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1. Study of Cloud Computing & Architecture(Theory)

Cloud computing is a technology that allows users to access computing resources such as servers, storage, databases, networking, software, and analytics over the internet ("the cloud") on a pay-as-you-go basis. Cloud computing offers several benefits, including scalability, flexibility, cost-efficiency, and reduced management overhead.

The architecture of cloud computing typically consists of several layers:

1. Infrastructure as a Service (IaaS): This is the foundational layer of cloud computing, providing virtualized computing resources over the internet. Users can rent virtual machines, storage, and networking resources on-demand. Examples of IaaS providers include Amazon Web Services (AWS), Microsoft Azure, and Google Cloud Platform (GCP).
2. Platform as a Service (PaaS): PaaS provides a platform allowing customers to develop, run, and manage applications without the complexity of building and maintaining the underlying infrastructure. PaaS offerings include development tools, middleware, databases, and other application services. Popular PaaS providers include Heroku, Google App Engine, and Microsoft Azure App Service.
3. Software as a Service (SaaS): SaaS delivers software applications over the internet on a subscription basis. Users access these applications through a web browser or API without needing to install or manage any software locally. Examples of SaaS applications include Salesforce, Google Workspace, and Microsoft Office 365.

Cloud computing architectures can also be categorized based on deployment models:

1. Public Cloud: Resources are owned and operated by third-party cloud service providers, and services are delivered over the public internet. Public clouds offer scalability and cost-effectiveness but may have security and compliance concerns.
2. Private Cloud: Infrastructure and services are provisioned for a single organization and are either located on-premises or hosted by a third-party provider. Private clouds offer greater control, security, and customization but may require higher upfront investment.
3. Hybrid Cloud: Combines elements of public and private clouds, allowing data and applications to be shared between them. Hybrid clouds provide flexibility, allowing organizations to leverage the benefits of both public and private clouds while addressing data sovereignty and regulatory requirements.

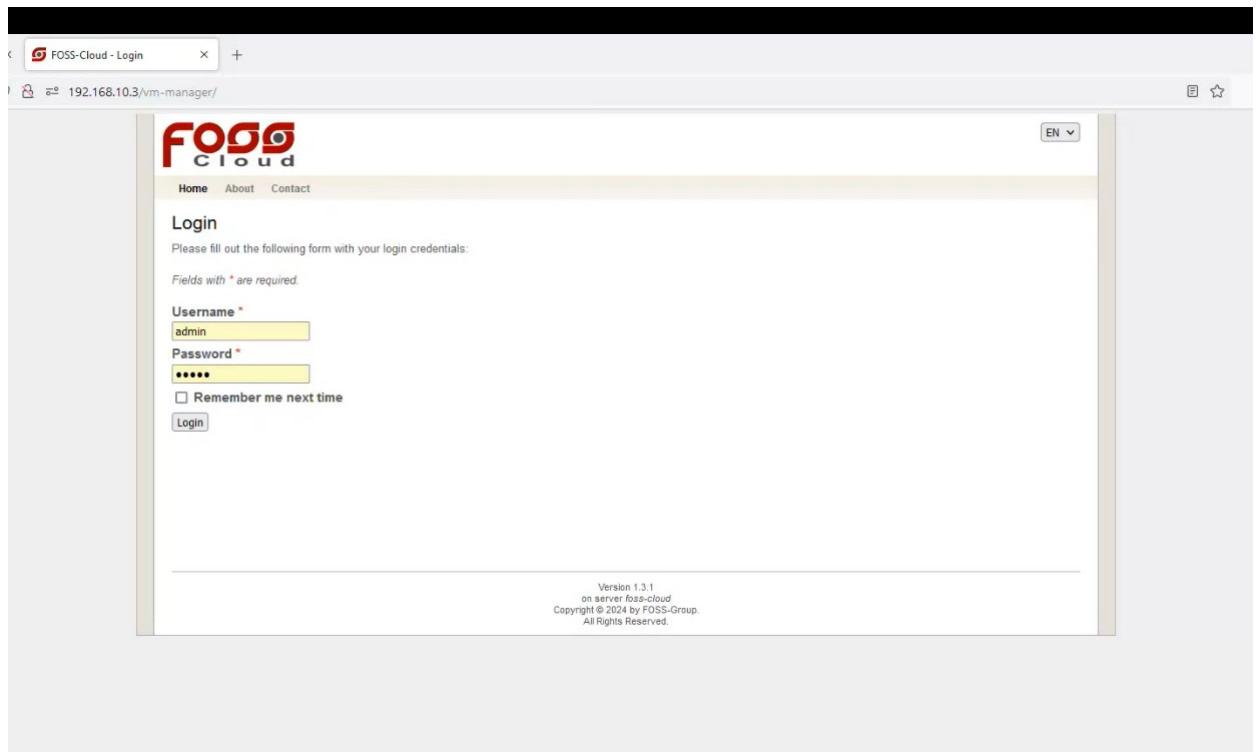
4. Multi-Cloud: Involves using services from multiple cloud providers to avoid vendor lock-in, increase redundancy, and optimize performance and cost. Multi-cloud architectures require careful management of resources across different providers.

There are numerous online resources, courses, certifications, and academic programs available for studying cloud computing and architecture, offered by providers such as AWS, Microsoft, Google Cloud, and various educational institutions. Additionally, hands-on experience through practical projects and experimentation with cloud platforms can greatly enhance your understanding of cloud computing concepts and technologies.

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

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

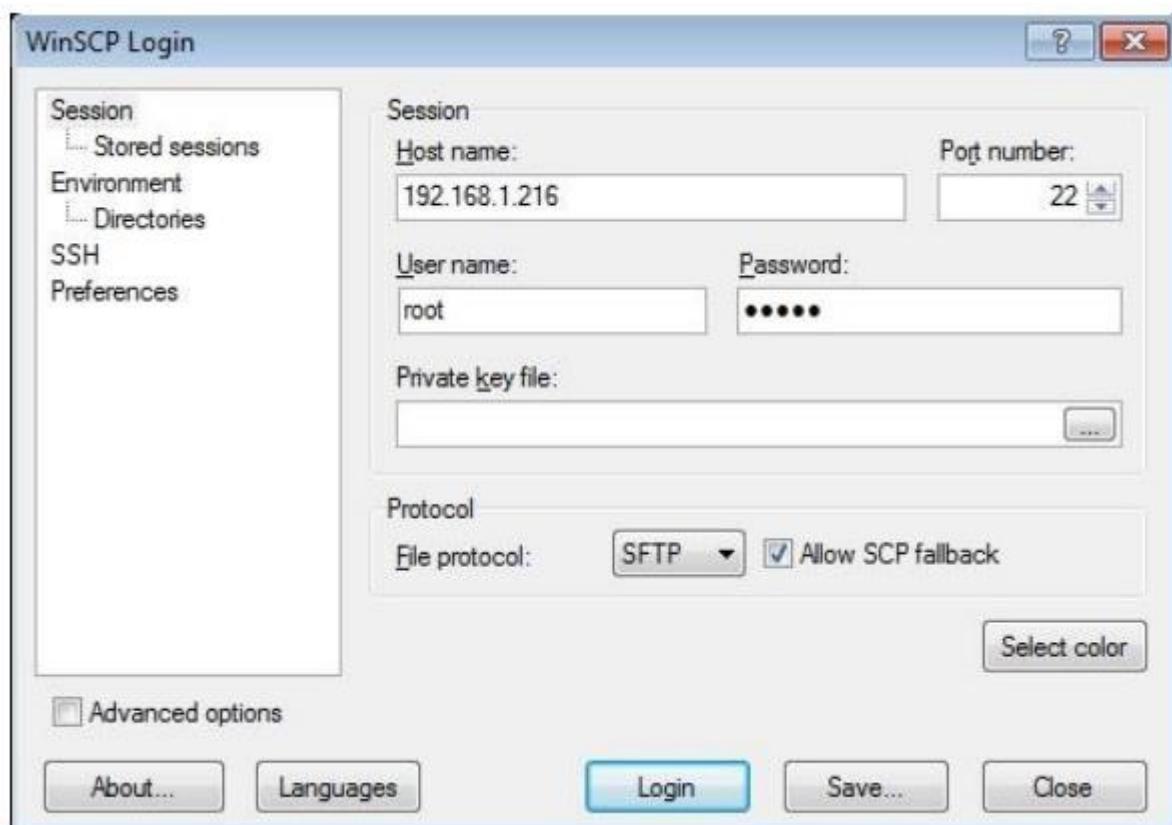
Open FOSS CLOUD on the LOCAL Server and LOGIN using admin username & Password

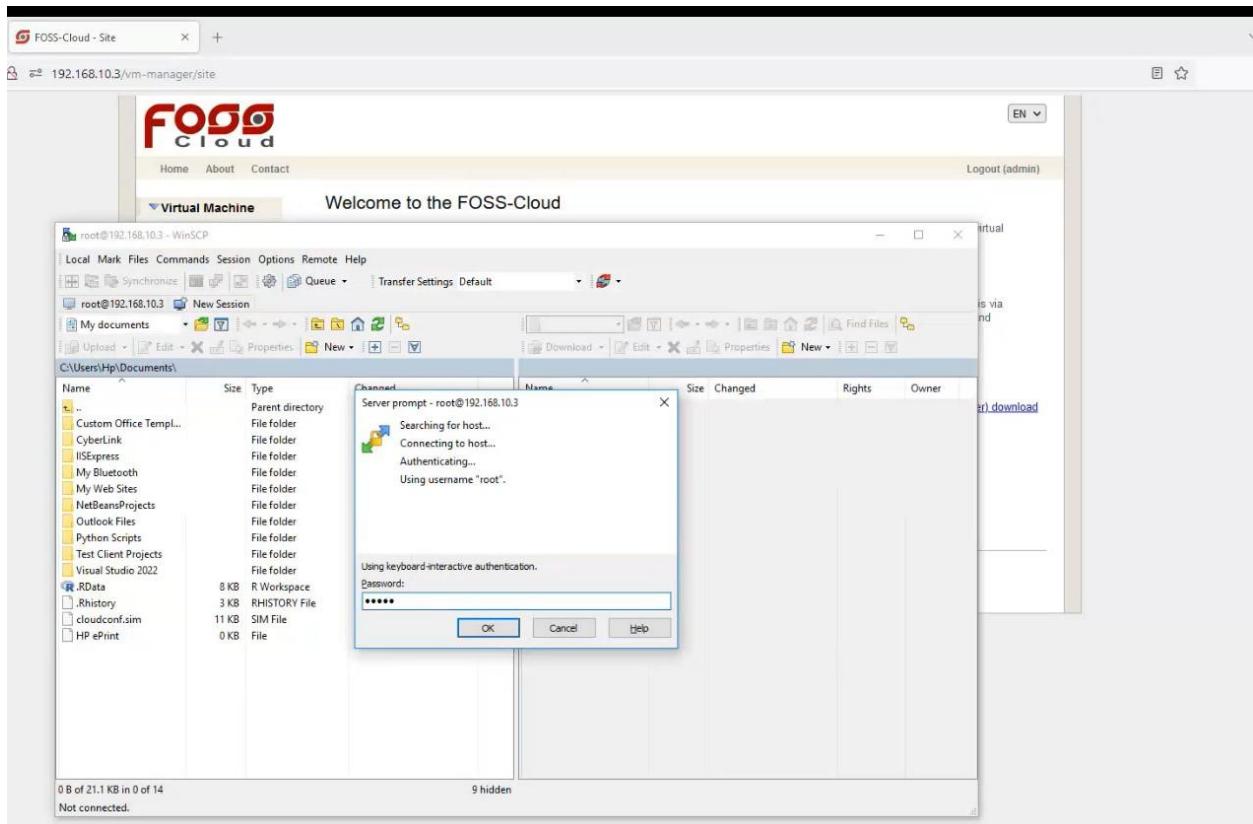
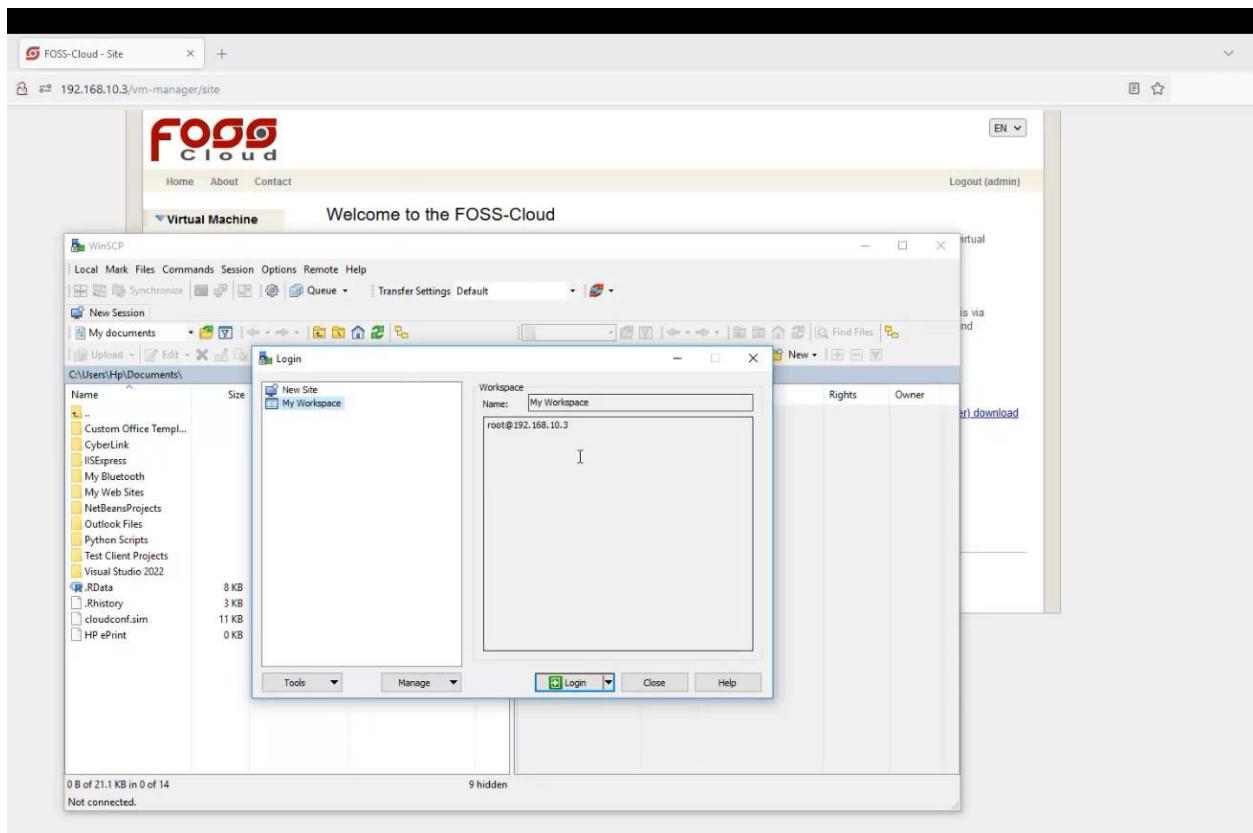


Local Windows computer with WinSCP installed (Download WinSCP)

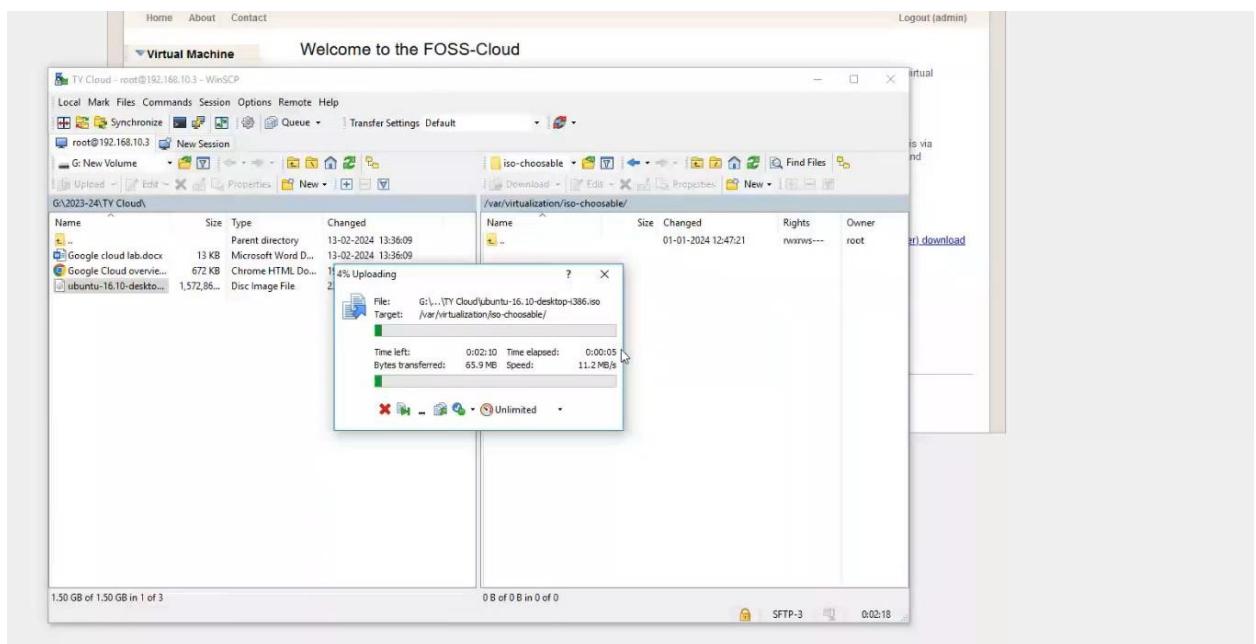
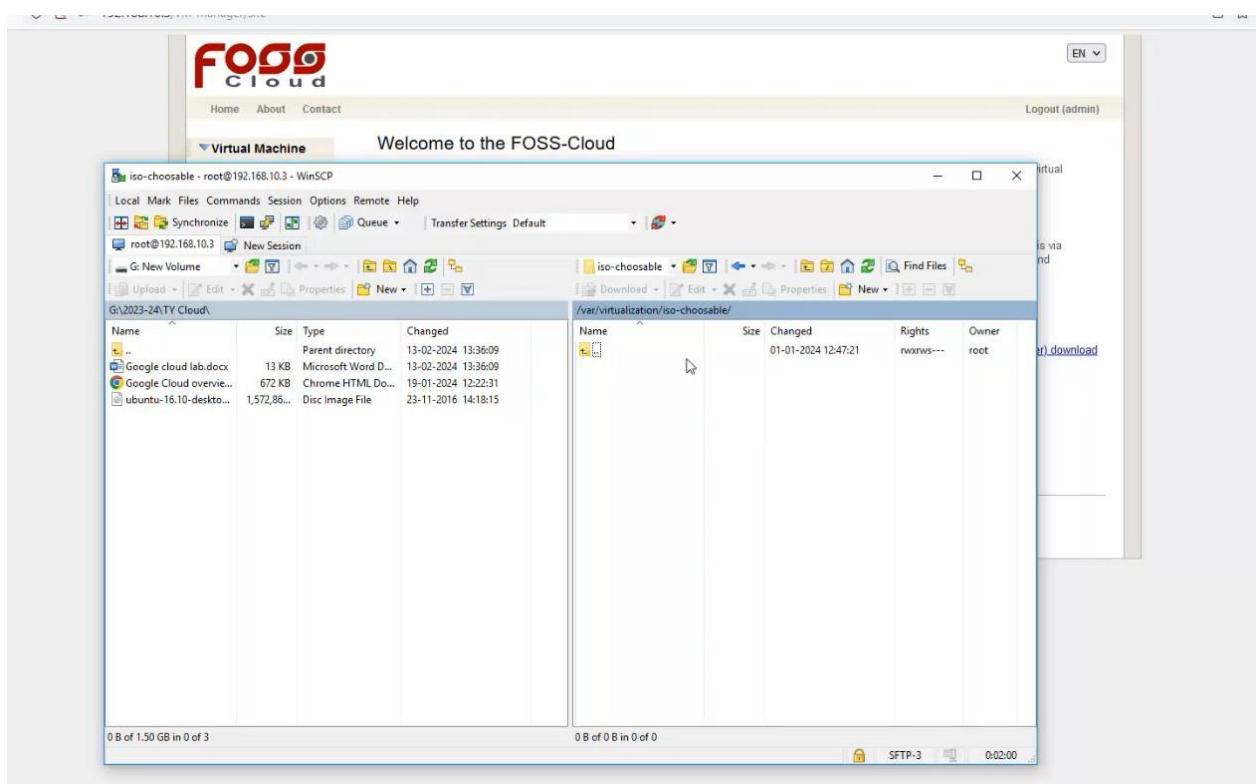
- You've downloaded a ISO-File to your computer. This example is done with: ubuntu-11.04-desktop-i386.iso
- The IP-address of the FOSS-Cloud Node. This example is done with:
192.168.1.216 Run WinSCP and establish a connection to the FOSS-Cloud Node:
username: root password: admin

Connect to FOSS CLOUD Node





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



Back to FOSS CLOUD

Create a Profile

What's new with Firefox - Mozilla Firefox FOSS-Cloud - Create VmProfile +

192.168.10.3/vm-manager/vmProfile/create.html

FOSS Cloud

Home About Contact Logout (admin) EN

Create VM Profile

Fields with * are required.

Step I
Please select a profile first!

BaseProfile

- linux
 - default
 - i686
 - multi
 - de-DE
 - de-AT
 - de-CH
 - en-US
 - en-GB
 - fr-CH
 - fr-FR
 - it-CH
 - it-IT
 - x86_32
 - x86_64
 - Ubuntu1
 - UbuntuVM
 - ubuntu123
 - Ubuntu
 - UbuntuM
 - Ubuntu2
 - ubuntu7537
 - Ubuntu2334
 - Ubuntu555
 - UbuntuByRam
 - Ubuntu_AkShree
 - Ubuntu
 - MyUbuntu
 - Ubuntu1
 - Ubuntu7616
 - Ubuntu89
 - soniya
 - UbuntuBySangi
 - windows

Step II
Overwrite the default values if necessary!

ISOfile *
ubuntu-16.10-desktop-i386.iso

Name * Linux1

Description * Linux OS

Memory *
128 MB 2.25 GB

Volume Capacity *
16 GB 31 GB

CPU * 1 Clock Offset * UTC

Create

FOSS-Cloud - VmProfile +

192.168.10.3/vm-manager/vmProfile/index.html?copyaction=10350

FOSS Cloud

Home About Contact Logout (admin) EN

Virtual Machine

No.	Name	Architecture	Language	Description	Action
11	UbuntuByRam	linux / i686	multi	This is the UbuntuByRam VM-Profile	
12	Ubuntu_AkShree	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	Ubuntu7616	linux / i686	multi	Ubuntu OS	
17	Ubuntu89	linux / i686	multi	Ubuntu OS	
18	soniya	linux / i686	multi	VM with Ubuntu OS	
19	UbuntuBySangi	linux / i686	multi	VM with Ubuntu OS	
20	Linux1	linux / i686	multi	linux OS	

Page 2 of 2 10

Version 1.3.1
on server foss-cloud
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Create VM Template

What's new with Firefox - Mon 10:30 AM

FOSS-Cloud - Create VmTemplate

192.168.10.3/vm-manager/vmTemplate/create.html

Create VmTemplate

Fields with * are required.

Step I
Please select a profile first.

Profile

- Vmpool *
 - linux
 - Ubuntu1
 - Ubuntu1/M
 - Ubuntu123
 - Ubuntu 1
 - Ubuntu10
 - Ubuntu7537
 - Ubuntu2324
 - UbuntuBySam
 - Ubuntu_AkShree
 - Ubuntu
 - Ubuntu100
 - Ubuntu19
 - Ubuntu7616
 - Ubuntu89
 - centos
 - UbuntuBySangi
 - Linux1
 - i686
 - multi
 - windows

Node *

foss-cloud.foss-cloud.org

Name *

Linux1

Description *

Linux OS

Memory *

128 MB 128 GB

Volume Capacity *

16 GB 256 GB 31 GB

CPU *

1

Clock Offset *

utc

Number of displays

1

Create

Version 1.3.1

teams.microsoft.com is sharing your screen. Stop sharing Hide

Manage VM Templates And Start the VM

192.168.10.3/vm-manager/vmTemplate/index.html

FOSS Cloud

Home About Contact Logout (admin) EN

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

Manage VMTemplates

Vm Pool **vm-template-virtual-machine-pool-01**

No.	DisplayName	Status	Run Action	Memory	Node	Action
11	Ubuntu89	stopped	→ ↳ ✎	---	foss-cloud.foss-cloud.org	
12	soniva	stopped	→ ↳ ✎	---	foss-cloud.foss-cloud.org	
13	UbuntuBySangi	stopped	→ ↳ ✎	---	foss-cloud.foss-cloud.org	
14	Linux1	stopped	→ ↳ ✎	---	foss-cloud.foss-cloud.org	

start VM

Page 2 of 2 Refresh 10

Version 1.3.1
on server foss-cloud
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192.168.10.3/vm-manager/vmTemplate/index.html

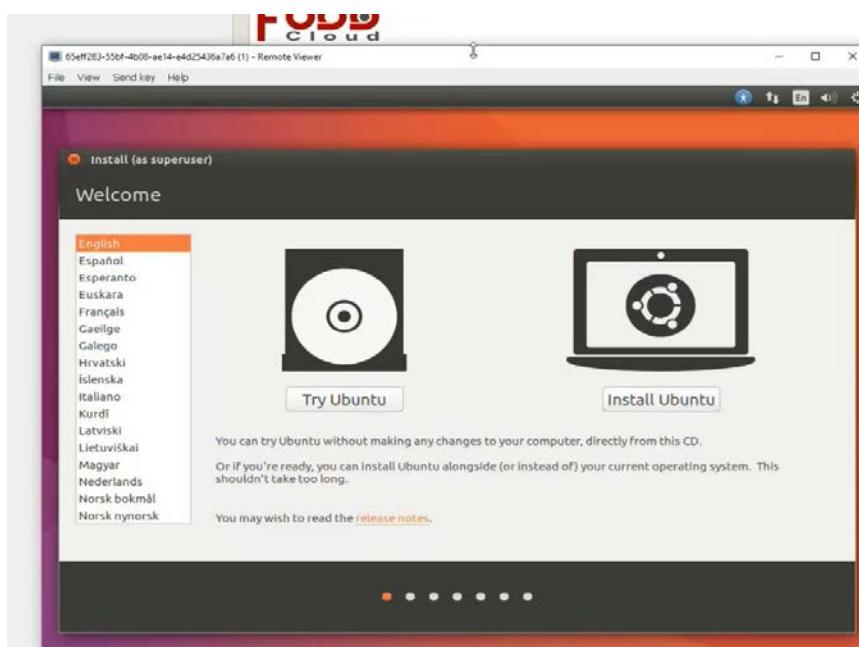
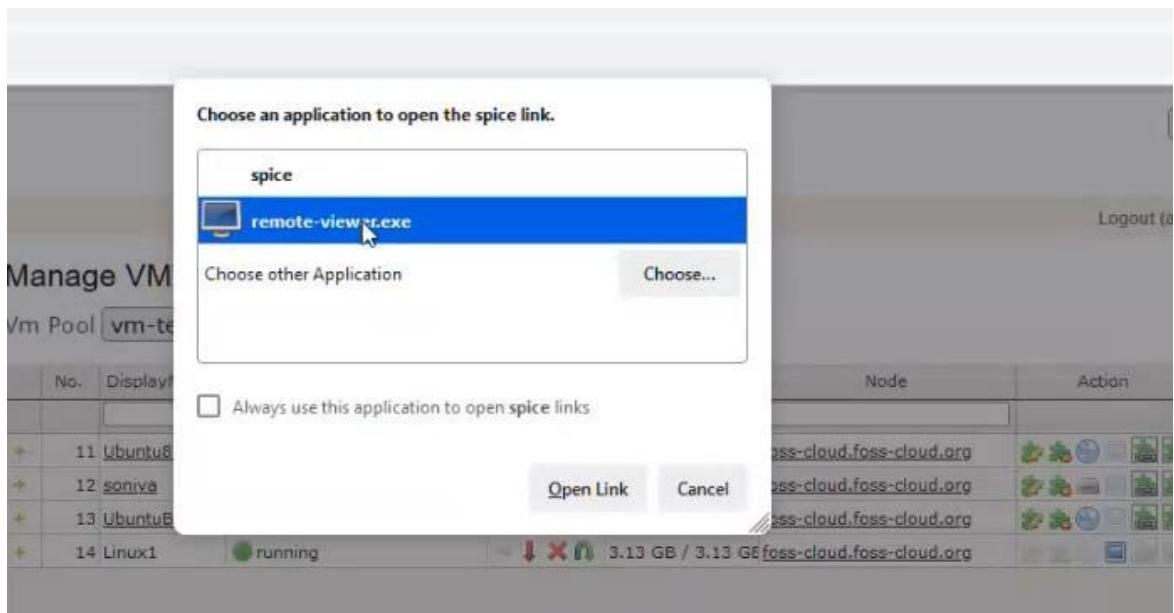
The screenshot shows the FOSS Cloud VM Manager interface. The left sidebar has sections for Virtual Machine (Persistent VMs, Dynamic VMs, VM Templates, Create), VM Pool (Create, Profiles, Create, Upload ISO File), Storage Pool, Node, Network, User, Configuration, Diagnostics, Assigned VMs, and Links (Download Spice Client). The main area is titled "Manage VM Templates" with a sub-section "Vm Pool vm-template-virtual-machine-pool-01". It displays a table of VMs:

No.	DisplayName	Status	Run Action	Memory	Node	Action
11	Ubuntu89	stopped	→ ↴ ⚡ 🌐	---	foss-cloud.foss-cloud.org	
12	soniva	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	

At the bottom right of the table, there is a button labeled "use VM Template". Below the table are navigation controls: Page 2 of 2, Refresh, and a dropdown for items per page (10). The footer contains version information: Version 1.3.1 on server foss-cloud, Copyright © 2024 by FOSS-Group, All Rights Reserved.

/index.html

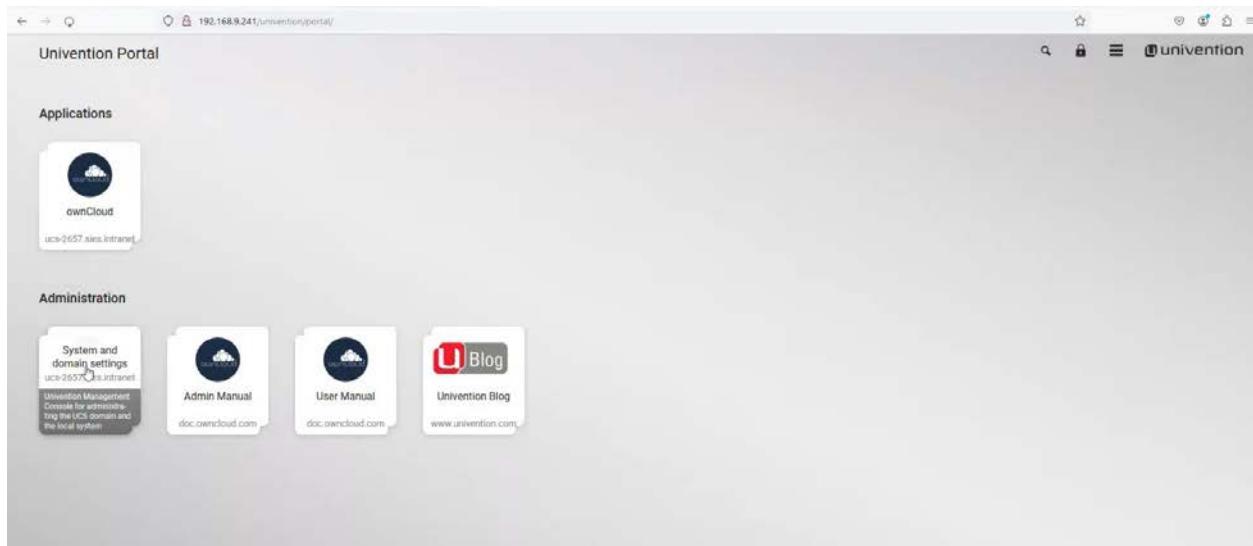
A modal dialog box is displayed, asking "Allow this site to open the spice link?". It says "You'll need to choose an application." and has an unchecked checkbox "Always allow http://192.168.10.3 to open spice links". There are "Choose Application" and "Cancel" buttons at the bottom. The background shows the same VM management interface as the top screenshot, with the "Manage VM" section visible.



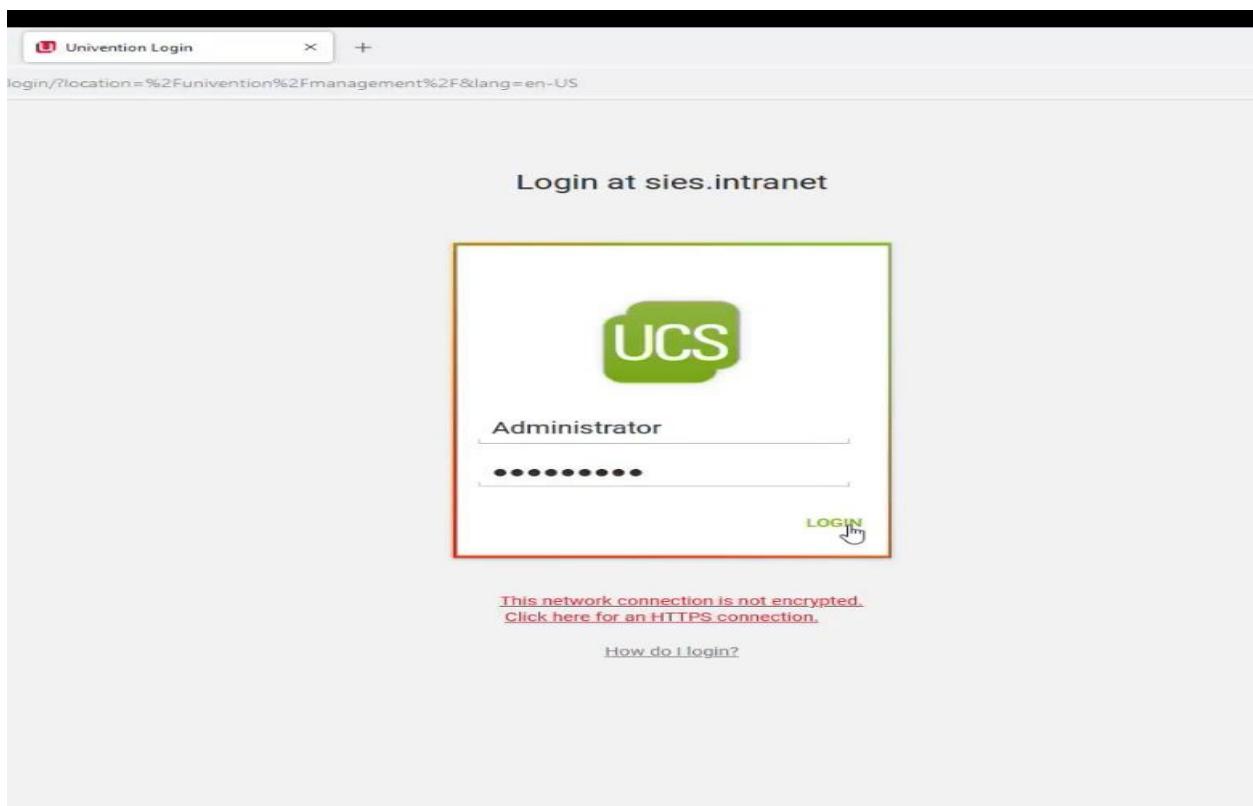
3. Study and implementation of Storage as a Service (Own Cloud)

Go to the OwnCloud IP address

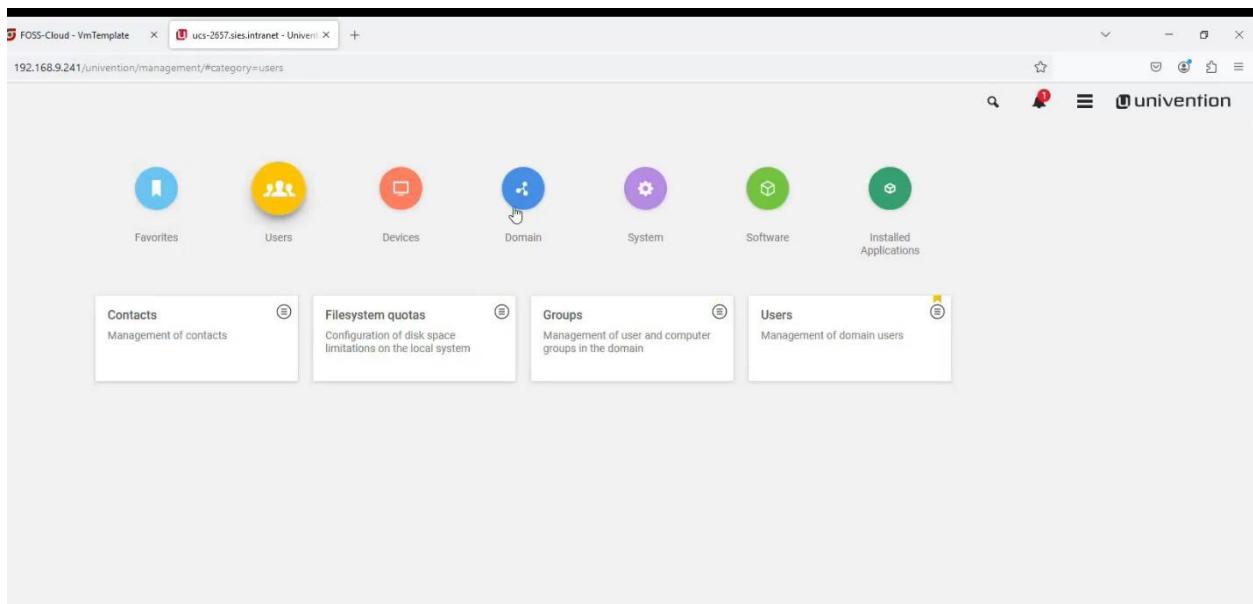
Click on System and Domain Settings



Login using Administrator & admin@123 as username & password

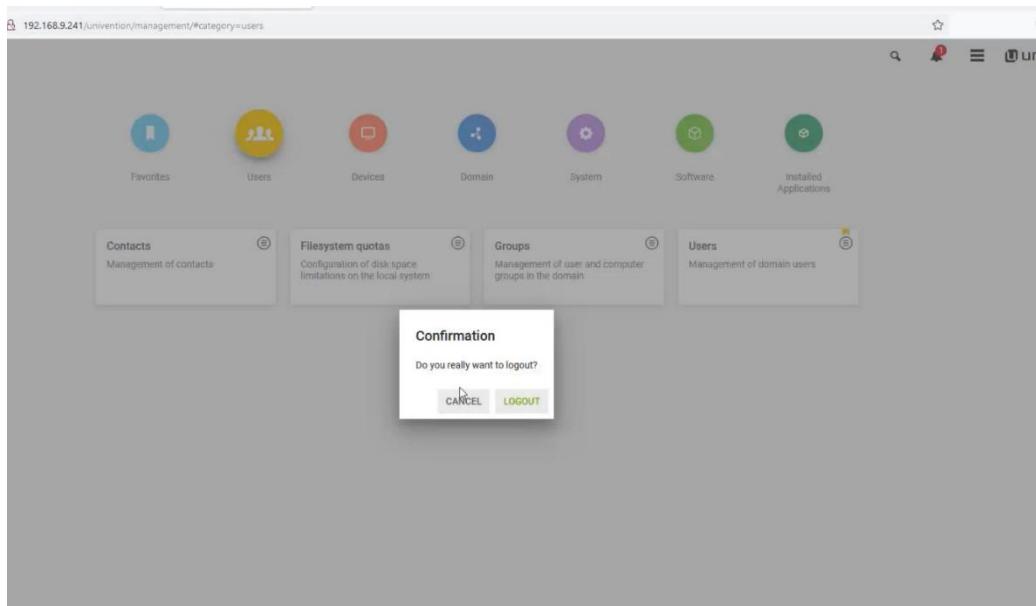


Click on Create New Users & Add new Users



The screenshot shows the "Users" module. The title bar includes tabs for "FOSS-Cloud - VmTemplate" and "ucs-2557.sies.intranet - Univen". The URL is "192.168.9.241/univention/management/#module=udmusers/user:0". The main area is titled "Users" with a search bar and a "CLOSE" button. It displays a list of users with checkboxes and their paths: abc (intranet.sies:/users), Administrator (intranet.sies:/users), ak_nadar (intranet.sies:/users), Bhola (intranet.sies:/users), Blessingraj (intranet.sies:/users), cloudcc (intranet.sies:/users), Donotdelete (intranet.sies:/users), and gudu1121 (intranet.sies:/users). A yellow arrow points to the "Administrator" entry in the list.

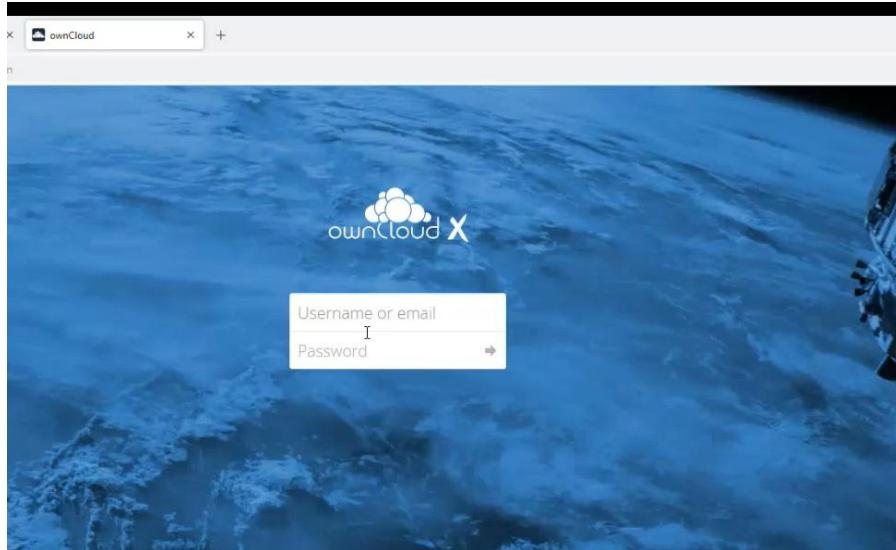
Then Logout



Click on OwnCloud application
And Login



using the Created User Credentials



4. Google cloud Linux VM creation

The screenshot shows the Google Cloud Platform Compute Engine interface. At the top, there's a navigation bar with a dropdown for 'TYCS-CC-ASSIGNMENT01', a search bar, and various icons. Below the navigation is a header with tabs: 'VM instances' (selected), 'CREATE INSTANCE' (button), 'IMPORT VM', and 'REFRESH'. Underneath are three sub-tabs: 'INSTANCES' (selected), 'OBSERVABILITY', and 'INSTANCE SCHEDULES'. A sidebar on the left has sections for 'Compute Engine', 'Compute', 'Cloud Functions', 'Cloud Run', and 'Cloud Tasks'. The main content area is titled 'VM instances' and features a large circular icon with a globe and network connections. Below the icon, there's a brief description of Compute Engine. A table lists the existing VM instance:

Name	Status	IP Address	Action
linux-web-server	Running	10.128.0.3	CONNECT

On the right side, there's a 'Monthly estimate' section showing 'US\$26.16' and a breakdown of costs for 2 vCPU + 4 GB memory and 10 GB SSD persistent disk. Below that is a 'Machine configuration' section with a heading 'NEW: General-purpose machine series in Preview'. It shows a preview of the N4 series and allows switching between 'General purpose', 'Compute-optimised', 'Memory-optimised', 'Storage optimised', 'GPU', and 'GPUs'. A table lists machine types with columns: Series, Description, vCPUs, Memory, and Platform. The E2 series is selected. At the bottom are 'CREATE', 'CANCEL', and 'EQUIVALENT CODE' buttons.

Boot disk

X

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

Debian

Version *

Debian GNU/Linux 12 (bookworm)

x86_64, amd64 built on 20240213

Boot disk type *

SSD persistent disk

[COMPARE DISK TYPES](#)

Size (GB) *

10

Provision between 10 and 65536 GB

[▼ SHOW ADVANCED CONFIGURATION](#)

[SELECT](#)

CANCEL

Confidential VM service [?](#)

 Confidential Computing is disabled on this VM instance

[ENABLE](#)

Container [?](#)

Deploy a container image to this VM instance

[DEPLOY CONTAINER](#)

Boot disk [?](#)

Name	linux-web-server
Type	New SSD persistent disk
Size	10 GB
Licence 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 check

Observability – Ops Agent

Monitor your system through collection of logs and key metrics.

- Install Ops Agent for monitoring and logging

Advanced options

Networking, disks, security, management, sole-tenancy

CREATE

CANCEL

EQUIVALENT CODE

VM instances		CREATE INSTANCE	IMPORT VM	REFRESH	LEARN						
INSTANCES		OBSERVABILITY		INSTANCE SCHEDULES							
VM instances											
 Filter Enter property name or value											
<input type="checkbox"/>	Status	Name	Zone	Recommendations	In use by	Internal IP					
<input checked="" type="checkbox"/>		iis-web-server	us-central1-a		10.128.0.2 (nic0)	34.69.149.244 (nic0)					
<input checked="" type="checkbox"/>		linux-web-server	us-central1-a		10.128.0.3 (nic0)	35.184.221.76 (nic0)					
<input checked="" type="checkbox"/>		web-server	us-central1-a		10.128.0.5 (nic0)	35.184.137.247 (nic0)					

Related actions

 Explore Backup and DR  Back up your VMs and set up disaster recovery	 View billing report View and manage your Compute Engine billing
 Set up firewall rules Control traffic to and from a VM instance	 Patch management Schedule patch updates and view patch compliance on VM instances

5. Google cloud Windows VM creation

Google Cloud

New Project

You have 12 projects remaining in your quota. Request an increase or delete projects. [Learn more](#)

[MANAGE QUOTAS](#)

Project name * ?

Project ID: tycs-cc-assignment01. It cannot be changed later. [EDIT](#)

Location * [BROWSE](#)

Parent organisation or folder

[CREATE](#) [CANCEL](#)

Google Cloud TYCS-CC-ASSIGNMENT01

Product details

 Compute Engine API
[Google Enterprise API](#)

Compute Engine API

[ENABLE](#) [TRY THIS API](#)

VM instances [CREATE INSTANCE](#) [IMPORT VM](#) [REFRESH](#)

INSTANCES OBSERVABILITY INSTANCE SCHEDULES

VM instances

Filter Enter property name or value

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

VM instances

Compute Engine lets you use virtual machines that run on Google's infrastructure. Create micro-VMs or larger instances running Debian, Windows or other standard images. Create your first VM instance, import it using a migration service or try the quickstart to build a sample app.

TYCS-CC-ASSIGNMENT01

Search (/) for resources, docs, products and more

Name *

MANAGE TAGS AND LABELS

Region * Zone *

Region is permanent Zone is permanent

Machine configuration

NEW: General-purpose machine series in Preview

Try the new N4 series, ideal for workloads that prioritize flexibility and cost-optimization

SIGN UP

General purpose Compute-optimized Memory-optimized Storage-optimized NEW GPUs

Machine types for common workloads, optimized for cost and flexibility

Series <input type="button" value=""/>	Description	vCPUs <input type="button" value=""/>	Memory <input type="button" value=""/>	Platform
<input type="radio"/> C3	Consistently high performance	4 - 176	8 - 1,408 GB	Intel Sapphire Rapids
<input type="radio"/> C3D	Consistently high performance	4 - 360	8 - 2,880 GB	AMD Genoa
<input checked="" type="radio"/> E2	Low-cost day-to-day computing	0.25 - 32	1 - 128 GB	Based on availability
<input type="radio"/> N2	Balanced price and performance	2 - 128	2 - 864 GB	Intel Cascade and Ice Lake
<input type="radio"/> N2D	Balanced price and performance	2 - 224	2 - 896 GB	AMD EPYC
<input type="radio"/> T2A	Scale-out workloads	1 - 48	4 - 192 GB	Ampere Altra ARM
<input type="radio"/> T2D	Scale-out workloads	1 - 60	4 - 240 GB	AMD EPYC Milan
<input type="radio"/> N1	Balanced price and performance	0.25 - 96	0.6 - 624 GB	Intel Skylake

Machine type

Confidential VM service

Confidential Computing is disabled on this VM instance

Container

Deploy a container image to this VM instance

Boot disk

Name	iis-web-server
Type	New SSD persistent disk
Size	50 GB
Licence type <input type="button" value=""/>	PAYG (Pay as you go)
Image	<input type="checkbox"/> Windows Server 2019 Datacenter

If you are using Windows and intend to run additional Microsoft software, please fill in the [Licence verification form](#)

[Learn more](#) about Microsoft licence mobility requirements

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**

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

Observability – Ops Agent ?

Monitor your system through collection of logs and key metrics.

- Install Ops Agent for monitoring and logging

Advanced options

Networking, disks, security, management, sole-tenancy

CREATE

CANCEL

EQUIVALENT CODE

TYCS-CC-ASSIGNMENT01

Search (/) for resources, docs, products and more

Search

≡ 2 ?

VM instances

CREATE INSTANCE

IMPORT VM

REFRESH

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			10.128.0.2 (nic0)	34.69.149.244 (nic0)	RDP

This instance is running.

Related actions

iis-web-server

EDIT RESET CREATE MACHINE IMAGE

DETAILS OBSERVABILITY OS INFO SCREENSHOT

RDP SET WINDOWS PASSWORD CONNECT TO SERIAL CONSOLE

Logs

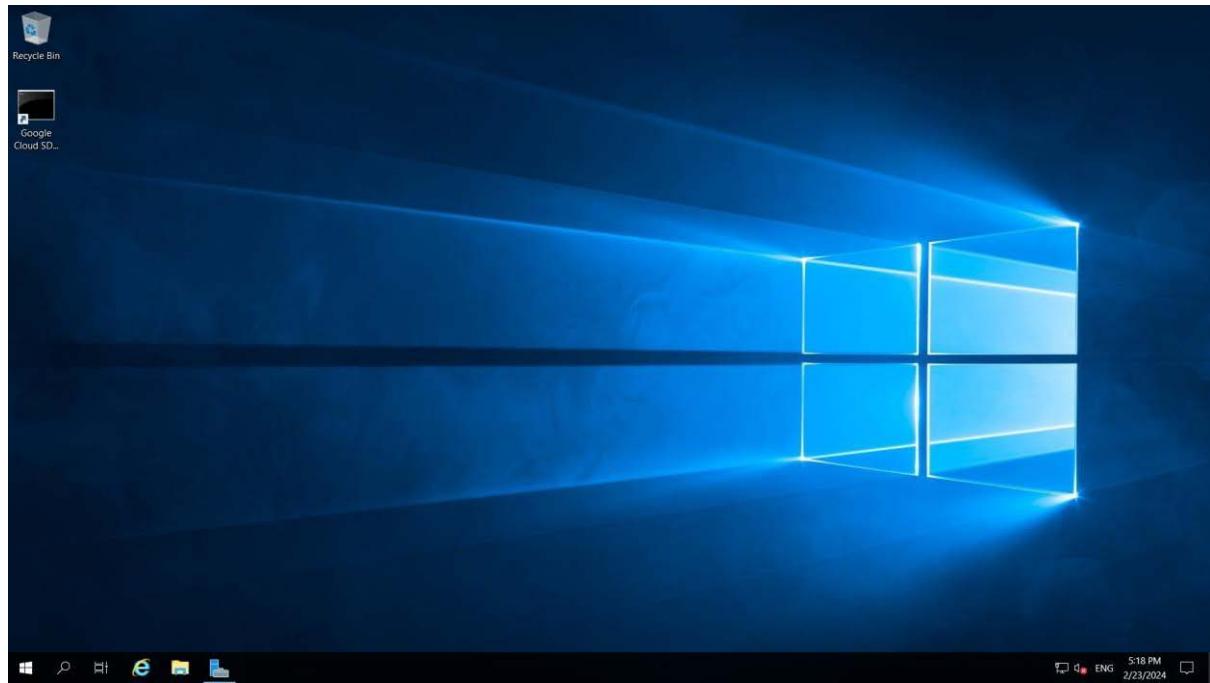
blob:null/8cb8b40d-204e-4c14-a799-8a8c616b0b97

Show in folder

iis-web-server.rdp

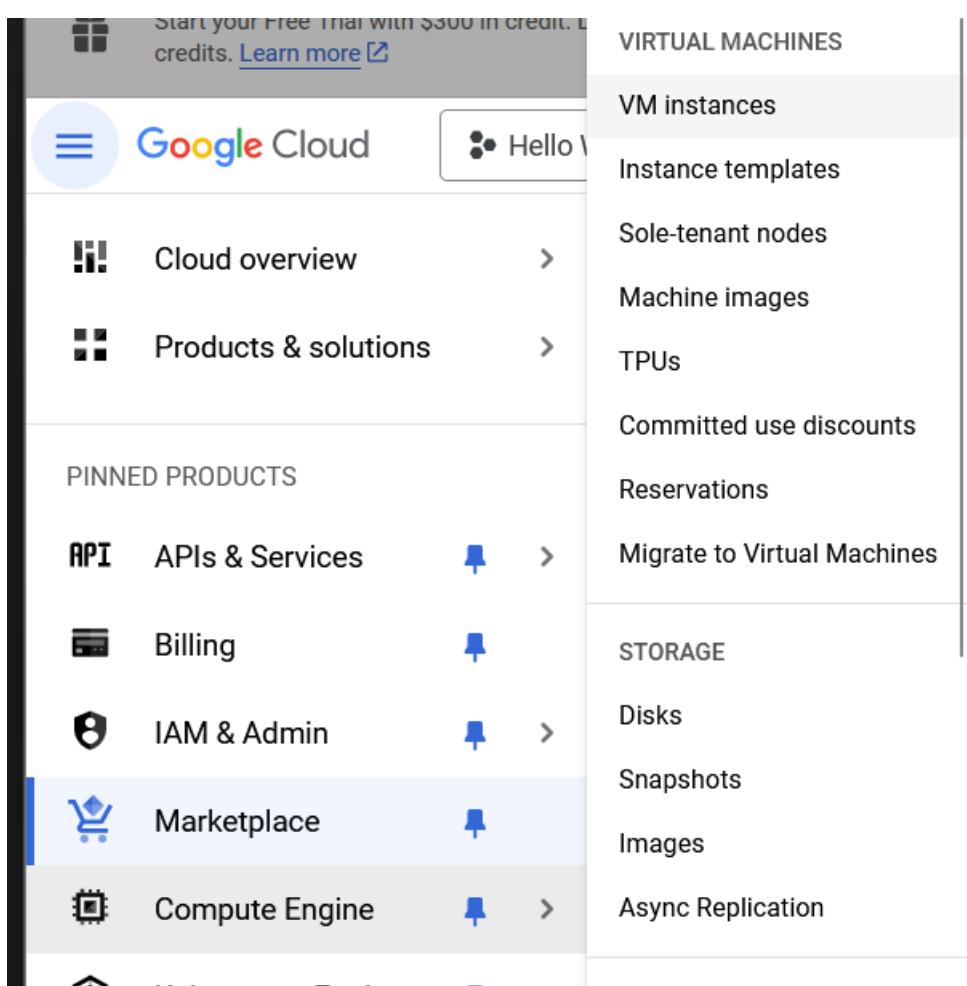
Show in folder

This screenshot shows a cloud-based server management interface. At the top, there's a header with the server name "iis-web-server" and buttons for "EDIT", "RESET", and "CREATE MACHINE IMAGE". Below the header are tabs for "DETAILS", "OBSERVABILITY", "OS INFO", and "SCREENSHOT". The "DETAILS" tab is selected. Under "RDP", there's a dropdown menu with "SET WINDOWS PASSWORD" and "CONNECT TO SERIAL CONSOLE". A sub-menu for "Logs" is open, showing "blob:null/8cb8b40d-204e-4c14-a799-8a8c616b0b97" and options to "View golcloud command to reset password", "Download the RDP file", and "Learn about Windows auth". There's also a "SHOW MORE" link. A modal window titled "iis-web-server.rdp" is displayed, containing the blob URL and a "Show in folder" link.



6. Perform the following in google cloud:

1. A “Hello world” website on IIS-Create an IIS web server VM using



 Compute Engine

VM instances 

INSTANCES OBSERVERABILITY INSTANCE SCHEDULING

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

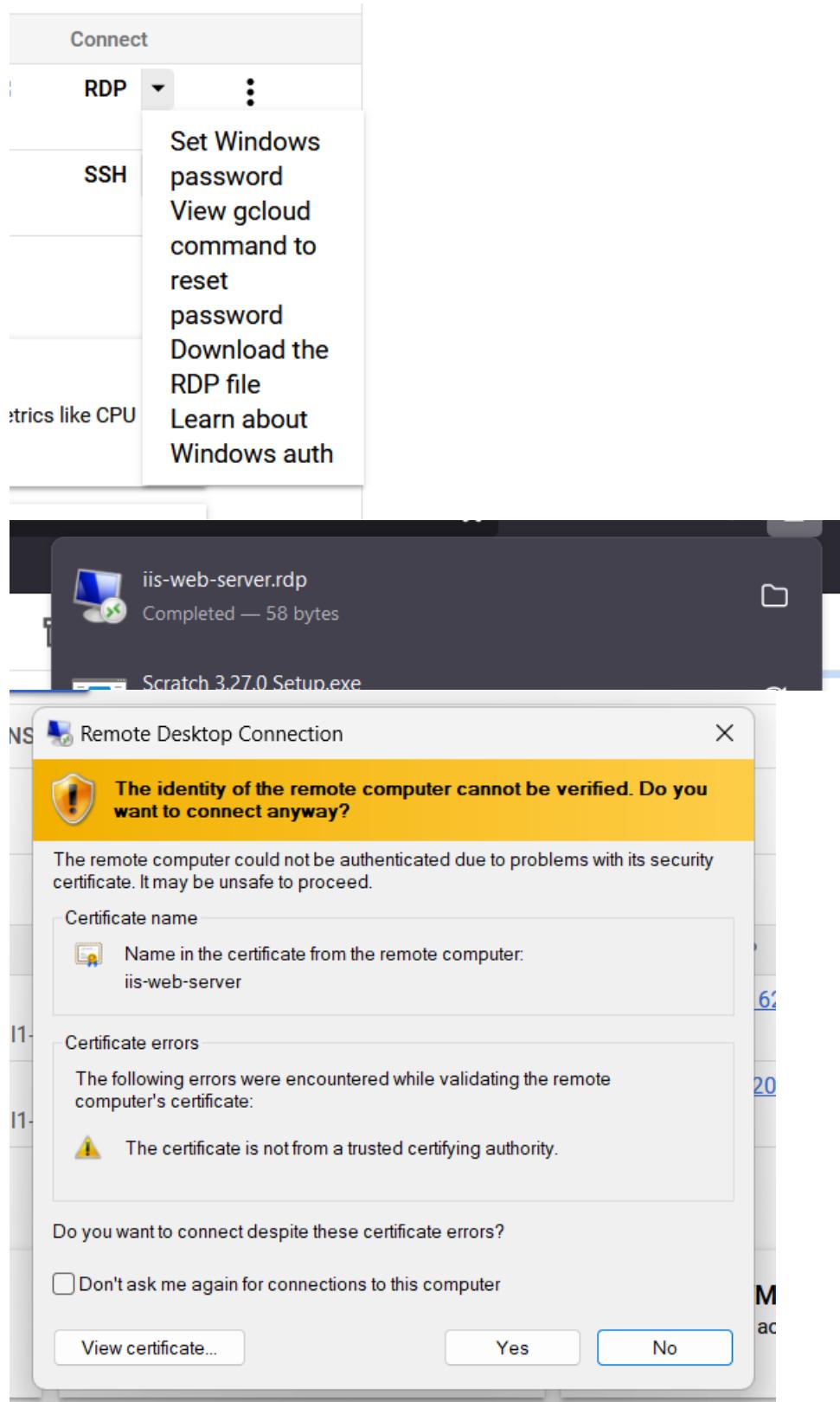
SELECT **CANCEL**

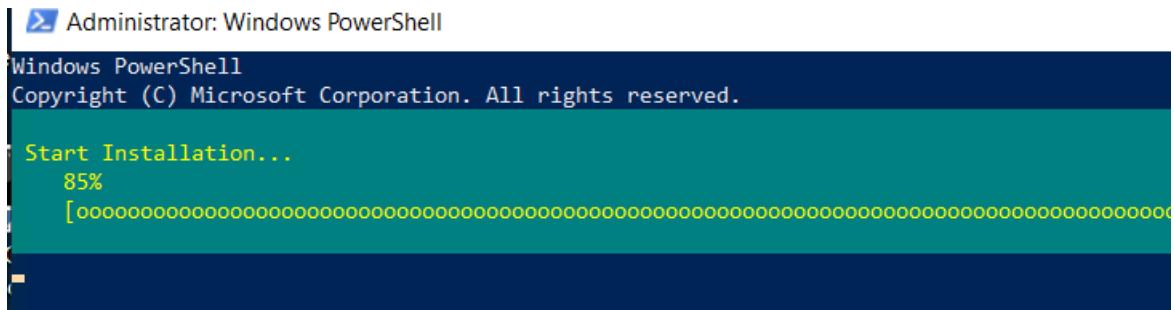
Firewall

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

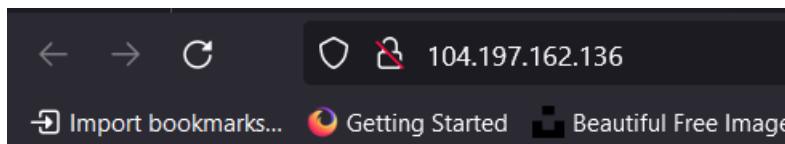
- Allow HTTP traffic
- Allow HTTPS traffic

	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)	104.197.162.136	RDP	





A screenshot of a Windows PowerShell window titled "Administrator: Windows PowerShell". The window shows the text "Start Installation..." followed by "85%" and a long progress bar consisting of many small yellow segments. The background of the window is dark blue.



Hello World!

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

Project setup

1. [Create a new project](#) to ensure that you have the permissions you need, or select an existing project in which you have the relevant permissions.

 Hello World Apache

2. Click **Enable APIs** to enable the required APIs for the tutorial.

The necessary APIs are enabled:

Compute Engine API

To learn how to create your VM, click **Next**.



Compute Engine API

[Google Enterprise API](#)

Compute Engine API



[TRY THIS API](#)

or other standard images. Create your first VM instance, import it using a migration service, or try the quickstart to build a sample app.

[CREATE INSTANCE](#)

[TAKE THE QUICKSTART](#)

[PUBLIC IMAGES](#)

[CUSTOM IMAGES](#)

[SNAPSHOTS](#)

[ARCHIVE SNAPSHOT](#)

Operating system

Debian



Version *

Debian GNU/Linux 12 (bookworm)



x86/64, amd64 built on 20240213

Boot disk type *

SSD persistent disk



[COMPARE DISK TYPES](#)

Size (GB) *

10

Provision between 10 and 65536 GB

[SHOW ADVANCED CONFIGURATION](#)

[SELECT](#)

[CANCEL](#)

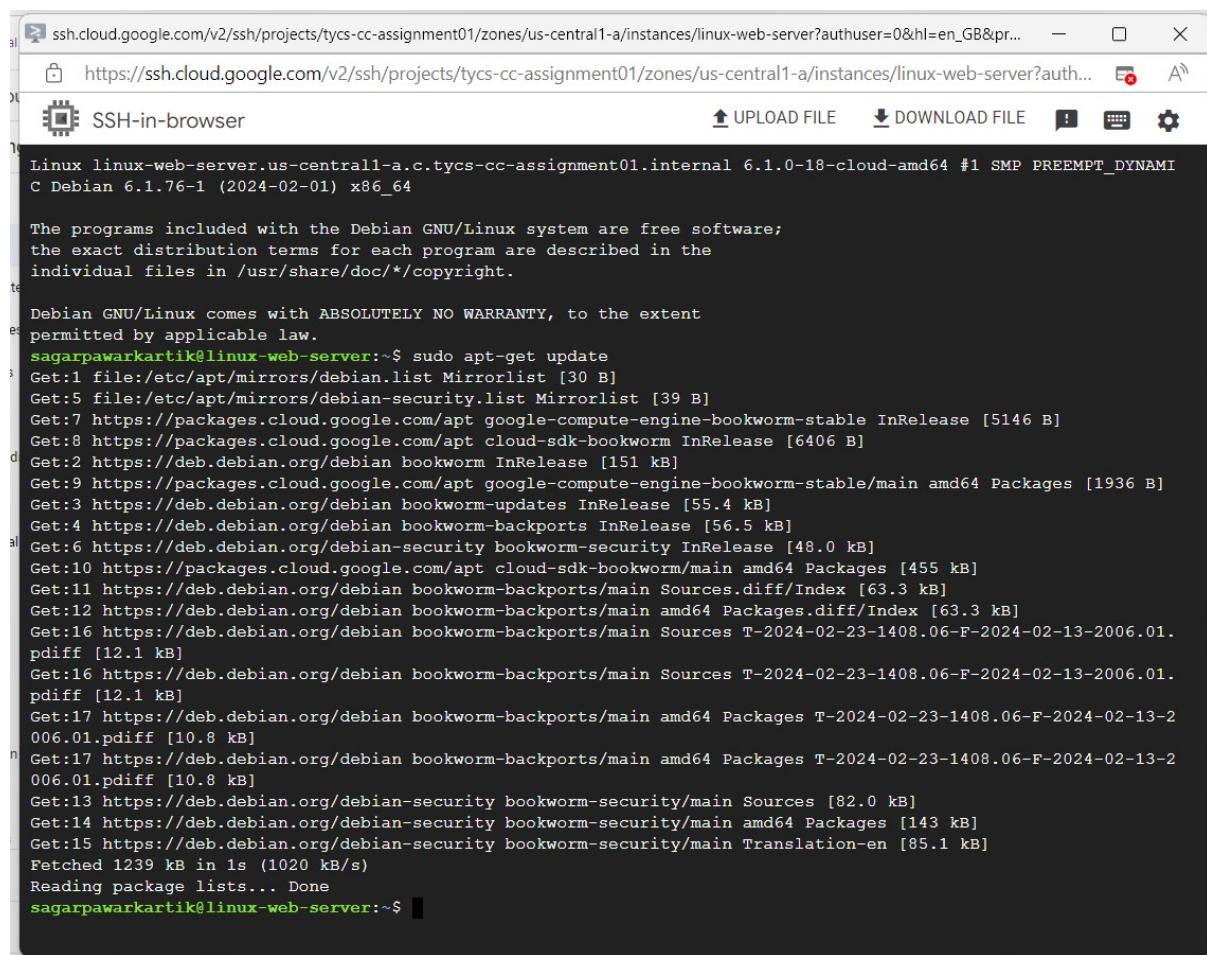
Firewall

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

Allow HTTP traffic

Allow HTTPS traffic

<input type="checkbox"/>	Status	Name 	Zone	Connect	
<input type="checkbox"/>		linux-web-server	us-central1-a	SSH 	

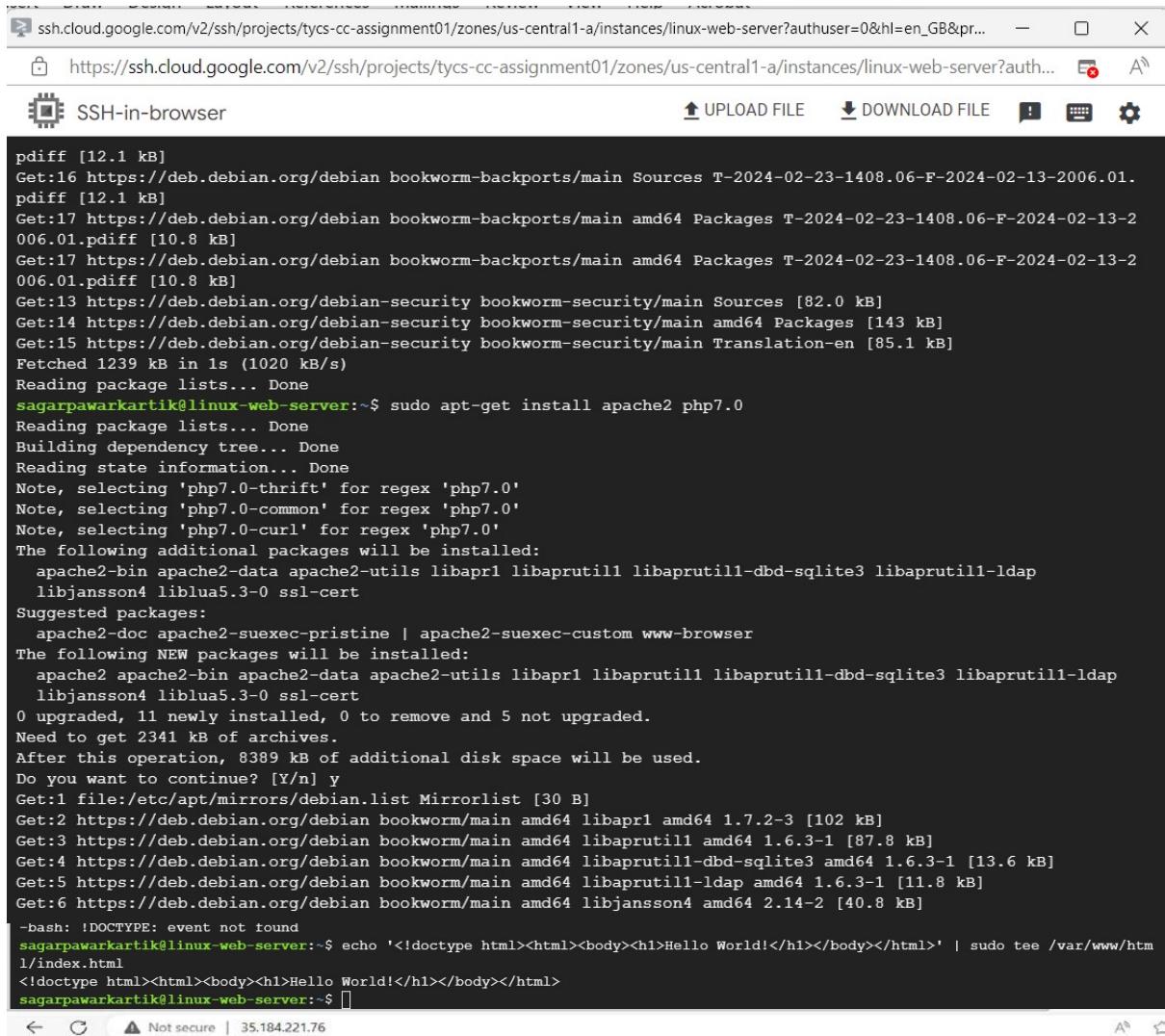


The screenshot shows a browser window with the URL https://ssh.cloud.google.com/v2/ssh/projects/tycs-cc-assignment01/zones/us-central1-a/instances/linux-web-server?authuser=0&hl=en_GB&pr.... The title bar of the browser says "SSH-in-browser". The main content area displays a terminal session:

```
Linux linux-web-server.us-central1-a.c.tycs-cc-assignment01.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.
sagarpawarkartik@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://packages.cloud.google.com/apt cloud-sdk-bookworm/main amd64 Packages [455 kB]
Get:11 https://deb.debian.org/debian bookworm-backports/main Sources.diff/Index [63.3 kB]
Get:12 https://deb.debian.org/debian bookworm-backports/main amd64 Packages.diff/Index [63.3 kB]
Get:16 https://deb.debian.org/debian bookworm-backports/main Sources T-2024-02-23-1408.06-F-2024-02-13-2006.01.pdiff [12.1 kB]
Get:16 https://deb.debian.org/debian bookworm-backports/main Sources T-2024-02-23-1408.06-F-2024-02-13-2006.01.pdiff [12.1 kB]
Get:17 https://deb.debian.org/debian bookworm-backports/main amd64 Packages T-2024-02-23-1408.06-F-2024-02-13-2006.01.pdiff [10.8 kB]
Get:13 https://deb.debian.org/debian-security bookworm-security/main Sources [82.0 kB]
Get:14 https://deb.debian.org/debian-security bookworm-security/main amd64 Packages [143 kB]
Get:15 https://deb.debian.org/debian-security bookworm-security/main Translation-en [85.1 kB]
Fetched 1239 kB in 1s (1020 kB/s)
Reading package lists... Done
sagarpawarkartik@linux-web-server:~$
```



```
pdiff [12.1 kB]
Get:16 https://deb.debian.org/debian bookworm-backports/main Sources T-2024-02-23-1408.06-F-2024-02-13-2006.01.
pdiff [12.1 kB]
Get:17 https://deb.debian.org/debian bookworm-backports/main amd64 Packages T-2024-02-23-1408.06-F-2024-02-13-2
006.01.pdiff [10.8 kB]
Get:17 https://deb.debian.org/debian bookworm-backports/main amd64 Packages T-2024-02-23-1408.06-F-2024-02-13-2
006.01.pdiff [10.8 kB]
Get:13 https://deb.debian.org/debian-security bookworm-security/main Sources [82.0 kB]
Get:14 https://deb.debian.org/debian-security bookworm-security/main amd64 Packages [143 kB]
Get:15 https://deb.debian.org/debian-security bookworm-security/main Translation-en [85.1 kB]
Fetched 1239 kB in 1s (1020 kB/s)
Reading package lists... Done
sagarpawarkartik@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
0 upgraded, 11 newly installed, 0 to remove and 5 not upgraded.
Need to get 2341 kB of archives.
After this operation, 8389 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 file:/etc/apt/mirrors/debian.list Mirrorlist [30 B]
Get:2 https://deb.debian.org/debian bookworm/main amd64 libapr1 amd64 1.7.2-3 [102 kB]
Get:3 https://deb.debian.org/debian bookworm/main amd64 libaprutil1 amd64 1.6.3-1 [87.8 kB]
Get:4 https://deb.debian.org/debian bookworm/main amd64 libaprutil1-dbd-sqlite3 amd64 1.6.3-1 [13.6 kB]
Get:5 https://deb.debian.org/debian bookworm/main amd64 libaprutil1-ldap amd64 1.6.3-1 [11.8 kB]
Get:6 https://deb.debian.org/debian bookworm/main amd64 libjansson4 amd64 2.14-2 [40.8 kB]
-bash: !DOCTYPE: event not found
sagarpawarkartik@linux-web-server:~$ echo '<!doctype html><html><body><h1>Hello World!</h1></body></html>' | sudo tee /var/www/htm
l/index.html
<!doctype html><html><body><h1>Hello World!</h1></body></html>
sagarpawarkartik@linux-web-server:~$
```

Hello World!

3. Transfer files to Windows VMs

Google Cloud | TYCS-CC-ASSIGNMENT01 | Bucket | Search | Transfer | New

Buckets CREATE REFRESH

Beginning on 29 April 2024, at-scale policy analysis and advanced IAM recommendation capabilities will require Security Command Centre Premium. Learn more.

Transfer **New**

Power near real-time analytics and replication with event-driven transfers

You can now capture changes faster at your Google Cloud Storage and Amazon S3 sources via event-driven transfers, enabling you to act on your data in near real-time. To get started, create a transfer job with a Pub/Sub or AWS SQS-based event stream configured to send event notifications when objects are created or updated.

CREATE TRANSFER JOB LEARN MORE

Security

View security recommendations

Improve security by applying security recommendations to your buckets. The security insights column in the table describes which buckets have excess permissions.

VIEW IN TABLE LEARN MORE

Filter Buckets

Name	Created	Location type	Location	Default storage class	Last modified	Public access	Access control	Protection	Bucket retention	Lifecycle rules
No rows to display										

Marketplace Release notes

Store and retrieve your data: Get started by creating a bucket – a container where you can organise and control access to your data and files in Cloud Storage.

Create a Bucket

Name your bucket

Pick a globally unique, permanent name. [Naming guidelines](#)

windows-files-tycs-cc-assignment01

Tip: Don't include any sensitive information

LABELS (OPTIONAL)

CONTINUE

Choose where to store your data

Location: us (multiple regions in United States)
Location type: Multi-region

Choose a storage class for your data

Default storage class: Standard

Choose how to control access to objects

Public access prevention: On
Access control: Uniform

Choose how to protect object data

Object versioning: Disabled
Bucket retention policy: Disabled
Object retention: Disabled
Encryption type: Google-managed

CREATE **CANCEL**

Good to know

Location pricing

Storage rates vary depending on the storage class of your data and location of your bucket. [Pricing details](#)

Current configuration: Multi-region / Standard

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

ESTIMATE YOUR MONTHLY COST

Buckets CREATE REFRESH LEARN

Beginning on 29 April 2024, at-scale policy analysis and advanced IAM recommendation capabilities will require Security Command Centre Premium. [Learn more](#) DISMISS

Transfer **New**

Power near real-time analytics and replication with event-driven transfers

You can now capture changes faster at your Google Cloud Storage and Amazon S3 sources via event-driven transfers, enabling you to act on your data in near real-time. To get started, create a transfer job with a Pub/Sub or AWS SQS-based event stream configured to send event notifications when objects are created or updated.

CREATE TRANSFER JOB LEARN MORE

Security

View security recommendations

Improve security by applying security recommendations to your buckets. The security insights column in the table describes which buckets have excess permissions.

VIEW IN TABLE LEARN MORE

Filter Buckets

Name	Public access	Access control	Protection	Bucket retention	Lifecycle rules	Tags	Encryption	Security insights
windows-files-tycs-cc-assignment01	None	Uniform	None	None	None	—	Google-managed	—

[Bucket details](#) [REFRESH](#) [LEARN](#)

windows-files-tycs-cc-assignment01

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

[OBJECTS](#) [CONFIGURATION](#) [PERMISSION](#) [PROTECTION](#) [LIFECYCLE](#) [OBSERVABILITY](#) [INVENTORY REPORTS](#)

Buckets > windows-files-tycs-cc-assignment01 [Filter](#)

[UPLOAD FILES](#) [UPLOAD FOLDER](#) [CREATE FOLDER](#) [TRANSFER DATA](#) [MANAGE HOLDS](#) [EDIT RETENTION](#) [DOWNLOAD](#) [DELETE](#)

Filter by name prefix only [Filter](#) Filter objects and folders

Name	Size	Type	Created	Storage class	Last modified	Public access	Version history	Encryption	Object ret.
Malware Analysis presentation.txt	6.8 KB	text/plain	24 Feb 2024, 10:29:08	Standard	24 Feb 2024, 10:29:08	Not public	-	Google-managed	-

[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"/>	l1s-web-server	us-central1-a			10.128.0.2 (nic0)	34.69.149.244 (nic0)	RDP
<input checked="" type="checkbox"/>	linux-web-server	us-central1-a			10.128.0.3 (nic0)	35.184.221.76 (nic0)	SSH
<input checked="" type="checkbox"/>	web-server	us-central1-a			10.128.0.5 (nic0)	35.184.137.247 (nic0)	RDP

[Related actions](#) [HIDE](#)

[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

[Explore VM logs](#)
View, search, analyse and download VM instance logs

[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

[Windows Security](#)

Enter your credentials

These credentials will be used to connect to 35.184.137.247.

sagarpawarkartik

Remember me

[More choices](#)

[OK](#) [Cancel](#)

[Filter](#) Filter buckets

Name	Created	Location type	Location	Default storage class	Last modified
windows-files-hello-world-apache-414516	Feb 16, 2024, 11:43:06 PM	Multi-region	us	Standard	Feb 16, 2024, 11:43:06 PM

Upload started [X](#) **Uploads and Hello World Apache operations** [▼](#)

12-Rules-for-Life.pdf

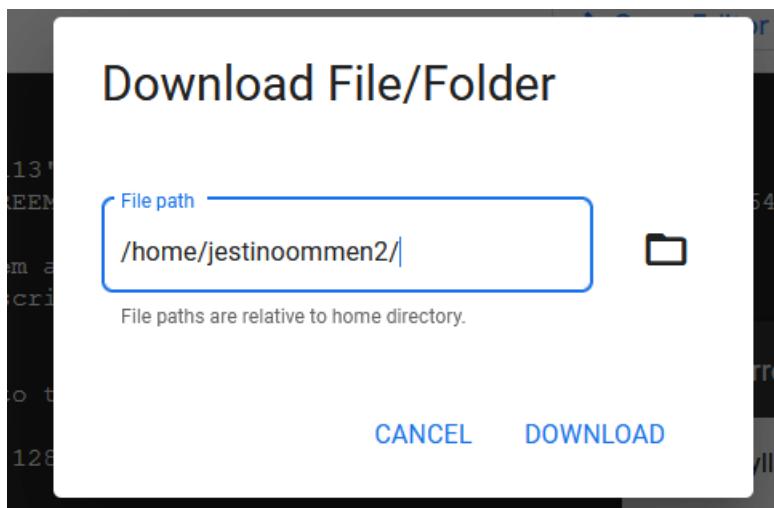
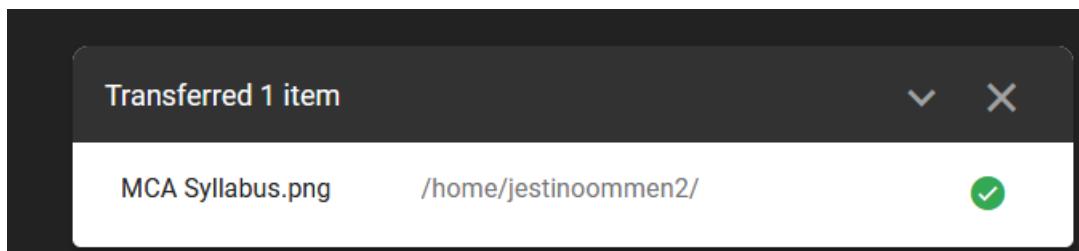
Filter by name prefix only							Filter objects and folders	Show selected data	More
	Name	Size	Type	Created	Storage class	Last modified			
<input type="checkbox"/>	12-Rules-for-Life.pdf	5 MB	application/pdf	Feb 16, 2024, 11:43:49 PM	Standard	Feb 16, 2024, 11:43:49 PM			

4.Transfer files to Linux VMs

```
jestinoommen2@cloudshell:~ (hello-world-apache-414516)$ 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/jestinoommen2/.ssh] before being able to generate SSH keys.

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

```
Your identification has been saved in /home/jestinoommen2/.ssh/google_compute_engine
Your public key has been saved in /home/jestinoommen2/.ssh/google_compute_engine.pub
The key fingerprint is:
SHA256:0ds2j3SztX1/FNDWdMXODVsdaYRi2SkKUePrJ352Rmo jestinoommen2@cs-1000705799515-default
The key's randomart image is:
+---[RSA 3072]---+
|       .oo..o.*=X|
|       ..o.=o+.B|
|       o.+o.oX=|
|       o. o =.B|
|       S. . + .o|
```



5. Back up a VM's persistent disk

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"/>	l5s-web-server	us-central1-a			10.128.0.2 (nic0)	34.69.149.244 (nic0)	RDP ▾
<input checked="" type="checkbox"/>	linux-web-server	us-central1-a			10.128.0.3 (nic0)	35.184.221.76 (nic0)	SSH ▾
<input checked="" type="checkbox"/>	web-server	us-central1-a			10.128.0.5 (nic0)	35.184.137.247 (nic0)	RDP ▾

Related actions HIDE

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

Explore VM logs
View, search, analyse and download VM instance logs

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

◀ linux-web-serv... EDIT RESET CREATE MACHINE IMAGE CREATE SIMILAR ▶ START/RESUME ■ STOP ■ SUSPEND DELETE OPERATIONS ▾

DETAILS **OBSERVABILITY** **OS INFO** **SCREENSHOT**

Network interfaces

Name	Network	Subnetwork	Primary internal IP address	Alias IP ranges	IP stack type	External IP address	Network
nic0	default	default	10.128.0.3		IPv4	35.184.221.76 (Ephemeral)	Private

Storage

Boot disk

Name	Image	Interface type	Size (GB)	Device name	Type	Architecture	Encryption	Mode	Wk
linux-web-server	debian-12-bookworm-v20240213	SCSI	10	linux-web-server	SSD persistent disk	x86/64	Google-managed	Boot, read/write	Del

◀ Manage disk CREATE INSTANCE CREATE SNAPSHOT [+] CREATE IMAGE CLONE DISK CREATE SECONDARY DISK EDIT DELETE

linux-web-server

DETAILS **MONITORING**

Properties

Type	SSD persistent disk
Size ?	10 GB
Architecture	x86/64
Zone	us-central1-a
Labels	None
In use by	linux-web-server
Snapshot schedule	None
Source image	debian-12-bookworm-v20240213
Encryption type	Google-managed
Consistency group	None

EQUIVALENT REST

[Create a snapshot](#)

Snapshots are backups of persistent disks. They're commonly used to recover, transfer or make data accessible to other resources in your project. [Learn more](#)

Name * Name is permanent

Description

Snapshot source type * Disk

Source disk * linux-web-server

Type * Snapshot Standard backup and disaster recovery; stored in a separate location to your disk
 Instant snapshot Rapid restoration; stored in the same location as your disk
 Archive snapshot Long-term storage for infrequently accessed data; stored in a separate location to your disk

Location ?
There may be a network transfer fee if you choose to store this snapshot in a location other than the source disk. [Learn more](#)
 Multi-regional
 Regional
Select location

Labels ?

[CREATE](#) [CANCEL](#) [EQUIVALENT CODE](#)

[Archive snapshots](#) [CREATE SNAPSHOT](#) [CREATE SNAPSHOT SCHEDULE](#) [REFRESH](#) [DELETE](#) [HIDE INFO PANEL](#) [LEARN](#)

Use archive snapshots for long-term data backup at a lower cost than standard snapshots for scenarios such as compliance, audits and long-term disaster recovery. [Learn more](#)

SNAPSHOTS	ARCHIVE SNAPSHOTS	INSTANT SNAPSHOTS	PREVIEW	SNAPSHOT SCHEDULES
<input type="checkbox"/> Status	<input checked="" type="checkbox"/> Name <small>↑</small>	Location	Snapshot size	Creation time
<input type="checkbox"/>	boot-disk-snapshot-tycs-cc-assignment01	us	656.93 MB	Feb 24, 2024, 11:37:33 am UTC+05:30
				Manual
				linux-web-server

Please select at least one resource.

Successfully created snapshot boot-disk-snapshot-tycs-cc-assignment01. [X](#)

6. Configure periodic backups with a snapshot schedule

The screenshot shows the Google Cloud Platform (GCP) interface for managing VM instances. At the top, there's a navigation bar with a dropdown for 'TYCS-CC-ASSIGNMENT01', a search bar, and various icons for account and help.

The main area is titled 'VM instances' and includes buttons for 'CREATE INSTANCE', 'IMPORT VM', and 'REFRESH'. Below this are tabs for 'INSTANCES', 'OBSERVABILITY', and 'INSTANCE SCHEDULES'. The 'INSTANCES' tab is selected.

A table lists three VM instances:

Status	Name	Zone	Recommendations	In use by	Internal IP	External IP	Connect
Green	linux-web-server	us-central1-a			10.128.0.2 (nic0)		RDP
Green	linux-web-server	us-central1-a			10.128.0.3 (nic0)	25.184.221.76 (nic0)	SSH
Green	web-server	us-central1-a			10.128.0.5 (nic0)		RDP

Below the table, a section titled 'Related actions' contains several links:

- Explore Backup and DR (NEW)
- View billing report
- Monitor VMs
- Explore VM logs
- Set up firewall rules
- Patch management
- Load balance between VMs

At the bottom of the page, there are navigation links and buttons for managing disks: 'Manage disk', 'CREATE INSTANCE', 'CREATE SNAPSHOT', 'CREATE IMAGE', 'CLONE DISK', 'CREATE SECONDARY DISK', 'EDIT', and 'DELETE'. The 'linux-web-server' instance is selected.

The 'DETAILS' tab is active, showing properties for the selected VM:

Type	SSD persistent disk
Size	10 GB
Architecture	x86/64
Zone	us-central1-a
Labels	None
In use by	linux-web-server
Snapshot schedule	None
Source image	debian-12-bookworm-v20240213
Encryption type	Google-managed
Consistency group	None

Below the properties table, there's a link to 'EQUIVALENT REST'.

In credit. Don't worry – you won't be charged if you run out of credit. [Learn more](#)

TYCS-CC-ASSIGNMENT01 Search (/) for resources, docs, products and more

[CREATE INSTANCE](#) [CREATE SNAPSHOT](#) [CREATE IMAGE](#) [CLONE DISK](#)

linux-web-server

Properties

Size * 10 GB [?](#)

Provision between 10 and 65,536 GB

Snapshot schedule

Select or create a snapshot schedule [Filter Type to filter](#)

There are no schedules in us-central1

[CREATE A SCHEDULE](#)

Labels

[+ ADD LABEL](#)

Type	SSD persistent disk
Architecture	x86/64
Zone	us-central1-a
In use by	linux-web-server
Source image	debian-12-bookworm-v20240213
Encryption type	Google-managed

Schedule options

Schedule frequency: Daily

Start time (UTC): 00:00-01:00

Auto-delete snapshots after: 14 days

Deletion rule

After you delete the disk that uses this schedule:

Keep snapshots

Create **CANCEL**

TYCS-CC-ASSIGNMENT01 Search (/) for resources, docs, products and more [Search](#)

[CREATE INSTANCE](#) [CREATE SNAPSHOT](#) [CREATE IMAGE](#) [CLONE DISK](#) [CREATE SECONDARY DISK](#) [EDIT](#) [DELETE](#)

linux-web-server

Properties

Size * 10 GB [?](#)

Provision between 10 and 65,536 GB

Snapshot schedule

Select or create a snapshot schedule [boot-disk-snapshot-schedule-tycs-cc-assignment01](#)

Every day, starts between 00:00 and 01:00, 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	linux-web-server
Source image	debian-12-bookworm-v20240213
Encryption type	Google-managed

SAVE **CANCEL**

TYCS-CC-ASSIGNMENT01 ▾

Search (/) for resources, docs, products and more

Manage disk CREATE INSTANCE CREATE SNAPSHOT CREATE IMAGE CLONE DISK CREATE SECONDARY DISK EDIT DELETE OPERATE

linux-web-server

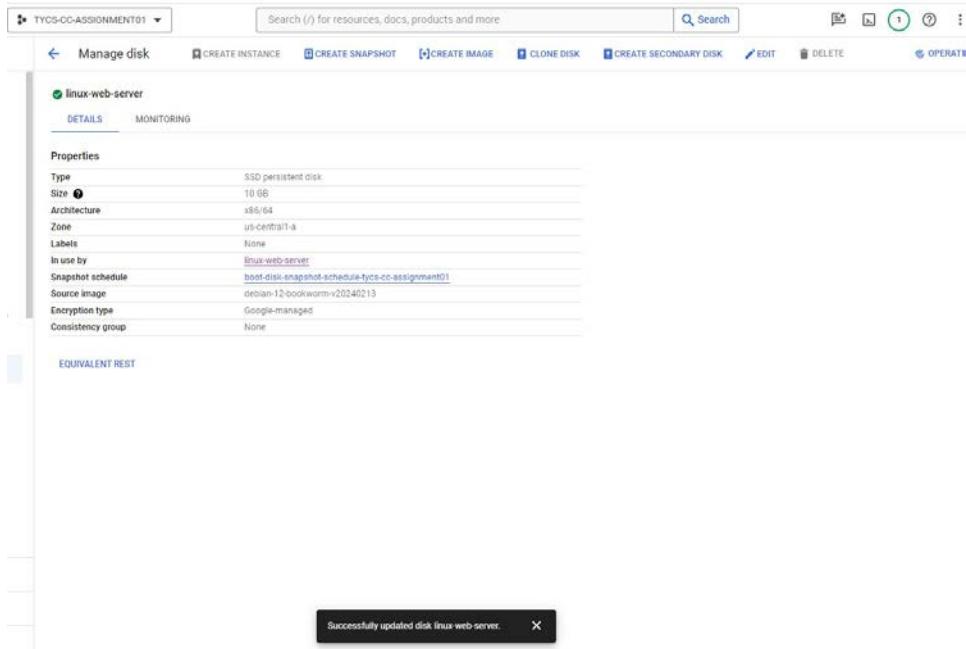
DETAILS MONITORING

Properties

Type	SSD persistent disk
Size <small>10 GB</small>	10 GB
Architecture	x86_64
Zone	us-central1-a
Labels	None
In use by	linux-web-server
Snapshot schedule	boot-disk-snapshot-schedule-tycs-cc-assignment01
Source image	debian-12-bookworm-v20240213
Encryption type	Google-managed
Consistency group	None

EQUIVALENT REST

Successfully updated disk linux-web-server. X



7. Restore a boot disk from a snapshot

The screenshot shows the Compute Engine VM instances page. At the top, there are buttons for 'CREATE INSTANCE', 'IMPORT VM', and 'REFRESH'. A 'LEARN' button is also present. Below the header, there are tabs for 'INSTANCES', 'OBSERVABILITY', and 'INSTANCE SCHEDULES'. The 'INSTANCES' tab is selected. A table lists three VM instances:

Status	Name	Zone	Recommendations	In use by	Internal IP	External IP	Connect
Running	iis-web-server	us-central1-a			10.128.0.2 (nic0)		RDP ▾
Running	linux-web-server	us-central1-a			10.128.0.3 (nic0)	35.184.221.76 (nic0)	SSH ▾
Running	web-server	us-central1-a			10.128.0.5 (nic0)		RDP ▾

Below the table, there is a section titled 'Related actions' with several buttons:

- 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
- Explore VM logs - View, search, analyse and download VM instance logs
- 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

On the right side of the main interface, there are buttons for 'HIDE' and 'SHOW'.

Below the main interface, there is a detailed view for the 'linux-web-server' instance. At the top, there are buttons for 'EDIT', 'RESET', 'CREATE MACHINE IMAGE', 'CREATE SIMILAR', 'START/RESUME', 'STOP', 'SUSPEND', 'DELETE', and a refresh icon.

The detailed view includes tabs for 'DETAILS', 'OBSERVABILITY', 'OS INFO', and 'SCREENSHOT'. The 'DETAILS' tab is selected. It shows the following information:

Name	linux-web-server
Instance ID	869440351817261507
Description	None
Type	Instance
Status	Running
Creation time	Feb 23, 2024, 11:38:46 pm UTC+05:30
Zone	us-central1-a
Instance template	None
In use by	None
Reservations	Automatically choose
Labels	None
Tags	-
Deletion protection	Disabled
Confidential VM service	Disabled
Preserved state size	0 GB

The 'Machine configuration' section shows:

Machine type	e2-medium
CPU platform	Intel Broadwell

[◀](#) linux-web-serv... [EDIT](#) [RESET](#) [CREATE MACHINE IMAGE](#) [CREATE SIMILAR](#) [START/RESUME](#) [STOP](#) [SUSPEND](#) [DELETE](#) [OPERATION](#)

[o previous page](#)

[DETAILS](#) [OBSERVABILITY](#) [OS INFO](#) [SCREENSHOT](#)

SSH [CONNECT TO SERIAL CONSOLE](#)

Connecting to serial ports is disabled [?](#)

Logs

Logging
Serial port 1 (console)

[SHOW MORE](#)

Basic information

Name	linux-web-server
Instance ID	869440351817261507
Description	None
Type	Instance
Status	Stopped
Creation time	Feb 23, 2024, 11:38:46 pm UTC+05:30
Zone	us-central1-a
Instance template	None
In use by	None
Reservations	Automatically choose
Labels	None
Tags ?	-
Deletion protection	Disabled
Confidential VM service ?	Disabled
Preserved state size	0 GB

Machine configuration

Machine type	e2-medium
CPU platform	Unknown CPU Platform

VM instance stopped [X](#)

[◀](#) [Edit linux-web-server instance](#)

[default default \(10.128.0.0/20\)](#) [▼](#)

[ADD A NETWORK INTERFACE](#)

Firewalls

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

Network tags

Network tags [?](#)

http-server [×](#)

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](#)

Don't worry – you won't be charged if you run out of credit. [Learn more](#)

TYCS-CC-ASSIGNMENT01 Search (/)

← Edit linux-web-server instance

default default (10.128.0.0/20)

ADD A NETWORK INTERFACE

Firewalls

Allow HTTP traffic
 Allow HTTPS traffic
 Allow Load Balancer Health checks

Network tags

Network tags http-server

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](#)

Local disks

None

Security and access

Shielded VM [?](#)

Select a shielded image to use shielded VM features.

[SAVE](#) [CANCEL](#)

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 —

Version * —

x86/64, amd64 built on 20240213

Name * [?](#)

Name is permanent

Boot disk type * —

[COMPARE DISK TYPES](#)

Size (GB) * —

Provision between 10 and 65536 GB

[SHOW ADVANCED CONFIGURATION](#)

[SELECT](#) [CANCEL](#)

linux-web-server

DETAILS MONITORING

Properties

Type	SSD persistent disk
Size <small>?</small>	10 GB
Architecture	x86/64
Zone	us-central1-a
Labels	None
In use by	None
Snapshot schedule	boot-disk-snapshot-schedule-tycs-cc-assignment01
Source image	debian-12-bookworm-v20240213
Encryption type	Google-managed
Consistency group	None

EQUIVALENT REST

Disks									
 CREATE DISK REFRESH DELETE									
 Filter Enter property name or value									
	Status	Name	Type	Size	Architecture	Zone(s)	In use by	Snapshot schedule	Actions
<input type="checkbox"/>		iis-web-server	SSD persistent disk	50 GB	x86/64	us-central1-a	iis-web	None	
<input type="checkbox"/>		linux-web-server	SSD persistent disk	10 GB	x86/64	us-central1-a		boot-disk-snapshot-schedule-tycs-cc-assignment01	
<input type="checkbox"/>		new-boot-disk-tycs-cc-assignment01	Balanced persistent disk	10 GB	x86/64	us-central1-a	linux-w	None	
<input type="checkbox"/>		web-server	Balanced persistent disk	50 GB	x86/64	us-central1-a	web-se	None	

8. Restore a persistent disk from a snapshot

[← previous page](#)

[EDIT](#) [RESET](#) [CREATE MACHINE IMAGE](#) [CREATE SIMILAR](#) [START/RESUME](#) [STOP](#) [SUSPEND](#) [DELETE](#) [OPERATION](#)

[DETAILS](#) [OBSERVABILITY](#) [OS INFO](#) [SCREENSHOT](#)

[SSH](#) [CONNECT TO SERIAL CONSOLE](#)

Connecting to serial ports is disabled ?

Logs

[Logging](#) [Serial port 1 \(console\)](#)

[SHOW MORE](#)

Basic information

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Zone	us-central1-a
Instance template	None
In use by	None
Reservations	Automatically choose
Labels	None
Tags <small>?</small>	
Deletion protection	Disabled

00 in credit. Don't worry – you won't be charged if you run out of credit. [Learn more](#)

TYCS-CC-ASSIGNMENT01 ▾

Edit linux-web-server instance

BOOT DISK

Name	new-boot-disk-tycs-cc-assignment01
Image	debian-12-bookworm-v20240213
Size	10 GB
Interface type	SCSI
Type	Balanced persistent disk
Encryption type	Google-managed
Mode	Boot, read/write
Snapshot schedule	None

Deletion rule
When deleting instance
 Keep disk
 Delete disk

Device name ⓘ
Used to reference the device for mounting or resizing.
 Device name
 linux-web-server
 Custom

DETACH BOOT DISK

Additional disks

[+ ADD NEW DISK](#) [+ ATTACH EXISTING DISK](#)

Local disks
None

Security and access

[SAVE](#) [CANCEL](#)

Add new disk

Name ⓘ new-persistent-disk-tycs-cc-assignment01

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-tycs-cc-assignment01

Disk settings
Disk type * Balanced persistent disk

COMPARE DISK TYPES

Size ⓘ 10 GB

Provision between 10 and 65,536 GB

Snapshot schedule (Recommended)
Use snapshot schedules to automate disk backups. [Learn more](#)

Select a snapshot schedule

Consistency group
Ensure that the asynchronous replication of data is aligned across multiple disks in the same region. [Learn more](#)

Select a consistency group

Encryption
Data is encrypted automatically. Select an encryption key management solution.

[SAVE](#) [CANCEL](#)

Additional disks

New disk new-persistent-disk-tycs-cc-assignment01, Blank, 10 GB



[+ ADD NEW DISK](#)

[+ ATTACH EXISTING DISK](#)

Local disks

None

Security and access

* SAVING CANCEL

Local disks

None

Additional disks

Name	Image	Interface type	Size (GB)	Device name	Type	Architecture	Encryption	Mode
new-persistent-disk-tycs-cc-assignment01	—	SCSI	10	new-persistent-disk-tycs-cc-assignment01	Balanced persistent disk	x86/64	Google-managed	Read/write

7. Write a program for web feed.

Code:-

```
<h3><b>Choose category: </b></h3>
<form method="post" id="myform">
<select name="rssurl" required>
<option value="">Select</option>
<option value="http://timesofindia.indiatimes.com/rssfeeds/-2128672765.cms">Science</option>
<option value="https://timesofindia.indiatimes.com/rssfeeds/65857041.cms">Astrology</option>
<option value="http://timesofindia.indiatimes.com/rssfeeds/66949542.cms">Tech</option>
</select>
<input type="submit" value="Load"/>
</form>
<?php
if(isset($_POST['rssurl']))
{ echo '<h1> Search Result for RSS url:</h1>';
'. $_POST['rssurl']. '</h1>';
$rssurl=$_POST['rssurl'];
$rss=new DOMDocument();
$rss->load($rssurl); $feed=array(); foreach($rss->getElementsByName('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++)

{

$title=str_replace('&','&',$feed[$x]['title']);

$link=$feed[$x]['link'];

$description=$feed[$x]['desc'];

$date=date('I F d,Y',strtotime($feed[$x]['date']));

echo '<p> <strong><a href="'.$link.'"'

title="'.$title.'">'.$title.'</a></strong><br>';

echo '<p>'.$description.' </p>; echo

'<small><em>Posted on

'.'/'.$date.'</em></small>';

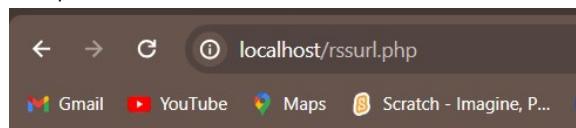
}

}

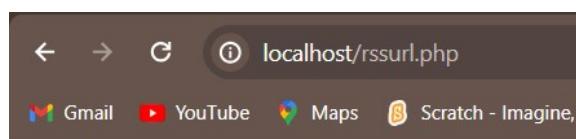
?>

```

Output:-



Choose category:



Choose category:

Select
Science
Astrology
Tech

Choose category:

[Select](#) [Load](#)

Search Result for RSS url: http://timesofindia.indiatimes.com/rssfeeds/66949542.cms

3 ways Google aims to support the 2024 Indian General Elections

Google supports the Indian General Election by providing easy access to voting information and countering misinformation. Initiatives include partnering with the Election Commission, prioritizing related content on YouTube, and implementing advertising policies for transparency. Measures against AI-generated content are also taken.

Posted on 9 March 12, 2024

This new AI tool can help you book train tickets, get refunds and check details on IRCTC website and app

Indian Railways' AI chatbot, AshDiva 2.0, powered by CogniX AI, offers a range of services like booking tickets, refunds, checking PNR status, cancelling tickets, changing boarding station, checking booking history, and accessing e-tickets via text or voice commands in multiple languages.

Posted on 9 March 12, 2024

TSMC returns to the list of world's 10 most valuable companies: Here's what led to its comeback

Taiwan Semiconductor Manufacturing Company (TSMC) has reclaimed a spot in the list of the world's 10 most valuable companies, returning to the top 10 after being overtaken by AI firm, Alibaba. TSMC's stock rallied, steering its market capitalization to a record, making it higher than Broadcom. Analysts expect TSMC to further advance amid surging AI-related revenue and strong pricing power.

Posted on 9 March 12, 2024

Google Maps gets better with directions with future updates; here's what's changing

Google Maps is updating its Fused Orientation Provider (FOP) API to improve direction accuracy in busy areas. The update combines gyroscope, accelerometers, and magnetometer data, reducing magnetic interference and boosting Google Maps and third-party apps on Android 5.0 or above.

Posted on 9 March 11, 2024

This popular YouTuber's account got hacked! What happened and tips to safeguard your account

Posted on 9 March 11, 2024

Choose category:

[Science](#) [Load](#)

Search Result for RSS url: http://timesofindia.indiatimes.com/rssfeeds/-2128672765.cms

New study suggests dark matter at distorted parallel universe

Scientists at the University of Chicago's Enrico Fermi Institute propose a theory suggesting that dark matter may be a distorted parallel universe that is not fully developed. Dark matter, constituting over 80% of the universe's matter, remains mysterious and undetectable. The prevailing belief is that dark matter is non-baryonic, possibly composed of neutrinos or sterile neutrinos.

Posted on 9 March 12, 2024

AI chatbot helps Syria-based actress cope with grief and loss of mother

Suad Malas copes with the loss of her mother Nagah, who passed away from kidney failure, by using an AI-based bot system called Project December that simulates the deceased. She fills out online forms and chats with the bot for a nominal cost. The founder of the service, Jason Rohrer, warns about the potential addiction and detachment from reality.

Posted on 9 March 12, 2024

Restoring Ukraine science infrastructure will cost \$1.3 billion: UN

More than 1,400 buildings belonging to scientific institutions in Ukraine have been damaged in Russia's invasion and restoring public science infrastructure will cost \$1.26 billion, a UN agency said on Monday. The study said that a total of 1,443 buildings belonging to 177 scientific institutions had been damaged or destroyed by Russia's invasion.

Posted on 9 March 11, 2024

Nasa budget for fiscal year 2025: No significant increase, uncertainty looms

The White House has announced that Nasa is not set to receive a significant increase in its budget for fiscal year 2025. The proposed budget of \$25.4 billion is a 2% increase from the previous year but remains uncertain. The budget includes funding for the Artemis program, crewed spaceflight efforts, commercial partnerships, and robotic planetary exploration. The Mars sample return project's budget will be determined based on recommendations from an independent review committee. Nasa aims to maintain a balanced portfolio while making tough choices.

Posted on 9 March 11, 2024

SpaceX station crew bound for Earth

Four astronauts left the International Space Station on Monday and were bound for Earth following a more than six month mission. Several private companies are working on commercial space stations to replace it, while China has already established its own orbital lab.

Posted on 9 March 12, 2024

Choose category:

[Astrology](#) [Load](#)

Search Result for RSS url: https://timesofindia.indiatimes.com/rssfeeds/65857041.cms

Exploring Taurus and Capricorn's Harmony

Taurus and Capricorn, both earth signs, create a strong bond. Their shared values, communication, and respect strengthens their relationship. They support each other, overcome challenges, and create love, stability, and happiness. Their commitment and down-to-earth nature ensure their bond stands the test of time. Let's take a closer look at how these two signs create a strong and stable bond.

Posted on 9 March 12, 2024

Understanding Leo and Aquarius: Different But Together

Some people believe in astrology, which tells us about different kinds of people based on their birth dates. Leo and Aquarius, with their strong bond and complementary traits, form an ideal pair. Their relationship is built on communication, with Leo's passion and Aquarius' creativity enhancing their connection.

Posted on 9 March 12, 2024

Exploring the Strong Connection Between Cancer and Scorpio: Water Signs in Harmony

Cancer and Scorpio, both water signs, create a deep and powerful bond. Cancer's nurturing nature complements Scorpio's intensity. With communication and trust, they create a strong, enduring relationship. Cancer and Scorpio, both are water signs, and when they come together, they create a deep and powerful bond. Let's take a closer look at how these two signs connect and what makes their relationship so special.

Posted on 9 March 12, 2024

Astrological insights for business partnerships: Understanding compatibility based on birth dates

Numerology reveals that specific birth traits can shape entrepreneurial traits. Natural-born leaders, strategic planners, creative innovators, and visionary communicators are born on different dates. These individuals excel in networking, making informed decisions, and fostering effective communication, contributing to the business world's dynamism and growth. These numbers reveal a lot about our personality traits, strengths, weaknesses, opportunities, challenges, and destiny.

Posted on 9 March 12, 2024

Birth-date associated with infectious charm

Birth dates can influence personality traits. People born on specific dates exhibit exceptional interpersonal skills, empathy, adaptability, wisdom, spiritual insight, leadership, abundance, balance, harmony, and depth. Numerology offers insights into personal characteristics based on the date of birth. Let's explore the list of birth dates that have the most attractive personalities, according to numerology.

Posted on 9 March 12, 2024

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

analysis)

Title: Leveraging Amazon EC2 for Scalable and Cost-Efficient Computing

This case study delves into the utilization of Amazon EC2, a core service within Amazon Web Services (AWS), to address the computing needs of a growing e-commerce startup. By leveraging the scalability, flexibility, and cost-effectiveness of Amazon EC2, the startup managed to overcome challenges related to fluctuating demand, resource provisioning, and infrastructure management.

Introduction: As an e-commerce startup, Company X faced the challenge of managing computational resources efficiently to handle variable workloads and maintain optimal performance without incurring high infrastructure costs. Traditional on-premises solutions were deemed insufficient due to scalability limitations and capital expenses. Hence, the decision was made to adopt cloud computing, with Amazon EC2 emerging as the primary choice due to its reputation for scalability, reliability, and extensive feature set.

Challenges Faced:

1. **Variable Workloads:** The nature of e-commerce led to fluctuating traffic patterns, requiring a solution capable of dynamically scaling compute resources to meet demand spikes.
2. **Infrastructure Provisioning:** Traditional infrastructure provisioning processes were time-consuming and cumbersome, hindering agility and responsiveness to market changes.
3. **Cost Management:** Balancing performance requirements with cost optimization was critical to ensure profitability and sustainability in a competitive market landscape.

Solution Implemented: Company X adopted Amazon EC2 to address its computational requirements. Key aspects of the solution included:

1. **Elasticity:** Leveraging Amazon EC2's auto-scaling capabilities to automatically adjust the number of instances based on demand fluctuations, ensuring optimal performance during peak periods while minimizing costs during off-peak hours.
2. **Instance Types:** Selection of appropriate EC2 instance types based on workload characteristics, balancing compute, memory, and storage requirements to optimize performance and cost.
3. **Managed Services Integration:** Integration with other AWS services such as Amazon RDS (Relational Database Service) and Amazon S3 (Simple Storage Service) to create a comprehensive and scalable architecture.

Results and Benefits:

1. **Scalability:** Amazon EC2 enabled Company X to scale compute resources seamlessly in response to changing demand patterns, ensuring consistent performance and customer experience.

2. **Cost Efficiency:** By leveraging auto-scaling and optimizing instance types, the company achieved significant cost savings compared to traditional on-premises infrastructure, paying only for the resources consumed.
3. **Agility:** The agility provided by Amazon EC2 allowed Company X to experiment with new features, roll out updates rapidly, and respond swiftly to market dynamics, enhancing competitiveness and innovation.

Conclusion: The adoption of Amazon EC2 proved instrumental in empowering Company X to overcome the challenges associated with managing computational resources in a dynamic e-commerce environment. By embracing cloud-native solutions and leveraging the scalability and cost-effectiveness of Amazon EC2, the company achieved enhanced performance, flexibility, and cost efficiency, paving the way for continued growth and success in the competitive e-commerce landscape.

References:

- Amazon EC2 Documentation: <https://aws.amazon.com/ec2/>
- Google.com
- AWS Case Studies: <https://aws.amazon.com/solutions/case-studies/>