Continuous Integration with Jenkins for Developers and DevOps Initiatives

Course Number: WA2271

Duration: 2 days

Course Description

This Jenkins training course teaches attendees how to use the Jenkins Continuous Integration system efficiently and effectively. Students learn how to install Jenkins on a Windows machine, create Jenkins jobs, set up Jenkins user authentication, and explore commonly-used Jenkins plugins.

Skills Gained

- Install and configure Jenkins in a servlet container
- Create Jenkins builds
- Configure and use Apache Ant and Apache Maven with Jenkins
- Use Jenkins to generate Java coding standards reports, code coverage reports, and change notices
- Use Jenkins to deploy software into a testing environment automatically.

Prerequisites

Attendees should have familiarity with Java development practices.

Course Details

Course Outline

- Chapter 1 - Introduction to Continuous Integration, Continuous Delivery, and Jenkins-CI
  - Foundation of Agile AppDev
  - XP Flow
  - Extreme Programming
  - Agile Development
  - What is Continuous Integration
  - Typical Setup for Continuous Integration
  - Setup Notes for Continuous Integration
  - CI with Artifact Management
  - What is Continuous Delivery?
  - Why Continuous Delivery?
  - DevOps and Continuous Delivery
  - Continuous Delivery Challenges
  - Continuous Delivery vs Continuous Deployment
  - Jenkins Continuous Integration
  - Jenkins Features
  - Running Jenkins
  - Summary
- Chapter 2 - Installing and Running Jenkins
  - Downloading and Installing Jenkins
  - Running Jenkins as a Stand-Alone Application
  - Running Jenkins as a Stand-Alone Application (cont'd)
  - Running Jenkins on an Application Server
  - The Jenkins Home Folder
  - Installing Jenkins as a Windows Service
  - Initial Configuration
  - Configuration Wizard
  - Configuring Tools
  - Configuring Tools - Best Practices
  - Logging in Jenkins
  - Custom Log Recorders
  - Summary

- Chapter 3 - Job Types in Jenkins
  - Introduction
  - Different types of Jenkins Items
  - Configuring Source Code Management (SCM)
  - Working with Subversion
  - Working with Git
  - Storing Credentials
  - Service Accounts
  - Storing Credentials
  - Build Triggers
  - Schedule Build Jobs
  - Polling the SCM
  - Polling vs Triggers
  - Maven Build Steps
  - Summary
- Chapter 4 - Advanced Jobs
  - Parameterized Jobs
  - Built-in Environment Variables
  - Parameter Types
  - Defining Parameters
  - Using Parameters / Environment Variables
  - Parameters in the config.xml File
  - Launching a Build with Parameters
  - Configuration Matrix
  - Configuration Matrix – Example
  - Defining Configuration Matrix
  - Monitoring External Jobs
  - Summary
- Chapter 5 - Non-Java Jenkins Jobs
  - Jenkins Jobs
  - Non-Java Jobs
  - Building .NET Projects with Jenkins

    - Installing MSTest Plugin in Jenkins
    - Configuring the MSBuild Plugin
    - Creating a Jenkins Job and Specify a Build Step
    - Specifying a Step for Running Unit Tests
    - Adding a Step for Deploying the .NET Project
    - Building a Node.js Application with Jenkins
    - Node.js Plugin
    - Provides direct Pipeline support
    - Building a C++ Project with Jenkins
    - Executing PowerShell Scripts with Jenkins
    - Summary
- Chapter 6 - Continuous Delivery and the Jenkins Pipeline
    - Continuous Delivery
    - DevOps and Continuous Delivery
    - Continuous Delivery Challenges
    - Continuous Delivery with Jenkins
    - The Pipeline Plugin
    - Defining a Pipeline
    - A Pipeline Example
    - Parallel Execution
    - Creating a Pipeline
    - Invoking the Pipeline
    - Interacting with the Pipeline
    - Pipeline vs. Traditional Jobs
- Chapter 7 - Groovy DSL
    - What is Groovy
    - Groovy in Jenkins
    - Comments in Groovy
    - Data Types
    - Identifiers
    - Variables
    - def
    - String Interpolation

- Operators
- Ranges
- Conditional Statements
- Loops
- Lists
- Maps
- Exception Handling
- Methods
- Closures
- this Keyword
- Classes
- Static Methods
- Inheritance
- Abstract Classes
- Interfaces
- Generics
- Jenkins Script Console
- Extending with Shared Libraries
- Directory Structure
- Sample Groovy Code
- Defining Shared Libraries
- Using Shared Libraries
- Same Shared Library Usage Code
- Defining Global Variables
- Summary

- Chapter 8 - Securing Jenkins
  - Jenkins Security - Overview
  - Jenkins Security
  - Authentication
  - Authorization
  - Confidentiality
  - Activating Security
  - Configure Authentication

- Using Jenkins's Internal User Database
- Creating Users
- Authorization
- Authorization
- Matrix-Based Security
- Note – Create the Administrative User
- Project-based Matrix Authorization
- Project-Based Authentication
- Role Based Access Control
- Conclusion

- Chapter 9 - Jenkins Plugins
  - Introduction
  - Jenkins Plugins - SCM
  - Jenkins Plugins – Build and Test
  - Jenkins Plugins – Analyzers
  - Jenkins for Teams
  - Installing Jenkins Plugins
  - Summary

- Chapter 10 - Distributed Builds with Jenkins
  - Distributed Builds - Overview
  - Distributed Builds – How?
  - Agent Machines
  - Configure Jenkins Master
  - Configure Projects
  - Conclusion

- Chapter 11 - Containerized Builds
  - Introduction to Docker
  - Docker – Benefits
  - Containers vs. Virtual Machines
  - Running Jenkins in a Docker Container
  - Delete Jenkins Container and Image
  - Configuring Command Prompt to Connect to Docker

- Creating Docker Container from Jenkins Job
- Test Custom Image Created by a Jenkins Job
- The Jenkins Docker Build Step Plugin
- Ephemeral Build Agents
- Summary

- Chapter 12 - The Jenkins API
  - Remote Access API
  - What you can do with the Jenkins Remote API
  - Remote API and CSRF Protection – API Token
  - Remote API and CSRF Protection – Crumb
  - Configure Jobs to Support the Jenkins Remote API
  - Making Remote API Calls
  - Example - Advanced REST Client
  - Example – cURL
  - Jenkins CLI
  - Configure Jenkins to use CLI
  - Download and Use Jenkins CLI
  - Summary

- Chapter 13 - Scripting
  - Introduction to Scripting
  - Benefits of Scripting
  - The Jenkins Script Console
  - Calling Scripts using cURL
  - Sample Scripts
  - Calling Groovy Scripts from a Jenkins Job
  - Jenkins API
  - Summary

- Chapter 14 - User Interface Options
  - User Interface Options
  - Customizing the UI with CSS
  - The User Content Folder
  - Using the User Content Folder and Simple Theme Plugin

    - Writing a Jenkins Plugin
    - Modify settings.xml
    - Generate Boilerplate Code for Custom Jenkins Plugin
    - Modify pom.xml
    - Package and Deploy the Plugin
    - The Blue Ocean Plugin
    - Blue Ocean Plugin Features
    - New modern user experience
    - Advanced Pipeline visualizations with built-in failure diagnosis
    - Branch and Pull Request awareness
    - Personalized View
    - Summary
- Chapter 15 - Best Practices for Jenkins
    - Best Practices - Secure Jenkins
    - Best Practices - Users
    - Best Practices - Backups
    - Best Practices - Reproducible Builds
    - Best Practices - Testing and Reports
    - Best Practices - Large Systems
    - Best Practices - Distributed Jenkins
    - Best Practices - Summary

Lab Exercises

- Lab 1. Configure Tools in Jenkins
- Lab 2. Create a Jenkins Job
- Lab 3. Advanced Jobs
- Lab 4. Node.js based Jenkins Job
- Lab 5. Create a Pipeline
- Lab 6. Advanced Pipeline with Groovy DSL
- Lab 7. Configure Jenkins Security
- Lab 8. Optional: Ephemeral Build Agents with Docker

- Chapter 1 - Introduction to Continuous Integration, Continuous Delivery, and Jenkins-CI

- Chapter 2 - Installing and Running Jenkins
- Chapter 3 - Job Types in Jenkins
- Chapter 4 - Advanced Jobs
- Chapter 5 - Non-Java Jenkins Jobs
- Chapter 6 - Continuous Delivery and the Jenkins Pipeline
- Chapter 7 - Groovy DSL
- Chapter 8 - Securing Jenkins
- Chapter 9 - Jenkins Plugins
- Chapter 10 - Distributed Builds with Jenkins
- Chapter 11 - Containerized Builds
- Chapter 12 - The Jenkins API
- Chapter 13 - Scripting
- Chapter 14 - User Interface Options
- Chapter 15 - Best Practices for Jenkins
- Lab Exercises