

Bachelor of Technology
Computer Engineering Sem : 7
01CE0717 – DevOps Essentials



Unit : 1 - Introduction to DevOps



- ☐ DevOps Essentials
- ☐ Introduction to AWS
- ☐ Introduction to GCP
- ☐ Introduction to Azure
- ☐ Git
- ☐ Concept of GitHub

❑ What is DevOps?

- ❑ DevOps is a set of practices that combines software development (**Dev**) and IT operations (**Ops**) to promote the development life cycle and deliver high-quality software continuously.



❑ Why DevOps?

- ❑ DevOps enhances the organization's performance, improves the productivity and efficiency of development and operations teams.
- ❑ Bringing the two teams together centralizes the responsibility on the entire team and not specific individuals working.
- ❑ DevOps is more than just a tool or a process change. It inherently requires an organizational culture shift.

☐ Why DevOps?

- ☐ DevOps is driven by various factors.

- ☐ Demand for an increased rate of production releases – from application and business unit stakeholders
- ☐ Increased usage of data center automation and configuration management tools.
- ☐ Use of agile and other development processes and methods
- ☐ Increased focus on test automation and continuous integration methods
- ☐ Wide availability of virtualized and cloud infrastructure.

☐ Benefits

☐ Technical Benefits

- ☐ Continuous software delivery is possible.
- ☐ There is less complexity to manage the project.
- ☐ The problems in the project get resolved faster.

☐ Cultural Benefits

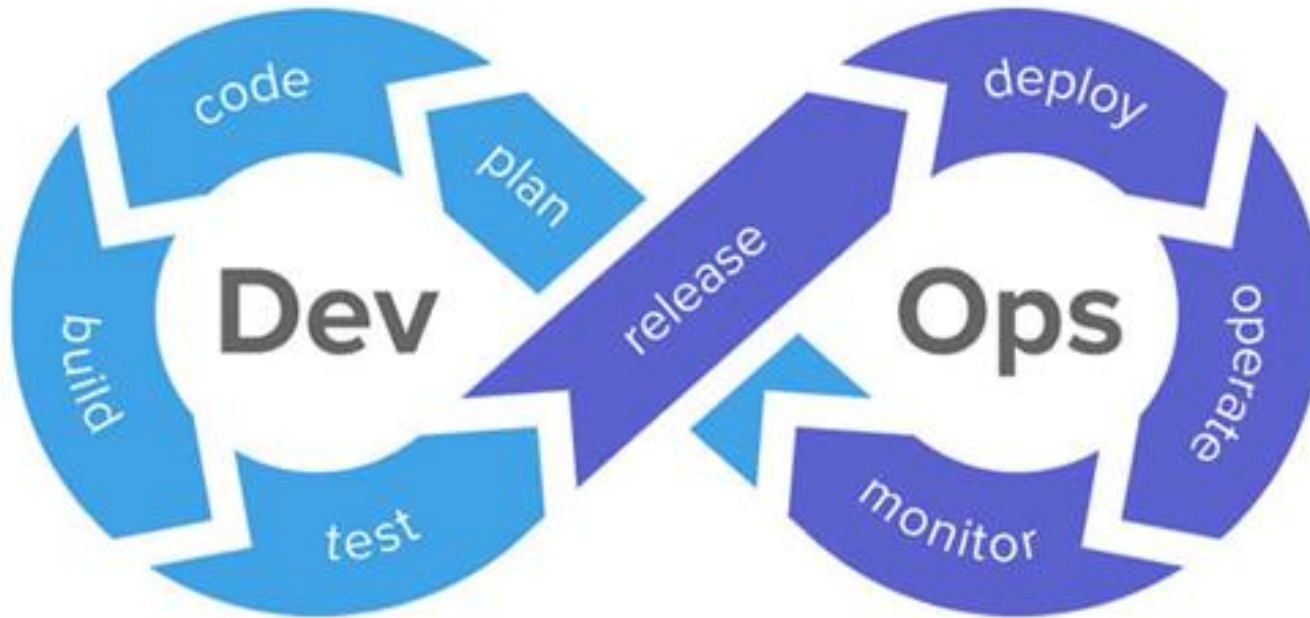
- ☐ The productivity of teams increased.
- ☐ There is higher employee engagement.
- ☐ There arise greater professional development opportunities.

☐ Benefits

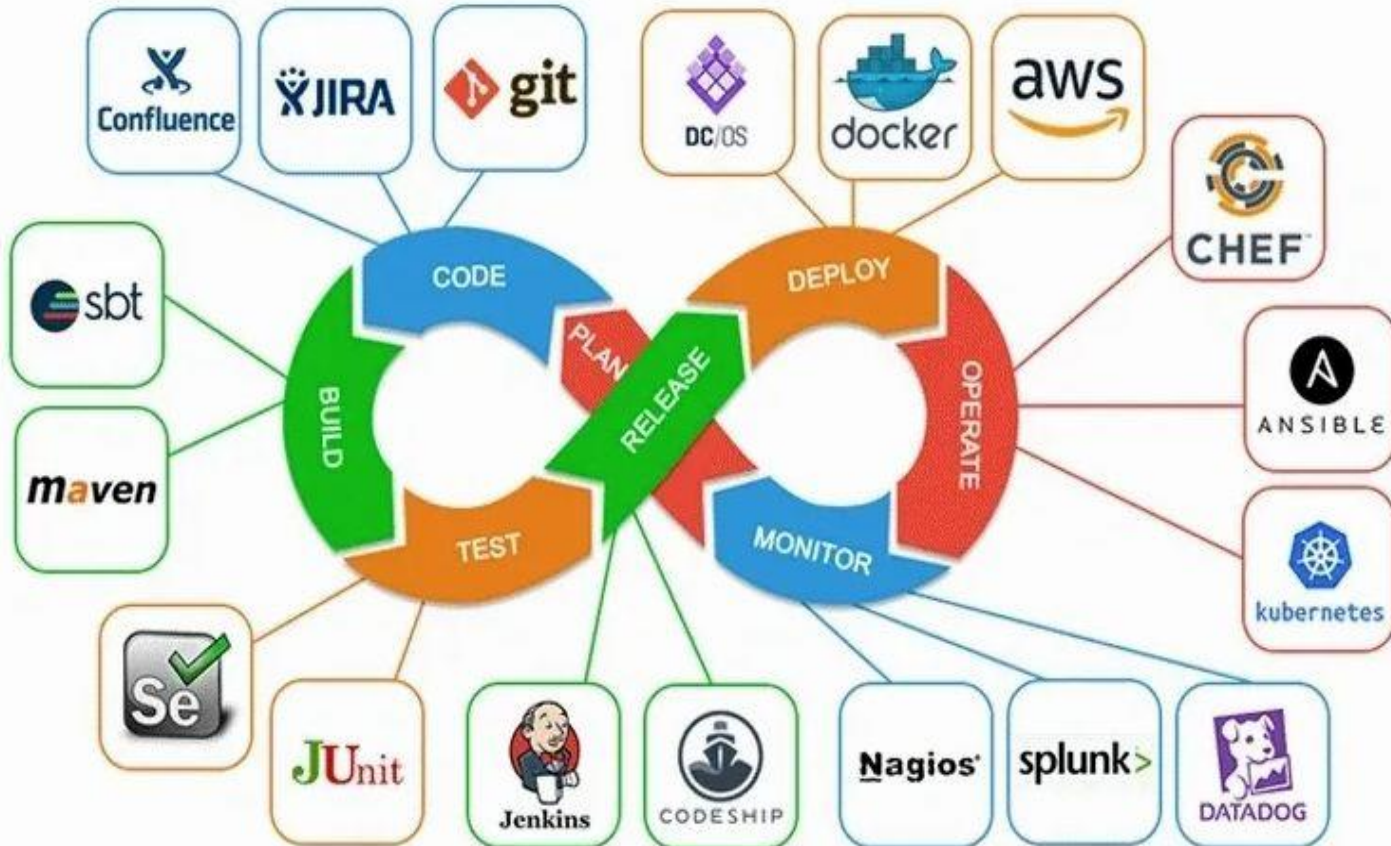
☐ Business Benefits

- ☐ The faster delivery of the product is possible.
- ☐ The operating environment becomes stable.
- ☐ More time is available for innovation rather than fixing and maintaining.

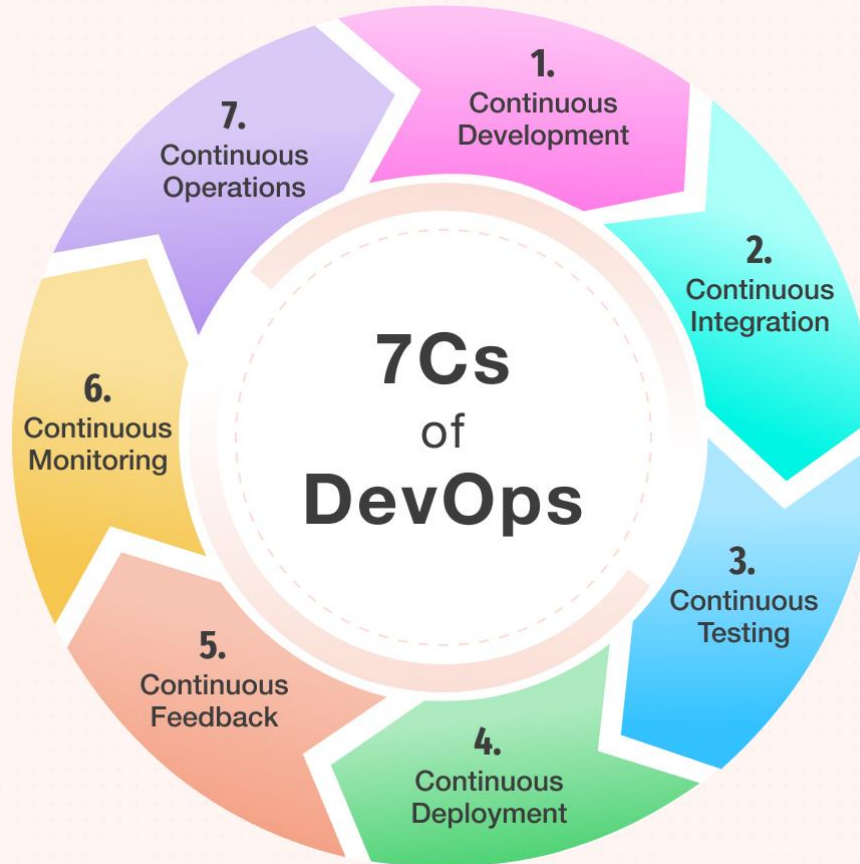
❑ DevOps Architecture



DevOps Essentials



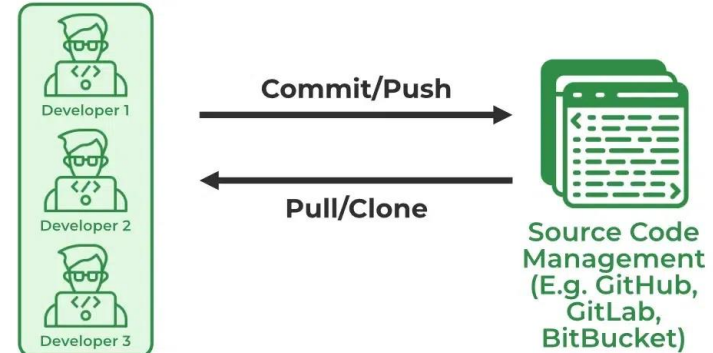
❑ DevOps Lifecycle



❑ DevOps Lifecycle

1. Continuous Development

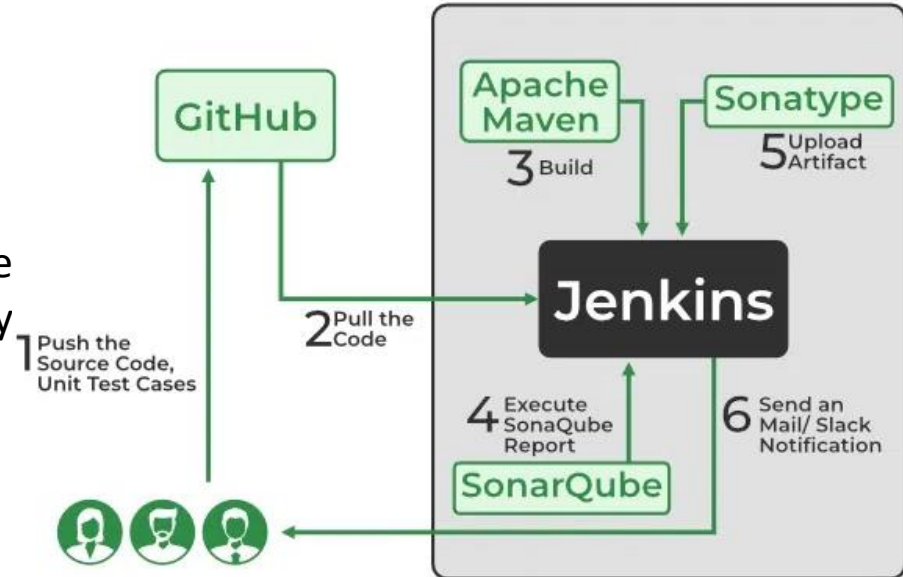
- ❑ In this phase, the planning and coding of software is done.
- ❑ There are no specific tools for planning, but the development team requires some tools for code maintenance like ***GIT*** and ***Jira***.



❑ DevOps Lifecycle

2. Continuous Integration

- ❑ Most Crucial phase
(heart of entire DevOps Lifecycle)
- ❑ To commit changes in the source code frequently; new functionality integrated with the existing code;
- ❑ 4 Stages:
 - a) Getting Source Code from SCM
 - b) Building the code
 - c) Code quality review
 - d) Storing the build artifacts
- ❑ Tools like **Jenkins**, **GitLab CI**, **CircleCI**, etc.



❑ DevOps Lifecycle

3. Continuous Testing

- ❑ In this phase, the software is continuously tested for bugs.
- ❑ Automated testing tools like *Selenuim*, *TestNG*, *JUnit*, etc.



❑ DevOps Lifecycle

4. Continuous Deployment

- ❑ In this phase, the final code is deployed on production servers.
- ❑ The continuous deployment includes configuration management to make the deployment of code on servers accurate and smooth. Development teams release the code to servers and schedule the updates for servers, keeping the configurations consistent throughout the production process.
- ❑ Tools like ***Chef***, ***Puppet***, ***Ansible***, and ***SaltStack***.

☐ DevOps Lifecycle

5. Continuous Feedback

- ☐ Continuous feedback came into existence to analyze and improve the application code. During this phase, customer behavior is evaluated regularly on each release to improve future releases and deployments.

6. Continuous Monitoring

- ☐ Monitoring is a phase that involves all the operational factors of the entire DevOps process, where important information about the use of the software is recorded and carefully processed to find out trends and identify problem areas.
- ☐ By continuous monitoring, we can get notified before anything goes wrong. We can gather many performance measures, including CPU and memory utilization, network traffic, application response time, error rates, etc. Tools - **Nagios**

❑ DevOps Lifecycle

7. Continuous Operations

- ❑ Continuous operation automates the process of launching the app and its updates. It uses container management systems like *Kubernetes* and *Docker* to eliminate downtime.
- ❑ Through continuous operations, developers save time that can be used to accelerate the application's time-to-market.

- ❑ DevOps Essentials
- ❑ ***Introduction to AWS***
- ❑ Introduction to GCP
- ❑ Introduction to Azure
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- ❑ Cloud computing is the delivery of computing services over the internet rather than using local servers or personal devices. We can access data from a remote server.
- ❑ **Amazon Web Services (AWS)** is a comprehensive and widely adopted cloud platform provided by Amazon.
- ❑ It includes services for storage, databases, analytics, networking, mobile development tool, management tool, IoT, Security, and enterprise applications.
- ❑ It provides different services of cloud such as Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and packaged Software as a Service (SaaS).

Features of AWS

- ☐ Flexibility
- ☐ Cost Effective
- ☐ Scalable and elastic
- ☐ Secure
- ☐ High Performance

Services offered by AWS

Amazon Elastic Cloud Computer (EC2)

-  EC2 is a machine with an operating system and hardware components of developer's choice. But the difference is that it is totally **virtualized**. The developer can run multiple virtual computers in a single physical hardware.
-  It provides scalable computing capacity in AWS cloud
-  It is secure.




Services offered by AWS

☐ *Amazon Simple Storage Service (S3)*

- ☐ It is a scalable, high-speed, web-based cloud storage service
- ☐ Data can be transferred to S3 via API
- ☐ It is object-based storage (store images, word files, pdf files, etc)
- ☐ File size can be from 0 to 5TB

Services offered by AWS

Amazon Virtual Private Cloud (VPC)

-  Logically isolated area of the AWS cloud which can be used as a private network but it is virtual. It resembles your *traditional networking*.
-  You have control over virtual networking environment including a selection of your IP address range, the creation of subnets and configuration of route tables, gateways, etc.
-  It provides multiple layers of security to the VPC

Services offered by AWS

☐ *Amazon Relational Database Service (RDS)*

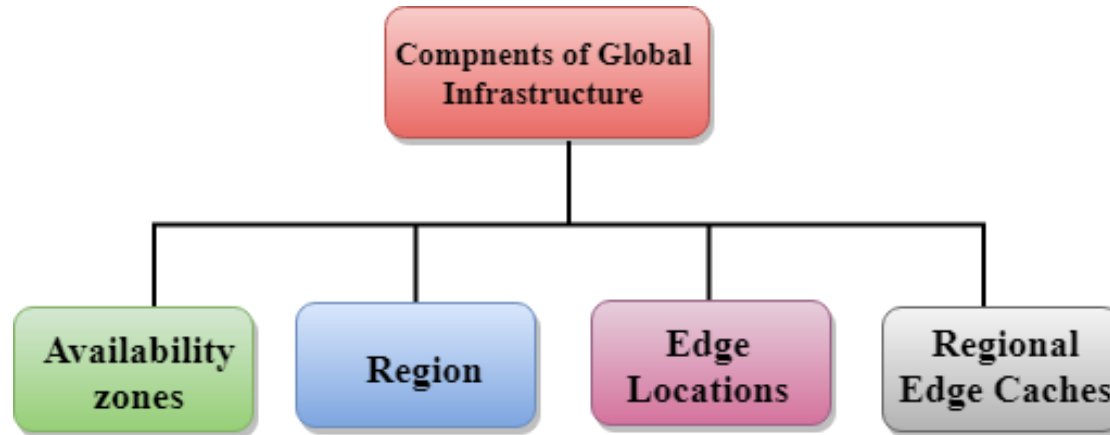
- ☐ It is relational database cloud service which store the data on cloud
- ☐ Similar to RDMS like data migration, backup, recovery, and patching
- ☐ It supports PostgreSQL, MYSQL, Maria DB, Oracle, SQL Server and Amazon Aurora

Services offered by AWS

Amazon CloudFront

- ☐ It is a fast Content Delivery Network (CDN) service
- ☐ It is a globally-distributed network which securely transfers content such as software, SDKs, videos, etc. to the clients, with high transfer speed.
- ☐ High security with the 'content privacy' feature.
- ☐ Gives lowest latency for transfer the content

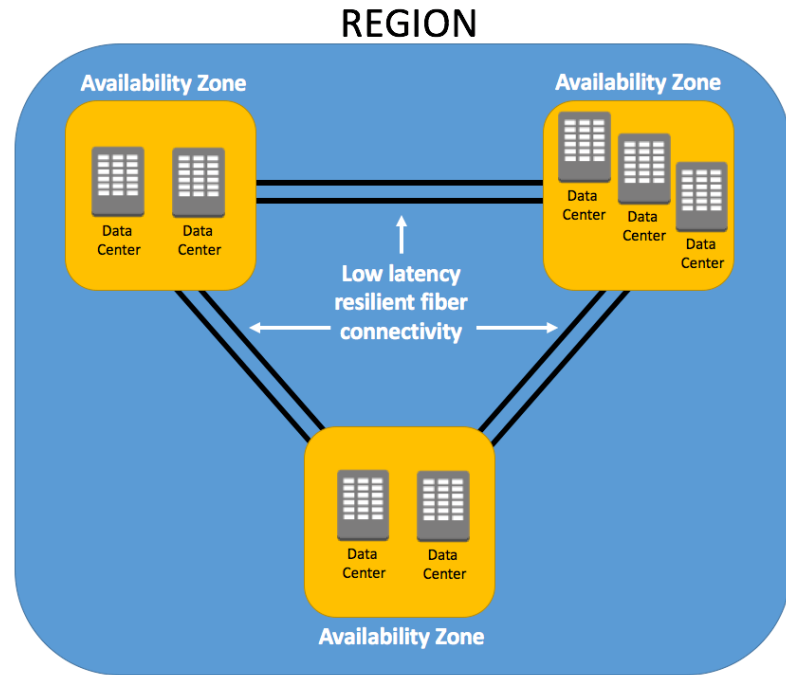
Global Infrastructure of AWS



Global Infrastructure of AWS

❑ *Region*

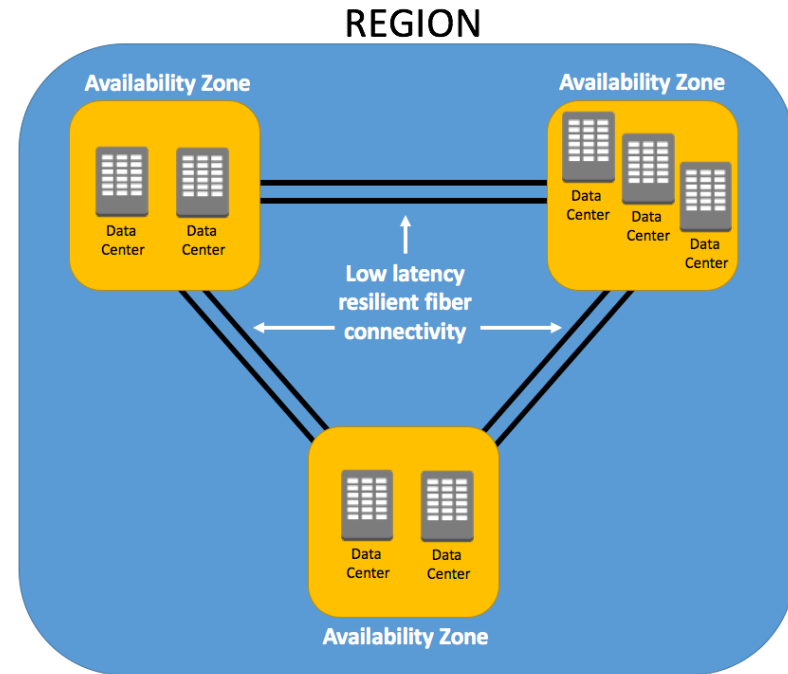
- ❑ It is physical location or geographical area.
- ❑ Collection of data centers which are completely isolated from other regions.
- ❑ A region consists of more than two *availability zones* connected to each other though links.



Global Infrastructure of AWS

❑ *Availability Zones*

- ❑ It is grouping of one or more discrete data centers which provides applications and services in an AWS region.
- ❑ *Availability zones* are connected through low latency and high throughput networking channels.
- ❑ If one zone fails, the other zone will operate fine without any effect.



Global Infrastructure of AWS

☐ *Edge locations*

- ☐ It is used for caching the content.
- ☐ Distribute the content to end users with reduced latency.

☐ *Regional edge cache*

- ☐ Larger cache than an individual edge location
- ☐ When user requests the data, then data is no longer available at the edge location.
Therefore, the edge location retrieves the cached data from the Regional edge cache instead of the origin servers that have high latency.

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- ❑ **GCP** stands for Google Cloud Platform
- ❑ **GCP** offered by Google, is a suite of cloud computing services that runs on the same infrastructure that Google uses internally for its end-user products, such as Google Search, Gmail, Google Drive and YouTube.
- ❑ It provides IaaS, PaaS and Serverless computing environments.
- ❑ It allows to store, manage and analyze data.
- ❑ It is used for developing, deploying and scaling applications on Google's environment.
- ❑ The services of **GCP** can be accessed by software developers, cloud administrators and IT Professionals over the Internet or through a dedicated network connection.

Features of GCP

- ☐ Tools and services
- ☐ Speed
- ☐ Cost effective
- ☐ Security

Services using GCP

❑ *Compute*

- ❑ Computer engine allows us to create Virtual Machines (VM), allocate CPU and Memory and choose from SSD or HDD storage. It allows you to create a workstation or computer virtually and handle all its details.

❑ *Networking*

- ❑ **Virtual Private Cloud (VPC)** : provides the flexibility to scale and control how workloads connect regionally and globally. You can manage your IP address to google network across all the regions.

Services using GCP

❑ *Networking*

- ❑ *Virtual Private Cloud (VPC)*
- ❑ *Cloud DNS* : It is scalable, reliable and managed authoritative DNS service. It is also programmable.
- ❑ *Premium Tier Network*: It is for high performance routing. Users can use the global fiber network, with the globally distributed Points of Presence (POP).
- ❑ *Cloud Load Balancing*: distributes workload across different computing resources to balance the entire system performance.

Services using GCP

☐ **Storage**

- ☐ Google Cloud Storage
- ☐ Cloud SQL
- ☐ Cloud BigTable

☐ **Big Data**

- ☐ BigQuery
- ☐ Google Cloud Dataproc
- ☐ Cloud Dataflow

☐ **Cloud AI**

- ☐ AutoML

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- ❑ Microsoft Azure, formerly known as **Windows Azure**, is Microsoft's public cloud computing platform.
- ❑ It provides range of capabilities, including SaaS, PaaS, and IaaS.
- ❑ It provides a broad range of cloud services, including compute, analytics, storage and networking.

Features of Azure

- ☐ Unique storage system
- ☐ Flexibility
- ☐ Scaling
- ☐ Security
- ☐ Cost effective
- ☐ Strong support in analytics

Services using Azure

☐ Compute Domain

- ☐ App Service
- ☐ Virtual Machine
- ☐ Functions

☐ Storage

- ☐ Blob Storage
- ☐ Queue Storage
- ☐ File Storage

☐ Database

- ☐ Cosmos DB
- ☐ MySQL
- ☐ MSSQL

☐ Networking

- ☐ Auto Scaling
- ☐ Load Balancing

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- ☐ ***Concept of GitHub***

Git

- ☐ Git is a DevOps tool used for source code management.
- ☐ It is free and open-source version control system used to handle small to very large projects efficiently.
- ☐ It is used to track changes in the source code, enabling multiple developers to work together.

Git Features

- ☐ Free and open-source tool
- ☐ Keeps track of any addition, modification, deletion
- ☐ It creates backups
- ☐ Creating branches and manage it
- ☐ Scalable
- ☐ Secure

Git and Concept of GitHub

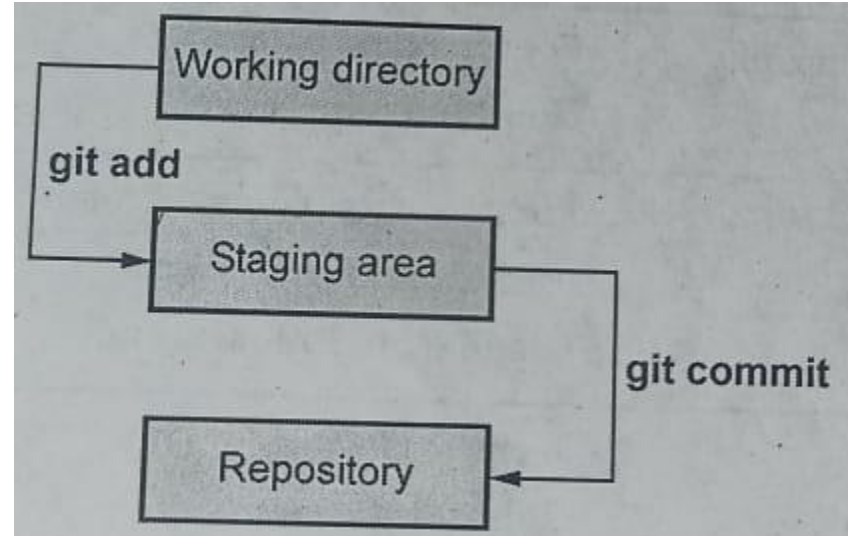


Git Workflow

- ☐ Untracked file
- ☐ Tracked file
- ☐ Working directory
- ☐ Staging area
- ☐ Repository

Git Commands

- ☐ Refer Practical-1



Git and Concept of GitHub



Git	GitHub
It is a command line tool	It is a GUI
It is a software	It is a service
It is installed locally on the PC	It is hosted on the web
Maintained by Linux	Maintained by Microsoft
Git is a version control system to manage source code history	GitHub is a hosting service for Git repositories
It has minimum external tool configuration	It has an active marketplace for tool integration

THANK YOU

