SUBMITTED by: JAGDISH GANESH NAIKAR

Roll.no: TCS2425101

Cloud Computing Journal

SIES College of Arts, Science & Commerce
RISE WITH EDUCATION
NAAC REACCREDITED - 'A' GRADE
ISO 9001 : 2008

S.I.E.S College of Arts, Science and Commerce
Sion(W), Mumbai - 400 022.

CERTIFICATE

This is to certify that Mr/~~Miss.~~ JAGDISH NAIKAR Roll No. TCS2429O1 Has successfully completed the necessary course of experiments in the subject of CLOUD COMPUTING during the academic year 2024 - 2025 complying with the requirements of University of Mumbai, for the course of T.Y.BSc. Computer Science [Semester-6]

Prof. In-Charge
Prof. Aditi Prajapati

Examination Date:
Examiner's Signature & Date:

Head of the Department
Prof. Manoj Singh

College Seal
And Date

Index

SIES COLLEGE OF ARTS SCIENCE AND COMMERCE (EMPOWERED AUTONOMOUS)
SION - WEST , MUMBAI-22

Name of the Student: Naikar Jagdish Ganesh
Class : TYBSc(Cs) Roll No: TCS2425101
Subject: Cloud Computing Semester: VI

Year: 2024-25

INDEX

Sr.No	DATE	TITLE OF PRACTICAL	SIGNATURE OF FACULTY
01	21/1/25	webfeed RSS	
02	4/2/25	Study and implemnt of IAAS (EC2,S3)	
03	10/02/25	Implementing a Web Services	
04	17/02/25	Developing Application using for Google App Engine	
05.	18/02/25	Implement fail over clustering on windows server.	18/02/25
06.	25/02/25	Implemant of virtualizationysingvsphue vmare in Esxiserva & managingwith client	25/2/25
		study of cc and its architecture	
		Case study on amazon ec2, Microsoft hyperV, Microsoft azure, Google cloud platform	
		(Research paper analysis)	

Name & Signature of Subject Incharge.

Name & Signature of Examiner

Cloud Computing

Practical No. 1

DEPARTMENT OF COMPUTER SCIENCE

Name:	Jagdish Ganesh Naikar	**Roll Number**	TCS2425101
Paper Code:	SIUSCS62	**Class**	TYBSc(Computer Science)
Topic:	Web Feed	**Batch**	2
Date:	21/01/2025	**Practical No**	1

A) AIM:

Write a program for web feed

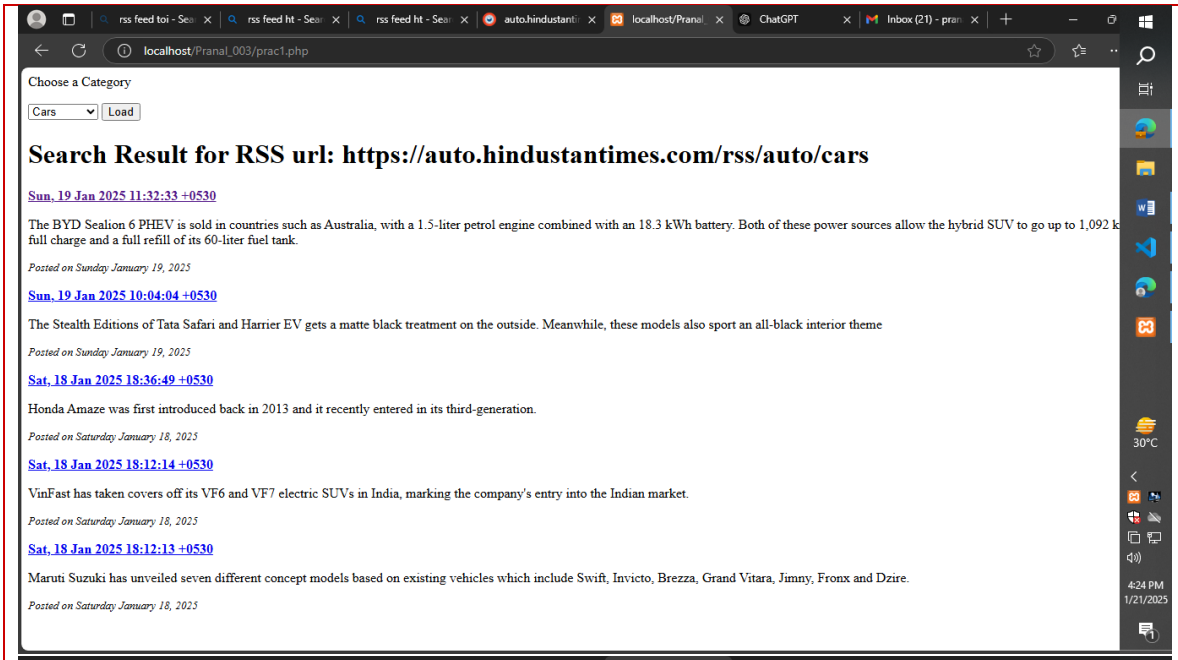
B) DESCRIPTION:

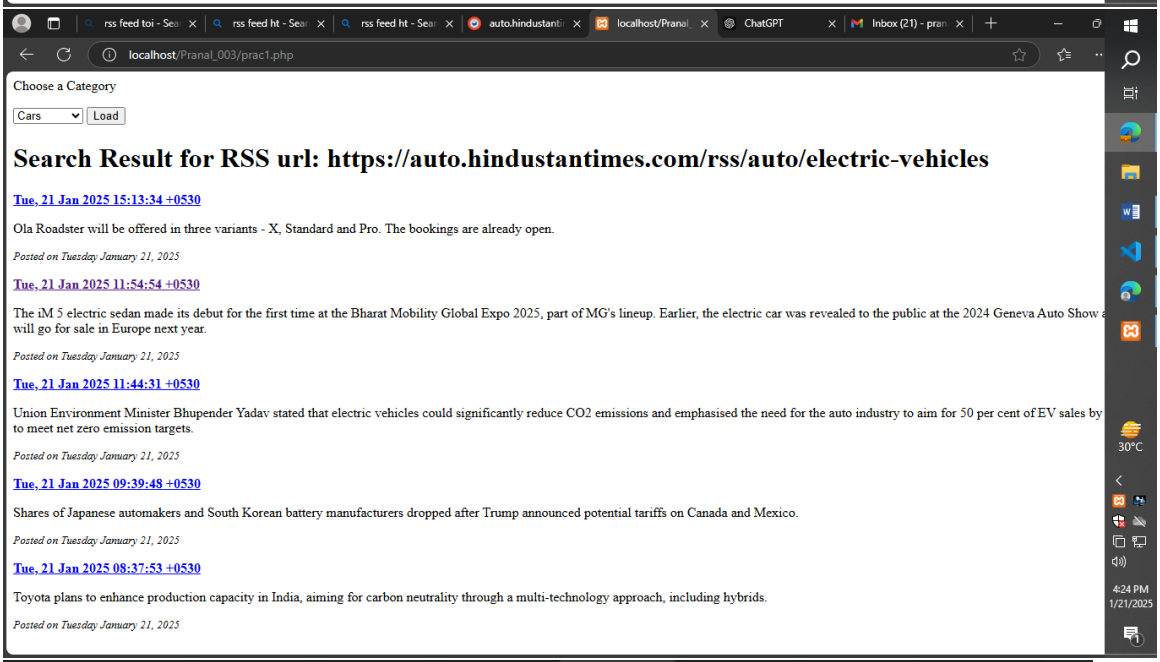
A web feed is a data format used to provide users with frequently updated content from websites, blogs, podcasts, and more. It allows users to subscribe to updates and receive new content automatically. Common formats for web feeds include RSS, Atom, and JSON Feed.

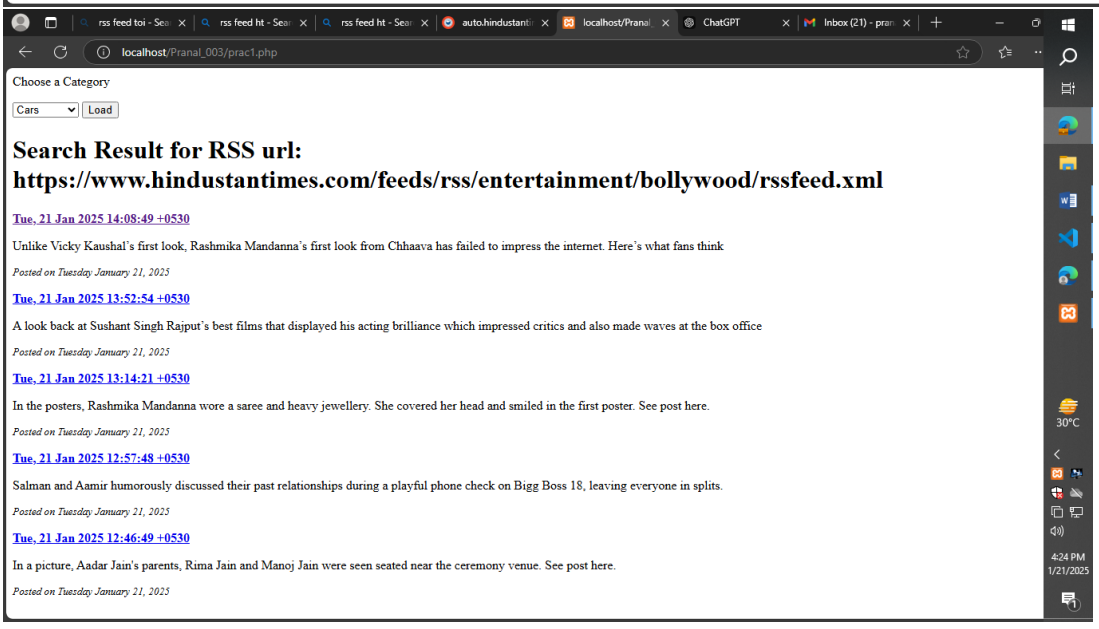
Name of Instructor: Prof. Aditi Prajapati

C) CODE & OUTPUT

```
<p> Choose a Category </p>

<form method = "post" id = "myform">
    <select required name = "rssurl">
        <option value = "https://auto.hindustantimes.com/rss/auto/cars">Cars</option>
        <option value = "https://auto.hindustantimes.com/rss/auto/electric-vehicles"> EV
</option>
        <option value =
"https://www.hindustantimes.com/feeds/rss/entertainment/bollywood/rssfeed.xml">Bollywood</opt
ion>
    </select>
    <input type = "submit" value = "Load"/>
</form>

<?php
if(isset($_POST['rssurl'])) {
    echo '<h1> Search Result for RSS url: ' . $_POST['rssurl'] . '</h1>';
    $rssurl = $_POST['rssurl'];
    $rss = new DOMDocument();
    $rss -> load($rssurl);
    $feed = array();

    foreach ($rss -> getElementsByTagName('item') as $node) {
        $item = array(
            'title' => $node -> getElementsByTagName('title') -> item(0) -> nodeValue,
            'desc' => $node -> getElementsByTagName('description') -> item(0) -> nodeValue,
            'link' => $node -> getElementsByTagName('link') -> item(0) -> nodeValue,
            'date' => $node -> getElementsByTagName('pubDate') -> item(0) -> nodeValue
        );
        array_push($feed, $item);
    }
    $limit = 5;
    for ($x = 0; $x < $limit; $x++) {
        $title = str_replace('&', '&amp;', ($feed[$x]['date'])); //Formatting the date
        $link = $feed[$x]['link'];
        $description = $feed[$x]['desc'];
        $date = date('l F d, Y', strtotime($feed[$x]['date']));

        echo '<p><strong><a href = "' . $link . '" title="' . $title . '">' . $title .
'</a></strong></p>';
        echo '<p>' . $description . '</p>';
        echo '<small><em>Posted on ' . $date . '</em></small>';
    }
}
?>
```







Name of Instructor: Prof. Aditi Prajapati

Cloud Computing

Practical No. 2

DEPARTMENT OF COMPUTER SCIENCE

Name:	Jagdish Ganesh Naikar	**Roll Number**	TCS2425101
Paper Code:	SIUSCS62	**Class**	TYBSc(Computer Science)
Topic:	IaaS	**Batch**	2
Date:	28/01/2025	**Practical No**	2

A) AIM:

Study and implement infrastructure as a cloud.

B) DESCRIPTION:

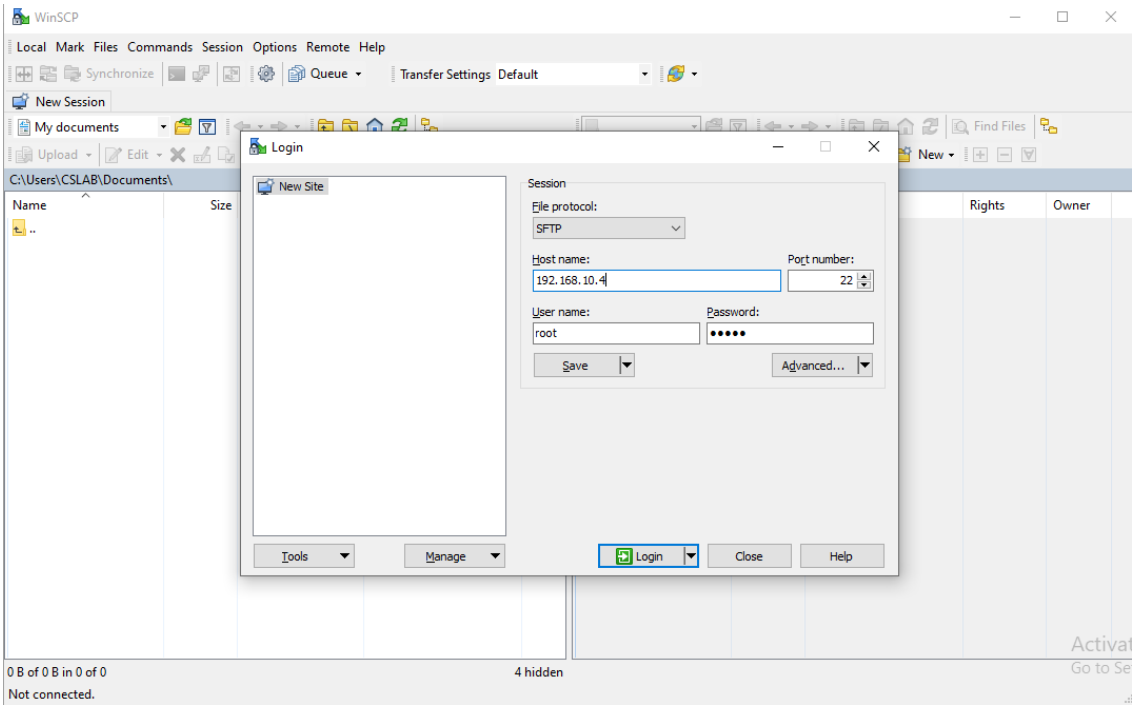
FOSS-Cloud is an open-source platform that provides Infrastructure as a Service (IaaS) capabilities. It allows users to create and manage virtualized resources such as virtual machines, storage, and networking using open-source technologies. Here are some key features of FOSS-Cloud:

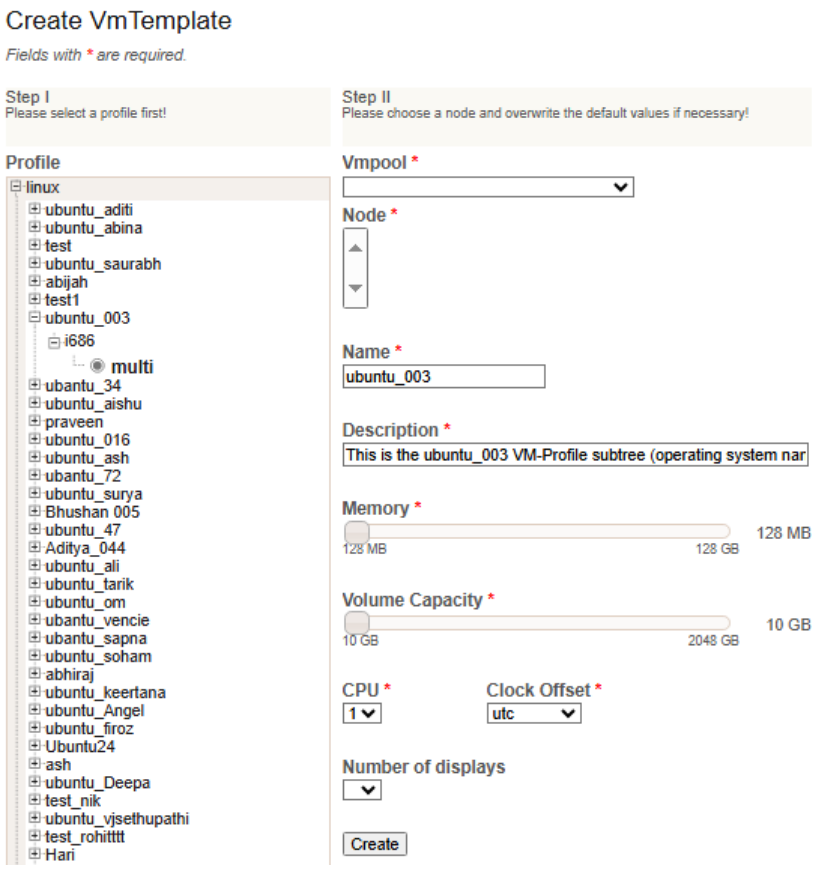
1. Virtualization and Cloud Services: It supports both Windows and Linux-based SaaS, Terminal Server, and Virtual Desktop Infrastructure (VDI) environments.
2. Redundant Server Infrastructure: FOSS-Cloud offers an integrated and redundant server setup, ensuring high availability and reliability.
3. Flexibility and Cost Savings: Being open-source, it provides flexibility and cost savings by avoiding vendor lock-in compared to proprietary cloud solutions.
4. Web-Based Management: It includes a web-based management console for easy administration and deployment of virtual machines.

STEPS:

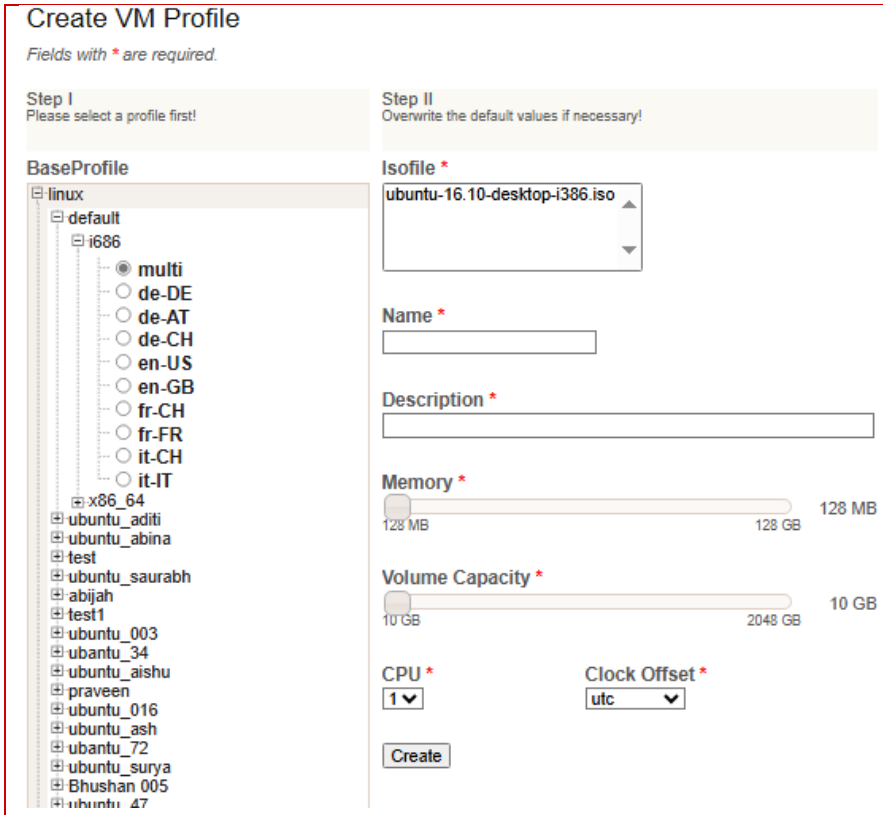
1. To create FOSS cloud server
2. Enter IP Address on client browser 192.168.10.4
3. Login Credentials – admin and admin
4. Download WinSCP
5. Create new file with hostname as **192.168.10.4**, user as **root** and password as **admin**
6. Copy the Ubuntu ISO file in your local machine.
7. In FOSS Cloud (192.168.10.4) create a VM profile by Virtual Machine > Profiles > Create
8. Create a VM Template by Virtual Machine > VM Templates > Create

C) OUTPUT





Name of Instructor: Prof. Aditi Prajapati



Name of Instructor: Prof. Aditi Prajapati

Cloud Computing

Practical No. 3

DEPARTMENT OF COMPUTER SCIENCE

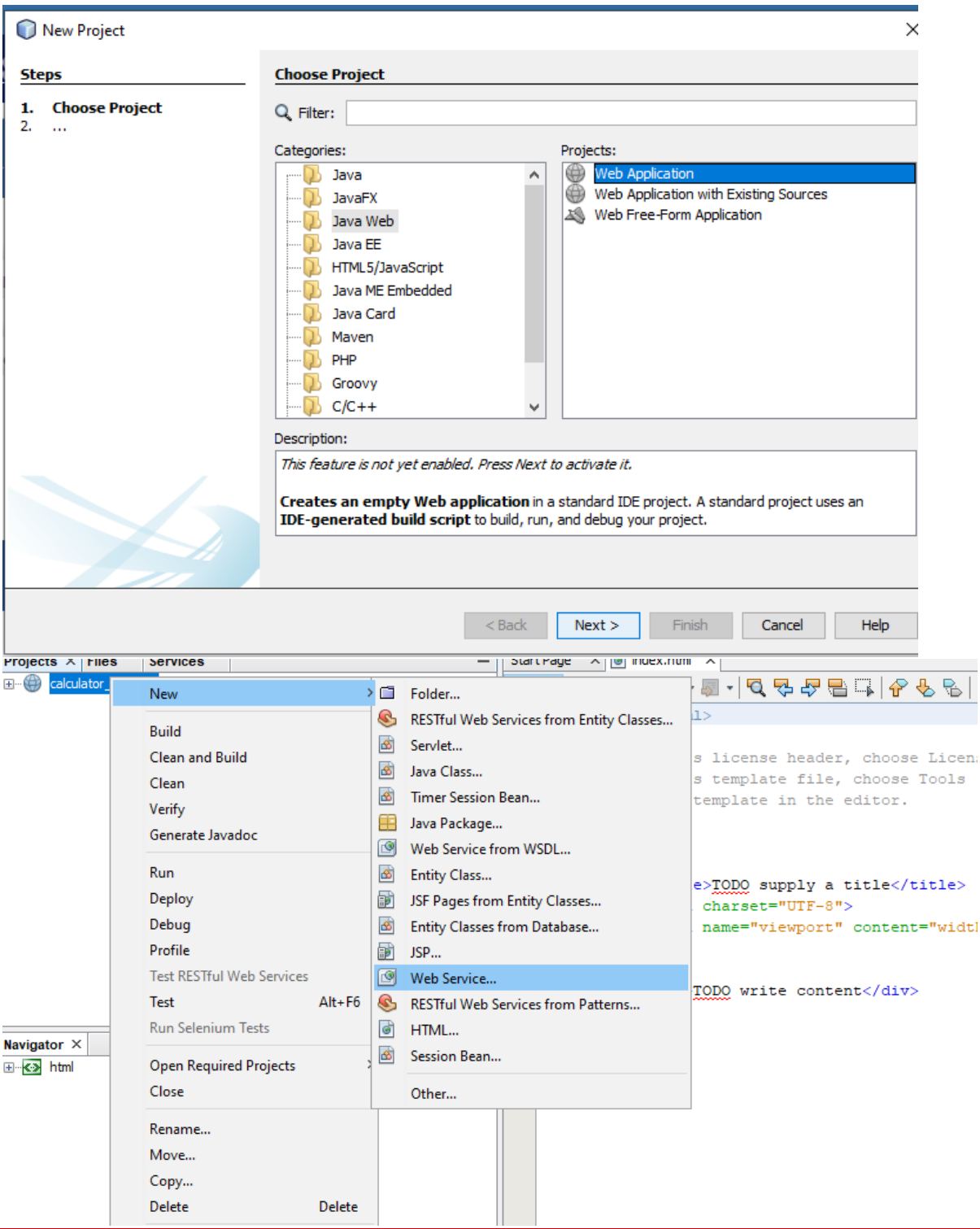
Name:	Jagdish Ganesh Naikar	**Roll Number**	TCS2425101
Paper Code:	SIUSCS62	**Class**	TYBSc(Computer Science)
Topic:	WS App	**Batch**	2
Date:	11/02/2025	**Practical No**	3

A) AIM:

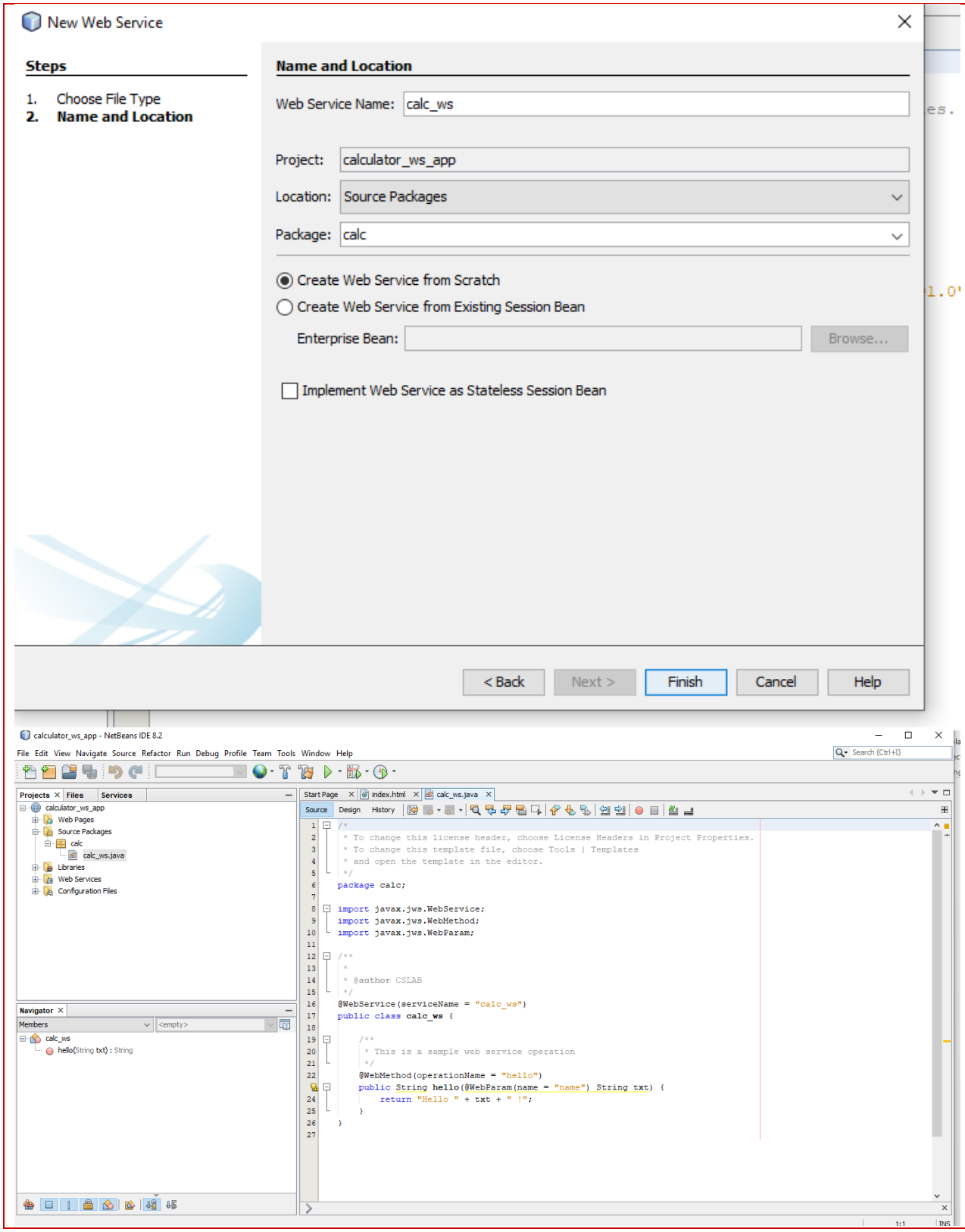
Implement Webservices Application (Calculator).

Name of Instructor: Prof. Aditi Prajapati

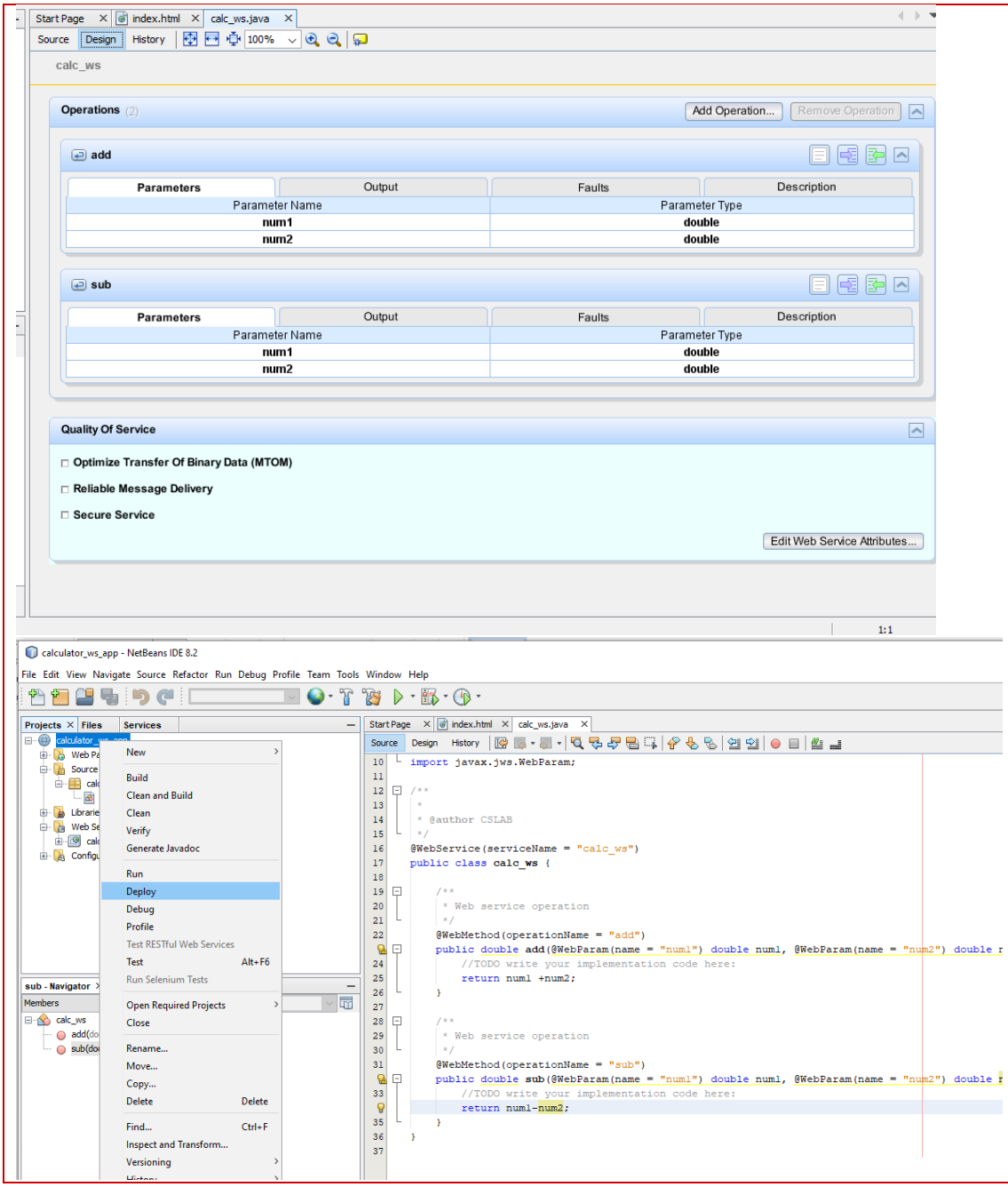
C) OUTPUT



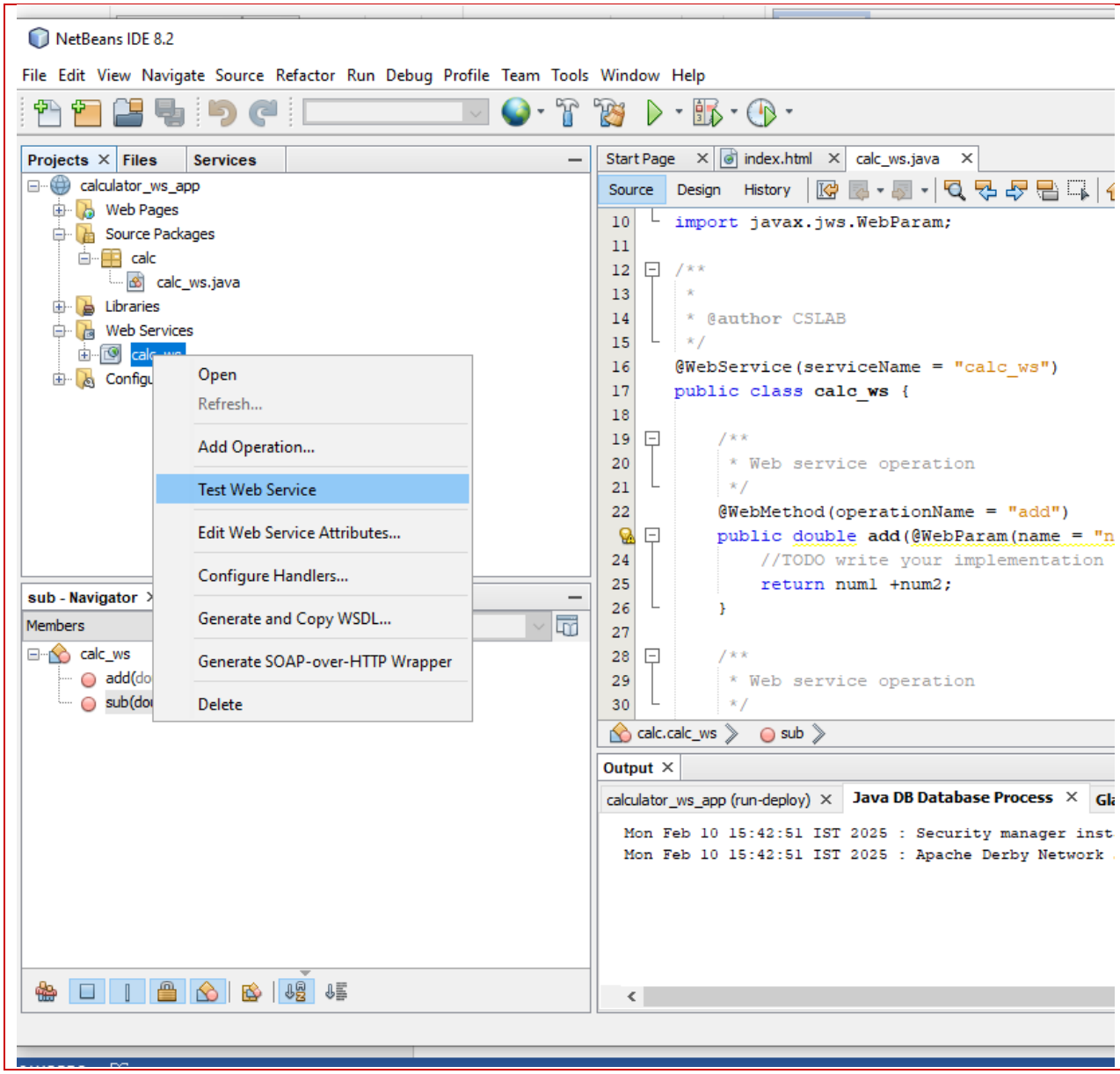
Name of Instructor: Prof. Aditi Prajapati



Name of Instructor: Prof. Aditi Prajapati



Name of Instructor: Prof. Aditi Prajapati



Name of Instructor: Prof. Aditi Prajapati

calc_ws Web Service Tester

This form will allow you to test your web service implementation (WSDL File)

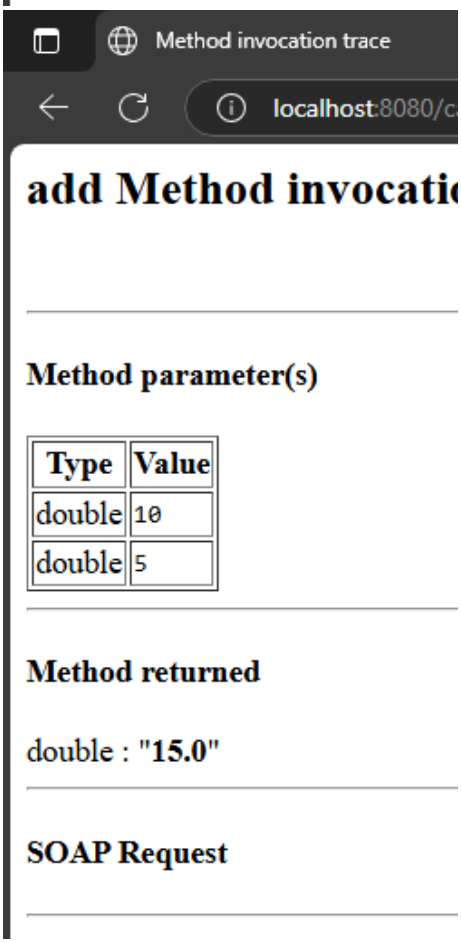
To invoke an operation, fill the method parameter(s) input boxes and click on the button la

Methods :

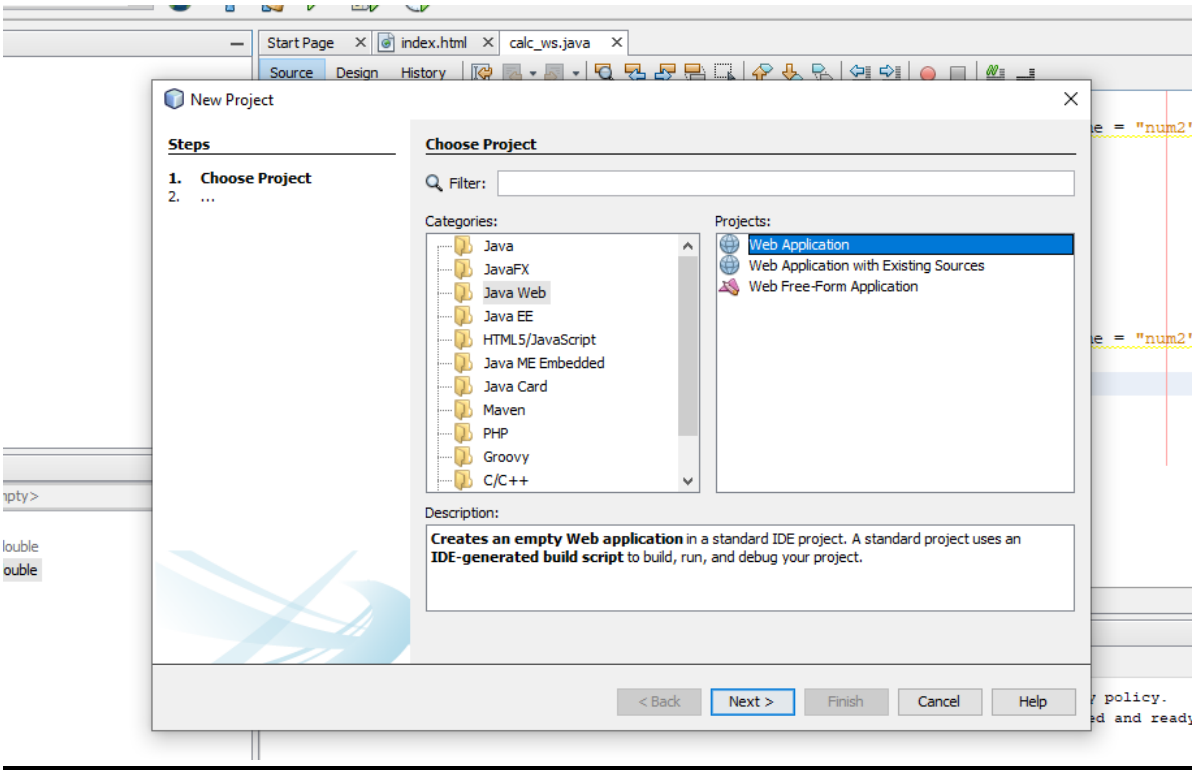
public abstract double calc.CalcWs.add(double,double)
add (10 , 5)

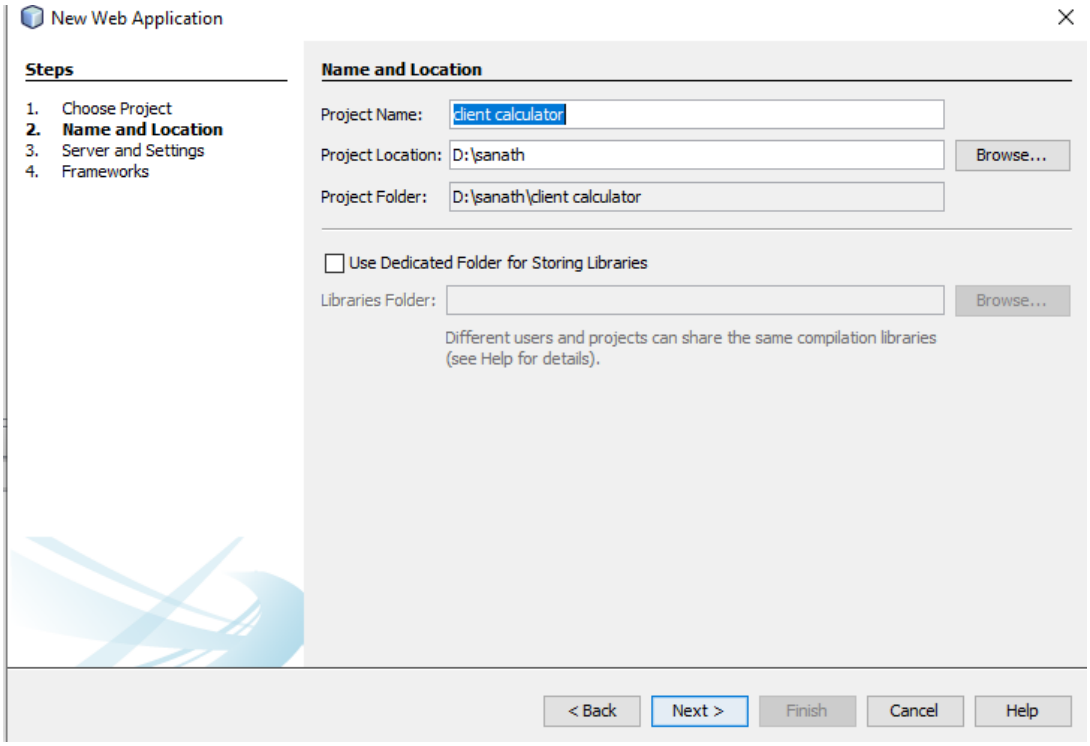
---

public abstract double calc.CalcWs.sub(double,double)
sub (10 , 5)



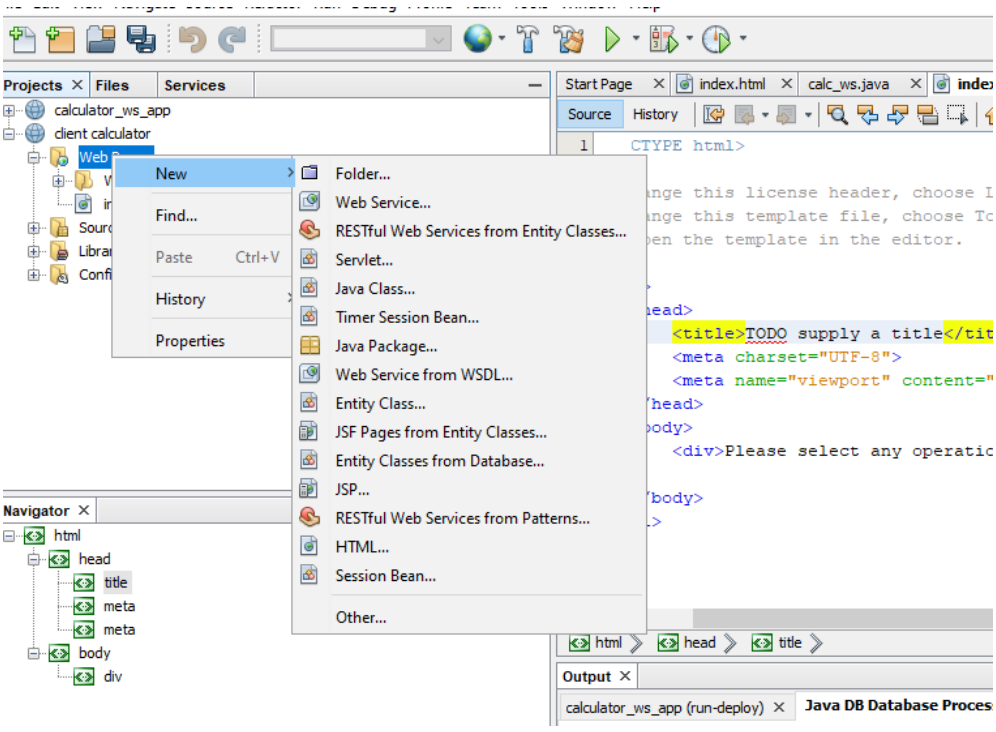
Web service Client

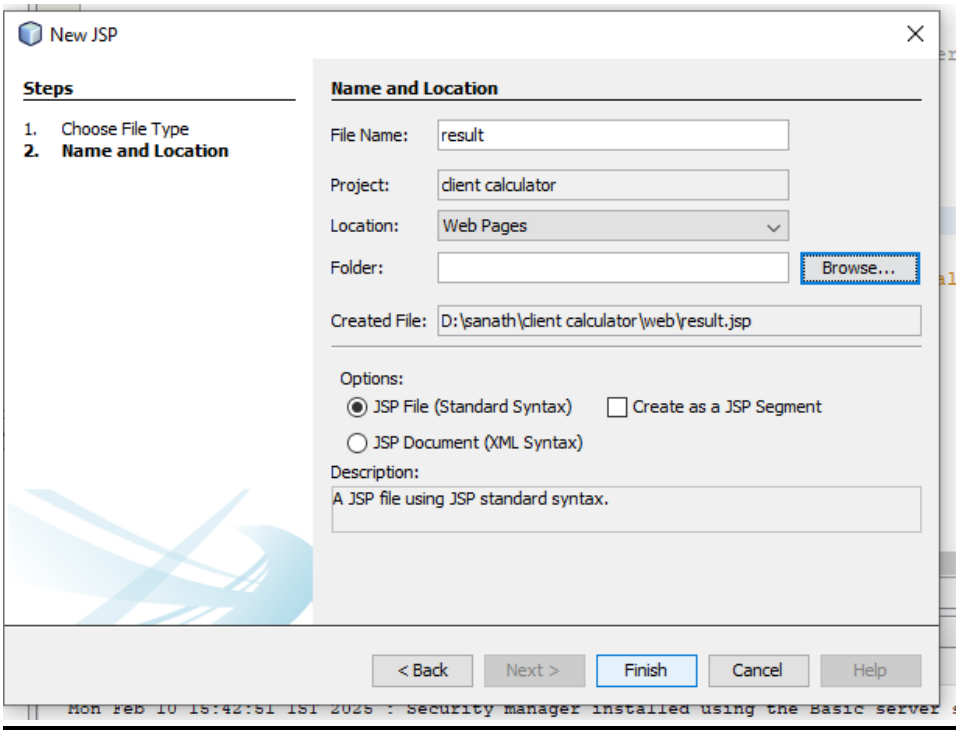




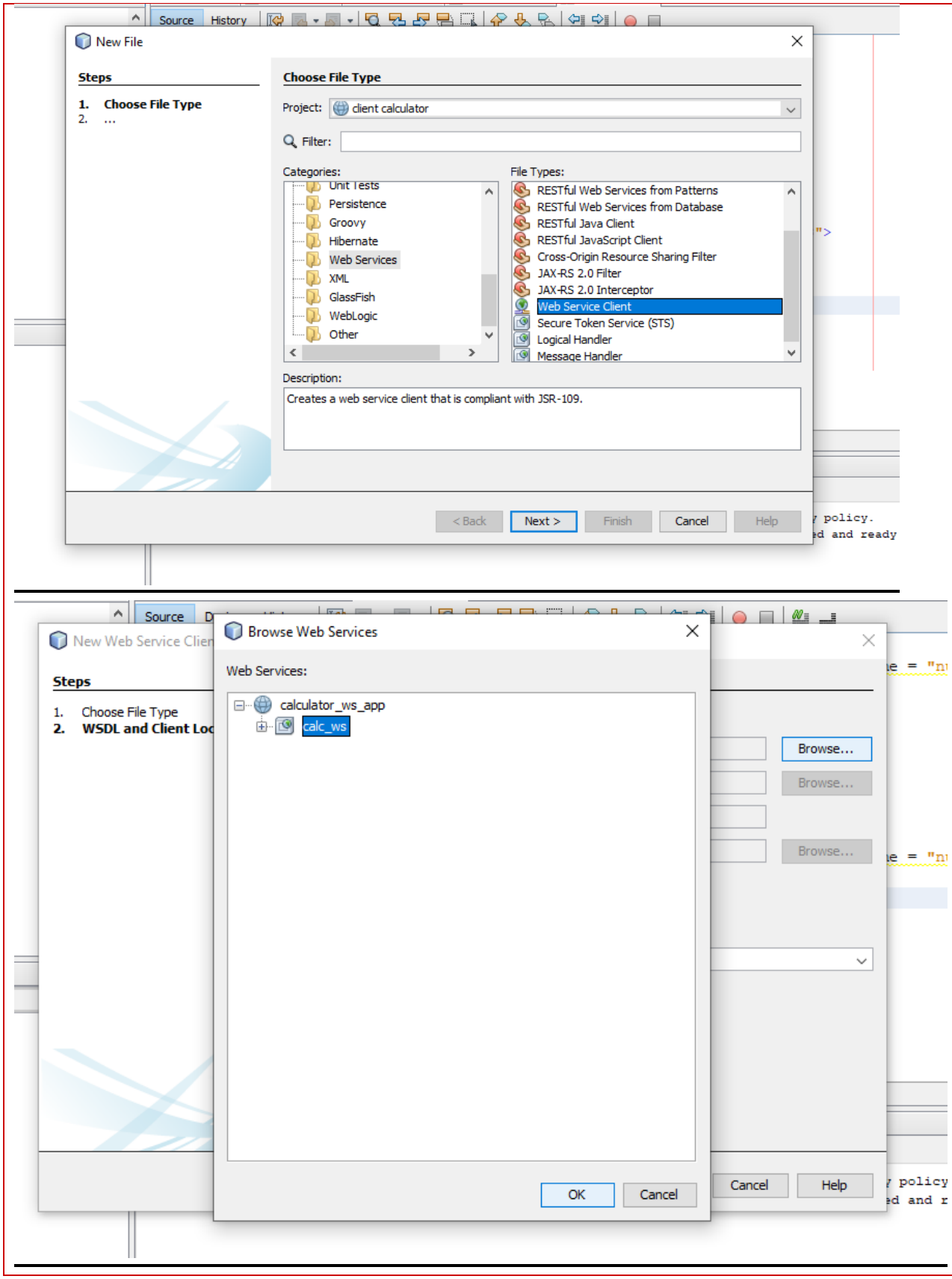
Name of Instructor: Prof. Aditi Prajapati

Add jsp webpage\





Name of Instructor: Prof. Aditi Prajapati



Name of Instructor: Prof. Aditi Prajapati

Start Page | index.html | calc_ws.java | index.html | result.jsp

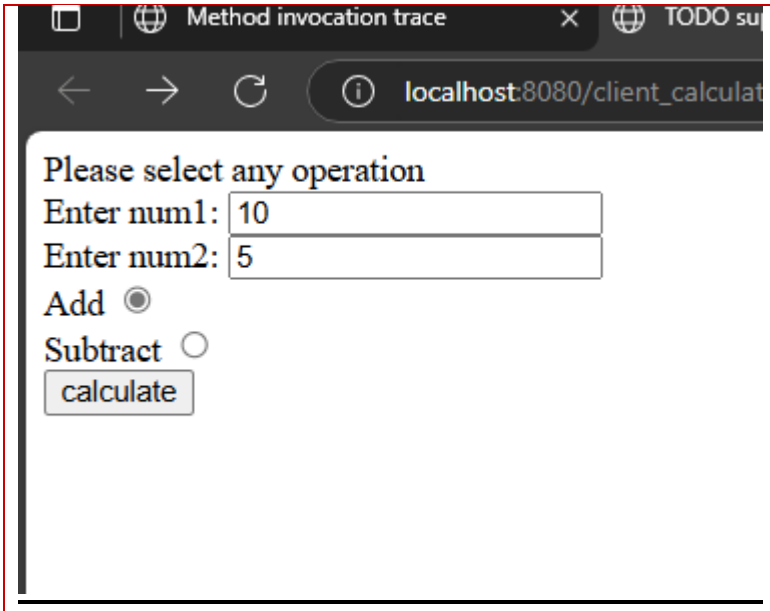
Source | History

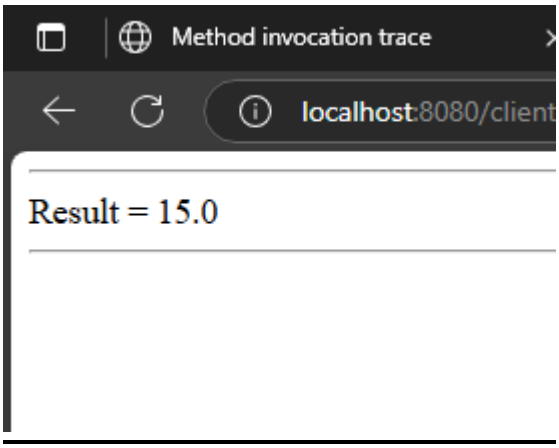
```
<!--
To change this license header, choose License Headers in Project Properties.
To change this template file, choose Tools | Templates
and open the template in the editor.
-->
<html>
    <head>
        <title>TODO supply a title</title>
        <meta charset="UTF-8">
        <meta name="viewport" content="width=device-width, initial-scale=1.0">
    </head>
    <body>
        <div>Please select any operation </div>
        <form name="f1" action="result.jsp">
            Enter num1: <input type="text" name="n1" value="" /> <br>
            Enter num2: <input type="text" name="n2" value="" /> <br>
            Add  <input type="radio" name="calc" value="1" /><br>
            Subtract <input type="radio" name="calc" value="2" /><br>
            <input type="submit" value="calculate" name="cal" />
        </form>
    </body>
</html>
```

Start Page | index.html | calc_ws.java | index.html | result.jsp

Source | History

```
    </head>
    <body>
            <%-- start web service invocation --%><hr/>
    <%
    try {
        String op;
        double result;
        calc.CalcWs_Service service = new calc.CalcWs_Service();
        calc.CalcWs port = service.getCalcWsPort();
         // TODO initialize WS operation arguments here
        double num1 = Double.parseDouble(request.getParameter("n1"));
        double num2 = Double.parseDouble(request.getParameter("n2"));
        op= request.getParameter("calc");
        if (op.equals("1")){
        result = port.add(num1, num2);}
        else{ result = port.sub(num1, num2);}
        out.println("Result = "+result);
    } catch (Exception ex) {
        // TODO handle custom exceptions here
    }
    %>
    <%-- end web service invocation --%><hr/>

    </body>
</html>
```


Method invocation trace
TODO su
localhost:8080/client_calculat
Please select any operation
Enter num1: 10
Enter num2: 5
Add
Subtract
calculate


Method invocation trace
localhost:8080/client
Result = 15.0

SIES

Cloud Computing

Practical No. 4

DEPARTMENT OF COMPUTER SCIENCE

Name:	Jagdish Ganesh Naikar	**Roll Number**	TCS2425101
Paper Code:	SIUSCS62	**Class**	TYBSc(Computer Science)
Topic:	App with Google App Engine	**Batch**	2
Date:	11/02/2025	**Practical No**	4

A) AIM:

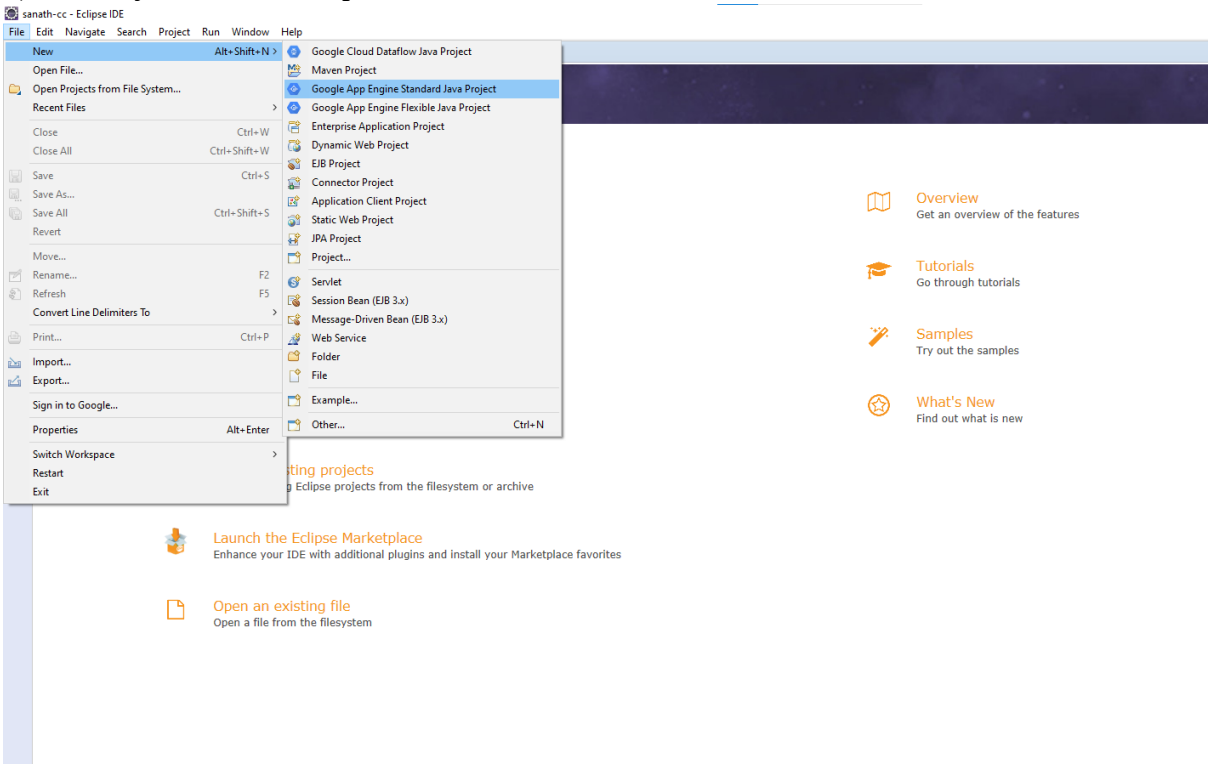
Developing application for Google App Engine.

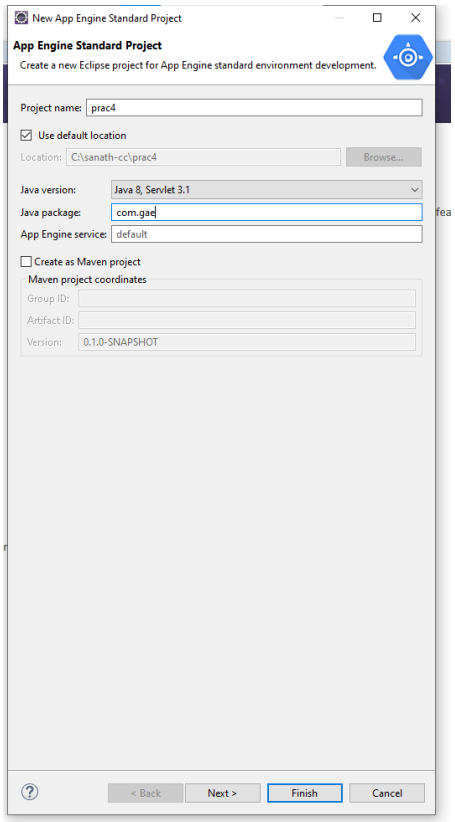
B) DESCRIPTION:

Name of Instructor: Prof. Aditi Prajapati

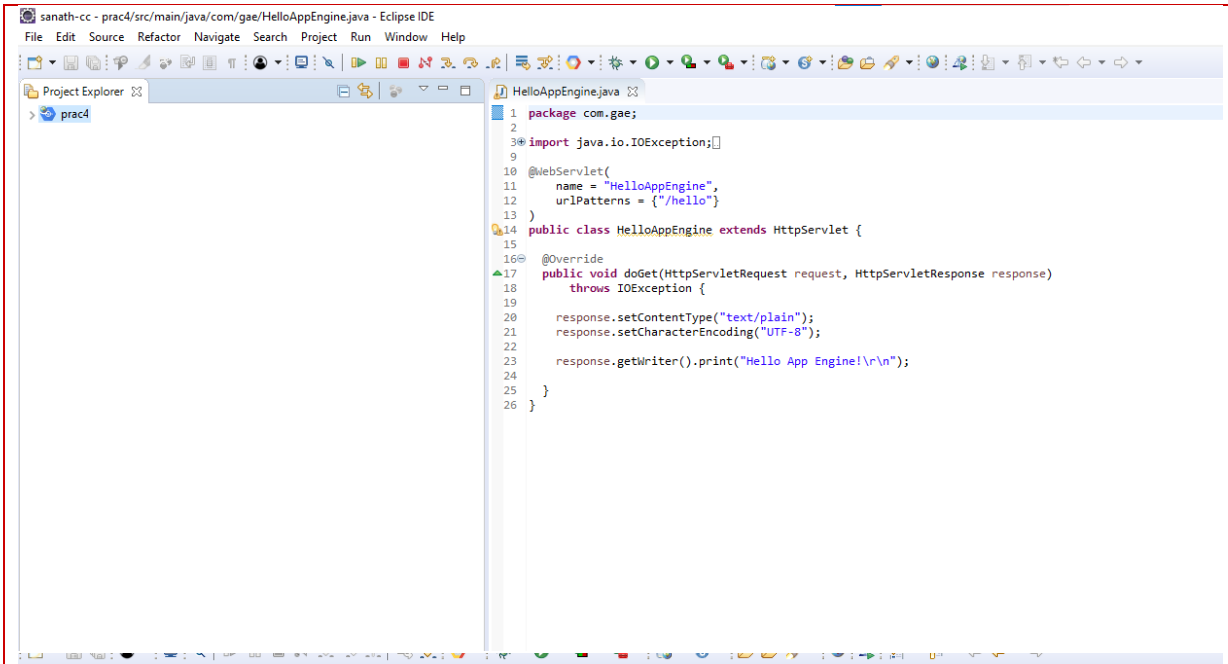
C) OUTPUT

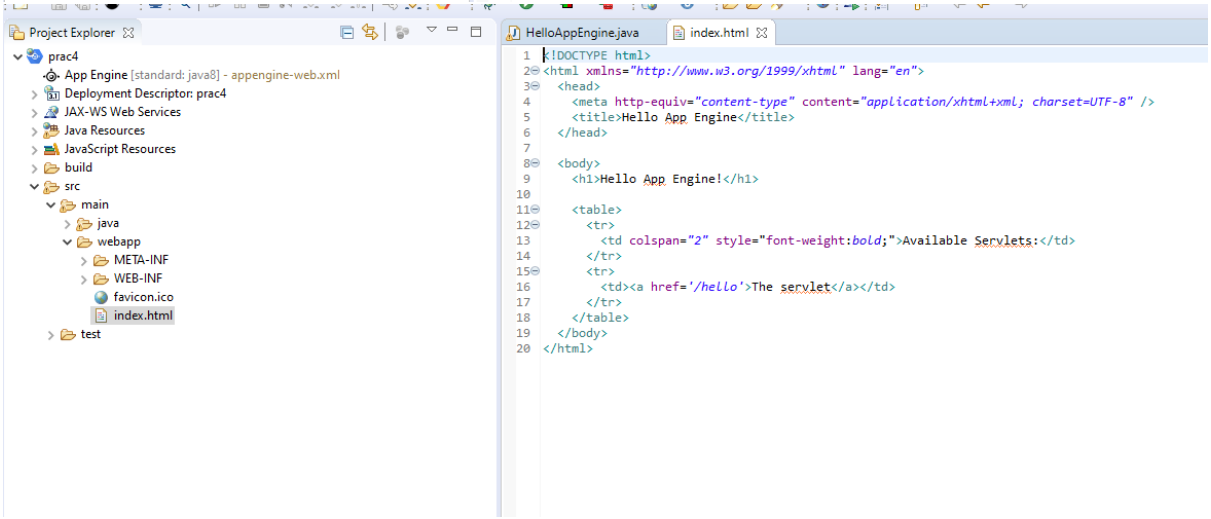
1)Choose your own workspace



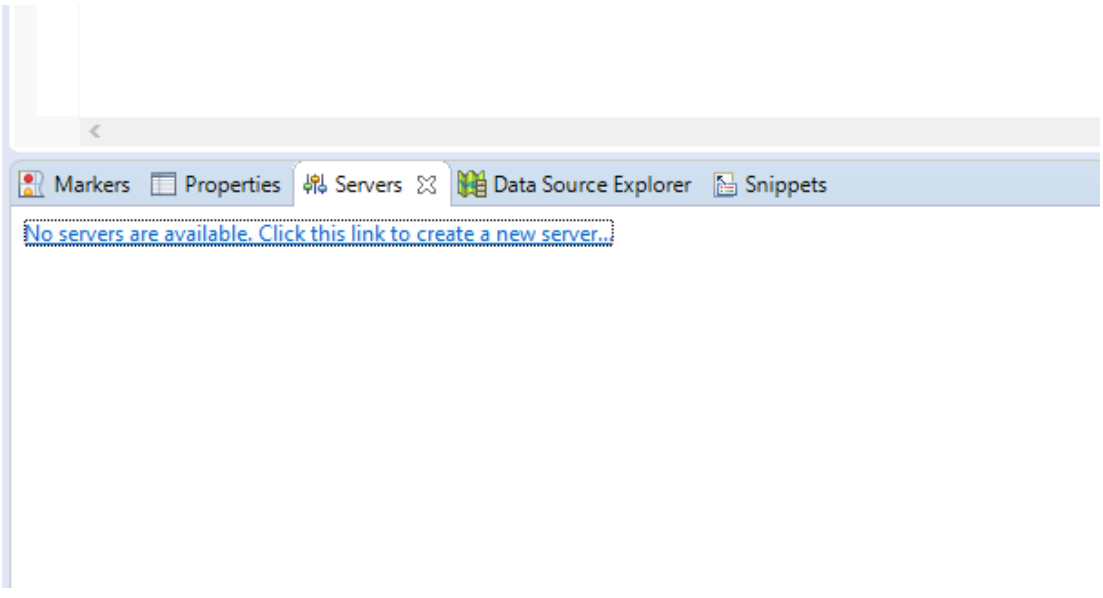


Name of Instructor: Prof. Aditi Prajapati

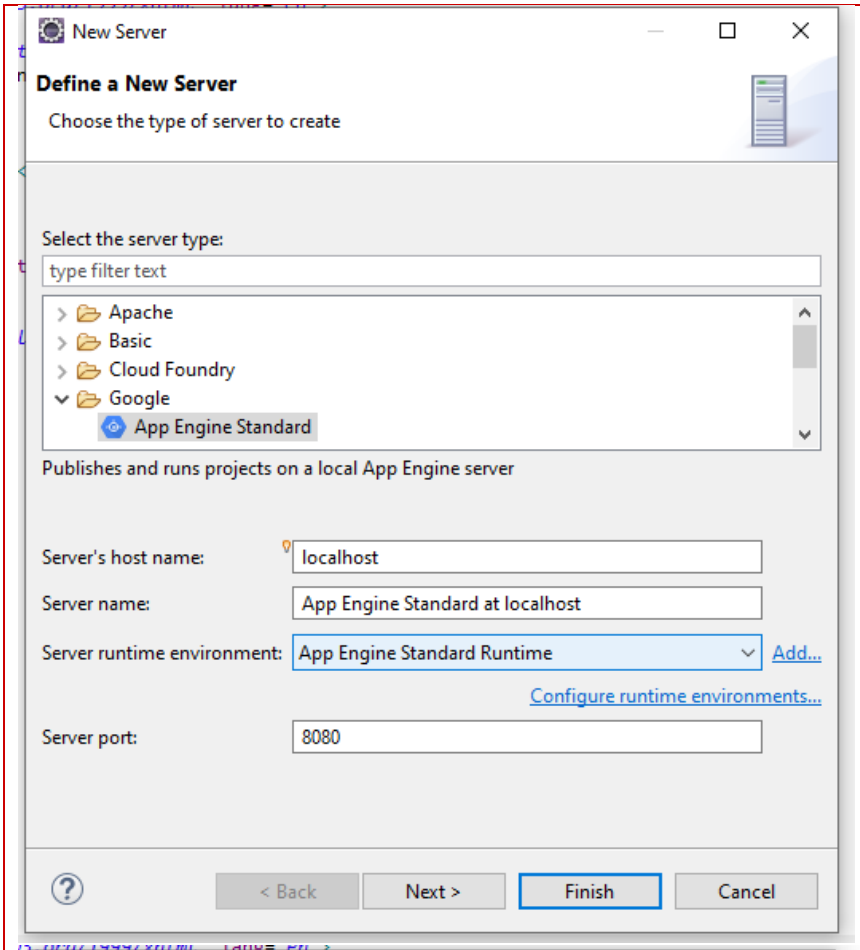


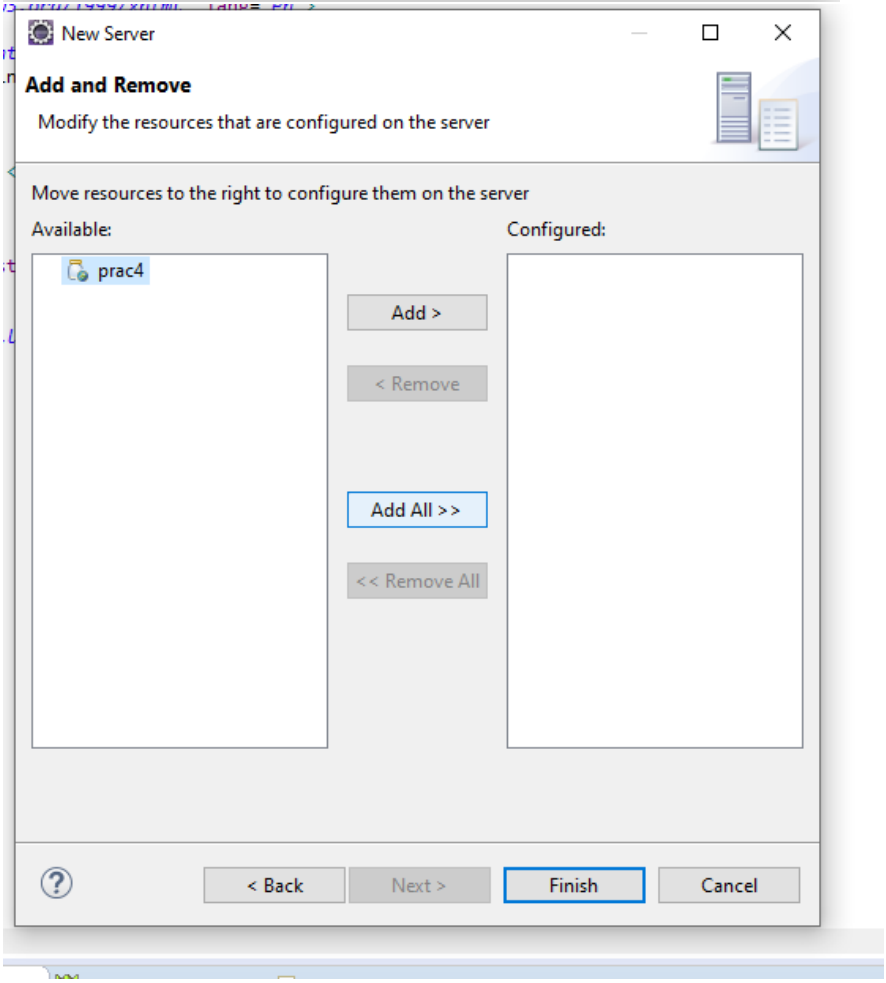


Go to servers

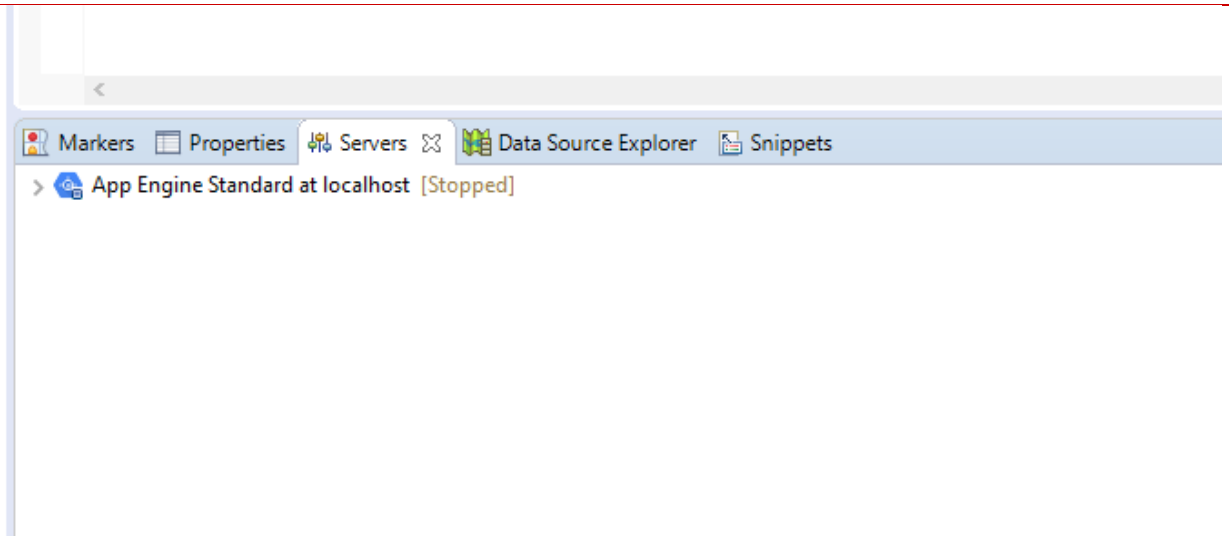


Name of Instructor: Prof. Aditi Prajapati

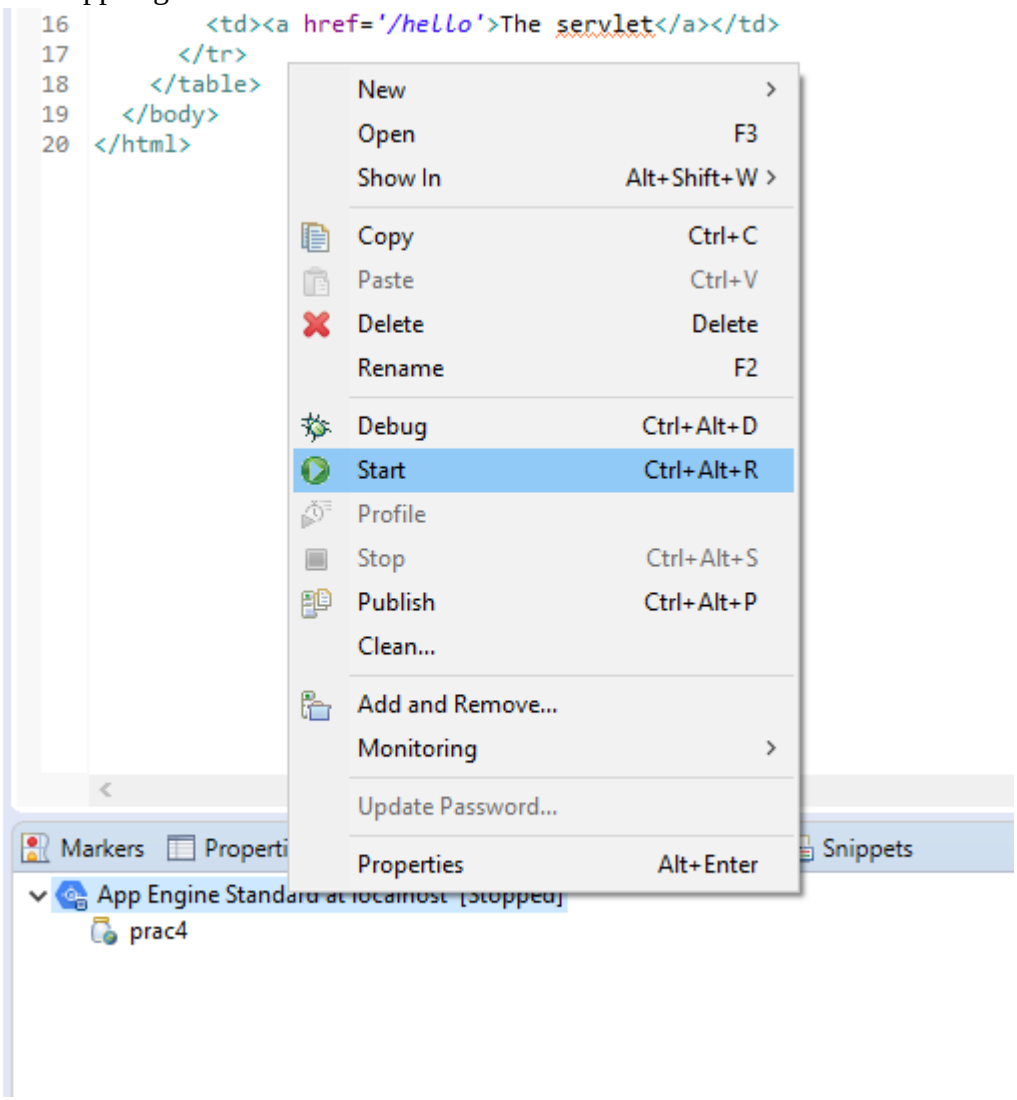


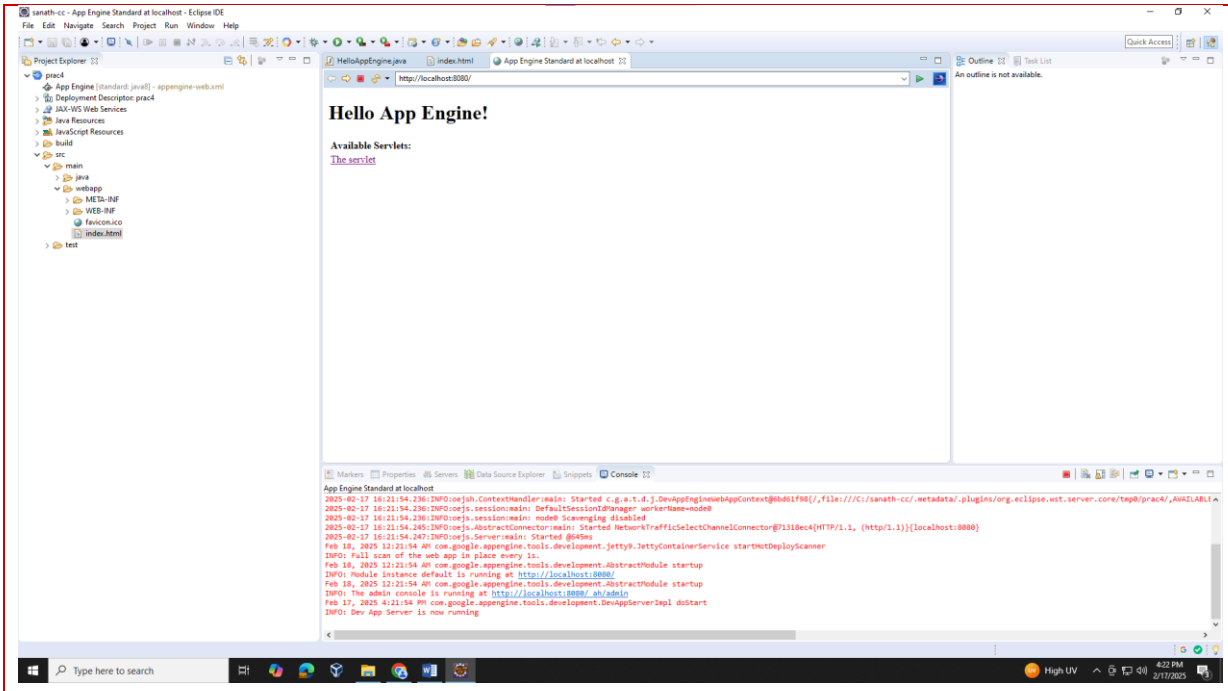


Name of Instructor: Prof. Aditi Prajapati

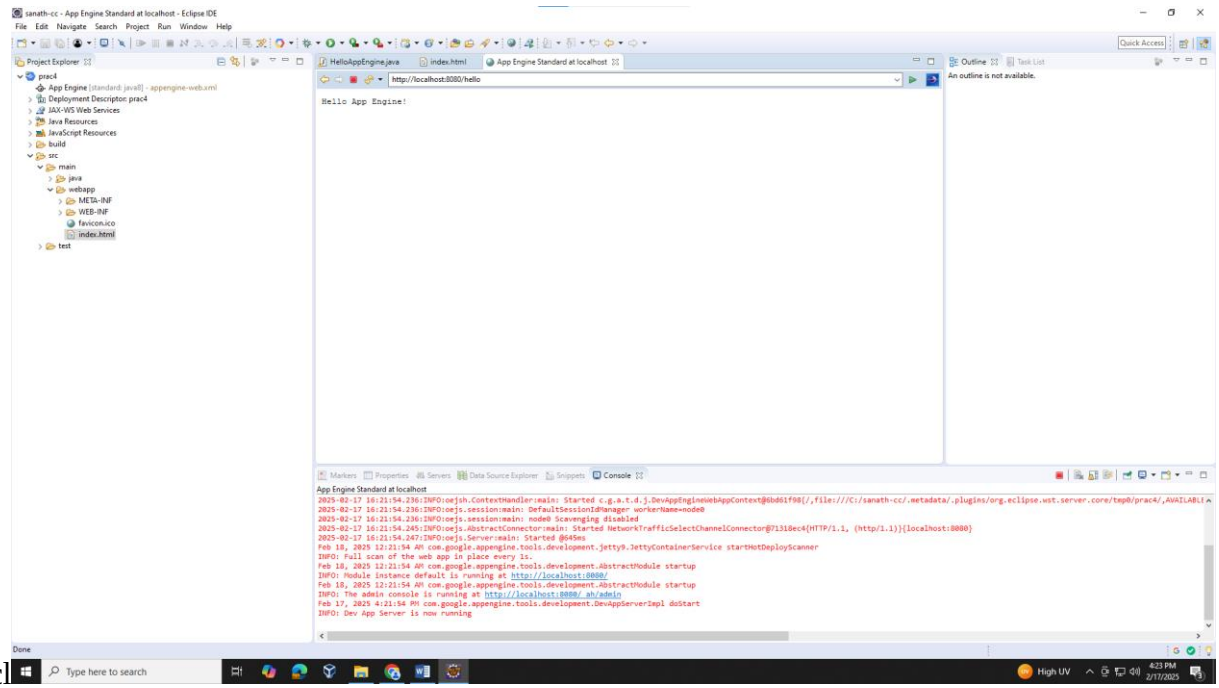


Right click on app engine in server





Click on servers



cl

hw: factorial and palindrome

Name of Instructor: Prof. Aditi Prajapati

Cloud Computing

Practical No. 5

DEPARTMENT OF COMPUTER SCIENCE

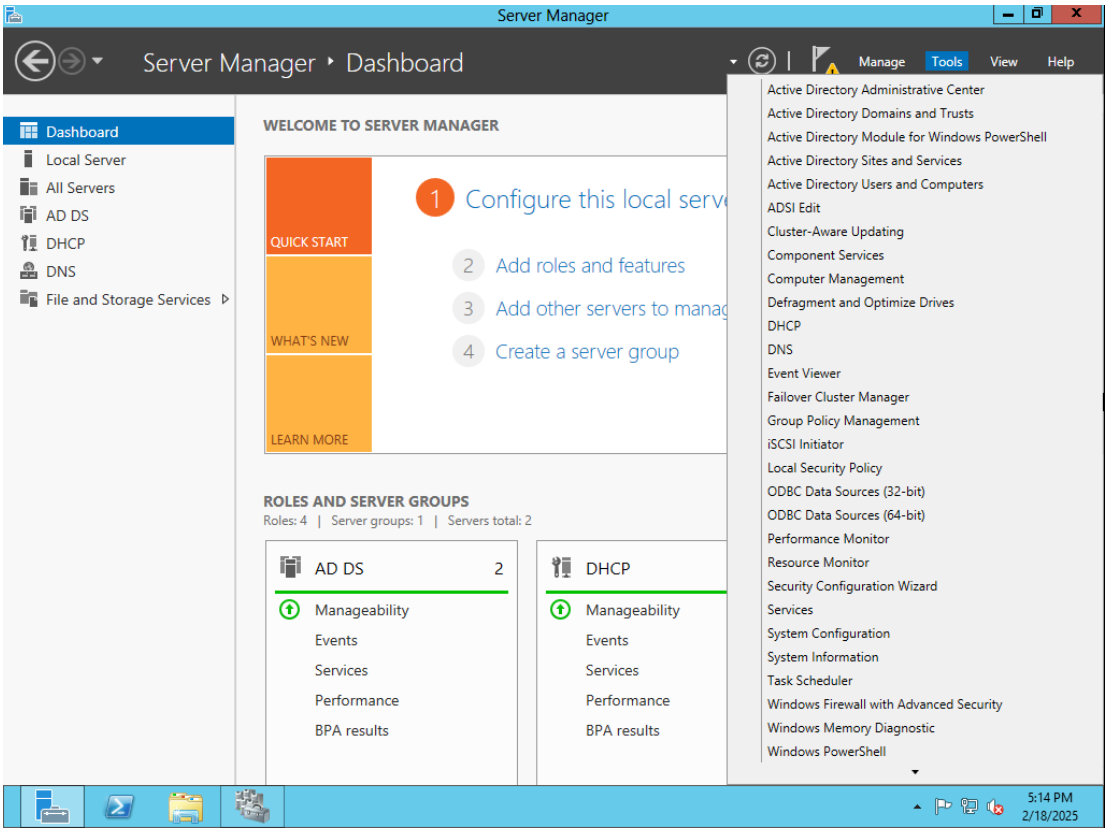
Name:	Jagdish Ganesh Naikar	**Roll Number**	TCS2425101
Paper Code:	SIUSCS62	**Class**	TYBSc(Computer Science)
Topic:	Failover Cluster	**Batch**	2
Date:	18/02/2025	**Practical No**	5

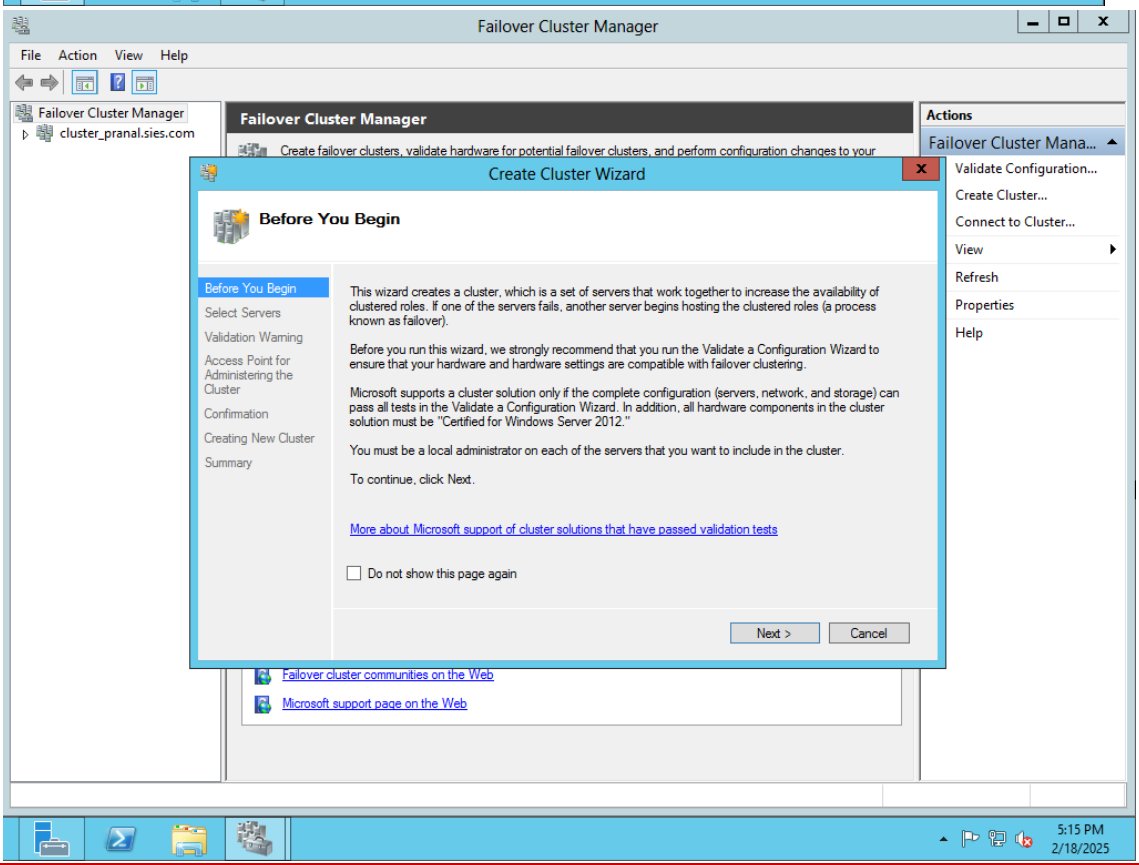
A) **AIM:**

Implementing Failover Cluster on Windows Server.

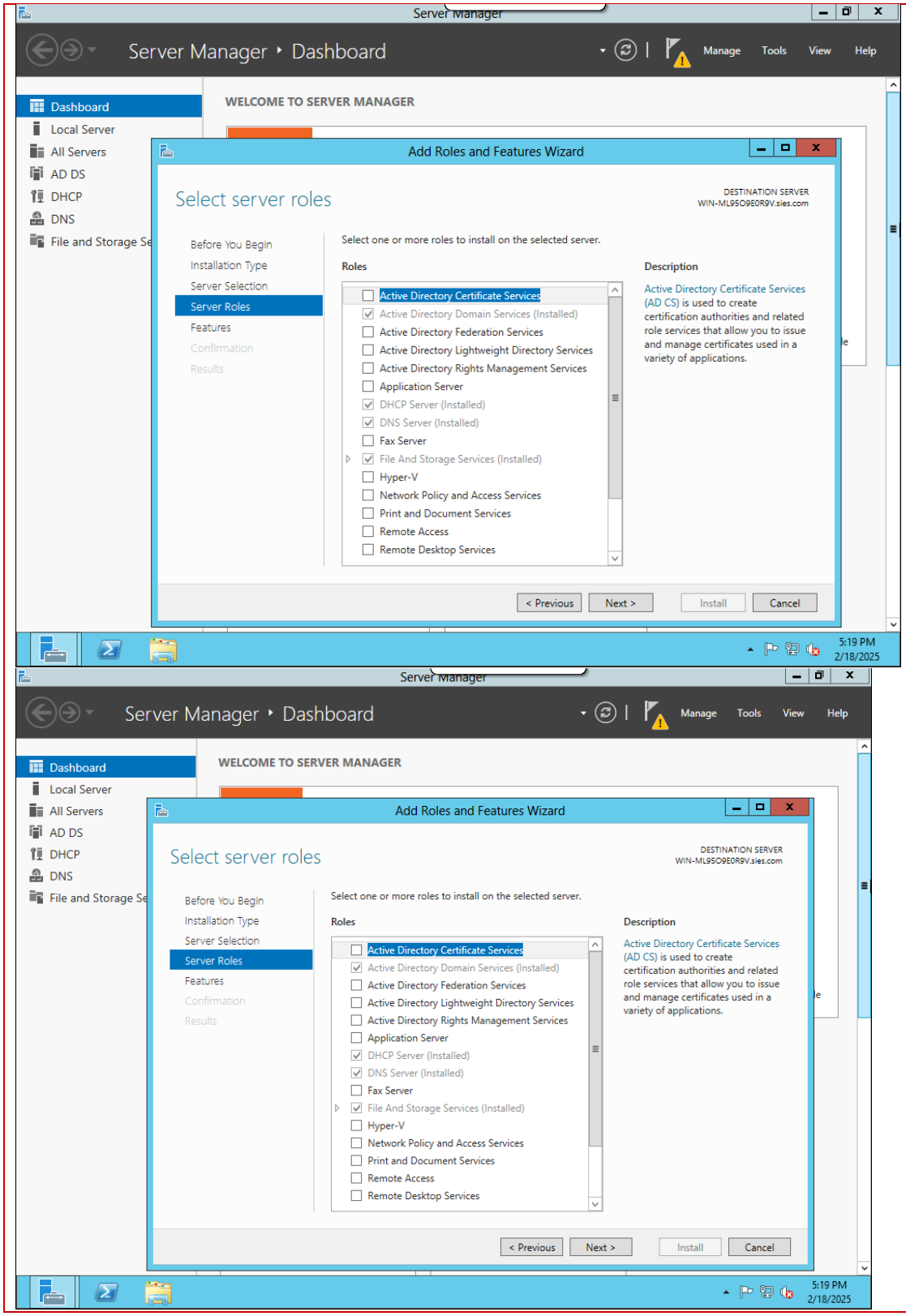
Name of Instructor: Prof. Aditi Prajapati

B) STEPS



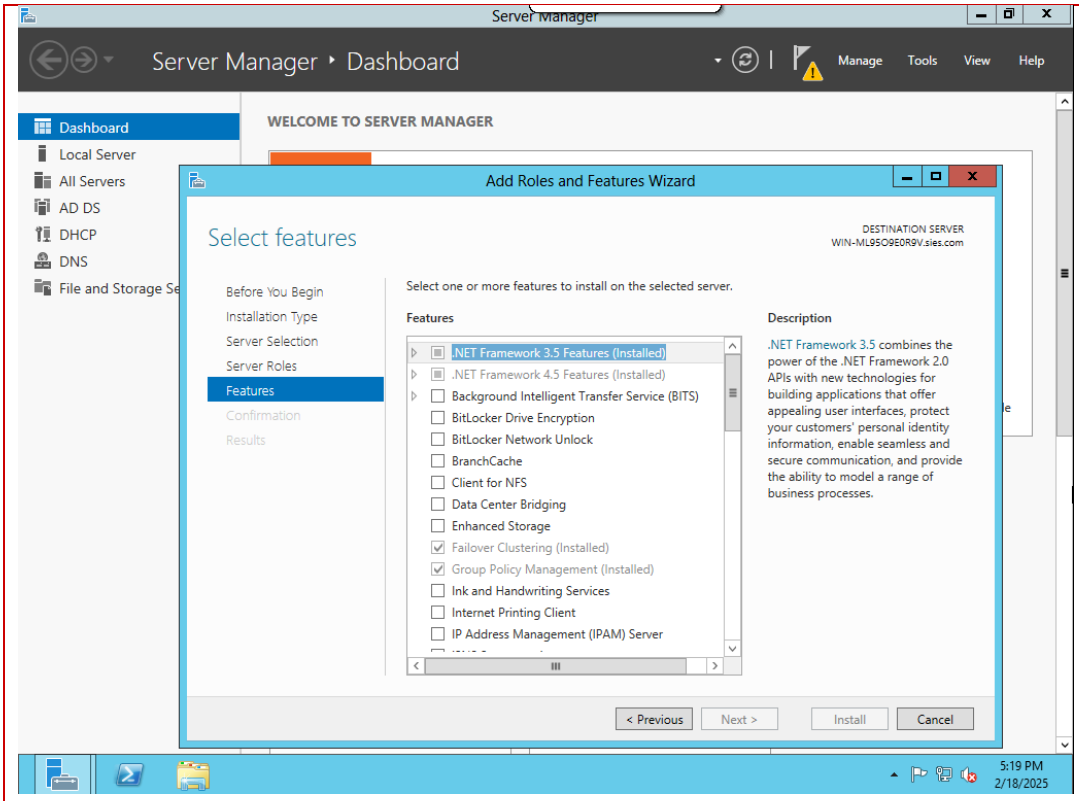


Name of Instructor: Prof. Aditi Prajapati



Server Manager
Server Manager ▸ Dashboard
Manage
Tools
View
Help
Dashboard
Local Server
All Servers
AD DS
DHCP
DNS
File and Storage Se
WELCOME TO SERVER MANAGER
Add Roles and Features Wizard
Select server roles
DESTINATION SERVER
WIN-ML95O9E0R9V.sies.com
Before You Begin
Installation Type
Server Selection
Server Roles
Features
Confirmation
Results
Select one or more roles to install on the selected server.
Roles
Active Directory Certificate Services
Active Directory Domain Services (Installed)
Active Directory Federation Services
Active Directory Lightweight Directory Services
Active Directory Rights Management Services
Application Server
DHCP Server (Installed)
DNS Server (Installed)
Fax Server
File And Storage Services (Installed)
Hyper-V
Network Policy and Access Services
Print and Document Services
Remote Access
Remote Desktop Services
Description
Active Directory Certificate Services (AD CS) is used to create certification authorities and related role services that allow you to issue and manage certificates used in a variety of applications.
< Previous
Next >
Install
Cancel
5:19 PM
2/18/2025

Name of Instructor: Prof. Aditi Prajapati



Name of Instructor: Prof. Aditi Prajapati

Cloud Computing

Practical No. 6

DEPARTMENT OF COMPUTER SCIENCE

Name:	Jagdish Ganesh Naikar	**Roll Number**	TCS2425101
Paper Code:	SIUSCS62	**Class**	TYBSc(Computer Science)
Topic:	Virtualization using VMWare ESXI Server	**Batch**	2
Date:	04/03/2025	**Practical No**	6

A) **AIM:**

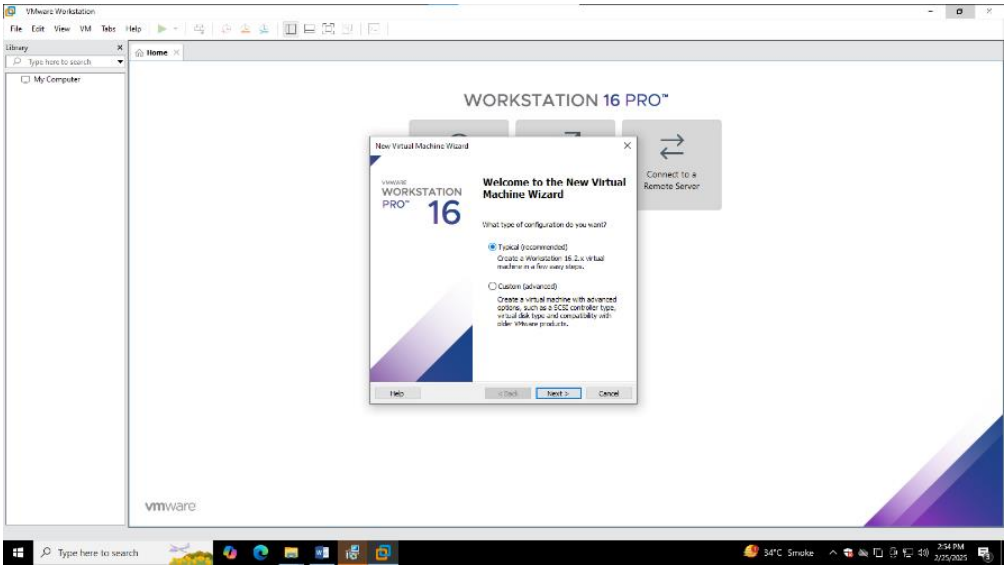
Virtualization using VMWare ESXI Server and managing with vSphere Client.

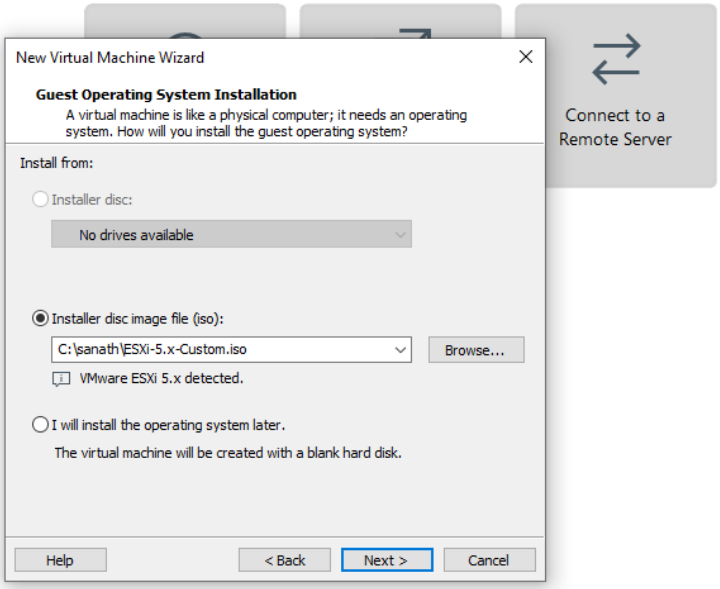
Name of Instructor: Prof. Aditi Prajapati

B) STEPS

Create Server, Create Client, Upload Iso File and Create Server Inside VM Through Client

Create new virtual machine in VMware workstation





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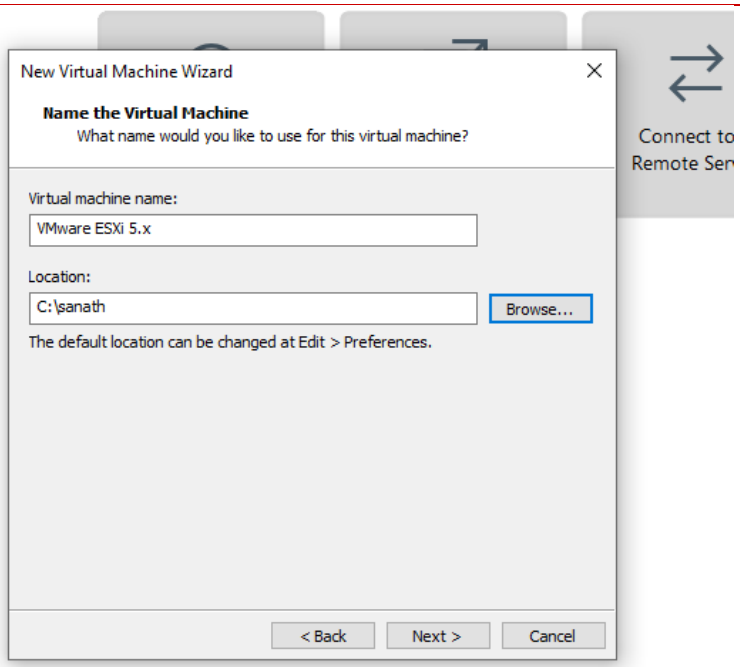

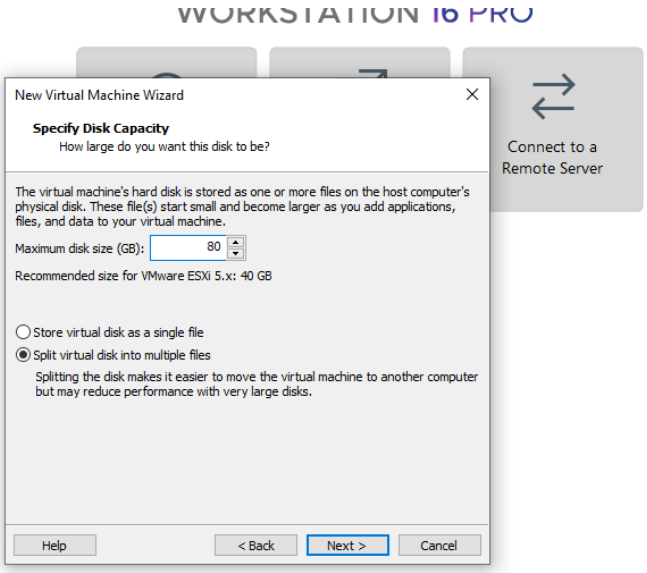

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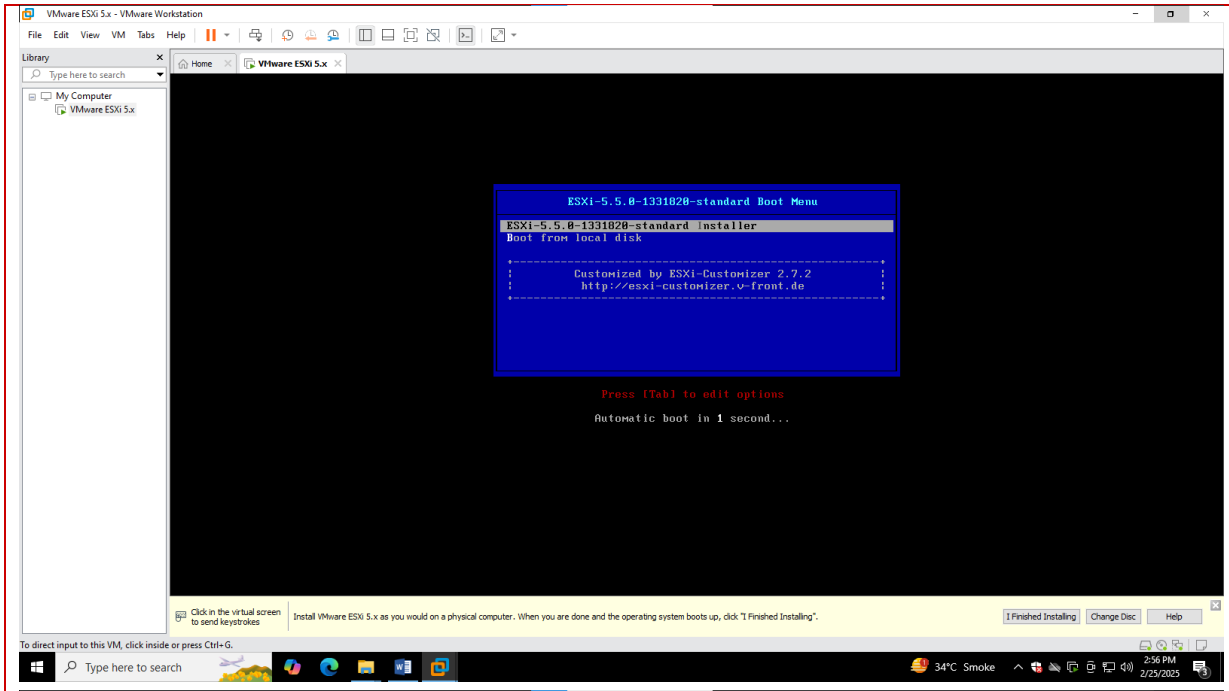

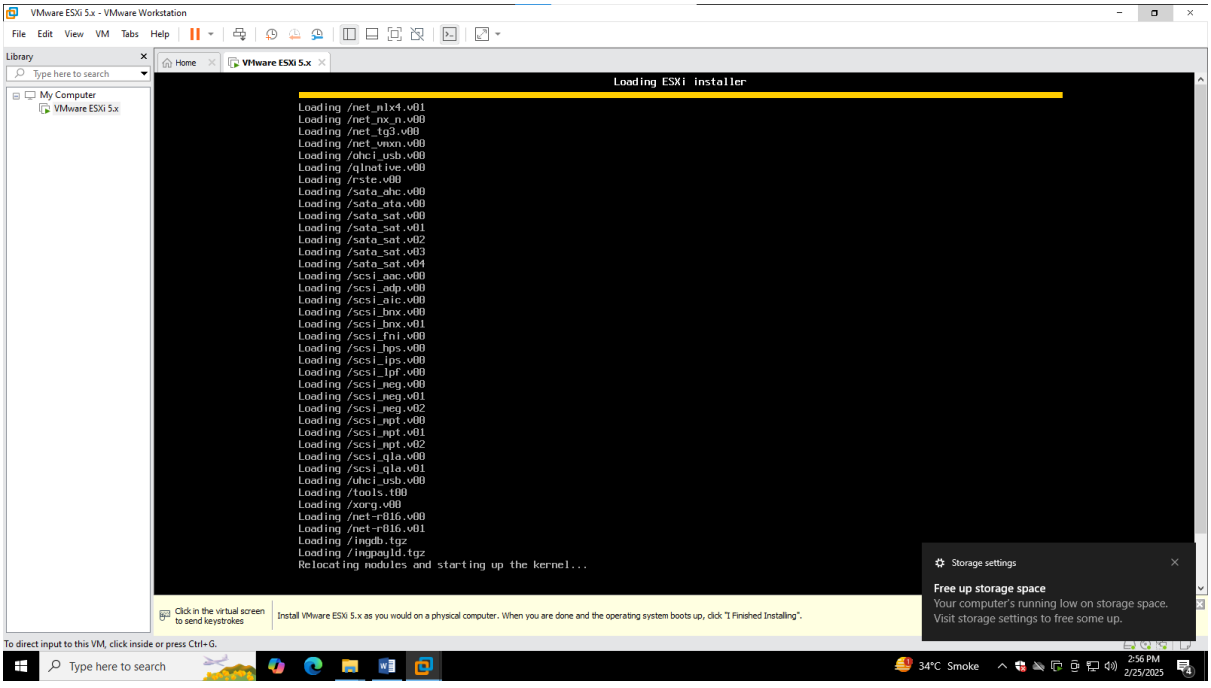

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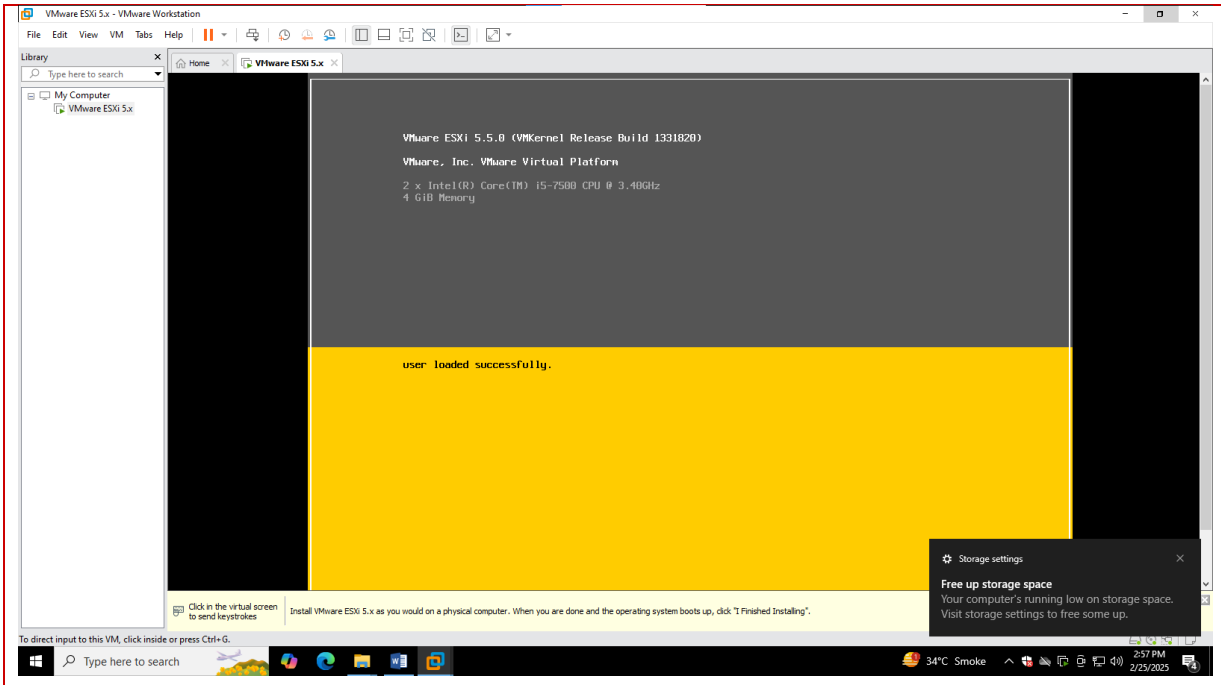
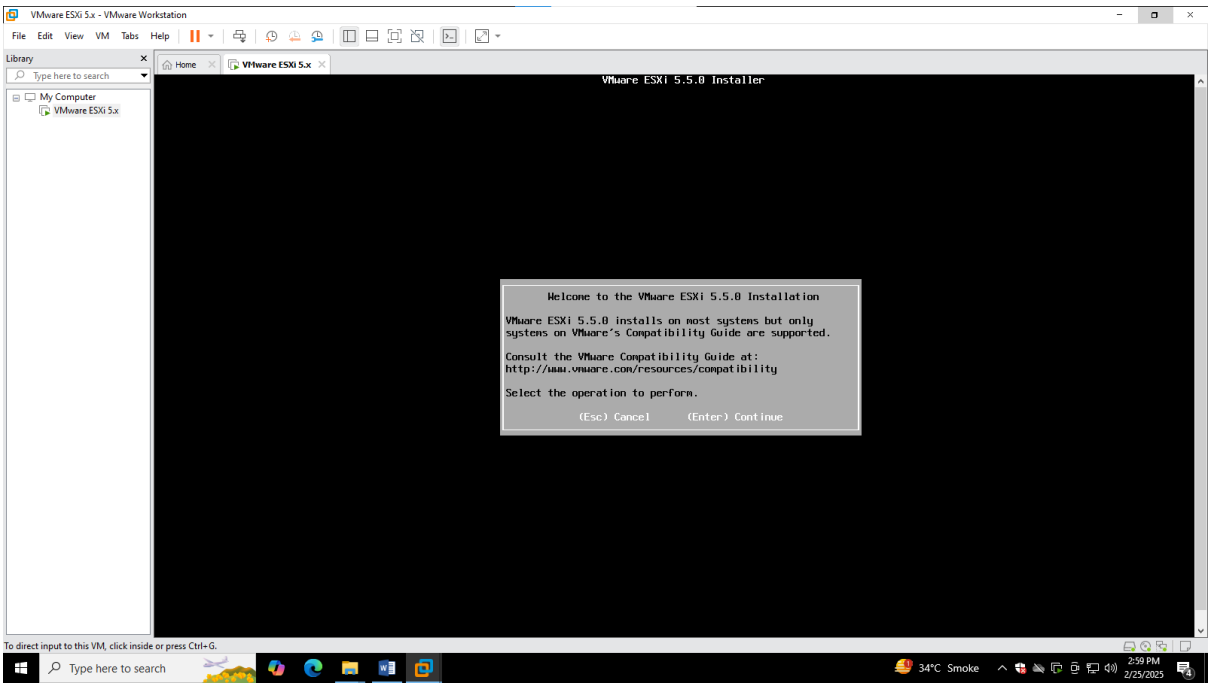
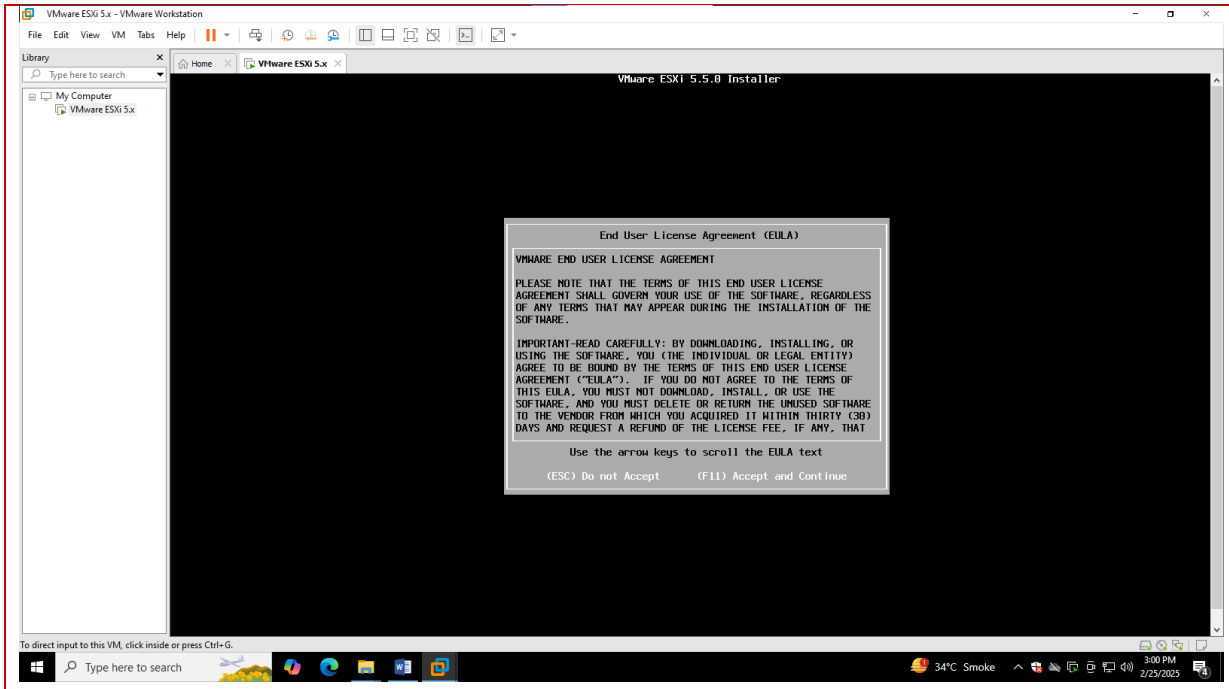
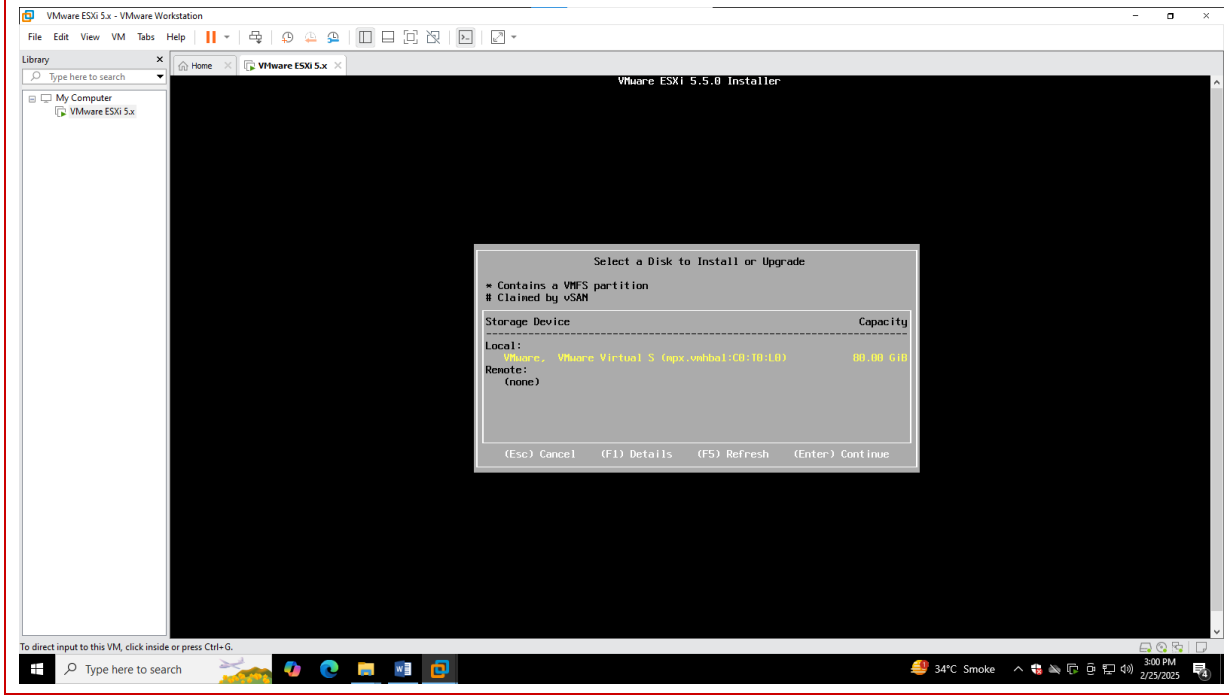


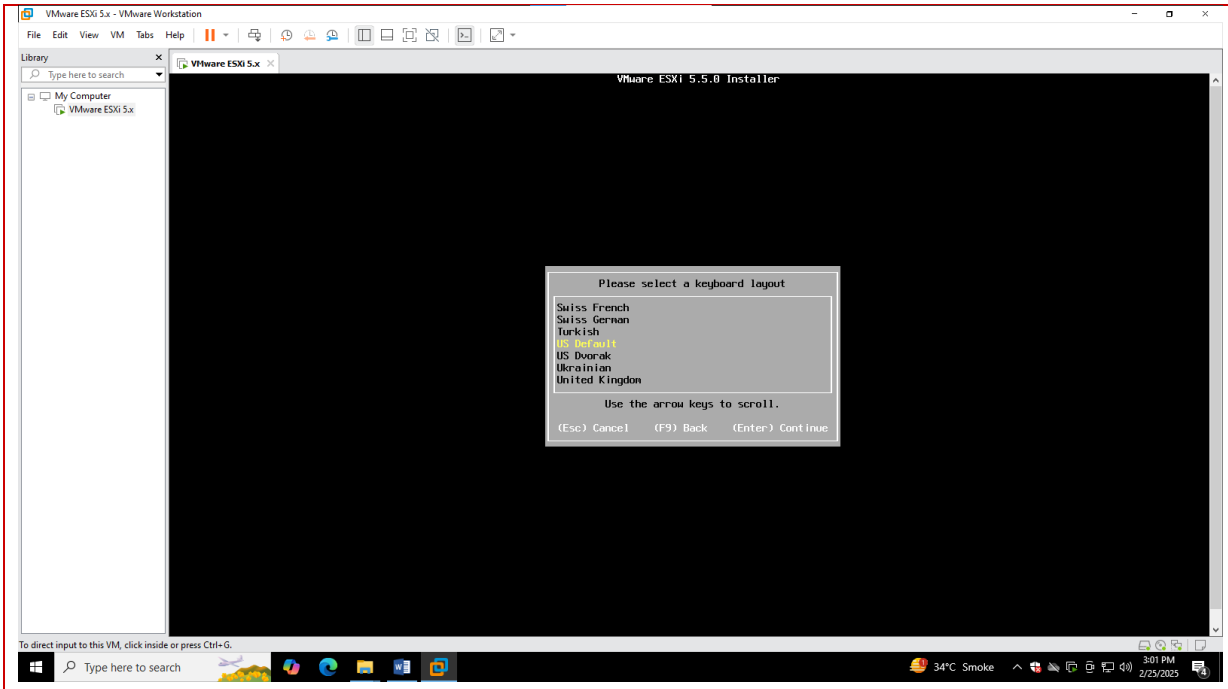


Name of Instructor: Prof. Aditi Prajapati

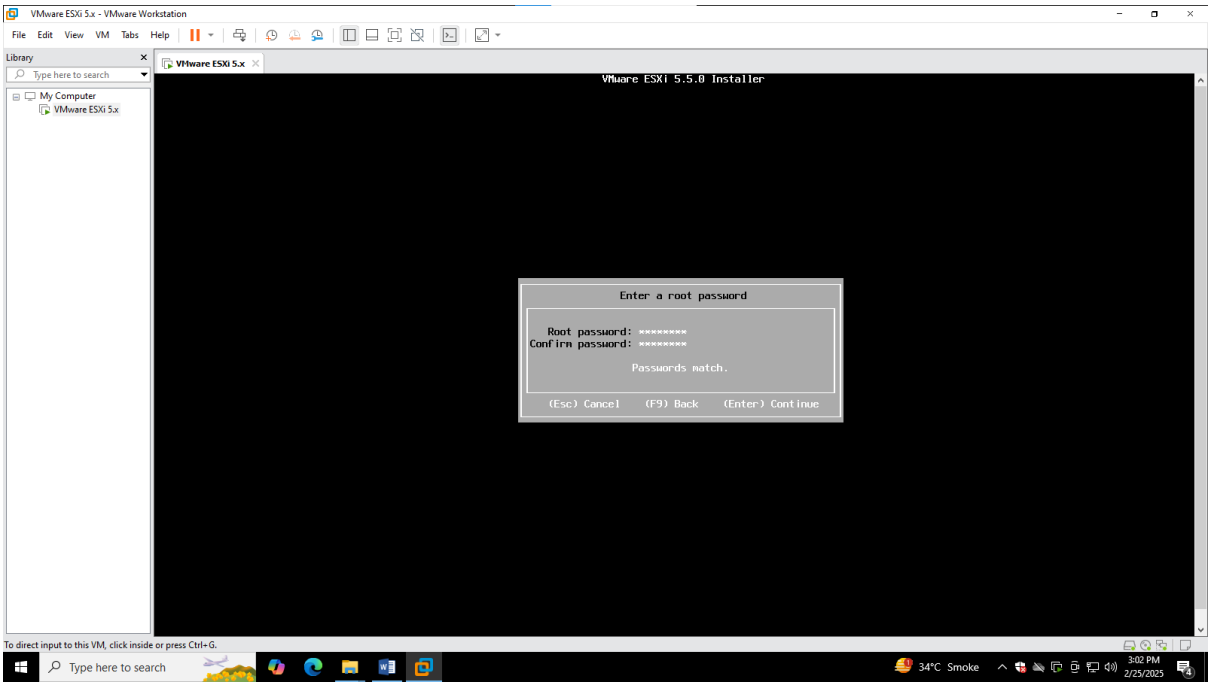




Name of Instructor: Prof. Aditi Prajapati



Root@123



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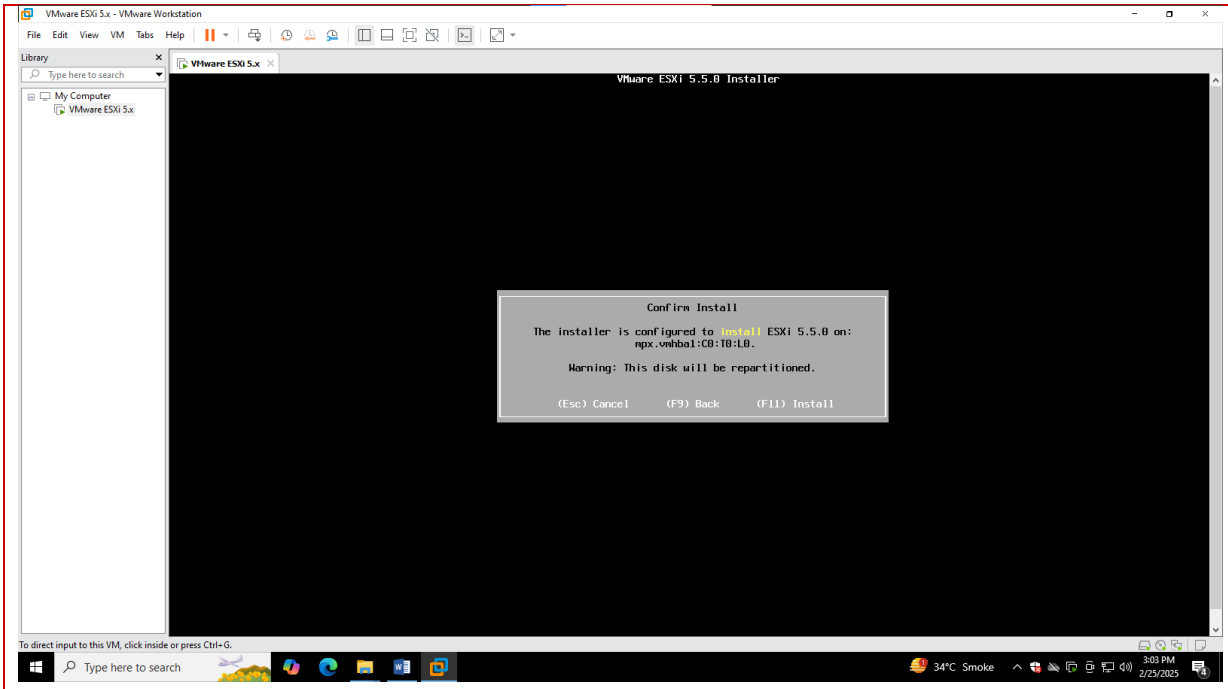
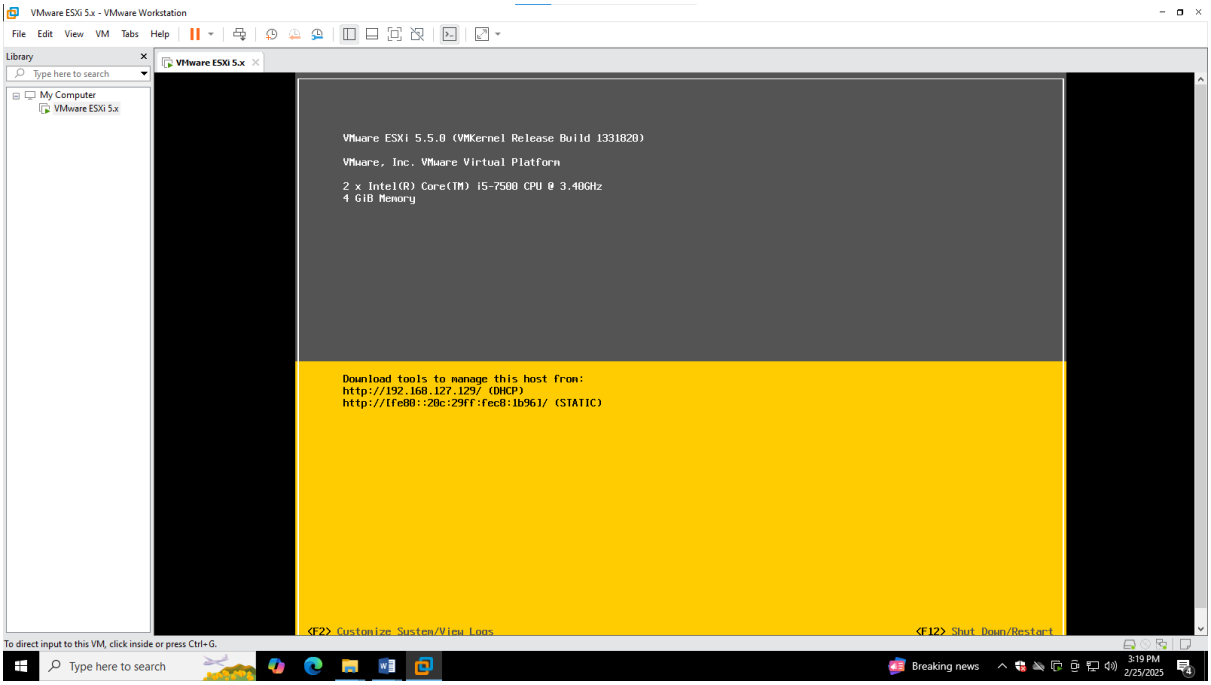
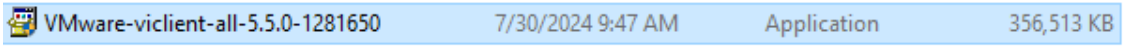




Note this IP



Install this

And open this VMware vSphere Client

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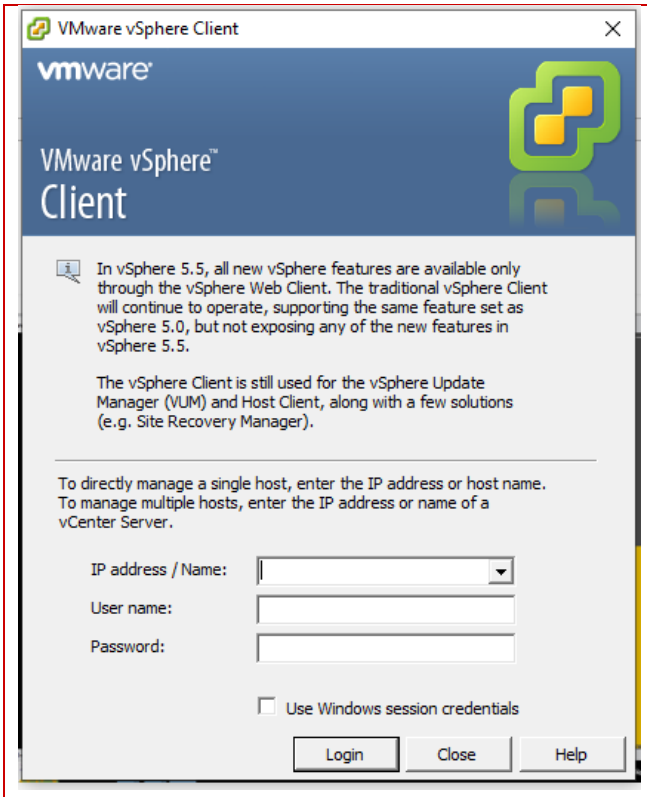
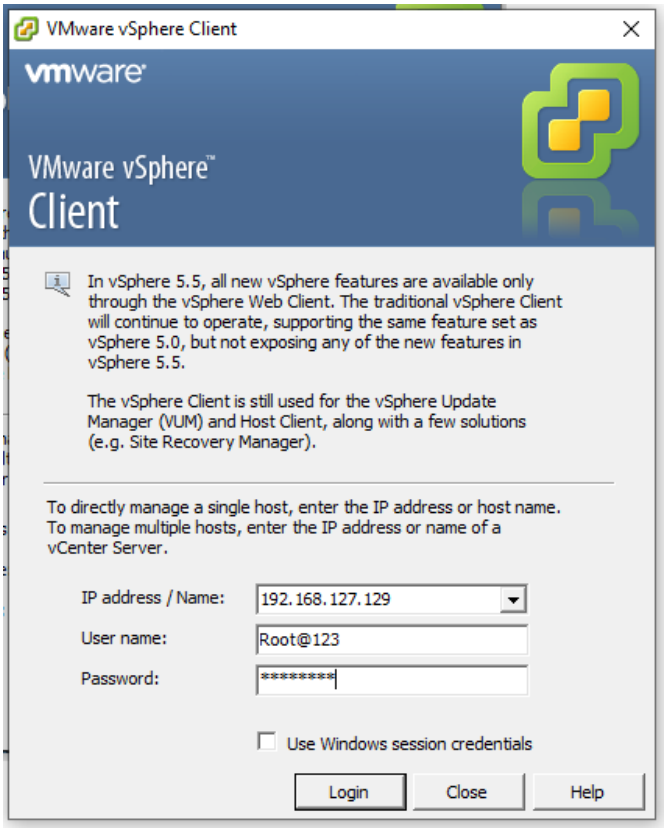
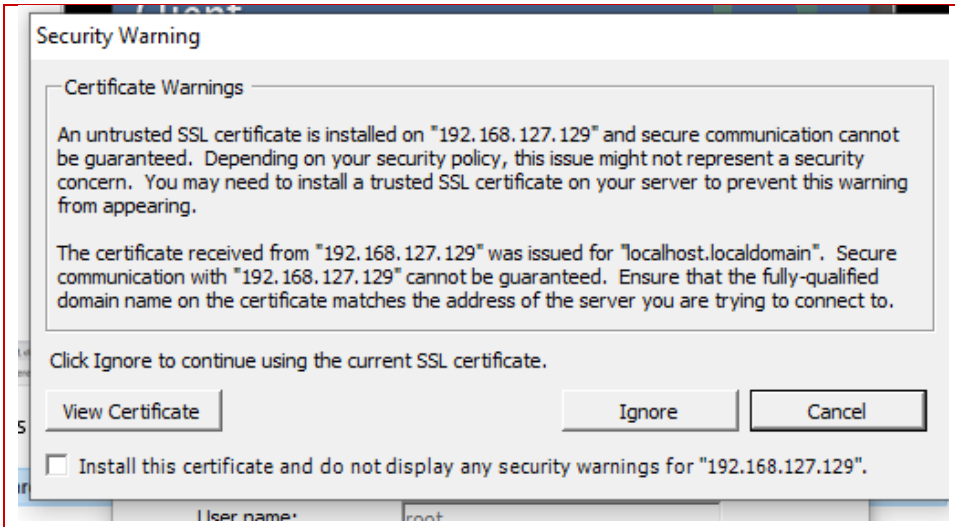


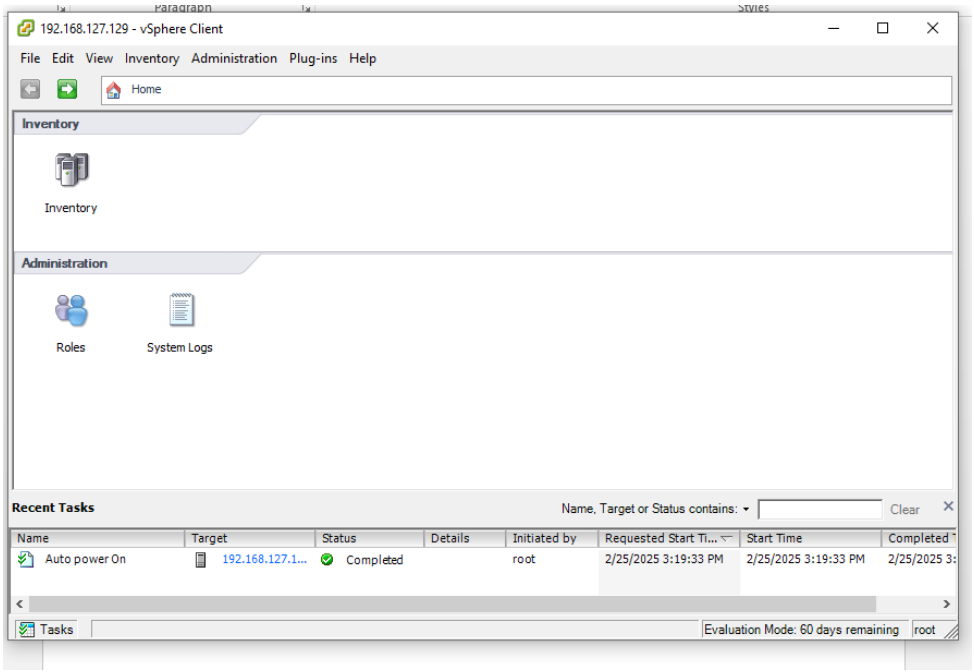


Correction: username is root

Name of Instructor: Prof. Aditi Prajapati



Ignore this



Click on inventory

And goto configuration tab

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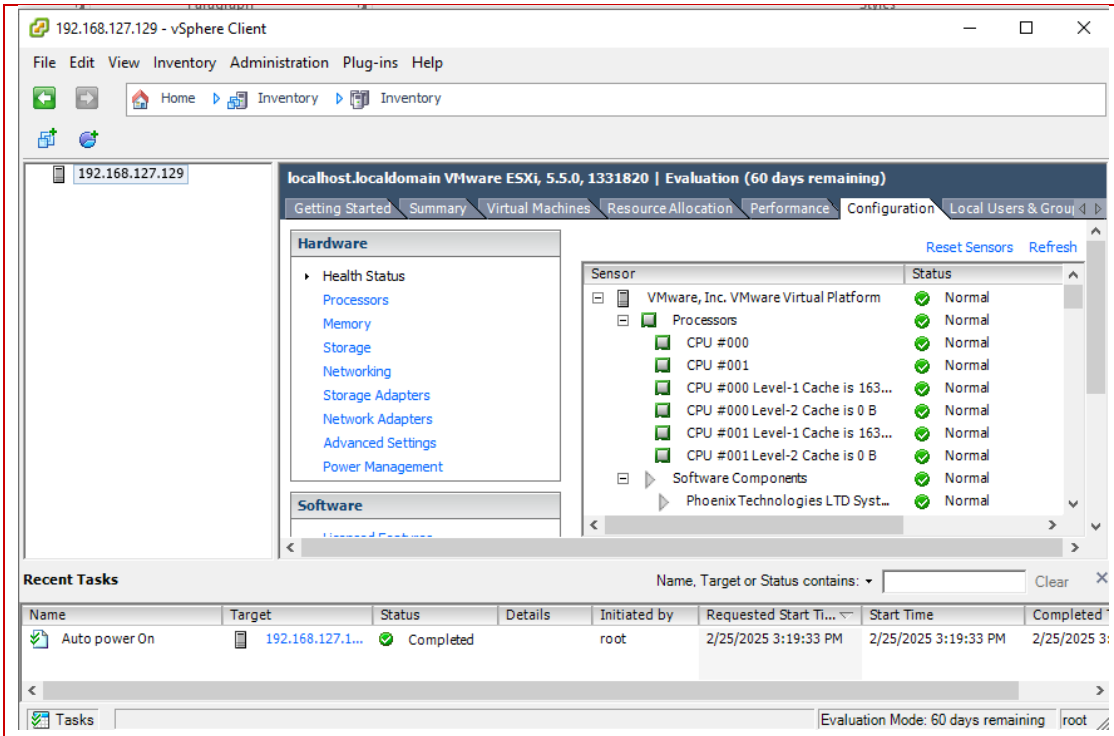
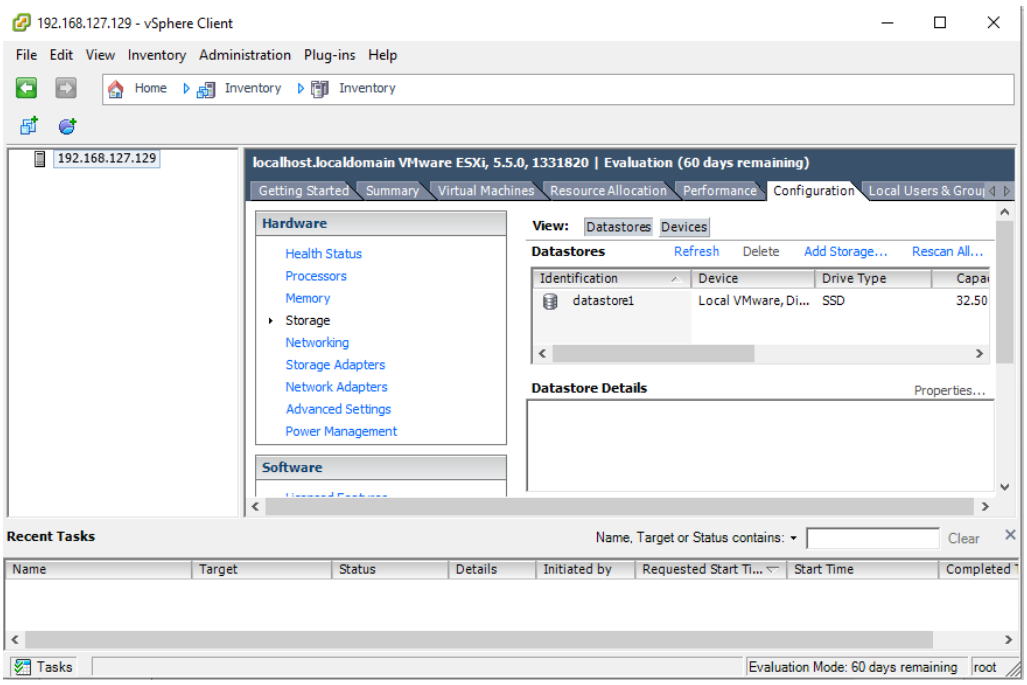


Go to storage



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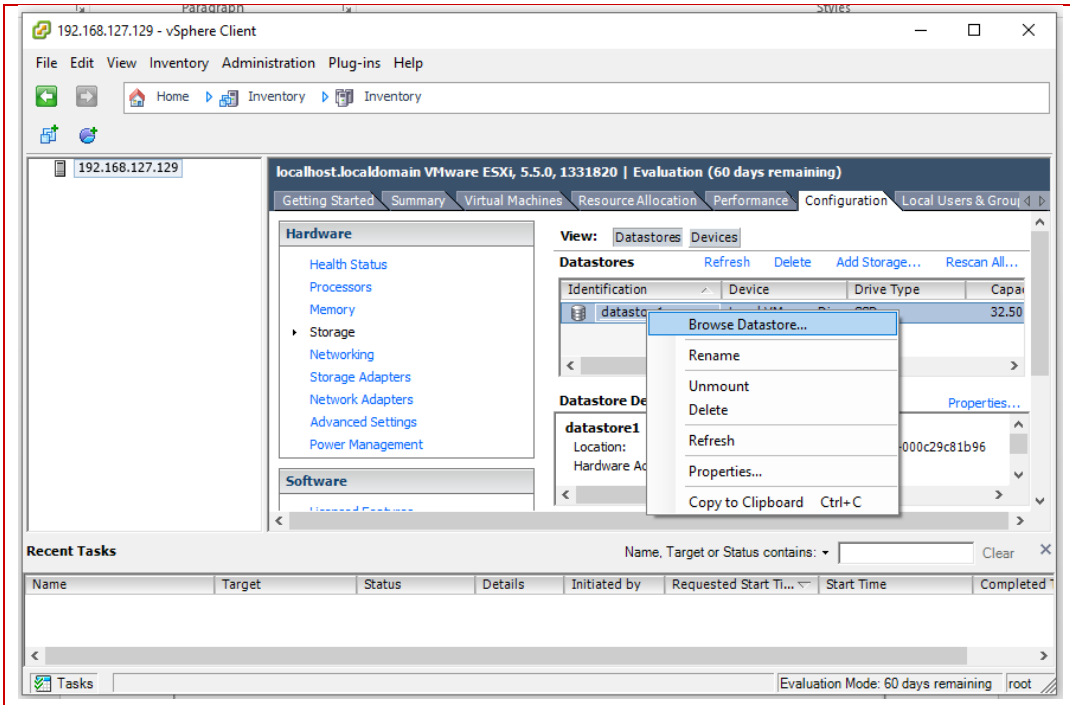

Go to datastore media device (virtual)

And upload windows iso DVD

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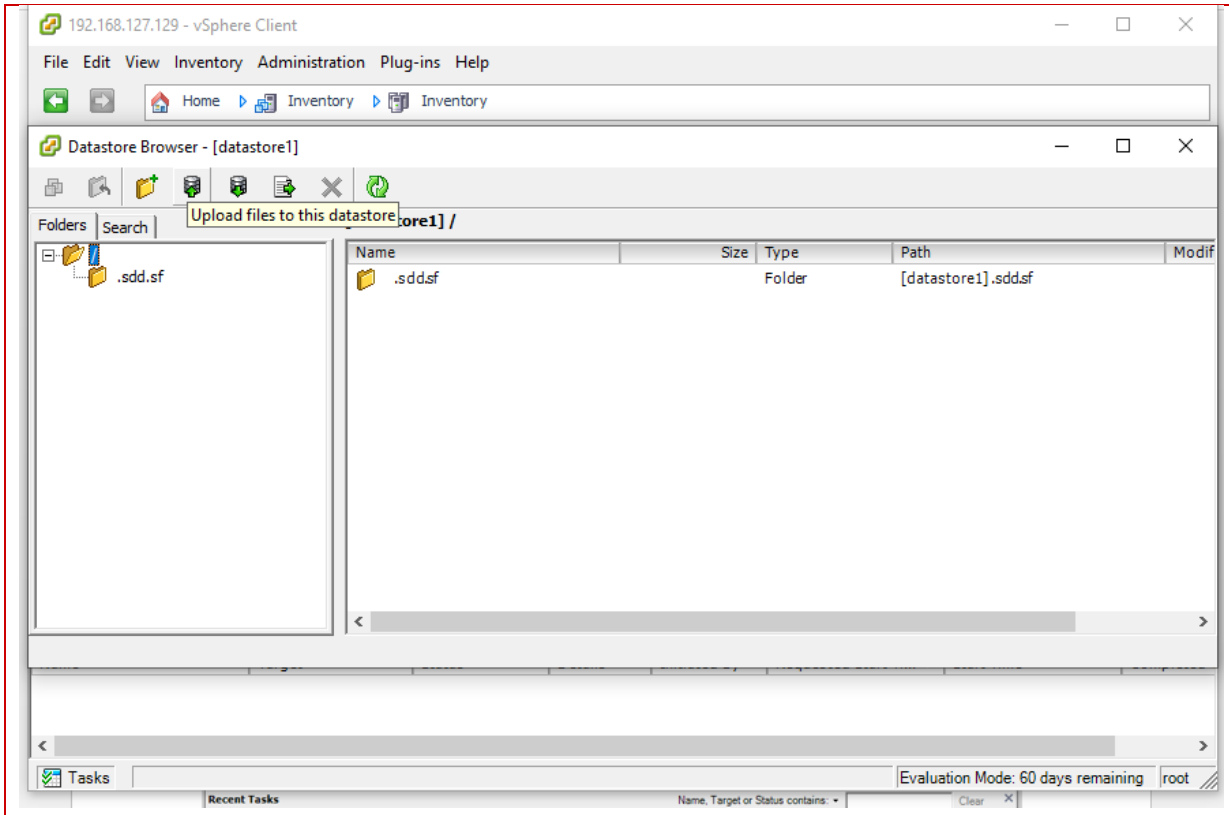
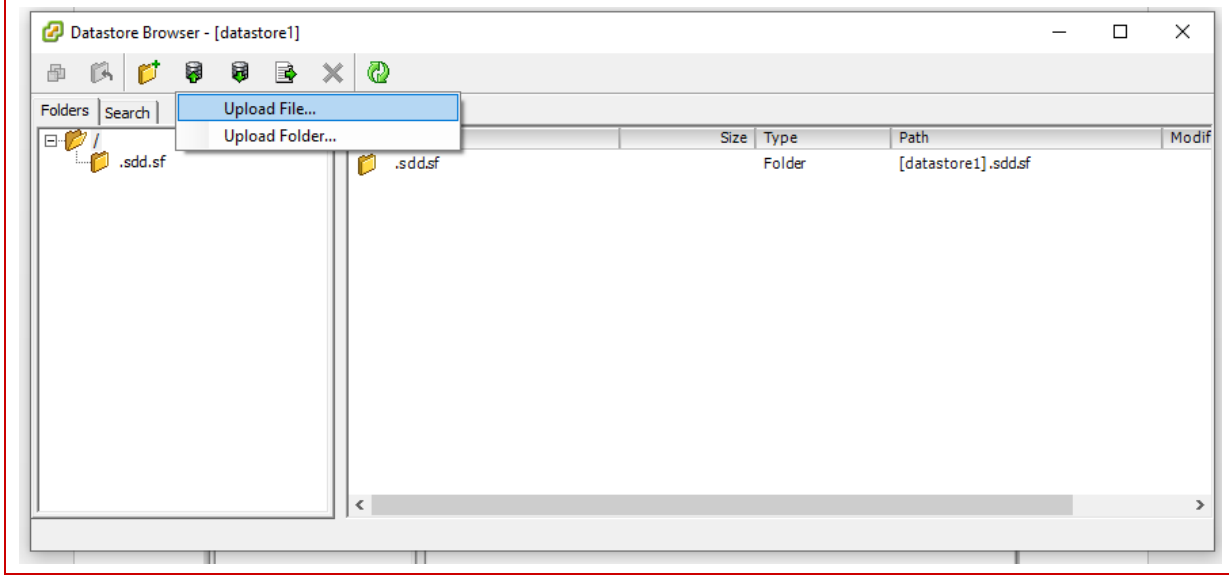
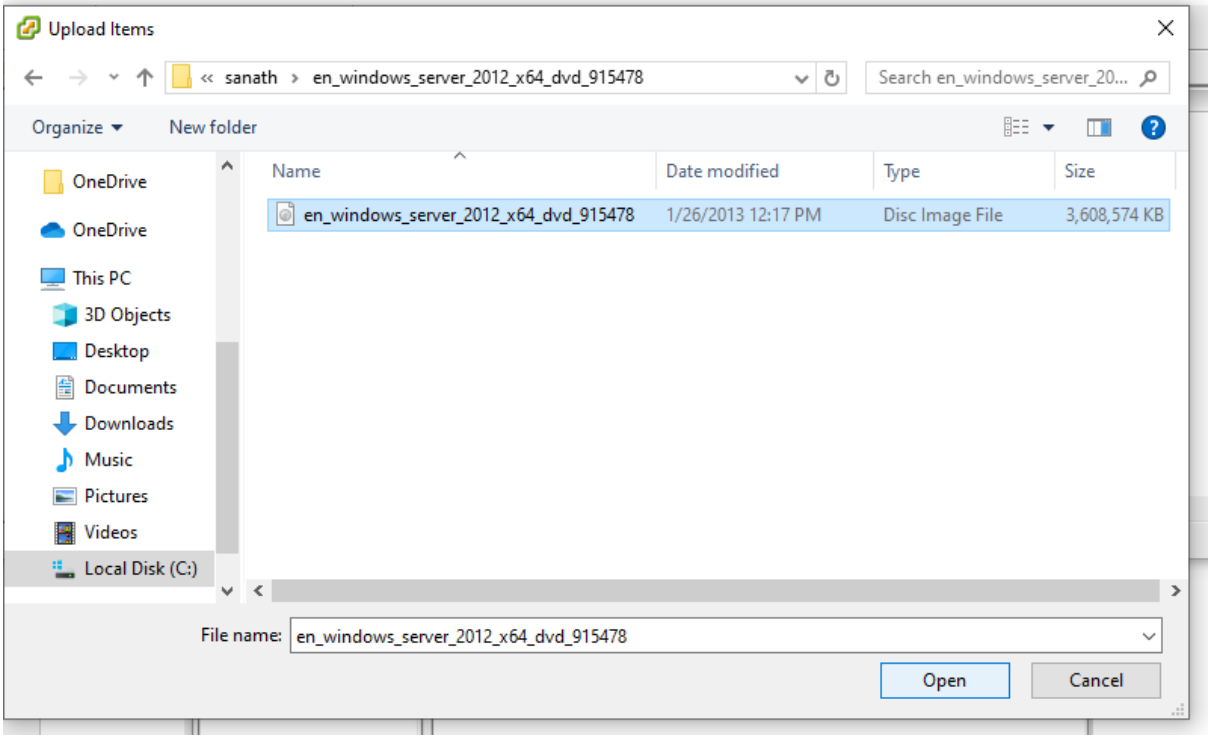
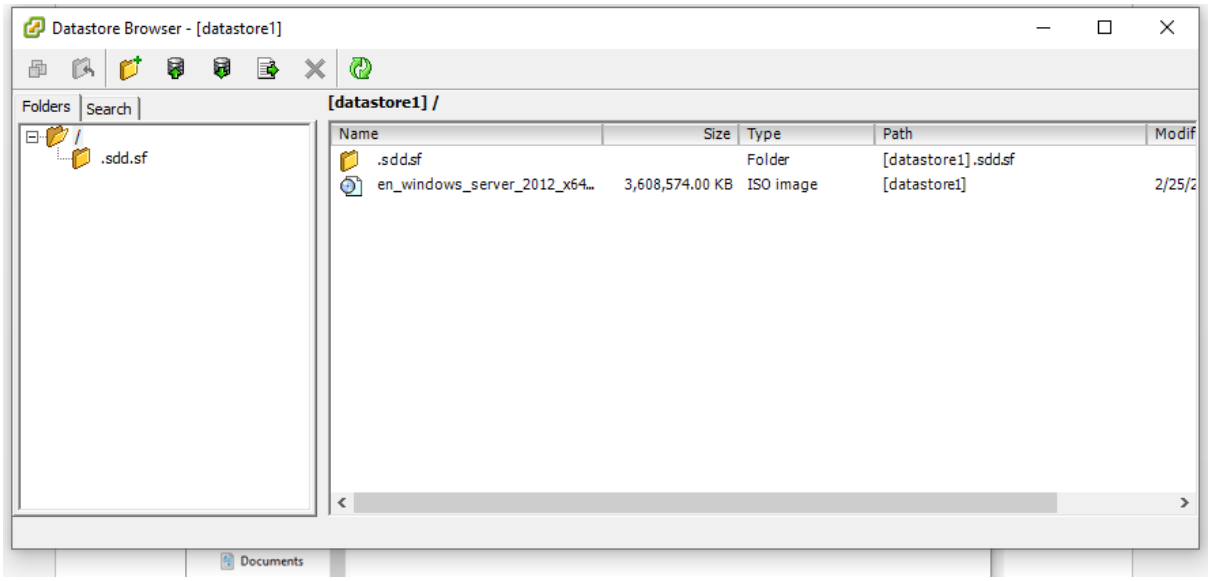




Name of Instructor: Prof. Aditi Prajapati





Create new virtual machine by right click on IP

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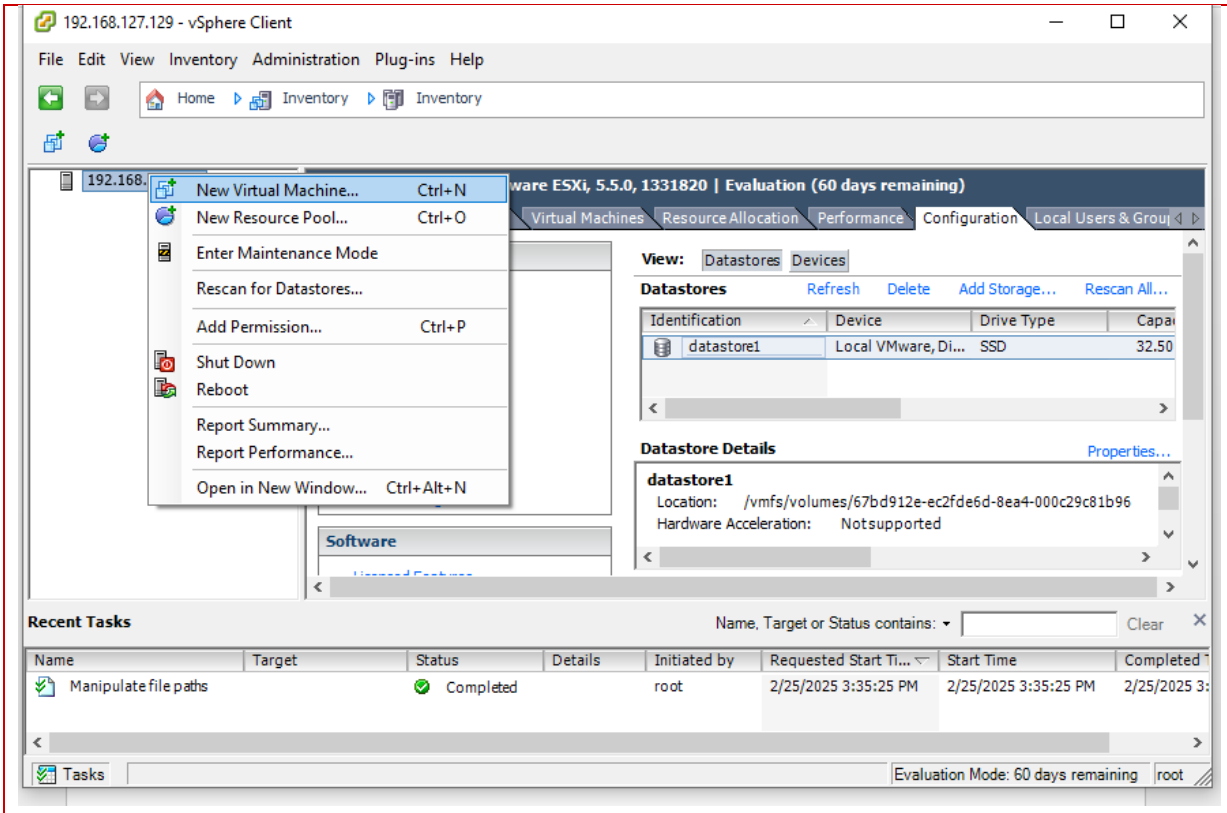
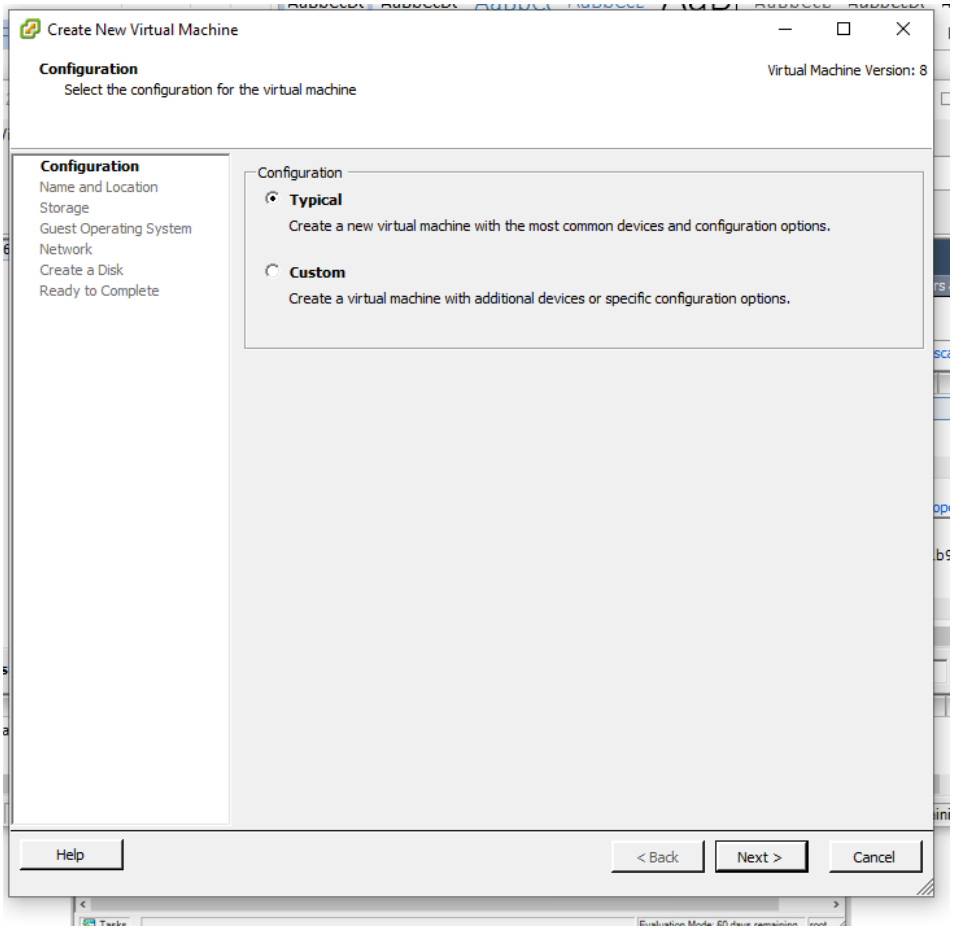
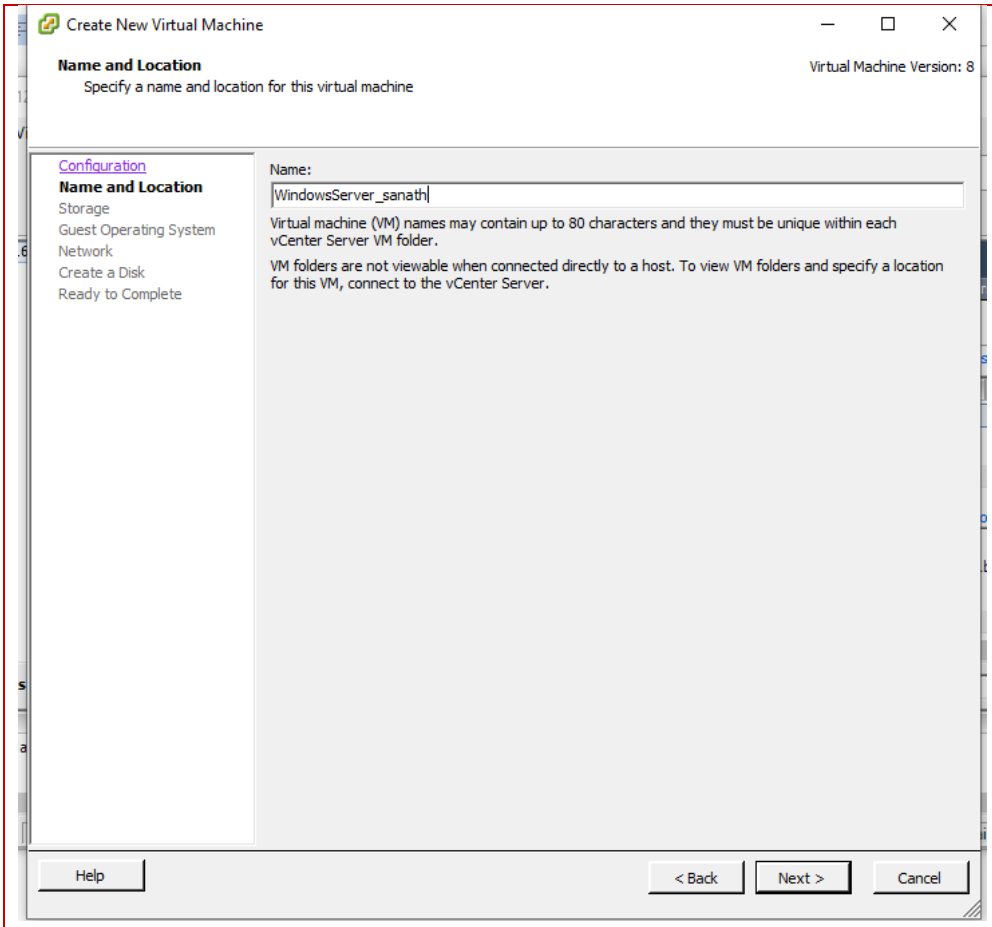
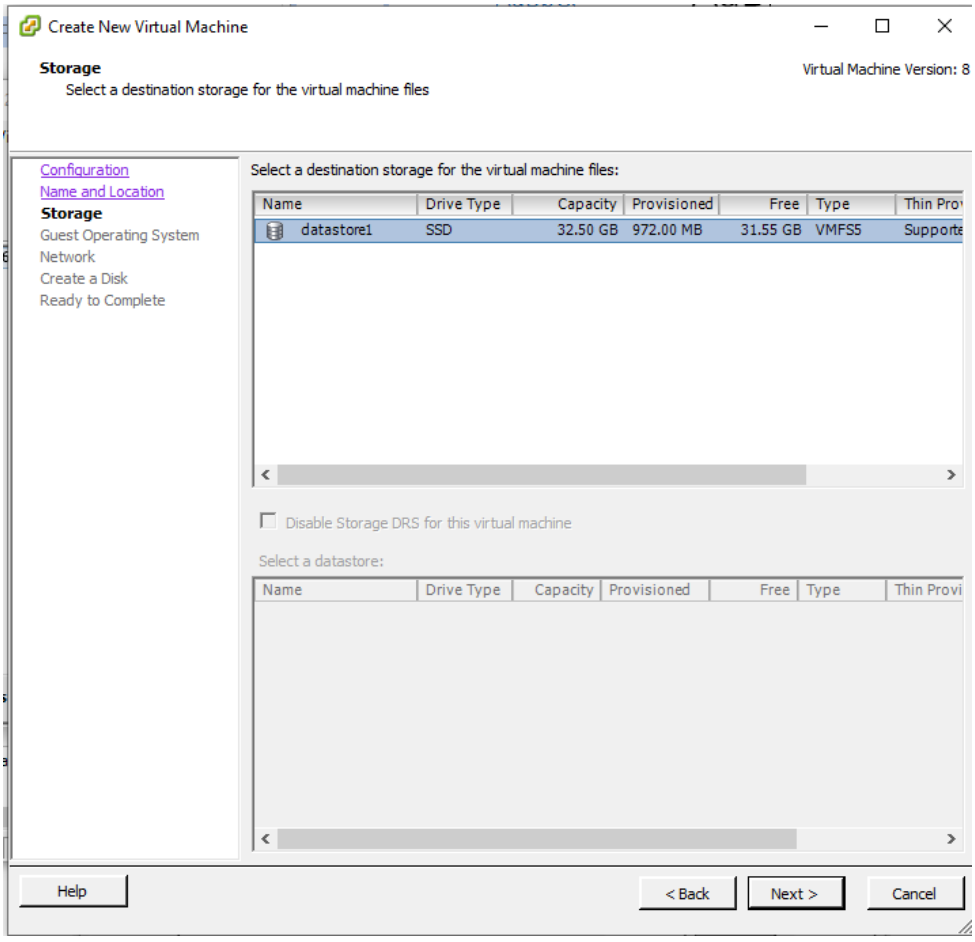




Name of Instructor: Prof. Aditi Prajapati





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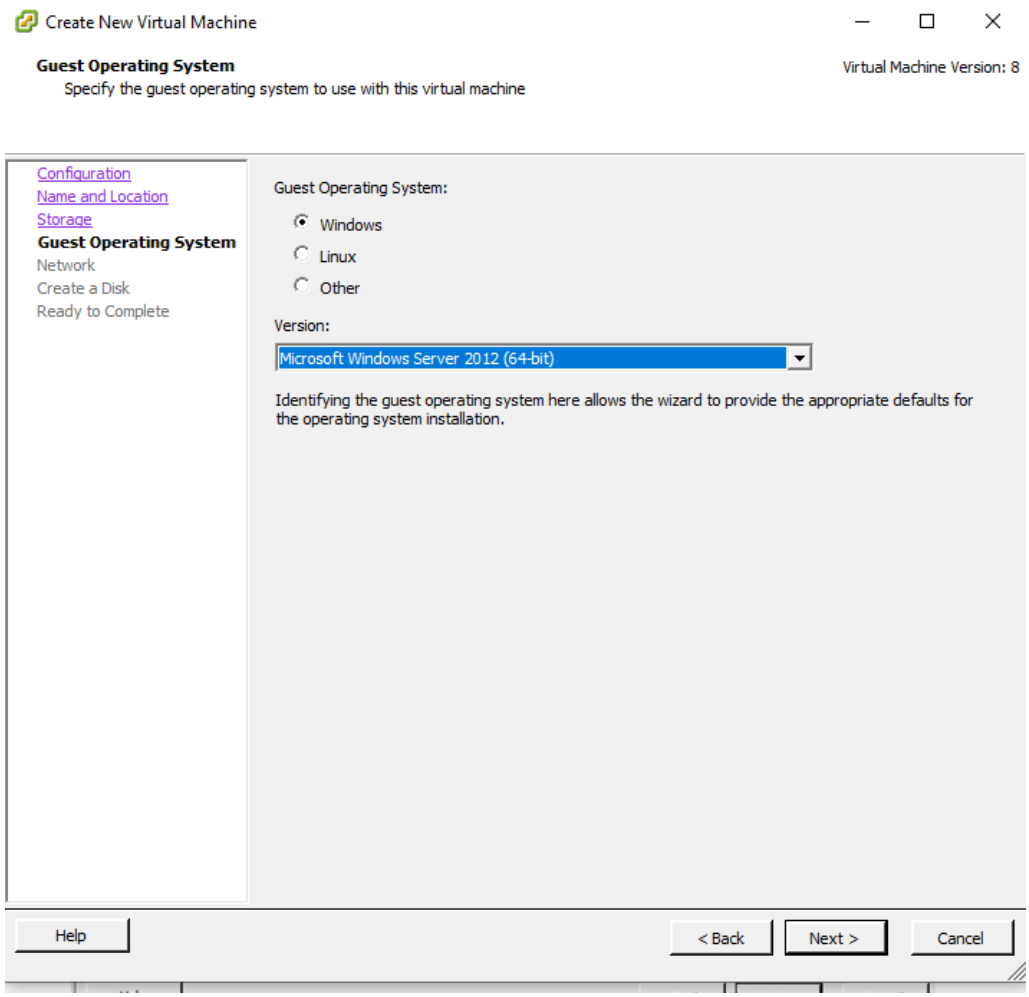
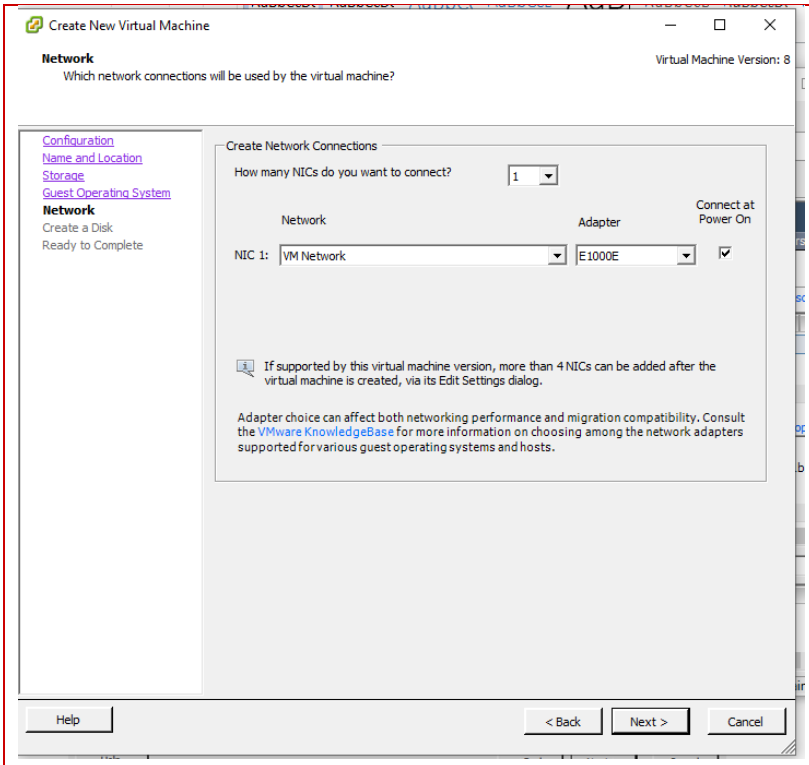
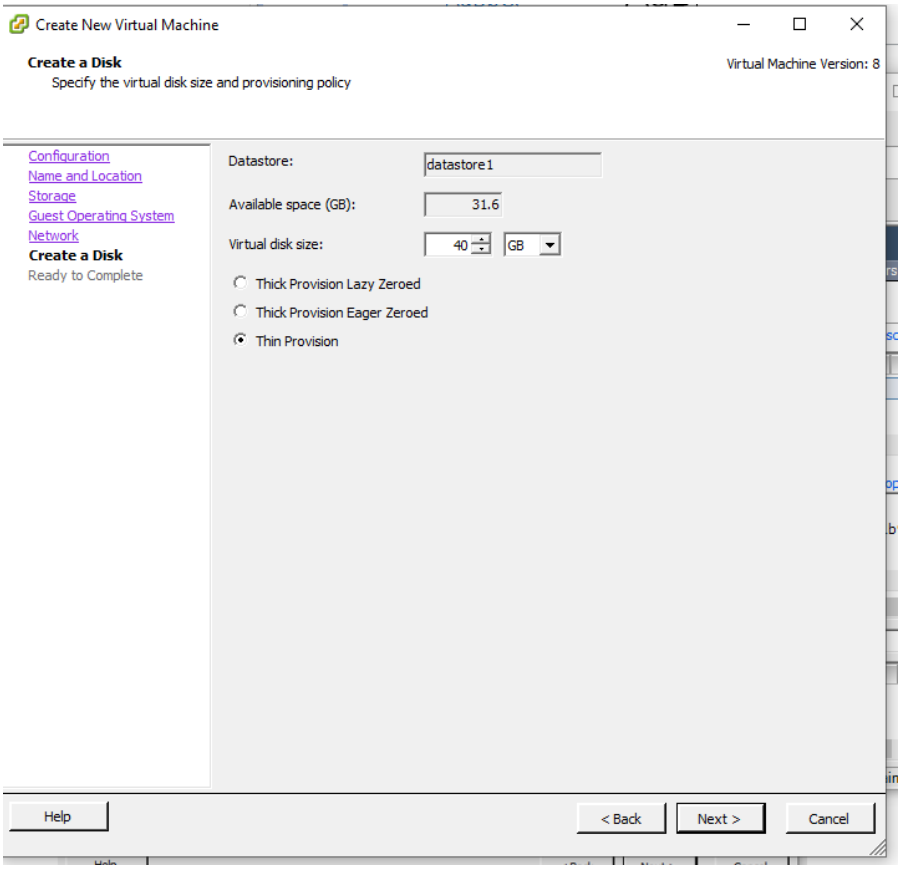
Select proper version

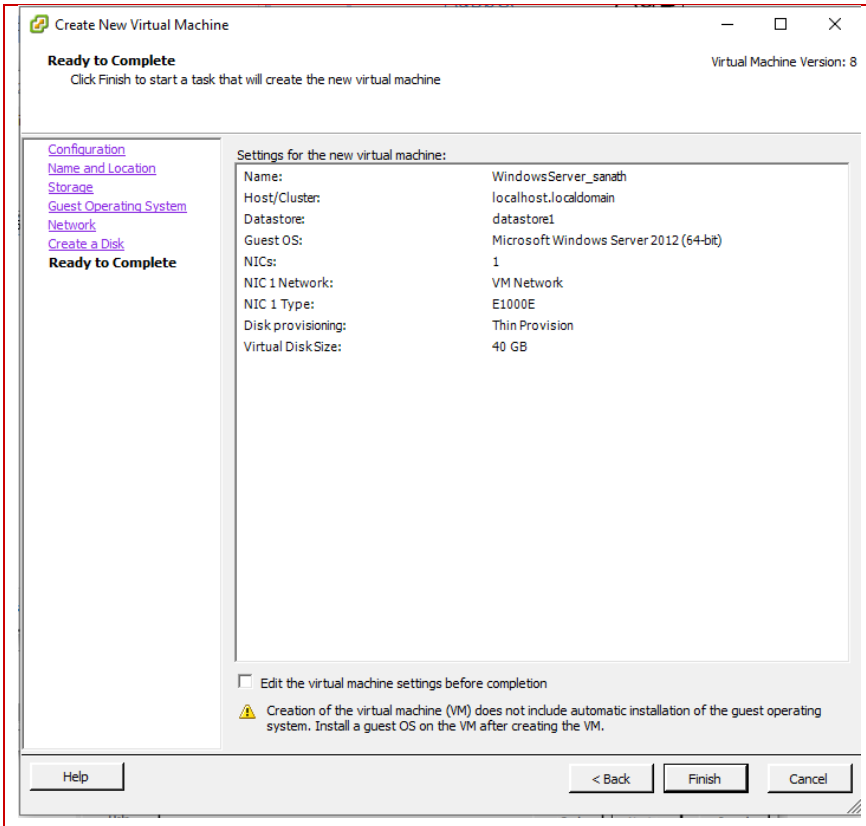


Name of Instructor: Prof. Aditi Prajapati



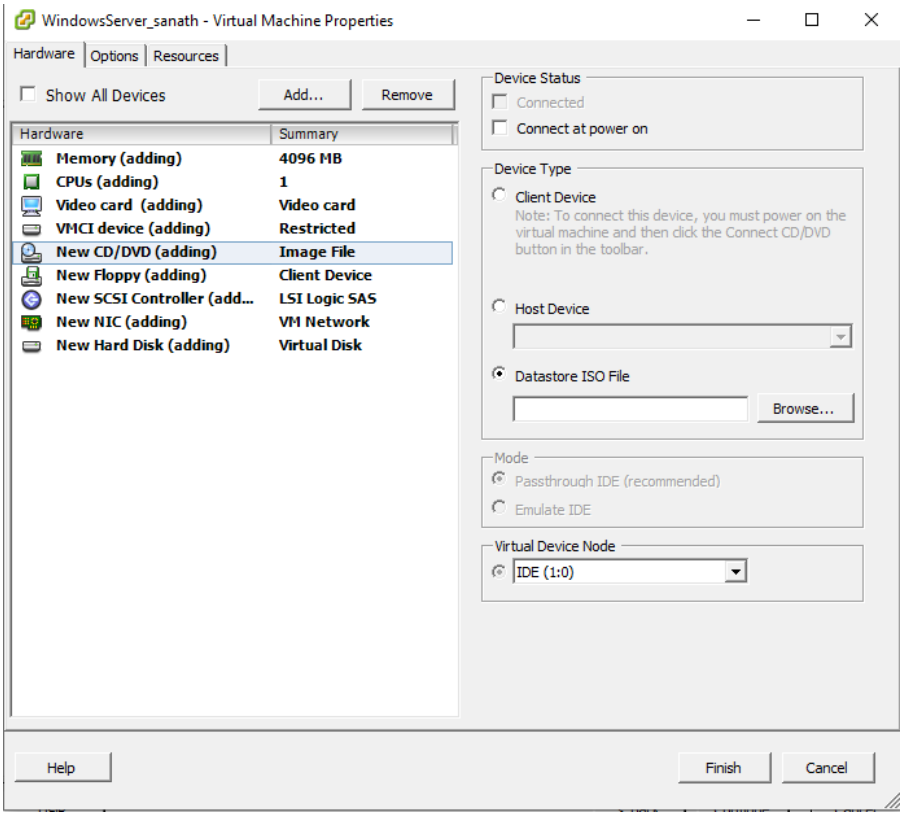


Name of Instructor: Prof. Aditi Prajapati

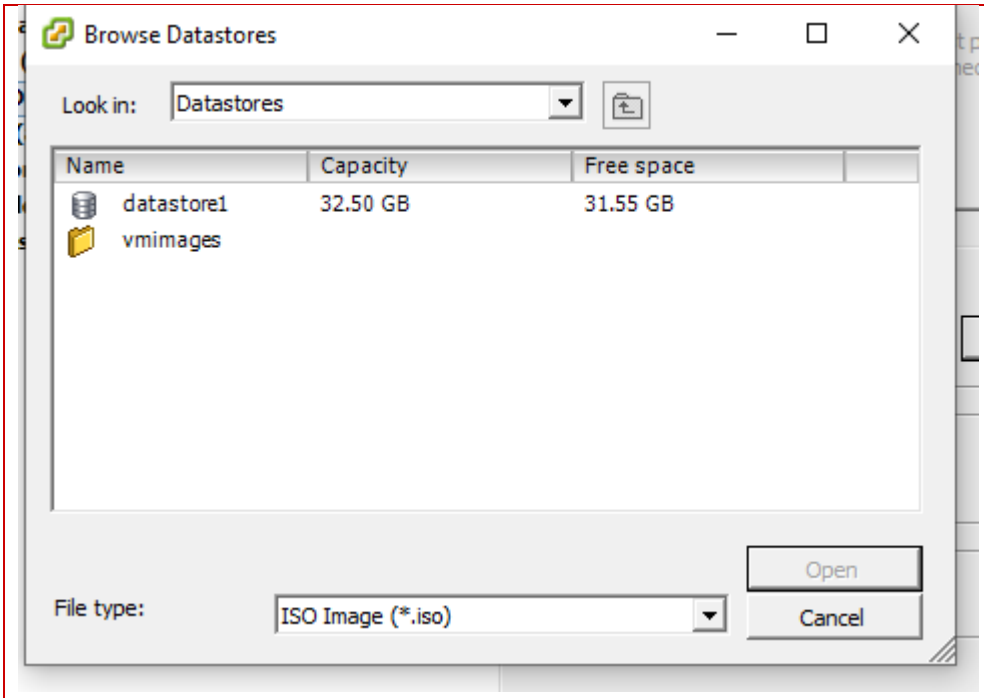


Click on edit the virtual machine settings

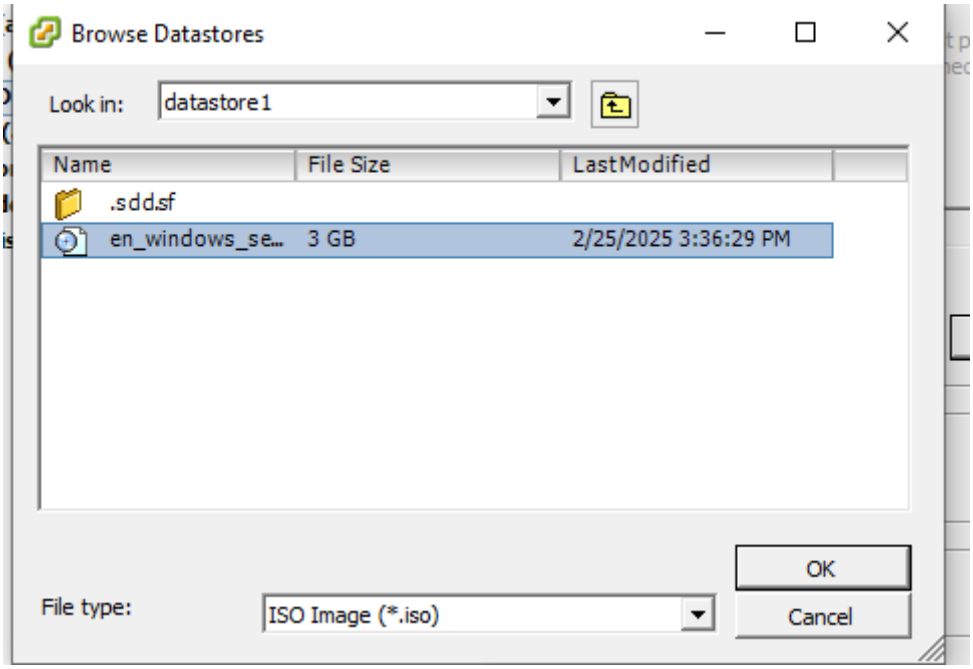
And continue



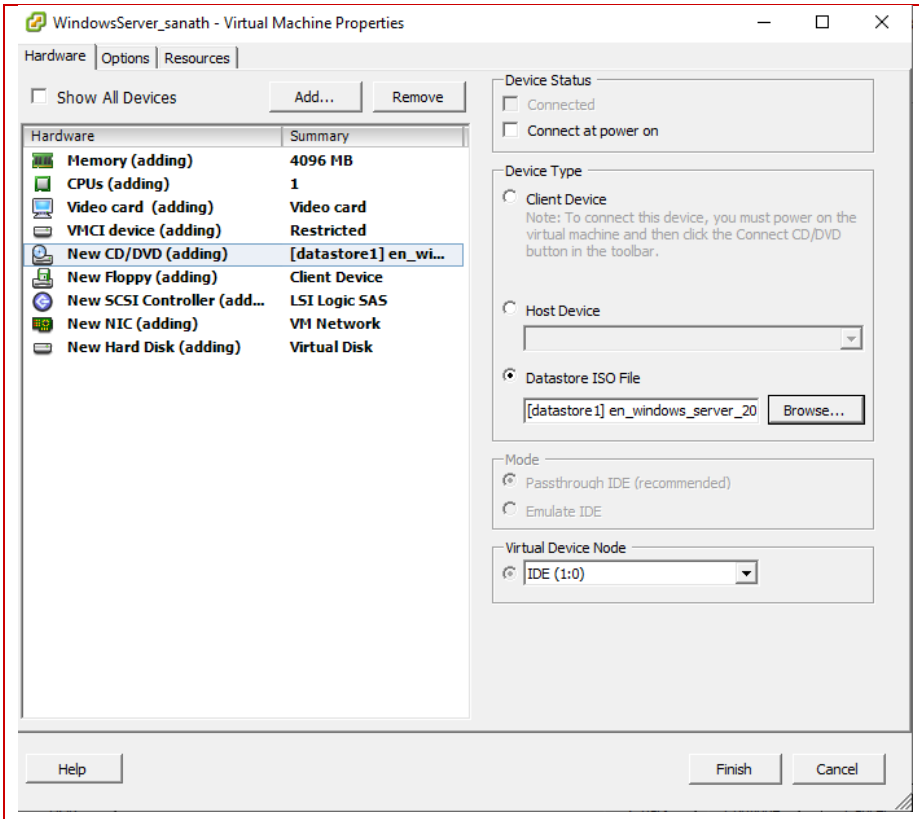
Name of Instructor: Prof. Aditi Prajapati



go inside datastore

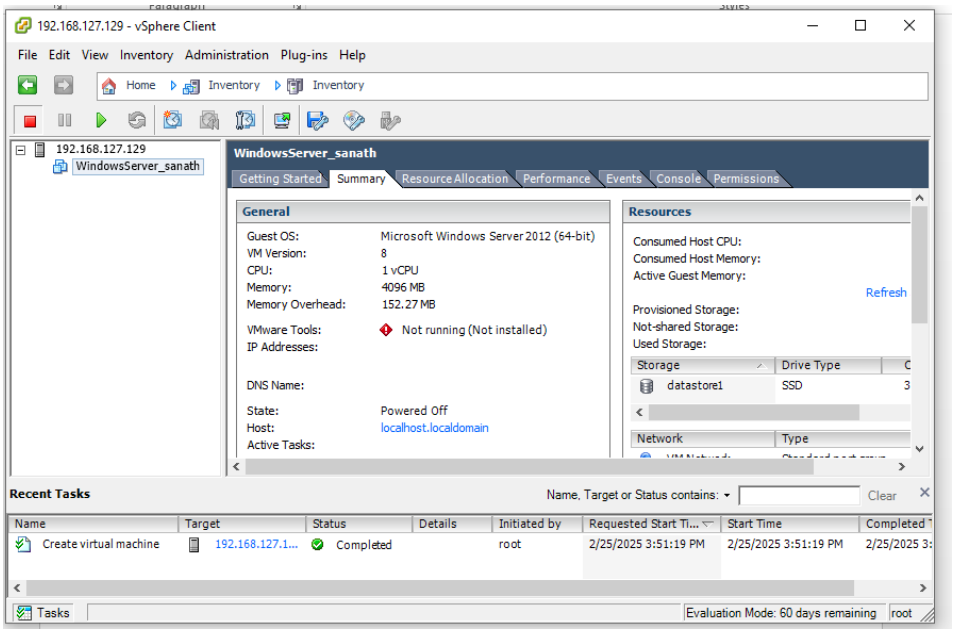


Select iso file

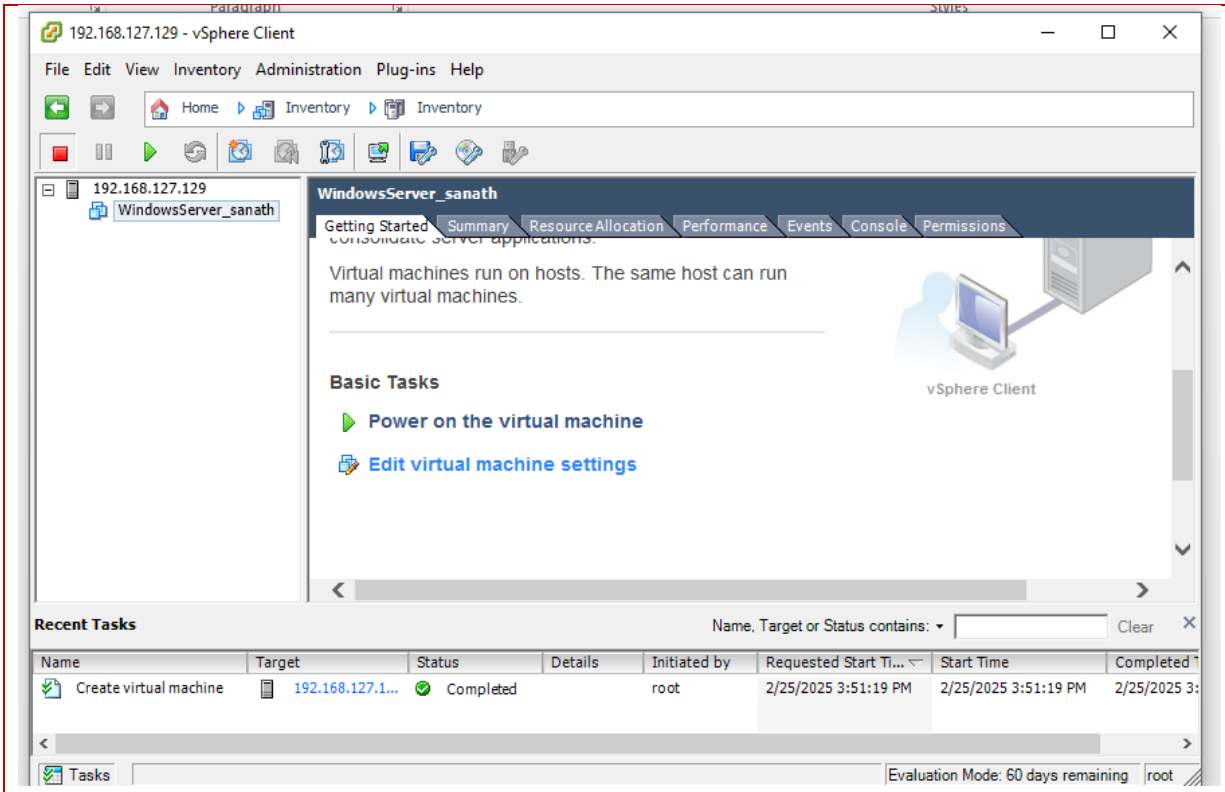


Click on connected power on check button and finish

Server gets added



Name of Instructor: Prof. Aditi Prajapati



edit VM settings

Set this to 2 GB

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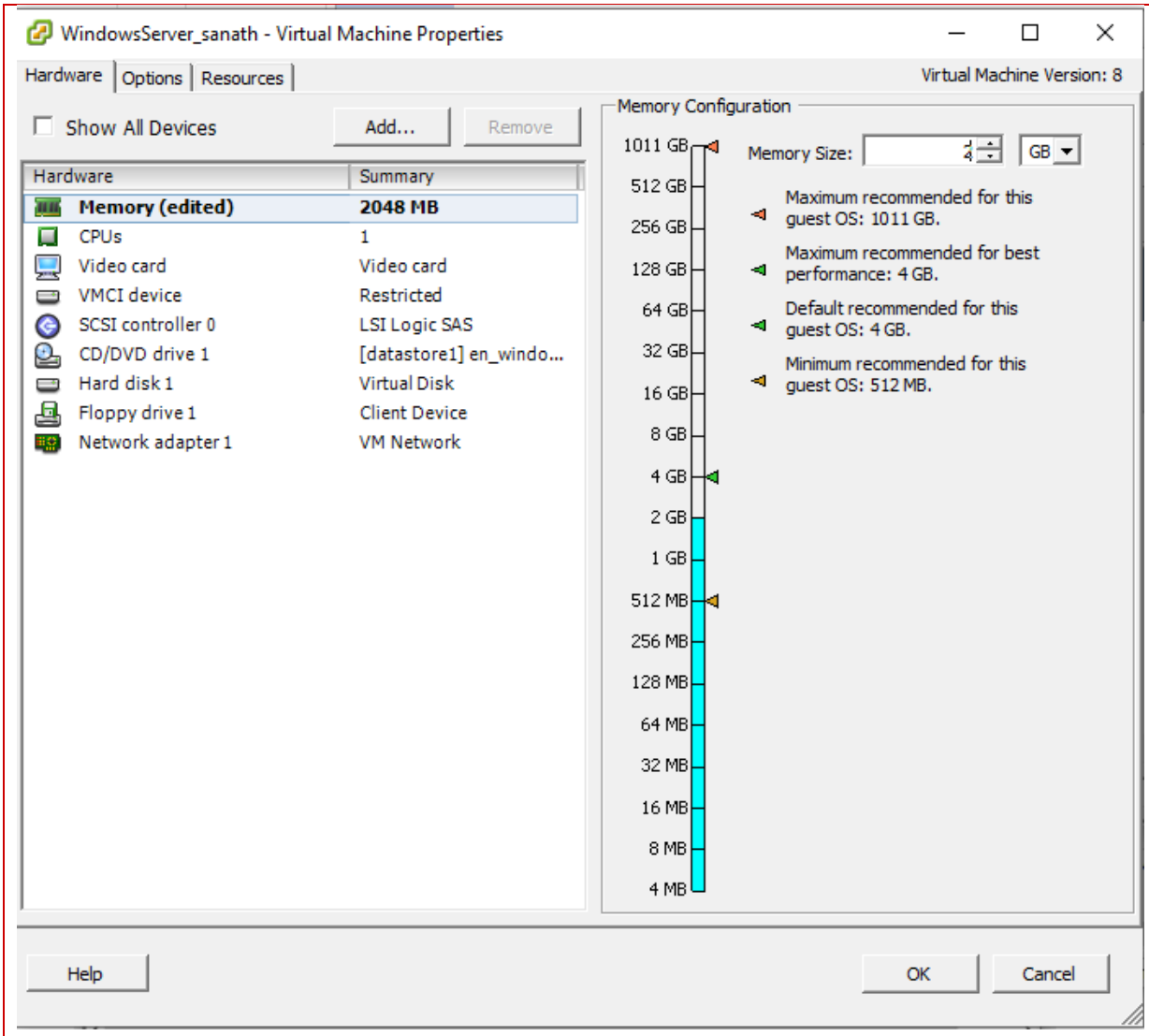
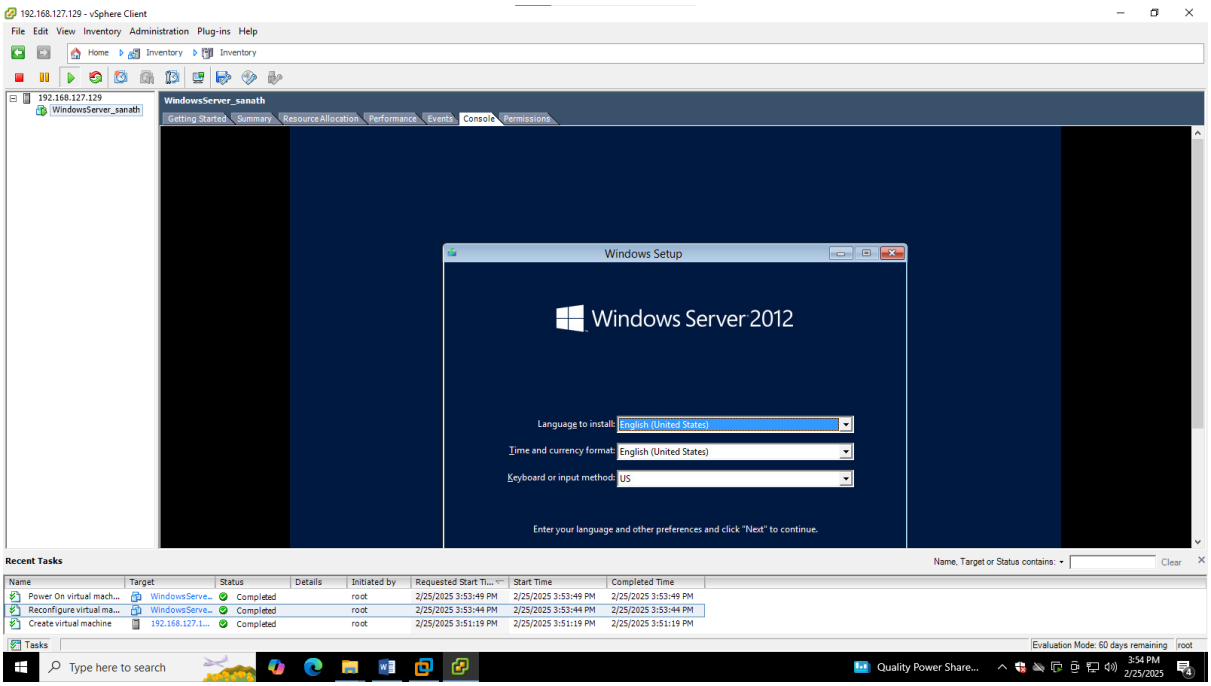


Now power on this and go to console



Name of Instructor: Prof. Aditi Prajapati

Cloud Computing

Practical No. 7

DEPARTMENT OF COMPUTER SCIENCE

Name:	Jagdish Ganesh Naikar	**Roll Number**	TCS2425101
Paper Code:	SIUSCS62	**Class**	TYBSc(Computer Science)
Topic:	Cloud Computing and its Architecture	**Batch**	2
Date:	03/03/2025	**Practical No**	7

A) AIM:

Study of Cloud Computing and its Architecture.

Cloud Computing and Its Architecture

Introduction to Cloud Computing

Cloud computing is a technology that enables users to access and store data, applications, and services over the internet rather than on local computers or physical servers. It provides scalable computing resources on demand, reducing the need for hardware maintenance and increasing flexibility.

Characteristics of Cloud Computing

1. **On-Demand Self-Service** – Users can provision resources without human intervention.
2. **Broad Network Access** – Services are accessible over the internet from various devices.
3. **Resource Pooling** – Multiple users share computing resources dynamically.
4. **Rapid Elasticity** – Resources scale up or down based on demand.
5. **Measured Service** – Usage is monitored, and users pay for what they consume.

Cloud Computing Service Models

1. **Infrastructure as a Service (IaaS)** – Provides virtualized computing resources such as virtual machines, storage, and networking (e.g., AWS EC2, Google Compute Engine).
2. **Platform as a Service (PaaS)** – Provides a development platform with tools and frameworks (e.g., Google App Engine, Microsoft Azure).
3. **Software as a Service (SaaS)** – Delivers applications over the internet (e.g., Google Drive, Dropbox, Microsoft Office 365).

Cloud Deployment Models

1. **Public Cloud** – Services are available to the general public over the internet (e.g., AWS, Google Cloud).
2. **Private Cloud** – Cloud infrastructure is dedicated to a single organization.
3. **Hybrid Cloud** – A combination of public and private clouds for flexibility.
4. **Community Cloud** – Shared infrastructure among organizations with common concerns.

Cloud Computing Architecture

Cloud computing architecture consists of the following layers:

1. Front-End Layer

- Users interact with cloud services via web browsers or applications.
- Includes client devices like computers, tablets, and smartphones.

2. Back-End Layer

- Consists of servers, storage systems, databases, and applications that process user requests.
- Provides core functionalities such as computing, networking, and storage.

3. Cloud Storage

- Stores data in distributed servers, ensuring redundancy and reliability.

4. Virtualization

- Creates multiple virtual environments on a single physical server, optimizing resource utilization.

5. Networking

- Ensures secure communication between cloud services and users through the internet.

Benefits of Cloud Computing

- Cost-efficient (pay-as-you-go model).
- High availability and scalability.
- Automatic software updates and maintenance.
- Enhanced collaboration and remote accessibility.

Challenges of Cloud Computing

- Security and privacy concerns.
- Internet dependency.
- Compliance and legal issues.
- Downtime and potential data loss risks.

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Conclusion

Cloud computing is revolutionizing IT infrastructure by offering scalable, cost-effective, and flexible solutions. Its architecture enables businesses to optimize resources, enhance productivity, and improve service delivery. As cloud technologies continue to evolve, they will play a crucial role in the future of computing.

Cloud Computing

Practical No. 8

DEPARTMENT OF COMPUTER SCIENCE

Name:	Jagdish Ganesh Naikar	**Roll Number**	TCS2425101
Paper Code:	SIUSCS62	**Class**	TYBSc(Computer Science)
Topic:	Case Study	**Batch**	2
Date:	03/03/2025	**Practical No**	8

A) AIM:

Case study on Amazon EC2, Microsoft Hyper-V, Microsoft Azure, and Google Cloud Platform

Case Study on Cloud Computing Platforms: Amazon EC2, Microsoft Hyper-V, Microsoft Azure, and Google Cloud Platform

Introduction

Cloud computing has transformed business operations by offering flexible, scalable, and cost-efficient solutions. This case study examines **Amazon EC2, Microsoft Hyper-V, Microsoft Azure, and Google Cloud Platform (GCP)** through real-world applications, highlighting how companies have benefited from each platform.

1. Amazon EC2 (Elastic Compute Cloud) Case Study – Netflix

Background:

Netflix is a leading global streaming service with over **260 million subscribers**. The company requires massive computing power to stream HD and 4K videos to millions of users across different regions while ensuring seamless performance.

Challenge:

- Scaling on-premise infrastructure was costly and inefficient.
- High demand for computing resources during peak hours.
- Need for real-time video encoding, content delivery, and recommendation algorithms.

Solution:

Netflix migrated its entire infrastructure to **Amazon EC2** on AWS.

- **Auto Scaling**: EC2 instances automatically adjust based on demand, reducing costs.
- **Elastic Load Balancing**: Distributes traffic across multiple instances for optimal performance.
- **Content Delivery via AWS Edge Locations**: Netflix stores content in AWS servers closer to users for low-latency streaming.

Outcome:

- **99.99% uptime**, ensuring uninterrupted streaming.
- **Cost savings** by scaling only when needed.
- **Faster content delivery** using AWS global infrastructure.

2. Microsoft Hyper-V Case Study – Dell Technologies

Background:

Dell Technologies, a global leader in IT solutions, manages vast enterprise infrastructures requiring efficient virtualization solutions.

Challenge:

- Managing thousands of servers in data centers.
- Need for a **cost-effective** virtualization solution.
- Seamless integration with Microsoft Windows Server and Azure.

Solution:

Dell implemented **Microsoft Hyper-V** to virtualize its data centers and streamline its internal IT infrastructure.

- **Hyper-V Live Migration** enabled moving workloads across servers without downtime.
- **Dynamic Memory Allocation** optimized resource utilization.
- **Hyper-V Replica** provided disaster recovery by replicating virtual machines (VMs) across locations.

Outcome:

- **40% reduction** in hardware costs.
- **Improved system performance** by efficiently managing VMs.
- **Seamless integration with Azure**, allowing Dell to expand into hybrid cloud solutions.

---

3. Microsoft Azure Case Study – GE Healthcare

Background:

GE Healthcare is a leading medical technology provider, managing vast amounts of healthcare data, including **medical imaging** (X-rays, MRIs, CT scans).

Challenge:

- Processing and storing large medical images required massive computing resources.
- Hospitals needed **real-time AI insights** for diagnostics.
- Regulatory compliance and data security were critical.

Solution:

GE Healthcare leveraged **Microsoft Azure AI and cloud storage**:

- **Azure Data Lake** to store and manage large medical datasets.
- **Azure Machine Learning** to analyze X-rays and MRI scans for faster diagnosis.
- **Azure Security & Compliance** to ensure **HIPAA compliance** for patient data protection.

Outcome:

- **Reduced diagnostic time by 50%** using AI-driven insights.
- **Increased efficiency** in medical imaging processing.
- **Global scalability** to serve hospitals worldwide.

4. Google Cloud Platform (GCP) Case Study – Spotify

Background:

Spotify, a music streaming giant with **over 600 million active users**, requires powerful infrastructure to manage personalized playlists, song recommendations, and music streaming.

Challenge:

- Handling billions of song streams daily.
- Real-time **data processing** for personalized music recommendations.
- Reducing **server maintenance costs**.

Solution:

Spotify migrated from AWS to **Google Cloud Platform (GCP)** to utilize Google's AI and data analytics tools.

- **BigQuery** processed petabytes of user data to enhance recommendations.
- **TensorFlow AI** improved Spotify's Discover Weekly algorithm.
- **Google Kubernetes Engine (GKE)** optimized application performance and scaling.

Outcome:

- **Faster and more accurate** music recommendations.
- **50% cost reduction** in infrastructure management.
- **Seamless scalability**, handling millions of new users effortlessly.