

# DevOps and its Tools

**COURSE CODE:20ITH104**

**L T P C**

**3 1 0 4**

## **COURSE OUTCOMES:**

At the end of the course, the student shall be able to

- CO1: Describe the principles of DevOps and JIRA tool.( L2 )
- CO2: Demonstrate tools for version control and infrastructure as code. ( L3 )
- CO3: Illustrate the use of Ansible for security and management. (L3)
- CO4: Practice containerizing an application using Docker and Kubernetes. (L3)
- CO5: Summarize observability and troubleshooting of an application. ( L2 )

## **UNIT-I:** (10 Lectures)

The World without DevOps: Overview, Problem Case Definition, Benefits of Fixing Application Development Challenges, DevOps Adoption Approach through Assessment, Solution Dimensions. (Textbook 1)

Application Lifecycle Management: JIRA (Textbook 1)

**Learning Outcomes:** At the end of the module student will be able to:

1. Explain the importance and benefits of DevOps. (L2)
2. Describe the role of ALM in DevOps. (L2)
3. Describe project management using JIRA. (L2)

## **UNIT-II:** (10 Lectures)

Source Code Management : Asks from a Source Code Management tool, GIT as Version Control System (Textbook 1)

Setting Up a Virtual Machine : Creating a VM with vagrant- Anatomy of a Vagrantfile, Basic Vagrant commands (Textbook 2)

Configure VM with Ansible: Key Ansible concepts, Ansible playbook, Basic Ansible commands (Textbook 2)

**Learning Outcomes:** At the end of the module student will be able to:

1. Discuss Source Code Management. (L2)
2. Illustrate the concept of Virtual Machines. (L3)
3. Experiment with Creation and configuration of Virtual machines. (L3)

## **UNIT-III:** (10 Lectures)

Using Ansible to manage password, users and groups: Enforcing Complex Passwords , Linux

User Types, Linux Groups, Updating the VM, Testing User and Group Permissions.  
Using Ansible to configure SSH - Understanding and Activating Public Key Authentication, Adding Two-Factor Authentication, Provisioning the VM.  
Controlling User Commands with Sudo: What is Sudo?, Installing the Greeting Web Application, Anatomy of a sudoers File, Provisioning the VM, Testing Permissions  
Automating Host-based Firewall: Planning the Firewall Rules, Automating UFW Rules, Provisioning the VM. (Textbook 2)

**Learning Outcomes:** At the end of the module student will be able to:

1. Illustrate the use of Ansible. (L3)
2. Summarize the automation of basic security hygiene on Virtual Machine. (L2)
3. Examine host-security improvement. (L3)

**UNIT-IV:** (10 Lectures)

Docker : Docker from 30,000 Feet , Installing and Testing Docker, Containerizing a Sample Application , Other Docker Client Commands , Testing the Container.  
Orchestrating with Kubernetes: Kubernetes from 30,000 Feet, Kubernetes Workload Resources, Deploying the Sample telnet-server Application , Testing the Deployment and Services.  
Deploying code: CI/CD in Modern Application Stacks, Setting Up Your Pipeline.  
(Textbook 2)

**Learning Outcomes:** At the end of the module student will be able to:

1. Explain the concept of containerization. (L2)
2. Apply orchestration of containers. (L3)
3. Demonstrate deployment in CI/CD pipelines. (L3)

**UNIT-V:** (10 Lectures)

Observability: Monitoring an application, Metrics, Golden signals, Alerts  
Troubleshooting hosts: Troubleshooting and Debugging: A Primer, Scenarios - High Load Average, High Memory Usage, High IO wait, Hostname Resolution Failure, Out of Disk Space  
(Textbook 2)

**Learning Outcomes:** At the end of the module student will be able to:

1. Explain the monitoring of health and performance of a service. (L2)
2. Describe the patterns in Golden Signals monitoring. (L2)
3. Summarize the issues that will be encountered in troubleshooting hosts. (L2)

**Text Books:**

1. Deepak Gaikwad, Viral Thakkar, “*DevOps Tools: from practitioner's point of view*”, 1<sup>st</sup> Edition, Wiley, 2019
2. Bradley Smith, “*DevOps for the Desperate: A Hands-On Survival Guide*”, 1<sup>st</sup> Edition, No Starch Press, 2022

**References:**

1. Gene Kim, Jez Humble, Patrick Debois, John Willis, “*The DevOps Handbook*”, IT

Revolution, 3<sup>rd</sup> Edition, 2016

**Web References:**

1. <https://www.coursera.org/learn/uva-darden-continuous-delivery-devops>
2. <https://www.coursera.org/learn/devops-culture-and-mindset>
3. <https://git-scm.com/docs>