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Week 0 - DevOps SRE Fundamentals

- DevOps/SRE tools setup on AWS
- DevOps Flow
- Redhat Linux - Introduction, and common commands
- Linux folder and file structure
- AWS account setup
- AWS basics / SRE system overview
- DevOps projects and real time scenarios
- Git and Github Overview

Week 1 - Source Code management & Networking Concepts

- Difference between CVCS and DVCS
- Importance of Git
- Installation of Git
- Git three-stage Architecture
- Detail explanation of Repository, Commit, Tags, Snapshots, Push-Pull Mechanism, and Branching Strategy
- Working with Git stash and Git pop
- Resolve Merge conflicts in Git
- Git Revert and Reset (Reset vs Revert)
- Git rebase
- Working with git Squash
- Git cherry pick
- What is Git fork?
- Git Integration on VScode, Git Authentication with Github via SSH and HTTPS Protocol
- Github Introduction, Creating Repositories, PR's
- Networking Concepts in Detail

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Week 2 - Continuous Integration and Continuous Delivery

- Understanding aggregate functions (SUM, AVG, COUNT)
- Continuous Integration/Continuous Deployment (CICD) Workflow Overview
- Understanding JenkinsFile: Exploring Jenkins Jobs, Jenkins Pipeline, and Jenkins File
- Build Triggers in Jenkins: SCM Polling, GITScm Polling, Build Periodically - Uncovering the What, Why, and How
- Groovy File Creation: Conceptualizing and Crafting Groovy Scripts for Jenkins
- Integrating GitHub with Jenkins: Establishing Webhooks for Seamless Collaboration
- Grasping Merge Request Concepts in the CI/CD Process
- Jenkins Master-Slave Configuration: Optimizing Resource Utilization in CI/CD
- Triggering Pipelines Directly from JenkinsFile: Streamlining Automation
- GitLab Branching Strategy: Best Practices for Code Collaboration and Version Control
- Hands-On Experience: Building a Jenkins CI Pipeline with Groovy, Incorporating Various Stages
- Configuring Docker Engineer as the Jenkins Slave - Jenkins Dynamic Slave Configuration
- Jenkins Plugins - Docker, Git, Maven and other common used plugins
- Integrating Kubernetes with jenkins

Week 3 - Package Management (Docker) Using Real Time Scenarios & Understanding SonarQube

- Conceptual Concepts of Dockers
    - What is Virtualization before deep dive into the Containerization
    - O.S level virtualization
    - Docker vs Virtual Machine
    - What is Docker and its History

- Docker Architecture
- Advantages and limitations of Docker
- Components of Docker (Docker Daemon, Docker Client, Docker Host)
- Docker Image
- Docker lifecycle
- Docker Image TAR and Unarchive, Docker container states, Docker Networking
- (Create and Manage), Dockerfile and CD flow
- CD Tools with Docker (Integrating CD tools like Jnekins and Github action using projects)
- Docker Networking
- Docker Security Introduction
- Docker volume

- SonarQube, Quality Gates, and Profiles:
  - Understanding SonarQube's Role in Code Quality Assessment
  - Implementing Quality Gates to Ensure Code Quality Standards
  - Configuring and Managing SonarQube Profiles for Code Analysis

Week 4 - Automation Using Shell Scripting & RedHat Linux Administration

- Shell Scripting
  - Basics of Shell Scripting
  - Real - Time Scenarios We have in shell Scripting.
- Red hat Linux Administration
  - Introduction to Red Hat Linux
  - File System Management
  - User and Group Administration
  - Package Management with Yum
  - System Services and systemd
  - Networking Configuration

    - Networking Concepts - SNAT, DNAT,IP, Netmask
    - Security and Permissions
    - System Performance Monitoring
    - Storage Management
    - Backup and Restore
    - Kernel and Module Management
    - Remote Access with SSH
    - CPU Scheduling, Job Scheduling
- Python Based Automation Scripts

Week 5 - Deep Dive Kubernetes

- Introduction to Kubernetes
    - Defining Kubernetes and its Role in Container Orchestration
    - Exploring the Features and History of Kubernetes
- Kubernetes Architecture
    - In-Depth Analysis of Kubernetes Architecture
    - Understanding Node Components, Manifest File Components, and Service Components
    - Overview of Node and Pod Fundamentals
    - Role of Master Node and Components of the Control Plane
    - Installing and Configuring kubectl and minikube
- Kubernetes Basics
    - Kubernetes Commands: Navigating and Interacting with Kubernetes
    - Creation and Deletion of Pods
    - Managing Kubernetes YAML Configurations
    - Higher-Level Kubernetes Objects and Object Management
    - Labels and Selectors in Kubernetes
    - Kubernetes Networking, Services, and NodePort
    - Understanding Namespaces in Kubernetes
    - Multi Container Pod Setup
    - Pods Design pattern - Sidecar, Ambassador
- Working with Applications in Kubernetes
    - Installing Kubernetes on AWS
    - Deploying Microservices Applications to Kubernetes Cluster

- ConfigMap and Secret Usage in Kubernetes
- Exploring Volumes in Kubernetes
- Persistent Volume and LivenessProbe in Kubernetes
- Replication, Auto-Healing, and Deployment in Kubernetes

Week 6 - Cloud Services & AWS Fundamentals

- Overview of AWS Global Infrastructure
- Detailed Overview of Elastic Compute Cloud (EC2)
- Setting Up Your First EC2 Instance
- In-Depth Guide to EC2 Instance Configuration
- Exploring EC2 Options in Detail
- Connecting to Cloud Instances
- Security Group Handling and Management
- Introduction to Amazon S3
- Auto Scaling and Load Balancing
- Understanding Cloud Formation and CloudWatch
- Exploring Simple Notification Service (SNS) and Simple Queue Service (SQS)
- Overview of Relational Database Service (RDS) and Identity and Access Management (IAM)
- Project-Based Learning: ECS and ECR
- Serverless Architecture
- Utilizing CloudWatch for Monitoring and Setting Billing Alarms
- Hands-On Experience with AWS Services:
  - AWS VPC
  - AWS Lambda
  - Amazon API Gateway
  - Amazon SNS
  - Amazon CloudFront
  - AWS CloudFormation

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Week 7 - Ansible

Week 8 - Infrastructure As Code using Terraform

- AWS Infrastructure Security with Terraform
- CIDR Setup Example with /16
- Subnet Configuration with Terraform
- Terraform State Locking
- Terraform Modules

Week - 9 Monitoring And Logging

- Installation Of grafana
- Database Installation MySQL
- Grafana Setup with My SQL
- Installation of prometheus
- Setting Up Prometheus on Kubernetes cluster
- Monitoring K8 Cluster with prometheus
- Alerts in Grafana
- Grafana Plugins

Projects

Major Projects - Mentor Guided

- Design and implement a robust DevOps project involving the deployment of Amazon Elastic Container Service (ECS) on EC2 instances, incorporating CloudWatch for monitoring, and integrating load balancers for optimal application scaling
- Amazon EKS, incorporating the Nginx Ingress Controller for efficient traffic routing, and integrating Cert-Manager for SSL certificate management.

Major Projects - Self Guided

- Github action to add ad node as a self hosted runner and run a specific docker image and expose it to particular port using nginx
- System Monitoring Script via Shell Scripting - Write a script to monitor system resources (CPU, memory, disk usage) and

generate reports. Include email notifications for critical conditions.

- DevOps pipeline with AWS, CI/CD pipeline with GitHub Actions and Jenkins,
- Deploying containerized applications using Docker and Kubernetes
- Deploying AWS services using Terraform