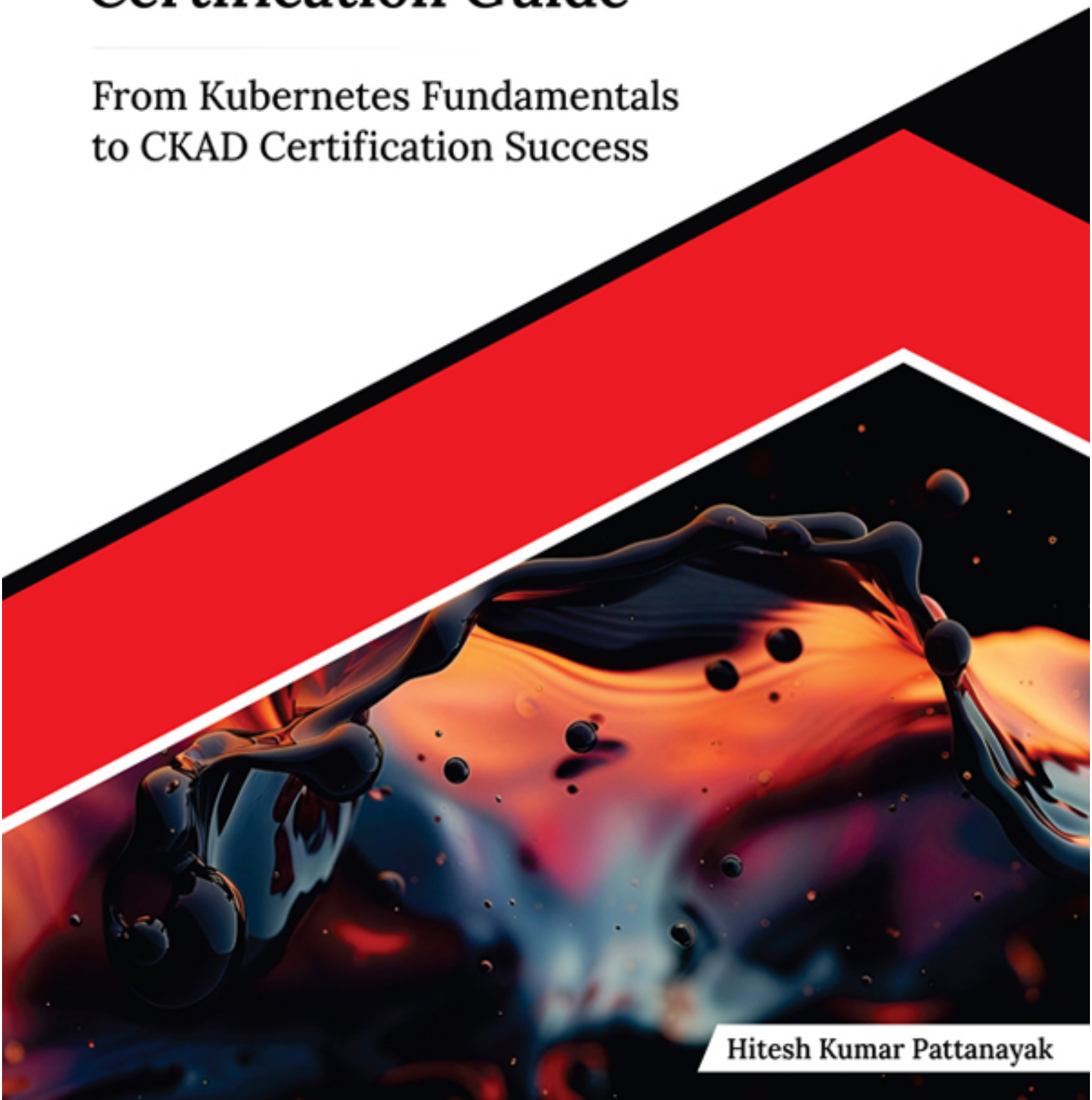
ULTIMATE

Certified Kubernetes Application Developer (CKAD) Certification Guide

From Kubernetes Fundamentals to CKAD Certification Success



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First Published: March 2026

Published by: Orange Education Pvt Ltd, AVA®

Address: 9, Daryaganj, Delhi, 110002, India

275 New North Road Islington Suite 1314 London,
N1 7AA, United Kingdom

ISBN (PBK): 978-93-49887-13-8

ISBN (E-BOOK): 978-93-49887-10-7

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CHAPTER 1

Understanding the CKAD Certification

Introduction

In this chapter, we will explore the Certified Kubernetes Application Developer (CKAD) certification program, developed by the Cloud Native Computing Foundation (CNCF) in collaboration with the Linux Foundation. This program is designed to validate your skills in designing and building applications that run on Kubernetes, a leading container orchestration platform.

Structure

In this chapter, we will discuss the following topics:

- Overview of CKAD Certification
- Purpose of being CKAD Certified
- How to Get Started with CKAD
    - Key Skills Tested
    - Exam Domains and Weightage
- Preparation of Exam: Environment and System Requirements
- Exam Format
- Preparation Strategy

Overview of CKAD Certification

The CKAD certification is a credential that demonstrates your ability to design, build, and manage applications in a Kubernetes environment. It emphasizes practical, hands-on skills that are essential for modern cloud-native development. As Kubernetes adoption continues to grow exponentially—visible through trends like those on Google—the demand for certified professionals is rising. By obtaining this certification, you can set yourself apart in the competitive job market, showcasing your ability to deploy and manage cloud-native applications with confidence.

Purpose of being CKAD Certified

In the current technological landscape, it is crucial for professionals to establish their credibility and demonstrate their value in the marketplace. The CKAD certification helps you stand out by proving that you have mastered the foundational skills necessary for Kubernetes application development. Whether you are looking to enhance your current role or seeking new opportunities, this certification serves as a mark of excellence.

By becoming CKAD certified, you also show that you are committed to continuous learning and adapting to the latest cloud-native practices. With Kubernetes quickly becoming the standard for container orchestration, attaining this certification will position you at the forefront of this rapidly evolving field.

How to Get Started with CKAD

Preparing for the CKAD certification begins with understanding the exam's structure and curriculum. The certification is designed to test your ability to perform real-world tasks in a Kubernetes environment, focusing on core topics that are critical to application development and deployment.

Key Skills Tested

The CKAD exam is designed to measure not only theoretical knowledge but also the **ability to apply** that knowledge in a Kubernetes environment, making it a **hands-on, practical assessment**. Success in the exam relies on demonstrating these key skills through task completion under time constraints.

Exam Domain and Weightage

Let us break down the exam domains and their respective weightage:

1. **Application Design and Build (20%)**
    a. Understand how to define, build, and modify container images.
    b. Choose the appropriate Kubernetes workload resource (such as Deployment, DaemonSet, StatefulSet, or CronJob) based on your use case and requirements.
    c. Implement multi-container pod design patterns.
    d. Utilize persistent and ephemeral volumes to manage data storage.
2. **Application Deployment (20%)**
    a. Use Kubernetes primitives to implement deployment strategies such as blue/green deployments and canary releases.

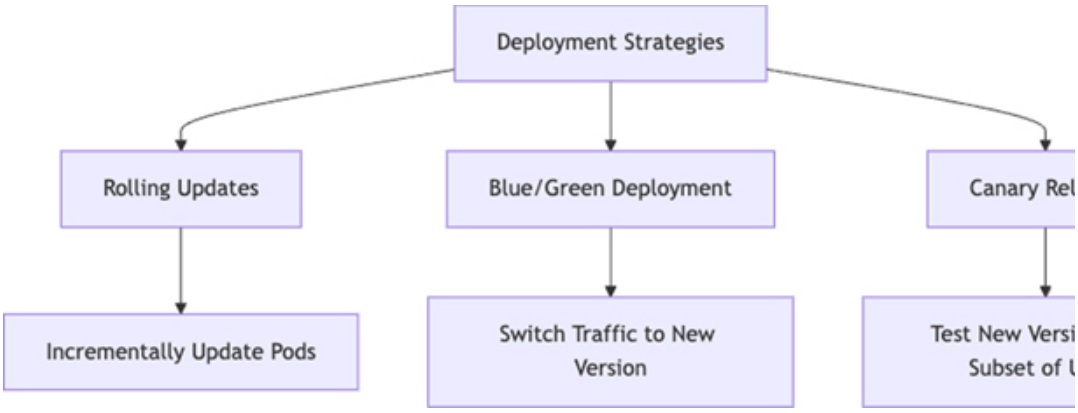

Figure 1.1: *Deployment Strategies*

b. Master rolling updates and rollback mechanisms to restore faulty deployments.
c. Create and use Helm packages for managing Kubernetes applications.
d. Employ Kustomize to manage Kubernetes resources.

3. **Application Observability and Maintenance (15%)**

a. Stay informed about API deprecations and their impact on application functionality.
b. Implement probes and health checks to ensure the stability of your applications.
c. Use logs and resource events to debug applications running in Kubernetes.

4. **Application Environment, Configuration, and Security (25%)**

a. Create and manage custom resources using Custom Resource Definitions (CRDs) and Operators.
b. Understand Kubernetes authentication, authorization, and admission control processes.
c. Define resource requests, limits, and quotas to manage application resources efficiently.
d. Work with ConfigMaps, Secrets, and ServiceAccounts to manage application configurations and secure sensitive data.
e. Implement security contexts and capabilities to ensure that your applications run securely.

5. **Services and Networking (20%)**

a. Understand and implement NetworkPolicies for controlling network traffic.
b. Troubleshoot application access issues using Kubernetes services.
c. Use Ingress rules to expose applications to external users effectively.

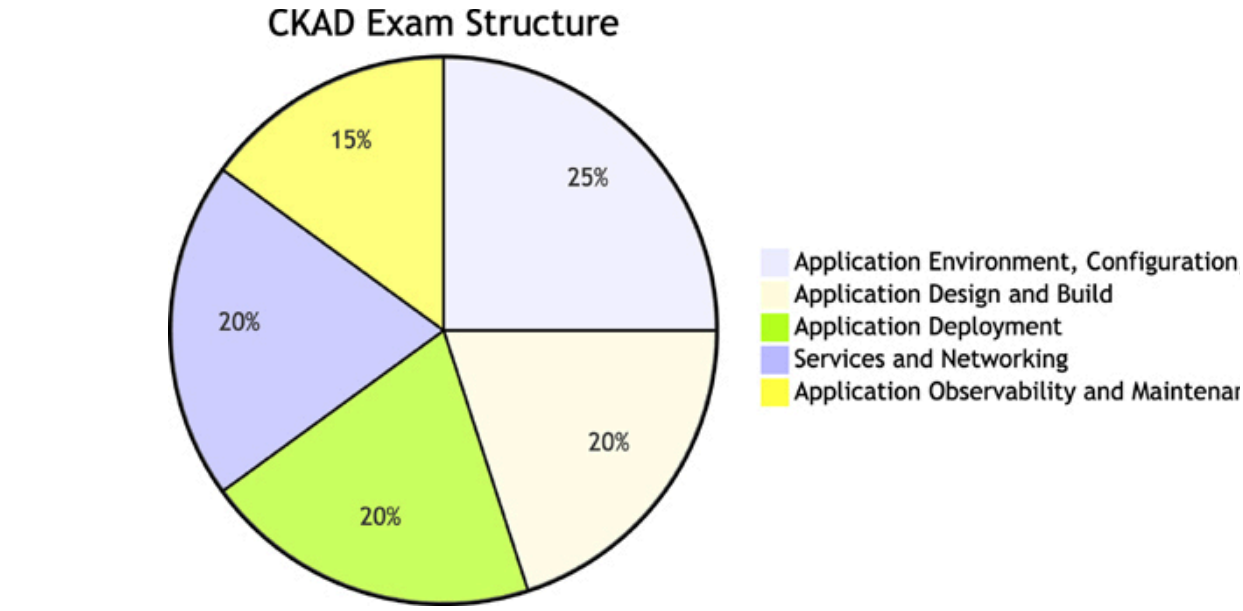

Figure 1.2: *CKAD Exam Structure*

For more information on the certification, please visit CNCF CKAD Certification: http://cncf.io/certification/ckad.

Preparing for the Exam: Environment and System Requirements

To ensure a smooth exam experience, it is important to be aware of the environmental and system requirements. The CKAD exam is conducted online, and can be taken from the comfort of your home, but there are specific guidelines you need to follow.

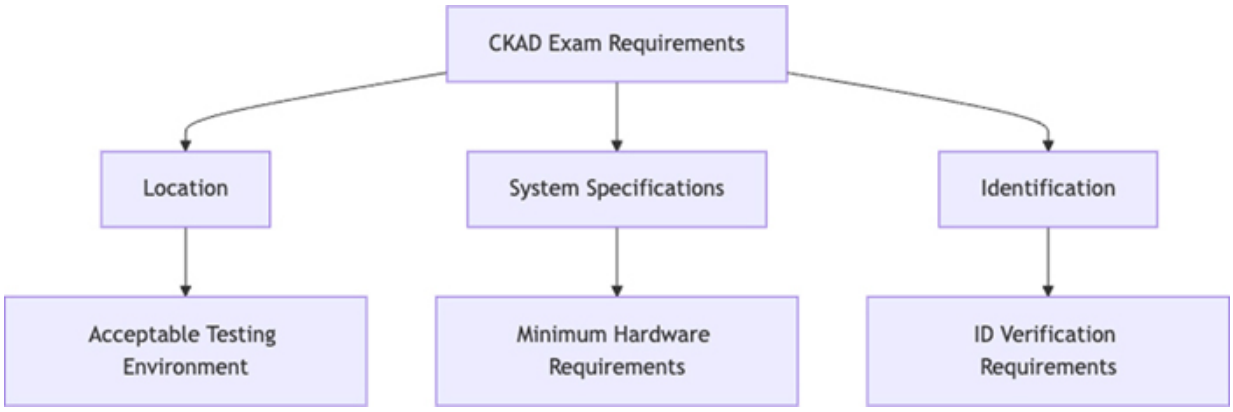

Figure 1.3: *CKAD Exam Requirements*

- **Room Setup**: Make sure your room meets the acceptable norms for the exam. For details, please review the Linux Foundation's guidelines:

https://docs.linuxfoundation.org/tc-docs/certification/tips-cka-and-ckad#acceptable-testing-location.

- **System Requirements**: Your system must meet specific hardware and software criteria to run the exam smoothly. Review the detailed requirements here: **https://docs.linuxfoundation.org/tc-docs/certification/tips-cka-and-ckad#system-requirements-to-take-the-exam.**
- **Network Connectivity**: Ensure that you have a stable internet connection to avoid disruptions during the exam.
- **Identification**: You will need valid identification to take the exam. For more information, please see the identification requirements: **https://docs.linuxfoundation.org/tc-docs/certification/tips-cka-and-ckad#id-requirements-to-take-the-exam.**

Exam Format

CKAD exam is not your typical multiple-choice exam. It is a hands-on, performance-based assessment where you will be required to complete practical tasks using Kubernetes. The focus is on real-world application, so memorization of commands is less important than understanding how Kubernetes works and being able to apply that knowledge.

You will have access to the official Kubernetes documentation (https://kubernetes.io/docs/home/) throughout the exam. Throughout this book, we will emphasize how to effectively use the documentation to find the right information quickly and efficiently.

The exam consists of **15-20** tasks that need to be completed within a two-hour window. As of today, the exam fee is **$395** USD and includes one free retake. The exam is proctored online, meaning you can take it anytime, anywhere, while being monitored by a live proctor.

You will receive your exam results via email within 24 hours of completion.

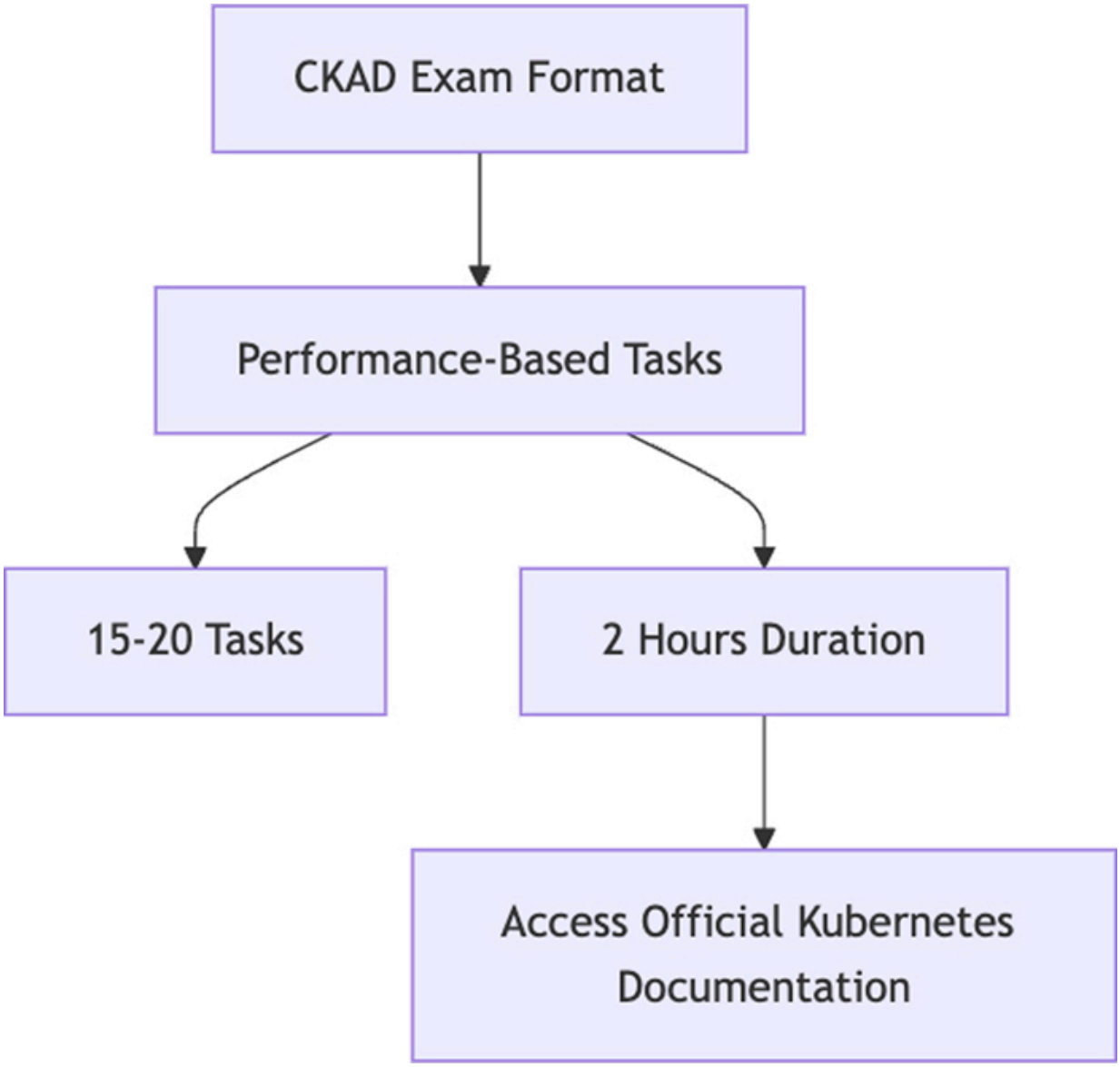

Figure 1.4: *CKAD Exam Format*

Preparation Strategy

Preparing for the Certified Kubernetes Application Developer (CKAD) exam requires a focused and practical approach. Since the exam emphasizes real-world application of Kubernetes, the preparation strategy should blend hands-on practice with a solid understanding of key concepts.

1. **Understand the Exam Structure and Domains**
    - Start by reviewing the exam curriculum to understand the weight of each domain.

- Prioritize your study time according to the weight of these sections. Focus more on high-weighted topics such as Application Environment, Configuration, and Security, but do not neglect other domains.

2. **Set Up a Kubernetes Practice Environment**
   - Use a local setup such as Minikube or Kind (Kubernetes in Docker) to create your own Kubernetes cluster for practice. Alternatively, use a cloud provider (for example, GKE, EKS, AKS) to gain exposure to cloud-managed Kubernetes.
   - Explore Kubernetes concepts by working with real deployments, services, and configurations. Practice the commands required during the exam.
   - For this book, we would stick to the usage of Minikube in local system (no cloud provider).
3. **Use the Kubernetes Documentation**
   - The Kubernetes official documentation is your best friend during preparation and the exam itself. Since the documentation is available during the exam, practice navigating through it quickly and efficiently.
   - Understand where to find information on common tasks such as creating deployments, managing services, configuring secrets, and more. Bookmark the most relevant sections for easier access.

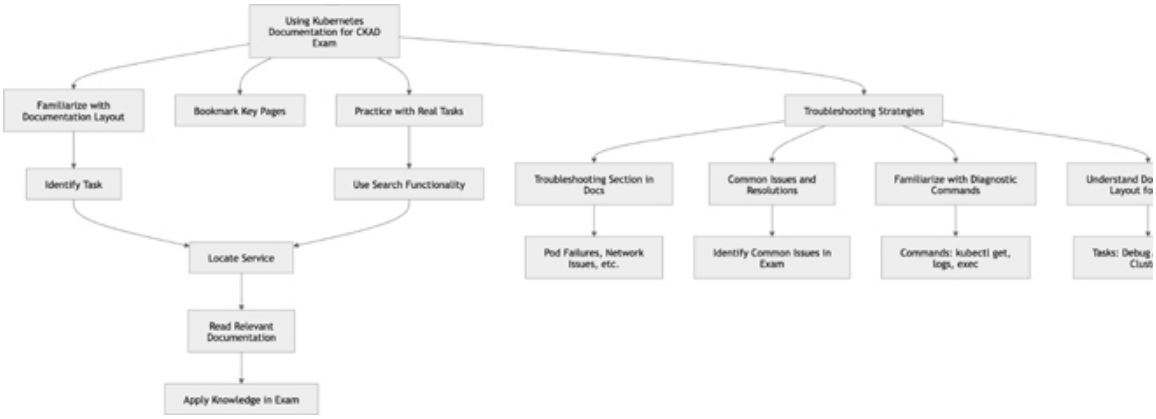

Figure 1.5: *Kubernetes Official Docs Usage*

4. **Focus on Key Topics**
   - **Workload Management**: Practice creating and managing deployments, DaemonSets, StatefulSets, and Jobs. Be comfortable with modifying resources during runtime.
   - **Container Image Management**: Learn how to define, build, and modify container images. Practice using kubectl run or kubectl create commands to deploy containers.

- **Deployment Strategies**: Implement different deployment strategies such as rolling updates, blue/green deployments, and canary releases.
- **Pod Design**: Get familiar with multi-container pods and patterns such as sidecar containers.
- **ConfigMaps and Secrets**: Learn to create and use ConfigMaps and Secrets to manage configuration data and sensitive information within applications.
- **Network and Services**: Practice setting up services, understanding ClusterIP, NodePort, and LoadBalancer types, and using Ingress to expose applications. Also, focus on implementing NetworkPolicies for securing traffic.

5. **Hands-On Practice**

- **Task Automation**: Automate repetitive Kubernetes tasks using kubectl and YAML manifests. Create your own YAML files to define deployments, services, and configurations.
- **Debugging and Troubleshooting**: Learn how to debug issues by examining pod logs, resource events, and using probes (readiness, liveness).
- **Performance Testing**: Test resource management by configuring requests, limits, and quotas for applications. Get familiar with commands such as kubectl top to monitor resource usage.

6. **Time Management During Practice**

- The CKAD exam gives you **2 hours** to complete around **15-20** tasks. Practice completing tasks within time limits.
- Create aliases for frequently used commands and practice using them regularly to ensure that you are comfortable applying them during the exam.

  The following list outlines the aliases used throughout this book. You are encouraged to customize them to fit your personal workflow or preferences.

```
alias k='kubectl'
alias kc='kubectl create'
alias kcfg='kubectl config'
alias kd='kubectl describe'
alias kdep='kubectl get deploy'
alias kdp='kubectl describe pod'
alias ke='kubectl explain'
alias kg='kubectl get'
```

```
alias kgaa='kubectl get all --show-labels'
alias kgpa='kubectl get pod --all-namespaces'
alias kns='kubectl get namespaces'
alias kpod='kubectl get pod'
alias krem='kubectl delete'
alias krep='kubectl replace'
alias ksetimg='kubectl set image deploy'
alias ksvc='kubectl get svc'
```

> ***Note**: Many of these commands may not make sense right now, but they will become clearer as we progress through the chapters.*

- Simulate exam conditions by timing yourself while completing hands-on labs. This helps develop speed and accuracy under pressure.
- Skip tasks that are taking too long and return to them later, just like you would in the exam.

7. **Mock Exams and Practice Tests**
   - Take mock exams or use online practice platforms such as **Killer.sh** (official CKAD simulator) to get a feel of the exam format. These simulators offer practice questions that closely resemble the CKAD exam.
   - Focus on problem-solving and understanding why each solution works.
8. **Stay Current with Kubernetes Updates**
   - Kubernetes is constantly evolving, and new versions may deprecate older APIs or introduce new features. Ensure that you are studying with the most recent version of Kubernetes (usually the exam is based on the most recent stable release).
   - Keep track of API deprecations and new features in each Kubernetes release, as this could affect exam content.
9. **Join the Kubernetes Community**
   - Engage with the Kubernetes community by joining forums such as Reddit, Slack channels, or the Kubernetes Discussion Forum. Here you can learn from others' experiences, gain valuable insights, and ask questions.
10. **Plan for Exam Day**
    - Make sure your environment and system are ready for the exam. Test your camera, microphone, and internet connection before the exam day.
    - Have a clean, quiet space where you would not be disturbed during the exam.

- Review the exam guidelines and ensure that you have all necessary identification documents ready.
- Familiarize yourself with the online proctoring process and system requirements as outlined by the Linux Foundation.

Strategy to Attempt Questions

The exam will feature questions with varying weightages, such as 4%, 6%, and 8%. Begin with the higher-weighted questions, rather than answering them sequentially. Avoid spending excessive time on any single question. Keep in mind that there will likely be a tricky question—flag it and move on to the next higher-weighted question.

Prepare on Simulator

When you feel prepared for the exam, take advantage of the free simulator test available upon registration here: https://training.linuxfoundation.org/certification/certified-kubernetes-application-developer-ckad/. Following is a screenshot showing where to access the mock simulator:

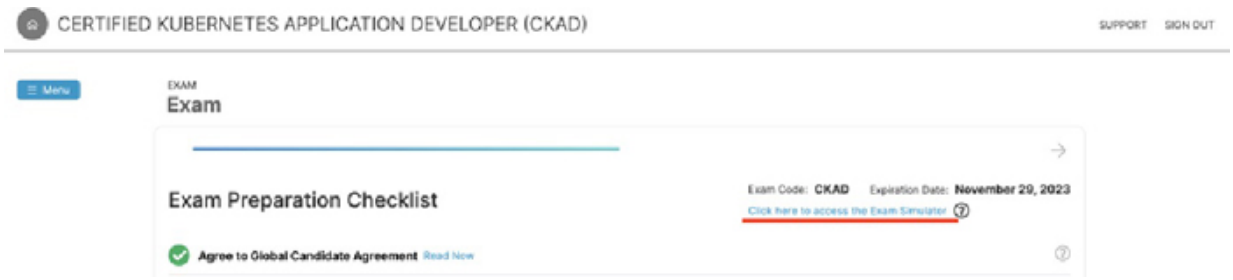

Figure 1.6: *CKAD Exam Mock Simulator Link*

The simulator offers a near-real exam experience, which is crucial for practice. Even basic tasks such as copying and pasting function differently in the actual exam environment, as it uses an Ubuntu OS.

Sample Preparation Schedule

The exam preparation is self-paced and will vary depending on the individual. Experience level also plays a significant role. However, the following schedule can serve as a reference.

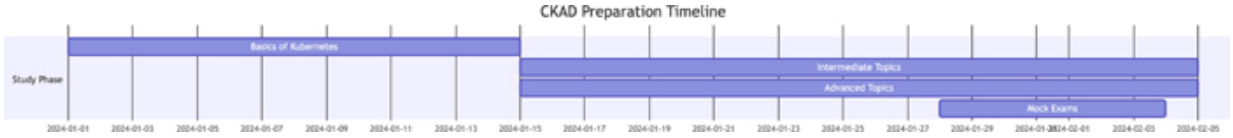

Figure 1.7: *Sample CKAD Preparation Timeline*

- **Week 1-2**: Learn the basics of Kubernetes, set up a practice environment, and go through key concepts such as Pods, Deployments, Services, and Storage.
- **Week 3-4**: Dive into more advanced topics such as multi-container pod patterns, Helm, Kustomize, and security contexts. Practice creating and troubleshooting workloads.
- **Week 5**: Take mock exams, review your performance, and work on areas where you need improvement. Focus on time management and documentation navigation.

Thus, by the end of this preparation strategy, you should feel comfortable with both the Kubernetes concepts and the exam format.

Mock Tests and Practice Exercises

There are limited quality CKAD exam practice tests available, but fortunately, they are sufficient for honing skills. Even better is the online Kubernetes environment provided by **Killercoda**, which allows users to experiment with practice tests and explore different Kubernetes objects.

- The official Kubernetes documentation at https://kubernetes.io/docs/tutorials is an excellent resource, offering comprehensive information. It is highly recommended to start from there.
- If additional guidance is needed, here is a direct link to a basic practice tutorial: https://kubernetes.io/docs/tutorials/kubernetes-basics/deploy-app/deploy-intro/.
- **KillerCoda CKAD practice test**:
- **CKAD exercises on GitHub**:
    - https://github.com/dgkanatsios/CKAD-exercises#contents
    - https://github.com/HiteshRepo/Kubernetes-101

Conclusion

In this chapter, we gained a comprehensive understanding of the Certified Kubernetes Application Developer (CKAD) certification, including what it entails, why it is valuable, and how to prepare for the exam. As Kubernetes continues to grow in popularity, becoming certified provides a significant advantage, showcasing your ability to design, build, and deploy cloud-native applications in this powerful platform. We also explored the exam's structure, key skill areas, and practical guidelines for success.

With the right preparation and practice, the CKAD certification will not only validate your expertise but also enhance your credibility in the competitive job market. Remember, this is a hands-on exam that tests your ability to work in real-world

Kubernetes environments, so focus on practical knowledge and efficient use of Kubernetes documentation.

In the next chapter, we will explore Container Image Management, covering how to define, build, and optimize images, best practices for security, and how Kubernetes integrates images into deployments—a foundational skill for Kubernetes application development.

Multiple Choice Questions

1. What is the CKAD certification designed for?
    a. System administrators
    b. Kubernetes cluster operators
    c. Kubernetes application developers
    d. Network administrators
2. Which organization developed the CKAD certification in collaboration with CNCF?
    a. Microsoft
    b. The Linux Foundation
    c. Red Hat
    d. AWS
3. What is the expected duration of the CKAD exam?
    a. 1 hour
    b. 2 hours
    c. 3 hours
    d. 4 hours
4. The CKAD exam focuses on:
    a. Memorizing Kubernetes commands
    b. Multiple-choice questions
    c. Performance-based tasks with hands-on skills
    d. Writing Kubernetes documentation
5. What percentage of the CKAD exam curriculum is dedicated to Application Design and Build?
    a. 10%

b. 20%

c. 25%

d. 30%

6. Which of the following is NOT part of the CKAD exam domains?

    a. Application Deployment

    b. Services and Networking

    c. Troubleshooting Kubernetes Clusters

    d. Application Observability and Maintenance

7. Which tool is commonly used to package Kubernetes applications as mentioned in the CKAD curriculum?

    a. Docker Compose

    b. Kustomize

    c. Terraform

    d. Ansible

8. Which Kubernetes concept is used for controlling network traffic between pods as covered in the CKAD exam?

    a. Ingress

    b. NetworkPolicies

    c. ServiceAccount

    d. ConfigMap

9. How many tasks can candidates expect to complete during the CKAD exam?

    a. 10-15

    b. 15-20

    c. 20-25

    d. 25-30

10. During the CKAD exam, candidates can refer to which of the following resources?

    a. Kubernetes official documentation

    b. Any internet resource

    c. Personal notes

    d. External Kubernetes tutorials

Answers

1. c
2. b
3. b
4. c
5. b
6. c
7. b
8. b
9. b
10. a