# IntelliQ IT

# **DevOps in a Multi-Cloud**









# Multi Cloud DEVOPS COURSE CONTENT

Date:	rimings:
Duration:	Fee:
Faculty:	

#### **CONFIGURATION MANAGEMENT TOOLS**

→ Ansible

#### **VIRTUALIZATION PLATFORMS**

- $\rightarrow$  Vagrant
- → Docker
- → Kubernetes
- $\rightarrow$  Swarm

#### **BUILD TOOLS**

- $\rightarrow$  ANT
- $\rightarrow$  Maven

#### **VERSION CONTROLLING**

 $\rightarrow$  GIT

#### **CONTINUOUS INTEGRATION**

- → Jenkins
- → Bamboo

#### **MONITORING**

- → Nagios
- → Prometheus
- → Grafana

### **SCRIPTING LANGUAGE**

- → Python
- → LINUX (Basics)

### **Introduction to DevOps**

- DevOps for Entire Business
- DevOps for Entire IT
- ♣ DevOps for Developer
- DevOps for Testing
- ♣ DevOps for Operations Team
- ♣ Role of DevOps in Agile Scrum

### **ANSIBLE**

### 1. Ansible Introduction & Setup

- ♣ Configuration management & Orchestration
- Set Up of Ansible
- ♣ Set Up of Controller & Managed Nodes

#### 2. Foundation

- Inventory
- Host Selection
- Tasks
- Plays
- Playbook Execution
- Ansible.cfg

### 3. Modules and Ad-hoc Commands

- Firewall
- 👃 Uri
- ♣ Get\_url
- ♣ APT/YUM
- Service
- User
- Command
- Shell
- Copy
- Fetch
- Archive / Unarchive

- \rm File
- Setup
- Debug
- Include
- ♣ Stat
- **♣** Git
- Docker\_Container
- Docker\_image
- Docker\_login
- ♣ Etc...,

### 4. YML Scripting

- ♣ Basics of YML
- ♣ How to write & test YML scripts
- ♣ YML Scripting for writing Playbook

### 5. Playbook for CM Automation

- Writing playbooks
- Execution of playbooks
- Playbooks for configuring Tomcat, Apache, FTP, Docker etc.,
- Playbook Notification
- Playbook tags & handlers
- Exception handling

#### 6. Roles

- Roles Overview
- Converting to Roles
- Using roles for implementing tomcat, apache, etc,,.
- External Roles & Galaxy

#### **Advanced Execution**

- When Conditions
- Loops(with items, with sequence)
- Removing Unnecessary Steps
- **Lesson** Extracting Repetitive Tasks
- Limiting Execution by Hosts

### **DOCKER**

#### **Docker Introduction**

- Installing Docker
- Docker Introduction
- Virtualization and Containerization
- Code or Text Editor for Docker and compose files
- Terminal Emulator and shell for Docker.

#### **Creating and Using Containers**

- ➡ Starting Application Server, Databases and Operating Systems as Containers
- 🖶 What happens when we run a container
- Container vs VM
- 🖶 Manage Multiple Containers
- 🖶 CLI Process Monitoring
- Linking of Containers
- Docker Volumes
- Reusable Volumes
- Getting a shell inside Containers: no need for SSH
- ♣ Package Management Basics: apt, yum, dnf, pkg
- ♣ Docker Networks: Concepts for Private & Public
- Docker's --format option for filtering CLI Output

### **Container Images**

- What's in an Image
- ♣ Official Docker Image Specification
- 🖶 The Mighty Hub: Using Docker Hub Registry Images
- List of Official Docker Images
- Images and Their Layers: Discover the Image Cache
- Images and Containers from Docker Docs
- 🖶 Image Tagging and Pushing to Docker Hub
- Building Images: The Docker file and Docker Commit
- Building Images: Running Docker Builds
- 🖶 Building Images: Extending Official Images

### **Docker Compose: The Multi-Container Tool**

- Docker Compose and the docker-compose.yml file
- ♣ The YAML Format: Sample Generic YAML File
- Compose File Version Differences (Docker Docs)
- Compose file for creating Development and QA Environment
- Setting CI-CD Environment for Jenkins Using Docker
- Setting up LAMP Architecture using docker compose

#### **Docker Swarm**

- Container Orchestration
- Load balancing using Swarm
- Scaling using swarm
- Handling fail over scenarios using swarm
- Rolling updates using swarm
- Handling fail over scenarios using Swarm
- Docker Stack

### **KUBERNETES**

#### **Kubernetes Overview:**

- **♣** Introduction
- Kubernetes Architecture

### **Setup Kubernetes**

Kubernetes setup -kubeadm Managed K8s Setup: EKS, GKE, AKS Self-managed K8s Setup: KOPS, KIND

### **Kubernetes Concepts**

- **♣** PODs
- ♣ Replica Set
- ♣ Replication Controllers
- Deployments
- Stateful sets
- Ingress, Ingress Controller
- Service Objects
- Secret Objects

Volumes

### **Kubernetes Concepts – PODs, Replica Sets, Deployments**

- Introduction to YAML
- PODs with YAML
- Replication Controllers and ReplicaSets using YAML
- Container Orchestration in Kubernetes
- Load Balancing using Kubernetes
- High availability using Kubernetes
- Scaling in Kubernetes
- ♣ Performing Rolling Updates and Rollback
- Handling fail over scenarios
- Deployments
- Deployments update and Rollback
- Statefulsets
- Persistent Volumes and Persistent Volume Claims
- RBAC (Role, Role Bindings, Cluster Role)
- ♣ HELM Package Management

### **Networking in Kubernetes**

- ♣ Basics of Networking in Kubernetes
- Service Object (Cluster IP, Node Port, Load Balancer, headless)
- Networking using Ingress

#### **Services**

- In-depth definition files on Service Objects
- Microservices Architecture

### **Microservices Application**

- Deploying Microservices Application Kubernetes Cluster
- ♣ Voting Application Deployment
- Using Compose to convert from Docker to Kubernetes

### **VAGRANT**

### **Introduction to Vagrant**

- Introduction & Installing vagrant
- The vagrant file & Boxes
- Communicating with Vagrant Box
- Network Access

### **Deploying your Vagrant Machine**

- Deploying a Complete Environment
- Setting Environment
- Finalizing the Environment
- Vagrant File

### **JENKINS**

### **Getting Started with Jenkins**

- Getting Started with Jenkins
- ♣ Introduction to Continuous Integration
- Install Jenkins on windows and LINUX
- Setup of Dev Environment, QA Environment, Prod Environment for Jenkins
- Jenkins Architecture and Terms of Jenkins
- Jenkins UI: Dashboard and Menus
- Create Our First Jenkins Job

### **Understanding Stages of CI-CD**

- Continuous Download
- Continuous Build
- Continuous Deployment
- Continuous Testing
- Continuous Delivery

### **Continuous Integration with Jenkins**

- Continuous Integration with Jenkins
- Install Git and Jenkins GitHub plug-in
- Install Maven on Our local box
- Configure Jenkins to work with Java, Git and Maven
- Create our Jenkins Project
- Trouble Shooting: Create our First Jenkins Project
- ♣ Run Our First Jenkins Build and Jenkins Workspace
- Source Control polling in Jenkins
- Other Build Triggers of Jenkins
- Jenkins Shell Scripts
- Archive Build Artifacts
- ♣ Install and configure Tomcat as the Stagging Environment
- Deploy to stagging Environment
- 🖶 Jenkins Build Pipeline
- 4 Parallel Jenkins Build
- Deploy to Production
- ♣ Trouble shooting: Deploy to Production

#### **Distributed Builds**

- Introduction to Distributed Jenkins Build
- Creating Master Slave Setup
- Install Jenkins Master Node in the Cloud
- Install Jenkins Slave Agents in the Cloud
- Concurrent Jenkins Build and Label Jenkins Build
- Continuous Delivery with Jenkins
- Code as Pipeline
- CI-CD using Jenkins file
- Groovy Scripting

### **Pipeline**

- Scripted Pipeline
- Declarative Pipeline
- Multibranch Pipeline
- Creating Shared Libraries Using Environment Variables

### **BAMBOO**

- Setup of Bamboo
- Continuous Integration using Bamboo

### **VERSION CONTROLLING(GIT)**

- Centralized and Distributed Version Controlling
- ♣ Git Local repo and GIT Hub
- Configuration
- Basic Commands
- Branches
- Push and Pull from GIT Hub
- Git Squash and Stash
- **4** Git Ignore
- 📥 Git Tags
- Git Rebase
- Git Amend and Revert
- Git Log and Git reflog
- Git Merging and Rebasing
- Cherry picking
- Git reset and Git Revert
- Git Amend

### **MAVEN**

- Introduction
- Understanding Build Process
- Creating Maven from command Prompt
- Maven Dependencies
- Maven Stages
- Maven repositories
- Maven plugins
- Integrating Maven with Jenkins

### **ANT**

- Introduction
- Configuring ANT
- Using Build.xml
- ANT Build Stages
- ♣ Run the code through Build.xml
- Integrating ANT with Jenkins

### PROMETHEUS and GRAFANA

- Installation of Prometheus and Grafana
- ♣ Configuring Prometheus and Grafana using HELM
- Monitoring with Prometheus and Grafana
- Triggering Alerts

### **NAGIOS**

- Installation of Nagios
- Configuring Nagios
- Monitoring with Nagios
- Triggering Alerts
- Environment Setup in AWS

### LINUX [BASICS]

- Basic Commands
- File Operations
- Redirection
- Piping
- Permissions
- User Controls

### **PYTHON**

- Basic Scripting
- Understanding Methods, Classes and Objects
- Creating Customized Modules
- Using Python to Automate Docker
- Using Python Scripts to Automate Jenkins

### Al

- Role of Al in Devops
- Practical implementation of AI on Devops tools
- Generating docker and Kubernetes files using Al
- ♣ Al for Ansible playbooks and roles

### <u>AWS</u>

- Cloud Deployment Scenarios in AWS
- Using Docker Containers in AWS
- ♣ Amazon Elastic Compute Cloud (EC2)
- ♣ Amazon Simple Storage Service(S3)
- 🖶 Auto Scaling
- VPC
- Route 53
- Elastic Kubernetes Service (EKS)
- Elastic Container Registry ( ECR)

### **TERRAFORM**

- Introduction to Terraform
- 🖶 Terraform local setup and AWS Migrations
- Automating AWS
- Terraform Core Concepts
  - 1. AWS Providers

- 2. Resources for VPC, Subnets, EC2 Instances
- 3. Data Sources
- 4. Terraform State
- 5. Variables in terraform

### **Terraform Project**

- Setup of Git repo for Terraform project
- Setup AWS vpc's and subnets
- Route table and Internet gateway setups
- Associating Subnets with Route table
- Creating Security Groups
- Creating ec2 instances
- Creating ssh key pairs
- Configuring ec2 server to run entry script and run a Docker container

#### **Provisioners in Terraform**

#### **Terraform Modules**

- Introduction to Modules
- Creating Local Modules
- Module Outputs
- Using in-build Modules from Terraform Registry
- Modularize the entire Terraform Project
- Remote State in Terraform

## **Azure DevOps**

#### **Azure Resources and Terraform**

- Introduction to Terraform and IAC Using HCL.
- Terraform setup and Statefile Concepts
- Creating Azure VM's Using Terraform
- Azure Virtual Networks Automation in Terraform
- Creating Reusable Scripts to handle Terraform Storage (Disk, File, Blob Storage etc...)
- Working on Azure Container Registries using Terraform Scripts
- Setup of AKS cluster as IAC
- Azure MYSQL Databases
- Azure Load Balancers
- ♣ Azure Active Directories and User Administration

- Azure Container Instances
- Azure CosmosDB

### **Azure CI-CD Pipelines**

- ♣ Introduction to CI-CD On Azure DevOps Dashboard
- ♣ Working on Azure repos and Pipelines

### **Automating End to End Pipeline on 3 Projects**

- CI-CD on Java Based Project
- ♣ CI-CD on Docker & Kubernetes Based Project
- ♣ CI-CD on Python, NodeJS, Dot Net based micro services application.

### **GCP**

- Overview of GCP
- Creating VM's On GCP
- ♣ Setting Up Kubernetes Cluster (GKE) and Container Orchestration
- Setting up Docker, Ansible, Jenkins on GCP
- ♣ GCP Databases
- GCP Networking