

Course Outline: DevOps Engineering Course Outline

Why DevOps?

DevOps is a critical approach in modern IT that combines development (Dev) and operations (Ops) to increase the efficiency, speed, and security of software development and delivery. This methodology is essential for several reasons:

- **Speed and Efficiency:** DevOps enables organizations to deliver applications and services at a high velocity, allowing for faster innovation, better adaptation to changing markets, and increased operational efficiency. This is achieved through practices like continuous delivery and microservices, which enable quicker updates and releases.
- **Cultural Philosophy and Practices:** Transitioning to DevOps involves a shift in culture, breaking down barriers between development and operations teams. This fosters a collaborative environment where teams work together to optimize productivity and reliability, with a focus on customer needs and quality of services.
- **Increased Collaboration:** DevOps encourages a more collaborative environment at all stages of the development cycle, emphasizing communication, collaboration, and shared responsibility for business outcomes. This leads to improved collaboration between teams, reducing handoff friction and enhancing responsiveness.
- **Automation and Continuous Improvement:** DevOps practices include automation of the software development lifecycle, which reduces manual intervention and errors. This, along with continuous improvement and minimization of waste, ensures a culture of building, testing, and releasing software that is more reliable and at a high velocity.
- **Security and Compliance:** Adopting a DevOps strategy helps businesses reduce security and compliance risks by integrating security into the development process, ensuring that security is an active and integrated part of the development process.
- **Cloud-Native Approach:** DevOps supports the cloud-native approach, enabling organizations to scale resources more easily, support faster software shipping, and align with business goals. This approach allows developers and operations teams to work more collaboratively, resulting in better software delivered faster.

In summary, DevOps is essential for organizations looking to transform how they build and deliver software, focusing on speed, efficiency, collaboration, and security. By adopting DevOps practices, organizations can innovate faster, adapt to market changes more effectively, and deliver high-quality products to their customers.

Module 1: Introduction to DevOps – 1 class

- Overview of DevOps principles and practices
- Evolution of DevOps and its importance in modern software development
- Benefits and challenges of adopting DevOps methodologies

Module 2: Containerization – 3 class

- Understanding containerization and its advantages
- Introduction to Docker: containers, images, and registries

Module 3: Version Control with Git – 2 class

- Introduction to version control systems (VCS)
- Git basics: repository, commits, branches, and merges
- Collaborative development workflows: feature branching, pull requests
- Git best practices and tips for effective version control management

Module 4: Continuous Integration/Continuous Deployment

Deployment (CI/CD) – 2 class- Understanding CI/CD pipelines

- Introduction to CI/CD tools (GitHub Actions, Jenkins)
- Integrating CI/CD with version control systems and artifact repositories

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Module 5: Jenkins – 2 class

- Introduction to CI/CD tools Jenkins
- Configuring CI/CD jobs: building, testing, code quality checks and deployment

Module 6: Ansible – 2 class

- Introduction to configuration management tools Ansible
- Automating server provisioning and configuration
- Managing configuration drift and ensuring consistency across environments

Module 7: AWS – 2 class

- AWS Fundamentals
- AWS Compute service, AWS Database service, AWS storage service and IAM policy.

Module 8: Infrastructure as Code (IaC) with Terraform– 1 class

- Introduction to IaC concepts and benefits
- Infrastructure provisioning tools
- Writing and managing infrastructure code
- Best practices for IaC development and deployment

Module 9: Kubernetes – 3 Class

- Introduction to Kubernetes
- Kubernetes cluster deployment
- Kubernetes Networking
- Demo Application Deployment

Module 10: Monitoring and Logging – 2 class

- Importance of monitoring and logging in DevOps
- Monitoring tools and metrics (e.g., Prometheus, Grafana)
- Alerting and incident response best practices