

BQ-013



DevOps

2nd EDITION



BUILD FASTER.
DEPLOY SMARTER.

Duration 3 months

● on-campus classes

www.banoqabil.org

Table of Contents

1. COURSE OVERVIEW	2
2. COURSE OBJECTIVES	2
3. LEARNING OUTCOMES.....	2
4. COURSE BREAKDOWN:	3
4.1. THEORY WORK 20%	3
4.2. PRACTICAL WORK 80%.....	3
5. ASSESSMENT CRITERIA	3
6. TOOLS USED	3
7. COURSE OUTLINE - WEEKLY BREAKDOWN	3
Week-1: Introduction to DevOps & Software Development Lifecycle.....	3
Week-2 Linux Fundamentals & Shell Scripting	3
Week-3 Version Control with Git & GitHub	4
Week-4: Continuous Integration with Jenkins	4
Week-5: Containerization with Docker / Soft Skill Session:.....	5
Week-6: Configuration Management with Ansible / Soft Skill Session:.....	5
Week-7: Infrastructure as Code with Terraform / Soft Skill Session:	5
Week-8: Cloud Fundamentals (AWS / Azure) / Soft Skill Session:	5
Week-9: Kubernetes for Container Orchestration / Soft Skill Session:	6
Week-10: Monitoring & Logging (Prometheus, Grafana) / Soft Skill Session:.....	6
Week-11: Optimization & Debugging / Soft Skills Session:	6
Week-12: Final Project & Cloud Deployment / Soft Skill Session:	6
8. GUEST SPEAKER SESSION: LOCAL DEVOPS ENGINEER OR CLOUD EXPERT.....	7

Course Title:	DevOps Fundamental Course
Course Code:	BQ-013
Duration:	12 Weeks
Class Structure	
Total Hours:	48 Hours
Total Sessions:	24 Sessions (Two sessions per week or as per convenience)
Session Duration:	2 Hours

1. Course Overview

This course provides hands-on training in **DevOps fundamentals**, covering the complete software delivery lifecycle — from development to deployment and monitoring.

Learners will gain experience with tools and practices that enable automation, continuous integration (CI), continuous delivery (CD), and containerization.

By the end of this course, students will understand how to build, deploy, and maintain modern applications efficiently in the cloud.

2. Course Objectives

By the end of this course, participants will be able to:

- Understand the principles and culture of DevOps
- Learn to automate workflows using CI/CD pipelines
- Deploy web applications on cloud and hosting platforms
- Implement containerization using Docker
- Monitor applications using modern DevOps tools
- Prepare for freelancing or professional roles in DevOps, cloud engineering, and site reliability

3. Learning Outcomes

By the end of this course, learners will be able to:

- Explain DevOps methodology and lifecycle stages
- Work with Linux, Git, Docker, and CI/CD pipelines
- Deploy full-stack applications using cloud services
- Automate code integration, testing, and deployment
- Implement monitoring dashboards and alerts
- Build and present a complete cloud-based DevOps project

4. Course Breakdown:

4.1. Theory Work **20%**

Includes: DevOps principles, CI/CD theory, Docker architecture, and cloud concepts.

4.2. Practical Work **80%**

Includes: Git workflows, CI/CD setup, Docker implementation, cloud deployment, and monitoring dashboards

5. Assessment Criteria

- 5.1. Quiz: -----15%
- 5.2. Assignments & Weekly Projects: ----- 20%
- 5.3. Portfolio (Project on GitHub+ Documentation: ----- 25%
- 5.4. Final Capstone Project & Presentation: -----40%

6. Tools Used

- a. **Linux (Ubuntu / WSL)** – Command Line & Automation
- b. **Git & GitHub** – Version Control and Collaboration
- c. **GitHub Actions** – CI/CD Automation
- d. **Docker** – Containerization
- e. **Render / Railway / Netlify** – Hosting Platforms
- f. **Grafana** – Application Monitoring
- g. **Visual Studio Code** – Development Environment
- h. **AWS / Azure / GCP (Optional)** – Cloud Deployment
- i. **Bash Scripting** – Task Automation
- j. **Notion / Trello** – Project Management
- k. **Postman** – API Testing
- l. **Nginx** – Web Server Configuration
- m. **Google Drive / GitHub Pages** – Documentation & Portfolio

7. Course Outline - Weekly Breakdown

A. Session Focus:

- a. Mission, Vision & Values Alkhidmat Foundation Pakistan & Bano Qabil Pakistan
- b. Course Structure, Rules, Regulations
- c. Success Stories & Project Impact
- d. Expectations from Students

Week-1: Introduction to DevOps & Software Delivery

A. Session-1: What is DevOps? Overview of Practices and Benefits

- i. Key DevOps Tools & Ecosystem
- ii. Object Manipulation and Transformation
- iii. **Trainer Resource:**
<https://roadmap.sh/devops>

B. Session-2: Toolchain Setup & Environment Configuration

- i. Installing Git, VS Code, and Linux Tools
- ii. Hands-on: Setting up DevOps Workspace
- C. Assignment:** Write a short report on DevOps lifecycle
- D. Quiz:** DevOps culture, tools, and workflows
- E. Trainer Resource:**
<https://www.atlassian.com/devops>

Week-2: Linux Essentials for DevOps

A. Session-3: Linux Command Line Basics

- i. Navigating directories, creating/editing files
- ii. Permissions and file ownership
- iii. **Trainer Resource:**
<https://linuxjourney.com>

B. Session-4: Bash Scripting & Automation

- i. Shell variables and loops
- ii. Writing reusable scripts
- C. Assignment:** Create a script to automate file backups
- D. Quiz:** Linux commands and bash basics
- E. Trainer Resource:**
<https://tldp.org/LDP/Bash-Beginners-Guide>

Week-3: Version Control with Git & GitHub

A. Session-5: Git Basics

- i. Init, Commit, Push, Pull, Branch, Merge
- ii. Git Log and Diff
- iii. **Trainer Resource:**
<https://git-scm.com/doc>

B. Session-6: GitHub Repositories & Team Collaboration

- i. Forks, Pull Requests, and Branch Protection
- ii. Hands-on: Create and manage a team repo
- C. Assignment:** Submit a group project repo
- D. Quiz:** Git commands and version control workflow
- E. Trainer Resource:**
<https://docs.github.com/en>

Week-4: Domains, DNS & Web Hosting

A. Session-7: Understanding Domains & DNS

- i. Record Types (A, CNAME, MX, TXT)
- ii. Domain configuration
- iii. **Trainer Resource:**
<https://www.cloudflare.com/learning/dns>

B. Session-8: Hosting Setup

- i. Linking a domain to GitHub Pages / Netlify
- ii. Deploying a static site
- C. Assignment:** Deploy your portfolio site
- D. Quiz:** DNS concepts and deployment workflow
- E. Trainer Resource:**
<https://www.namecheap.com/support/knowledgebase>

Week-5: Continuous Integration (CI) Fundamentals / Soft Skill Session

A. Session-9: Introduction to CI/CD

- i. What is CI/CD and Why It Matters
- ii. Pipeline Stages Overview
- iii. **Trainer Resource:**
<https://www.redhat.com/en/topics/devops/what-is-ci-cd>

B. Session-10: Soft Skill – Collaboration in DevOps Teams

- i. Agile communication & sprint planning
 - ii. Understanding team pipelines
- C. Assignment:** Create a basic CI plan for your app
- D. Quiz:** CI/CD terminology and concepts
- E. Trainer Resource:**
<https://circleci.com/docs>

Week-6: GitHub Actions for Automation / Soft Skill Session

A. Session-11: Building Workflows in GitHub Actions

- i. YAML Syntax and Triggers
- ii. Build & Test Automation
- iii. **Trainer Resource:**
<https://docs.github.com/en/actions>

B. Session-12: Soft Skill – Time Management in Projects

- i. Setting Deadlines & Tracking Progress
 - ii. Managing Tasks via Notion/Trello
- C. Assignment:** Automate testing using GitHub Actions
- D. Quiz:** Workflow structure and triggers
- E. Trainer Resource:**
<https://learn.microsoft.com/devops>

Week-7: Introduction to Docker

A. Session-13: What is Containerization?

- i. Virtual Machines vs Containers
- ii. Docker Architecture and Syntax
- iii. **Trainer Resource:**
<https://docs.docker.com/get-started/>

B. Session-14: Docker Images & Containers

- i. **Writing Dockerfiles**
- C. Building and Running Containers**
- D. Assignment:** Containerize a sample Node.js app
- E. Quiz:** Docker basics
- F. Trainer Resource:**
<https://dockerlabs.collabnix.com>

Week-8: Docker in Action / Soft Skill Session

A. Session-15: Docker Compose & Multi-Container Apps

- i. Compose YAML Structure
- ii. Linking Services and Networking
- iii. **Trainer Resource:**
<https://docs.docker.com/compose/>

B. Session-16: Soft Skill – Problem Solving for Engineers

- i. Debugging Containers and Logs
- C. Continuous Learning in Tech**
- D. Assignment:** Build and deploy a multi-container app
- E. Quiz:** Docker compose and deployment
- F. Trainer Resource:** <https://hub.docker.com>

Note: 01-hour Soft Skills Session will be conducted weekly from **Week 05 to Week 12.**

Week-9: Hosting & Deployment**A. Session-17: Hosting Platforms Overview**

- i. Render, Railway, Vercel, Netlify
- ii. Environment Variables and Secrets
- iii. **Trainer Resource:** <https://render.com/docs>

B. Session-18: Deploying Dynamic Apps

- i. Backend & Database Deployment
- ii. Testing Live Services

C. Assignment: Deploy a full-stack web app

D. Quiz: Hosting and deployment steps

E. Trainer Resource: <https://railway.app>

Week-10: Monitoring & Logging / Soft Skill**Session****A. Session-19: Introduction to Monitoring Tools**

- i. Metrics, Alerts, and Dashboards
- ii. Grafana Setup and Configuration
- iii. **Trainer Resource:**
<https://grafana.com/docs/>

B. Session-20: Soft Skill – Portfolio Building & Presentation

- i. Documenting DevOps Pipelines
- ii. Creating Case Studies for GitHub Portfolio

C. Assignment: Set up a Grafana dashboard for app metrics

D. Quiz: Monitoring and alerting fundamentals

E. Trainer Resource:
<https://prometheus.io/docs>

Week-11: Infrastructure as Code & Optimization / Soft Skill Session**A. Session-21: Infrastructure as Code (IaC) Overview**

- i. Intro to Terraform / Ansible Basics
- ii. Automating Server Setup
- iii. **Trainer Resource:**
[://developer.hashicorp.com/terraform/docs](https://developer.hashicorp.com/terraform/docs)

B. Session-22: Soft Skill – Freelancing & Client Communication

- i. DevOps as a Service Projects
- ii. Writing Technical Proposals

C. Assignments: Write a simple Terraform configuration

D. Quiz: IaC and automation concepts

E. Trainer Resource:
<https://www.ansible.com/resources>

Week-12: Final Project & Capstone**A. Session-23: Final Project Development**

- i. Build & Deploy an Application with Full CI/CD
- ii. Integrate Monitoring & Docker
- iii. **Trainer Resource:**
<https://roadmap.sh/devops>

B. Session-24: Project Presentation & Documentation

- i. Building Present Live Demo and GitHub Repository
- ii. Portfolio Review and Feedback

C. Assignment: Submit Complete DevOps Project & Portfolio

D. Quiz: Final review and reflection

E. Trainer Resource:
<https://docs.github.com/en/actions>

Note: 01-hour Soft Skills Session will be conducted weekly from **Week 05 to Week 12**.

8. Guest Speaker Sessions: Local DevOps Engineer or Freelancer