



S.I.E.S College of Arts, Science and Commerce(Autonomous)

Sion(W), Mumbai – 400 022.

CERTIFICATE

This is to certify that Miss./Mr **Kamal.j.vasa**

Roll No. **TCS2324087** has successfully completed the necessary course of experiments in the subject of **Cloud Computing** during the academic year **2023 – 2024** complying with the requirements of **University of Mumbai**, for the course of **T.Y.BSc Computer Science [Semester-VI]**.

Prof. In-Charge

MAYA NAIR

Examination date:

Examiner's Signature & Date:

Head of the DepartmentCollege Seal

Prof. Manoj Singh

Index Page

Sr. No	Description	Pg no	Date	Sign
1	Study of Cloud Computing & Architecture.	3		
2	Study and implementation of Infrastructure as a Service (FOSS Cloud).	5		
3	Study and implementation of Storage as a Service (Own Cloud).	12		
4	Google cloud Linux VM creation.	16		
5	Google cloud Windows VM creation.	17		
6	<p>Perform the following in google cloud:</p> <ul style="list-style-type: none"> 1. A “Hello world” website on IIS- Create an IIS web server VM using Compute Engine in. 1. A “Hello World” website on Apache. Create an Apache web server on a Linux VM. 1. Transfer files to Windows VMs. 1. Transfer files to Linux VMs. 1. Back up a VM's persistent disk. 	21		

	<ul style="list-style-type: none"> 1. Configure periodic backups with a snapshot schedule. 1. Restore a boot disk from a snapshot. 1. Restore a persistent disk from a snapshot. 		
7	Write a program for web feed.	48	
8	Case study on Amazon EC2/Microsoft Azure/Google Cloud Platform.	49	

Practical 1

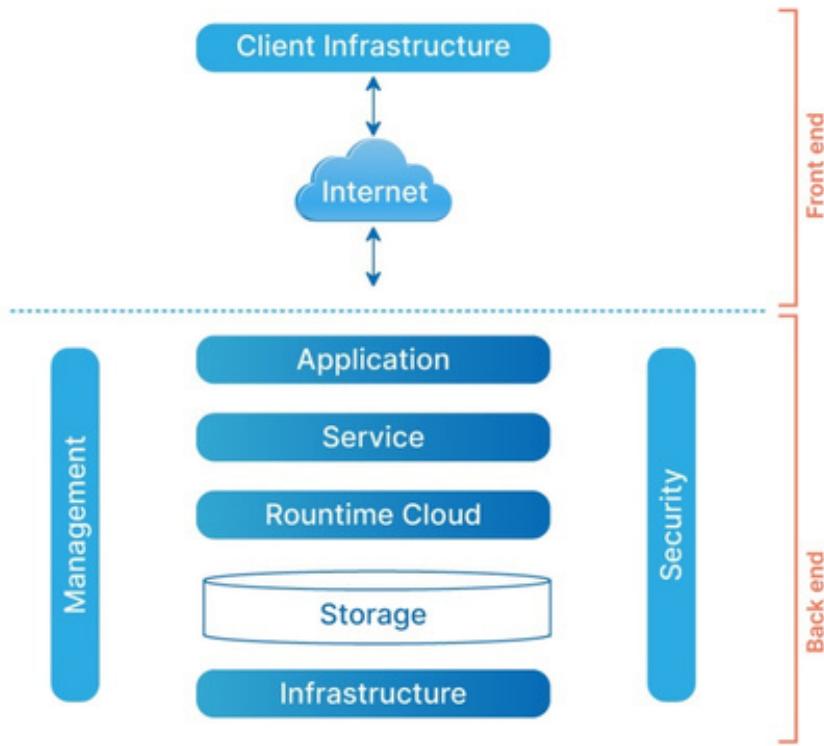
Study of Cloud Computing & Architecture.

Cloud computing refers to the delivery of computing services, including storage, processing power, and software, over the internet. Instead of relying on a local server or a personal computer to handle such tasks, users can access and utilize these resources through remote servers hosted on the internet. The term "cloud" is a metaphor for the internet, and cloud computing allows users to access and use computing resources as if they were utilities.

Popular cloud service providers include Amazon Web Services (AWS), Microsoft Azure, Google Cloud Platform (GCP), and many others. These providers offer a wide range of services catering to different business needs and application requirements.

Cloud architecture typically involves a combination of various components and services that work together to deliver computing resources over the internet. The cloud architecture is divided into 2 parts: Front-end & Back-end.

ARCHITECTURE OF CLOUD COMPUTING



Front-end:

Front-end of the cloud architecture refers to the client side of cloud computing system. It provides a GUI (Graphical User Interface) to interact with the cloud. For example, use of a web browser to access the cloud platform.

Back-end:

Back-end refers to the cloud itself which is used by the service provider. It contains the resources as well as manages the resources and provides security mechanisms. Along with this, it includes huge storage, virtual applications, virtual machines, traffic control mechanisms, deployment models, etc.

Application: Provides the service in back-end as per the client requirement.

Service: Manages which type of service (SaaS, PaaS, and IaaS) the user accesses.

Runtime Cloud: Provides the execution and Runtime platform/environment to the Virtual machine.

Storage: provides flexible and scalable storage service and manages stored data.

Infrastructure: Hardware and software components of cloud like it includes servers, storage, network devices, virtualization software etc.

Management: Management in backend refers to management of backend components.

Security: Implementation of different security mechanisms in the backend.

Internet: bridge between frontend and backend and establishes the interaction and communication between them.

When a user interacts with a cloud service, the front-end application sends requests to the cloud infrastructure through the internet. The back-end processes these requests, retrieves or stores data, and returns the results to the front end. The use of virtualization, scalability, and automation allows for efficient resource utilization and flexibility in meeting varying workloads.

Benefits of Cloud Computing Architecture:

- Makes overall cloud computing system simpler.
- Improves data processing requirements.
- Helps in providing high security.
- Makes it more modularized.
- Results in better disaster recovery.
- Gives good user accessibility.
- Reduces IT operating costs.
- Provides high level reliability.
- Scalability.

Practical 2

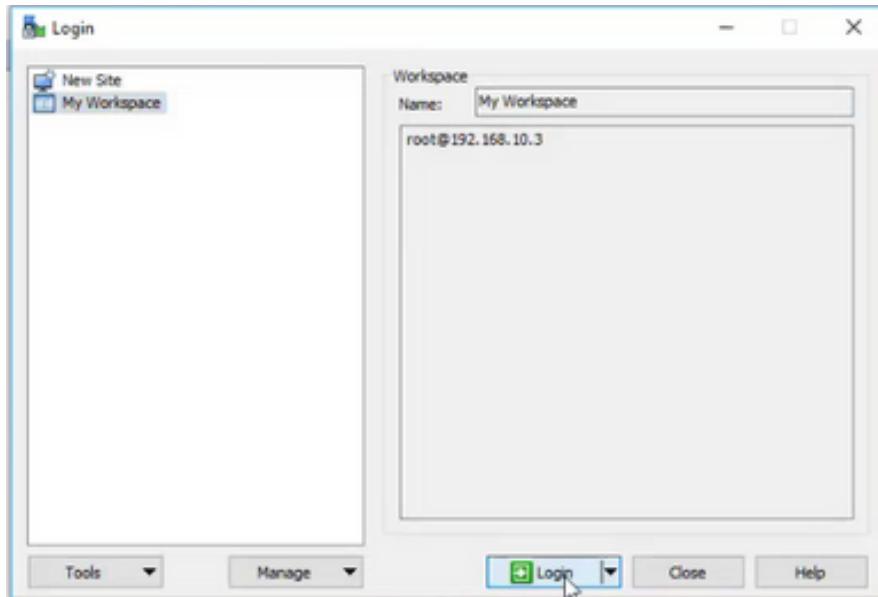
Study and implementation of Infrastructure as a Service (FOSS Cloud).

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.

Steps to implement FOSS Cloud Demo System

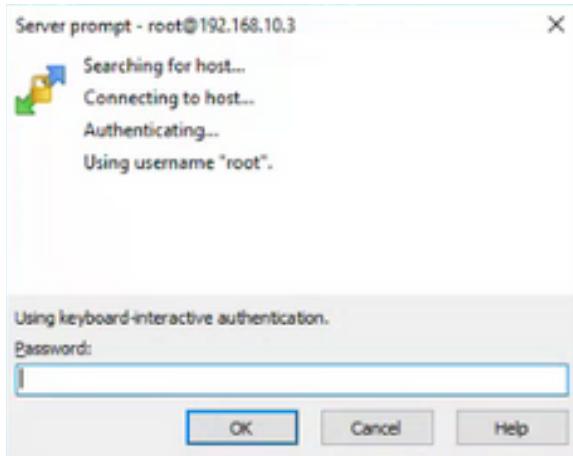
Q1] Uploading ISO files to FOSS cloud.

- ISO files need to be uploaded manually.
1. Local Windows computer with WinSCP installed (Download WinSCP)
 2. Downloaded an ISO-File to your computer. (ubuntu-16.10-desktop-i386.iso)
 3. The IP-address of the FOSS-Cloud Node. (192.168.10.3)

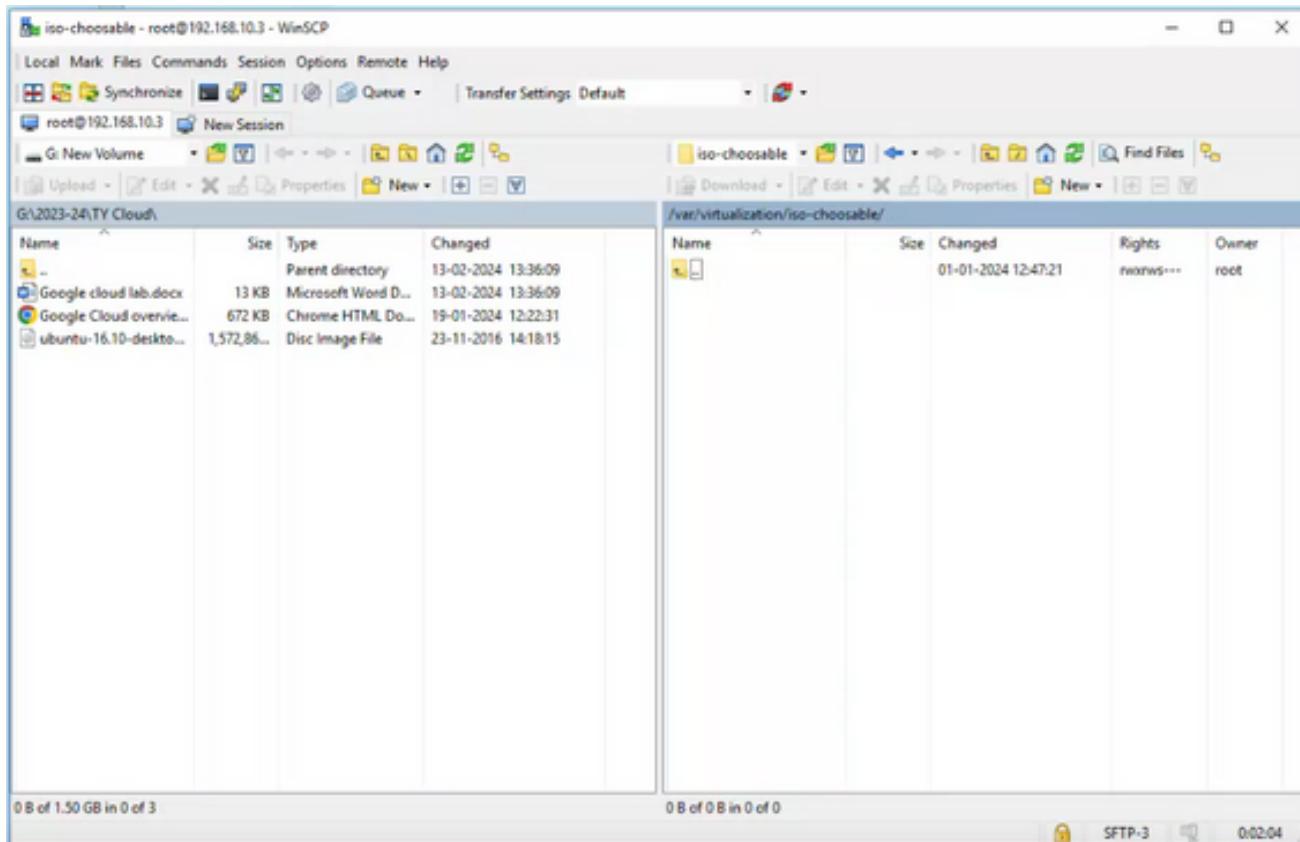


1. Run WinSCP and establish a connection to the FOSS-Cloud Node:

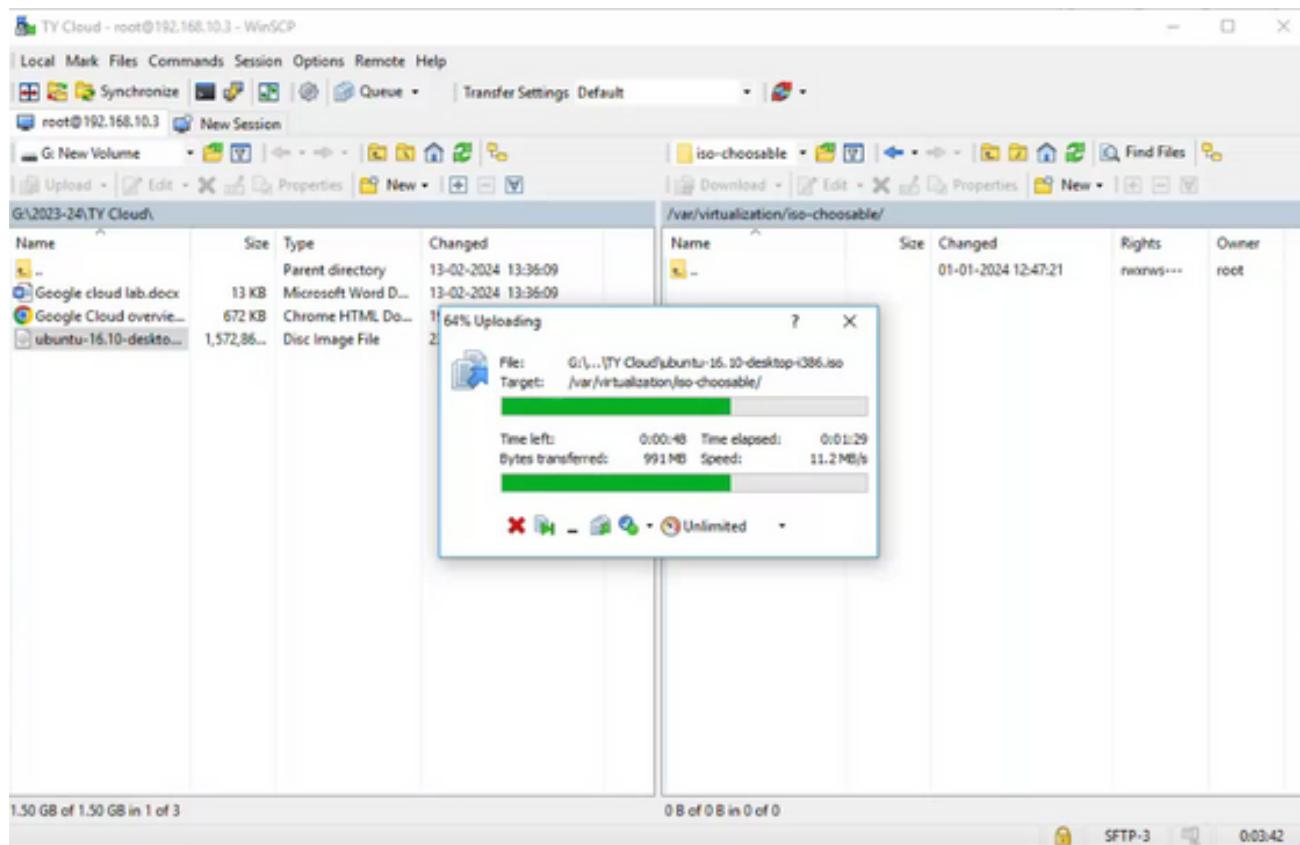
username: root | password: admin.



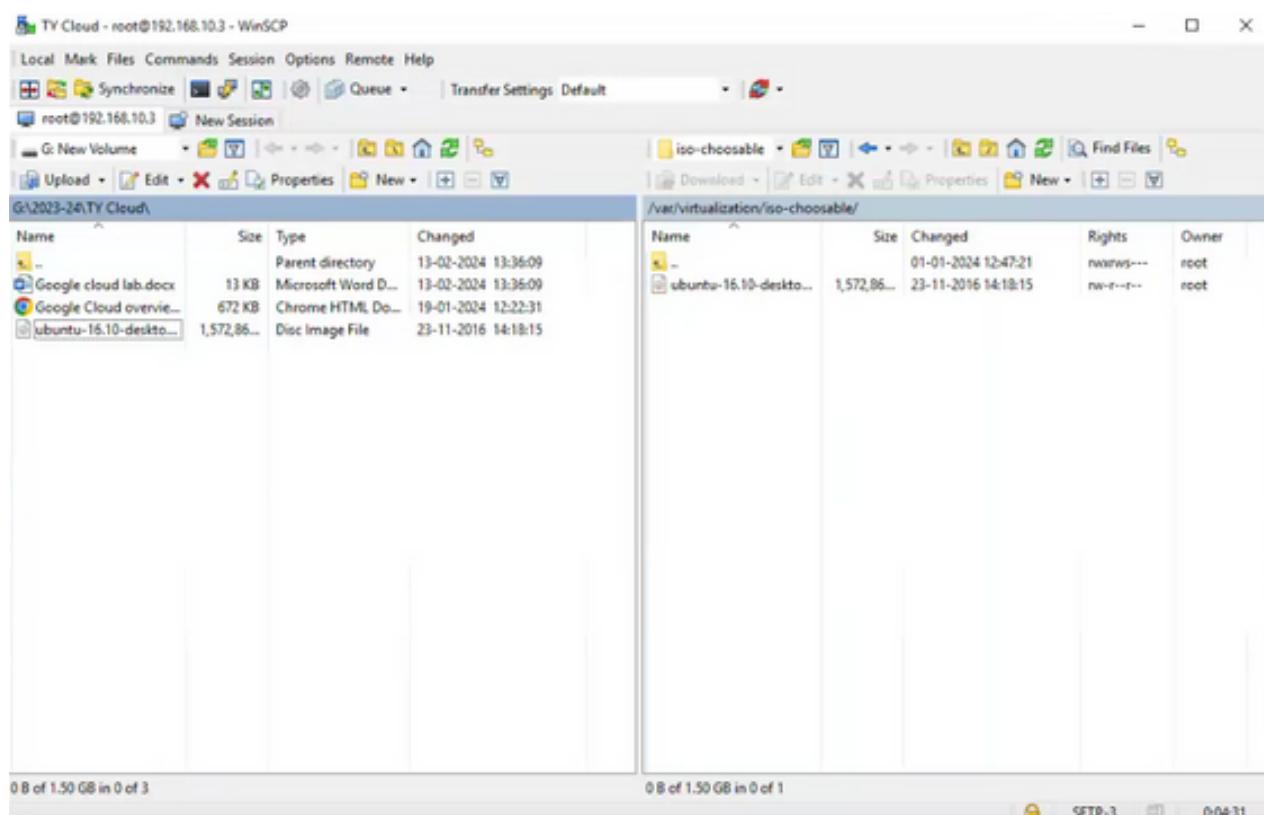
1. On the guest machine change to the '/var/virtualization/iso-choosable' directory. On the host, change to the directory the ISO-file is located.



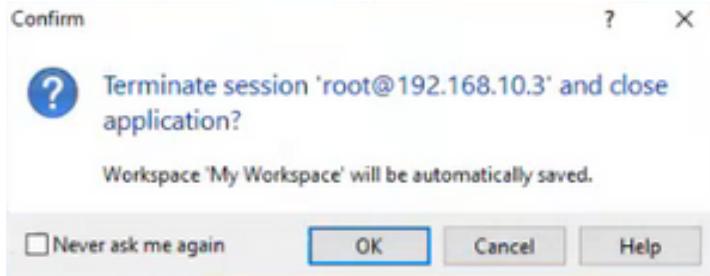
1. Drag (Drag & Drop) the ISO-file in the '/var/virtualization/iso-choosable' directory and commit the copy.



1. After the copy, simply select the ISO-file and press 'F9'. Change the rights. (rights should be as rw-r--r--)



1. Close the WinSCP window.



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

Q2| Creating Virtual Machines.

username: admin | password: admin.

FOSS-Cloud - Site X +

192.168.10.3/vm-manager/site

EN Logout (admin)

FOSS Cloud

Home About Contact

Virtual Machine

- VM Pool
- Storage Pool
- Node
- Network
- User
- Configuration
- Diagnostics
- Assigned VMs

Welcome to the FOSS-Cloud

The FOSS-Cloud is the foundation to build Windows or Linux based SaaS-, Terminal Server-, Virtual Desktop Infrastructure (VDI) or virtual Server-Environments.

The FOSS-Cloud solution is the most advanced Open-Source Cloud in the marketplace today.

Before using, the FOSS-Cloud team would like to remind you that the primary means of sustaining the development of FOSS-Cloud is via contributions by users such as yourself. FOSS-Cloud is now and will continue to be totally free of charge; however, it takes money and resources to make FOSS-Cloud available. If you are able, please consider donating to the FOSS-Cloud Project.

[Donate](#)

Thank you for using FOSS-Cloud

The FOSS-Cloud Team

Links

[Documentation](#)
[Sonic-Client \(with protocol handler\) download](#)

Version 1.3.1
on server rta-cloud
Copyright © 2014 by FOSS-Group.
All Rights Reserved.

Step 1. Create a Profile.

FOSS-Cloud - Create VmProfile X +

192.168.10.3/vm-manager/vmProfile/create.html

EN Logout (admin)

FOSS Cloud

Home About Contact

Virtual Machine

- Persistent VMs
- Dynamic VMs
- VM Templates
- Create
- Profiles **Create**
- Upload ISO File

VM Pool

Storage Pool

Node

Network

User

Configuration

Diagnostics

Assigned VMs

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
 - x86
 - multi
 - de-DE
 - de-AT
 - de-CH
 - en-US
 - en-GB
 - fr-CH
 - fr-FR
 - it-CH
 - it-IT
 - x86_64
 - Ubuntu1
 - UbuntuVM
 - Ubuntu123
 - Ubuntu 1
 - UbuntuM
 - Ubuntu2
 - UbuntuTS37
 - UbuntuT
 - Ubuntu2324
 - Ubuntu555
 - UbuntuByRam
 - Ubuntu_AkShree
 - Ubuntu
 - MyUbuntu
 - Ubuntu19
 - Ubuntu7616
 - Ubuntu89
 - soniya
 - UbuntuBySangi
 - windows

Isofile *

ubuntu-16.10-desktop-i386.iso

Name *

Linux

Description *

linux OS

Memory *

2.25 GB

Volume Capacity *

31 GB

CPU *

1

Clock Offset *

utc

Create

This screenshot shows the 'Create VM Profile' interface. On the left, there's a sidebar with navigation links for various cloud components. The main area is titled 'Create VM Profile' and contains fields for creating a new VM profile. It includes dropdown menus for selecting the base profile ('BaseProfile') and ISO file ('Isofile'), and input fields for the name ('Name') and description ('Description'). There are also sliders for memory and volume capacity, and dropdowns for CPU and clock offset. A 'Create' button at the bottom right is highlighted in green.

The screenshot shows a web-based management interface for a cloud system named "FOSS Cloud". The top navigation bar includes links for Home, About, Contact, and Logout (admin). A sidebar on the left contains a tree menu with categories like Virtual Machine, VM Pool, Storage Pool, Node, Network, User, Configuration, Diagnostics, and Assigned VMs. The "Virtual Machine" category is expanded, and "Profiles" is selected. The main content area is titled "Manage VMProfiles" and displays a table of existing profiles. The table columns are No., Name, Architecture, Language, Description, and Action. The profiles listed are:

No.	Name	Architecture	Language	Description	Action
11	Ubuntu18.04	Linux / i686	multi	This is the Ubuntu18.04 VM-Profile	
12	Ubuntu_18.04es	Linux / i686	multi	VM with Ubuntu OS	
13	Ubuntu	Linux / i686	multi	This is the Ubuntu VM-Profile subre	
14	MyUbuntu	Linux / x86_64	multi	This is my virtual machine	
15	Ubuntu19	Linux / i686	multi	Ubuntu OS	
16	Ubuntu17.10	Linux / i686	multi	Ubuntu OS	
17	Ubuntu16	Linux / i686	multi	Ubuntu OS	
18	secos3	Linux / i686	multi	VM with Ubuntu OS	
19	Ubuntu16.04es	Linux / i686	multi	VM with Ubuntu OS	
20	Linux1	Linux / i686	multi	linux OS	

At the bottom of the page, there is a footer with the text: Version 1.3.1 on server foss-cloud Copyright © 2024 by FOSS-Group. All Rights Reserved.

Step 2. Create VM Template

FOSS-Cloud - Create VmTemplate X +

192.168.10.3/vm-manager/vmTemplate/create.html

CLOUD

Home About Contact Logout (admin)

Virtual Machine

Persistent VMs
Dynamic VMs
VM Templates
Create
Profiles
Create
Upload ISO File

VM Pool
Storage Pool
Node
Network
User
Configuration
Diagnostics
Assigned VMs

Create VmTemplate

Fields with * are required.

Step I
Please select a profile first!

Profile

linux
Ubuntu1
UbuntuVM
Ubuntu123
Ubuntu 1
UbuntuM
Ubuntu2
ubuntu7537
Ubuntu7
Ubuntu2324
Ubuntu555
UbuntuByRam
Ubuntu_AkShree
Ubuntu
MyUbuntu
Ubuntu19
Ubuntu7616
Ubuntu89
soniya
UbuntuBySangi
Linux1
i686
windows

Vmpool *
vm-template-virtual-machine-pool-01

Node *
foss-cloud.foss-cloud.org

Name *
Linux1

Description *
linux OS

Memory *
128 MB 3.13 GB

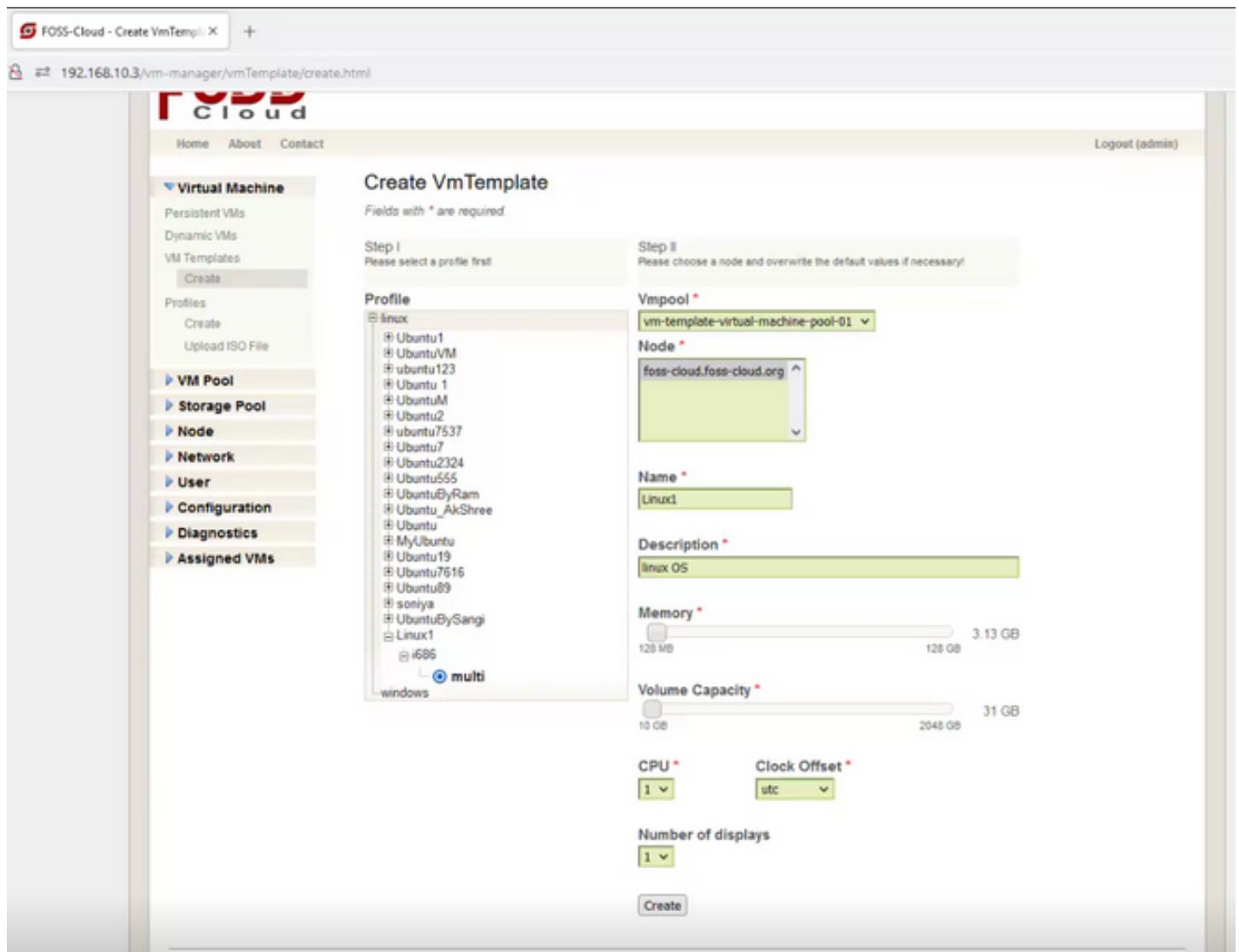
Volume Capacity *
10 GB 31 GB

CPU *
1 utc

Clock Offset *
utc

Number of displays
1

Create



Step 3. Manage VM Templates

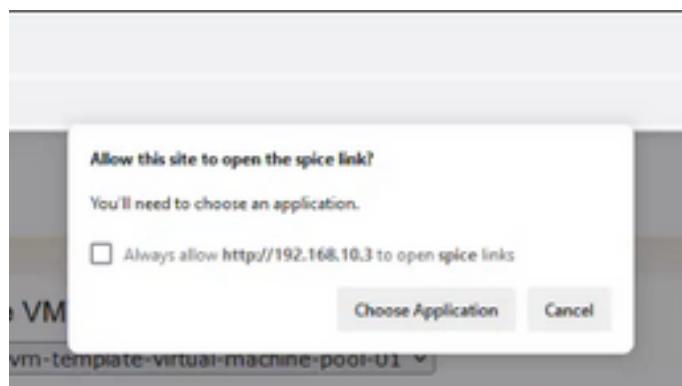
FOSS-Cloud - VmTemplate X +

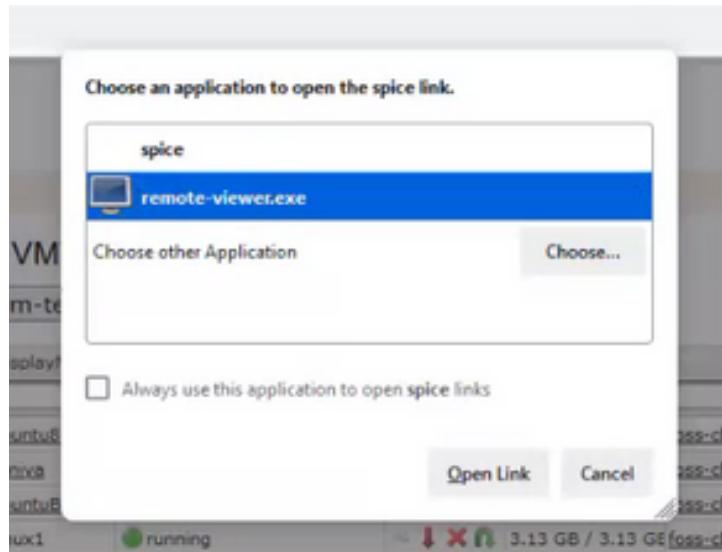
192.168.10.3/vm-manager/vmTemplate/index.html

No.	DisplayName	Status	Run Action	Memory	Node	Action
11	Ubuntu89	stopped		---	foss-cloud.foss-cloud.org	
12	soniya	stopped		---	foss-cloud.foss-cloud.org	
13	UbuntuBySang	stopped		---	foss-cloud.foss-cloud.org	
14	Linux1	running		3.13 GB / 3.13 GE	foss-cloud.foss-cloud.org	

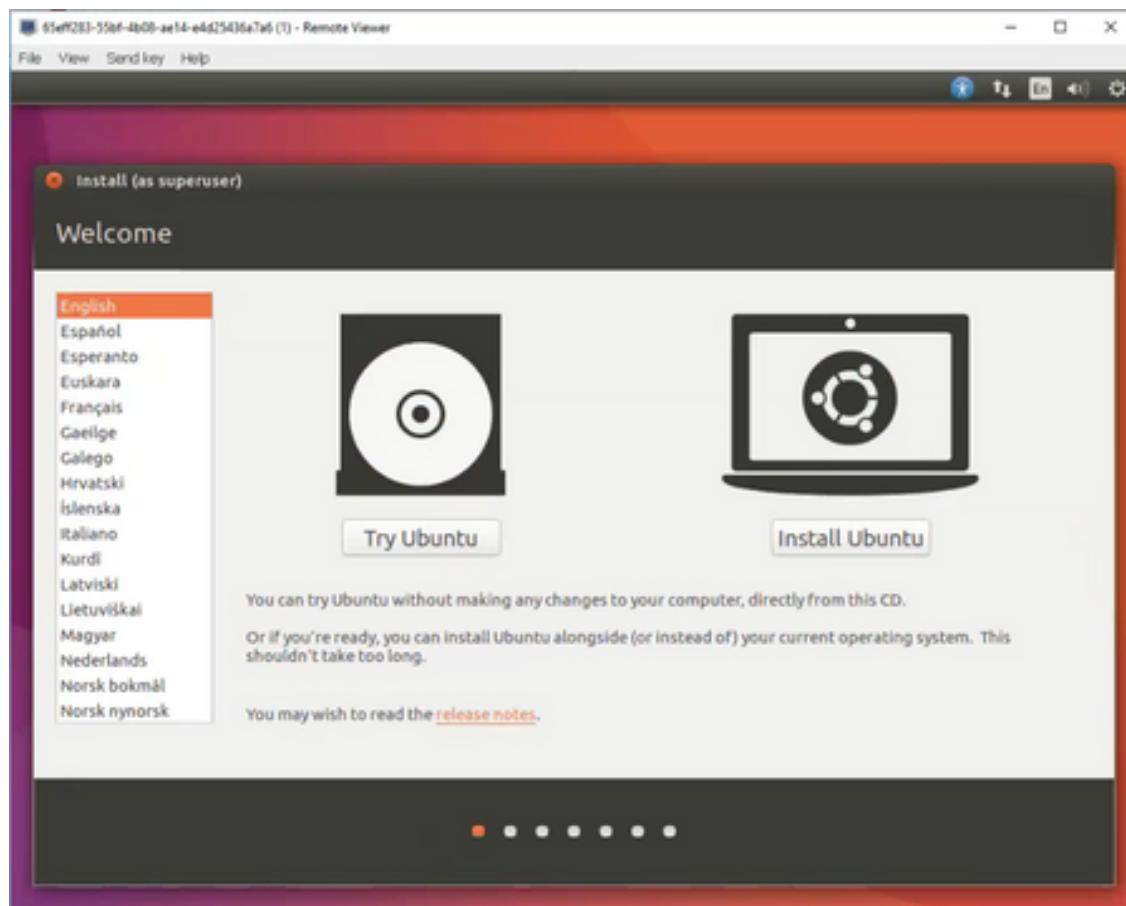
Today, Linux distributions like Ubuntu, Suse, Fedora etc. contains the spice protocol in their distribution. The client is named virt- or remote-viewer. FOSS-Cloud needs the remote viewer which is part of the virt-viewer package. In general, the client is working out of the box.

No.	DisplayName	Status	Run Action	Memory	Node	Action
11	Ubuntu89	stopped		---	foss-cloud.foss-cloud.org	
12	soniya	stopped		---	foss-cloud.foss-cloud.org	
13	UbuntuBySang	stopped		---	foss-cloud.foss-cloud.org	
14	Linux1	running		3.13 GB / 3.13 GE	foss-cloud.foss-cloud.org	





The Virtual Desktop Interface opens up for that Virtual Machine:



Practical 3

Study and implementation of Infrastructure as a Service (Own Cloud).

1. Go to the OwnCloud IP address.

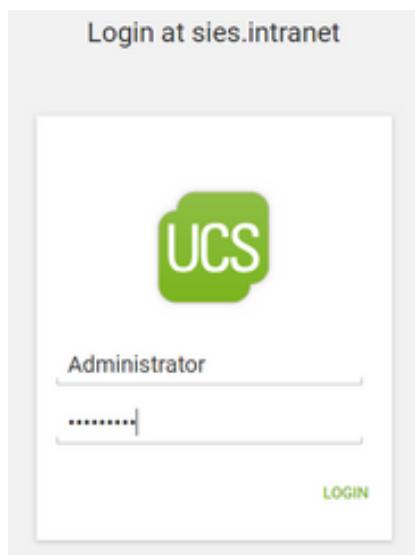
1. Click on System and Domain Settings.

The screenshot shows the Univention Portal interface. At the top, there's a header bar with the title "Univention Portal" and a URL "192.168.9.241/univention/portal/". Below the header, the main content area has two sections: "Applications" and "Administration".

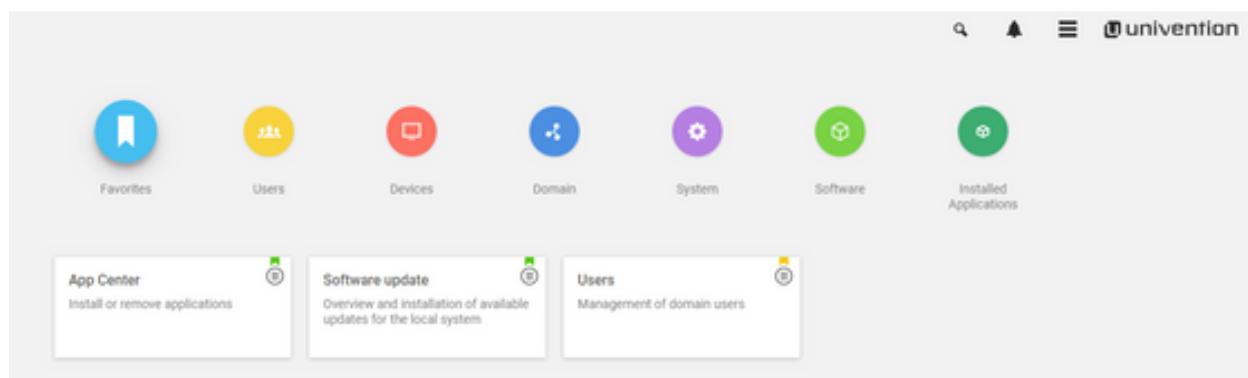
Applications: This section contains a single item: "ownCloud" with the subtext "ucs-2657.sies.intranet".

Administration: This section contains four items arranged horizontally: "System and domain settings" (with subtext "ucs-2657.sies.intranet"), "Admin Manual" (with subtext "doc.owncloud.com"), "User Manual" (with subtext "doc.owncloud.com"), and "Univention Blog" (with subtext "www.univention.com").

1. Login using Administrator & admin@123 as username & password.



1. Click on Create New Users & Add new Users.



Users

CLOSE

Search users...

Add a new user.

0 users of 18 selected.

ADD

- Name
- abc
- Administrator
- ak_nadar

Title First name Last name *

User name *

CANCEL ADVANCED NEXT

This screenshot shows the 'Users' management screen. It includes a search bar, a list of existing users, and a form for adding a new user. The 'Add a new user' form requires 'First name', 'Last name', and 'User name'. There are 'ADVANCED' and 'NEXT' buttons at the bottom right of the form.

Add a new user.

.....
Password *
Password (retype) *

User has to change password on next login ⓘ

Override password check ⓘ

Account disabled

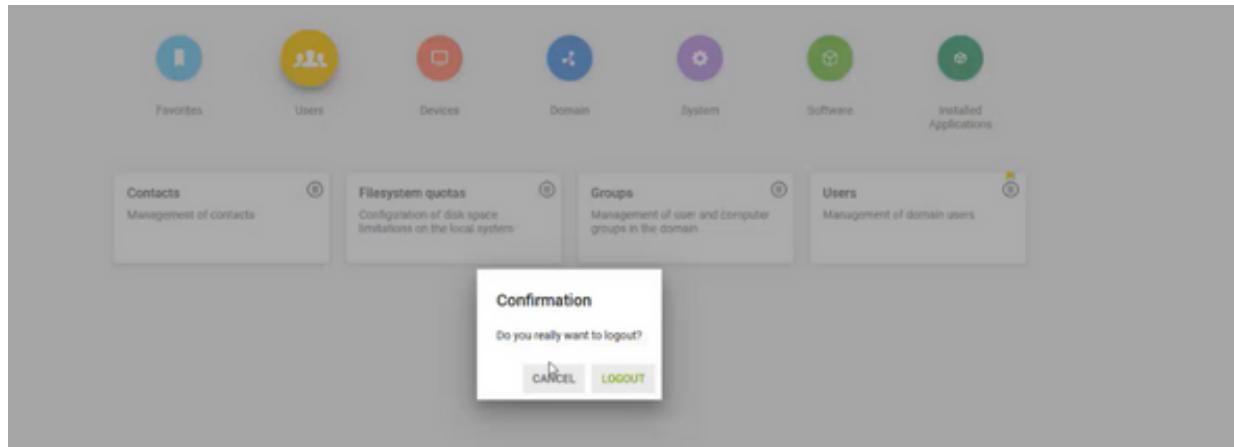
CANCEL

ADVANCED

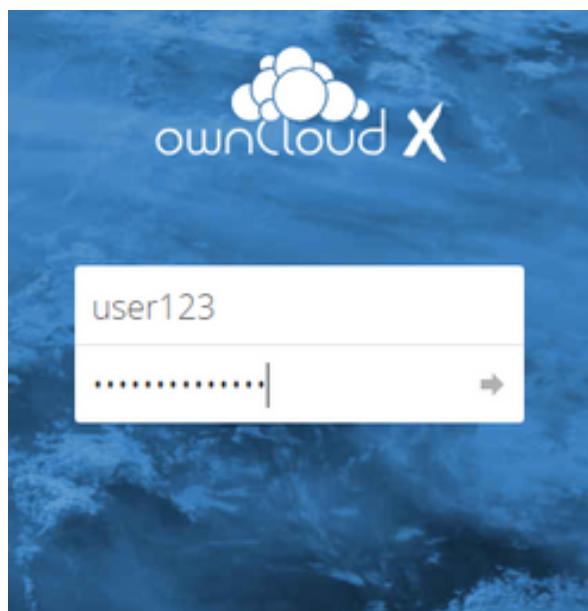
BACK

CREATE USER

1. Then Logout



1. Click on OwnCloud application.
2. And Login using the Created User Credentials.



The screenshot shows the ownCloud web interface with the title bar "ownCloud" and user "user 123". The left sidebar includes links for "All files", "Favorites", "Shared with you", "Shared with others", "Shared by link", and "Tags". The main area displays a file list with columns for Name, Size, and Modified. There are two folders: "Documents" and "Photos", and one file: "ownCloud Manual.pdf".

Name	Size	Modified
Documents	35 KB	7 minute...
Photos	663 KB	7 minute...
ownCloud Manual.pdf	4.7 MB	7 minute...

2 folders and 1 file
5.4 MB

1. Upload files.

The screenshot shows the ownCloud web interface with the title bar "ownCloud" and user "user 123". The left sidebar includes links for "All files", "Favorites", "Shared with you", "Shared with others", "Shared by link", and "Tags". The main area displays a file list with columns for Name, Size, and Modified. There are two folders: "Documents" and "Photos", and two files: "MongoDB manual.pdf" and "ownCloud Manual.pdf".

Name	Size	Modified
Documents	35 KB	7 minute...
Photos	663 KB	7 minute...
MongoDB manual.pdf	241 KB	19 days a...
ownCloud Manual.pdf	4.7 MB	7 minute...

1. Download Files.

The screenshot shows the ownCloud web interface with the title bar "ownCloud" and user "user 123". The left sidebar includes links for "All files", "Favorites", "Shared with you", "Shared with others", "Shared by link", and "Tags". The main area displays a file list with columns for Name, Size, and Modified. There are two folders: "Documents" and "Photos", and two files: "MongoDB manual.pdf" and "ownCloud Manual.pdf". A context menu is open over the "MongoDB manual.pdf" file, showing options: "Details", "Rename", "Download", and "Delete".

Name	Size	Modified
MongoDB manual.pdf	241 KB	19 days a...
ownCloud Manual.pdf	4.7 MB	7 minute...

2 folders and 2 files

1. Creating a share link.

MongoDB manual.pdf

★ 241 KB, 19 days ago

Collaborative tags

Comments **Sharing** Versions

User and Groups Public Links

Share with users, groups or remote users... i

Comments **Sharing** Versions

User and Groups **Public Links**

Social share

MongoDB manual.pdf link

Create link share: /MongoDB manual.pdf

x

Link name

MongoDB manual.pdf link

Download / View
Recipients can view or download contents.

Password

Expiration

14-03-2024

Cancel Share

Practical 4

Google cloud Linux VM creation.

- a. On the Compute Engine page, click VM instances → Create Instance
- b. In Boot disk, click Change, and then:
 - a. In the Operating system list, select Debian.
 - b. In the Version list, keep the default value.
 - c. In the Boot disk type list, select SSD persistent disk.
 - d. Click Select.

In the Firewall section, select Allow HTTP traffic.

Click Create.

Boot disk ?

Name	linux-web-server
Type	New SSD persistent disk
Size	10 GB
License type ?	Free
Image	Debian GNU/Linux 12 (bookworm)

[CHANGE](#)

Identity and API access ?

Service accounts ?

Service account	Compute Engine default service account	▼
-----------------	--	--

Requires the Service Account User role (`roles/iam.serviceAccountUser`) to be set for users who want to access VMs with this service account. [Learn more](#)

Access scopes ?

- Allow default access
- Allow full access to all Cloud APIs
- Set access for each API

Firewall ?

Add tags and firewall rules to allow specific network traffic from the Internet

- Allow HTTP traffic
- Allow HTTPS traffic
- Allow Load Balancer Health Checks

c. Install an Apache server

To open a terminal to your instance, in the Connect column, click SSH.

Practical 5

Google cloud Windows VM creation.

1. Create new Project
2. Enable Compute Engine APIs
3. On the Compute Engine page, click VM instances.
4. On the VM instances page, click Create instance.

VM instances – Compute Engine

console.cloud.google.com/compute/instances?project=assignment88-415005

VM instances

CREATE INSTANCE IMPORT VM REFRESH LEARN

INSTANCES OBSERVABILITY INSTANCE SCHEDULES

VM instances

Filter Enter property name or value

Status Name ↑ Zone Recommendations In use by Internal IP External IP Connect

5. In Boot disk, click Change, and then:

- In the Operating system list, select Windows Server.
- In the Version list, select Windows Server 2019 Datacenter.
- In the Boot disk type list, select SSD persistent disk.
- Click Select.

Create an instance

New VM instance

New VM instance from template

New VM instance from machine image

Marketplace

DEPLOY CONTAINER

Boot disk

Name: iis-web-server

Type: New balanced persistent disk

Size: 10 GB

License type: Free

Image: Debian GNU/Linux 12 (bookworm)

Monthly estimate: \$25.46

Identity and API access

Service accounts

Compute Engine default service account

Boot disk

Select an image or snapshot to create a boot disk; or attach an existing disk. Can't find what you're looking for? Explore hundreds of VM solutions in [Marketplace](#).

PUBLIC IMAGES CUSTOM IMAGES SNAPSHOTS ARCHIVE SNAPSHOTS EXISTING DISKS

Operating system —
Windows Server

Version * —
Windows Server 2019 Datacenter

x86/64, Server with Desktop Experience, x64 built on 20240214

Boot disk type * —
SSD persistent disk

[COMPARE DISK TYPES](#)

Size (GB) * —
50

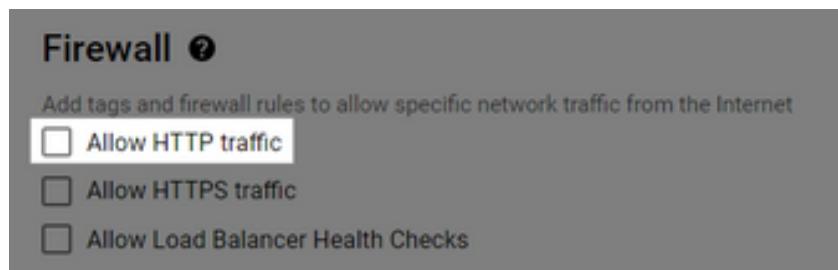
Provision between 50 and 65536 GB

[SHOW ADVANCED CONFIGURATION](#)

SELECT CANCEL

6. In the Firewall section, select Allow HTTP traffic.

7. Click Create.



8. Connect to the VM:

If using an Apple computer, get Mac version of Microsoft RDP.

If using a Linux machine, use the RDP client of your choice. For example, xrdp

If using a Windows computer, use the Microsoft RDP.

1. Click the arrow next to RDP and click Set Windows password.

VM instances

CREATE INSTANCE IMPORT VM REFRESH LEARN

INSTANCES OBSERVABILITY INSTANCE SCHEDULES

VM instances

Filter Enter property name or value

Status	Name	Zone	Recommendations	In use by	Internal IP	External IP	Connect
<input checked="" type="checkbox"/>	iis-web-server	us-central1-a			10.128.0.3 (nic0)	34.41.101.66 (nic0)	RDP

Related actions

Explore Backup and DR NEW

Back up your VMs and set up disaster recovery

View billing report

View and manage your Compute Engine billing

Monitor VMs

View outlier VMs across metrics like CPU and network

Set up firewall rules

Control traffic to and from a VM instance

Patch management

Schedule patch updates and view patch compliance on VM instances

Load balance between VMs

Set up Load Balancing for your applications as your traffic and users grow

Expl

View, search, instance l

Set Windows password

View gcloud command to reset password

Download the RDP file

Learn about Windows auth

2. Click the arrow next to RDP and click Set Windows password.

3. Verify username is correct, then click Set.

Set new Windows password

If a Windows account with the following username does not exist, it will be created and a new password assigned. If the account exists, its password will be reset.

⚠ If the account already exists, resetting the password can cause the loss of encrypted data secured with the current password, including files and stored passwords. [Learn more](#)

Username * ?

CANCEL SET

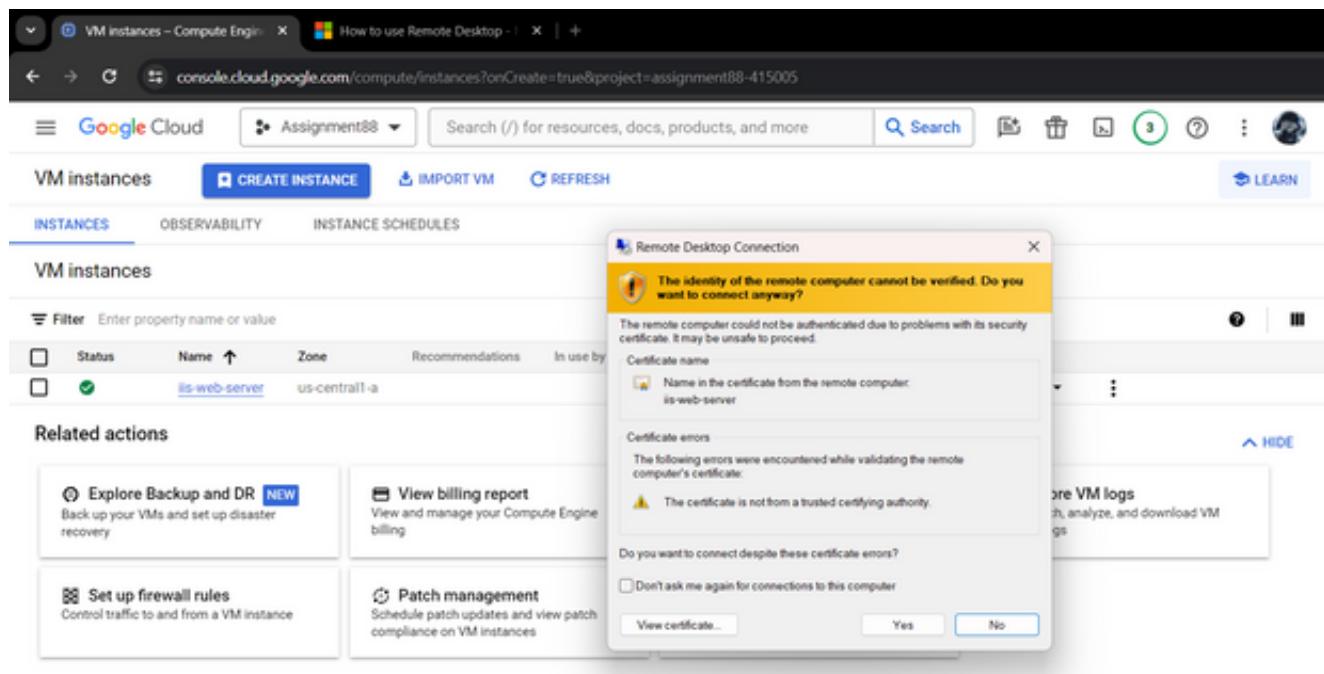
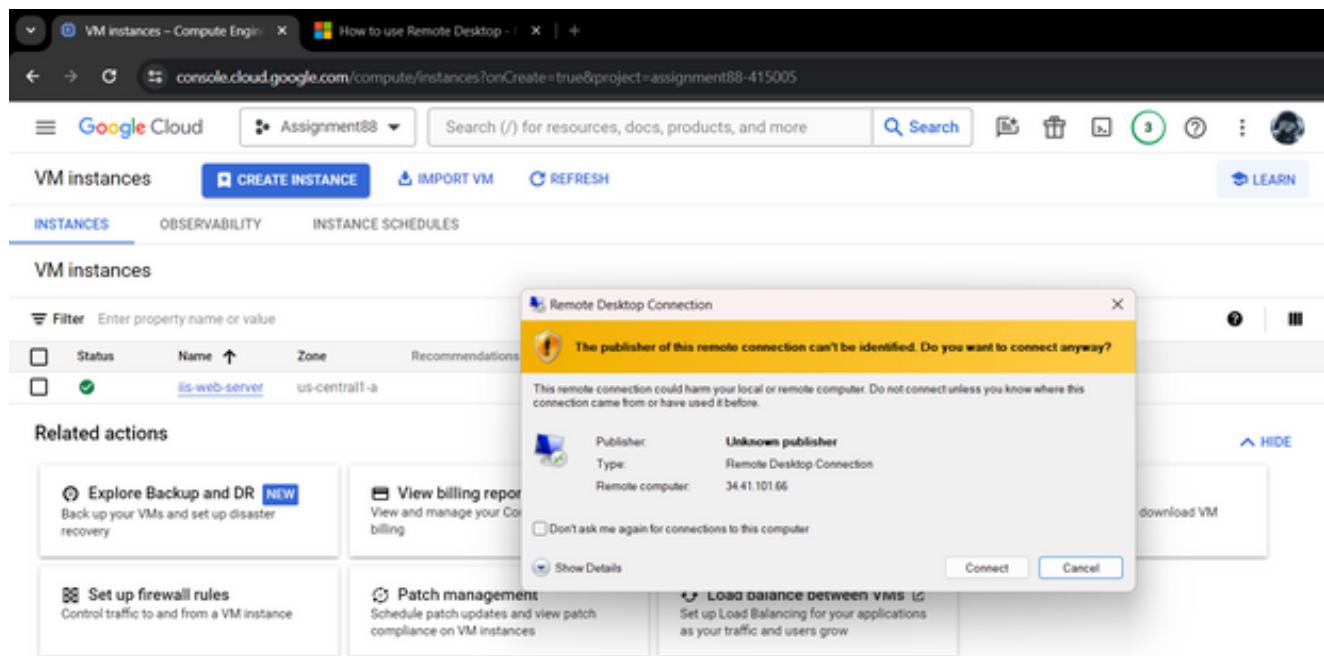
4. Copy the password that is shown. Save this password for reference.

5. Click the arrow next to the RDP button, and then select Download the RDP file.

6. Open the RDP file by using the RDP client you downloaded.

7. When your RDP client prompts for a password, enter the password that you generated earlier.

8. When you're prompted whether you want your computer discoverable by other PCs and devices on the network, click No.

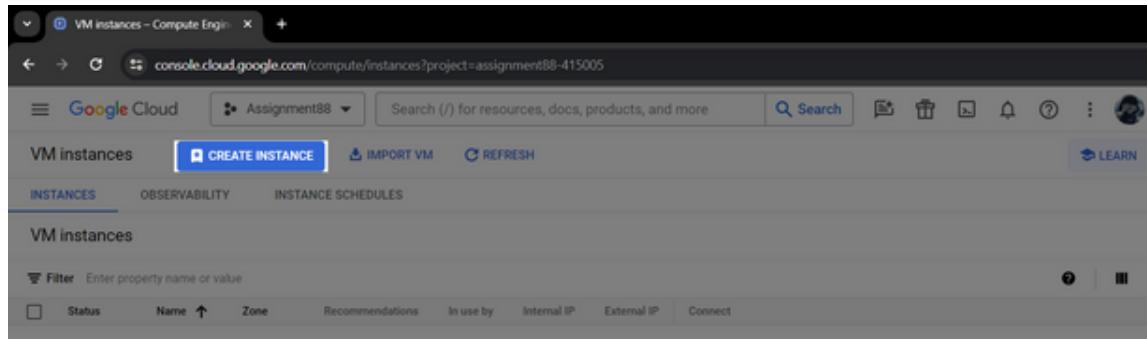


Practical 6

Perform the following in google cloud:

a. A “Hello world” website on IIS-Create an IIS web server VM using Compute Engine in

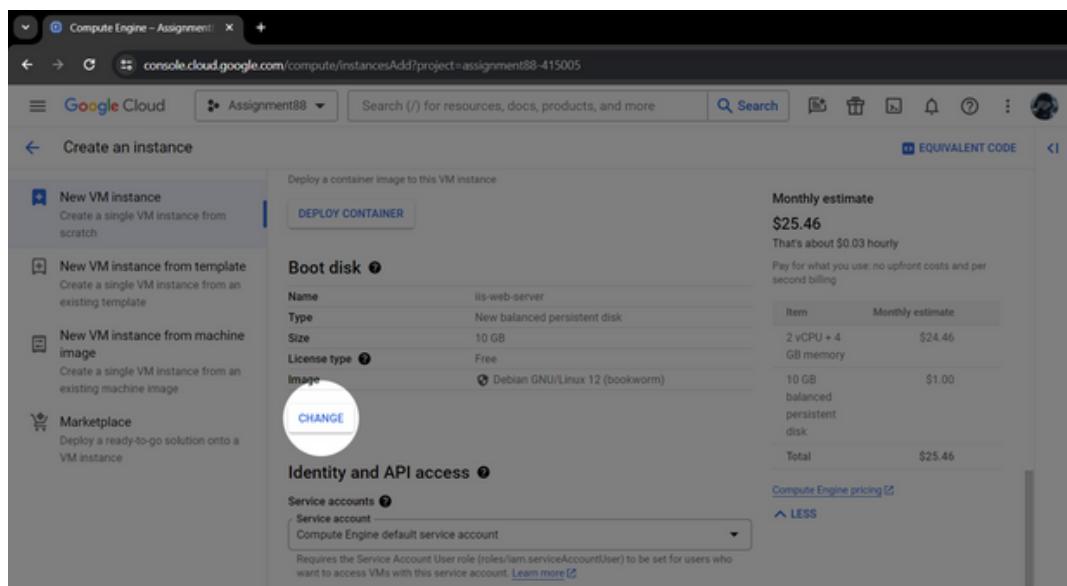
1. Create new Project
2. Enable Compute Engine APIs
3. On the Compute Engine page, click VM instances.
4. On the VM instances page, click Create instance.



The screenshot shows the Google Cloud VM instances page. At the top, there's a navigation bar with the project name 'Assignment88'. Below it is a search bar and a 'CREATE INSTANCE' button, which is highlighted with a blue border. The main area is titled 'VM instances' and contains tabs for 'INSTANCES', 'OBSERVABILITY', and 'INSTANCE SCHEDULES'. Underneath, there's a table with columns for Status, Name, Zone, Recommendations, In use by, Internal IP, External IP, and Connect. A filter bar at the top of the table allows searching by property name or value.

5. In Boot disk, click Change, and then:

- a. In the Operating system list, select Windows Server.
- b. In the Version list, select Windows Server 2019 Datacenter.
- c. In the Boot disk type list, select SSD persistent disk.
- d. Click Select.



The screenshot shows the 'Create an instance' dialog. On the left, there are three options: 'New VM instance', 'New VM instance from template', and 'New VM instance from machine image'. The 'Marketplace' option is also listed. The central part of the dialog is titled 'Deploy a container image to this VM instance' and includes a 'DEPLOY CONTAINER' button. To the right, there's a 'Monthly estimate' section showing '\$25.46' and a note about hourly costs. Below this is a table for 'Boot disk' settings, which includes columns for 'Item' and 'Monthly estimate'. The table shows three items: '2 vCPU + 4 GB memory' (\$24.46), '10 GB balanced persistent disk' (\$1.00), and a 'Total' row (\$25.46). At the bottom, there's a 'Compute Engine pricing' link and a 'LESS' link. The 'Identity and API access' section is partially visible at the bottom.

Boot disk

Select an image or snapshot to create a boot disk; or attach an existing disk. Can't find what you're looking for? Explore hundreds of VM solutions in [Marketplace](#)

PUBLIC IMAGES CUSTOM IMAGES SNAPSHOTS ARCHIVE SNAPSHOTS EXISTING DISKS

Operating system —
Windows Server

Version * —
Windows Server 2019 Datacenter

x86/64, Server with Desktop Experience, x64 built on 20240214

Boot disk type * —
SSD persistent disk

COMPARE DISK TYPES

Size (GB) * —
50

Provision between 50 and 65536 GB

SHOW ADVANCED CONFIGURATION

SELECT CANCEL

6. In the Firewall section, select Allow HTTP traffic.

7. Click Create.

Firewall ?

Add tags and firewall rules to allow specific network traffic from the Internet

Allow HTTP traffic

Allow HTTPS traffic

Allow Load Balancer Health Checks

8. Connect to the VM:

If using an Apple computer, get Mac version of Microsoft RDP.

If using a Linux machine, use the RDP client of your choice. For example, xrdp

If using a Windows computer, use the Microsoft RDP.

1. Click the arrow next to RDP and click Set Windows password.

The screenshot shows the Google Cloud Platform interface for managing VM instances. In the top navigation bar, there are tabs for 'VM instances' and 'OBSERVABILITY'. Below this, a table lists the 'iis-web-server' instance. The instance details include its status (Running), name (iis-web-server), zone (us-central1-a), internal IP (10.128.0.3), external IP (34.41.101.66), and an 'RDP' button. A dropdown menu is open next to the RDP button, containing four options: 'Set Windows password', 'View gcloud command to reset password', 'Download the RDP file', and 'Learn about Windows auth'. Other related actions listed include 'Explore Backup and DR', 'View billing report', 'Monitor VMs', 'Set up firewall rules', 'Patch management', and 'Load balance between VMs'.

2. Click the arrow next to RDP and click Set Windows password.

3. Verify username is correct, then click Set.

Set new Windows password

If a Windows account with the following username does not exist, it will be created and a new password assigned. If the account exists, its password will be reset.

⚠ If the account already exists, resetting the password can cause the loss of encrypted data secured with the current password, including files and stored passwords. [Learn more](#)

Username * ?

CANCEL SET

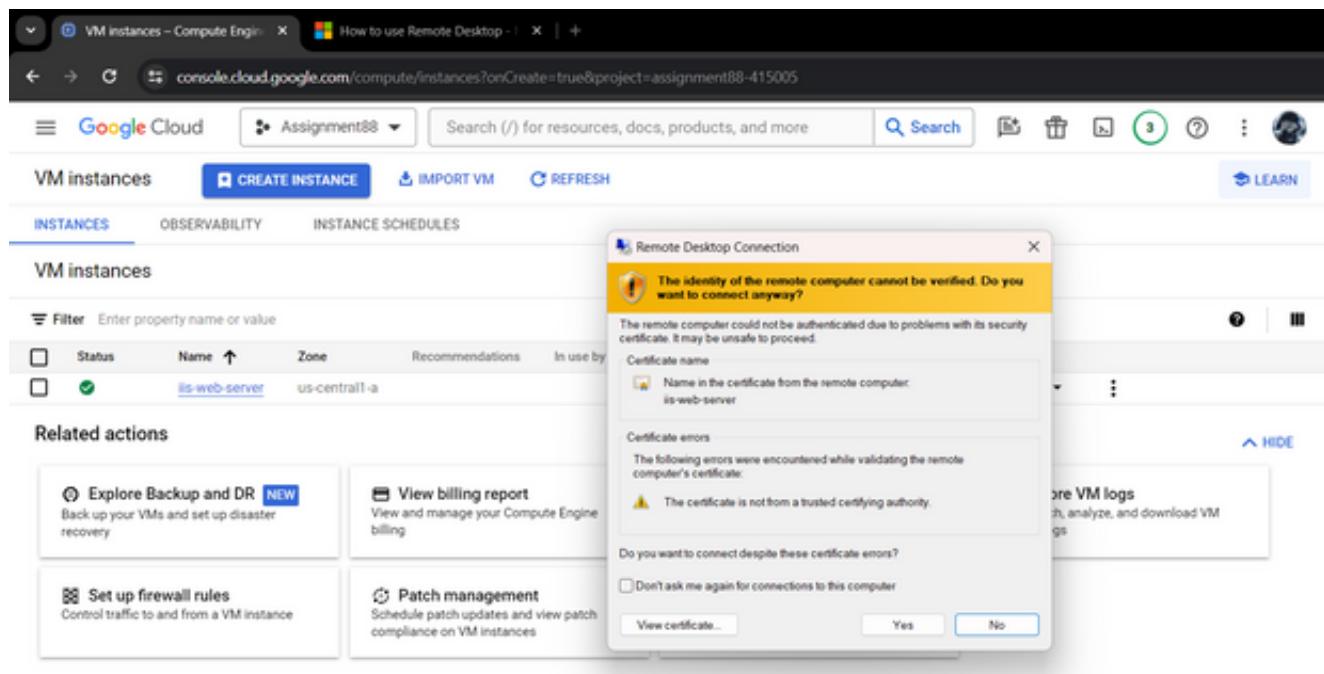
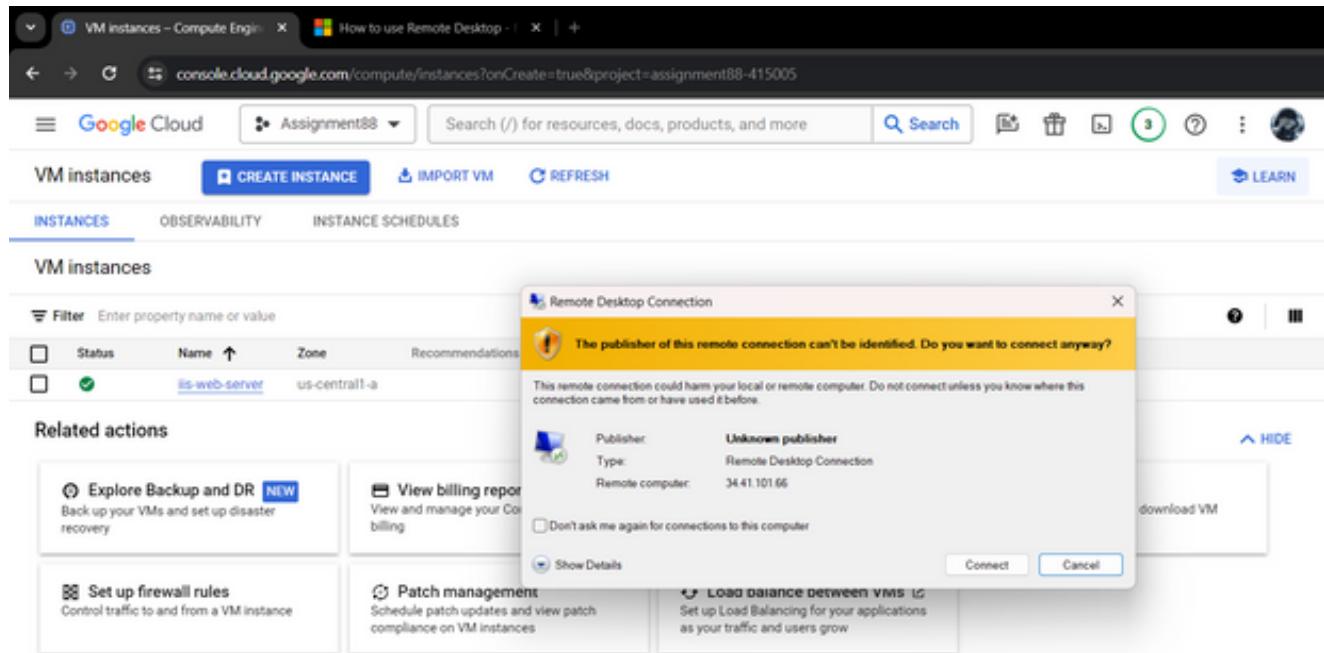
4. Copy the password that is shown. Save this password for reference.

5. Click the arrow next to the RDP button, and then select Download the RDP file.

6. Open the RDP file by using the RDP client you downloaded.

7. When your RDP client prompts for a password, enter the password that you generated earlier.

8. When you're prompted whether you want your computer discoverable by other PCs and devices on the network, click No.

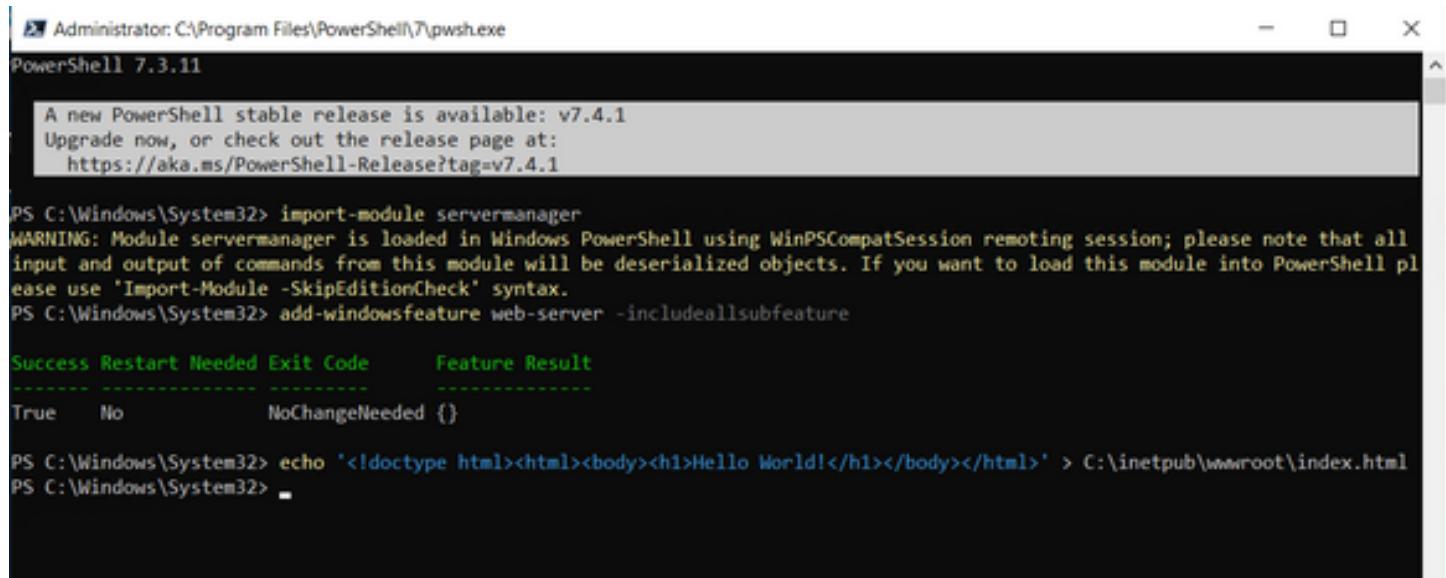


9. Create and view the website

1. In your VM, in the Search field in the Windows Server toolbar, type PowerShell.
2. Right-click on the PowerShell application icon to invoke the sub-menu, and then

select Run as administrator.

3. Install IIS services with the following commands



A screenshot of a Windows PowerShell window titled "Administrator: C:\Program Files\PowerShell\7\pwsh.exe". The window shows the following command history:

```
A new PowerShell stable release is available: v7.4.1
Upgrade now, or check out the release page at:
https://aka.ms/PowerShell-Release?tag=v7.4.1

PS C:\Windows\System32> import-module servermanager
WARNING: Module servermanager is loaded in Windows PowerShell using WinPSCo
mmonSession remoting session; please note that all input and output of commands from this module will be deserialized objects. If you want to load this module into PowerShell please use 'Import-Module -SkipEditionCheck' syntax.
PS C:\Windows\System32> add-windowsfeature web-server -includeallsubfeature

Success Restart Needed Exit Code      Feature Result
-----  -----  -----  -----
True     No        NoChangeNeeded {}

PS C:\Windows\System32> echo '<!doctype html><html><body><h1>Hello World!</h1></body></html>' > C:\inetpub\wwwroot\index.html
PS C:\Windows\System32>
```

10. Test your server

1. In the Google Cloud Console, go to the VM instances.

You can see where it is by clicking the following button: Compute

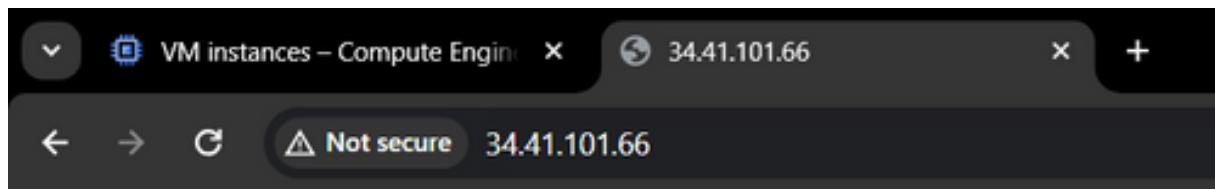
Engine chevron_right VM instances

2. Copy the VM's IP address from the External IP column.

3. Paste the IP address in a new browser tab.



Internal IP	External IP
10.128.0.3 (nic0)	34.41.101.66 (nic0)



Hello World!

b. A “Hello World” website on Apache. Create an Apache web server on a Linux VM

- a. On the Compute Engine page, click VM instances → Create Instance
- b. In Boot disk, click Change, and then:
 - a. In the Operating system list, select Debian.
 - b. In the Version list, keep the default value.
 - c. In the Boot disk type list, select SSD persistent disk.
 - d. Click Select.

In the Firewall section, select Allow HTTP traffic.

Click Create.

Boot disk ?

Name	linux-web-server
Type	New SSD persistent disk
Size	10 GB
License type ?	Free
Image	 Debian GNU/Linux 12 (bookworm)

[CHANGE](#)

Identity and API access ?

Service accounts ?

Service account	Compute Engine default service account	▼
-----------------	--	----------------

Requires the Service Account User role (`roles/iam.serviceAccountUser`) to be set for users who want to access VMs with this service account. [Learn more](#) 

Access scopes ?

- Allow default access
- Allow full access to all Cloud APIs
- Set access for each API

Firewall ?

Add tags and firewall rules to allow specific network traffic from the Internet

- Allow HTTP traffic
- Allow HTTPS traffic
- Allow Load Balancer Health Checks

c. Install an Apache server

To open a terminal to your instance, in the Connect column, click SSH.

A new cmd window opens showing you are connected to your VM terminal. Update the package lists on your instance:

```
sudo apt-get update
```

Install the Apache2 HTTP Server:

```
sudo apt-get install apache2 php7.0
```

Overwrite the Apache web server default web page with the following command:

```
echo '<!doctype html><html><body><h1>Hello World!</h1></body></html>' | sudo tee /var/www/html/index.html
```

SSH-in-browser

```
Linux linux-web-server.us-central1-a.c.assignment88-415005.internal 6.1.0-18-cloud-amd64 #1 SMP PREEMPT_DYNAMIC Debian 6.1.76-1 (2024-02-01) x86_64

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/*copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
vinithameera@linux-web-server:~$ sudo apt-get update
Get:1 file:/etc/apt/mirrors.debian.list Mirrorlist [30 B]
Get:5 file:/etc/apt/mirrors/debian-security.list Mirrorlist [39 B]
Get:7 https://packages.cloud.google.com/apt google-compute-engine-bookworm-stable InRelease [5146 B]
Get:8 https://packages.cloud.google.com/apt cloud-sdk-bookworm InRelease [6406 B]
Get:2 https://deb.debian.org/debian bookworm InRelease [151 kB]
Get:9 https://packages.cloud.google.com/apt google-compute-engine-bookworm-stable/main amd64 Packages [1936 B]
Get:3 https://deb.debian.org/debian bookworm-updates InRelease [55.4 kB]
Get:4 https://deb.debian.org/debian bookworm-backports InRelease [56.5 kB]
Get:6 https://deb.debian.org/debian-security bookworm-security InRelease [48.0 kB]
Get:10 https://deb.debian.org/debian bookworm-backports/main Sources.diff/Index [63.3 kB]
Get:11 https://deb.debian.org/debian bookworm-backports/main amd64 Packages.diff/Index [63.3 kB]
Get:15 https://deb.debian.org/debian bookworm-backports/main Sources T-2024-02-21-0205.57-F-2024-02-13-2006.01.pdiff [10.3 kB]
Get:15 https://deb.debian.org/debian bookworm-backports/main Sources T-2024-02-21-0205.57-F-2024-02-13-2006.01.pdiff [10.3 kB]
Get:16 https://deb.debian.org/debian bookworm-backports/main amd64 Packages T-2024-02-21-0205.57-F-2024-02-13-2006.01.pdiff [10.0 kB]
Get:16 https://deb.debian.org/debian bookworm-backports/main amd64 Packages T-2024-02-21-0205.57-F-2024-02-13-2006.01.pdiff [10.0 kB]
Get:12 https://deb.debian.org/debian-security bookworm-security/main Sources [81.2 kB]
Get:13 https://deb.debian.org/debian-security bookworm-security/main amd64 Packages [139 kB]
Get:14 https://deb.debian.org/debian-security bookworm-security/main Translation-en [83.0 kB]
Fetched 775 kB in 1s (645 kB/s)
Reading package lists... Done
vinithameera@linux-web-server:~$ sudo apt-get install apache2 php7.0
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Note, selecting 'php7.0-thrift' for regex 'php7.0'
Note, selecting 'php7.0-common' for regex 'php7.0'
Note, selecting 'php7.0-curl' for regex 'php7.0'
The following additional packages will be installed:
 apache2-bin apache2-data apache2-utils libapr1 libaprutil1 libaprutil1-dbd-sqlite3 libaprutil1-ldap
 libjansson4 liblua5.3-0 ssl-cert
Suggested packages:
 apache2-doc apache2-suexec-pristine | apache2-suexec-custom www-browser
The following NEW packages will be installed:
 apache2 apache2-bin apache2-data apache2-utils libapr1 libaprutil1 libaprutil1-dbd-sqlite3 libaprutil1-ldap
 libjansson4 liblua5.3-0 ssl-cert
```

```
Created symlink /etc/systemd/system/multi-user.target.wants/apache2.service → /lib/systemd/system/apache2.service.
Created symlink /etc/systemd/system/multi-user.target.wants/apache-htcacheclean.service → /lib/systemd/system/apache-htcacheclean.service.
Processing triggers for man-db (2.11.2-2) ...
Processing triggers for libc-bin (2.36-9+deb12u4) ...
vinithameera@linux-web-server:~$ echo '<!doctype html><html><body><h1>Hello World!</h1></body></html>' | sudo tee /var/www/html/index.html
<!doctype html><html><body><h1>Hello World!</h1></body></html>
vinithameera@linux-web-server:~$
```

d. Test your server

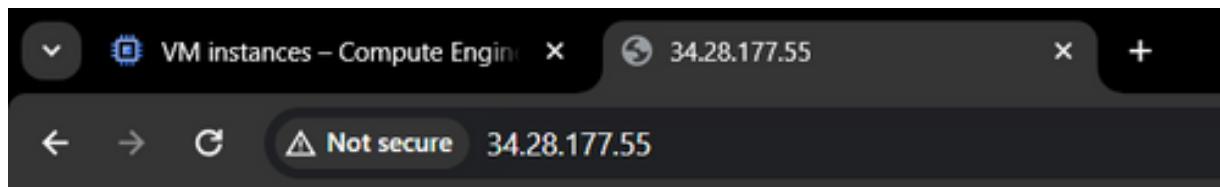
In the Google Cloud Console, go to the VM instances.

You can see where it is by clicking the following button: Compute

Engine chevron_right VM instances

Copy the VM's IP address from the External IP column.

Paste the IP address in a new browser tab.



Hello World!

c. Transfer files to Windows VMs

1. In the Google Cloud console navigation menu, click Cloud Storage, and then select Buckets → Create

A screenshot of the Google Cloud Storage Buckets page. A modal window titled "Create bucket" is open, prompting for a bucket name (Assignment88), location (US), and storage class (Standard). A tooltip for "Event-based transfers" is visible over the Cloud Storage menu. The main interface shows a list of buckets and various navigation options.

The screenshot shows the 'Create a bucket' wizard. In the 'Name your bucket' step, the user has entered 'windows-files-assignment88-415005'. The 'Good to know' sidebar includes a 'Location pricing' section with a table showing costs for 'us' (multiple regions in United States) and 'With default replication'.

Item	Cost
us (multiple regions in United States)	\$0.026 per GB-month
With default replication	\$0.020 per GB written

2. On the Buckets page, click the name of the bucket to upload files to.
3. Click Upload files or Upload folders and choose the file or folders to upload to the bucket.

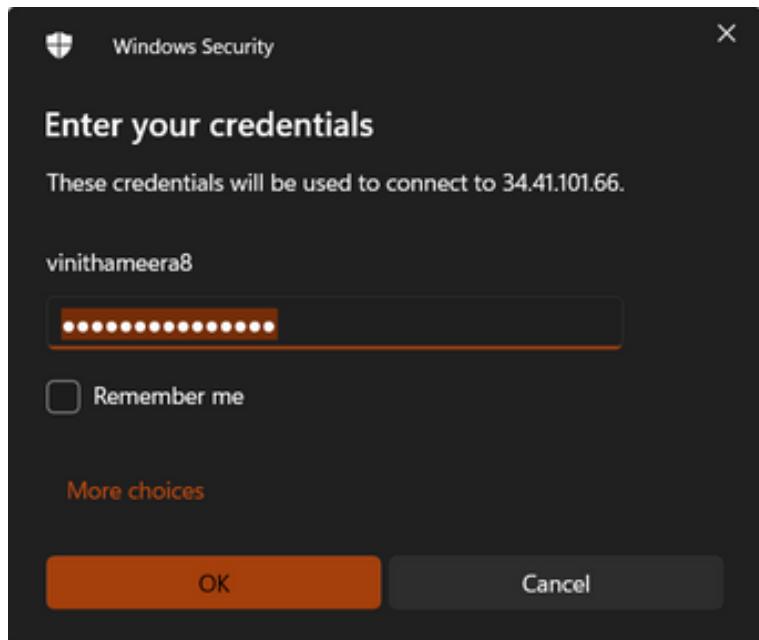
The screenshot shows the 'Bucket details' page for 'windows-files-assignment88-415005'. It displays basic bucket metadata: Location (us), Storage class (Standard), Public access (Not public), and Protection (None). The 'OBJECTS' tab is selected, showing a table with columns for Name, Size, Type, Created, Storage class, Last modified, Public access, Version history, Encryption, Object retention retain until time, and Retention. A message at the bottom states 'No rows to display'.

The screenshot shows the 'Uploads and Assignment88 operations' section. It lists a single file: 'DS_Assignment_088.pdf' with a checkmark icon and the status 'Complete'.

Download files from the Cloud Storage bucket to the Windows VM

1. On the Windows VM, open a web browser and go to <https://console.cloud.google.com/>.
2. Log in to the Google account that has the previously created Cloud Storage bucket.

3. Select the project that has the previously created Cloud Storage bucket.
4. In the Google Cloud console navigation menu, click Cloud Storage, and then select Buckets.
5. Click the name of the bucket that has the files or folders you previously uploaded.
6. Select the files or folders to download, and then click Download.



iis-web-server - 34.41.101.66 - Remote Desktop Connection

The screenshot shows the Google Cloud Storage interface. On the left, a sidebar lists 'Cloud Storage', 'Buckets', 'Monitoring', and 'Settings'. The main area displays 'Bucket details' for 'windows-files-assignment88-415005'. Key information shown includes:

- Location:** us (multiple regions in United States)
- Storage class:** Standard
- Public access:** Not public
- Protection:** None

Below this, there are tabs for 'OBJECTS' (selected), 'CONFIGURATION', and 'PERMISSIONS'. Under 'OBJECTS', there is a file named 'DS_Assignment_088.pdf' listed with a size of 372.6 KB. The interface also includes buttons for 'UPLOAD FILES', 'UPLOAD FOLDER', 'CREATE FOLDER', 'TRANSFER DATA', 'MANAGE HOLDS', 'EDIT RETENTION', 'DOWNLOAD', and 'DELETE'.

On the right side, there are several help sections:

- Get started with Cloud Storage**
- Getting bucket information** (with a 'Help document' link)
- Uploading objects** (with a 'Help document' link)
- Downloading objects** (with a 'Help document' link)
- Use cases for Cloud Storage** (with a 'Help document' link)

iis-web-server - 34.41.101.66 - Remote Desktop Connection

Vinitha Venugopal
TCS2324088

Data Science Assignment - I

1. Consider the StudentsPerformance.csv dataset provided. This dataset contains Marks secured by the students in high school Students from the United States. Use dplyr package to perform the following.
 - a. Calculate Total Score of each student as sum of math score, reading score and writing score and add as a new column.
 - b. Sort the data on the basis of Total Score and math score.
 - c. Count the number of female students with Total Score greater than 250.
 - d. Summarize the data group by parental level of education.

CODE:

```
Assignment_088.R # Source | Save | Run | Source | ...  
1 st_df<-read.csv("StudentsPerformance.csv")  
2 View(st_df)  
3 library(dplyr)  
4 mutate for forming new cols  
5 st_df<-st_df %>% mutate(Total_Score=math.score+reading.score+writing.score)  
6 #arrange to sort the data  
7 st_df<-st_df %>% arrange(Total_Score,math.score)  
8 #filter to filter out female students
```

d. Transfer files to Linux VMs

1. Select the project that contains your VM instances.

2. Open Cloud Shell by clicking the following button:

Open Cloud Shell

3. To connect to the VM, run the following command:

4. gcloud compute ssh <vm-name> \

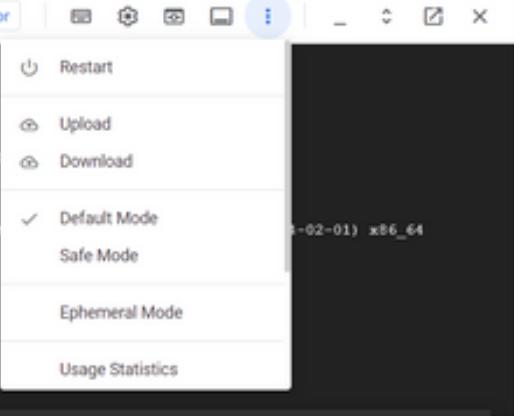
--zone=<zone>

CLOUD SHELL Terminal (assignment88-415005) + ✎ Open Editor

```
Welcome to Cloud Shell! Type "help" to get started.  
Your Cloud Platform project in this session is set to assignment88-415005.  
Use "gcloud config set project [PROJECT_ID]" to change to a different project.  
vinithameera@cloudshell:~ (assignment88-415005)$ gcloud compute ssh linux-web-server \\  
--zone=us-central1-a  
WARNING: The private SSH key file for gcloud does not exist.  
WARNING: The public SSH key file for gcloud does not exist.  
WARNING: You do not have an SSH key for gcloud.  
WARNING: SSH keygen will be executed to generate a key.  
This tool needs to create the directory [/home/vinithameera/.ssh] before being able to generate SSH keys.  
  
Do you want to continue (Y/n)? y  
  
Generating public/private rsa key pair.  
Enter passphrase (empty for no passphrase):  
Enter same passphrase again:  
Your identification has been saved in /home/vinithameera/.ssh/google_compute_engine  
Your public key has been saved in /home/vinithameera/.ssh/google_compute_engine.pub  
The key fingerprint is:  
SHA256:NK8ji35FcUry@tnuImmx30cqc3Luw95AzGYS9Wz8Ie6Q vinithameera@cs-851371844976-default  
The key's randomart image is:  
+---[RSA 3072]---+  
| ..  
| .o+ ..  
| ..+* ..  
| ..+ o ..  
| . .S++ o ..  
| ..+o+o@ o ..  
| ..o++*E o o ..  
| =...Boo= ..  
| .....o+ ..  
+---[SHA256]---+  
Updating project ssh metadata...working.Updated [https://www.googleapis.com/compute/v1/projects/assignment88-415005].  
Updating project ssh metadata...done.  
Waiting for SSH key to propagate.  
Warning: Permanently added 'compute.7305145426908824969' (ECDSA) to the list of known hosts.  
Linux linux-web-server.us-central1-a.c.assignment88-415005.internal 6.1.0-18-cloud-amd64 #1 SMP PREEMPT_DYNAMIC Debian 6.1.76-1 (2024-02-01) x86_64
```

```
The programs included with the Debian GNU/Linux system are free software;  
the exact distribution terms for each program are described in the  
individual files in /usr/share/doc/*/*copyright.  
  
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent  
permitted by applicable law.  
Last login: Wed Feb 21 13:33:44 2024 from 35.235.245.129  
vinithameera@linux-web-server:~$
```

CLOUD SHELL Terminal (assignment88-415005) + ✎ Open Editor



```
+...o+o@ o ..  
+..o++*E o o ..  
.=...Boo= ..  
.....o+ ..  
+---[SHA256]---+  
Updating project ssh metadata...working.Updated [https://www.googleapis.com/compute/v1/projects/assignment88-415005].  
Updating project ssh metadata...done.  
Waiting for SSH key to propagate.  
Warning: Permanently added 'compute.7305145426908824969' (ECDSA) to the list of known hosts.  
Linux linux-web-server.us-central1-a.c.assignment88-415005.internal 6.1.0-18-cloud-amd64 #1 SMP PREEMPT_DYNAMIC Debian 6.1.76-1 (2024-02-01) x86_64  
  
The programs included with the Debian GNU/Linux system are free software;  
the exact distribution terms for each program are described in the  
individual files in /usr/share/doc/*/*copyright.  
  
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent  
permitted by applicable law.  
Last login: Wed Feb 21 13:33:44 2024 from 35.235.245.129  
vinithameera@linux-web-server:~$
```

Upload files

1. After the connection is established, click More and select Upload. The upload dialog

opens.

2. Select the file or folder to upload.

3. Specify the directory where you want to upload the file. By default, the file uploads to

your /home/<USERNAME> directory.

Upload

Choose Files

DS_Assignment_088.pdf X

SELECT A DESTINATION DIRECTORY

Destination Directory /home/vinithameera8/ 📁

Files can only be uploaded within the home directory. If the specified directory does not exist, it will be created.

[CANCEL](#) [UPLOAD](#)

4. To upload the file, click Upload.

Download files

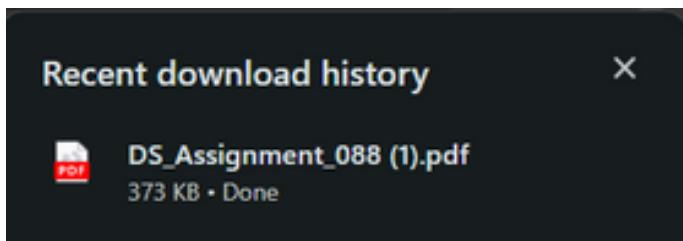
1. After the connection is established, click More and select Download. The download dialog opens.
2. Specify the file or folder to download.
3. Click Download.
4. The save dialog opens. Choose the directory where you want to download the file on your machine and click Save.

Download File/Folder

File path /vinithameera8/DS_Assignment_088.pdf 📁

File paths are relative to home directory.

[CANCEL](#) [DOWNLOAD](#)



e. Back up a VM's persistent disk

Back up a VM's persistent disk by creating a manual snapshot

1. Select the project that contains your VM instances. Show me.
2. In the Name column, click the name of the VM that has the persistent disk to back up.

A screenshot of the Google Cloud Platform VM Instances page. The page header includes the Google Cloud logo, a dropdown for 'Assignment88', a search bar, and various navigation icons. Below the header, there are tabs for 'INSTANCES', 'OBSERVABILITY', and 'INSTANCE SCHEDULES'. The 'INSTANCES' tab is selected. A table lists two VM instances:

Status	Name	Zone	Recommendations	In use by	Internal IP	External IP	Connect
<input type="checkbox"/>	iis-web-server	us-central1-a			10.128.0.3 (nic0)	34.41.101.66 (nic0)	RDP
<input checked="" type="checkbox"/>	linux-web-server	us-central1-a			10.128.0.4 (nic0)	34.28.177.55 (nic0)	SSH

Below the table, there is a 'Related actions' section with a 'HIDE' link.

3. In Storage:

- To back up the boot disk, in the Boot disk section, click the Name of the boot disk.

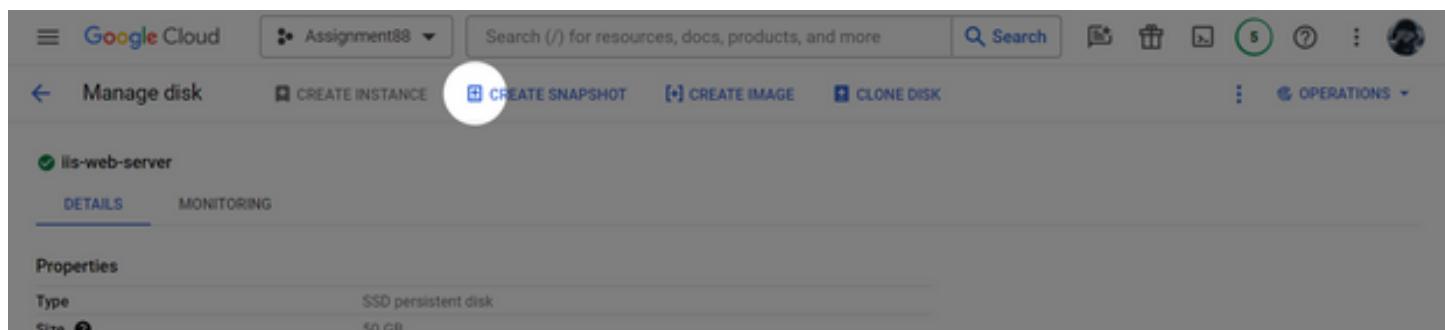
A screenshot of the Google Cloud Storage page. The title is 'Storage'. The 'Boot disk' section is expanded, showing a table with one row:

Name	Image	Interface type	Size (GB)	Device name	Type	Architecture	Encryption	Mode	Wh
iis-web-server	windows-server-2019-dc-v20240214	SCSI	50	iis-web-server	SSD persistent disk	x86/64	Google-managed	Boot, read/write	Del

The 'Local disks' and 'Additional disks' sections are shown below the table, both indicating 'None'.

- To back up an attached persistent disk, in Additional disks, click the Name of the attached persistent disk.

4. Click Create snapshot.



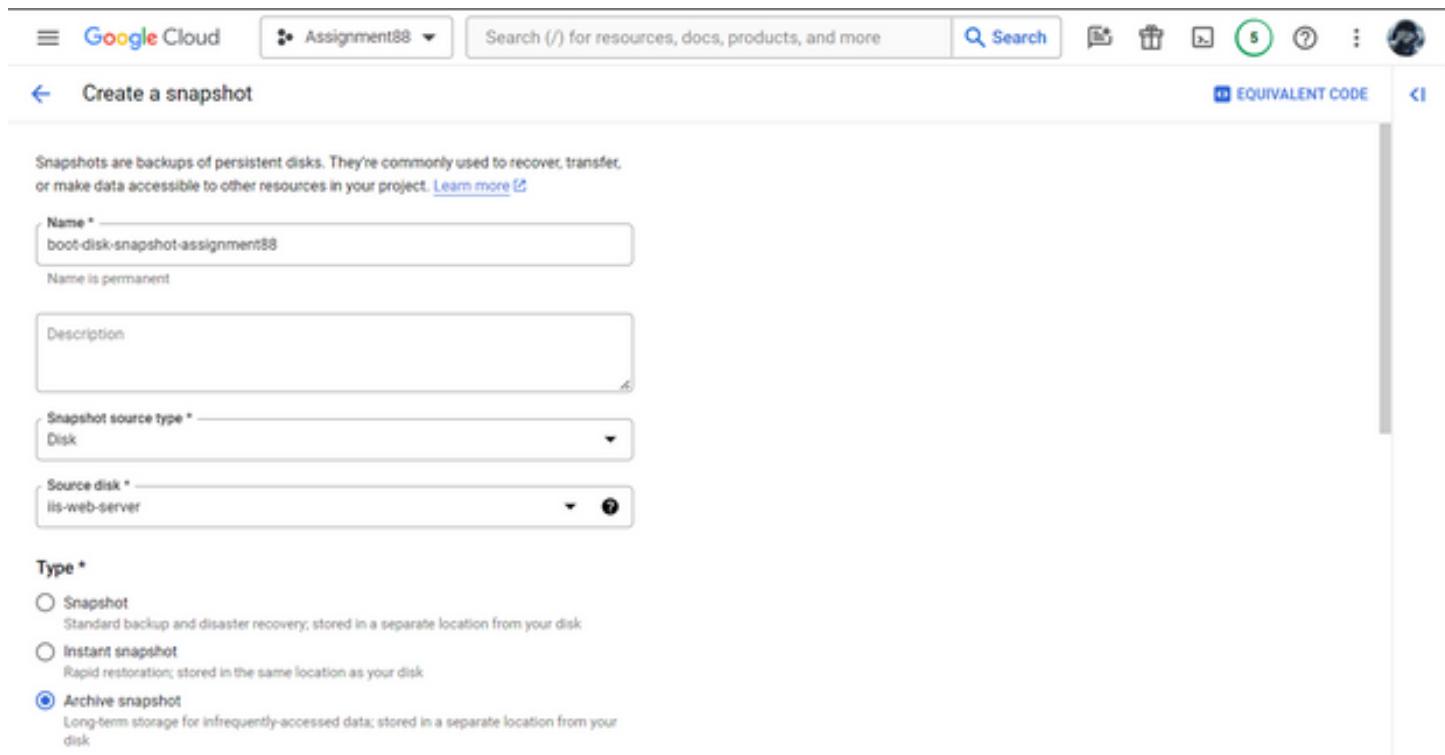
The screenshot shows the Google Cloud Platform interface for managing a disk named 'iis-web-server'. The top navigation bar includes 'Google Cloud', 'Assignment88', a search bar, and various icons. Below the navigation is a toolbar with buttons for 'CREATE INSTANCE', 'CREATE SNAPSHOT' (which is circled in white), 'CREATE IMAGE', and 'CLONE DISK'. The main area displays the disk's properties, including its name, type (SSD persistent disk), and status (enabling). There are tabs for 'DETAILS' and 'MONITORING'.

5. In Name, enter a unique name to help identify the purpose of the snapshot, for example:

- boot-disk-snapshot-assignment88

6. In Type, the default is a regular snapshot, which is best for long-term back up and disaster recovery.

Choose Archive snapshot for more cost-efficient data retention.



The screenshot shows the 'Create a snapshot' form. At the top, there is a brief description of what snapshots are used for. Below that, the 'Name' field contains 'boot-disk-snapshot-assignment88'. The 'Description' field is empty. The 'Snapshot source type' dropdown is set to 'Disk'. The 'Source disk' dropdown is set to 'iis-web-server'. The 'Type' section is expanded, showing three options: 'Snapshot' (selected), 'Instant snapshot', and 'Archive snapshot'. The 'Archive snapshot' description indicates it is for long-term storage of infrequently-accessed data.

7. In the Location section,

Choose the type of storage location that you want for your snapshot.

- Choose Multi-regional for higher availability at a higher cost.
- Choose Regional snapshots for more control over the physical location of your data at a lower cost.

In the Select location field, select the specific region or multi-region that you want to use. To use the region or multi-region that is closest to your source disk, select Based on disk's location.

8. To create a manual snapshot, click Create.

The screenshot shows the 'Create a snapshot' dialog box. At the top left is a back arrow and the title 'Create a snapshot'. At the top right is a 'GO EQUIVALENT CODE' button. Below the title is a 'Location' section with a note about network transfer fees and two radio button options: 'Multi-regional' (unchecked) and 'Regional' (checked). A dropdown menu labeled 'Select location' shows 'us-central1 (Iowa)' with a downward arrow. Below this is a 'Labels' section with a '+ ADD LABEL' button. Under 'Encryption', it says 'This snapshot will use the same encryption type as the disk.' with a 'Learn more' link. It also shows 'Encryption type: Google-managed'. In the 'Application consistency' section, it says 'An application consistent snapshot is taken while a disk is in use, so there's no need to shut down the VM or take the disk offline. With application consistency, pending writes are completed (using guest flush or VSS) before the snapshot is taken.' with a 'Learn more' link. There is a checkbox 'Enable application consistent snapshot' which is unchecked. At the bottom are 'CREATE', 'CANCEL', and 'GO EQUIVALENT CODE' buttons.

Notifications

- ✓ Create snapshot "boot-disk-snapshot-assignment88"
Assignment88 Just now

The screenshot shows the Google Cloud Platform interface for managing archive snapshots. At the top, there's a navigation bar with 'Google Cloud' and a dropdown for 'Assignment88'. A search bar says 'Search (/) for resources, docs, products, and more' with a 'Search' button. To the right are icons for file operations like copy, delete, and refresh.

The main area has tabs for 'SNAPSHOTS', 'ARCHIVE SNAPSHOTS' (which is selected), 'INSTANT SNAPSHOTS', 'PREVIEW', and 'SNAPSHOT SCHEDULES'. Below these tabs is a filter bar with a 'Filter' icon and a text input 'Enter property name or value'. The table lists one archive snapshot:

Status	Name	Location	Snapshot size	Creation time	Creation type	Source d
<input type="checkbox"/>	<input checked="" type="checkbox"/> boot-disk-snapshot-assignment88	us-central1	12.02 GB	Feb 21, 2024, 9:36:00 PM UTC+05:30	Manual	iis-web-server

To the right, a sidebar titled 'Select an archive snapshot' shows 'PERMISSIONS' and 'LABELS' sections. A message at the bottom says 'Please select at least one resource.'

f. Configure periodic backups with a snapshot schedule

1. click Compute Engine → VM instances.
2. In the Name column, click the name of the VM that has the persistent disk to create a snapshot schedule for.
3. In Storage, click the name of the Boot disk or the Additional disk to create a snapshot schedule for.
4. Click Edit.

The screenshot shows the 'Manage disk' page for a disk named 'iis-web-server'. At the top, there are buttons for 'CREATE INSTANCE', 'CREATE SNAPSHOT', 'CREATE IMAGE', and 'CLONE DISK'. On the right, there are buttons for 'OPERATIONS' (with 'CREATE SECONDARY DISK', 'EDIT', and 'DELETE' options), 'MONITORING' (selected), and 'EQUIVALENT REST'.

The 'DETAILS' tab is selected, showing the following disk properties:

Type	SSD persistent disk
Size <small>?</small>	50 GB
Architecture	x86/64
Zone	us-central1-a
Labels	None
In use by	iis-web-server
Snapshot schedule	None
Source image	windows-server-2019-dc-v20240214
Encryption type	Google-managed
Consistency group	None

5. In Snapshot schedule, choose Create a schedule.

The screenshot shows the Google Cloud Platform interface for managing disks. On the left, a sidebar for 'Manage disk' shows a disk named 'iis-web-server' with properties like size (50 GB) and a snapshot schedule section. The main area is titled 'Create a schedule' for a new snapshot. It includes fields for 'Name' (set to 'boot-disk-snapshot-schedule-assignment88'), 'Description' (empty), 'Schedule location' (set to 'us-central1'), 'Snapshot storage location' (set to 'us (multiple regions in United States)'), and 'Schedule options'. Buttons for 'CREATE' and 'CANCEL' are at the bottom.

6. In Name, enter one of the following names for the snapshot schedule:

o boot-disk-snapshot-schedule-assignment88

In the Location section, choose your snapshot storage location. The predefined or customized default location defined in your snapshot settings is automatically selected. Optionally, you can override the snapshot settings and store your snapshots in a custom storage location by doing the following:

Choose the type of storage location that you want for your snapshot.

- Choose Multi-regional for higher availability at a higher cost.
- Choose Regional snapshots for more control over the physical location of your data at a lower cost.

In the Select location field, select the specific region or multi-region that you want to use. To use the region or multi-region that is closest to your source disk, select Based on disk's location.

Snapshot storage location

Choose where to store snapshots generated by this schedule. Location can affect availability and networking costs. [Learn more](#)

- Multi-regional
 Regional

Select location —
us (multiple regions in United States)

Schedule options

Schedule frequency —
Daily

Start time (UTC) —
6:00 AM - 7:00 AM

Autodelete snapshots after * —
14 days

Deletion rule [?](#)

After you delete the disk that uses this schedule:

- Keep snapshots
 Delete snapshots older than 14 days

CREATE

CANCEL

7. To finish creating the snapshot schedule, click Create.

Google Cloud Assignment88 Search (/) for resources, docs, products, and more

Manage disk CREATE INSTANCE CREATE SNAPSHOT CREATE IMAGE CLONE DISK OPERATIONS

Properties

Size * 50 GB Provision between 50 and 65,536 GB

Snapshot schedule

Select or create a snapshot schedule boot-disk-snapshot-schedule-assignment88 Every day, starts between 6:00 AM and 7:00 AM, Storage location: us (United States)

Consistency group

Select or create a consistency group

Labels

+ ADD LABEL

Type	SSD persistent disk
Architecture	x86/64
Zone	us-central1-a
In use by	iis-web-server
Source image	windows-server-2019-dc-v20240214
Encryption type	Google-managed

SAVE CANCEL

8. To attach this snapshot schedule to the persistent disk, click Save.

iis-web-server

DETAILS

MONITORING

Properties

Type	SSD persistent disk
Size 	50 GB
Architecture	x86/64
Zone	us-central1-a
Labels	None
In use by	iis-web-server
Snapshot schedule	boot-disk-snapshot-schedule-assignment88
Source image	windows-server-2019-dc-v20240214
Encryption type	Google-managed
Consistency group	None

EQUIVALENT REST

Successfully updated disk "iis-web-server".



g. Restore a boot disk from a snapshot

Detach the boot disk and configure a new boot disk

1. click Compute Engine, and then select VM instances.
2. Click the Name of the VM with the persistent disk to restore.
3. Stop the VM.

The screenshot shows the Google Cloud VM Instances page. A modal window titled "Stop iis-web-server?" is open, asking if the user wants to stop the selected VM instance. The modal lists resources that will be billed: Persistent disks and Static IP addresses. It also notes that the VM will gracefully shut down in 90 seconds if processes are still running. The modal has "CANCEL" and "STOP" buttons. In the background, the main interface shows two VM instances: "iis-web-server" and "linux-web-server", both in the "us-central1" zone. There are "Related actions" like "Explore Backup and DR" and "Set up firewall rules". On the right, there are "Connect" options for RDP and SSH, and a link to "Explore VM logs".

Notifications

- Stop VM instance "iis-web-server"** Just now
Assignment88

4. Click Edit the VM.

Google Cloud Assignment88 Search (/) for resources, docs, products, and more

iis-web-server EDIT RESET CREATE MACHINE IMAGE CREATE SIMILAR START / RESUME OPERATIONS

DETAILS OBSERVABILITY OS INFO SCREENSHOT

RDP SET WINDOWS PASSWORD CONNECT TO SERIAL CONSOLE

Connecting to serial ports is disabled ?

Logs Logging Serial port 1 SHOW MORE

Basic information

Name	iis-web-server
Instance Id	5617920679190462635
Description	None
Type	Instance
Status	Stopped
Creation time	Feb 21, 2024, 2:41:33 PM UTC+05:30
Zone	us-central1-a
Instance template	None
In use by	None
Reservations	Automatically choose
Labels	None
Tags	-

VM instance stopped

<https://console.cloud.google.com/compute/instancesEdit/zones/us-central1-a/instances/iis-web-server?project=assignment88-415005>

5. In Storage, click Detach boot disk

Device name ?
Used to reference the device for mounting or resizing.

Use a custom device name
Device name: iis-web-server
Based on disk name (default)

X DETACH BOOT DISK

Additional disks

+ ADD NEW DISK + ATTACH EXISTING DISK

Storage

Boot disk

No disk selected. You can add a new disk or attach an existing disk.

 [CONFIGURE BOOT DISK](#)

Additional disks

 [+ ADD NEW DISK](#)

 [+ ATTACH EXISTING DISK](#)

7. In Snapshots, choose a snapshot to create a disk from.

8. In Name, enter new-boot-disk-assignment88

Boot disk

Select an image or snapshot to create a boot disk; or attach an existing disk. Can't find what you're looking for? Explore hundreds of VM solutions in [Marketplace](#)

PUBLIC IMAGES

CUSTOM IMAGES

SNAPSHOTS

ARCHIVE SNAPSHOTS

EXISTING DISKS

Snapshot

boot-disk-snapshot-assignment88

Created on Feb 21, 2024, 9:36:00 PM, iis-web-server

Name *

new-boot-disk-assignment88



Name is permanent

Boot disk type *

Balanced persistent disk

[COMPARE DISK TYPES](#)

Size (GB) *

50

Provision between 50 and 65536 GB

[▼ SHOW ADVANCED CONFIGURATION](#)

[SELECT](#)

[CANCEL](#)

9. After configuring the source for the new boot disk, click Select.

10. To finish configuring the VM, click Save.

Notifications

Edit VM instance "iis-web-server"
Assignment88

Just now

11. To start the VM, click Start

VM instances

VM instances								
<input type="checkbox"/>	Status	Name	Zone	Recommendations	In use by	Internal IP	External IP	Connect
<input type="checkbox"/>		iis-web-server	us-central1-a			10.128.0.3 (nic0)		RDP
<input checked="" type="checkbox"/>		linux-web-server	us-central1-a			10.128.0.4 (nic0)	34.28.177.55 (nic0)	SSH

Related actions

- [Start / Resume](#)
- [Stop](#)
- [Download](#)

Google Cloud Assignment88 Search (/) for resources, docs, products, and more

VM instances

INSTANCES OBSERVABILITY INSTANCE SCHEDULES

VM instances

Filter Enter property name or value

<input type="checkbox"/>	Status	Name	Zone	Recommendations	In use by	Internal IP	External IP	Connect
<input type="checkbox"/>		iis-web-server	us-central1-a			10.128.0.3 (nic0)		RDP
<input checked="" type="checkbox"/>		linux-web-server	us-central1-a			10.128.0.4 (nic0)	34.28.177.55 (nic0)	SSH

Related actions

- [Explore Backup and DR](#)
Backup up your VMs and set up disaster recovery
- [View](#)
View and manage billing
- [Start iis-web-server?](#)
You'll be charged for running this VM according to its configuration.
 [CANCEL](#) [START](#)
- [Set up firewall rules](#)
Control traffic to and from a VM instance
- [Patch management](#)
Schedule patch updates and view patch compliance on VM Instances
- [Load balance between VMs](#)
Set up Load Balancing for your applications as your traffic and users grow
- [Explore VM logs](#)
View, search, analyze, and download VM instance logs

Notifications

Start VM instance "iis-web-server" Just now
Assignment88

VM instances

VM instances								
<input type="checkbox"/>	Status	Name	Zone	Recommendations	In use by	Internal IP	External IP	Connect
<input type="checkbox"/>		iis-web-server	us-central1-a			10.128.0.3 (nic0)	35.225.54.195 (nic0)	RDP
<input checked="" type="checkbox"/>		linux-web-server	us-central1-a			10.128.0.4 (nic0)	34.28.177.55 (nic0)	SSH

Related actions

- [Start / Resume](#)
- [Stop](#)
- [Download](#)

Optionally delete the disk

To delete the original disk if you no longer need it, do the following:

1. click Compute Engine, and then select Disks.

The screenshot shows the Google Cloud Compute Engine interface. On the left, there's a sidebar with various services: Products & solutions, APIs & Services, Marketplace, Compute Engine (which is currently selected), Kubernetes Engine, Cloud Storage, BigQuery, VPC network, Cloud Run, SQL, Security, Google Maps Platform, and Billing. Under Compute Engine, there are sub-options like VM Instances, Instance templates, Sole-tenant nodes, Machine images, TPUs, Committed use discounts, Reservations, and Migrate to Virtual Machines. A dropdown menu is open over the 'Compute Engine' button, with 'Disks' highlighted. The main pane shows a table of VM instances with columns for Name, In use by, Internal IP, External IP, and Connect. Two rows are visible: one with Internal IP 10.128.0.3 (nic0) and External IP 35.225.54.195 (nic0), and another with Internal IP 10.128.0.4 (nic0) and External IP 34.28.177.55 (nic0). Below the table are several cards: 'Monitor VMs' (View outlier VMs across metrics like CPU and network), 'Explore VM logs' (View, search, analyze, and download VM instance logs), and 'Load balance between VMs' (Set up Load Balancing for your applications as your traffic and users grow). A modal at the bottom says 'VM instance started' with a close button. The URL in the address bar is https://console.cloud.google.com/compute/disks/project=assignment88-415005.

2. In the In use by column, note that the original disk is no longer in use by any VM.

You can't delete a disk that is in use by a VM.

3. Click the Name of the original disk

Google Cloud Assignment88 Search (/) for resources, docs, products, and more

Disks CREATE DISK REFRESH DELETE OPERATIONS HIDE INFO PANEL LEARN

Status	Name	Type	Size	Architecture	Zone(s)	In use by	Actions
<input checked="" type="checkbox"/>	iis-web-server	SSD persistent disk	50 GB	x86/64	us-central1-a		<input type="button" value="..."/>
<input type="checkbox"/>	linux-web-server	SSD persistent disk	10 GB	x86/64	us-central1-a	linux-w	<input type="button" value="..."/>
<input type="checkbox"/>	new-boot-disk-assignment88	Balanced persistent disk	50 GB	x86/64	us-central1-a	iis-web	<input type="button" value="..."/>

iis-web-server

PERMISSIONS LABELS

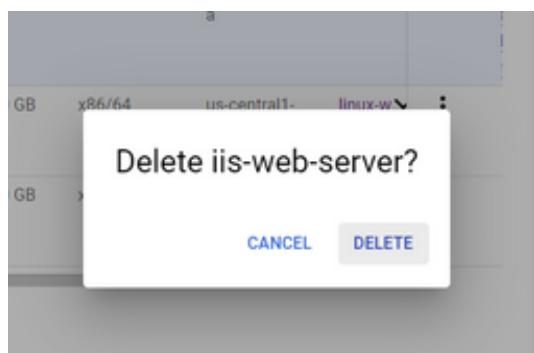
Edit or delete permissions below, or select "Add Principal" to grant new access.

Show inherited permissions

Filter Enter property name or value

Role / Principal	Inheritance
▶ Compute Engine Service Agent (1)	
▶ Editor (2)	
▶ Owner (1)	

4. Click Delete, and then confirm by clicking Delete again.



Notifications

✓ Delete disk "iis-web-server" Just now

Assignment88

5. You have successfully restored the boot disk to the VM.

Disks

 CREATE DISK

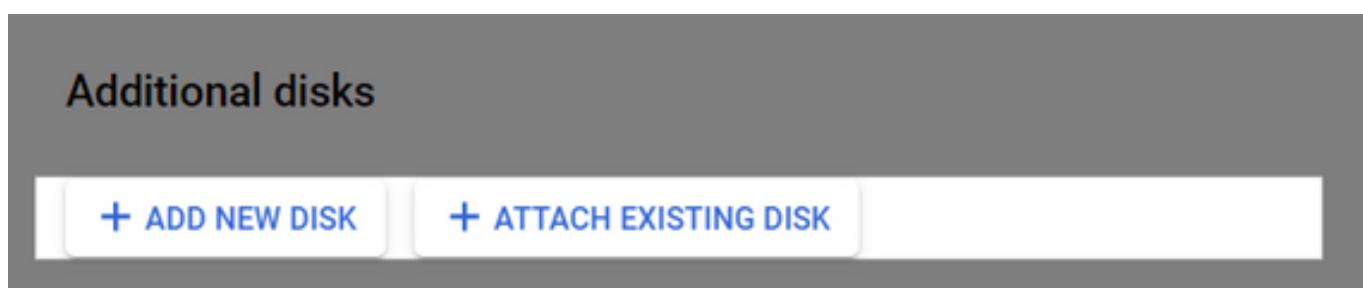
 REFRESH

 DELETE

Filter Enter property name or value									
<input type="checkbox"/>	Status	Name 	Type	Size	Architecture	Zone(s)	In use by	Actions	
<input type="checkbox"/>		linux-web-server	SSD persistent disk	10 GB	x86/64	us-central1-a	linux-w...		
<input type="checkbox"/>		new-boot-disk-assignment88	Balanced persistent disk	50 GB	x86/64	us-central1-a	iis-web...		

h. Restore a persistent disk from a snapshot

1. click Compute Engine, and then select VM instances. → Select the project which contains VM instance.
2. Click the Name of the VM with the persistent disk to restore.
3. Edit the VM
4. In Additional disks, detach the disk.
5. In Additional disks, click Add new disk.



6. In Name, enter new-persistent-disk-assignment88.
Wait a moment for Compute Engine to verify that the default name is unique. If you get a Name is already in use error, enter a new name for the disk.
7. In Disk source type, choose Snapshot.
8. In Source snapshot, select the name of a previously created snapshot.

Add new disk

X

Name *
new-persistent-disk-assignment88



Name is permanent

Description

Source

Create a blank disk, apply a bootable disk image, or restore a snapshot of another disk in this project.

Disk source type *
Archive snapshot

Source archive snapshot *
boot-disk-snapshot-assignment88



Disk settings

Disk type *
Balanced persistent disk

COMPARE DISK TYPES

Size *
50 GB

Provision between 50 and 65,536 GB

Snapshot schedule (Recommended)

SAVE

CANCEL

Additional disks

New disk new-persistent-disk-assignment88, Blank, 50 GB



+ ADD NEW DISK

+ ATTACH EXISTING DISK

9. To attach the snapshot to the VM, click Save.

10. To update the VM details, click Save.

Notifications

✓ Edit VM instance "iis-web-server" Just now
Assignment88

Practical 7

Write a program for web feed.

```
1  <p>Choose a Category</p>
2  <form method="post" id="myform">
3  <select required name="rssurl">
4  <option value="http://timesofindia.indiatimes.com/rssfeedmostrecent.cms">Category 1</option>
5  <option value="http://timesofindia.indiatimes.com/rssfeedstopstories.cms">Category 2</option>
6  <option value="http://timesofindia.indiatimes.com/rssfeeds/913168846.cms">Category 3</option>
7  </select>
8  <input type="submit" value="Load"/>
9  </form>
10 <?php
11 if(isset($_POST['rssurl']))
12 {
13     echo '<h1> Search Result for RSS url:'. $_POST['rssurl']. '</h1>';
14     $rssurl=$_POST['rssurl'];
15     $rss=new DOMDocument();
16     $rss->load($rssurl);
17     $feed=array();
18     foreach($rss->getElementsByTagName('item') as $node)
19     {
20         $item=array(
21             'title'=>$node->getElementsByTagName('title')->item(0)->nodeValue,
22             'desc'=>$node->getElementsByTagName('description')->item(0)->nodeValue,
23             'link'=>$node->getElementsByTagName('link')->item(0)->nodeValue,
24             'date'=>$node->getElementsByTagName('pubDate')->item(0)->nodeValue
25         );
26         array_push($feed,$item);
27     }
28     $limit=5;
29     for($x=0;$x<$limit;$x++){
30         $title=str_replace('&','&',$feed[$x]['title']);
31         $link=$feed[$x]['link'];
32         $description=$feed[$x]['desc'];
33         $date=date('l F d, Y',strtotime($feed[$x]['date']));
34         echo '<p><strong><a href="'.$link.'" title="'.$title.'">'.$title.'</a></strong></p>';
35         echo '<p>'.$description.'</p>';
36         echo '<small><em>Posted on '.$date.'</em></small>';
37     } } ?>
```

Search Result for RSS url:<https://timesofindia.indiatimes.com/rssfeeds/2647163.cms>

[Gut-friendly bacteria could breathe life into these patients](#)
Posted on Sunday March 10, 2024

[Asiatic lions aren't 'endangered' anymore, just 'vulnerable': IUCN](#)

Gujarat can now take pride in the reclassification of the Asiatic lion from endangered to vulnerable by the International Union for Conservation of Nature (IUCN). This change in conservation status, as indicated in IUCN's latest global report, reflects a positive shift for the iconic species. The report also highlights a notable distinction in the risk of decline between African and Indian lions. The likelihood of a 33% decline in the lion population in Africa is 19 times higher than in India, mainly attributed to widespread poaching in the African region.

Posted on Sunday March 10, 2024

[Wind blows light out of coal in Germany](#)
Posted on Saturday March 09, 2024

[Austria fishermen fume over](#)

Practical 8

Case study on Amazon EC2/Microsoft Azure/Google Cloud Platform (Research paper analysis)

Title: A Comparative Study of Cloud Computing Platforms

Author: Akash Chauhan

Introduction:

The introduction provides a clear outline of the research focus, emphasizing the comparison of cloud computing platforms. It effectively communicates the significance of the study in the context of the evolving technology landscape. However, it could benefit from more explicit statements on the specific objectives and hypotheses guiding the comparative analysis.

Literature Review:

The literature review is comprehensive, covering key concepts and advancements in cloud computing. It effectively contextualizes the study within the existing body of knowledge. However, a more critical analysis of the strengths and weaknesses of various cloud platforms in the literature would enhance the paper's depth.

Methodology:

The methodology section outlines the research design, data collection methods, and criteria for platform comparison. The inclusion of specific platforms and their selection criteria demonstrates transparency. However, further details on potential biases, limitations, and the rationale behind choosing specific metrics would enhance the robustness of the methodology.

Results and Findings:

The presentation of results is well-structured, utilizing tables and figures for clarity. The findings highlight differences and similarities among the chosen cloud computing platforms. However, a more detailed discussion of unexpected results or variations in performance would add depth to the interpretation.

Discussion:

The discussion section effectively interprets the results, connecting them to the research question and objectives. The author acknowledges the limitations of the study, such as the dynamic nature of technology. However, a more explicit exploration of the broader implications for businesses or industries adopting cloud platforms would strengthen the discussion.

Conclusion:

The conclusion summarizes the key findings and their relevance. It briefly touches upon potential future developments in cloud computing but could be more explicit in outlining recommendations for businesses or areas for further research.

Writing Style and Clarity:

The writing style is clear, and the paper is well-organized. Technical terms are appropriately explained, making the content accessible to a broad audience. However, a few sections could benefit from additional clarity, especially in explaining complex methodologies.

Ethical Considerations:

The paper does not explicitly address ethical considerations, such as data privacy or potential conflicts of interest. Including a section on ethical considerations would enhance the transparency and credibility of the research.

Citations and References:

The references cited are relevant and up-to-date, reflecting a comprehensive review of the literature on cloud computing platforms.

Final Thoughts:

"A Comparative Study of Cloud Computing Platforms" by Akash Chauhan is a valuable contribution to the understanding of cloud technologies. While the paper effectively compares different platforms, addressing the identified areas for improvement would enhance its overall impact and applicability.

This sample analysis provides a structured evaluation of the various sections of the research paper, focusing on strengths, weaknesses, and areas for improvement. Keep in mind that this is a fictional analysis, and a more detailed assessment would require a thorough examination of the actual paper.