



IIT KHARAGPUR



NPTEL ONLINE  
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# CLOUD COMPUTING

## Private Cloud Implementation using OpenStack

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IIT KHARAGPUR

# Overview

- *Meghamala @IITKgp* on OpenStack Cloud
- VM Creation
- Accessing VM by User
- VM Termination



IIT KHARAGPUR



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Meghamala - a one stop solution to your computational needs.

The IIT Kharagpur cloud gives you compute and storage with one click.

[Know more](#)

## Welcome to Meghamala!

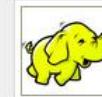
Meghamala is an initiative by the Indian Institute of Technology, Kharagpur to provide on demand computational and storage resources to the institute research community. It is built using OpenStack Cloud Computing platform.

Meghamala has been set up in the Computer and Informatics Centre, IIT Kharagpur. The hardware of the system includes :

- Blade servers
- SAN Storage
- NAS

Please visit the various sections of this website to know more about Meghamala.

### Latest News



MAR 23, 2016

#### **MegHadoop**

MegHadoop, a Hadoop cluster on Meghamala is up and available for use.



AUG 12, 2015

#### **MeghaData**

MeghaData, a data storage service is under beta testing.



APR 25, 2015

#### **Inauguration**

Inauguration and Workshop on Meghamala was carried out on 30th April 2015.

## Services offered by Meghamala

Meghamala was conceptualized to address the computational needs of the research community at IIT Kharagpur.

To meet these demands, Meghamala offers the following services :

- **VMS4U -- Compute Nodes**

Provision a virtual machine on demand and use it as a desktop or run your workload on it. The following virtual machine configurations are available :

- **IITKG\_P\_regular**

2 VCPUs  
4 GB RAM  
45 GB ephemeral storage

- **IITKG\_P\_large**

4 VCPUs  
8 GB RAM  
45 GB ephemeral storage

- **IITKG\_P\_xLarge**

8 VCPUs  
16 GB RAM  
60 GB ephemeral storage

The virtual machines can have the following guest operating systems.

- **Ubuntu 14.04**

- **Centos 7**

- **Fedora 20**

- **Storage on the House**

- Persistent storage provided on request

[Click here to request for a VM](#)

- **MegHadoop**

- Hadoop cluster running on Meghamala

## Latest News



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MAR 17, 2015

### **Installation Complete**

Hardware and software installed. Testing in progress.



MAR 13, 2015

### **GUI on Meghamala**

VM images with GUI have been created on Meghamala.

## VMs4U - Request form

Name of faculty

Department

Designation

Phone/Mobile no.

E-mail

Purpose

Preferred VM Name

VM Type

- IITKGP\_regular  IITKGP\_large  IITKGP\_xlarge

Number of VMs

1

Operating system

Ubuntu 14.04

Persistent storage of 20 GB required



Yes



No

VM required till (max 60 days)



Enter the code above here

Can't read the image? click [here](#) to refresh

Please note that the VMs should be used only for academic purposes. Neither the Meghamala team nor IIT Kharagpur is responsible for the contents of your VMs. It is important to highlight that the presence of inappropriate material may lead to immediate termination of the VM(s).

### Steps to follow



**Fill out this form.**  
Fill out the form on the left and click on Submit.



**Get hard copy signed.**  
Print the generated PDF and sign it. You may save a copy for future reference.



**Submit signed hard copy.**  
Submit the signed hard copy to the professor-in-charge, Meghamala.

## Meghamala team

- Students

### Current Members

- Shubham Jain, 4th year Dual Degree (Computer Science and Engineering)
- Shreyans Pagariya, 4th year Dual Degree (Computer Science and Engineering)
- Arindam Roy, PhD Scholar (Advanced Technology Development Center)
- Rajesh Basak, PhD Scholar (Computer Science and Engineering)
- Debopriyo Banerjee, PhD Scholar (Computer Science and Engineering)
- Chandan Misra, PhD Scholar (Advanced Technology Development Center)

### Past Members

- Harshit Gupta, Dual Degree (Computer Science and Engineering)
- Nikhil Agrawal, Dual Degree (Computer Science and Engineering)
- Ashish Kale, M.Tech (Computer Science and Engineering)
- Major Sujeet Deshmukh, M.Tech. (Information Technology)

- CIC Engineers

- Alokes Chattopadhyay
- Alok Baran Das

- Faculty

- Soumya K. Ghosh (Dept. of Computer Science and Engineering)
- Shamik Sural (Dept. of Computer Science and Engineering)

We plan to add more team members as time progresses. After all, the key aim of the project remains to make people learn.

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VM images with GUI have been created on Meghamala.

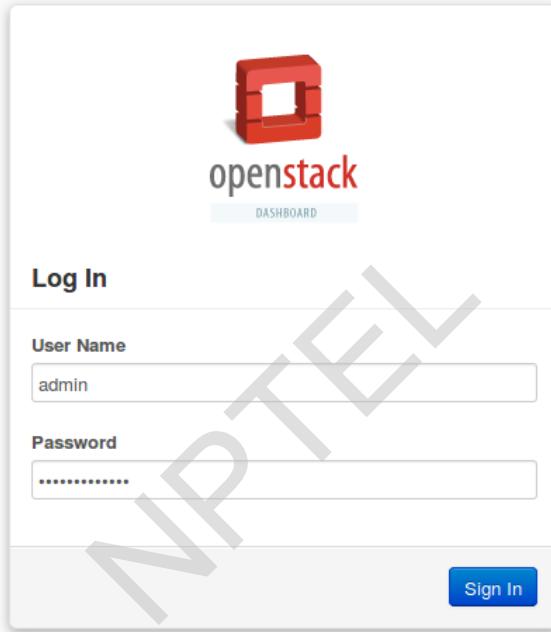
---

# Meghamala - IITKgp Cloud

*(using OpenStack)*



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Horizon Login Page

Project

Compute

Overview

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Images

Access &amp; Security

Network

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Orchestration

Admin

# Overview

## Usage Summary

Select a period of time to query its usage:

From: 2017-06-01

To: 2017-06-30

Submit

The date should be in YYYY-mm-dd format.

Active Instances: 30 Active RAM: 304GB This Period's VCPU-Hours: 679.47 This Period's GB-Hours: 64662.52

## Usage

[Download CSV Summary](#)

Project Name	VCPUs	Disk	RAM	VCPUs Hours	Disk GB Hours
admin	128	2855	304GB	679.47	64662.52

Displaying 1 item

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## Overview

### Limit Summary



**Instances**  
Used Inf of No Limit



**VCPUs**  
Used Inf of No Limit



**RAM**  
Used Inf.0PB of No Limit



**Floating IPs**  
Used 43 of 250



**Security Groups**  
Used 1 of No Limit



**Volumes**  
Used 21 of 200



**Volume Storage**  
Used 3.0TB of 3.7TB

### Usage Summary

Select a period of time to query its usage:

From: To: 

The date should be in YYYY-mm-dd format.

Active Instances: 30 Active RAM: 304GB This Period's VCPU-Hours: 680.30 This Period's GB-Hours: 64741.88

### Usage

Instance Name	VCPUs	Disk	RAM	Uptime
nik_windows	2	45	4GB	2 years, 2 months
Ravi_Teja_2	8	160	16GB	1 year, 4 months
4	—	—	16GB	1 year, 11 months
5	—	—	4GB	1 year, 10 months

Graphical representation of resource usage

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## Instances

## Instances

Instance Name

Filter

Filter

+ Launch Instance

Soft Reboot Instances

Terminate Instances

<input type="checkbox"/>	Instance Name	Image Name	IP Address	Size	Key Pair	Status	Availability Zone	Task	Power State	Uptime	Actions
<input type="checkbox"/>	ccTest	Centos_7_GUI	192.164.0.1 10.4.0.1	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Active	nova	None	Running	2 months, 2 weeks	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	TestDiskPartition	Ubuntu_14_04_x2go_45G	192.164.0.2 10.4.0.2	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Active	nova	None	Running	3 months, 2 weeks	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	centosForSify	CentOS_6.5_GUI	192.164.0.3 10.4.0.3	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Shutoff	nova	None	Shutdown	7 months	<button>Start Instance</button> <button>More</button>
<input type="checkbox"/>	CL1_R_SERVER1	Ubuntu_New_X2Go	192.164.0.4 10.4.0.4	IITKGP_xxlarge   32GB RAM   8 VCPU   60.0GB Disk	-	Active	nova	None	Running	9 months, 1 week	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	Harshit_Utkarsh_LARGE	Ubuntu_14_04_x2go_60G	192.164.0.5 10.4.0.5	IITKGP_xlarge   16GB RAM   8 VCPU   60.0GB Disk	-	Active	nova	None	Running	1 year, 2 months	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	cc16_test1	Ubuntu_14_04_x2go_45G	192.164.0.6 10.4.0.6	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Shutoff	nova	None	Shutdown	1 year, 4 months	<button>Start Instance</button> <button>More</button>
<input type="checkbox"/>	MeghdooPNewMaster	CentOS_6.5_GUI	192.164.0.7 10.4.0.7	IITKGP_MeghdooP_Bigger   48GB RAM   8 VCPU   600.0GB Disk	-	Active	nova	None	Running	1 year, 4 months	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	MeghdooP_18	CentOS_6.5_GUI	192.164.0.8 10.4.0.8	MeghdooP_new   8GB RAM   4 VCPU   90.0GB Disk	-	Active	nova	None	Running	1 year, 5 months	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	MeghdooP_19			8GB RAM   90.0GB Disk	-	Active	nova	None	Running	1 year, 5 months	<button>Create Snapshot</button> <button>More</button>

Details of Instances

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## Volumes & Snapshots

[Volumes](#) [Volume Snapshots](#)

### Volumes

Filter



Filter

[+ Create Volume](#)[Delete Volumes](#)

<input type="checkbox"/>	Name	Description	Size	Status	Type	Attached To	Availability Zone	Actions
<input type="checkbox"/>	checkcentos_vol	created on 30-12-2016 for downloading...	200GB	In-Use	-	Attached to CheckCentos on /dev/vdb	nova	<a href="#">Edit Volume</a> <a href="#">More</a>
<input type="checkbox"/>	CL1_R_VOL1		100GB	In-Use	-	Attached to CL1_R_SERVER1 on /dev/vdc	nova	<a href="#">Edit Volume</a> <a href="#">More</a>
<input type="checkbox"/>	cc16		5GB	In-Use	-	Attached to cc16_test1 on /dev/vdb	nova	<a href="#">Edit Volume</a> <a href="#">More</a>
<input type="checkbox"/>	cc16_test1		2GB	Available	-		nova	<a href="#">Edit Volume</a> <a href="#">More</a>
<input type="checkbox"/>	DebopriyoTestTwitter_vol	Volume reduced to 1TB from 2TB	1024GB	In-Use	-	Attached to DebopriyoTwitterTest on /dev/vdb	nova	<a href="#">Edit Volume</a> <a href="#">More</a>
<input type="checkbox"/>	Meghadoop_20_Vol	-	110GB	In-Use	-	Attached to Meghadoop_20 on /dev/vdb	nova	<a href="#">Edit Volume</a> <a href="#">More</a>
<input type="checkbox"/>	Meghadoop_19_Vol	-	110GB	In-Use	-	Attached to Meghadoop_19 on /dev/vdb	nova	<a href="#">Edit Volume</a> <a href="#">More</a>
<input type="checkbox"/>	Meghadoop_18_Vol	-	110GB	In-Use	-	Attached to Meghadoop_18 on /dev/vdb	nova	<a href="#">Edit Volume</a> <a href="#">More</a>
<input type="checkbox"/>	Meghadoop_17_Vol	-	110GB	In-Use	-	Attached to Meghadoop_17 on /dev/vdb	nova	<a href="#">Edit Volume</a> <a href="#">More</a>
<input type="checkbox"/>	Meghadoop_16_Vol	-	110GB	In-Use	-	Attached to Meghadoop_16 on /dev/vdb	nova	<a href="#">Edit Volume</a> <a href="#">More</a>

## Cinder- details of Volumes

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## Images

### Images

[Project \(16\)](#) [Shared with Me \(0\)](#) [Public \(14\)](#)[+ Create Image](#)[Delete Images](#)

<input type="checkbox"/>	Image Name	Type	Status	Public	Protected	Format	Actions
<input type="checkbox"/>	Meghadoop_snapshot_ready	Snapshot	Active	Yes	No	QCOW2	<a href="#">Launch</a> <a href="#">More</a>
<input type="checkbox"/>	CentOS_6.5_GUI	Image	Active	Yes	No	QCOW2	<a href="#">Launch</a> <a href="#">More</a>
<input type="checkbox"/>	Stacksync1_10_4_2_30_01092015	Snapshot	Active	No	No	QCOW2	<a href="#">Launch</a> <a href="#">More</a>
<input type="checkbox"/>	stacksync_working	Snapshot	Active	No	No	QCOW2	<a href="#">Launch</a> <a href="#">More</a>
<input type="checkbox"/>	Ubuntu_14_04_x2go_60G	Image	Active	Yes	No	QCOW2	<a href="#">Launch</a> <a href="#">More</a>
<input type="checkbox"/>	Ubuntu_14_04_x2go_45G	Image	Active	Yes	No	QCOW2	<a href="#">Launch</a> <a href="#">More</a>
<input type="checkbox"/>	Ubuntu_14_04_x2go_20G	Image	Active	Yes	No	QCOW2	<a href="#">Launch</a> <a href="#">More</a>
<input type="checkbox"/>	Ubuntu_New_X2Go	Image	Active	Yes	No	QCOW2	<a href="#">Launch</a> <a href="#">More</a>
<input type="checkbox"/>	Windows_7_x64	Image	Active	Yes	No	QCOW2	<a href="#">Launch</a> <a href="#">More</a>
<input type="checkbox"/>	Fedora_20_GUI	Image	Active	Yes	No	QCOW2	<a href="#">Launch</a> <a href="#">More</a>
<input type="checkbox"/>	Centos_7_GUI	Image	Active	Yes	No	QCOW2	<a href="#">Launch</a> <a href="#">More</a>

Glance- Overview of available images in Meghamala cloud

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## Manage Security Group Rules: default

## Security Group Rules

[+ Add Rule](#)[Delete Rules](#)

<input type="checkbox"/>	Direction	Ether Type	IP Protocol	Port Range	Remote	Actions
<input type="checkbox"/>	Egress	IPv4	Any	-	0.0.0.0/0 (CIDR)	<a href="#">Delete Rule</a>
<input type="checkbox"/>	Ingress	IPv4	Any	-	default	<a href="#">Delete Rule</a>
<input type="checkbox"/>	Ingress	IPv6	Any	-	default	<a href="#">Delete Rule</a>
<input type="checkbox"/>	Egress	IPv6	Any	-	::/0 (CIDR)	<a href="#">Delete Rule</a>
<input type="checkbox"/>	Ingress	IPv4	ICMP	-	0.0.0.0/0 (CIDR)	<a href="#">Delete Rule</a>
<input type="checkbox"/>	Ingress	IPv4	TCP	1 - 65535	0.0.0.0/0 (CIDR)	<a href="#">Delete Rule</a>
<input type="checkbox"/>	Ingress	IPv4	TCP	3389 (RDP)	0.0.0.0/0 (CIDR)	<a href="#">Delete Rule</a>
<input type="checkbox"/>	Ingress	IPv4	TCP	27017	0.0.0.0/0 (CIDR)	<a href="#">Delete Rule</a>

Displaying 8 items

Neutron- Network Access Rules of a Security Group

Project

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# All Hypervisors

## Hypervisor Summary



VCPUs Usage  
Used 128 of 144



Memory Usage  
Used 305GB of 377GB



Disk Usage  
Used 2.8TB of 3.1TB

## Hypervisors

Hostname	Type	VCPUs (total)	VCPUs (used)	RAM (total)	RAM (used)	Storage (total)	Storage (used)	Instances
node-77.domain.tld	QEMU	48	52	125GB	104GB	1.0TB	930.0GB	13
node-62.domain.tld	QEMU	48	26	125GB	84GB	1.0TB	985.0GB	5
node-79.domain.tld	QEMU	48	50	125GB	116GB	1.0TB	940.0GB	12

Displaying 3 items

Nova-vCPU, RAM, Storage details of Hypervisors

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## Flavors

## Flavors

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Filter

Create Flavor

Delete Flavors

<input type="checkbox"/>	Flavor Name	VCPUs	RAM	Root Disk	Ephemeral Disk	Swap Disk	ID	Public	Actions
<input type="checkbox"/>	m1.tiny	1	512MB	1GB	0GB	0MB	1	Yes	Edit Flavor  More
<input type="checkbox"/>	m1.small	1	2048MB	20GB	0GB	0MB	2	Yes	Edit Flavor  More
<input type="checkbox"/>	m1.medium	2	4096MB	40GB	0GB	0MB	3	Yes	Edit Flavor  More
<input type="checkbox"/>	IITKGP_regular	2	4096MB	45GB	0GB	0MB	66e4a1a7-249a-4853-925d-6b59e1118b4f	Yes	Edit Flavor  More
<input type="checkbox"/>	RamOverCommitTest	2	16384MB	2GB	0GB	0MB	206e40e2-dfba-432a-8bac-61e80147a5ca	Yes	Edit Flavor  More
<input type="checkbox"/>	IITKGP_large	4	8192MB	45GB	0GB	0MB	a0266a30-b6b1-4d82-8468-1e4b643dfc51	Yes	Edit Flavor  More
<input type="checkbox"/>	m1.large	4	8192MB	80GB	0GB	0MB	4	Yes	Edit Flavor  More
<input type="checkbox"/>	Megadoop	4	8192MB	90GB	0GB	1024MB	1cc3f7a3-7678-4139-b51a-e72a6b0a42b4	Yes	Edit Flavor  More
<input type="checkbox"/>	Megadoop_new	4	8192MB	90GB	0GB	0MB	dc1aaa5b-d6e8-435d-b994-7172606c9312	Yes	Edit Flavor  More
<input type="checkbox"/>	IITKGP_xlarge	8	16384MB	60GB	0GB	0MB	36031ddf-12b0-406c-9343-221567593cff	Yes	Edit Flavor  More
<input type="checkbox"/>	m1.xlarge	8	16384MB	160GB	0GB	0MB	5	Yes	Edit Flavor  More
<input type="checkbox"/>									Edit Flavor  More
<input type="checkbox"/>									Edit Flavor  More

Nova- Different flavors of VMs in Meghamala

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## Images

### Images

Image Name =

Filter

Filter

+ Create Image

Delete Images

<input type="checkbox"/>	Image Name	Type	Status	Public	Protected	Format	Actions
<input type="checkbox"/>	Meghadoop_snapshot_ready	Snapshot	Active	Yes	No	QCOW2	<button>Edit</button> <button>More</button>
<input type="checkbox"/>	CentOS_6.5_GUI	Image	Active	Yes	No	QCOW2	<button>Edit</button> <button>More</button>
<input type="checkbox"/>	Stacksync1_10_4_2_30_01092015	Snapshot	Active	No	No	QCOW2	<button>Edit</button> <button>More</button>
<input type="checkbox"/>	stacksync_working	Snapshot	Active	No	No	QCOW2	<button>Edit</button> <button>More</button>
<input type="checkbox"/>	Ubuntu_14_04_x2go_60G	Image	Active	Yes	No	QCOW2	<button>Edit</button> <button>More</button>
<input type="checkbox"/>	Ubuntu_14_04_x2go_45G	Image	Active	Yes	No	QCOW2	<button>Edit</button> <button>More</button>
<input type="checkbox"/>	Ubuntu_14_04_x2go_20G	Image	Active	Yes	No	QCOW2	<button>Edit</button> <button>More</button>
<input type="checkbox"/>	Ubuntu_New_X2Go	Image	Active	Yes	No	QCOW2	<button>Edit</button> <button>More</button>
<input type="checkbox"/>	Windows_7_x64	Image	Active	Yes	No	QCOW2	<button>Edit</button> <button>More</button>
<input type="checkbox"/>	Fedora_20_GUI	Image	Active	Yes	No	QCOW2	<button>Edit</button> <button>More</button>
<input type="checkbox"/>	Centos_7_GUI	Image	Active	Yes	No	QCOW2	<button>Edit</button> <button>More</button>
<input type="checkbox"/>	Ubu					QCOW2	<button>Edit</button> <button>More</button>
<input type="checkbox"/>	Cent					QCOW2	<button>Edit</button> <button>More</button>

Images of Cloud Instance in Meghamala

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## System Info

Services

Compute Services

Network Agents

Default Quotas

## Compute Services

Filter



Filter

Name	Host	Zone	Status	State	Updated At
nova-consoleauth	node-61.domain.tld	internal	enabled	up	0 minutes
nova-conductor	node-61.domain.tld	internal	enabled	up	0 minutes
nova-scheduler	node-61.domain.tld	internal	enabled	up	0 minutes
nova-cert	node-61.domain.tld	internal	enabled	up	0 minutes
nova-compute	node-77.domain.tld	nova	enabled	up	0 minutes
nova-compute	node-62.domain.tld	nova	enabled	up	0 minutes
nova-compute	node-79.domain.tld	nova	enabled	up	0 minutes
nova-console	node-61.domain.tld	internal	enabled	up	0 minutes

Displaying 8 items

Compute Services in Meghamala

---

**VM Creation**

NFTEL

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## Object Store

## Orchestration

## Admin

## Instances

## Launch Instance

## Details \*

## Access &amp; Security \*

## Networking \*

## Post-Creation

## Advanced Options

## Availability Zone

nova

## Instance Name \*

Cloud\_npTEL\_1

## Flavor \*

m1.tiny

m1.tiny

m1.small

m1.medium

IITKGP\_regular

Meghdooop

m1.large

IITKGP\_large

Meghdooop\_new

IITKGP\_xlarge\_Meghdooop

RamOverCommitTest

IITKGP\_xlarge

m1.xlarge

IITKGP\_xxlarge

IITKGP\_Meghdooop\_Bigger

Specify the details for launching an instance.

The chart below shows the resources used by this project in relation to the project's quotas.

## Flavor Details

Name m1.tiny

VCPU 1

Root Disk 1 GB

Ephemeral Disk 0 GB

Total Disk 1 GB

RAM 512 MB

## Project Limits

## Number of Instances

inf of No Limit Used

## Number of VCPUs

inf of No Limit Used

## Total RAM

inf of No Limit MB Used

Cancel

Launch

<input type="checkbox"/>	Meghdooop_18	CentOS_6.5_GUI	192.164.111.105 10.4.2.52	Meghdooop_new   8GB RAM   4 VCPU   90.0GB Disk	-	Active	nova	None	Running	1 year, 5 months	Create Snapshot More ▾
<input type="checkbox"/>	Meghdooop_19	CentOS_6.5_GUI	192.164.111.106 10.4.2.53	Meghdooop_new   8GB RAM   4 VCPU   90.0GB Disk	-	Active	nova	None	Running	1 year, 5 months	Create Snapshot More ▾

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## Launch Instance

## Details \*

## Access &amp; Security \*

## Networking \*

## Post-Creation

## Advanced Options

## Availability Zone

nova

## Instance Name \*

Cloud\_npTEL\_1

## Flavor \*

IITKGP\_regular

Some flavors not meeting minimum image requirements have been disabled.

## Instance Count \*

1

## Instance Boot Source \*

Boot from image

## Image Name

CentOS 6.5 GUI (1.0 GB)

Specify the details for launching an instance.

The chart below shows the resources used by this project in relation to the project's quotas.

## Flavor Details

Name	IITKGP_regular
------	----------------

VCPUs	2
-------	---

Root Disk	45 GB
-----------	-------

Ephemeral Disk	0 GB
----------------	------

Total Disk	45 GB
------------	-------

RAM	4,096 MB
-----	----------

## Project Limits

## Number of Instances

inf of No Limit Used

## Number of VCPUs

inf of No Limit Used

## Total RAM

inf of No Limit MB Used

Cancel

Launch

Uptime	Actions
2 months, 2 weeks	Create Snapshot More ▾
3 months, 2 weeks	Create Snapshot More ▾
7 months	Start Instance More ▾
9 months, 1 week	Create Snapshot More ▾
1 year, 2 months	Create Snapshot More ▾
1 year, 4 months	Start Instance More ▾
1 year, 4 months	Create Snapshot More ▾
1 year, 5 months	Create Snapshot More ▾
1 year, 5 months	Create Snapshot More ▾

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## Instances

 Instance Name ccTest TestDiskPartition centosForSify CL1\_R\_SERVER1 Harshit\_Utkarsh\_LARGE cc16\_test1 MeghdooPNewMaster MeghdooP\_18 MeghdooP\_19

## Launch Instance

Details \*

Access &amp; Security \*

Networking \*

Post-Creation

Advanced Options

## Selected Networks

## Available networks

- net04\_ext (00:0c:95:0c:46:63 9a:0d:40:0e:00:0f:91:91)
- net04 (00:0c:95:0c:46:63 9a:0d:40:0e:00:0f:7a:17:90)

Choose network from Available networks to Selected Networks by push button or drag and drop, you may change nic order by drag and drop as well.

Cancel

Launch

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	Instance Name	Image Name	IP Address	Specs	Key Pair	Status	Availability Zone	Task	Power State	Uptime	Actions
	ccTest	Centos_7_GUI	192.164.111.133 10.4.2.26	IITKGPMRegular   4GB RAM   2 VCPU   45.0GB Disk	-	Active	nova	None	Running	2 months, 2 weeks	<button>Create Snapshot</button> <button>More</button>
	TestDiskPartition	Ubuntu_14_04_x2go_45G	192.164.111.132	IITKGPMRegular   4GB RAM   2 VCPU   45.0GB Disk	-	Active	nova	None	Running	3 months, 2 weeks	<button>Create Snapshot</button> <button>More</button>
	centosForSify	CentOS_6.5_GUI	192.164.111.131 10.4.2.21	IITKGPMRegular   4GB RAM   2 VCPU   45.0GB Disk	-	Shutoff	nova	None	Shutdown	7 months	<button>Start Instance</button> <button>More</button>
	CL1_R_SERVER1	Ubuntu_New_X2Go	192.164.111.120 10.4.2.23	IITKGPMxxlarge   32GB RAM   8 VCPU   60.0GB Disk	-	Active	nova	None	Running	9 months, 1 week	<button>Create Snapshot</button> <button>More</button>
	Harshit_Utkarsh_LARGE	Ubuntu_14_04_x2go_60G	192.164.111.129 10.4.2.17	IITKGPMxlarge   16GB RAM   8 VCPU   60.0GB Disk	-	Active	nova	None	Running	1 year, 2 months	<button>Create Snapshot</button> <button>More</button>
	cc16_test1	Ubuntu_14_04_x2go_45G	192.164.111.113 10.4.2.18	IITKGPMRegular   4GB RAM   2 VCPU   45.0GB Disk	-	Shutoff	nova	None	Shutdown	1 year, 4 months	<button>Start Instance</button> <button>More</button>
	MeghadoopNewMaster	CentOS_6.5_GUI	192.164.111.111 10.4.2.55	IITKGPMMeghdoo_Bigger   48GB RAM   8 VCPU   600.0GB Disk	-	Active	nova	None	Running	1 year, 4 months	<button>Create Snapshot</button> <button>More</button>
	Meghadoop_18	CentOS_6.5_GUI	192.164.111.105 10.4.2.52	Meghadoop_new   8GB RAM   4 VCPU   90.0GB Disk	-	Active	nova	None	Running	1 year, 5 months	<button>Create Snapshot</button> <button>More</button>
	Meghadoop_19	CentOS_6.5_GUI	192.164.111.106 10.4.2.53	Meghadoop_new   8GB RAM   4 VCPU   90.0GB Disk	-	Active	nova	None	Running	1 year, 5 months	<button>Create Snapshot</button> <button>More</button>




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	Instance Name	Image Name	IP Address	Size	Key Pair	Status	Availability Zone	Task	Power State	Uptime	Actions
<input type="checkbox"/>	Cloud_nptel_1	CentOS_6.5_GUI		IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Build	nova	Scheduling	No State	0 minutes	<button>Associate Floating IP</button> <button>More</button>
<input type="checkbox"/>	ccTest	Centos_7_GUI	192.164.0.1 10.4.0.1	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Active	nova	None	Running	2 months, 2 weeks	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	TestDiskPartition	Ubuntu_14_04_x2go_45G	192.164.0.2 10.4.0.2	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Active	nova	None	Running	3 months, 2 weeks	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	centosForSify	CentOS_6.5_GUI	192.164.0.3 10.4.0.3	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Shutoff	nova	None	Shutdown	7 months	<button>Start Instance</button> <button>More</button>
<input type="checkbox"/>	CL1_R_SERVER1	Ubuntu_New_X2Go	192.164.0.4 10.4.0.4	IITKGP_xxlarge   32GB RAM   8 VCPU   60.0GB Disk	-	Active	nova	None	Running	9 months, 1 week	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	Harshit_Utkarsh_LARGE	Ubuntu_14_04_x2go_60G	192.164.0.5 10.4.0.5	IITKGP_xlarge   16GB RAM   8 VCPU   60.0GB Disk	-	Active	nova	None	Running	1 year, 2 months	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	cc16_test1	Ubuntu_14_04_x2go_45G	192.164.0.6 10.4.0.6	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Shutoff	nova	None	Shutdown	1 year, 4 months	<button>Start Instance</button> <button>More</button>
<input type="checkbox"/>	MeghdooPNewMaster	CentOS_6.5_GUI	192.164.0.7 10.4.0.7	IITKGP_MeghdooP_Bigger   48GB RAM   8 VCPU   600.0GB Disk	-	Active	nova	None	Running	1 year, 4 months	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	MeghdooP_18	CentOS_6.5_GUI	192.164.0.8 10.4.0.8	MeghdooP_new   8GB RAM   4 VCPU   90.0GB Disk	-	Active	nova	None	Running	1 year, 5 months	<button>Create Snapshot</button> <button>More</button>

Success: Launched instance named "Cloud\_nptel\_1".

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Terminate Instances

<input type="checkbox"/>	Instance Name	Image Name	IP Address	Size	Key Pair	Status	Availability Zone	Task	Power State	Uptime	Actions
<input type="checkbox"/>	Cloud_npTEL_1	CentOS_6.5_GUI	192.164.111.149	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Active	nova	None	Running	1 minute	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	ccTest	Centos_7_GUI	192.164.0.1 10.4.0.1	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Active	nova	None	Running	2 months, 2 weeks	<button>Associate Floating IP</button> <button>Edit Instance</button> <button>Edit Security Groups</button> <button>Console</button> <button>View Log</button> <button>Pause Instance</button> <button>Suspend Instance</button> <button>Resize Instance</button> <button>Soft Reboot Instance</button> <button>Hard Reboot Instance</button> <button>Shut Off Instance</button> <button>Rebuild Instance</button> <button>Terminate Instance</button>
<input type="checkbox"/>	TestDiskPartition	Ubuntu_14_04_x2go_45G	192.164.0.2 10.4.0.2	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Active	nova	None	Running	3 months, 2 weeks	
<input type="checkbox"/>	centosForSify	CentOS_6.5_GUI	192.164.0.3 10.4.0.3	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Shutoff	nova	None	Shutdown	7 months	
<input type="checkbox"/>	CL1_R_SERVER1	Ubuntu_New_X2Go	192.164.0.4 10.4.0.4	IITKGP_xxlarge   32GB RAM   8 VCPU   60.0GB Disk	-	Active	nova	None	Running	9 months, 1 week	
<input type="checkbox"/>	Harshit_Utkarsh_LARGE	Ubuntu_14_04_x2go_60G	192.164.0.5 10.4.0.5	IITKGP_xlarge   16GB RAM   8 VCPU   60.0GB Disk	-	Active	nova	None	Running	1 year, 2 months	
<input type="checkbox"/>	cc16_test1	Ubuntu_14_04_x2go_45G	192.164.0.6 10.4.0.6	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Shutoff	nova	None	Shutdown	1 year, 4 months	<button>Start Instance</button> <button>More</button>
<input type="checkbox"/>	MeghdooPNewMaster	CentOS_6.5_GUI	192.164.0.7 10.4.0.7	IITKGP_Meghdoo_Bigger   48GB RAM   8 VCPU   600.0GB Disk	-	Active	nova	None	Running	1 year, 4 months	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	MeghdooP_18	CentOS_6.5_GUI	192.164.0.8 10.4.0.8	MeghdooP_new   8GB RAM   4 VCPU   90.0GB Disk	-	Active	nova	None	Running	1 year, 5 months	<button>Create Snapshot</button> <button>More</button>

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<input type="checkbox"/>	Instance Name	Image Name	IP Address	Size	Key Pair	Status	Availability Zone	Task	Power State	Uptime	Actions
<input type="checkbox"/>	Cloud_npTEL_1	CentOS_6.5_GUI	192.164.111.149 10.4.2.38	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Active	nova	None	Running	2 minutes	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	ccTest	Centos_7_GUI	192.164.0.1 10.4.0.1	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Active	nova	None	Running	2 months, 2 weeks	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	TestDiskPartition	Ubuntu_14_04_x2go_45G	192.164.0.2 10.4.0.2	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Active	nova	None	Running	3 months, 2 weeks	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	centosForSify	CentOS_6.5_GUI	192.164.0.3 10.4.0.3	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Shutoff	nova	None	Shutdown	7 months	<button>Start Instance</button> <button>More</button>
<input type="checkbox"/>	CL1_R_SERVER1	Ubuntu_New_X2Go	192.164.0.4 10.4.0.4	IITKGP_xxlarge   32GB RAM   8 VCPU   60.0GB Disk	-	Active	nova	None	Running	9 months, 1 week	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	Harshit_Utkarsh_LARGE	Ubuntu_14_04_x2go_60G	192.164.0.5 10.4.0.5	IITKGP_xlarge   16GB RAM   8 VCPU   60.0GB Disk	-	Active	nova	None	Running	1 year, 2 months	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	cc16_test1	Ubuntu_14_04_x2go_45G	192.164.0.6 10.4.0.6	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Shutoff	nova	None	Shutdown	1 year, 4 months	<button>Start Instance</button> <button>More</button>
<input type="checkbox"/>	MeghdooPNewMaster	CentOS_6.5_GUI	192.164.0.7 10.4.0.7	IITKGP_Meghdoo_Bigger   48GB RAM   8 VCPU   600.0GB Disk	-	Active	nova	None	Running	1 year, 4 months	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	MeghdooP_18	CentOS_6.5_GUI	192.164.0.8 10.4.0.8	MeghdooP_new   8GB RAM   4 VCPU   90.0GB Disk	-	Active	nova	None	Running	1 year, 5 months	<button>Create Snapshot</button> <button>More</button>

```
rr@rr-X556UF:~$ ping 10.4.2.38
PING 10.4.2.38 (10.4.2.38) 56(84) bytes of data.
64 bytes from 10.4.2.38: icmp_seq=1 ttl=60 time=1.73 ms
64 bytes from 10.4.2.38: icmp_seq=2 ttl=60 time=1.01 ms
64 bytes from 10.4.2.38: icmp_seq=3 ttl=60 time=1.08 ms
64 bytes from 10.4.2.38: icmp_seq=4 ttl=60 time=1.18 ms
64 bytes from 10.4.2.38: icmp_seq=5 ttl=60 time=0.857 ms
```

NPTEL

---

# Accessing VM by User



---



Session:

Session preferences - cloud-nptel

Session Connection Input/Output Media Shared folders

Session name: **cloud-nptel**

 << change icon

Path: /

Server

Host: 10.4.2.38  
Login: centos  
SSH port: 22

Use RSA/DSA key for ssh connection:  

Try auto login (via SSH Agent or default SSH key)  
 Kerberos 5 (GSSAPI) authentication  
 Delegation of GSSAPI credentials to the server  
 Use Proxy server for SSH connection

Session type

XFCE

Accessing of newly created VM through X2Go Client

Applications Menu



centos - File Browser

04:53



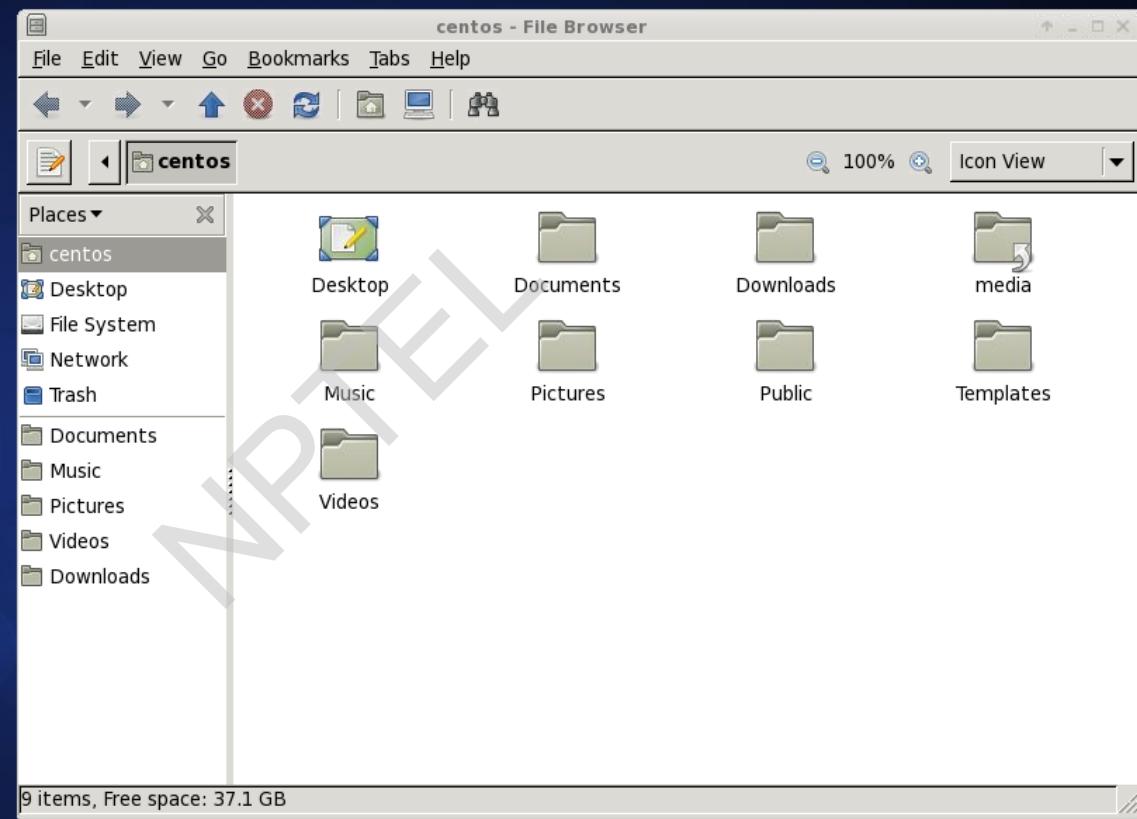
Computer



centos's Home



Trash



Accessing newly created VM - 'cloud-nptel'



Applications Menu

Google - Mozilla Firefox

centos - File Browser

## Google - Mozilla Firefox

Google

[https://www.google.co.in/?gfe\\_rd=cr&ei=7thbWcQt6\\_LwB4XjpYAM&gws\\_rd=ssl](https://www.google.co.in/?gfe_rd=cr&ei=7thbWcQt6_LwB4XjpYAM&gws_rd=ssl)

Search



Gmail Images



Sign in

Come here often? Make Google your homepage.



Yes, show me

# Google

India

Google Search

I'm Feeling Lucky

Google.co.in offered in: हिन्दी वांग्ना தமிழ் மராதி தமிழ் ગુજરાતી କ୍ଷେତ୍ର ମହାଙ୍କୁ ପੰਜਾਬੀ

Advertising

Business

About

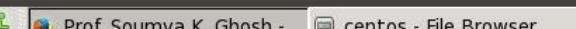
Privacy

Terms

Settings

Use Google.com





Prof. Soumya K. Ghosh - YouTube - Mozilla Firefox

https://www.youtube.com/watch?v=OL8prdrpjOg

Search: soumya k ghosh

Sign in

A screenshot of a Mozilla Firefox browser window displaying a YouTube video. The video shows three people (two men and one woman) sitting around a table in what appears to be a conference room or office setting. Behind them is a wooden panel wall with the Indian Institute of Technology Kharagpur logo and name. The video player has a large watermark "NPTEL" across it. The browser's address bar shows the URL of the video and its title. The search bar also contains the query "soumya k ghosh".

NPTEL

Prof. Soumya K. Ghosh

Up next

Autoplay 

---

# VM Termination



---

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<input type="checkbox"/>	Instance Name	Image Name	IP Address	Size	Key Pair	Status	Availability Zone	Task	Power State	Uptime	Actions
<input checked="" type="checkbox"/>	Cloud_npTEL_1	CentOS_6.5_GUI	192.164.111.149 10.4.2.38	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Active	nova	None	Running	2 minutes	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	ccTest	Centos_7_GUI	192.164.0.1 10.4.0.1	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Active	nova	None	Running	2 months, 2 weeks	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	TestDiskPartition	Ubuntu_14_04_x2go_45G	192.164.0.2 10.4.0.2	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Active	nova	None	Running	3 months, 2 weeks	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	centosForSify	CentOS_6.5_GUI	192.164.0.3 10.4.0.3	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Shutoff	nova	None	Shutdown	7 months	<button>Start Instance</button> <button>More</button>
<input type="checkbox"/>	CL1_R_SERVER1	Ubuntu_New_X2Go	192.164.0.4 10.4.0.4	IITKGP_xxlarge   32GB RAM   8 VCPU   60.0GB Disk	-	Active	nova	None	Running	9 months, 1 week	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	Harshit_Utkarsh_LARGE	Ubuntu_14_04_x2go_60G	192.164.0.5 10.4.0.5	IITKGP_xlarge   16GB RAM   8 VCPU   60.0GB Disk	-	Active	nova	None	Running	1 year, 2 months	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	cc16_test1	Ubuntu_14_04_x2go_45G	192.164.0.6 10.4.0.6	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Shutoff	nova	None	Shutdown	1 year, 4 months	<button>Start Instance</button> <button>More</button>
<input type="checkbox"/>	MeghdooPNewMaster	CentOS_6.5_GUI	192.164.0.7 10.4.0.7	IITKGP_Meghdoo_Bigger   48GB RAM   8 VCPU   600.0GB Disk	-	Active	nova	None	Running	1 year, 4 months	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	MeghdooP_18	CentOS_6.5_GUI	192.164.0.8 10.4.0.8	MeghdooP_new   8GB RAM   4 VCPU   90.0GB Disk	-	Active	nova	None	Running	1 year, 5 months	<button>Create Snapshot</button> <button>More</button>

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## Confirm Terminate Instances

You have selected "Cloud\_ntpel\_1". Please confirm your selection. This action cannot be undone.

Cancel

Terminate Instances

Instance Name	Image	IP Address	Processor	Memory	Volume	Status	Host	None	Uptime	Actions
<input checked="" type="checkbox"/> Cloud_ntpel_1	CentOS 6.5 (x86_64)	192.164.111.103 10.4.2.38	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	-	Active	nova	None	2 minutes	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/> ccTest	Centos_7_GUI	192.164.111.133 10.4.2.26	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	-	Active	nova	None	2 months, 2 weeks	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/> TestDiskPartition	Ubuntu_14_04_x2go_45G	192.164.111.132 10.4.2.27	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	-	Active	nova	None	3 months, 2 weeks	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/> centosForSify	CentOS_6.5_GUI	192.164.111.101 10.4.2.21	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	-	Shutoff	nova	None	7 months	<button>Start Instance</button> <button>More</button>
<input type="checkbox"/> CL1_R_SERVER1	Ubuntu_New_X2Go	192.164.111.102 10.4.2.25	IITKGP_xxlarge   32GB RAM   8 VCPU   60.0GB Disk	-	-	Active	nova	None	9 months, 1 week	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/> Harshit_Utkarsh_LARGE	Ubuntu_14_04_x2go_60G	192.164.111.129 10.4.2.17	IITKGP_xlarge   16GB RAM   8 VCPU   60.0GB Disk	-	-	Active	nova	None	1 year, 2 months	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/> cc16_test1	Ubuntu_14_04_x2go_45G	192.164.111.113 10.4.2.18	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	-	Shutoff	nova	None	1 year, 4 months	<button>Start Instance</button> <button>More</button>
<input type="checkbox"/> MegahadoopNewMaster	CentOS_6.5_GUI	192.164.111.111 10.4.2.55	IITKGP_Megahadoop_Bigger   48GB RAM   8 VCPU   600.0GB Disk	-	-	Active	nova	None	1 year, 4 months	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/> Megahadoop_18	CentOS_6.5_GUI	192.164.111.105 10.4.2.52	Megahadoop_new   8GB RAM   4 VCPU   90.0GB Disk	-	-	Active	nova	None	1 year, 5 months	<button>Create Snapshot</button> <button>More</button>

**Success:** Scheduled termination of  
Instance: Cloud\_ntpel\_1

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<input type="checkbox"/>	Instance Name	Image Name	IP Address	Size	Key Pair	Status	Availability Zone	Task	Power State	Uptime	Actions
<input type="checkbox"/>	Cloud_ntpel_1	CentOS_6.5_GUI	192.164.111.149 10.4.2.38	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Active	nova	 Deleting	Running	34 minutes	
<input type="checkbox"/>	ccTest	Centos_7_GUI	192.164.0.1 10.4.0.1	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Active	nova	None	Running	2 months, 2 weeks	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	TestDiskPartition	Ubuntu_14_04_x2go_45G	192.164.0.2 10.4.0.2	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Active	nova	None	Running	3 months, 2 weeks	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	centosForSify	CentOS_6.5_GUI	192.164.0.3 10.4.0.3	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Shutoff	nova	None	Shutdown	7 months	<button>Start Instance</button> <button>More</button>
<input type="checkbox"/>	CL1_R_SERVER1	Ubuntu_New_X2Go	192.164.0.4 10.4.0.4	IITKGP_xxlarge   32GB RAM   8 VCPU   60.0GB Disk	-	Active	nova	None	Running	9 months, 1 week	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	Harshit_Utkarsh_LARGE	Ubuntu_14_04_x2go_60G	192.164.0.5 10.4.0.5	IITKGP_xlarge   16GB RAM   8 VCPU   60.0GB Disk	-	Active	nova	None	Running	1 year, 2 months	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	cc16_test1	Ubuntu_14_04_x2go_45G	192.164.0.6 10.4.0.6	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Shutoff	nova	None	Shutdown	1 year, 4 months	<button>Start Instance</button> <button>More</button>
<input type="checkbox"/>	MeghadoopNewMaster	CentOS_6.5_GUI	192.164.0.7 10.4.0.7	IITKGP_Meghdoo_Bigger   48GB RAM   8 VCPU   600.0GB Disk	-	Active	nova	None	Running	1 year, 4 months	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	Meghadoop_18	CentOS_6.5_GUI	192.164.0.8 10.4.0.8	Meghadoop_new   8GB RAM   4 VCPU   90.0GB Disk	-	Active	nova	None	Running	1 year, 5 months	<button>Create Snapshot</button> <button>More</button>



## Instances

## Instances

Instance Name	Filter	Filter	+ Launch Instance	Soft Reboot Instances	Terminate Instances
---------------	--------	--------	-------------------	-----------------------	---------------------

	Instance Name	Image Name	IP Address	Size	Key Pair	Status	Availability Zone	Task	Power State	Uptime	Actions
<input type="checkbox"/>	ccTest	Centos_7_GUI	192.164.0.1 10.4.0.1	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Active	nova	None	Running	2 months, 2 weeks	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	TestDiskPartition	Ubuntu_14_04_x2go_45G	192.164.0.2 10.4.0.2	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Active	nova	None	Running	3 months, 2 weeks	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	centosForSify	CentOS_6.5_GUI	192.164.0.3 10.4.0.3	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Shutoff	nova	None	Shutdown	7 months	<button>Start Instance</button> <button>More</button>
<input type="checkbox"/>	CL1_R_SERVER1	Ubuntu_New_X2Go	192.164.0.4 10.4.0.4	IITKGP_xxlarge   32GB RAM   8 VCPU   60.0GB Disk	-	Active	nova	None	Running	9 months, 1 week	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	Harshit_Utkarsh_LARGE	Ubuntu_14_04_x2go_60G	192.164.0.5 10.4.0.5	IITKGP_xlarge   16GB RAM   8 VCPU   60.0GB Disk	-	Active	nova	None	Running	1 year, 2 months	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	cc16_test1	Ubuntu_14_04_x2go_45G	192.164.0.6 10.4.0.6	IITKGP_regular   4GB RAM   2 VCPU   45.0GB Disk	-	Shutoff	nova	None	Shutdown	1 year, 4 months	<button>Start Instance</button> <button>More</button>
<input type="checkbox"/>	MeghadoopNewMaster	CentOS_6.5_GUI	192.164.0.7 10.4.0.7	IITKGP_Meghadoop_Bigger   48GB RAM   8 VCPU   600.0GB Disk	-	Active	nova	None	Running	1 year, 4 months	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	Meghadoop_18	CentOS_6.5_GUI	192.164.0.8 10.4.0.8	Meghadoop_new   8GB RAM   4 VCPU   90.0GB Disk	-	Active	nova	None	Running	1 year, 5 months	<button>Create Snapshot</button> <button>More</button>
<input type="checkbox"/>	Meghadoop_19	CentOS_6.5_GUI	192.164.0.9 10.4.0.9	Meghadoop_new   8GB RAM   4 VCPU   90.0GB Disk	-	Active	nova	None	Running	1 year, 5 months	<button>Create Snapshot</button> <button>More</button>

# Thank You!

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# CLOUD COMPUTING

## CREATE A PYTHON WEB APP IN MICROSOFT AZURE:

PROF. SOUMYA K. GHOSH  
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING  
IIT KHARAGPUR

# Microsoft Azure : An overview

- Microsoft Azure is a growing collection of integrated cloud services which developers and IT professionals use to build, deploy and manage applications through a global network of datacenters.
- With Azure, developers get the freedom to build and deploy wherever they want, using the tools, applications and frameworks of their choice.

Ref: <https://azure.microsoft.com/en-in/>



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# Deploy anywhere with your choice of tools

- Connecting cloud and on-premises with consistent hybrid cloud capabilities and using open source technologies



Build your apps, your way

Connect on-premises data and apps

Extend the cloud on-premises

Ref: <https://azure.microsoft.com/en-in/>

# Protect your business with the most trusted cloud

- Azure helps to protect assets through a rigorous methodology and focus on security, privacy, compliance and transparency.



Achieve global scale in local regions

Detect and mitigate threats

Rely on the most trusted cloud

Ref: <https://azure.microsoft.com/en-in/>

# Accelerate app innovation

- Build simple to complex projects within a consistent portal experience using deeply-integrated cloud services, so developers can rapidly develop, deploy and manage their apps.



Build apps quickly and easily

Manage apps proactively

Deliver mobile apps seamlessly

Ref: <https://azure.microsoft.com/en-in/>

# Power decisions and apps with insights

- Uncover business insights with advanced analytics and data services for both traditional and new data sources. Detect anomalies, predict behaviors and recommend actions for your business.



Add intelligence to your apps



Predict and respond proactively



Support your strategy with any data

Ref: <https://azure.microsoft.com/en-in/>

**In this demo, we are going to present the creation of a python web app in Microsoft Azure.**

Ref: <https://azure.microsoft.com/en-in/>



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# Azure Web Apps

- Highly scalable, Self-patching web hosting service.
- Prerequisites
  - ✓ To complete this demo:
    - ➔ Install Git
    - ➔ Install Python

Ref: <https://azure.microsoft.com/en-in/>

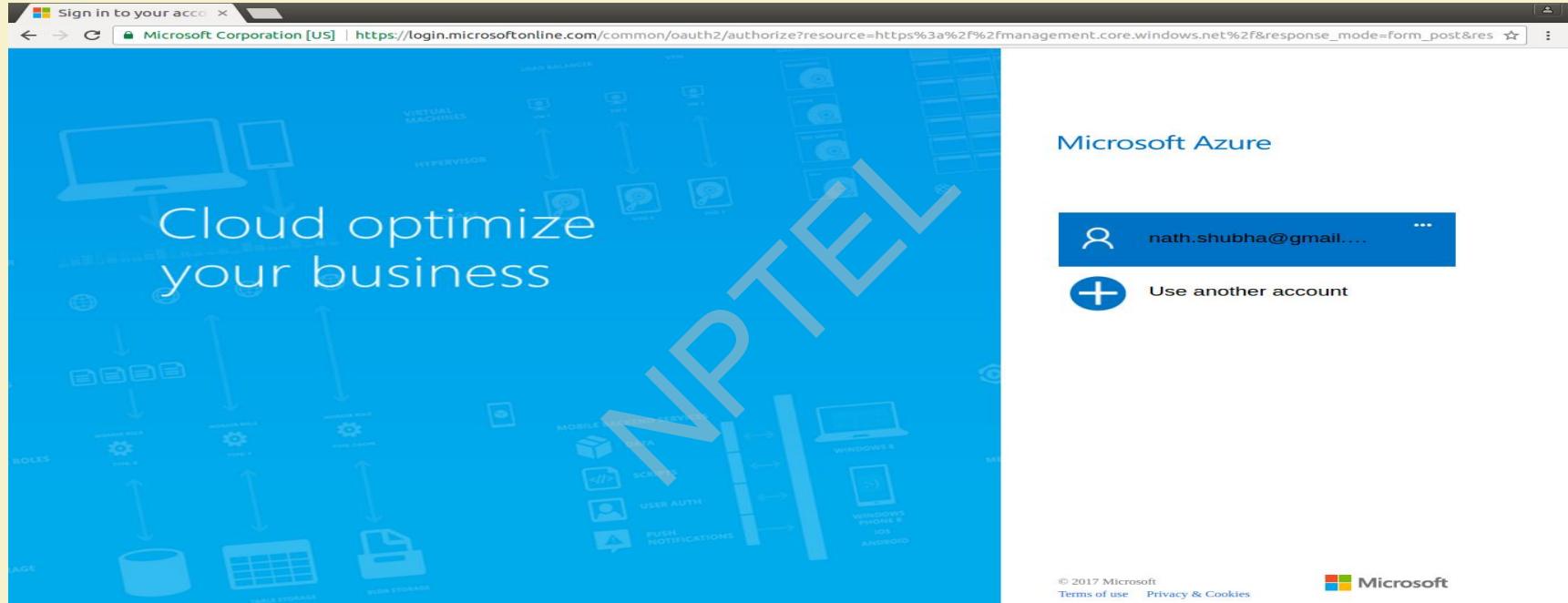


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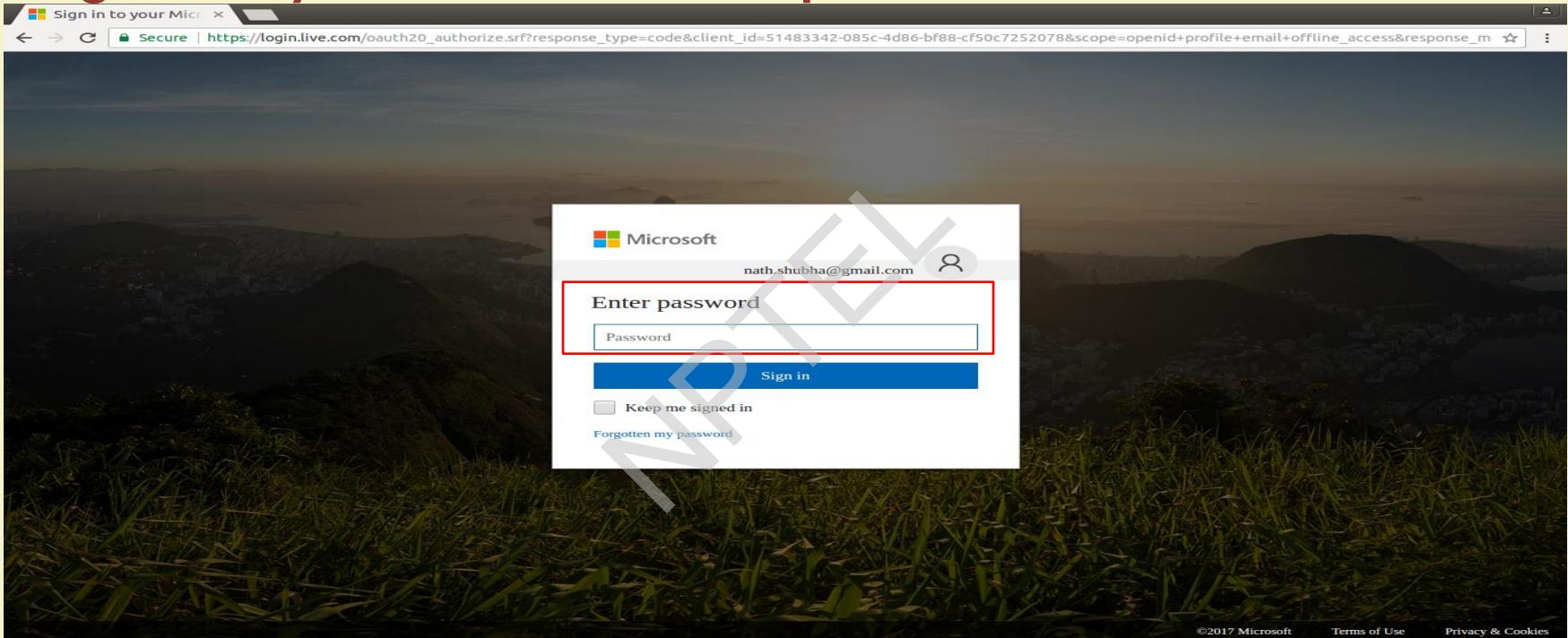
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# Go to <https://portal.azure.com/> and login with your username and password



Ref: <https://docs.microsoft.com/en-us/azure/app-service-web/app-service-web-get-started-python>

# Login with your username and password



Ref: <https://docs.microsoft.com/en-us/azure/app-service-web/app-service-web-get-started-python>

# Launch Azure Cloud Shell : It is a free bash shell that we can directly use within the Azure portal

The screenshot shows the Microsoft Azure portal dashboard. On the left, there's a sidebar with various service icons like New, Dashboard, All resources, Resource groups, App Services, Function Apps, SQL databases, Azure Cosmos DB, Virtual machines, Load balancers, and More services. Below this is a Bash terminal window with the command "nath\_shubha@Azure:~\$". At the top right of the dashboard, there's a toolbar with icons for Search resources, Edit dashboard, Share, Fullscreen, Clone, Delete, and a dropdown menu. A red box highlights the dropdown menu icon (three dots) in the toolbar. The main area shows "All resources ALL SUBSCRIPTIONS" and a "Quickstart tutorials" section with links to Windows Virtual Machines, Linux Virtual Machines, App Service, Functions, and SQL Database.

Ref: <https://docs.microsoft.com/en-us/azure/app-service-web/app-service-web-get-started-python>

# Download the sample

In a terminal window, run the following command to clone the sample app repository to your local machine.

```
root@shubha-OptiPlex-9020:/home/shubha
root@shubha-OptiPlex-9020:/home/shubha# git clone https://github.com/Azure-Samples/python-docs-hello-world
Cloning into 'python-docs-hello-world'...
remote: Counting objects: 18, done.
remote: Total 18 (delta 0), reused 0 (delta 0), pack-reused 18
Unpacking objects: 100% (18/18), done.
Checking connectivity... done.
root@shubha-OptiPlex-9020:/home/shubha#
```

Ref: <https://docs.microsoft.com/en-us/azure/app-service-web/app-service-web-get-started-python>

# Change to the directory that contains the sample code

```
root@shubha-OptiPlex-9020: /home/shubha/python-docs-hello-world
root@shubha-OptiPlex-9020: /home/shubha# cd python-docs-hello-world/
root@shubha-OptiPlex-9020: /home/shubha/python-docs-hello-world# █
```

Ref: <https://docs.microsoft.com/en-us/azure/app-service-web/app-service-web-get-started-python>

# Install flask

```
root@shubha-OptiPlex-9020:/home/shubha/python-docs-hello-world
root@shubha-OptiPlex-9020:/home/shubha/python-docs-hello-world# pip install flask
Collecting flask
  Downloading Flask-0.12.2-py2.py3-none-any.whl (83kB)
    100% |██████████| 92kB 140kB/s
Collecting itsdangerous>=0.21 (from flask)
  Downloading itsdangerous-0.24.tar.gz (46kB)
    100% |██████████| 51kB 4.3MB/s
Collecting click>=2.0 (from flask)
  Downloading click-6.7-py2.py3-none-any.whl (71kB)
    100% |██████████| 71kB 322kB/s
Collecting Werkzeug>=0.7 (from flask)
  Downloading Werkzeug-0.12.2-py2.py3-none-any.whl (312kB)
    100% |██████████| 317kB 408kB/s
Collecting Jinja2>=2.4 (from flask)
  Downloading Jinja2-2.9.6-py2.py3-none-any.whl (340kB)
    100% |██████████| 348kB 389kB/s
Collecting MarkupSafe>=0.23 (from Jinja2>=2.4->flask)
  Downloading MarkupSafe-1.0.tar.gz
Building wheels for collected packages: itsdangerous, MarkupSafe
  Running setup.py bdist_wheel for itsdangerous ... done
  Stored in directory: /root/.cache/pip/wheels/fc/a8/66/24d655233c757e178d45dea2de22a04c6d92766abfb741129a
  Running setup.py bdist_wheel for MarkupSafe ... done
  Stored in directory: /root/.cache/pip/wheels/88/a7/30/e39a54a87bcbe25308fa3ca64e8ddc75d9b3e5afa21ee32d57
Successfully built itsdangerous MarkupSafe
Installing collected packages: itsdangerous, click, Werkzeug, MarkupSafe, Jinja2, flask
Successfully installed Jinja2-2.9.6 MarkupSafe-1.0 Werkzeug-0.12.2 click-6.7 flask-0.12.2 itsdangerous-0.24
You are using pip version 8.1.1, however version 9.0.1 is available.
You should consider upgrading via the 'pip install --upgrade pip' command.
root@shubha-OptiPlex-9020:/home/shubha/python-docs-hello-world#
```

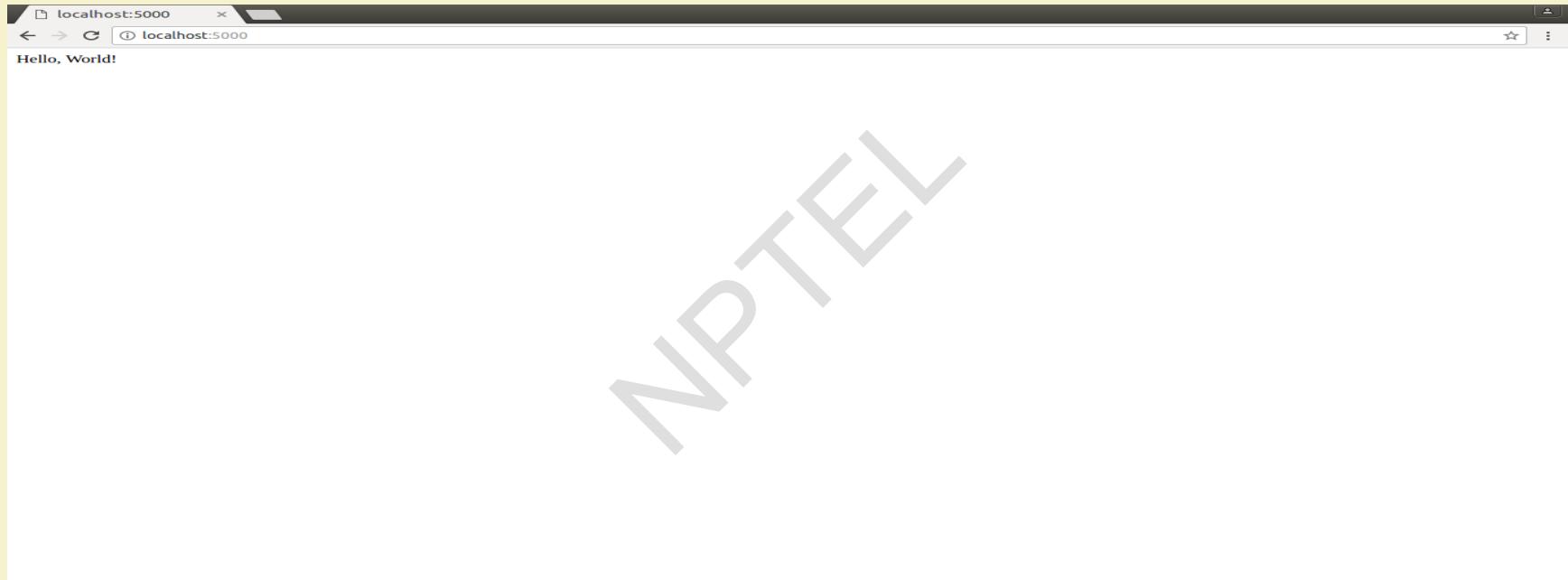
Ref: <https://docs.microsoft.com/en-us/azure/app-service-web/app-service-web-get-started-python>

# Run the app locally

```
root@shubha-OptiPlex-9020: /home/shubha/python-docs-hello-world
root@shubha-OptiPlex-9020: /home/shubha/python-docs-hello-world# python main.py
 * Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
```

Ref: <https://docs.microsoft.com/en-us/azure/app-service-web/app-service-web-get-started-python>

**Open a web browser, and navigate to the sample app at <http://localhost:5000>. You can see the Hello World message from the sample app displayed in the page.**



Ref: <https://docs.microsoft.com/en-us/azure/app-service-web/app-service-web-get-started-python>

# Configure a deployment user using the command

- A deployment user is required for FTP and local Git deployment to a web app.

```
az webapp deployment user set --user-name <username> --  
password <password>
```

Ref: <https://docs.microsoft.com/en-us/azure/app-service-web/app-service-web-get-started-python>



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**Create a resource group: A resource group is a logical container into which Azure resources like web apps, databases, and storage accounts are deployed and managed.**

The screenshot shows the Microsoft Azure portal dashboard. On the left, there's a sidebar with various service icons: Dashboard, All resources, Resource groups, App Services, Function Apps, SQL databases, Azure Cosmos DB, Virtual machines, Load balancers, and More services. The main area displays 'All resources ALL SUBSCRIPTIONS' with one item listed: 'csg235f3d99e07fx472... Storage account'. To the right, there's a section for 'Quickstart tutorials' with links for Windows Virtual Machines, Linux Virtual Machines, App Service, Functions, and SQL Database. At the bottom, a terminal window shows the command 'az group create --name myResourceGroup --location westeurope' being run, followed by its JSON output.

```
nath_shubha@Azure:~$ az group create --name myResourceGroup --location westeurope
{
  "id": "/subscriptions/235f3d99-e07f-472c-b707-0dac28e4b402/resourceGroups/myResourceGroup",
  "location": "westeurope",
  "managedBy": null,
  "name": "myResourceGroup",
  "properties": {
    "provisioningState": "Succeeded"
  },
  "tags": null
}
nath_shubha@Azure:~$
```

Ref: <https://docs.microsoft.com/en-us/azure/app-service-web/app-service-web-get-started-python>

# Create an Azure App Service plan

- An App Service plan specifies the location, size, and features of the web server farm that hosts your app. You can save money when hosting multiple apps by configuring the web apps to share a single App Service plan.
- App Service plans define:
  - Region (for example: North Europe, East US, or Southeast Asia)
  - Instance size (small, medium, or large)
  - Scale count (1 to 20 instances)
  - SKU (Free, Shared, Basic, Standard, or Premium)

Ref: <https://docs.microsoft.com/en-us/azure/app-service-web/app-service-web-get-started-python>



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# Create an Azure App Service plan

The screenshot shows the Microsoft Azure portal dashboard. On the left, there's a sidebar with navigation links like 'Dashboard', 'All resources', 'Resource groups', etc. The main area shows 'All resources ALL SUBSCRIPTIONS' with one item listed: 'csg235f3d99e07fx472... Storage account'. To the right, there's a 'Quickstart tutorials' section with links to 'Windows Virtual Machines', 'Linux Virtual Machines', 'App Service' (which is currently selected), and 'Functions'. Below the dashboard, a terminal window is open with the following command:

```
nath.shubha@Azure:~$ az appservice plan create --name myAppServicePlan --resource-group myResourceGroup --sku FREE
{
  "adminSiteName": null,
  "appServicePlanName": "myAppServicePlan",
  "geoRegion": "West Europe",
  "hostingEnvironmentProfile": null,
  "id": "/subscriptions/235f3d99-e07f-472c-b707-0dac28e4b402/resourceGroups/myResourceGroup/providers/Microsoft.Web/serverFarms/myAppServicePlan",
  "kind": "app",
  "location": "West Europe",
  "maxComputeUnitOrWorkers": 1,
  "name": "myAppServicePlan",
  "numberOfSites": 0,
  "perSiteScaling": false,
  "provisioningState": "Succeeded",
  "reserved": false,
  "resourceGroup": "myResourceGroup",
  "sku": {
    "family": "B1"
  }
}
```

Ref: <https://docs.microsoft.com/en-us/azure/app-service-web/app-service-web-get-started-python>

# Create a web app

- The web app provides a hosting space for your code and provides a URL to view the deployed app.

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Ref: <https://docs.microsoft.com/en-us/azure/app-service-web/app-service-web-get-started-python>



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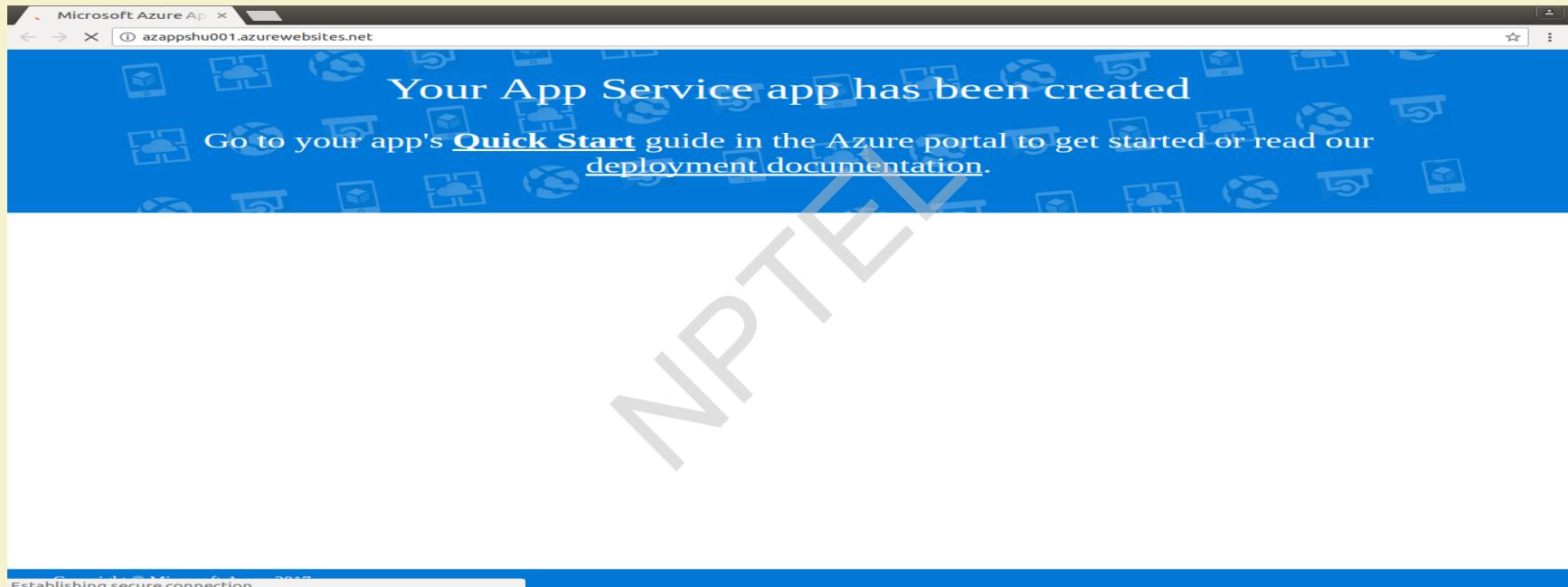
# Create a web app

The screenshot shows the Microsoft Azure portal dashboard. On the left, the navigation menu includes options like Dashboard, All resources, Resource groups, App Services, Function Apps, SQL databases, Azure Cosmos DB, Virtual machines, Load balancers, and More services. The main area displays 'All resources ALL SUBSCRIPTIONS' with a storage account listed. To the right, there's a 'Quickstart tutorials' section with links to Windows Virtual Machines, Linux Virtual Machines, App Service, Functions, and SQL Database. At the bottom, a terminal window shows the command: `nath.shubha@Azure:~$ az webapp create --name azappshu001 --resource-group myResourceGroup --plan myAppServicePlan`. The output of the command is displayed, detailing the configuration of the new web app.

```
nath.shubha@Azure:~$ az webapp create --name azappshu001 --resource-group myResourceGroup --plan myAppServicePlan
{
  "availabilityState": "Normal",
  "clientAffinityEnabled": true,
  "clientCertEnabled": false,
  "cloningInfo": null,
  "containerSize": 0,
  "dailyMemoryTimeQuota": 0,
  "defaultHostName": "azappshu001.azurewebsites.net",
  "enabled": true,
  "enabledHostNames": [
    "azappshu001.azurewebsites.net",
    "azappshu001.scm.azurewebsites.net"
  ],
  "ftpPublishingUrl": "ftp://waws-prod-am2-121.ftp.azurewebsites.windows.net/site/wwwroot",
  "gatewaySiteName": null,
  "hostNameSslStates": [
    ...
  ]
}
```

Ref: <https://docs.microsoft.com/en-us/azure/app-service-web/app-service-web-get-started-python>

Browse to the site [azappshu001.azurewebsites.net](https://azappshu001.azurewebsites.net) to see your newly created web app.



Ref: <https://docs.microsoft.com/en-us/azure/app-service-web/app-service-web-get-started-python>

# Configure to use Python: Setting the Python version this way uses a default container provided by the platform.

The screenshot shows the Microsoft Azure portal dashboard. On the left, there's a sidebar with various service icons like Storage account, App Services, Functions, SQL databases, and Virtual machines. The main area shows a storage account named 'csg235f3d99e07fx472...'. To the right, there's a 'Quickstart tutorials' section with links to Windows Virtual Machines, Linux Virtual Machines, App Service, Functions, and SQL Database. At the bottom, a terminal window is open with the following command:

```
nath.shubha@Azure:~$ az webapp config set --python-version 3.4 --name azappshu001 --resource-group myResourceGroup
{
  "alwaysOn": false,
  "apiDefinition": null,
  "appCommandLine": "",
  "appSettings": null,
  "autoHealEnabled": false,
  "autoHealRules": [
    {
      "actions": null,
      "triggers": null
    }
  ],
  "autoSwapSlotName": null,
  "connectionStrings": null,
  "cors": null,
  "defaultDocuments": [
    "Default.htm",
    "Default.html"
  ],
  ...
}
```

Ref: <https://docs.microsoft.com/en-us/azure/app-service-web/app-service-web-get-started-python>

# Configure local Git deployment

- App Service supports several ways to deploy content to a web app, such as FTP, local Git, GitHub, Visual Studio Team Services, and Bitbucket. For this quickstart, you deploy by using local Git. That means you deploy by using a Git command to push from a local repository to a repository in Azure.

Ref: <https://docs.microsoft.com/en-us/azure/app-service-web/app-service-web-get-started-python>



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# Configure local Git deployment

The screenshot shows the Microsoft Azure portal dashboard. On the left, the navigation menu includes options like Dashboard, All resources, Resource groups, App Services, Function Apps, SQL databases, Azure Cosmos DB, Virtual machines, Load balancers, and More services. The main area displays a storage account resource named 'csg235f3d99e07fx472...'. To the right, there's a 'Quickstart tutorials' section with links for Windows Virtual Machines, Linux Virtual Machines, App Service, Functions, and SQL Database. At the bottom, a terminal window shows the execution of an Azure CLI command:

```
nath_shubha@Azure:~$ az webapp deployment source config-local-git --name azappshu001 --resource-group myResourceGroup --query url --output tsv  
https://shudem011@azappshu001.scm.azurewebsites.net/azappshu001.git  
nath_shubha@Azure:~$
```

Ref: <https://docs.microsoft.com/en-us/azure/app-service-web/app-service-web-get-started-python>

# Push to Azure from Git: Add an Azure remote to your local Git repository.

```
x root@shubha-OptiPlex-9020: /home/shubha/python-docs-hello-world
root@shubha-OptiPlex-9020:/home/shubha/python-docs-hello-world# git remote add azure https://shudemo11@azap
pshu001.scm.azurewebsites.net/azappshu001.git
root@shubha-OptiPlex-9020:/home/shubha/python-docs-hello-world# █
```

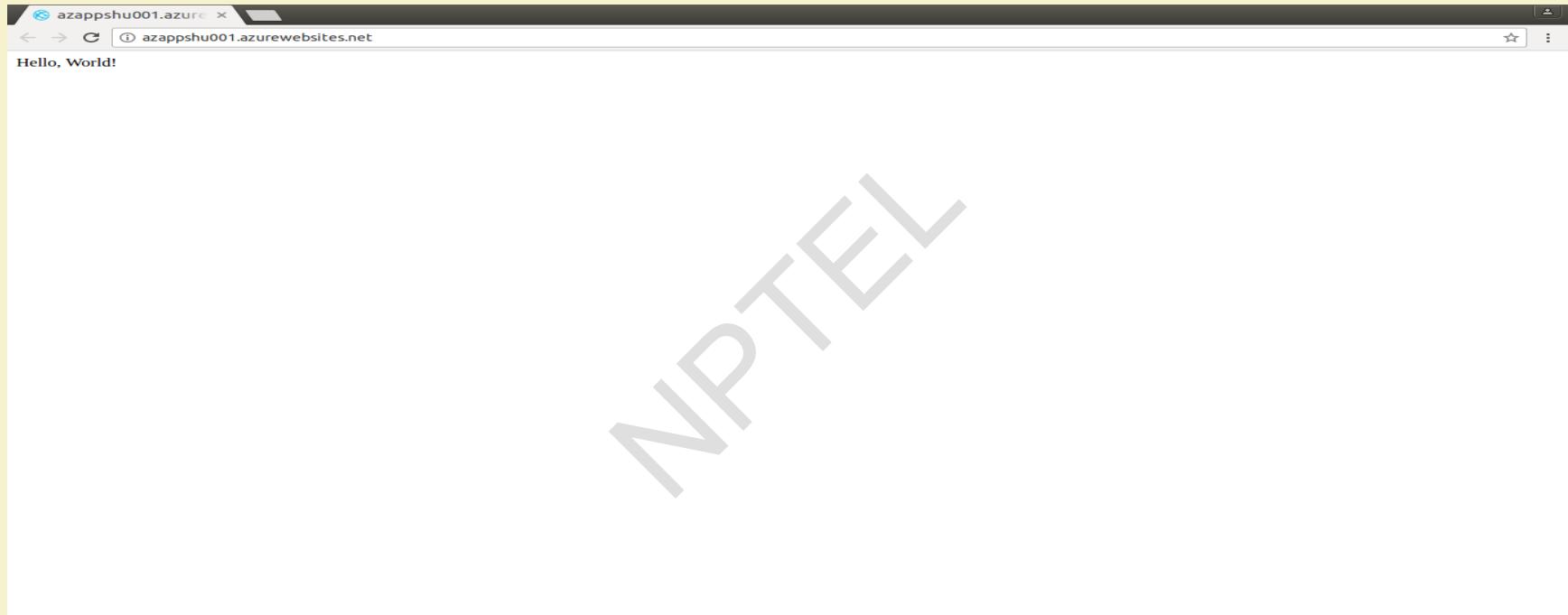
Ref: <https://docs.microsoft.com/en-us/azure/app-service-web/app-service-web-get-started-python>

**Push to the Azure remote to deploy your app. You are prompted for the password you created earlier when you created the deployment user. Make sure that you enter the password you created in Configure a deployment user, not the password you use to log in to the Azure portal.**

```
root@shubha-OptiPlex-9020: /home/shubha/python-docs-hello-world# git push azure master
Counting objects: 18, done.
Delta compression using up to 4 threads.
Compressing objects: 100% (16/16), done.
Writing objects: 100% (18/18) 4.31 KiB | 0 bytes/s, done.
Total 18 (delta 0)
remote: Updating branch 'master'.
remote: Updating submodules.
remote: Preparing deployment for commit id '44e74fe7dd'.
remote: Generating deployment script...
remote: Creating deployment package for python Web site
remote: Generated deployment script files
remote: Running deployment command...
remote: Handling python deployment.
remote: KuduSync.NET from: 'D:\home\site\repository' to: 'D:\home\site\wwwroot'
remote: Publishing file: 'hostingstart.html'
remote: Copying file: '.gitignore'
remote: Copying file: 'LICENSE'
remote: Copying file: 'main.py'
remote: Copying file: 'README.md'
remote: Copying file: 'requirements.txt'
remote: Copying file: 'virtualenv_proxy.py'
remote: Copying file: 'web.2.7.config'
remote: Copying file: 'web.3.4.config'
remote: Detected requirements.txt. You can skip Python specific steps with a .skipPythonDeployment file.
remote: Detecting Python runtime from site configuration
remote: Detected python 3.4
remote: Creating python 3.4 virtual environment.
remote: .
remote: Pip install requirements.
remote: Downloading/unpacking Flask==0.12.1 (from -r requirements.txt (line 1))
remote: Downloading/unpacking itsdangerous==0.21 (from Flask==0.12.1->-r requirements.txt (line 1))
remote: Running setup.py (path:D:\home\site\wwwroot\env\build\itsdangerous\setup.py) egg_info for package itsdangerous
remote: .
remote:   warning: no previously-included files matching '*' found under directory 'docs\_build'
remote: Downloading/unpacking Jinja2==2.4 (from Flask==0.12.1->-r requirements.txt (line 1))
remote: Downloading/unpacking click==2.0 (from Flask==0.12.1->-r requirements.txt (line 1))
remote: Downloading/unpacking Werkzeug==0.7 (from Flask==0.12.1->-r requirements.txt (line 1))
remote: Downloading/unpacking MarkupSafe==0.23 (from Jinja2==2.4->Flask==0.12.1->-r requirements.txt (line 1))
remote: Downloading MarkupSafe-1.0.tar.gz
remote: Running setup.py (path:D:\home\site\wwwroot\env\build\MarkupSafe\setup.py) egg_info for package MarkupSafe
remote: .
remote: Installing collected packages: Flask, itsdangerous, Jinja2, click, Werkzeug, MarkupSafe
remote: Running setup.py install for itsdangerous
remote:
```

Ref: <https://docs.microsoft.com/en-us/azure/app-service-web/app-service-web-get-started-python>

# Browse to the app at azappshu001.azurewebsites.net



Ref: <https://docs.microsoft.com/en-us/azure/app-service-web/app-service-web-get-started-python>

# Update and redeploy the code

```
root@shubha-OptiPlex-9020: /home/shubha/python-docs-hello-world
root@shubha-OptiPlex-9020: /home/shubha/python-docs-hello-world# nano main.py
```

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Ref: <https://docs.microsoft.com/en-us/azure/app-service-web/app-service-web-get-started-python>



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# Using a local text editor, open the main.py file in the Python app, and make a small change

```
root@shubha-OptiPlex-9020: /home/shubha/python-docs-hello-world
GNU nano 2.5.3                                         File: main.py                                         Modified

from flask import Flask
app = Flask(__name__)

@app.route('/')
def hello_world():
    return 'Welcome to the NPTEL course on Cloud Computing!!!'

if __name__ == '__main__':
    app.run()

^C Get Help      ^O Write Out     ^W Where Is      ^K Cut Text      ^J Justify      ^C Cur Pos      ^Y Prev Page
^X Exit         ^R Read File     ^\ Replace       ^U Uncut Text    ^T To Linter    ^G Go To Line   ^V Next Page
```

Ref: <https://docs.microsoft.com/en-us/azure/app-service-web/app-service-web-get-started-python>

# Commit your changes in Git

```
root@shubha-OptiPlex-9020: /home/shubha/python-docs-hello-world
root@shubha-OptiPlex-9020: /home/shubha/python-docs-hello-world# git commit -am "updated output"
[master 17a5143] updated output
 1 file changed, 1 insertion(+), 1 deletion(-)
root@shubha-OptiPlex-9020: /home/shubha/python-docs-hello-world# █
```

Ref: <https://docs.microsoft.com/en-us/azure/app-service-web/app-service-web-get-started-python>

# Push the code changes to Azure

```
root@shubha-OptiPlex-9020: /home/shubha/python-docs-hello-world
root@shubha-OptiPlex-9020:/home/shubha/python-docs-hello-world# git push azure master
Password for 'https://shudemo11@azappshu001.scm.azurewebsites.net':
Counting objects: 3, done.
Delta compression using up to 4 threads.
Compressing objects: 100% (3/3), done.
Writing objects: 100% (3/3), 396 bytes | 0 bytes/s, done.
Total 3 (delta 1), reused 0 (delta 0)
remote: Updating branch 'master'.
remote: Updating submodules.
remote: Preparing deployment for commit id '17a51436e4'.
remote: Generating deployment script.
remote: Running deployment command...
remote: Handling python deployment.
remote: KuduSync.NET from: 'D:\home\site\repository' to: 'D:\home\site\wwwroot'
remote: Copying file: 'main.py'
remote: Detected requirements.txt. You can skip Python specific steps with a .skipPythonDeployment file.
remote: Detecting Python runtime from site configuration
remote: Detected python-3.4
remote: Found compatible virtual environment.
remote: Pip install requirements.
remote: Requirement already satisfied (use --upgrade to upgrade): Flask==0.12.1 in d:\home\site\wwwroot\env\lib\site-packages (from -r requirements.txt (line 1))
remote: Cleaning up...
remote: Overwriting web.config with web.3.4.config
```

Ref: <https://docs.microsoft.com/en-us/azure/app-service-web/app-service-web-get-started-python>

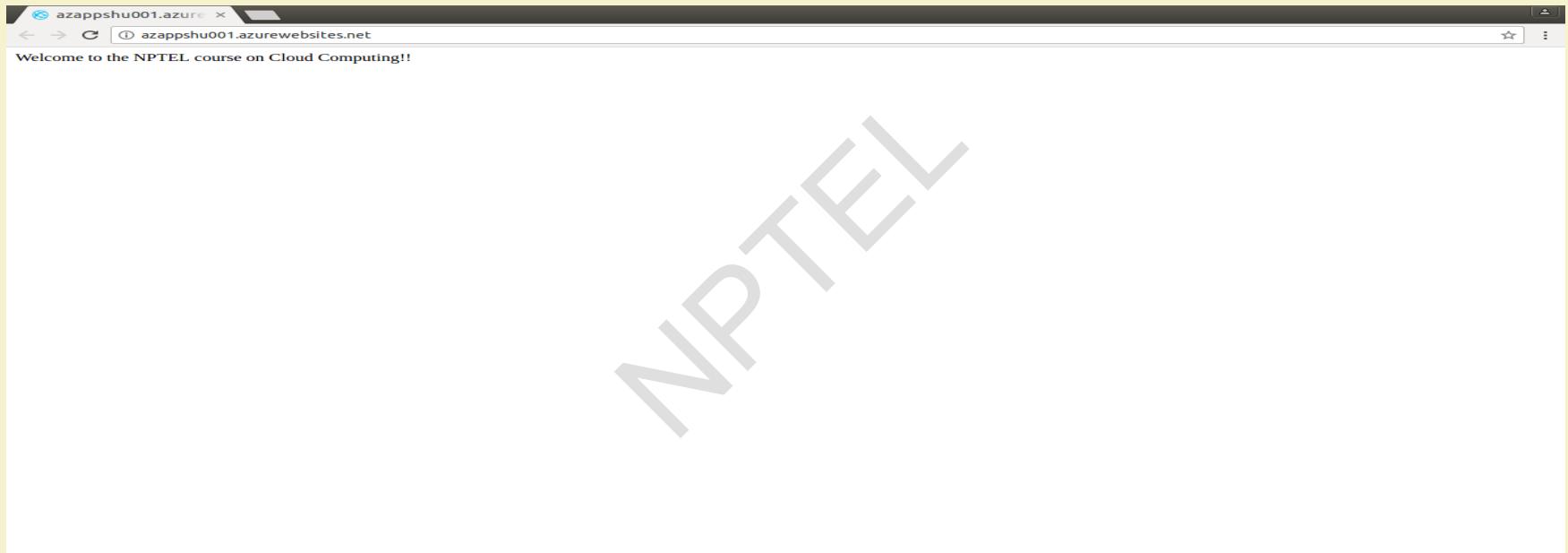


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Once deployment has completed, refresh the page  
**azappshu001.azurewebsites.net**



Ref: <https://docs.microsoft.com/en-us/azure/app-service-web/app-service-web-get-started-python>

# References

1. <https://docs.microsoft.com/en-us/azure/app-service-web/app-service-web-get-started-python>

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# Thank You!!

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# Google Cloud Platform (GCP)

Prof. Soumya K Ghosh

Department of Computer Science and Engineering

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# What's Google Cloud Platform?

- **Google Cloud Platform** is a set of services that enables developers to **build, test and deploy** applications on Google's reliable infrastructure.
- **Google cloud platform** is a set of modular cloud-based services that allow you to create anything from simple websites to complex applications



Google Cloud Platform

# Google Cloud Platform Services!



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# Why Google Cloud Platform?

## *Run on Google's Infrastructure*

Build on the same infrastructure that allows Google to return billions of search results in milliseconds, serve 6 billion hours of YouTube video per month and provide storage for 425 million Gmail users.

- ✓ Global Network
- ✓ Redundancy
- ✓ Innovative Infrastructure

# Why Google Cloud Platform? (contd..)

## *Focus on your product*

Rapidly develop, deploy and iterate your applications without worrying about system administration. Google manages your application, database and storage servers so you don't have to.

- ✓ Managed services
- ✓ Developer Tools and SDKs
- ✓ Console and Administration

# Why Google Cloud Platform? (contd..)

## *Mix and Match Services*

Virtual machines. Managed platform. Blob storage. Block storage. NoSQL datastore. MySQL database. Big Data analytics. Google Cloud Platform has all the services your application architecture needs.

- ✓ Compute
- ✓ Storage
- ✓ Services

# Why Google Cloud Platform? (contd..)

## *Scale to millions of users*

Applications hosted on Cloud Platform can automatically scale up to handle the most demanding workloads and scale down when traffic subsides. You pay only for what you use.

**Scale-up:** Cloud Platform is designed to scale like Google's own products, even when you experience a huge traffic spike. Managed services such as App Engine or Cloud Datastore give you auto-scaling that enables your application to grow with your users.

**Scale-down:** Just as Cloud Platform allows you to scale-up, managed services also scale down. You don't pay for computing resources that you don't need.

# Why Google Cloud Platform? (contd..)

## *Performance you can count on*

Google's compute infrastructure gives you consistent CPU, memory and disk performance. The network and edge cache serve responses rapidly to your users across the world.

- ✓ CPU, Memory and Disk
- ✓ Global Network
- ✓ Transparent maintenance

# Why Google Cloud Platform? (contd..)

## *Get the support you need*

With a worldwide community of users, partner ecosystem and premium support packages, Google provides a full range of resources to help you get started and grow.



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# Google Cloud Platform Services

The diagram illustrates the Google Cloud Platform's Compute services. A red rectangular box is labeled "Compute" at the top. Inside, there are two service icons: "Compute Engine" (represented by a blue cube icon) and "App Engine" (represented by a white icon with blue arrows). A blue circle highlights the "Compute Engine" icon. To the right of the red box is a white rectangular area containing three numbered points:

- I. Cloud Platform offers both a fully managed platform and flexible virtual machines, allowing you to choose a system that meets your needs.
- II. Use App Engine, a Platform-as-a-Service, when you just want to focus on your code and not worry about patching or maintenance.
- III. Get access to raw virtual machines with Compute Engine and have the flexibility to build anything you need.

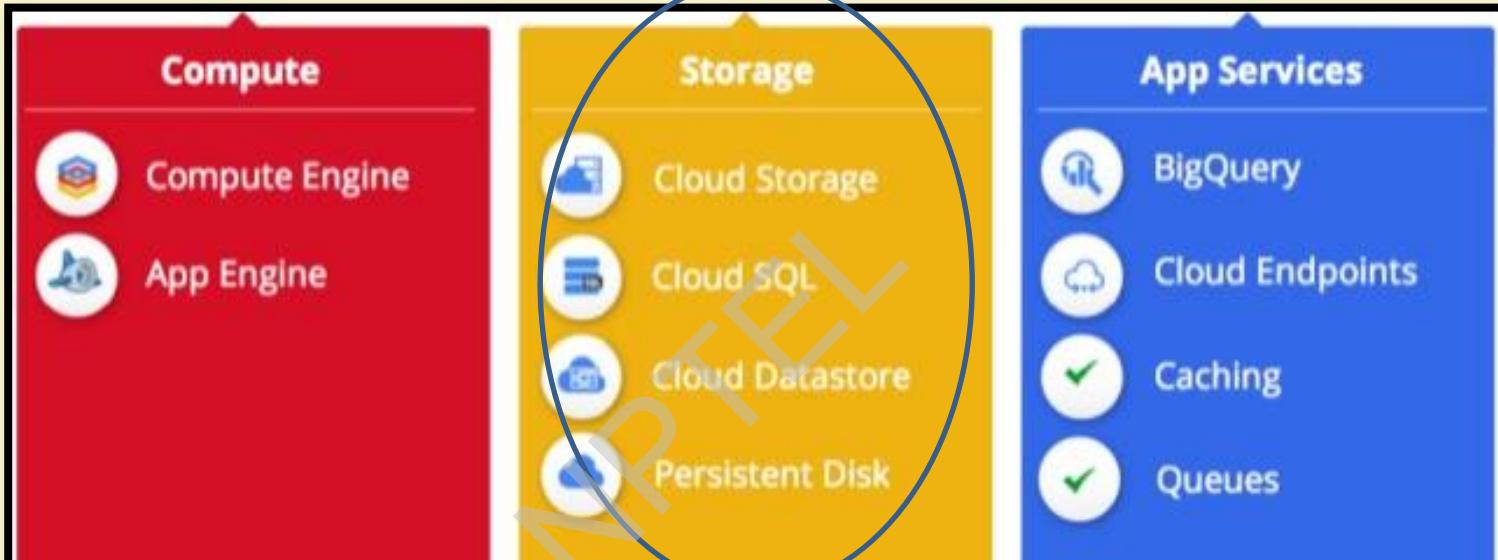


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# Google Cloud Platform Services



- I. Google Cloud Platform provides a range of storage services that allow you to maintain easy and quick access to your data.
- II. With **Cloud SQL** and **Datastore** you get MySQL or NoSQL databases, while **Cloud Storage** provides flexible object storage with global edge caching.



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# Google Cloud Platform Services

The diagram illustrates the Google Cloud Platform services, organized into three main categories:

- Compute** (Red box): Contains **Compute Engine**.
- Storage** (Yellow box): Contains **Cloud Storage**.
- App Services** (Blue box): Contains **BigQuery**, **Cloud Endpoints**, **Caching**, and **Queues**.

A blue circle highlights the **App Services** category.

- I. Use Google APIs and services to quickly enable a wide range of functionality for your application.
- II. You don't need to build these from scratch, just take advantage of easy integration within Cloud Platform.

# Google Cloud Platform Services – from User end!

- Consider to migrate your web application to Google Cloud Platform for better performance using **GoogleAppEngine**.
- Your application should go wherever your users go: Scale your application using **GoogleCloudEndpoints**.
- Integrate Google's services into your Application using **GoogleAPIs**.

*Example 1:* Host your *web-page* in *Google Cloud Platform*

*Example 2:* Build your *web-app* using *Google App Engine*

*Example 1: Host your **web-page** in Google Cloud Platform*



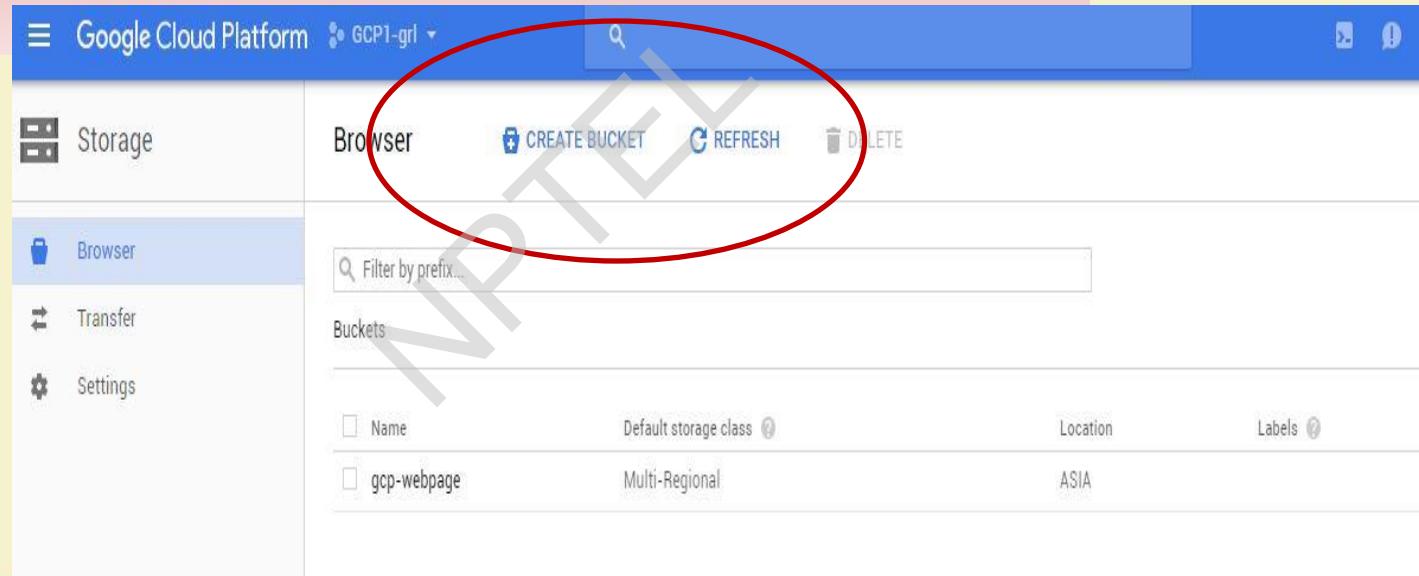
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## An easy example: Host your *web-page* inside Google Cloud Platform

- i) Open the Cloud Storage browser in the Google Cloud Platform Console & click on Create Bucket



## An easy example: Host your *web-page* inside Google Cloud Platform

ii) In the list of buckets, find the bucket you created.  
And Click the more actions icon next to the bucket and select **Edit configuration.**

The screenshot shows the Google Cloud Storage Browser interface. On the left, a sidebar has 'Storage' selected, with 'Browser' also highlighted. The main area shows a table of buckets. A red oval encircles the first row of the table, which contains the bucket 'gcp-webpage'. To the right of this row, a 'More Actions' icon (three vertical dots) is circled in red. A dropdown menu from this icon lists three options: 'Edit bucket permissions', 'Edit labels', and 'Edit default storage class'.

Name	Default storage class	Location	Labels
<input checked="" type="checkbox"/> gcp-webpage	Multi-Regional	ASIA	

## An easy example: Host your *web-page* inside Google Cloud Platform

iii) In the **Configure website** dialog, specify the **Main Page** and the **404 (Not Found) Page** or even your web-site folder!

The screenshot shows the Google Cloud Platform Storage Browser interface. On the left is a sidebar with 'Storage' selected, followed by 'Browser', 'Transfer', and 'Settings'. The main area is titled 'Browser' and shows a list of files in a bucket named 'gcp-webpage'. A red oval highlights the top navigation bar with 'UPLOAD FILES', 'UPLOAD FOLDER', 'CREATE FOLDER', and 'REFRESH'. A red bracket on the left side groups several files: '404.html', 'bin/', 'cc1.html', 'css/', 'figures/', 'font-awesome/', 'fonts/', 'index.html', 'index1.html', 'js/', 'LICENSE', and 'README.md'. A red callout bubble points to this group with the text 'Upload all files/ figures of your web-site!'. Another red callout bubble on the right side points to the 'Share publicly' column with the text 'Check whether all are shared publicly!'.

Name	Size	Type	Storage class	Last modified	Share publicly
404.html	9.15 KB	text/html	Multi-Regional	7/20/17, 12:37 AM	<input checked="" type="checkbox"/> Public link
bin/	—	Folder	—	—	⋮
cc1.html	6.26 KB	text/html	Multi-Regional	7/20/17, 12:37 AM	<input checked="" type="checkbox"/> Public link
css/	—	Folder	—	—	⋮
figures/	—	Folder	—	—	⋮
font-awesome/	—	Folder	—	—	⋮
fonts/	—	Folder	—	—	⋮
index.html	12.81 KB	text/html	Multi-Regional	7/20/17, 12:37 AM	<input checked="" type="checkbox"/> Public link
index1.html	10.49 KB	text/html	Multi-Regional	7/20/17, 12:37 AM	<input checked="" type="checkbox"/> Public link
js/	—	Folder	—	—	⋮
LICENSE	1.07 KB	application/octet-stream	Multi-Regional	7/20/17, 12:37 AM	<input checked="" type="checkbox"/> Public link
README.md	1.64 KB	application/octet-stream	Multi-Regional	7/20/17, 12:37 AM	<input checked="" type="checkbox"/> Public link

## An easy example: Host your *web-page* inside Google Cloud Platform

iv) Get the public link of your html of home-page or *index.html*

The screenshot shows the Google Cloud Platform Storage Browser interface. On the left, there's a sidebar with 'Storage' selected, followed by 'Browser', 'Transfer', and 'Settings'. The main area is titled 'Buckets / gcp-webpage / GCP-Webpage'. It lists several files and folders:

Name	Size	Type	Storage class	Last modified	Share publicly
404.html	9.15 KB	text/html	Multi-Regional	7/20/17, 12:37 AM	<input checked="" type="checkbox"/> Public link
bin/	—	Folder	—	—	
cc1.html	6.26 KB	text/html	Multi-Regional	7/20/17, 12:37 AM	<input checked="" type="checkbox"/> Public link
css/	—	Folder	—	—	
figures/	—	Folder	—	—	
font-awesome/	—	Folder	—	—	
fonts/	—	Folder	—	—	
index.html	12.81 KB	text/html	Multi-Regional	7/20/17, 12:37 AM	<input checked="" type="checkbox"/> Public link
index1.html	10.49 KB	text/html	Multi-Regional	7/20/17, 12:37 AM	<input checked="" type="checkbox"/> Public link
js/	—	Folder	—	—	
LICENSE	1.07 KB	application/octet-stream	Multi-Regional	7/20/17, 12:37 AM	<input checked="" type="checkbox"/> Public link
README.md	1.64 KB	application/octet-stream	Multi-Regional	7/20/17, 12:37 AM	<input checked="" type="checkbox"/> Public link

And you are ready to go! ☺



<https://storage.googleapis.com/gcp-webpage/GCP-Webpage/index1.html>

Hi there!

Home Summary ▾

Data and Computing : Up in the Cloud!

Welcome to Cloud Computing NPTEL Course!

✓ About this Course!

This course will introduce various aspects of cloud computing, including fundamentals, management issues, security challenges and future research trends. This will help students (both UG and PG levels) and researchers to use and explore the cloud computing platforms.

⌚ Course PRE-REQUISITES & Suggested Reading

Course Pre-requisites:

- Basics of Computer Architecture and organization
- Networking

💡 Course Instructor & Certification

Taught by: Prof. Soumya K Ghosh, Dept. of CSE, IIT Khargpur

Certification Exam: Exams will be on 22 October 2017. Time: Shift 1: 9am-12 noon; Shift 2: 2pm-5pm. Final score will be calculated as 10% assignment,

*Example 2: Build your **web-app** using **Google App Engine***



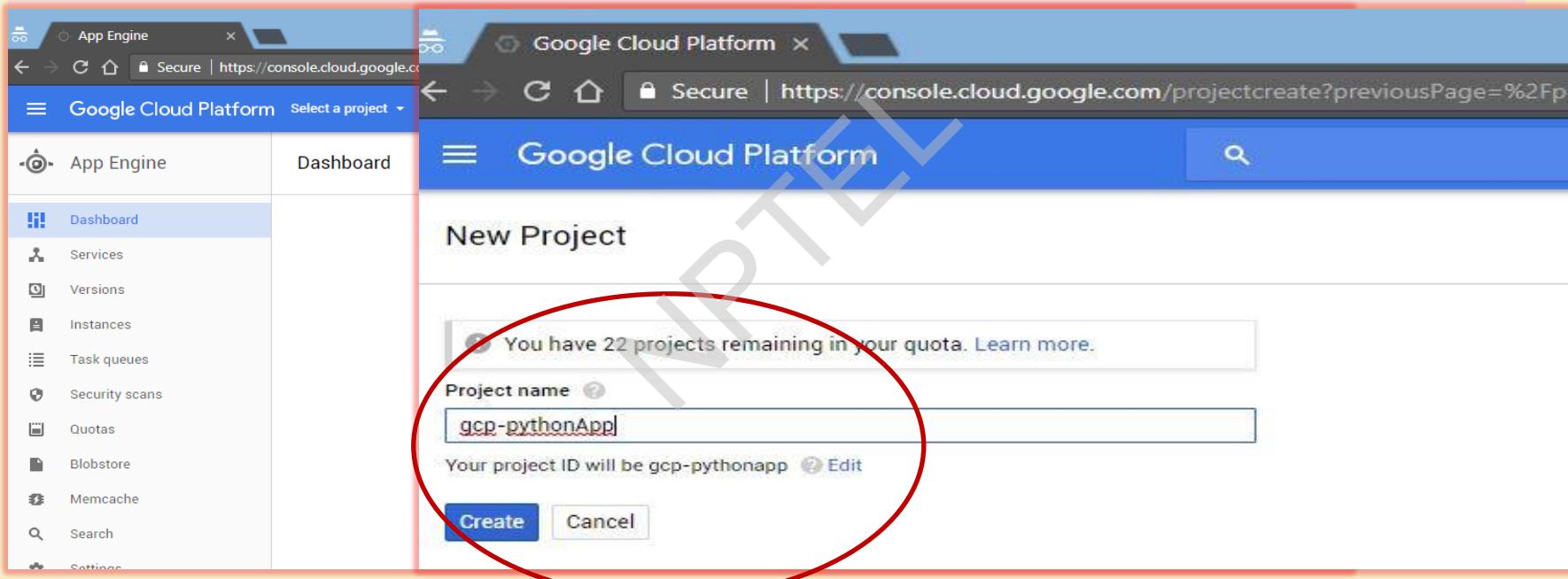
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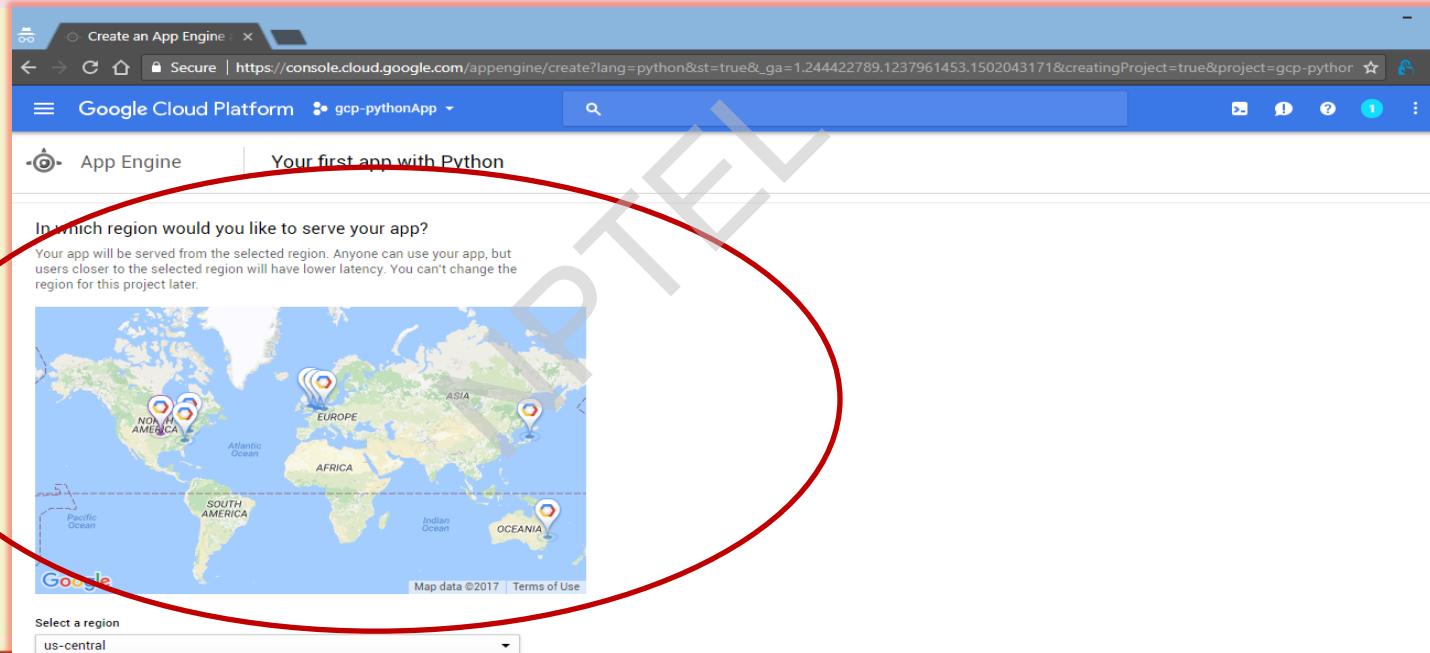
## Another example: Host your *web-app* using *Google App Engine*

- i) Open the Google Cloud Platform Console & create a new project using *Cloud Platform project and App Engine application*



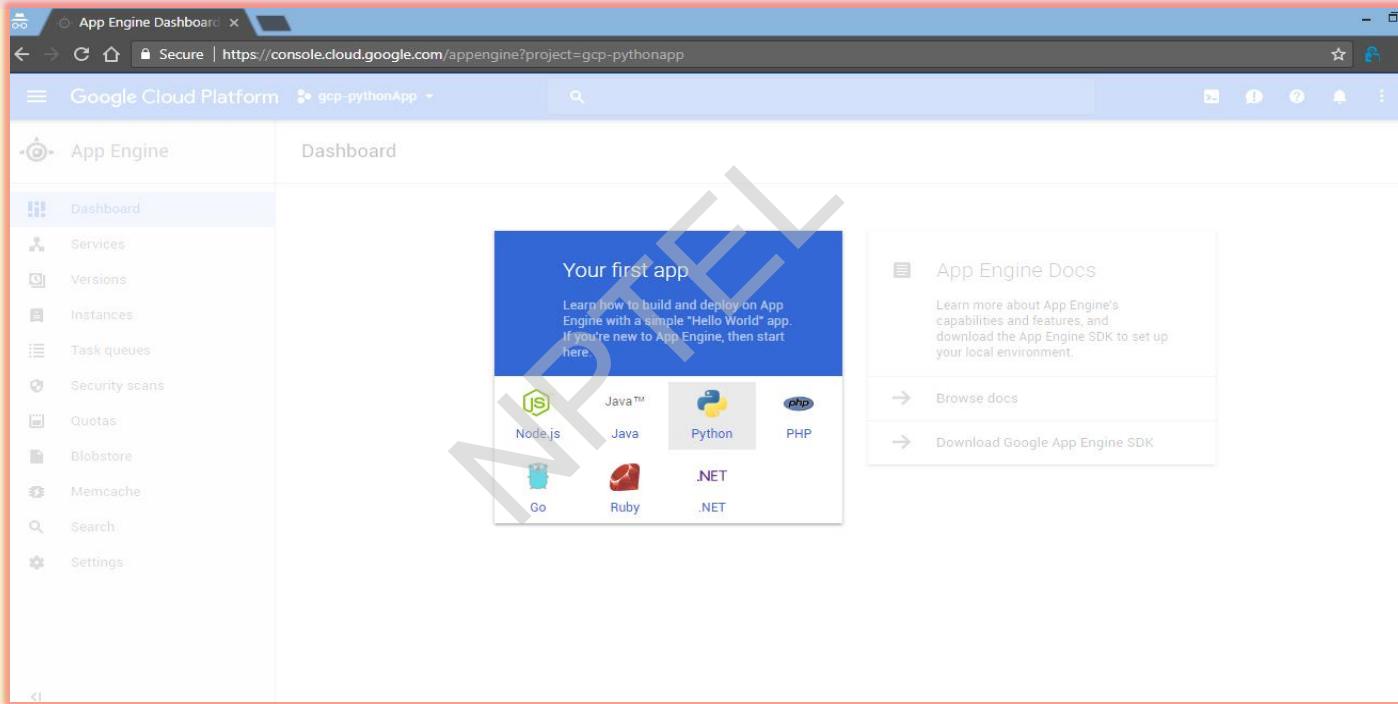
## Another example: Host your *web-app* using Google App Engine

- ii) When prompted, select the **region** where you want your App Engine application located.



## Another example: Host your *web-app* using *Google App Engine*

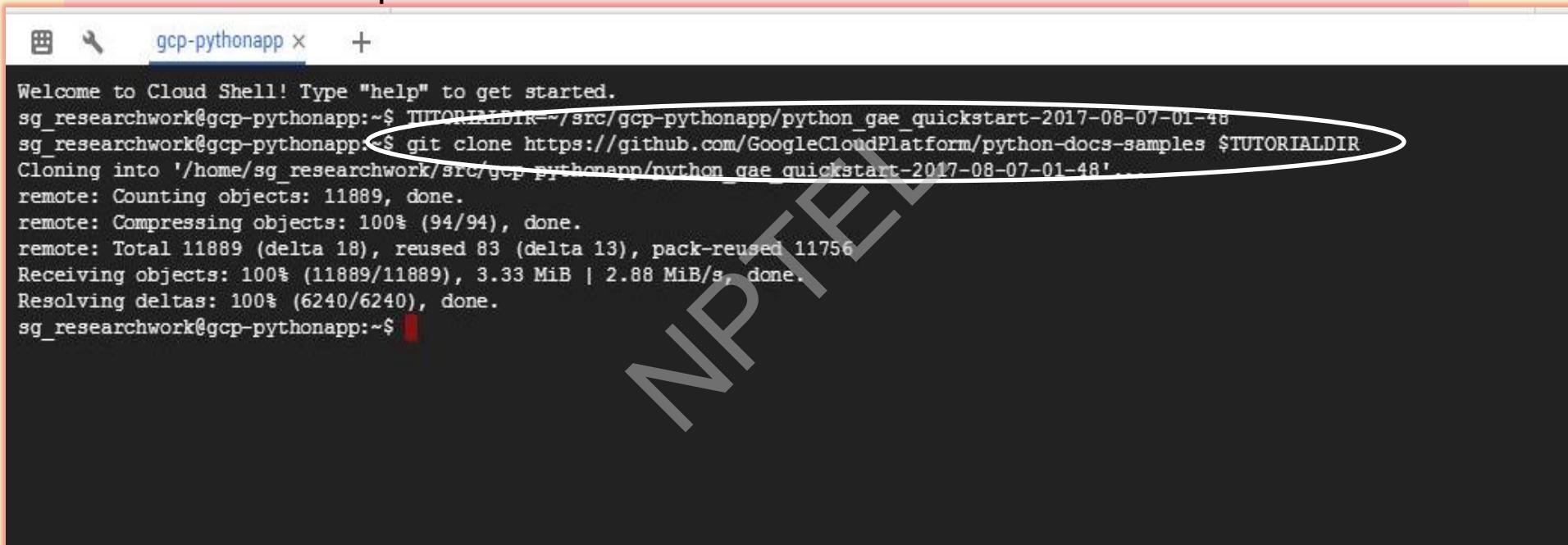
iii) Select your preferred programming language to build your app.



iv) Activate your ***Google Cloud Shell*** .

The screenshot shows the Google Cloud Platform App Engine Dashboard. At the top, there's a header bar with the URL <https://console.cloud.google.com/appengine?project=gcp-pythonapp>. Below the header, there's a toolbar with various icons. A red callout bubble highlights the "Cloud Shell" icon, which is currently selected and highlighted in blue. To the right of the toolbar, there's a message box containing the text "Google Cloud Shell will appear". Further down, another message box says "... Connecting: Provisioning your Google Cloud Shell machine...". In the main content area, there's a terminal window titled "gcp-pythonapp" with the message "Welcome to Cloud Shell! Type "help" to get started." followed by the prompt "sq\_researchwork@gcp-pythonapp:~\$". At the bottom right of the dashboard, there are buttons for "CANCEL TUTORIAL" and "SEND FEEDBACK".

v) Clone the Hello World sample app repository and go to the directory that contains the sample code



```
Welcome to Cloud Shell! Type "help" to get started.  
sg_researchwork@gcp-pythonapp:~$ TUTORIALDIR=~/src/gcp-pythonapp/python_gae_quickstart-2017-08-07-01-48  
sg_researchwork@gcp-pythonapp:~$ git clone https://github.com/GoogleCloudPlatform/python-docs-samples $TUTORIALDIR  
Cloning into '/home/sg_researchwork/src/gcp-pythonapp/python_gae_quickstart-2017-08-07-01-48'.  
remote: Counting objects: 11889, done.  
remote: Compressing objects: 100% (94/94), done.  
remote: Total 11889 (delta 18), reused 83 (delta 13), pack-reused 11756  
Receiving objects: 100% (11889/11889), 3.33 MiB | 2.88 MiB/s, done.  
Resolving deltas: 100% (6240/6240), done.  
sg_researchwork@gcp-pythonapp:~$
```

v) Each application must contain ‘app.yaml’ and code base ‘main.py’ [with Flask web app deployment ]

```
gcp-pythonapp +  
sg_research  
sg_research  
runtime: python  
api_version:  
threadsafe:  
  
handlers:  
- url: /.*  
  script: MainPage  
sg_research  
  
# you may not use this file except in compliance with the License.  
# You may obtain a copy of the License at  
#  
#     http://www.apache.org/licenses/LICENSE-2.0  
#  
# Unless required by applicable law or agreed to in writing, software  
# distributed under the License is distributed on an "AS IS" BASIS,  
# WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.  
# See the License for the specific language governing permissions and  
# limitations under the License.  
  
import webapp2  
  
class MainPage(webapp2.RequestHandler):  
    def get(self):  
        self.response.headers['Content-Type'] = 'text/plain'  
        self.response.write('Hello, World!')  
  
app = webapp2.WSGIApplication([  
    ('/', MainPage),  
], debug=True)  
sg_researchwork@gcp-pythonapp:~/src/gcp-pythonapp/python_gae_quickstart-2017-08-07-01-48/appengine/standard/hello_world$
```

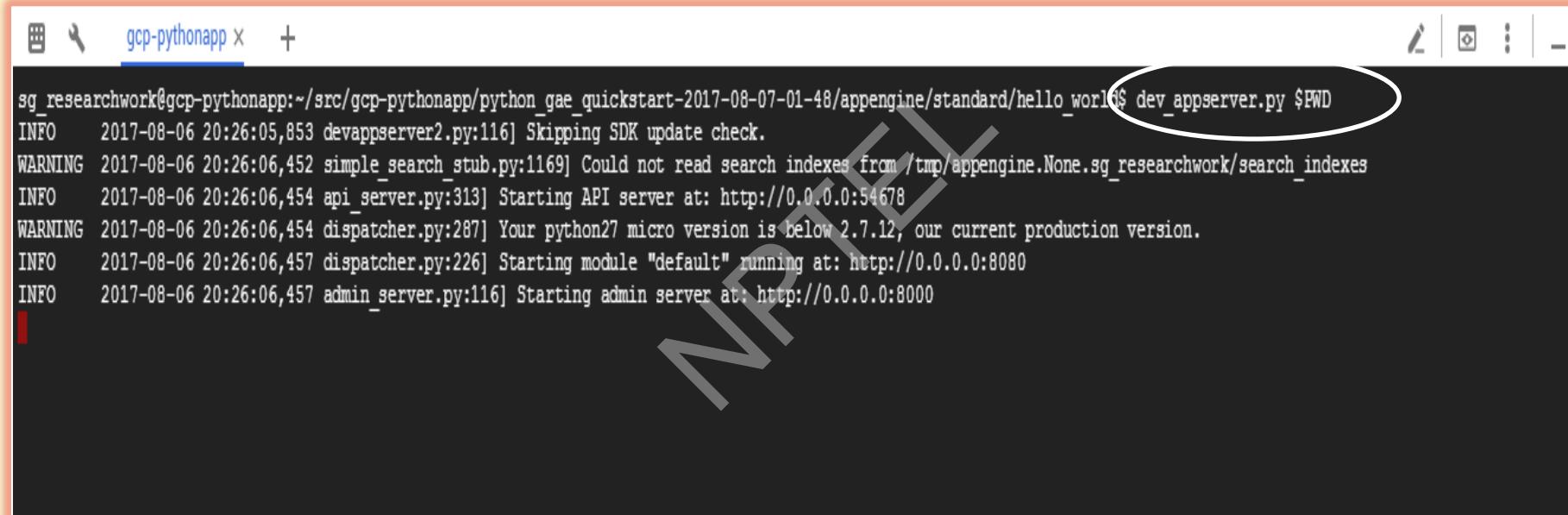


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vi) From within the hello\_world directory where the app's app.yaml configuration file is located, start the *local development server* :  
**dev\_appserver.py \$PWD**



```
gcp-pythonapp x +
```

```
sg_researchwork@gcp-pythonapp:~/src/gcp-pythonapp/python_gae_quickstart-2017-08-01-48/appengine/standard/hello_world$ dev_appserver.py $PWD
INFO    2017-08-06 20:26:05,853 devappserver2.py:116] Skipping SDK update check.
WARNING 2017-08-06 20:26:06,452 simple_search_stub.py:116] Could not read search indexes from /tmp/appengine.None.sg_researchwork/search_indexes
INFO     2017-08-06 20:26:06,454 api_server.py:313] Starting API server at: http://0.0.0.0:54678
WARNING 2017-08-06 20:26:06,454 dispatcher.py:287] Your python27 micro version is below 2.7.12, our current production version.
INFO     2017-08-06 20:26:06,457 dispatcher.py:226] Starting module "default" running at: http://0.0.0.0:8080
INFO     2017-08-06 20:26:06,457 admin_server.py:116] Starting admin server at: http://0.0.0.0:8000
```

Visit in your web browser to view the app

The screenshot shows a terminal window at the top and a browser window below it. A red circle highlights the 'Web preview' icon in the terminal's toolbar. A red arrow points from the bottom of the terminal window down to the browser window, indicating the connection between the two.

sq\_researchwork@gcp-pythonapp:~/src/gcp-pythonapp/python\_gae\_quickstart-2017-08-07-01-48/appengine/standard/hello\_world\$ dev\_appserver.py \$PWD  
INFO 2017-08-06 20:26:05,853 devappserver2.py:116] Skipping SDK update check.  
WARNING 2017-08-06 20:26:06,452 simple\_search\_stub.py:116] Could not read search indexes from /tmp/appengine.None.sg\_researchwork/search\_indexes  
INFO 2017-08-06 20:26:06,454 api\_server.py:313] Starting API server at: http://0.0.0.0:54678  
WARNING 2017-08-06 20:26:06,454 dispatcher.py:287] Your python27 micro version is below 2.7.12, our current production version.  
INFO 2017-08-06 20:26:06,457 dispatcher.py:226] Starting module "default" running at: http://0.0.0.0:8080  
INFO 2017-08-06 20:26:06,457 admin\_server.py:116] Starting admin server at: http://0.0.0.0:8000

Secure | https://8080-dot-2985339-dot-devshell.appspot.com/?authuser=0

Hello, World!

## You can shut-down the development server at any point!

A screenshot of a terminal window titled "gcp-pythonapp x". The terminal shows log output from the command "dev\_appserver.py \$PWD". The logs include INFO messages about skipping SDK update check, starting API and admin servers, and handling a shutdown request. A red oval highlights the shutdown message. Below the terminal is a browser window showing the "App Engine Dashboard" and a tab for "https://8080-dot-2985339-dot-devshell.appspot.com/?authuser=0". The browser displays an error message: "Error: Could not connect to Cloud Shell on port 8080." A red arrow points from the error message in the browser back up to the shutdown log entry in the terminal.

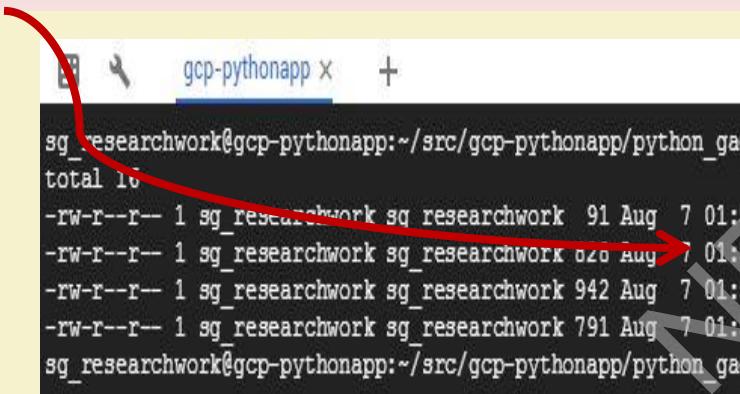
```
sg_researchwork@gcp-pythonapp:~/src/gcp-pythonapp/python_gae_quickstart-2017-08-07-01-48/appengine/standard/hello_world$ dev_appserver.py $PWD
INFO    2017-08-06 20:26:05,853 devappserver2.py:116] Skipping SDK update check.
WARNING 2017-08-06 20:26:06,452 simple_search_stub.py:1169] Could not read search indexes from /tmp/appengine.None.sg_researchwork/search_indexes
INFO    2017-08-06 20:26:06,454 api_server.py:313] Starting API server at: http://0.0.0.0:54678
WARNING 2017-08-06 20:26:06,454 dispatcher.py:287] Your python27 micro version is below 2.7.12, our current production version.
INFO    2017-08-06 20:26:06,457 dispatcher.py:226] Starting module "default" running at: http://0.0.0.0:8080
INFO    2017-08-06 20:26:06,457 admin_server.py:116] Starting admin server at: http://0.0.0.0:8000
INFO    2017-08-06 20:27:28,674 module.py:832] default: "GET /?authuser=0 HTTP/1.0" 200 13
^CINFO    2017-08-06 20:28:14,914 shutdown.py:15] Shutting down.
INFO    2017-08-06 20:28:14,914 api_server.py:945] Applying all pending transactions and saving the datastore
INFO    2017-08-06 20:28:14,915 api_server.py:948] Saving search indexes
sg_researchwork@gcp-pythonapp:~/src/gcp-pythonapp/python_gae_quickstart-2017-08-07-01-48/appengine/standard/hello_world$
```

**Error: Could not connect to Cloud Shell on port 8080.**

Ensure your server is listening on port 8080 and try again.

You can leave the development server running while you develop your application. The development server watches for changes in your source files and reloads them if necessary

### ***Edit main.py***



```
gcp-pythonapp x +  
sg_researchwork@gcp-pythonapp:~/src/gcp-pythonapp/python_gae_quickstart-2017-08-01-48/appengine/standard/hello_world$ ls -l  
total 16  
-rw-r--r-- 1 sg_researchwork sg_researchwork 91 Aug 7 01:51 app.yaml  
-rw-r--r-- 1 sg_researchwork sg_researchwork 626 Aug 7 01:55 main.py  
-rw-r--r-- 1 sg_researchwork sg_researchwork 942 Aug 7 01:57 main.pyc  
-rw-r--r-- 1 sg_researchwork sg_researchwork 791 Aug 7 01:51 main_test.py  
sg_researchwork@gcp-pythonapp:~/src/gcp-pythonapp/python_gae_quickstart-2017-08-01-48/appengine/standard/hello_world$
```

## Edit main.py

```
import webapp2

class MainPage(webapp2.RequestHandler):
    def get(self):
        self.response.headers['Content-Type'] = 'text/plain'
        self.response.write('Hello, World!')

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



```
import webapp2

class MainPage(webapp2.RequestHandler):
    def get(self):
        self.response.headers['Content-Type'] = 'text/plain'
        self.response.write('Hi! Welcome to NPTEL Cloud Computing Course\nHappy Learning!! :)')

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



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## *Reload the web-page*



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Now deploy your app to App Engine : ***gcloud app deploy app.yaml --project gcp-pythonapp***



```
App Engine Dashboard x https://8080-dot-2985.x
Secure | https://console.cloud.google.com/appengine?project=gcp-pythonapp
Google Cloud Platform gcp-pythonApp ▾
gcp-pythonapp x + Services to deploy:
sg_researchwork@gcp-pythonapp:~/src/gcp-pythonapp/python_gae_quickstart-2017-08-07-01-48/appengine/standard/hello_world$ gcloud app deploy app.yaml --project gcp-pythonapp
descriptor: [/home/sg_researchwork/src/gcp-pythonapp/python_gae_quickstart-2017-08-07-01-48/appengine/standard/hello_world/app.yaml]
source: [/home/sg_researchwork/src/gcp-pythonapp/python_gae_quickstart-2017-08-07-01-48/appengine/standard/hello_world]
target project: [gcp-pythonapp]
target service: [default]
target version: [20170807t020530]
target url: [https://gcp-pythonapp.appspot.com]

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

Beginning deployment of service [default]...
Some files were skipped. Pass `--verbosity=info` to see which ones.
You may also view the gcloud log file, found at
[~/tmp/tmp.YLV7NzHY4B/logs/2017.08.07/02.05.25.079263.log].
[ Uploading 5 files to Google Cloud Storage ] File upload done.
Updating service [default]...
```

Now deploy your app to App Engine : *gcloud app deploy app.yaml --project gcp-pythonapp*

```
sg_researchwork@gcp-pythonapp:~/src/gcp-pythonapp/python_gae_quickstart-2017-08-07-01-48/appengine/standard/hello_world$ gcloud app deploy app.yaml --project gcp-pythonapp
Services to deploy:
descriptor: [/home/sg_researchwork/src/gcp-pythonapp/python_gae_quickstart-2017-08-07-01-48/appengine/standard/hello_world/app.yaml]
source: [/home/sg_researchwork/src/gcp-pythonapp/python_gae_quickstart-2017-08-07-01-48/appengine/standard/hello_world]
target project: [gcp-pythonapp]
target service: [default]
target version: [20170807t020530]
target url: [https://gcp-pythonapp.appspot.com]

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

Beginning deployment of service [default]...
Some files were skipped. Pass `--verbosity=info` to see which ones.
You may also view the gcloud log file, found at
[~/tmp/tmp.YLV7NzHY4B/logs/2017.08.07/02.05.25.079263.log].
[ Uploading 5 files to Google Cloud Storage ] File upload done.
Updating service [default]...done.
Waiting for operation [apps/gcp-pythonapp/operations/891c8591-ecc1-4ac8-b5a8-a3358c03e16a] to complete...done.
Updating service [default]...done.
Deployed service [default] to [https://gcp-pythonapp.appspot.com]

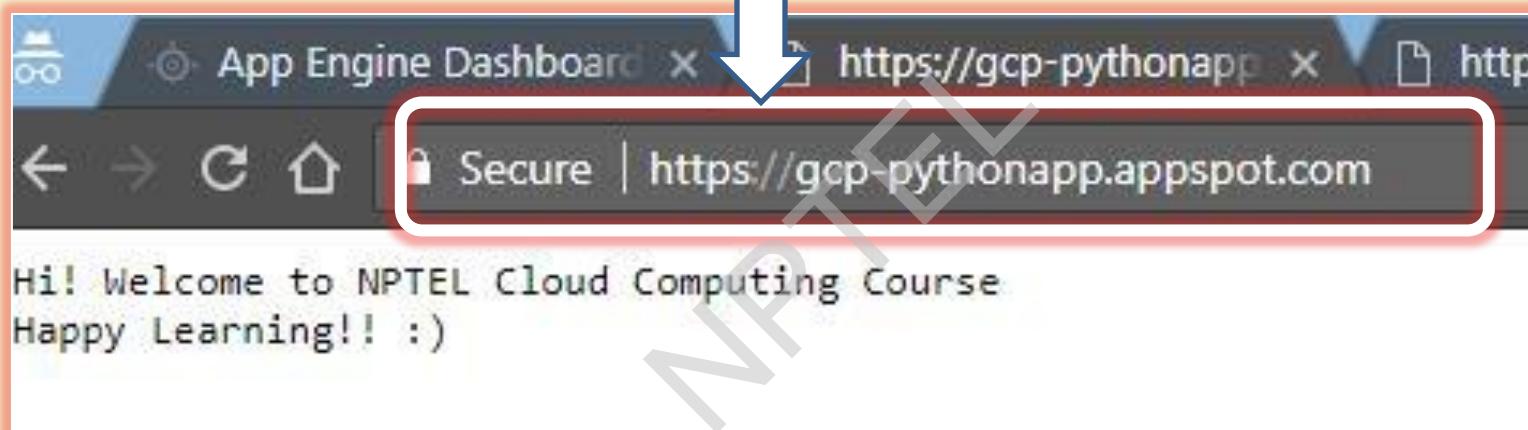
You can stream logs from the command line by running:
$ gcloud app logs tail -s default

To view your application in the web browser run:
$ gcloud app browse
sg_researchwork@gcp-pythonapp:~/src/gcp-pythonapp/python_gae_quickstart-2017-08-07-01-48/appengine/standard/hello_world$
```

View your application : ***gcloud app browse***

```
sg_researchwork@gcp-pythonapp:~/src/gcp-pythonapp/python_gae_quickstart-2017-08-07-01-48/appengine/standard/hello_world$ gcloud app browse
Did not detect your browser. Go to this link to view your app:
https://gcp-pythonapp.appspot.com
sg_researchwork@gcp-pythonapp:~/src/gcp-pythonapp/python_gae_quickstart-2017-08-07-01-48/appengine/standard/hello_world$
```

View your application : ***gcloud app browse***



You have successfully deployed an web-app!

The screenshot shows a software window titled "App Engine Quickstart". At the top, there are several icons: a right arrow, a speech bubble, a question mark, a bell, and three vertical dots. Below the title, a green progress bar is partially filled. The main content area starts with a trophy icon and the text "Congratulations". It then states: "You have successfully deployed an App Engine application! Here are some next steps:". Two numbered steps are listed: 1. "Download the Google Cloud SDK and develop locally" with a blue button labeled "Download Cloud SDK for Windows", and 2. "Build your next application". A note below step 2 says: "Learn how to use App Engine with other Cloud Platform products:".

App Engine Quickstart

**🏆 Congratulations**

You have successfully deployed an App Engine application! Here are some next steps:

1. Download the Google Cloud SDK and develop locally

**Download Cloud SDK for Windows**

After it downloads, extract the file  $\rightarrow$  and initialize the SDK  $\rightarrow$ .

2. Build your next application

Learn how to use App Engine with other Cloud Platform products:



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# Some Useful Links!

- Google Cloud Platform Developers Portal: <https://cloud.google.com/developers>
- Google Developers Global Portal: <https://developers.google.com>
- Google Cloud Platform Products list: <https://cloud.google.com/products/compute-engine/>
- Understanding Google APIs: <https://fethidilmi.blogspot.com/2013/01/understanding-google-apis.html>

# References

- <https://cloud.google.com/storage/docs/>
- <https://cloud.google.com/why-google/>
- <https://cloud.google.com/products/>
- <http://fethidilmi.blogspot.com>
- <https://www.slideshare.net/delphiexile/google-cloud-platform-overview-28927697>

# Thank You!!



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