Distributed Systems

1 Kubernetes

1. Explain the ”Works on My Machine” problem. Using the details from the presentation, describe how different software versions and operating systems can cause an application to fail in various environments and why this leads to deployment issues.
2. Describe the fundamental difference between how Virtual Machines (VMs) and Containers achieve virtualization. In your answer, compare their performance characteristics, including speed, weight, and resource efficiency.
3. Define what a Dockerfile, an Image, and a Container are. Explain the relationship between them, describing how one leads to the next in the process of running an application.
4. The presentation explains that once you have a container, you face the problem of scale. Describe the four specific challenges mentioned on slide 7 that arise when you need to manage many containers, and briefly explain what is meant by Scaling, Self-Healing, Rolling Updates, and Service Discovery.
5. Explain the core idea of ”Desired State Management” in Kubernetes, as detailed on slide 9. How does a user declare the desired state, and what is Kubernetes’s continuous job in response? Use the example of a crashing container to illustrate how Kubernetes maintains this state.
6. The Kubernetes architecture is composed of a Control Plane (”The Brain”) and Worker Nodes (”The Muscle”). Describe the primary role of each of these components. List and explain the function of two components from the Control Plane and two components from a Worker Node as detailed on slide 11.
7. According to slide 14, what is a Kubernetes Namespace used for? Explain at least two benefits of using namespaces in a multi-team or multi-environment cluster.
8. Slide 23 presents a structural hierarchy it calls ”The Container Chain”. List this chain of objects in order, from the largest element (Cluster) down to the smallest (Container). Briefly describe how each object in the chain logically contains or manages the next.
9. What is the difference between Kubernetes and Docker and how are they used together?

What to Submit

Your answers.

Contributors

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