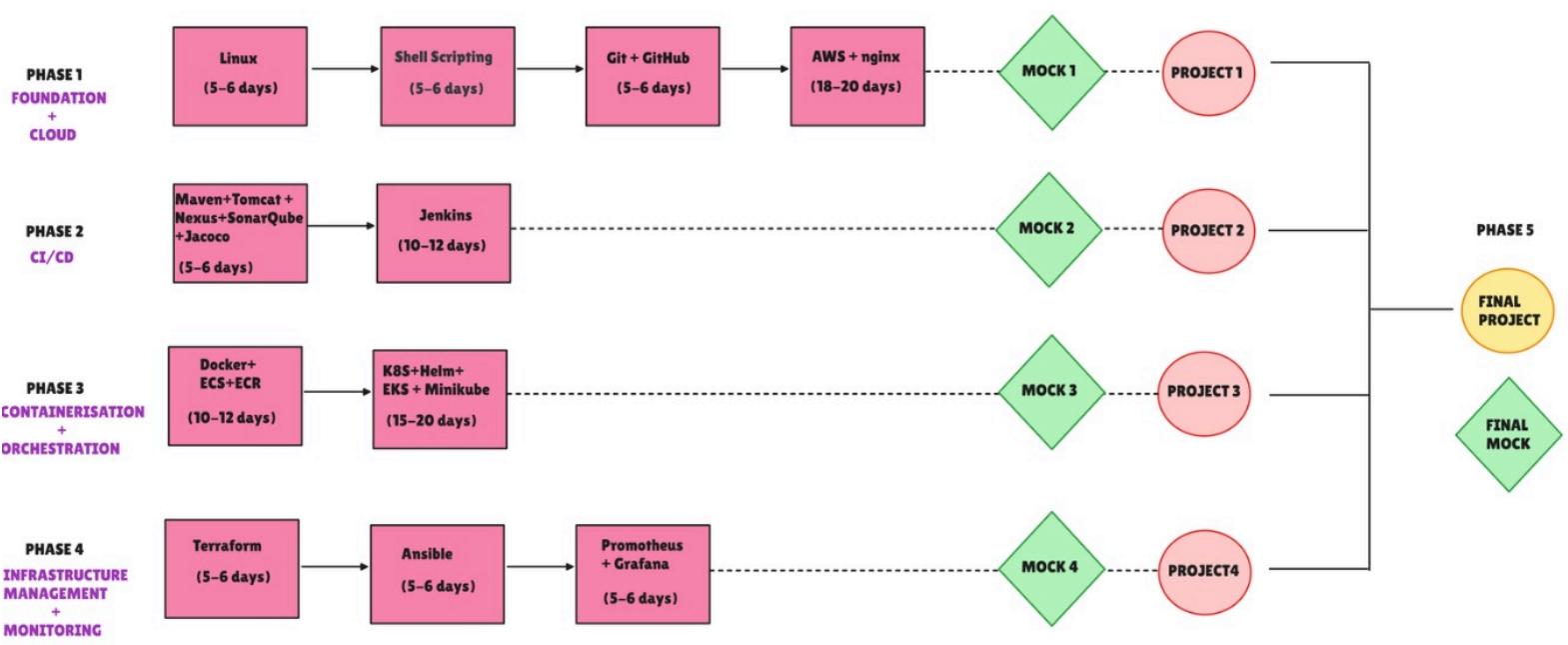


# **Flow of DevOps**

# DEVOPS ROADMAP



## Contents

- **DevOps Overview**
- **Linux OS**
- **Shell Scripting**
- **GIT & GitHub**
- **AWS & Nginx**
- **Maven**
- **Tomcat**
- **SonarQube**
- **Nexus**
- **Jacoco**
- **Jenkins**
- **Docker**
- **ECS & ECR**
- **Kubernetes (Minikube)**
- **Helm**
- **EKS**
- **Terraform**
- **Ansible**
- **Prometheus**
- **Grafana**
- **Projects**

## Flow of AWS

### **Introduction to IT Resources**

- IT Resources
- Types of IT Resources
- Problems with Traditional IT Resources

### **Introduction to Cloud Computing**

- What is Cloud Computing
- Types of Cloud Computing
- Advantages of Cloud Computing
- Top Cloud Service Providers

### **Introduction to AWS**

- AWS
- History of AWS
- Features of AWS
- Economic Models
- Different Ways to use AWS
- AWS Global Infrastructure (Regions, Availability Zones , Edge Locations, Regional Edge Locations)
- Explain AWS Management Console

### **EC2 (Elastic Compute Cloud)**

- Introduction to EC2
- Components in EC2
- Sizing & configuration Options in EC2
- Types of Instances
- Features of EC2
- Pricing for EC2
- Hands On Creation of EC2 Instance (Linux)
- AMI (Amazon Machine Images)
- Creation of Windows Instances
- EBS (Elastic Block Store) Volumes & Creations
- EC2 Auto Scaling
- Elastic Load Balancing (ELB)

### **S3 (Simple Storage Service)**

- Drawbacks of EBS volumes
- Introduction to S3
- Use Cases of S3
- S3 Buckets

- S3 Objects
- Bucket Creation
- Static Web Hosting
- Storage Classes
- Accessing S3 using EC2 (includes IAM service)

## **CloudFront**

- Introduction to CloudFront
- Creating Distributions

## **IAM(Identity & Access Management)**

- Introduction to IAM
- Components in IAM- Roles, Permission Policies, Users & Groups
- Creation of Role & Permission Policies , Users & Groups
- IAM Users, Groups

## **VPC(Virtual Private Cloud)**

- Introduction to VPC
- Why we need VPC
- Components in VPC
- IP Address - IPv4 & IPv6
- Security Groups
- Elastic IP
- ACL
- Hands on VPC Creation

## **Lambda**

- Introduction to Lambda
- Difference between EC2 & Lambda
- Features of Lambda
- Pricing in Lambda
- Structure of Lambda
- Types of Event Source
- Creation of Functions
- Author from Scratch (4 scripts)
- Author from Scratch (Get S3 Objects)
- Blueprint (Canary, Get S3 Objects)

## **SNS(Simple Notification Service)**

- Introduction to SNS
- Creation of Topics

- Creation Of Subscriptions
- Using SNS with S3 as Event Source

## **CloudWatch**

- Introduction to CloudWatch
- Components of CloudWatch
- Explain Metrics
- Create Dashboards ( at least 2 dashboards)
- Create Alarms for EC2

## **DynamoDB**

- Introduction to DynamoDB
- Creating tables and inserting data

## **Amazon RDS**

- Intro to AWS Databases
- Relational vs Non-Relational
- Amazon RDS
- Hands-on practice

## **Amazon CLI**

- Intro to CLI
- Explain Commands
- Hands-on practice

## **AWS account & Billing**

- AWS Billing
- AWS Payments
- AWS Free tier Status

## **Flow of GIT**

### **VCS** (Version Control System)

- Example for VCS
- Types of VCS & Explanation

### **GIT** (Global Information Tracker)

- Introduction to GIT
- History of GIT

- Features of GIT
- Working Stages of GIT
- Workflow of GIT
- Basic Commands & Hands On

## GitHub

- Introduction to GitHub
- Account Creation
- Push & Pull into Remote Repository
- GitHub Token

## Branching

- Introduction to Branching
- Types of Branching
- Branching Commands & hands On

## Merging

- Merging Commands
- Hands On
- Merge Conflict
- Resolving Merge Conflicts

## Undoing Changes & Extra Commands

- Undoing Changes
- Additional Commands

## Additional Commands

- Collaboration
- Branching
- Stash
- Tag
- .gitignore
- README File
- Forking
- Rebase & Squash

## Flow of LINUX

## Software

- What is Software

- Types of Software

## Installation

- Installing Oracle Virtual Box
- Setting up Ubuntu (Jammy Jellyfish)

## Linux

- Introduction to Linux OS
- History of LinuxOS
- Flavours/ Distribution of LinuxOS
- Features of LinuxOS
- Architecture of LinuxOS
- Difference between LinuxOS & Windows OS
- Basic Commands on Linux

## File Systems Hierarchy

- Linux filesystem hierarchy
- Types of File systems

## File Management

- Types of path
- Commands in File Management

## User Management

- Types of User
- Commands in user management

## Group Management

- Commands in Group Management

## File permissions

- Commands in File permissions
- Permissions using alphabet series
- Permissions using number series

## File Compressions

- Types of Compression

## System Commands

- top, du, df, ps, kill, systemctl, uname -a

## Additional Commands

- grep, pgrep, find, locate, head & tail, wc, cut, awk, pipeline

## **Package Manager**

- Yum, apt

## **Networking Commands**

- Ifconfig, ping, ss -tuln, netstat, curl, wget, etc

## **Flow of Shell**

## **Recap of Architecture Of Linux**

### **Shell**

- What is Shell?
- Types of Shell

## **Shell Scripting**

- What is Shell Scripting?
- Features
- Commands to check shell
- Creation of shell script file

## **Input & Output Commands**

- echo
- read.

## **Variables**

- Declaring variable
- Utilising the value of a variable “\$”.

## **Operator & Its Types**

- Arithmetic Operators
- Relational Operators
- Logical Operators
- String Operators
- File Operators

## **Conditional Statements**

- if
- if-else
- elif
- nested condition

## **Looping Statements**

- For loop
- While loop
- Until loop

## **Functions**

- Creation of functions

## **Scripts**

- User management scripts
- Backup & Restore scripts
- Monitoring the CPU usage
- Creating Jobs
- Service management script

- Automating Installation & Updation

## Flow of Maven

### **Recap of Traditional Approach**

#### **Build**

- What is Build?
- Build Process:- Processes involved in developing the builds
- Why we need build tools
- Examples of Build Tools

#### **Introduction to Maven**

- What is Maven?
- History of Maven
- Features of Maven
- What is Pom.xml ?
- Plugins & dependencies (Jacoco, JUnit, TestNG)

#### **Types of Repositories**

- Local Repository
- Central Repository
- Remote Repository(Nexus)

#### **Maven Phases**

- Explain phases( with the commands)

#### **Maven Lifecycles**

- Clean Lifecycle
- Default Lifecycle
- Site Lifecycle

#### **Additional Topics**

- Configure settings.xml for integrating with nexus
- Copying dependencies from maven repository

#### **Code Quality Inspection & Analysis**

- SonarQube

## Web Servers

- Nginx
- Tomcat

## Flow of Jenkins

### **Traditional Build & Release Process**

#### **Introduction to Jenkins**

- What is Jenkins
- What is CI, CD & CD
- History of Jenkins
- Features of Jenkins
- CI/CD Tools

#### **Installation & Setup**

#### **Explain Jenkins Dashboard**

#### **Jobs & its Types**

- What is a Job & its types ?
- Freestyle Jobs
- Pipeline Jobs & its Types
- Maven Project

#### **Role Based Authorization**

- What is Plugin
- Role Based Strategy Plugin
- How to enable Role Based Authorization

#### **Build Triggers**

- Build Periodically
- Poll SCM
- Github webhook

- Pre and Post build

## Notifications

- Email notification

## CI/CD Implementation

- Creating CI/CD pipeline by integrating GIT,Maven ,Nexus, SonarQube, and Tomcat

## JenkinsFile

- What is Jenkinsfile
- Creation of Jenkinsfile

## Master Slave Architecture

- What is master-slave architecture? Explain with diagram
- Creation and setup of master slave architecture

## Flow of Docker

## Application Architecture

- Monolithic
- Microservices
- 3-tier Architecture

## Introduction to Containers

- What are containers?
- Containers vs Virtual Machines

## Introduction to Docker

- Tools available for containerization.
- History of Docker
- Features of Docker
- Architecture of Docker
- Components of Docker
- Installation of Docker

## Introduction to Docker Hub

- Create Account in Docker hub

## **Docker File**

- What is Dockerfile?
- Creation of Dockerfile

## **Basic Commands in Docker**

- Dockerfile to Docker Image
- List Docker Images
- Docker Image to Docker Container
- List Docker Containers
- Stop & Delete Container
- Delete Docker images
- Push & Pull the Docker Images from Docker hub
- Copying files from host to container and vice versa

## **Advanced Concepts**

- Multi stage Docker
- Docker Volume
- Docker Networking
- Intro to YAML
- Docker Compose
- AWS ECS & ECR

# **Flow of KUBERNETES**

## **Problems with Containers**

## **Container Orchestration**

- What is container orchestration
- Container Orchestration tools

## **Kubernetes**

- What is Kubernetes?
- History & Features of Kubernetes
- Kubernetes Architecture
- Components of Kubernetes Cluster
- Kubernetes Objects
- Stateful VS Stateless Applications

## **YAML in Kubernetes**

- What is YAML?
- Components of YAML

- Creation of pod using YAML

## Kubernetes Namespaces

- What is namespaces?
- Creation of namespaces

## ConfigMaps & Secrets

- Store and manage environment variables
- Secure sensitive data with Secrets

## ReplicaSet

- What is replicaset?
- Creation of replicaset

## Deployment

- What is deployment?
- Creating Deployment

## Kubernetes Services

- What is Kubernetes services?
- Types of Kubernetes Services
  - ClusterIP Service
  - NodePort Service
  - LoadBalancer Service
- Creating service.yml
- Ingress Controllers

## Persistent Storage & Volume

- Types of Kubernetes Volumes
- PV & PVC

## Installation & SetUp

- Minikube
- EKS ( Elastic Kubernetes Service)
- Understand kubectl CLI commands

## Advanced Kubernetes Concepts

- Helm Charts
- Deploying application using Helm
- Jenkins & Kubernetes Integration

## Flow of TERRAFORM

### **Introduction**

- Introduction to Infrastructure as a code
- Why we need Infrastructure as a Code

### **Terraform**

- What is Terraform?
- Terraform Architecture
- History
- Lifecycle ( init, plan, apply, destroy )
- Installation
- Basic terraform commands
- Providers - AWS, Azure,GCP
- Variables and output
- Terraform state management
- Terraform modules

## Flow of Ansible

### **Introduction**

- What is Configuration Management
- Uses of Configuration Management
- Introduction to Ansible
- Installation Process
- Creation of inventory file
- Introduction to Ad-Hoc commands
- Ansible Playbook
- Ansible variables
- Ansible module

## Flow of Prometheus

### **Prometheus**

- Why Prometheus
- Prometheus Architecture

- Installation & Configuration
- PromQL
- Exporters
- Service Discovery
- Alerting with Alert Manager
- Monitoring Kubernetes with Prometheus

## Flow of Grafana

### **Grafana**

- What is grafana?
- Installation & Configuration
- Connecting grafana with Prometheus
- Creating dashboards
- Grafana Alerts & Notifications
- Data Sources
- Kubernetes monitoring with Grafana

## Flow of AZURE

### **Azure Account**

- Introduction to Azure Account
- Hierarchy of Azure
- Introduction to Management Groups
- Creation of Management Groups
- Introduction to Azure Subscription
- Types of Azure Subscription
- Introduction to Resource Groups
- Creation of Resource Groups
- Introduction to Resources/Services

### **Introduction to IT Resources**

- IT Resources
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### **Introduction to Cloud Computing**

- What is Cloud Computing
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- Advantages of Cloud Computing

- Top Cloud Service Providers

## **Introduction to Azure**

- Azure
- History of Azure
- Features of Azure
- Economic Models
- AWS Global Infrastructure (Geography, Regions, Availability Zones, Data Center, Availability Sets, Edge Locations,)
- Explain AWS Management Console

## **VM (Virtual Machine)**

- Introduction to VM
- Sizing & configuration Options in EC2
- Types of Sizes
- Features of VM
- Pricing for VM
- Hands On Creation of EC2 Instance (Linux)
- Different Connection methods
- Capture (Images)
- Creation of Windows Instances
- Disks

## **Storage Account**

- Introduction to Storage Account.
- Creation of Storage Account
- Introduction to Blob storage
- Creation of Containers
- Uploading of Objects
- Enabling Object versioning
- Static Web Hosting

## **Entra ID and IAM**

- Introduction to Entra ID and IAM
- Introduction to Users and Groups
- Creating Users
- Creating Groups
- Giving policies to the groups on services
- Adding Groups to the service.
- Adding Bulk users.

## **Vnet (Virtual Network)**

- Introduction to Vnet
- Why we need Vnet

- Creation of Vnet
- Network Security Groups
- Network Interface
- Vnet Public and Private connection
- NAT gateway
- Vnet Peering

## Azure SQL

- Introduction to Azure SQL
- Azure Deployment model
- Creation of Azure SQL Database
- Connection of Database with other Database Engine

## CosmosDB

- Introduction to CosmosDB
- Creation of CosmosDB
- Creating Tables
- Adding Key-Values

## Azure Monitor

- Introduction to Azure Monitor
- Components of Azure Monitor
- Different types of Metrics
- Creating alert for VM

## Azure CLI

- Introduction to CLI
- Explain Commands

## Billings and Cost Management

- Managing Bills
- Azure Free Tier

## **PROJECTS**

1. Hosting a WebApp using Nginx , AWS ELB & ASG.
2. Creating CI/CD Pipeline by integrating GIT, Maven, Jenkins, SonarQube, Nexus, Tomcat
3. Deploying an Application in Kubernetes Cluster & configuring DNS.
4. Creating & Configuring Infrastructure using Terraform & Ansible
5. Creating dashboard using Prometheus & Grafana

