Week 1 - Automation Using Shell Scripting & RedHat Linux Administration

Session 1:

- Red Hat Linux Administration
- Introduction to Red Hat Linux
- File System Management
- User and Group Administration
- Package Management with Yum
- System Services and Systems
- Networking Configuration
- Networking Concepts - SNAT, DNAT, IP, Netmask
- Security and Permissions
- System Performance Monitoring
- Storage Management
- Backup and Restore

Session 2:

- Basics of Shell Scripting
- Real-Time Scenarios in Shell Scripting

Week 2 - Cloud Services & AWS Fundamentals

Session 3:

- 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

Session 4:

- 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 Utilising CloudWatch for Monitoring and Setting Billing Alarms

Week 3 - Source Code Management & Networking Concepts

Session 5:

- Difference between CVCS and DVCS
- Importance of Git
- Installation of Git
- Git three-stage Architecture
- Detailed 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?

Session 6:

- Git Integration on VScode, Git Authentication with Github via SSH and HTTPS Protocol
- Github Introduction, Creating Repositories, PR’ Networking Concepts in Detail
- How Systems Communicate
- LAN/WAN
- Switch, Router IP
- IP address and its types

- OSI Model
- Subnetting
- DNS Basics
- Switching + Routing

Week 4 - Package Management (Docker) Using Real-Time Scenarios & Understanding SonarQube

Session 7:

- Conceptual Concepts of Dockers
- What is Virtualization before deep dive into 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 Jenkins and Github action using projects)
- Docker Networking
- Docker Security Introduction
- Docker volume

Session 8:

- 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 5 - Minor Project Week

Session 9:

- Design and implement a minor DevOps project involving shell scripting and RedHat Linux Administration:
- Develop a script to automate user and group administration on a RedHat Linux system.
- Create a shell script to add, delete, and list users and groups.
- Implement file system management tasks using shell scripting, such as creating directories, setting permissions, and managing disk usage.
- Write a script to monitor system performance (CPU, memory usage) and generate periodic reports.

Session 10:

- Continue the project and integrate the use of Git and Docker:
- Initialise a Git repository for the project, commit the shell scripts, and push them to a GitHub repository.
- Create a Dockerfile to containerize the shell scripting application.
- Build and run the Docker container, ensuring the shell scripts can be executed within the container environment.
- Document the project setup, usage instructions, and any issues encountered during the implementation

Week 6 - Continuous Integration and Continuous Delivery

Session 11:

- Understanding aggregate functions (SUM, AVG, COUNT)
- Continuous Integration/Continuous Deployment (CI/CD) Workflow Overview
- Understanding JenkinsFile: Exploring Jenkins Jobs, Jenkins Pipeline, and Jenkins
- 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

Session 12:

- Grasping Merge Request Concepts in the CI/CD Process Jenkins Master-Slave Configuration: Optimising Resource Utilisation in CI/CD
- Triggering Pipelines Directly from JenkinsFile: Streamlining Automation o GitLab Branching Strategy: Best Practices for Code Collaboration and Version Control
- Hands-On Experience: Building a Jenkins CI Pipeline with Groovy
- Incorporating Various Stages o Configuring Docker Engineer as the Jenkins Slave - Jenkins Dynamic Slave Configuration
- Jenkins Plugins - Docker, Git, Maven, and other commonly used plugins Integrating Kubernetes with Jenkins

Week 7 - Deep Dive Kubernetes

Session 13:

- Introduction to Kubernetes
- Defining Kubernetes and its Role in Container Orchestration
- Exploring the Features and History of Kubernete
- 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

Session 14:

- 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

Week 8 - Working with Applications in Kubernetes

Session 15:

- 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

Session 16:

- Advanced Kubernetes Topics
- Helm And Istio Service mesh
- Role-Based Access Control (RBAC) and Service Accounts
- Helm and Istio Integration in Kubernetes
- Kubernetes Interview Questions
- Differences Between Monolithic and Microservices Architecture
- HPA, Ingress, Taint, and toleration

Week 9 - Ansible

Session 17:

- Defining Ansible and Understanding the Need for Configuration Management
- In-Depth Exploration of Ansible Architecture
- Analysing the Architecture of Ansible for Efficient Configuration Management.
- Detailed Steps for Installing and Setting Up Ansible
- Exploring Essential Components such as Ansible Roles, Ansible Collections, Ad-hoc Commands, and Playbooks Setup.

Session 18:

- Automation with Ansible Playbooks
- Creating Playbooks for Automation.
- Building Playbooks to Copy Files with Special Variables.
- Utilising Ansible Handlers and Notifiers for Effective Automation.
- Implementing Playbooks for Downloading Artefacts and Unzipping Files.
- Advanced Automation Scenarios with Ansible
- Leveraging Ansible Tags for Targeted Deployment to Serve
- Automating the Installation of Apache and Configuring the Corresponding Configuration Files
- Configure Multi-node k8s cluster with Ansible
- Manage Variable and Ansible Facts

Week 10 - Infrastructure As Code using Terraform

Session 19:

- Introduction to Infrastructure as Code (IaC)
- Getting Started with Terraform
- Terraform Basics: Variables, Resources, Attributes, and Dependencies
- Terraform State Management

Session 20:

- Advanced Terraform Concepts: for-each and module
- Terraform Project Development
- AWS Infrastructure Security with Terraform
- CIDR Setup Example with /16
- Subnet Configuration with Terraform
- Terraform State Locking
- Terraform Modules

Week 11 - Monitoring And Logging

Session 1:

- Installation Of Grafana
- Database Installation MySQL
- Grafana Setup with My SQL

Session 2:

- Installation of Prometheus
- Setting Up Prometheus on Kubernetes cluster
- Monitoring K8 Cluster with Prometheus
- Alerts in Grafana
- Grafana Plugins

Week 12 - Major Projects - Mentor and Self Guided

Session 1:

- Mentor Guided Project: 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
- Mentor Guided Project: Amazon EKS, incorporating the Nginx Ingress Controller for efficient traffic routing, and integrating Cert-Manager for SSL certificate management.

Session 2:

- Self Guided Projects: GitHub action to add a node as a self-hosted runner and run a specific docker image and expose it to a particular port using Nginx
- System Monitoring Script via Shell Scripting - Write a script to monitor system resources (CPU, memory, disk usage