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# DevOps: foundational concepts, tools, and practices

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INSTITUTE OF MANAGEMENT,  
TECHNOLOGY & FINANCE

# DevOps: foundational concepts, tools, and practices

## Unlocking the power of DevOps

**Course:** DevOps: foundational concepts, tools, and practices

**Institution:** Institute of Management Technology & Finance  
(MTF)

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# DevOps: foundational concepts, tools, and practices

## Course overview

- Introduction to DevOps
- Version Control with Git
- Basics of CI/CD
- Introduction to Containers
- Configuration Management Basics
- Monitoring and Logging
- Cloud Basics
- DevOps Practices and Culture
- Mini Capstone Project
- Next Steps



# DevOps: foundational concepts, tools, and practices

## Introduction to DevOps

### What is DevOps?

- **Definition:** A culture and set of practices for automating and integrating development and operations.
- **Goals:** Collaboration, automation, continuous delivery.



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## Introduction to DevOps

### History of DevOps

- **Origins:** Agile methodology, need for faster releases.
- **Evolution:** From manual processes to automated pipelines.



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## Introduction to DevOps

### Benefits of DevOps

- Faster delivery of software.
- Improved collaboration and communication.
- Enhanced reliability through automation.



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## Introduction to DevOps

### DevOps Lifecycle

- **Phases:** Plan, Develop, Build, Test, Release, Deploy, Operate, Monitor.



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## Introduction to DevOps

### Hands-on Exercise

**Goal:** Set up a GitHub account and create a repository for storing course-related projects.

#### Steps:

- Go to GitHub.com and sign up for an account.
- Create a new repository titled "DevOps Foundations."
- Clone the repository locally using `git clone`.



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## Version Control with Git

### What is Git?

- A version control system for tracking code changes.
- **Importance:** Collaboration, rollback capabilities.



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## Version Control with Git

### Key Commands

git clone

git commit

git push

git pull

git branch



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## Version Control with Git

### Remote Collaboration with GitHub

- Pull requests
- Issue tracking
- Team collaboration



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## Version Control with Git

### Hands-on Exercise

**Goal:** Practice Basic Git Commands

#### Steps:

- Ensure You Are in the Repository Directory
- Create a New Branch
- Modify the Repository
- Stage the Changes
- Commit the Changes
- Push the Branch to GitHub
- Simulate a Team Update
- Merge the Branch
- Push the Updated Branch
- Delete the Branch Locally and Remotely



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## Basics of CI/CD

### What is CI/CD?

- **CI:** Automating the integration of code changes.
- **CD:** Streamlining deployment processes.



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## Basics of CI/CD

### Tools for CI/CD

- Examples:
  - Jenkins
  - GitHub Actions
  - GitLab CI/CD



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## Basics of CI/CD

### Benefits

- Faster testing and deployment cycles.
- Reduced human error.



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## Basics of CI/CD

### What is YAML?

- YAML stands for "YAML Ain't Markup Language"
- A human-readable data serialisation format
- Commonly used in configuration files



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## Basics of CI/CD

### Basic YAML Syntax

- Key-value pairs: `key: value`
- Lists: `item1, item2`
- Nested items: Indented with spaces



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## Basics of CI/CD

### GitHub Actions and YAML

- GitHub Actions workflows are defined using YAML
- Workflows are stored in `.github/workflows/`
- Workflows specify events and jobs



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## Basics of CI/CD

### Hands-on Exercise

**Goal:** Set up a basic CI/CD pipeline using GitHub Actions to automate a simple build process.

#### Steps:

- Go to GitHub and create a new repository
- Name it something like **ci-cd-demo**
- Initialise it with a README.md



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## Introduction to Containers

### What are Containers?

- Lightweight virtualized environments for running applications.



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## Introduction to Containers

### Docker Basics

- Key concepts:
  - Images
  - Containers
  - Dockerfiles



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## Introduction to Containers

### Benefits of Containers

- Portability
- Scalability
- Consistent environments
- Resource efficiency
- Improved deployment speed



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## Introduction to Containers

### Basic Docker Commands:

- `docker build`: Creates an image from a Dockerfile.
- `docker run`: Starts a container from an image.
- `docker stop`: Stops a running container.
- `docker ps`: Lists all running containers.



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## Configuration Management Basics

### What is Configuration Management?

- Automating system setup and maintenance



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## Configuration Management Basics

### Introduction to Ansible

- YAML-based playbooks for configuration automation



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## Configuration Management Basics

### Ansible Workflow:

- Write a playbook defining the desired configurations
- Specify the target systems in the inventory
- Run the playbook, and Ansible applies the changes to the specified systems



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## Configuration Management Basics

### Benefits

- Consistency
- Efficiency
- Reduced errors
- Version Control and Collaboration
- Faster Recovery

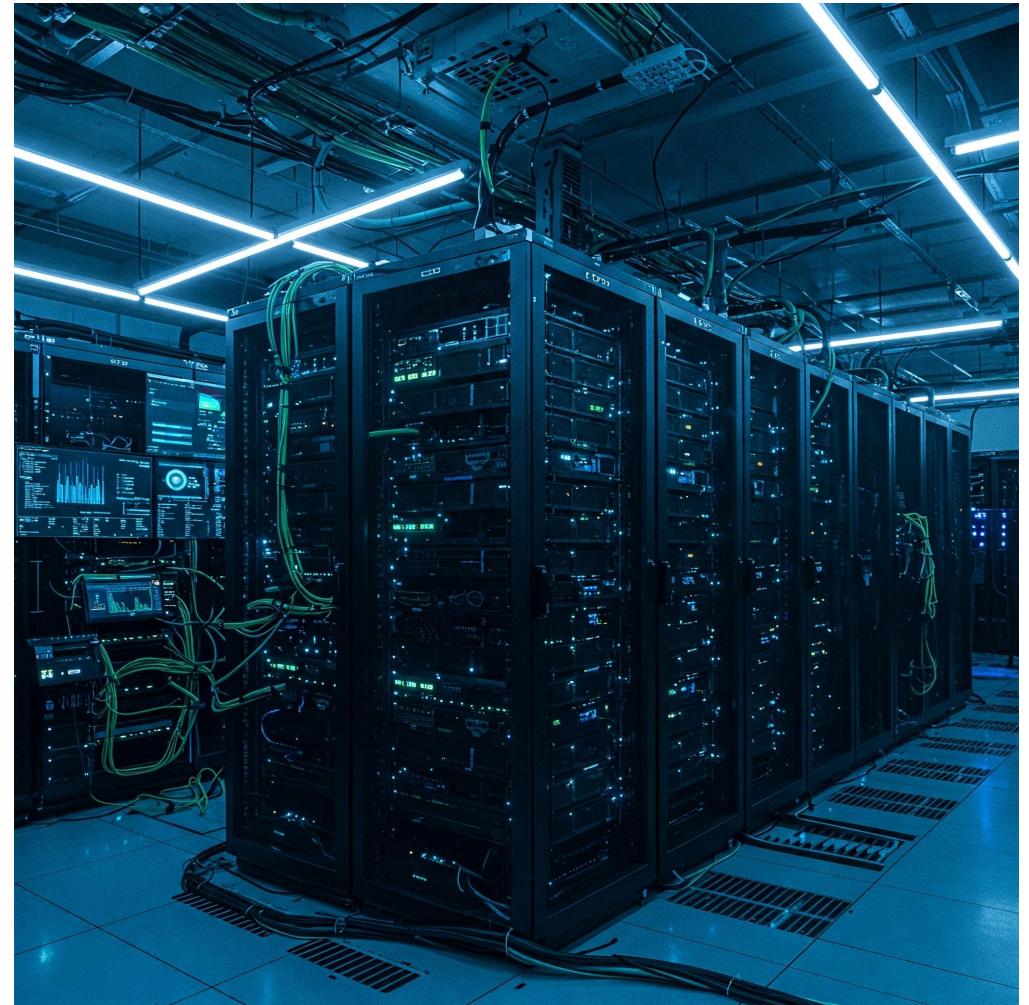


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## Monitoring and Logging

### Importance of Monitoring

- Uptime
- Performance
- Issue detection

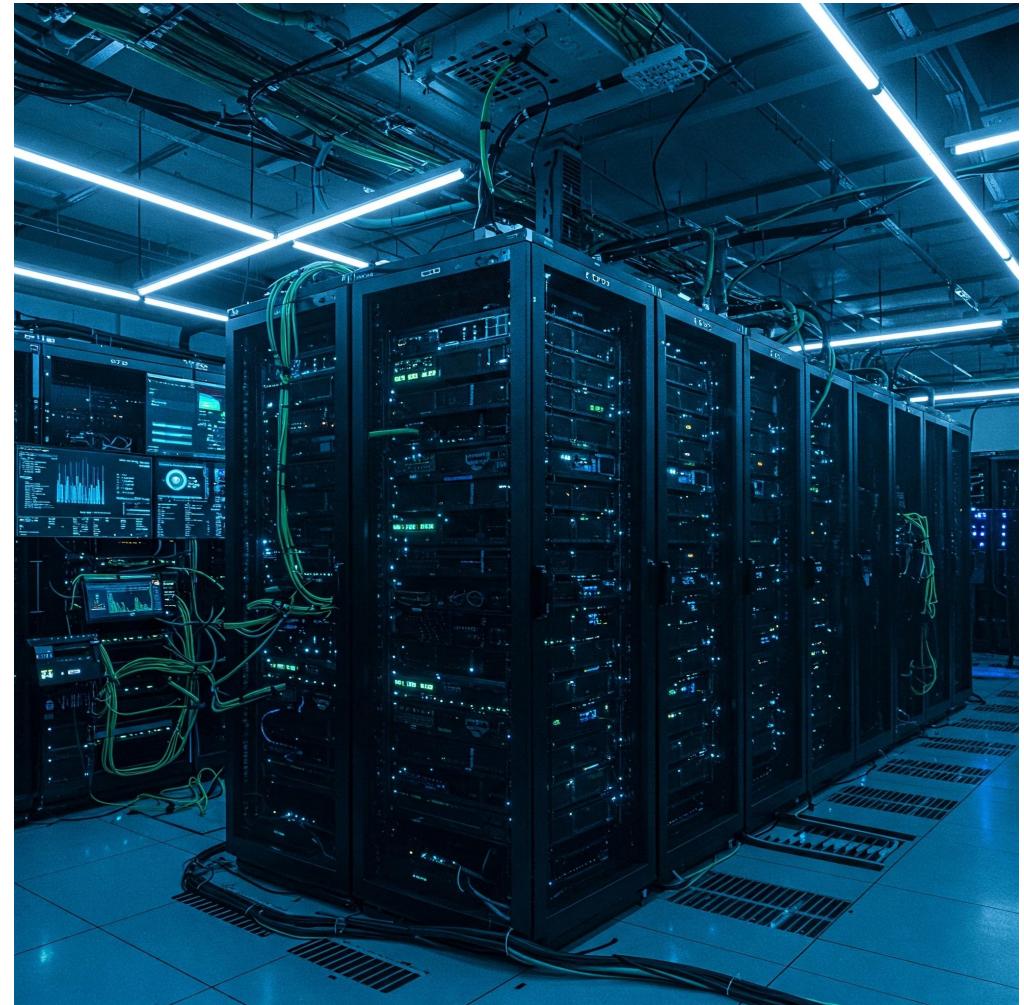


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## Monitoring and Logging

### Types of Monitoring

- Infrastructure Monitoring
- Application Monitoring
- User Experience Monitoring

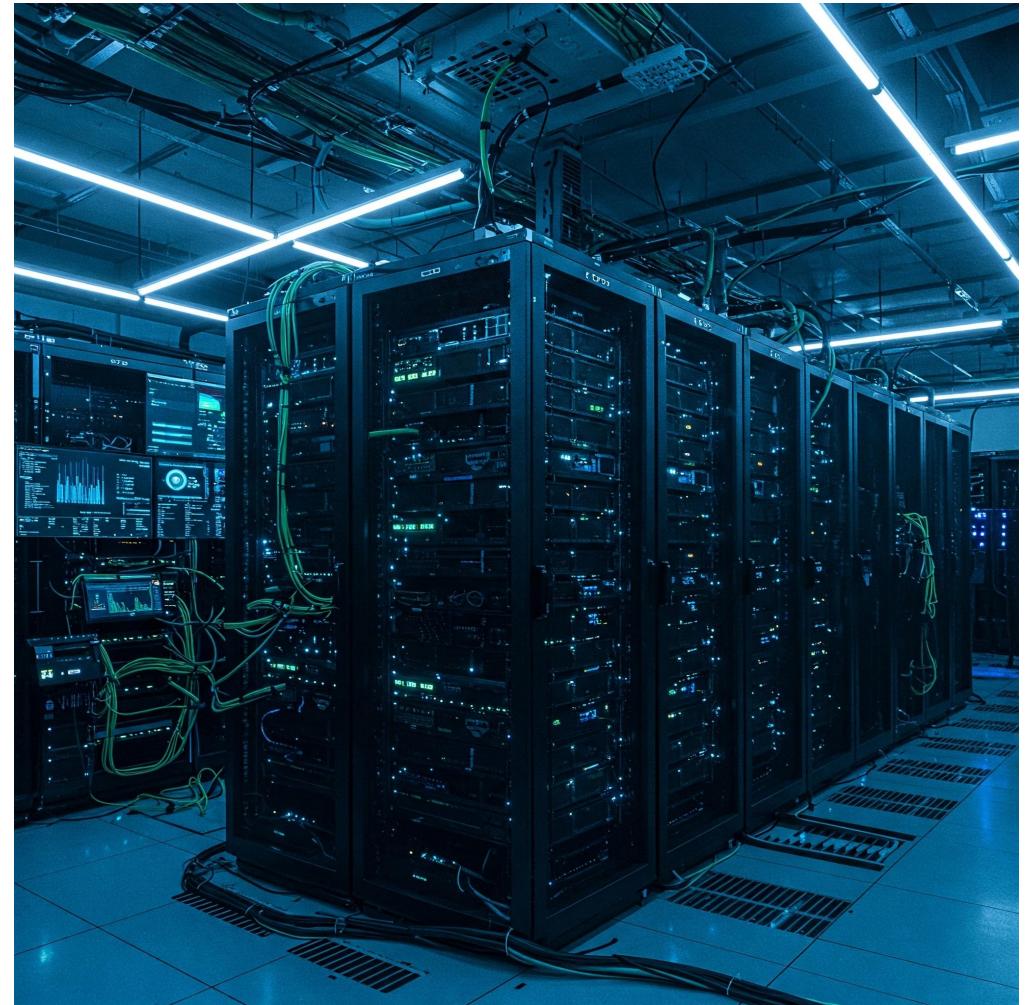


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## Monitoring and Logging

### Tools Overview

- **Prometheus:** Metric collection
- **Grafana:** Visualisation

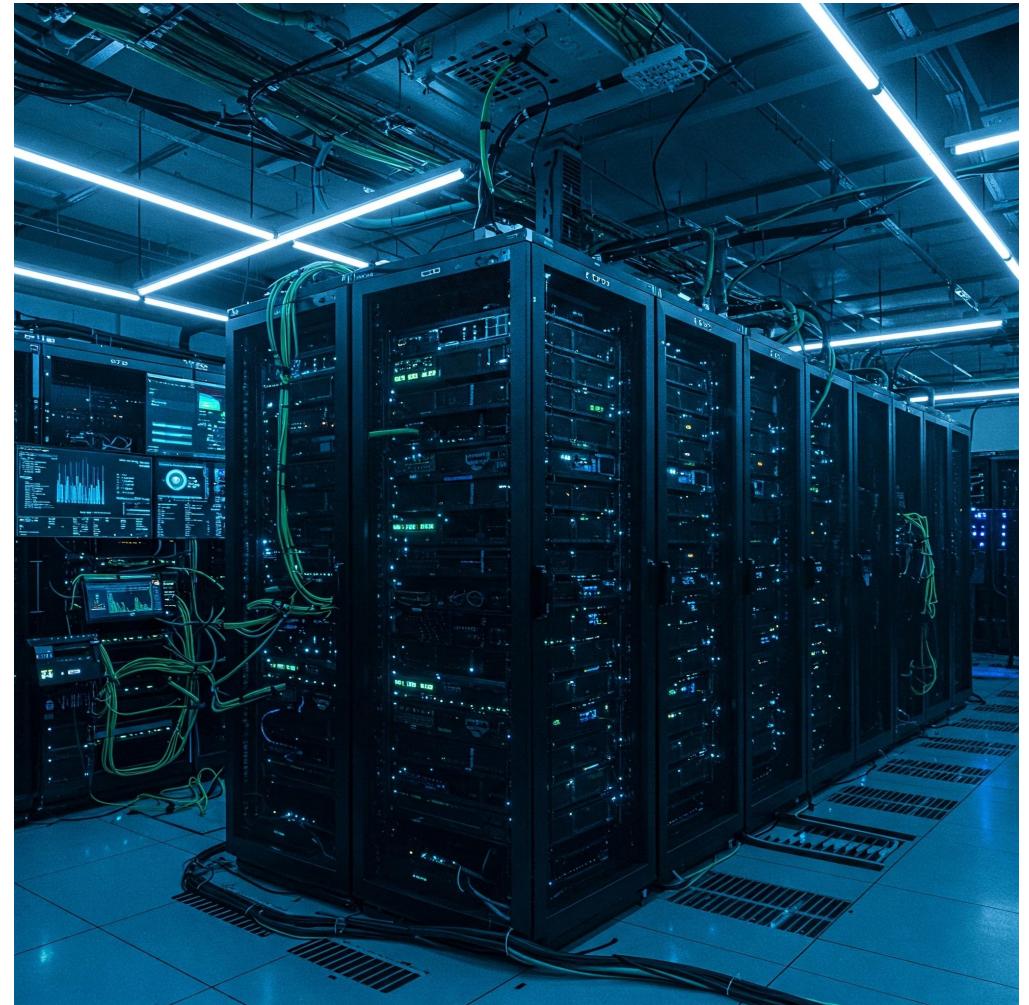


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## Monitoring and Logging

### Logging

- Centralised logging with tools like ELK stack

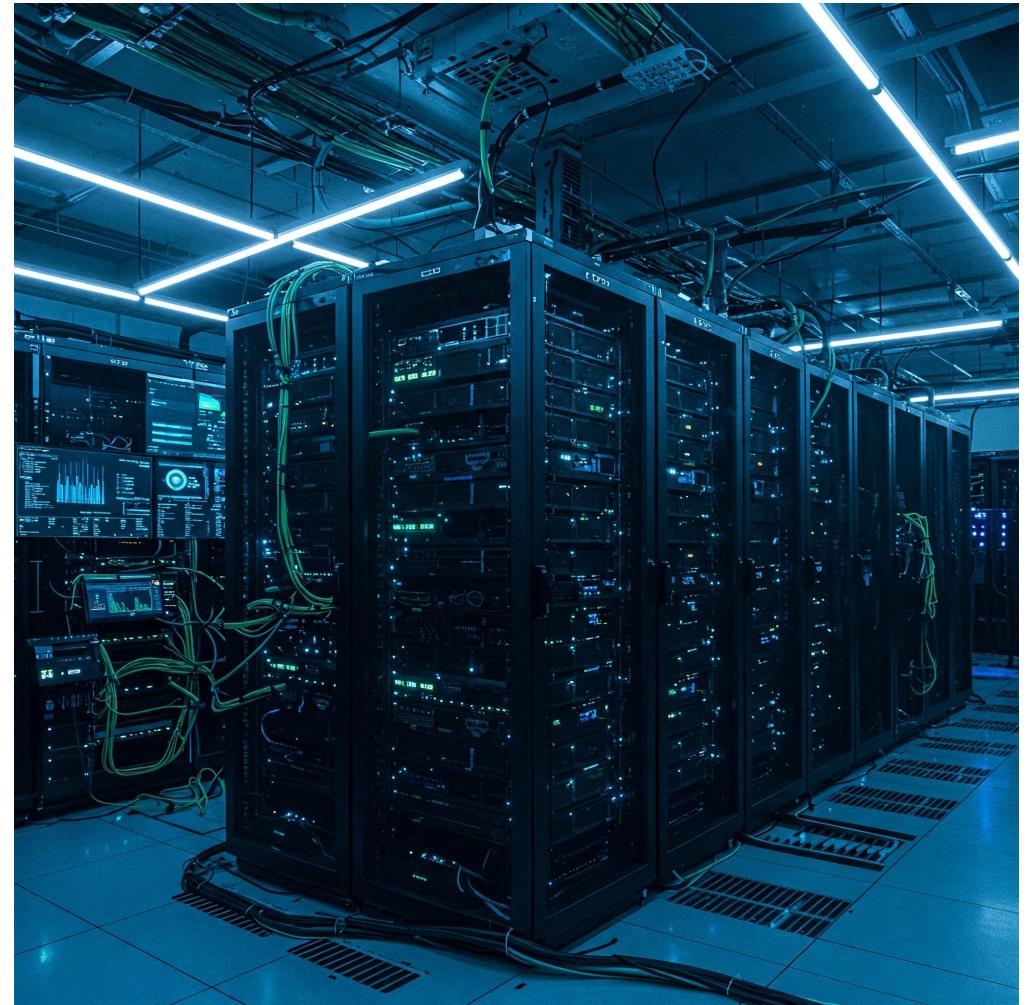


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## Monitoring and Logging

### Benefits of Logging

- Root Cause Analysis
- Auditing and Compliance
- Debugging



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## Next steps

- Explore DevOps Tools and Technologies: e.g. Kubernetes or Terraform
- Hands-on Practice
- Learn Continuous Improvement
- Join the Community
- Stay Updated



### Sources

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