Git and GitHub Actions

Duration: 4 Days (8 hours per day)

Hands-On Format: This hands-on class is approximately 80/20 lab to lecture ratio, combining engaging lecture, demos, group activities and discussions with comprehensive machine-based practical programming labs and project work.

Module 1 – Git and GitHub

Getting Started with Git
Configuring Git
Project Setup
Working with Git Repositories
Staging Files and Creating Commits
Multiple Commits and Checking Out Snapshots
Reverting Changes with “git revert”
Resetting Code with “git reset”
Staging Multiple Files and Ignoring with gitignore
Understanding Branches
Working with Branches
Merging Branches
GitHub Introduction
Creating a GitHub Account
Creating a GitHub Repository
Connecting Local and Remote Repositories
Pushing Commits and Understanding Permissions
GitHub and Branches
Readme Files and Pulling Changes
Cloning Repositories
Making Changes as a Different User
GitHub Issues and Collborators
Working with Pull Requests
Understanding and Using Forks

Module 2 – GitHub Actions – Basic Building Blocks and Components

Key Components: Workflows, Jobs, Steps and More
Creating a First Workflow
Running the First Workflow
Onwards to a More Realistic Example
A New Workflow and The “push” Event
Using Actions in Workflows
Checking Out Code in Workflows
Configuring Actions
Adding More Workflow Job Steps
Failing Workflow and Analyzing Workflows
Adding Multiple Jobs
Jobs: In Parallel vs Sequential
Using Multiple Triggers (Events)
Expressions and Context Objects

Module 3 – Workflows and Events – Deep Dive

Which Events Can You Use?
Demo Project Setup
More on the “push” Event
Introducing Event Filters and Activity Types
Using Activity Types
Using Event Filters

Special Behaviour: Forks and Pull Request Events
Cancelling Workflows and Skipping Workflows

Module 4 – Building an Amazon EKS Cluster with AWS Fargate

Visual Overview of the Amazon EKS Architecture to be Built in Labs
IAM Authentication
Amazon VPC and AWS Networking Fundamentals
Different Methods to Create Cluster
High-Level Steps in Creating Cluster
Function of EKSCTL
Creating EKS Private Cluster

Module 5 – Job Artifacts and Outputs

Understanding Job Artifacts
Artifacts – An Example
Uploading Job Artifacts
Downloading Artifacts (Manually and Automatically)
Understanding Job Outputs
Job Outputs – An Example
Using Job Output in Other Jobs
The need for Dependency Caching
Caching Dependencies in Practice
Using and Invalidating Caches

Module 6 – Using Environment Variables and Secrets

Project Setup and Understanding Environment Variables
Providing Environment Variable Values
Demo: Creating a Database and Using Database Environment Variable Values
Using Environment Variables in Code and Workflows
Understanding and Using Secrets
Utilizing Repository Environments

Module 7 – Controlling Workflow and Job Execution

Understanding Conditional Steps and Jobs
Understanding a Problem
Controlling Execution via “if”
Working with Special Conditional Functions
Conditional Jobs
More “if” Examples
Ignoring Errors and Failures with “continue-on-error”
Understanding and Using Matrix Strategies
Including and Excluding Values (Matrix Strategy)
Saving Time and Code with Reusable Workflows
Adding Inputs to Reusable Workflows
Reusable Workflows and Secrets
Reusable Workflows Outputs

Module 8 – Jobs and Docker Containers

What are Containers?
Why Might You Want to Use Containers (with GitHub Actions)
Run Jobs in Containers
Service Containers -Theory
Adding Services (via Service Containers)
Communication Between Jobs and Service Containers

Module 9 – Building and Using Custom Actions

Why Custom Actions?
Understanding Different Types of Custom Actions
Creating Composite Actions
Using Custom Actions in Workflows
Adding Inputs to Custom Actions
Custom JavaScript Actions – Getting Started
Configuring JavaScript Actions
Adding Basic JavaScript Logic
Adding Action Inputs
Interacting with GitHub Actions Features
Java Script Actions and Outputs
Creating a Custom Docker Actions

Module 10 – Security and Permissions

Key Security Concerns
Understanding Script Injection Attacts
Increasing Actions Safety
Understanding permissions and Potential Issues
GITHUB_TOKEN and Managing Permissions\