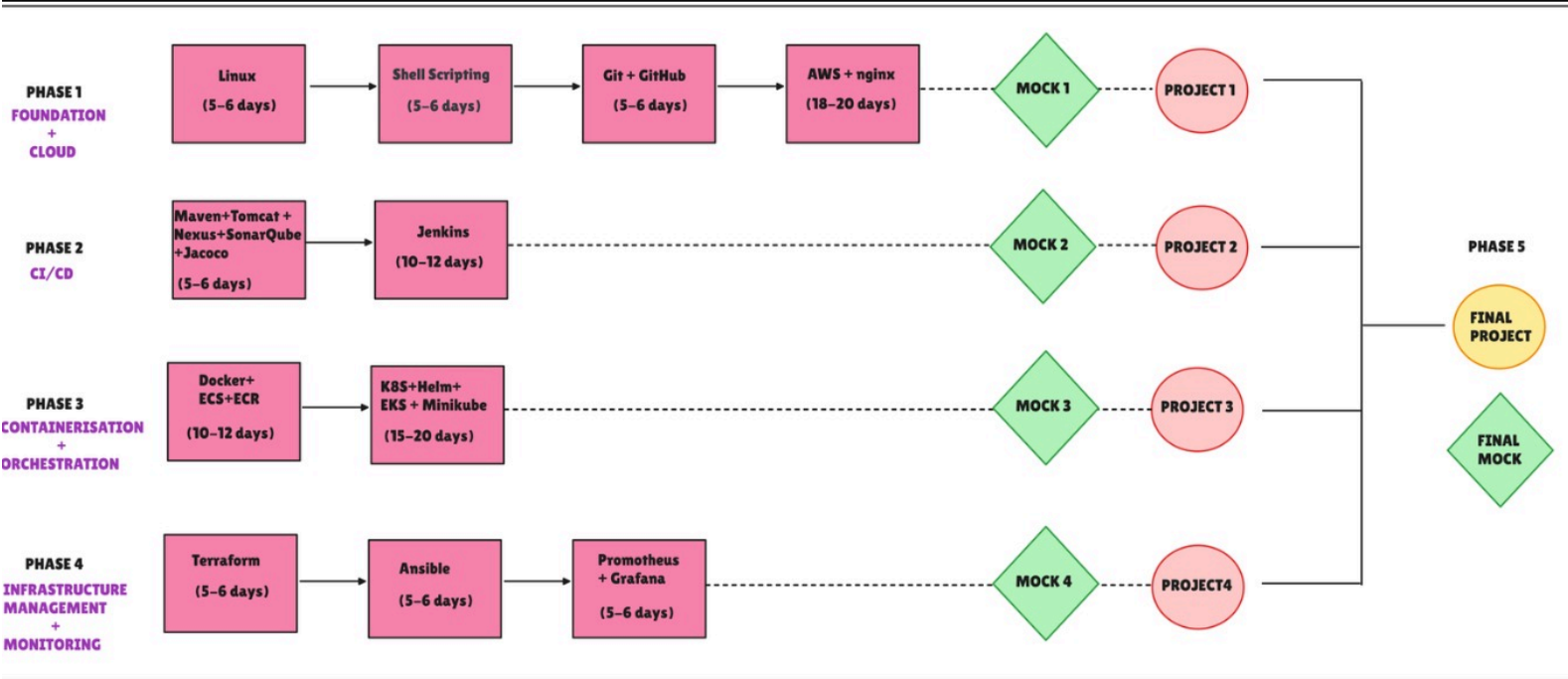


Flow of DevOps

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, pgerp, 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
- 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 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

