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Learning made Simpler!

Docker & Kubernetes Training on Azure

Training Plan

31st May, 2019

Course type

- Instructor-Led Classroom Training

Course Duration

- Approx. 40+ Hours (5 days)

Prerequisites

- A foundational understanding of IT infrastructure
- Knowledge of Unix/Linux operating system
- Basic knowledge about Software Development Life Cycle

Learning outcomes

- Learn concepts of Virtualization and Containerisation.
- Learn concepts of Microservices-based Architecture.
- Learn how Cloud-DevOps and Virtualization concepts converge together.
- Learn how applications can be deployed and managed on a cluster of servers.
- Get prepared for Kubernetes Administration certification.

Docker & Kubernetes: Course Overview

Environment setup

- Azure Cloud Account
- Connectivity tool: Putty, puttygen and Winscp
- Internet connectivity for the trainer and participants
- Connectivity to the cloud

1. Getting Started with Docker Containers

- Introduction Installing Docker on Ubuntu
- Installing Docker on CentOS
- Setting Up a Local Docker Host by Using Vagrant
- Starting a Docker Host in the Cloud by Using Docker Machine
- Using Docker Experimental Binaries
- Running Hello World in Docker
- Running a Docker Container in Detached Mode
- Creating, Starting, Stopping, and Removing Containers

2. Image Creation and Sharing

- Introduction
- Keeping Changes Made to a Container by Committing to an Image
- Writing Your First Dockerfile
- Packaging a Flask Application Inside a Container
- Optimizing Your Dockerfile by Following Best Practices
- Versioning an Image with Tags
- Migrating from Vagrant to Docker with the Docker Provider
- Using Packer to Create a Docker Image
- Publishing Your Image to Docker Hub
- Running a Private Registry
- Setting Up an Automated Build on Docker Hub for Continuous Integration
- Building a Docker Image with a Dockerfile

- Sharing Data in Your Docker Host with Containers

3. The Container Ecosystem

- Using Docker Compose to Create a WordPress
- Starting Containers on a Cluster with Docker Swarm
- Using Docker Machine to Create a Swarm Cluster Across Cloud Providers
- Discovering Docker Services
- Running Containers on a Cluster

4. Container Management Systems: Docker Swarm

- Using Docker Compose to Create a WordPress
- Starting Containers on a Cluster with Docker Swarm
- Using Docker Machine to Create a Swarm Cluster Across Cloud Providers
- Discovering Docker Services
- Running Containers on a Cluster
- Scaling your Application across the cluster
- Best practices on Docker Swarm

5. Introduction to Microservices:

- Service Oriented Architecture
- Monoliths vs microservices
- Deployment Patterns
- Data management
- Event sourcing
- Deploying microservices on containers

6. Kubernetes: Introduction

- Introduction Understanding Kubernetes Architecture
- Docker Swarm and Kubernetes
- Creating a Multi-Node Kubernetes Cluster with Vagrant
- Starting Containers on a Kubernetes Cluster with Pods
- Taking Advantage of Labels for Querying Kubernetes Objects
- Running Multiple Containers in a Pod
- Running the Kubernetes Dashboard

7. Kubernetes: Core Concepts

- Kubernetes Cluster
- Architecture & Generic Installation
- Kubernetes Architecture
- Kubernetes Core
- Kubernetes API Primitives & Cluster Architecture
- Kubernetes Services & Network Primitives
- Run a Job
- Deploy a Pod
- Hardware and Underlying Infrastructure
- Validating Nodes & the Cluster

8. Installation, Configuration & Validation

- Design a Kubernetes cluster.
- Raw Kubernetes Install on CentOS machines
- Install Kubernetes masters and nodes.
- Configure components of Kubernetes cluster.
- Provision underlying infrastructure to deploy a Kubernetes cluster.
- Choose a network solution (calico)
- Choose your Kubernetes
- Infrastructure configuration.
- Run end-to-end tests on your cluster.

9. Azure Kubernetes Services

- Create an AKS cluster
- Work with AKS CLI
- Deploy an application
- Scale an application
- Upgrade a cluster

10. Application Lifecycle Management

- Understand Deployments
- Performing rolling updates and rollbacks.
- Ways to configure applications.

- Scaling applications.
- Create a self-healing application.

11. Controllers and Schedulers

- Labels & Selectors
- Replica set
- Replication controllers
- Deployments
- Services
- DaemonSets
- Raise a DaemonSet
- Resource Limits & Pod Scheduling
- Manually Scheduling Pods
- Label a Node & Schedule a Pod
- Multiple Scheduler
- Labels & Selectors
- Annotations

12. Jobs:

- Job Resource
- Job manifest
- Batch Jobs
- CronJob
- Running multiple pods in a Job
- Scheduling and parallelism

13. Logging & Monitoring

- Monitoring Cluster Components and Applications
- View the Logs
- Managing Logs
- Liveness Probe
- Readiness Probe
- Logging/Monitoring

14. Multi-tenancy and Cluster Maintenance

- Namespaces,
- Authentication,

- RBAC,
- Quotas,
- Network Policies
- Upgrading Kubernetes Components
- Config Maps,
- Secrets,
- Upgrading the Underlying Operating System(s)
- Backup and Restore a Kubernetes Cluster

15. Networking

- Node Network Configuration
- Service Networking
- Ingress and Ingress rules
- Deploying a Load Balancer
- Configure & Use Cluster DNS
- Container Network Interface (CNI)
- Calico
- Calico modes, Local and Internode Routing, RR, Data Paths
- Network Policy

16. Storage

- Persistent Volumes (PV)
- Volumes and their Access Modes
- Applications & Persistent Storage
- Stateful sets
- Kubernetes storage objects.
- Storage with cloud (Azure)
- Persistent volume claims (PVC).

17. Security:

- Authentication & Authorization
- Configure Network Policies
- Securing Images
- Security Contexts
- Troubleshooting in Kubernetes

18. Helm

- Introduction to Helm
- Helm installation
- Tiller installation
- Helm Charts.
- Deployments using Helm,
- Update using Helm

Doubt Clearing / Queries session

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