



DevOps & CI/CD

From Basics to Deployment

Automation



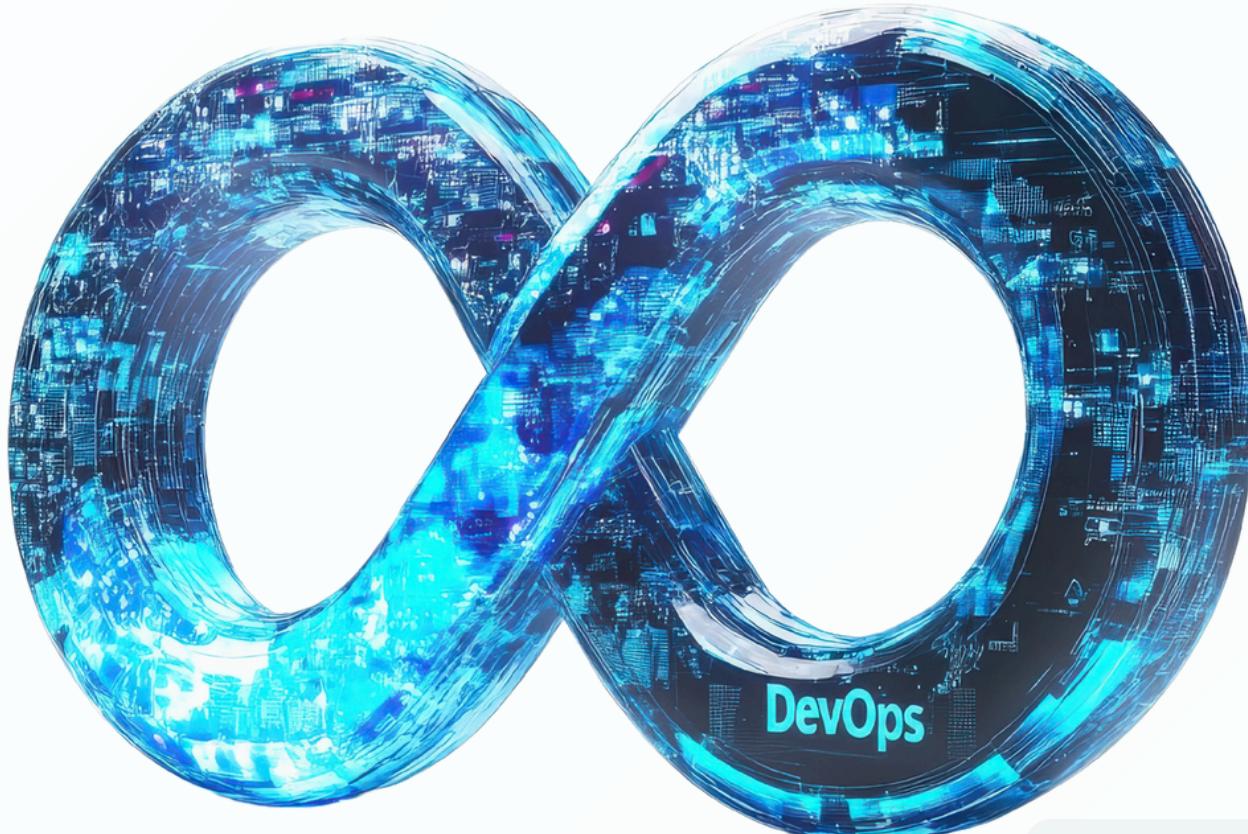
For software engineers &
DevOps professionals



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Introduction to DevOps

- DevOps is a set of practices that combines software development (Dev) and IT operations (Ops).

Key principles of DevOps:

Automation: Reducing manual processes.

Collaboration: Bridging the gap between development and operations.

Monitoring & Feedback: Ensuring reliability and performance.



Did you know?

Companies using DevOps report 60% faster deployment cycles and lower failure rates.



Version Control & Git



Tracking Code Changes

- Version control allows developers to track and manage code changes efficiently.
- Popular tools: Git, GitHub, GitLab, Bitbucket.



Example: Basic Git Commands

```
git init  
git add .  
git commit -m "Initial commit"  
git push origin main
```



Practice Link: [Learn Git on GitHub](#)



Continuous Integration (CI)



What is CI?

- Continuous Integration (CI) is the practice of automatically testing and merging code changes.
- Popular CI tools: Jenkins, GitHub Actions, GitLab CI/CD, Travis CI.

Example: GitHub Actions CI Pipeline

```
name: CI Pipeline
on: [push]
jobs:
  build:
    runs-on: ubuntu-latest
    steps:
      - uses: actions/checkout@v2
      - name: Install dependencies
        run: npm install
      - name: Run tests
        run: npm test
```



[Practice Link: Jenkins Beginner Guide](#)



Continuous Deployment (CD)



Automating Deployment

- Continuous Deployment (CD) ensures that new code changes are automatically deployed to production.
- Common CD tools: Kubernetes, Docker, AWS CodeDeploy, CircleCI.

Example: Docker Deployment

```
docker build -t myapp .  
docker run -p 3000:3000 myapp
```

👉 **Practice Link:** [Docker Getting Started Guide](#)



Infrastructure as Code (IaC)



What is IaC?

- Infrastructure as Code (IaC) automates infrastructure provisioning using code.
- Popular IaC tools: Terraform, Ansible, CloudFormation.



Example: Terraform Configuration

```
provider "aws" {  
    region = "us-east-1"  
}  
  
resource "aws_instance" "example" {  
    ami = "ami-12345678"  
    instance_type = "t2.micro"  
}
```



[Practice Link: Terraform Basics](#)



Monitoring & Logging



Why is monitoring important?

- Detect issues early and ensure system reliability.
- Popular monitoring tools: Prometheus, Grafana, ELK Stack, Datadog.



Example: Prometheus Monitoring Setup

```
scrape_configs:  
  - job_name: 'myapp'  
  
static_configs:  
  - targets: ['localhost:9090']
```



[Practice Link: Prometheus Monitoring Guide](#)



Security in DevOps



DevSecOps – Integrating Security into DevOps

- Automated security scans in CI/CD pipelines.
- Tools for security scanning: Snyk, OWASP ZAP, SonarQube.



Example: Running OWASP ZAP Security Scan

```
zap-cli quick-scan http://example.com
```



Practice Link: [OWASP ZAP Security Guide](#)



Final Project – Automate a Full DevOps Pipeline



Project: "End-to-End CI/CD Pipeline for a Web Application"

Features:

- CI with GitHub Actions.
- Docker containerization.
- Kubernetes for orchestration.
- Monitoring with Prometheus.



Tech stack:

- CI/CD: GitHub Actions + Jenkins
- Containerization: Docker + Kubernetes
- Infrastructure: Terraform + AWS

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