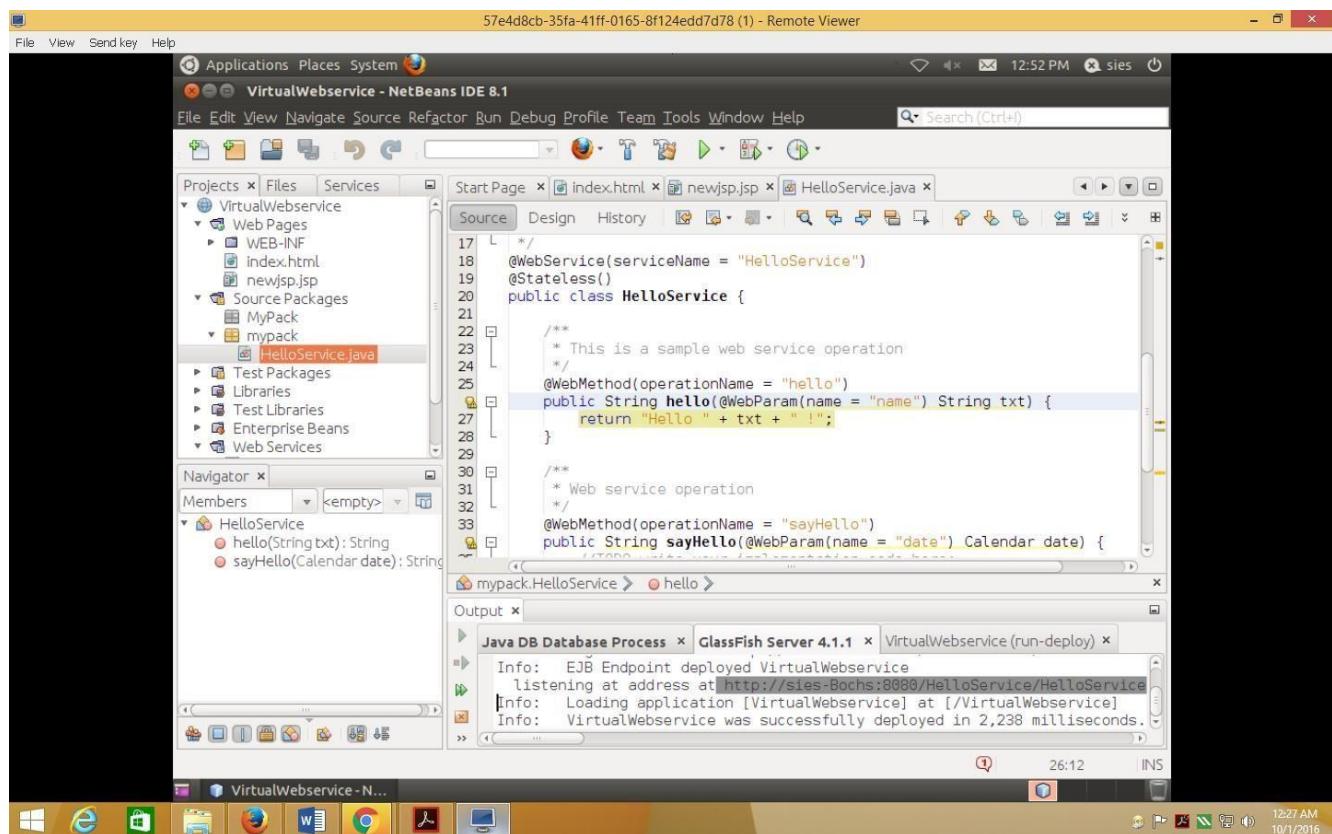
Practical 9

Implement FOSS-Cloud Functionality VSI (Virtual Server Infrastructure)

Software as a Service (SaaS)

Applications created and deployed in the virtual machines can be accessed by outside world.

This can be implemented as Software as Service.



This XML file does not appear to have any style information associated with it. The document tree is shown below.

```
<!-- Published by JAX-WS RI (http://jax-ws.java.net). RI's version is Metro/2.3.2-b608 (trunk-7979; 2015-01-21T12:50:19+0000) JAXWS-RI/2.2.11-b1 -->
<!-- Generated by JAX-WS RI (http://jax-ws.java.net). RI's version is Metro/2.3.2-b608 (trunk-7979; 2015-01-21T12:50:19+0000) JAXWS-RI/2.2.11-b1 -->
<definitions targetNamespace="http://mypack/" name="HelloService">
  <types>
    <xsd:schema>
      <xsd:import namespace="http://mypack/" schemaLocation="http://sies-bochs:8080/HelloService/HelloService?xsd=1"/>
    </xsd:schema>
  </types>
  <message name="hello">
    <part name="parameters" element="tns:hello"/>
  </message>
  <message name="helloResponse">
    <part name="parameters" element="tns:helloResponse"/>
  </message>
  <message name="sayHello">
    <part name="parameters" element="tns:sayHello"/>
  </message>
  <message name="sayHelloResponse">
    <part name="parameters" element="tns:sayHelloResponse"/>
  </message>
  <portType name="HelloService">
```

Practical 10

Aim: Explore GCP / AWS / Azure

Theory:

What is DynamoDB?

DynamoDB is a hosted NoSQL database offered by Amazon Web Services (AWS). It offers:

- reliable performance even as it scales;
- a managed experience, so you won't be SSH-ing into servers to upgrade the crypto libraries;
- a small, simple API allowing for simple key-value access as well as more advanced query patterns.

DynamoDB is a particularly good fit for the following use cases:

Applications with large amounts of data and strict latency requirements. As your amount of data scales, JOINs and advanced SQL operations can slow down your queries. With DynamoDB, your queries have predictable latency up to any size, including over 100 TBs!

Serverless applications using AWS Lambda. AWS Lambda provides auto-scaling, stateless, ephemeral compute in response to event triggers. DynamoDB is accessible via an HTTP API and performs authentication & authorization via IAM roles, making it a perfect fit for building Serverless applications.

Data sets with simple, known access patterns. If you're generating recommendations and serving them to users, DynamoDB's simple key-value access patterns make it a fast, reliable choice.

Steps:

- 1) Create table

The new DynamoDB console is now complete, and becomes your default experience

Following the preview phase in which we analyzed and incorporated your feedback, we have completed the new DynamoDB console, making it even easier for you to manage your data and resources. Let us know what you think. You can still choose to return to the previous console from the navigation pane.

Amazon DynamoDB

A fast and flexible NoSQL database service for any scale

DynamoDB is a fully managed, key-value, and document database that delivers single-digit-millisecond performance at any scale.

How it works

What is Amazon DynamoDB?

Get started

Create a new table to start exploring DynamoDB.

Create table

Pricing

DynamoDB charges for reading, writing, and storing data in your DynamoDB tables, along with any optional features you choose to enable. DynamoDB has on-demand capacity mode and provisioned capacity mode, and these modes have pricing for processing reads and writes on

Create table

Table details Info

DynamoDB is a schemaless database that requires only a table name and a primary key when you create the table.

Table name
This will be used to identify your table.
 Copy link

Between 3 and 255 characters, containing only letters, numbers, underscores (_), hyphens (-), and periods (.)

Partition key
The partition key is part of the table's primary key. It is a hash value that is used to retrieve items from your table and allocate data across hosts for scalability and availability.
 Number

1 to 255 characters and case sensitive.

Sort key - optional
You can use a sort key as the second part of a table's primary key. The sort key allows you to sort or search among all items sharing the same partition key.
 String

1 to 255 characters and case sensitive.

https://us-east-1.console.aws.amazon.com/dynamodbv2/home?region=us-east-1#create-table

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Read/write capacity [Info](#)
Using provisioned capacity mode. Read and write capacity are set to 5 units each with auto scaling enabled.

Secondary indexes [Info](#)
No secondary indexes have been created. Queries will be run by using the table's partition key and sort key only.

Key management for encryption at rest [Info](#)
Using the AWS owned key. This key is managed by DynamoDB at no extra cost.

Table class
Using DynamoDB Standard table class. The default general-purpose table class. Recommended for the vast majority of tables that store frequently accessed data, with throughput (reads and writes) as the dominant table cost.

Tags
Tags are pairs of keys and optional values, that you can assign to AWS resources. You can use tags to control access to your resources or track your AWS spending.

No tags are associated with the resource.
[Add new tag](#)
You can add 50 more tags.

Cancel [Create table](#)

https://us-east-1.console.aws.amazon.com/dynamodbv2/home?region=us-east-1#tables

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DynamoDB Creating the Zeeshan-practical-8 table. It will be available for use shortly.

Tables (1) [Info](#)

Name	Status	Partition key	Sort key	Indexes	Read capacity mode	Write capacity mode
Zeeshan-practical-8	Creating	Roll-no (S)	-	0	Provisioned with auto scaling (5)	Provisioned with auto scaling (5)

Dashboard

Tables

- Update settings
- Explore items

PartiQL editor [New](#)

Backups

Exports to S3

Reserved capacity

DAX

- Clusters
- Subnet groups
- Parameter groups
- Events

Tell us what you think

Return to the previous console experience

Screenshot of the AWS DynamoDB console showing the 'Tables' page for the 'Zeeshan-Practical-8' table.

The left sidebar shows navigation options like Dashboard, Tables, Update settings, Explore items, PartiQL editor, Backups, Exports to S3, Reserved capacity, DAX, Clusters, Subnet groups, Parameter groups, Events, Tell us what you think, and Return to the previous console experience.

The main content area displays the table details for 'Zeeshan-Practical-8'. It includes:

- General information:** Partition key (Roll-no (Number)), Sort key (-), Capacity mode (Provisioned), Table status (Active, No active alarms).
- Items summary:** Item count (0), Table size (0 bytes), Average item size (0 bytes). A 'Get live item count' button is available.

Actions dropdown menu options include: Edit capacity, Update table class, Delete table, Create item, Create index, Create replica, Export to S3, Enable TTL, Manage tags, and Create access control policy.

Screenshot of the AWS DynamoDB console showing the 'Tables' page for the 'Zeeshan-Practical-8' table.

The left sidebar shows navigation options like Dashboard, Tables, Update settings, Explore items, PartiQL editor, Backups, Exports to S3, Reserved capacity, DAX, Clusters, Subnet groups, Parameter groups, Events, Tell us what you think, and Return to the previous console experience.

The main content area displays the table details for 'Zeeshan-Practical-8'. It includes:

- General information:** Partition key (Roll-no (Number)), Sort key (-), Capacity mode (Provisioned).
- Items summary:** Item count (0), Table size (0 bytes), Average item size (0 bytes). A 'Get live item count' button is available.

Actions dropdown menu options include: Edit capacity, Update table class, Delete table, Create item, Create index, Create replica, Export to S3, Enable TTL, Manage tags, and Create access control policy.

Screenshot of the AWS DynamoDB console showing the 'Items' page for the 'Zeeshan-Practical-8' table.

The left sidebar shows navigation options like Dashboard, Tables, Update settings, Explore items, PartiQL editor, Backups, Exports to S3, Reserved capacity, DAX, Clusters, Subnet groups, Parameter groups, Events, Tell us what you think, and Return to the previous console experience.

The main content area displays the table details for 'Zeeshan-Practical-8'. It includes:

- Scan/Query items:** Scan, Query buttons.
- Table or index:** Zeeshan-Practical-8
- Filters:** Attribute name (Enter attribute), Type (String), Condition (Equal to), Value (Enter attribute), Remove button, Add filter button.

Action buttons: Run, Reset.

2) Create Item

The screenshot shows the AWS DynamoDB Item Editor interface. At the top, there's a navigation bar with links like 'Most Visited', 'Web Development Co...', 'Web Development Co...', 'Seán Halpin - a web d...', 'Free Vector Icons and ...', and 'Getting Started'. Below the navigation is a search bar and a dropdown for 'Region' set to 'N. Virginia'. The main area is titled 'Create item' and has tabs for 'Form' and 'JSON'. Under the 'Attributes' section, there are three fields: 'Roll-no - Partition key' with value '99' (Type: Number), 'Name' with value 'Goliath' (Type: String), and 'Phone-No' with value '6969696969' (Type: Number). There are 'Add new attribute' and 'Remove' buttons. At the bottom right are 'Cancel' and 'Create Item' buttons.

3) Scan Items.

The screenshot shows the 'Items returned' page with a status message 'Completed' and 'Read capacity units consumed: 0.5'. Below it, a table displays three items with columns: 'Roll-no', 'Name', and 'Phone-No'. The items are:

	Roll-no	Name	Phone-No
<input type="checkbox"/>	99	Goliath	6969696969
<input type="checkbox"/>	1	John	
<input type="checkbox"/>	4	Zeeshan	

▼ Scan/Query items

Table or index

▼ Filters

Attribute name	Type	Condition	Value	Remove
Roll-no	Number	Equal to	4	<input type="button" value="Remove"/>

Completed Read capacity units consumed: 0.5

Items returned (1)

<input type="checkbox"/>	Roll-no	Name	<input type="checkbox"/>
<input type="checkbox"/>	4	Zeeshan	<input type="checkbox"/>

4) Query Items.

▼ Scan/Query items

Scan Query

Table or index
Zeeshan-Practical-8

Roll-no (Partition key)
99

▼ Filters
Add a filter to get started.
Add filter

Run Reset

Completed Read capacity units consumed: 0.5

Items returned (1)

	Roll-no	Name	Phone-No
<input type="checkbox"/>	99	Goliath	6969696969

5) Delete table

Delete table X

You are about to delete a table.

- Zeeshan-Practical-8

Delete all CloudWatch alarms for this table.

Create a backup of this table before deleting it.
If you do not select this check box, you will not be able to restore data being deleted.

To confirm the deletion of this table, type *delete* in the box.

Cancel Delete table

The screenshot shows the AWS DynamoDB console interface. The left sidebar is titled "DynamoDB" and contains navigation links for Dashboard, Tables (selected), Update settings, Explore items, Parameter editor (New), Backups, Exports to S3, and Reserved capacity. Below these are sections for DAX, Clusters, Subnet groups, Parameter groups, and Events. A feedback section at the bottom asks for user input and provides links to tell us what you think, return to the previous console experience, and density settings.

The main content area shows a confirmation message: "The request to delete the 'Zeehan-Practical-8' table has been submitted successfully." Below this, the "Tables (1) Info" section displays a table with one row. The table columns are Name, Status, Partition key, Sort key, Indexes, Read capacity mode, Write capacity mode, Size, and Table class. The single row shows "Zeehan-Practical-8" with a status of "Deleting".

Name	Status	Partition key	Sort key	Indexes	Read capacity mode	Write capacity mode	Size	Table class
Zeehan-Practical-8	Deleting	-	-	0	Provisioned (1)	Provisioned (1)	0 bytes	DynamoDB Standard

Conclusion: Add, Update, Scan, Query and Delete table operation successfully implemented on DynamoDB.