

# پک پیشرفته مهندسی دواپس

فهرست سرفصل‌های دوره‌های آموزشی

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سرفصل‌های دوره آموزشی

# Git & Jenkins

Introduction of DevOps

Understanding DevOps concepts

DevOps Automation

Continuous Integration

Continues Delivery

Continuous Deployment

The roles of Git & Jenkins in CI/CD

## **Part 1: Git**

Introduction of Git

Version Control System

Version Control System types

Git structure

Git VS other VCS

Git workflow

Environment setup for Git

Install Git on Linux

Install Git on Windows

Git over HTTP

Git Configuration

Git repository

Local repository

Remote repository

Git commands

Tagging

Types of tags

Tag management

Branching

Branch management

Merging

Conflicts

GitHub

Account Setup

Create a repo in GitHub

GitHub via SSH

## **Part 2: Jenkins**

Introduction to Jenkins

What is Jenkins?

Why Jenkins?

What can you do with Jenkins?

Environment setup for Jenkins

Prerequisites to install Jenkins

Installing Jenkins on Redhat, Fedora or CentOS

Installing Jenkins on SUSE or OpenSuse

Installing Jenkins on Debian or Ubuntu

Installing Jenkins on Docker

Installation of Jenkins as a standalone web application

Install Jenkins on windows

Post Installation

Jenkins Job

Create a freestyle job

Job Configuration

Build a Job

Job Status

Configuring Jenkins Server

Configure system

Global Tool Configuration

Manage plugins

Create a maven project

Install Apache maven

Create maven jobs

Configure maven jobs

Build maven jobs

Master Slave Structure

Parametric jobs

Jenkins views

Jenkins Security

Jenkins Credential

Configure global security

Authentication strategies

Authorization strategies

Backup and Restore Jenkins

Job Configuration History

Jenkins Pipeline

Jenkins CLI

Integrate Jenkins and Ansible

Build and deploy a web application via Jenkins and Ansible

Integrate Jenkins and Docker

# Advanced Kubernetes

## Advanced Kubernetes High-Availability Master Nodes (HA Master Nodes)

- Design a Kubernetes Master Nodes in Enterprise Architecture
- Installation of Kubernetes HA Master Nodes with Keepalived & HA Proxy
- Configure Keepalived and Assigned Virtual IP
- Configure Multi HA Proxy as Load Balancer with Keepalived
- Deploy External ETCD in Kubernetes Cluster
- Configure Multi External ETCD as Service
- Verify ETCD Installation
- Issue Certificate for all ETCD
- Replicate ETCD and Initialize Kubernetes Cluster



## Advanced Kubernetes Security

- Understand Service Account and Token
- Deploy Service Account
- Use Default Service Account
- Use Bearer Token Authorization Mode for Service Account Token
- Create Role & Role Binding for Service Account as User
- Create Your Own Service Account
- Understand Auto Mount Service Account Token Mode

## Advanced Kubernetes Storage

- Install & Configure CEPH Rook in Kubernetes Cluster
- Configure Storage Class to Use CEPH Rook
- Deploy CEPH Rook in RBD Mode
- Deploy CEPH Rook in CEPH-FS Mode
- Configure Kubernetes Persistence Volume in Read-Write-Once Mode
- Configure Kubernetes Persistence Volume in Read-Write-Many Mode
- Install & Configure External CEPH Storage and Connect it to Kubernetes Cluster
- Define Storage Class for External CEPH Storage
- Setup & Configure NFS Server as Default Storage in Kubernetes Cluster
- Configure Storage Class to Use NFS Server
- Deploy Kubernetes StatefulSet
- Configure Headless Service for StatefullSet Applications
- Example of Deploying MySQL with StatefullSet

## Helm in Kubernetes

- Understand Helm and Helm Charts
- Helm Commands
- Install Nginx & MySQL Using Helm
- Create Your own Helm Charts
- Configure Helm Values
- Configure GitHub as a Repository for Your Helm Chart
- Download and Edit Helm Chart before Install

## Running Automated Task in Kubernetes

- Understand Kubernetes Job
- Configure Kubernetes job with Auto Delete Mode
- Deploy Kubernetes Jobs in Parallelism Mode
- Understand Kubernetes Cron Job
- Deploy Kubernetes Cron Jobs with History Limit
- Deploy Kubernetes Cron Jobs with Suspend True

## Advanced Kubernetes Monitoring

- Understand how to Monitor all Cluster with External Monitoring Tools
- Install & Configure Metric-Server
- Install & and Configure Prometheus & Grafana in Kubernetes Cluster
- Monitor All Cluster-Components with Prometheus
- Deploy Kubernetes Horizontal POD Auto Scaling (HPA)
- Configure HPA and Deploy Auto Scaling Up PODs
- Deploy Kubernetes Vertical POD Auto scaling (VPA)
- Configure VPA for Automatically Adjust PODs CPU & Memory
- Creating VPA for Increasing CPU & Memory Under High Load

## CI/CD in Kubernetes

- Understand CI/CD in Kubernetes
- Deploy Kubernetes CI/CD with GitLab
- Install and Configure GitLab Runner as Service in Separated Node
- Deploy Docker Registry for Automating CI/CD
- Configure GitLab for Automatic Build, Push and Pull Image in Kubernetes
- Configure Image Pull Security in Kubernetes
- Running Automatic Deployment Rolling Update

## Azure DevOps CI/CD

- Setting up a CI/CD Pipeline Using Azure DevOps
- Install and Configure Azure DevOps Agent for Running Task
- Deploy & Register Nexus as a Docker Registry in Azure Devops
- Create Kubernetes Pipeline using Azure Devops

## ArgoCD

- Install and Configure ArgoCD
- ArgoCD Architecture and Components
- Understanding Applications in ArgoCD
- Introduction to Repositories in ArgoCD
- Managing Application Lifecycle
- Connctet gitlab to ArgoCD and running Kubernetes Rolling Update

# ELK Stack

## Introduction to Elastic Stack

- What is the Elastic Stack? Overview and History
- Working with data, structured vs. semi-structured vs. unstructured data
- Overview of the data analysis process
- What is Big Data? Characteristics (3Vs: Volume, Velocity, Variety)
- Elastic Stack vs. ELK Stack, Evolution and Components
- Common Use Cases: Log Management, Business Analysis, Security Analytics, Monitoring
- Installing Elastic Stack Components: Elasticsearch, Logstash, Kibana, Beats

## Deep Dive into Elasticsearch

- Elasticsearch Architecture: Nodes, Clusters, and Indexes
- What is API and advanced usage of API in Elasticsearch
- Data Modeling and Indexing
- Understanding Mapping, Documents, and Fields
- CRUD Operations: Create, Read, Update and Delete data
- Search Queries: Term, Match, Range, Aggregations
- Advanced Search and Filtering: Bool Queries, Nested, and Geo Queries
- Performance Tuning with Sharding, Replication, Caching, and Index Management

## Data Collection with Logstash

- Introduction to Logstash, architecture and Pipeline Concepts
- Configuring input plugins for various data sources
- Reading data from different sources (logs, metrics, CSVs, Databases, etc.)
- Input Plugins: File, Syslog, Beats, JDBC
- Data Transformation using filters for parsing, enriching, and transforming data
- Output Plugins: Elasticsearch, File, Email, Kafka
- Managing and Debugging Pipelines
- Logstash Configuration Best Practices

## Data Visualization with Kibana

- Introduction to Kibana, Interface and Navigation
- Index Patterns and Data Discovery
- Building Visualizations with Pie Charts, Bar Graphs, Line Graphs, and Maps
- Creating Dashboards for Monitoring and Analytics
- Working with Kibana Lens for Simplified Data Exploration
- Advanced Visualizations: Timelion, Vega, Canvas
- Alerts and Reporting in Kibana
- Alarm and triggers in Kibana
- Security and Access Control in Kibana

## Data Shipping with Beats

- Overview of Beats: Filebeat, Metricbeat, Packetbeat, Auditbeat, Heartbeat
- Installing and Configuring Beats
- Collecting and Parsing Log Files with FileBeat
- System and Application Metrics with MetricBeat
- Network Traffic Analysis with PacketBeat
- Security Event and File Integrity Monitoring with AuditBeat
- Uptime Monitoring with HeartBeat

- Sending Data from Beats to Elasticsearch/Logstash

## Unified Data Collection with Elastic Agent

- Introduction to Elastic Agent
- Replacing Beats with Elastic Agent
- Configuring Elastic Agent for Data Collection (Log and Metric)
- Centralized Management with Fleet

## Security and Monitoring in the Elastic Stack

- Securing the Stack: Role-Based Access Control (RBAC) and Encryption
- HTTPS interfaces and Secure communications
- Auditing and Compliance, Monitoring Access and Changes
- Implementing Security Rules and Alerts
- SIEM (Security Information and Event Management) and SOC Use Cases

## Advanced Elastic Stack Topics

- Machine Learning in Elastic Stack: Anomaly Detection and Forecasting
- IoT integration with Elastic Stack
- Advanced alarm and triggers deployment (sending email, SMS, Physical action, etc)
- APM (Application Performance Monitoring): Tracing and Performance Metrics
- Scaling Elasticsearch Clusters, High Availability and Load Balancing
- Backup and restore Strategies for Elasticsearch
- Handling Large Datasets, Index Lifecycle Management (ILM) and Rollups

## Real-World Use Cases and Projects

- Setting Up a Centralized Logging Solution
- Building a Real-Time Monitoring Dashboard for Infrastructure Metrics
- Security Analytics and Threat Detection with the Elastic Stack
- Implementing Application Performance Monitoring (APM) for services
- IoT Management and monitoring platform with elastic stack