

DEVOPS ENGINEERING CURRICULUM

Week 1: Introduction to DevOps and Cloud Integration

Overview of DevOps principles and practices

Discuss the cultural shift towards collaboration and communication between development and operations teams.

Explore the importance of automation, continuous integration, and continuous delivery in DevOps.

Understanding the role of a DevOps engineer

Define the responsibilities of a DevOps engineer, including collaboration, automation, and monitoring.

Integration of DevOps with cloud computing

Explore different cloud service models (IaaS, PaaS, SaaS) and deployment models (public, private, hybrid).

Discuss how DevOps practices align with cloud principles for scalability and flexibility.

Key cloud services and features relevant to DevOps

Dive deeper into specific cloud services such as AWS, Azure, or Google Cloud that are commonly used in DevOps workflows.

Explore services like computer instances, storage, networking, and identity management.

Week 2: Version Control with Git

Introduction to version control

Discuss the importance of version control in collaborative software development.

Explore other version control systems and understand why Git is widely adopted.

Understanding Git and its basic commands

Cover Git basics, including commits, branches, merges, and remotes.

Explore advanced Git features like rebasing and cherry-picking.

Branching and merging strategies

Discuss branching models such as Git Flow and strategies for effective collaboration.

Explore the concept of pull requests and code reviews.

Collaborative development using Git

Emphasize collaborative workflows, including forking, cloning, and contributing to open-source projects.

Explore Git best practices for large teams and distributed development.

Week 3: Infrastructure as Code (IaC) with Terraform

Introduction to Infrastructure as Code (IaC)

Discuss the benefits of treating infrastructure as code.

Explore how IaC improves versioning, collaboration, and repeatability.

Overview of Terraform and its syntax

Introducing HashiCorp's Terraform as a popular IaC tool.

Dive into Terraform's declarative language and configuration syntax.

Creating and managing infrastructure using Terraform

Hands-on exercises to create infrastructure using Terraform.

Explore Terraform modules and best practices.

Best practices for IaC

Discuss best practices for writing maintainable and reusable Terraform code.

Explore strategies for managing state files and handling sensitive data.

Week 4: Continuous Integration (CI) with Jenkins

Introduction to Continuous Integration (CI)

Discuss the benefits of CI in automating the build and test phases.

Explore how CI helps in identifying and fixing integration issues early.

Setting up Jenkins for CI/CD

Install and configure Jenkins for CI.

Explore Jenkins plugins and their role in extending functionality.

Creating and configuring Jenkins jobs

Hands-on exercises to create Jenkins jobs for building, testing, and deploying applications.

Explore parameterized builds and build triggers.

Integrating Jenkins with version control systems

Configure Jenkins to work seamlessly with Git, SVN, or other version control systems.

Explore Jenkins pipeline as code for defining complex CI/CD workflows.

Week 5: Containerization with Docker

Introduction to containerization

Discuss the advantages of containerization for consistency and scalability.

Explore containerization vs. virtualization.

Understanding Docker and container basics

Dive into Docker architecture and components.

Explore Docker images, containers, and Dockerfile.

Creating and managing Docker containers

Hands-on exercises to build and run Docker containers.

Explore container orchestration and networking.

Docker networking and storage

Discuss Docker networking models and best practices.

Explore persistent storage solutions for containers.

Week 6: Container Orchestration with Kubernetes

Introduction to Kubernetes

Discuss the need for container orchestration.

Explore Kubernetes architecture and components.

Setting up a Kubernetes cluster

Hands-on exercises to set up a Kubernetes cluster.

Explore different deployment models (single-node, multi-node).

Deploying applications on Kubernetes

Explore Kubernetes manifests for deploying applications.

Discuss Helm for managing Kubernetes applications.

Managing and scaling applications in Kubernetes

Discuss scaling strategies and auto-scaling in Kubernetes.

Explore monitoring and logging for Kubernetes clusters.

Week 7: Configuration Management with Ansible

Introduction to configuration management

Discuss the importance of configuration management in maintaining infrastructure.
Explore other configuration management tools and why Ansible is chosen.
Understanding Ansible and its architecture

Dive into Ansible components, including playbooks, roles, and inventory.
Explore how Ansible communicates with remote hosts.
Writing Ansible playbooks for configuration management

Hands-on exercises to create Ansible playbooks for common tasks.
Explore variables, loops, and conditionals in Ansible.
Ansible roles and best practices

Discuss the role-based organization of Ansible playbooks.
Explore best practices for structuring Ansible projects.

Week 8: Monitoring and Logging

Importance of monitoring and logging in DevOps

Discuss the role of monitoring in maintaining application health.
Explore how logging aids in troubleshooting and debugging.
Implementing monitoring solutions (e.g., Prometheus, Grafana)

Hands-on exercises to set up Prometheus for monitoring.
Explore Grafana for visualization and alerting.
Centralized logging with tools like ELK stack

Discuss the ELK (Elasticsearch, Logstash, Kibana) stack for centralized logging.
Explore log aggregation and analysis.
Setting up alerts and notifications

Configure alerting rules in Prometheus.
Explore notification channels and integrations with communication platforms

Week 9: Continuous Deployment (CD) with Jenkins and Spinnaker

Introduction to Continuous Deployment (CD)

Discuss the benefits of CD in automating the deployment process.

Explore different deployment strategies.

Implementing CD with Jenkins and Spinnaker

Hands-on exercises to set up CD pipelines using Jenkins.

Explore Spinnaker for advanced deployment strategies.

Blue-green deployments and canary releases

Discuss blue-green deployment and canary release concepts.

Explore how these strategies minimize downtime and risk during deployments.

Managing CD pipelines

Explore best practices for maintaining and versioning CD pipelines.

Discuss rollback strategies and post-deployment validation.

Week 10: Project Week