

CANONICAL



Canonical Distribution of Kubernetes

Training Curriculum

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Prepared On:	24/09/2018
Version:	1.1

Page Index

Introduction & Scope	2
Agenda	2
Day 1	3
1. Containers	3
2. Docker and LXD	3
Lab I	3
3. Kubernetes Overview	3
4. Canonical Distribution of Kubernetes (CDK) + Juju	3
Day 2	4
5. Pods	4
Lab II	4
6. Networking	4
7. Services	4
Lab III	4
8. Keeping applications healthy	4
Lab IV	4
9. Storage, passing data for Apps	5
Lab V	5
Day 3	5
10. RBAC and authentication	5
11. Network Security	5
12. Security at Pod level	5
Lab VI	5
13. Private Registry	5
14. Helm	6
LAB VII	6
15. Upgrading CDK	6
LAB VIII	6
16. Best practices with Kubernetes	6
Additional Topics	6
Monitoring Kubernetes	6

Introduction & Scope

This document provided a high level overview of the topics which are covered during the 3 days under the curriculum of the Canonical Kubernetes Training.

Agenda

The following items will be covered throughout the course of the three-day training:

1. Containers

2. Docker and LXD

LAB i: LXD and Docker containers (lab pages 1-10): LXD lab + Docker lab (also contains info about container networking and storage/volumes)

3. Kubernetes overview

4. CDK + 5. Pods

LAB ii: Kubernetes basics -> CDK (lab pages 10-17): Includes deployment exercises and info + pod exercises + Juju information

6. Networking + 7. Services

LAB iii: Networking (lab pages 17-24): infos about the k8s cloud networking setup + pod networking

8. Keeping applications healthy

LAB iv: Keeping applications healthy (lab pages 17-31): infos about Deployments, StatefulSets

9. Storage, passing data for Apps

LAB v: Storage (lab pages 31-35): infos about Persistent Volumes, Storage Classes, config Maps, etc.

10. RBAC and authentication + 11. Network Security + 12. Security at Pod level

LAB vi: Authentication and Authorization (lab pages 35-40)

13. Private Registry

14. Helm

LAB vii: Helm (lab pages 41-44)

15. Upgrading CDK

LAB viii: Upgrading CDK (lab pages 44-45)

16. Best practices with Kubernetes

Day 1

1. Containers

- Introduction to container virtualization
- Why is this needed
- What are the benefits of this approach

2. Docker and LXD

- Exploring Docker and LXD container technologies
- Explain how they work
- Explain the difference between them

Lab I

LXD and Docker containers (lab pages 1-10): LXD lab + Docker lab (also contains info about container networking and storage/volumes)

- Create and manage both Docker and LXD containers
- Work with Docker network model

3. Kubernetes Overview

- Explain what Kubernetes is and how it interacts with Docker
- Explore Kubernetes architecture and components

4. Canonical Distribution of Kubernetes (CDK)

- Explain Canonicals approach to Kubernetes with Juju
- Explore Juju components and how it works
- See the advantages of choosing this solution

Day 2

5. Pods

- Explore the simplest unit of compute in Kubernetes
- Why Pods are used and how they integrate with Docker containers

Lab II

Kubernetes basics -> CDK (lab pages 10-17): Includes deployment exercises and info + pod exercises

6. Networking

- Explain the differences between Flannel, Calico, Canal. Highlight the benefits, advantages and disadvantages between them.
- Explain what CNI plugins are, how they are used and which ones are supported. Explain that third party network manufacturers (I.E Cisco or F5) can produce CNI plugins which can be supported and used.

7. Services

- Explore how networking works within Kubernetes
- How different applications can talk to each other

Lab III

Networking (lab pages 17-24): infos about the k8s cloud networking setup + pod networking

8. Keeping applications healthy

- Explore one of key benefits of Kubernetes, application high-availability

Lab IV

Keeping applications healthy (lab pages 17-31): infos about Deployments, StatefulSets

9. Storage, passing data for Apps

- Explore how data persistency can be achieved
- See supported storage backends for Kubernetes

Lab V

Storage (lab pages 31-35): infos about Persistent Volumes, Storage Classes, config Maps, etc.

Day 3

10. RBAC and authentication

- Explore how Kubernetes does implement Authentication and Authorization
- Use RBAC as a plugin for authorization

11. Network Security

- Explore how groups of pods are allowed to communicate with each other
- Pod networking isolation

12. Security at Pod level

- Discuss the differences between Container level security and virtual machines.
- Explain that Containers do not use/require VT instructions

Lab VI

Networking (lab pages 17-24): infos about the k8s cloud networking setup + pod networking

13. Private Registry

- Explore what a private registry is and why is it useful
- Explore different options of private registries

14. Helm

- Explore how to package and deploy complex applications and architectures
- Use Helm as a package manager for Kubernetes

LAB VII

Helm (lab pages 41-44)

15. Upgrading CDK

- Demonstrate an upgrade between two or more older versions.

LAB VIII

Upgrading CDK (lab pages 44-45)

16. Best practices with Kubernetes

- Explore some of the best practices closely related to what was taught in this course

Additional Topics

If there is any remaining time during the Training, the trainer will make efforts to cover additional topics or provide clarifications based on questions from the customer during the training sessions.

Monitoring Kubernetes

- Discuss monitoring Kubernetes, what tools can be used, deployed and supported.
- Discuss Prometheus
- Discuss ElasticSearch
- Discuss third party products which could be used.