# Docker, Container and Kubernetes Foundations

Proficiency Level - Learner

Duration – 4 Days

## Pre-requisites

* Linux Essential

## Day - 1 Agenda Outlined

**Architecture** (Discussion)

* Virtualization Basic
* Containers (Why containers (non-technical elevator pitch), Why containers (technical elevator pitch), How Docker helps us to build, ship, and run, The history of containers)
* Docker architecture
* Introduction to docker
* Devs vs Ops, before Docker
* Devs vs Ops, after Docker

**Containerization Basics and docker basics** (Discussion, Demo & Lab)

* The Docker Story
* Learning the Basics of Docker
* Docker Deep Dive - A Quick Update
* The Docker Hub
* Docker Installation (on Linux and windows)
* Creating our First Image
* Working with Multiple Images
* Packaging a Customized Container
* Running Container Commands with Docker
* Introduction to Images
* Creating Images, understanding images (Differences between containers and images)
* Managing Images
* Docker Continuous Integration
* Volumes
* Containers Virtualization
* Differences between virtualization and containers

## Day - 2 Agenda Outlined

**The Docker file, Builds and Network Configuration** (Discussion, Demo & Lab)

* Docker file Directives: USER and RUN
* Docker file Directives: RUN Order of Execution
* Docker file Directives: ENV
* Docker file Directives: CMD vs. RUN
* Docker file Directives: ENTRYPOINT
* Docker file Directives: EXPOSE
* Container Volume Management
* Docker Network: List and Inspect
* Docker Network: Create and Remove
* Docker Network: Assign to Containers
* Using Docker into a Continuous Integration and Deployment process

**Docker Commands and Structures** (Discussion, Demo & Lab)

* Naming Our Containers
* Docker Events
* Managing and Removing Base Images
* Saving and Loading Docker Images
* Image History
* Taking Control of Our Tags
* Pushing to Docker Hub

## Day - 3 Agenda Outlined

* Installation and Configuration (Discussion, Demo & Lab)
  + Getting Started with Kubernetes
    - Master
    - Minion
    - Jobs
  + Minikube
  + kubeadm
  + More Installation Tools
* APIs and Access (Discussion, Demo & Lab)
  + API Access
  + Annotations
  + Working with A Simple Pod
  + kubectl and API
  + Swagger and Open API
* API Objects (Discussion, Demo & Lab)
  + API Objects
  + The v1 Group
  + API Resources
  + RBAC APIs
* Backups (Discussion, Demo & Lab)
  + Before you begin
  + Snapshot etcd data
  + Restore etcd data
  + Migrating an etcd cluster
* Managing State with Deployments (Discussion, Demo & Lab)
  + Deployment Overview
  + Managing Deployment States
  + Deployments and Replica Sets
  + Daemon Sets
  + Labels

## Day - 4 Agenda Outlined

* Volumes and Data (Discussion, Demo & Lab)
  + Volumes Overview
  + Volumes
  + Persistent Volumes
  + Passing Data to Pods
  + Config Maps
* Scheduling (Discussion, Demo & Lab)
  + Overview
  + Scheduler Settings
  + Policies
  + Affinity Rules
  + Taints and Tolerations
  + Labs
* Logging and Troubleshooting (Discussion, Demo & Lab)
  + Overview
  + Troubleshooting Flow
  + Monitoring
  + Logging
  + Troubleshooting Resources
  + Labs
* Networking and Kubernetes (Discussion, Demo & Lab)
  + Kubernetes Networking
  + Pod to Pod
  + Exposing Services
  + IP Per Pod
  + Inter Pod Communication
  + Intra Pod Communication
* Ingress (Discussion, Demo & Lab)
  + Overview
  + Ingress Controller
  + Ingress Rules
  + Labs