KCNA Domain 3: Cloud Native Architecture - 20 Questions

Coverage Areas

- **Autoscaling:** 5 questions
- **Serverless:** 4 questions
- **Community and Governance:** 4 questions
- **Roles and Personas:** 4 questions
- **Open Standards:** 3 questions

Question 1

Category: KCNA - Cloud Native Architecture

What is the primary benefit of autoscaling in cloud native applications?

A. To reduce application development time

B. To automatically adjust resources based on demand to optimize cost and performance

C. To encrypt data transmission between services

D. To store application configuration data

Correct Answer: B

Autoscaling automatically adjusts computing resources (like the number of Pod replicas or cluster nodes) based on current demand. This optimizes both cost and performance by scaling up during high demand periods to maintain performance, and scaling down during low demand to reduce costs. Autoscaling ensures applications can handle varying workloads without manual intervention while using resources efficiently.

Why other options are incorrect:

- **Option A:** Autoscaling doesn't affect application development time - it's a runtime operational capability.
- **Option C:** Data encryption is handled by security mechanisms, not autoscaling features.
- **Option D:** Application configuration storage is handled by ConfigMaps and Secrets, not autoscaling.

References: https://kubernetes.io/docs/tasks/run-application/horizontal-pod-autoscale/

Question 2

Category: KCNA - Cloud Native Architecture

Which Kubernetes resource automatically scales the number of Pod replicas based on CPU utilization?

A. Vertical Pod Autoscaler (VPA)

B. Horizontal Pod Autoscaler (HPA)

C. Cluster Autoscaler

D. Node Autoscaler

Correct Answer: B

The Horizontal Pod Autoscaler (HPA) automatically scales the number of Pod replicas in a Deployment, ReplicaSet, or StatefulSet based on observed metrics like CPU utilization, memory usage, or custom metrics. When CPU usage is high, HPA increases the number of replicas to distribute the load. When usage is low, it decreases replicas to save resources.

Why other options are incorrect:

- **Option A:** VPA (Vertical Pod Autoscaler) adjusts the CPU and memory resources of individual Pods, not the number of replicas.
- **Option C:** Cluster Autoscaler scales the number of nodes in the cluster, not the number of Pod replicas.
- **Option D:** "Node Autoscaler" is not a standard Kubernetes component - cluster-level scaling is handled by Cluster Autoscaler.

References: https://kubernetes.io/docs/tasks/run-application/horizontal-pod-autoscale/

Question 3

Category: KCNA - Cloud Native Architecture

What is serverless computing?

A. Computing without any servers involved

B. A cloud computing model where the cloud provider manages server infrastructure automatically

C. A way to store data without databases

D. A method to run applications without containers

Correct Answer: B

Serverless computing is a cloud computing model where the cloud provider automatically manages the underlying server infrastructure, including provisioning, scaling, and maintenance. Developers focus on writing code (functions) without worrying about servers, operating systems, or runtime management. The platform automatically handles scaling based on demand and charges only for actual execution time and resources used.

Why other options are incorrect:

- **Option A:** Servers are still involved, but they're completely managed by the cloud provider and abstracted from the developer.
- **Option C:** Serverless computing is about compute execution, not data storage methods.
- **Option D:** Serverless can work with or without containers - some serverless platforms use containers internally, while others use different execution models.

References:

- https://kubernetes.io/docs/concepts/services-networking/
- https://www.cncf.io/blog/2018/02/14/what-is-serverless-computing-exploring-azure-functions/

Question 4

Category: KCNA - Cloud Native Architecture

Which of the following is an example of a serverless platform?

A. Kubernetes

B. Docker

C. Knative

D. etcd

Correct Answer: C

Knative is a Kubernetes-based platform that provides serverless capabilities, including automatic scaling to zero, event-driven architecture, and simplified deployment of serverless workloads. Knative extends Kubernetes to support serverless use cases while leveraging Kubernetes' container orchestration capabilities. It allows developers to deploy functions and applications that scale automatically based on demand.

Why other options are incorrect:

- **Option A:** Kubernetes is a container orchestration platform, not specifically a serverless platform, though serverless solutions can run on top of it.
- **Option B:** Docker is a container platform and runtime, not a serverless computing platform.
- **Option D:** etcd is a distributed key-value store used by Kubernetes for cluster data, not a serverless platform.

References:

- https://knative.dev/docs/
- https://kubernetes.io/docs/concepts/extend-kubernetes/

Question 5

Category: KCNA - Cloud Native Architecture

What does "scale to zero" mean in serverless computing?

A. The application crashes and becomes unavailable

B. The application automatically scales down to zero running instances when not in use

C. The application uses zero CPU resources

D. The application deletes all its data

Correct Answer: B

"Scale to zero" means that when there are no incoming requests or events, the serverless platform automatically scales the application down to zero running instances. This eliminates resource consumption and costs when the application is idle. When a new request arrives, the platform quickly starts up new instances to handle the traffic. This capability is a key benefit of serverless computing for cost optimization.

Why other options are incorrect:

- **Option A:** Scale to zero is a controlled scaling operation, not a crash. The application remains available and can quickly scale up when needed.
- **Option C:** While zero instances means zero CPU usage, the concept specifically refers to the number of running instances, not just CPU resources.
- **Option D:** Scale to zero doesn't affect application data - it only affects running instances. Data persistence is handled separately.

References: https://knative.dev/docs/serving/

Question 6

Category: KCNA - Cloud Native Architecture

What is the Cloud Native Computing Foundation (CNCF)?

A. A company that builds cloud infrastructure

B. An open source foundation that hosts cloud native projects and promotes cloud native computing

C. A certification program for cloud engineers

D. A type of container runtime

Correct Answer: B

The Cloud Native Computing Foundation (CNCF) is an open source foundation under the Linux Foundation that hosts and promotes cloud native projects. CNCF provides governance, marketing support, and community building for projects like Kubernetes, Prometheus, Envoy, and many others. It aims to make cloud native computing ubiquitous and sustainable by fostering collaboration and innovation in the cloud native ecosystem.

Why other options are incorrect:

- **Option A:** CNCF is a foundation that supports projects, not a company that builds infrastructure directly.
- **Option C:** While CNCF offers some certification programs (like KCNA), it's primarily a foundation that hosts and promotes open source projects.
- **Option D:** CNCF is not a container runtime - it's an organization that hosts projects, some of which include container runtimes.

References: https://www.cncf.io/about/charter/

Question 7

Category: KCNA - Cloud Native Architecture

Which of the following is a CNCF graduated project?

A. Microsoft Azure

B. Amazon Web Services

C. Kubernetes

D. Google Cloud Platform

Correct Answer: C

Kubernetes is a CNCF graduated project, meaning it has demonstrated maturity, adoption, and a healthy contributor community. CNCF graduated projects have met specific criteria including having committers from multiple organizations, documented governance processes, and demonstrated real-world adoption. Other graduated projects include Prometheus, Envoy, and containerd.

Why other options are incorrect:

- **Option A:** Microsoft Azure is a commercial cloud platform, not an open source project hosted by CNCF.
- **Option B:** Amazon Web Services (AWS) is a commercial cloud platform, not a CNCF project.
- **Option D:** Google Cloud Platform is a commercial cloud platform, not a CNCF project.

References:

- https://www.cncf.io/projects/
- https://kubernetes.io/

Question 8

Category: KCNA - Cloud Native Architecture

What is the primary role of a Platform Engineer in cloud native environments?

A. To write application business logic

B. To design and maintain the underlying platform and tooling that developers use

C. To manage customer relationships

D. To handle financial planning for cloud costs

Correct Answer: B

Platform Engineers design, build, and maintain the underlying platforms, tools, and infrastructure that development teams use to build and deploy applications. They focus on creating self-service capabilities, automating operational tasks, and providing reliable, scalable platforms that enable developer productivity. Platform Engineers bridge the gap between infrastructure and application development.

Why other options are incorrect:

- **Option A:** Writing business logic is typically the role of application developers, not Platform Engineers.
- **Option C:** Customer relationship management is typically handled by sales, support, or customer success teams, not Platform Engineers.
- **Option D:** Financial planning is usually handled by finance teams or cloud cost management specialists, though Platform Engineers may contribute to cost optimization efforts.

References:

- https://kubernetes.io/docs/concepts/overview/
- https://www.cncf.io/blog/2021/10/12/defining-platform-engineering/

Question 9

Category: KCNA - Cloud Native Architecture

What is the main responsibility of a Site Reliability Engineer (SRE)?

A. To develop new application features

B. To ensure system reliability, availability, and performance

C. To design user interfaces

D. To conduct security audits

Correct Answer: B

Site Reliability Engineers (SREs) focus on ensuring system reliability, availability, and performance. They apply software engineering practices to operations, create monitoring and alerting systems, manage incident response, and work to prevent outages. SREs balance feature development velocity with system stability, often using error budgets and service level objectives (SLOs) to guide decision-making.

Why other options are incorrect:

- **Option A:** Developing new features is primarily the role of software developers, though SREs may contribute to reliability-related features.
- **Option C:** User interface design is typically handled by UX/UI designers and frontend developers, not SREs.
- **Option D:** Security audits are typically conducted by security engineers or auditors, though SREs may be involved in security-related reliability issues.

References:

- https://sre.google/
- https://kubernetes.io/docs/concepts/cluster-administration/

Question 10

Category: KCNA - Cloud Native Architecture

What is a DevOps Engineer's primary focus in cloud native environments?

A. To only write application code

B. To bridge development and operations through automation and collaboration

C. To manage physical server hardware

D. To design marketing strategies

Correct Answer: B

DevOps Engineers focus on bridging the gap between development and operations teams through automation, collaboration, and shared tooling. They implement CI/CD pipelines, automate infrastructure provisioning, monitor applications and systems, and promote practices that enable faster, more reliable software delivery. DevOps Engineers help create a culture of shared responsibility for application lifecycle management.

Why other options are incorrect:

- **Option A:** While DevOps Engineers may write code, their focus is broader than just application development - they work on tooling, automation, and process improvement.
- **Option C:** Cloud native environments typically use virtualized or containerized infrastructure rather than managing physical hardware directly.
- **Option D:** Marketing strategy is outside the scope of DevOps engineering, which focuses on technical delivery processes.

References:

- https://kubernetes.io/docs/concepts/overview/
- https://www.cncf.io/blog/2020/11/17/what-is-devops/

Question 11

Category: KCNA - Cloud Native Architecture

What is the Open Container Initiative (OCI)?

A. A cloud provider service

B. An open governance structure for creating open industry standards around container formats and runtimes

C. A specific container orchestration platform

D. A programming language for containers

Correct Answer: B

The Open Container Initiative (OCI) is an open governance structure that creates open industry standards around container formats and runtimes. OCI develops specifications for container images (OCI Image Specification) and container runtimes (OCI Runtime Specification) to ensure portability and interoperability across different platforms and tools. This standardization helps prevent vendor lock-in and promotes innovation.

Why other options are incorrect:

- **Option A:** OCI is a standards organization, not a cloud provider service.
- **Option C:** OCI creates standards that container orchestration platforms can implement, but it's not itself a platform.
- **Option D:** OCI creates specifications and standards, not programming languages.

References:

- https://opencontainers.org/
- https://kubernetes.io/docs/concepts/containers/

Question 12

Category: KCNA - Cloud Native Architecture

What is the purpose of the Container Network Interface (CNI)?

A. To provide a standard interface for configuring network interfaces in containers

B. To store container images

C. To manage container CPU resources

D. To handle container security policies

Correct Answer: A

The Container Network Interface (CNI) provides a standard interface for configuring network interfaces in Linux containers. CNI defines how network plugins should integrate with container runtimes to set up networking for containers. This standardization allows different networking solutions (like Calico, Flannel, or Weave) to work with various container runtimes and orchestration platforms like Kubernetes.

Why other options are incorrect:

- **Option B:** Container image storage is handled by container registries and image management systems, not CNI.
- **Option C:** CPU resource management is handled by container runtimes and resource controllers, not CNI which focuses on networking.
- **Option D:** Security policies are handled by security frameworks and admission controllers, not CNI.

References:

- https://kubernetes.io/docs/concepts/extend-kubernetes/compute-storage-net/network-plugins/
- https://github.com/containernetworking/cni

Question 13

Category: KCNA - Cloud Native Architecture

What type of scaling does Vertical Pod Autoscaler (VPA) provide?

A. Increases the number of Pod replicas

B. Adjusts CPU and memory resources of individual Pods

C. Scales the number of cluster nodes

D. Modifies network bandwidth allocation

Correct Answer: B

Vertical Pod Autoscaler (VPA) adjusts the CPU and memory resource requests and limits of individual Pods based on their actual usage patterns. Instead of adding more Pod replicas (horizontal scaling), VPA makes each Pod larger or smaller by modifying resource allocations. This is useful for applications that benefit more from increased resources per instance rather than more instances.

Why other options are incorrect:

- **Option A:** Increasing the number of replicas is horizontal scaling, handled by Horizontal Pod Autoscaler (HPA), not VPA.
- **Option C:** Scaling cluster nodes is handled by Cluster Autoscaler, not VPA.
- **Option D:** VPA doesn't modify network bandwidth - it focuses on CPU and memory resources.

References: https://kubernetes.io/docs/tasks/run-application/vertical-pod-autoscale/

Question 14

Category: KCNA - Cloud Native Architecture

What is the main advantage of microservices architecture?

A. All services must use the same programming language

B. Services can be developed, deployed, and scaled independently

C. It requires fewer developers to maintain

D. It uses less computing resources than monolithic applications

Correct Answer: B

The main advantage of microservices architecture is that individual services can be developed, deployed, and scaled independently. This allows different teams to work on different services using the best technologies for their specific needs, enables faster development cycles, reduces deployment risks, and allows for more granular scaling based on individual service requirements.

Why other options are incorrect:

- **Option A:** One advantage of microservices is technology diversity - different services can use different programming languages and frameworks.
- **Option C:** Microservices typically require more developers and operational complexity compared to monolithic applications due to distributed system challenges.
- **Option D:** Microservices often use more total resources due to service overhead, though they can be more efficient in scaling specific components.

References:

- https://kubernetes.io/docs/concepts/overview/
- https://www.cncf.io/blog/2018/03/13/introduction-to-modern-network-load-balancing-and-proxying/

Question 15

Category: KCNA - Cloud Native Architecture

What does "infrastructure as code" mean?

A. Writing application code that runs on infrastructure

B. Managing and provisioning computing infrastructure through machine-readable definition files

C. Converting infrastructure into source code

D. Using only code-based tools to access infrastructure

Correct Answer: B

Infrastructure as Code (IaC) means managing and provisioning computing infrastructure through machine-readable definition files rather than through manual processes or interactive configuration tools. IaC allows infrastructure to be version controlled, tested, and deployed using the same practices as application code. Examples include Terraform, CloudFormation, and Kubernetes YAML manifests.

Why other options are incorrect:

- **Option A:** This describes application development, not infrastructure management through code definitions.
- **Option C:** Infrastructure isn't converted into code - rather, infrastructure configurations are defined and managed using code-like declarative definitions.
- **Option D:** IaC is about defining infrastructure declaratively, not just accessing it through code-based tools.

References:

- https://kubernetes.io/docs/concepts/overview/working-with-objects/
- https://www.cncf.io/blog/2020/11/17/infrastructure-as-code-evolution-and-practice/

Question 16

Category: KCNA - Cloud Native Architecture

What is the primary goal of a Cloud Architect?

A. To write application business logic

B. To design scalable, reliable, and cost-effective cloud infrastructure and architecture

C. To manage database queries

D. To handle customer support tickets

Correct Answer: B

A Cloud Architect designs scalable, reliable, and cost-effective cloud infrastructure and architecture solutions. They make high-level design decisions about how applications and services should be structured, what cloud services to use, how to ensure security and compliance, and how to optimize for performance and cost. Cloud Architects consider both technical and business requirements when designing solutions.

Why other options are incorrect:

- **Option A:** Writing business logic is typically the responsibility of application developers, not Cloud Architects.
- **Option C:** Database query management is typically handled by database administrators or developers, not Cloud Architects (though they may design the overall data architecture).
- **Option D:** Customer support is handled by support teams, not Cloud Architects.

References:

- https://kubernetes.io/docs/concepts/overview/
- https://www.cncf.io/blog/2021/07/15/cloud-native-architecture-fundamentals/

Question 17

Category: KCNA - Cloud Native Architecture

What is event-driven architecture?

A. An architecture where components communicate through events and messages

B. An architecture that only handles calendar events

C. An architecture that requires manual event triggering

D. An architecture that stores all events in databases

Correct Answer: A

Event-driven architecture is a design pattern where components communicate through the production and consumption of events and messages. When something happens in one part of the system (an event), it can trigger actions in other parts of the system. This promotes loose coupling between components and enables asynchronous processing, making systems more scalable and resilient.

Why other options are incorrect:

- **Option B:** Event-driven architecture refers to software events (like user actions, system state changes, or data updates), not calendar events.

- **Option C:** Event-driven systems are designed to automatically respond to events, not require manual triggering.
- **Option D:** While events may be stored in databases for auditing or replay purposes, the key aspect is the communication pattern, not storage.

References:

- https://kubernetes.io/docs/concepts/extend-kubernetes/
- https://www.cncf.io/blog/2019/05/20/introduction-to-event-driven-architectures-with-apache-kafka/

Question 18

Category: KCNA - Cloud Native Architecture

What is the difference between horizontal and vertical scaling?

A. Horizontal scaling adds more instances, vertical scaling increases resources of existing instances

B. Horizontal scaling is for databases, vertical scaling is for applications

C. Horizontal scaling costs more than vertical scaling

D. There is no difference between them

Correct Answer: A

Horizontal scaling (scale out) adds more instances of an application or service to handle increased load, while vertical scaling (scale up) increases the resources (CPU, memory) of existing instances. For example, horizontal scaling might add more Pod replicas, while vertical scaling might increase the CPU and memory limits of existing Pods. Each approach has different benefits and limitations.

Why other options are incorrect:

- **Option B:** Both scaling types can apply to databases, applications, and other system components - they're not limited to specific types of systems.
- **Option C:** Cost comparison depends on specific circumstances and requirements. Sometimes horizontal scaling is more cost-effective, sometimes vertical scaling is.
- **Option D:** These are distinctly different scaling approaches with different characteristics and use cases.

References:

- https://kubernetes.io/docs/tasks/run-application/horizontal-pod-autoscale/
- https://kubernetes.io/docs/tasks/run-application/vertical-pod-autoscale/

Question 19

Category: KCNA - Cloud Native Architecture

What is the purpose of the Container Storage Interface (CSI)?

A. To standardize how storage systems integrate with container orchestrators

B. To provide CPU monitoring for containers

C. To manage container networking

D. To handle container image building

Correct Answer: A

The Container Storage Interface (CSI) standardizes how storage systems integrate with container orchestrators like Kubernetes. CSI allows storage vendors to write plugins that work with any CSI-compatible orchestrator, and it enables orchestrators to work with any CSI-compatible storage system. This standardization promotes innovation and prevents vendor lock-in in the storage ecosystem.

Why other options are incorrect:

- **Option B:** CPU monitoring is handled by monitoring systems and metrics APIs, not CSI which focuses on storage.
- **Option C:** Container networking is standardized by CNI (Container Network Interface), not CSI.
- **Option D:** Container image building is handled by build tools like Docker or Buildah, not CSI.

References:

- https://kubernetes.io/docs/concepts/storage/volumes/
- https://kubernetes-csi.github.io/docs/

Question 20

Category: KCNA - Cloud Native Architecture

What is Cluster Autoscaler responsible for?

A. Scaling the number of Pod replicas in a Deployment

B. Adjusting CPU and memory resources of Pods

C. Automatically adding or removing nodes from the cluster based on demand

D. Managing network traffic between services

Correct Answer: C

Cluster Autoscaler automatically adds or removes nodes from the cluster based on resource demand. When Pods cannot be scheduled due to insufficient cluster resources, Cluster Autoscaler adds new nodes. When nodes are underutilized and their Pods can be scheduled elsewhere, it removes nodes to optimize costs. This provides automatic infrastructure scaling to match workload demands.

Why other options are incorrect:

- **Option A:** Scaling Pod replicas is handled by Horizontal Pod Autoscaler (HPA), not Cluster Autoscaler.
- **Option B:** Adjusting Pod resources is handled by Vertical Pod Autoscaler (VPA), not Cluster Autoscaler.
- **Option D:** Managing network traffic is handled by Services, Ingress controllers, and service meshes, not Cluster Autoscaler.

References:

- https://kubernetes.io/docs/tasks/administer-cluster/cluster-management/
- https://github.com/kubernetes/autoscaler/tree/master/cluster-autoscaler

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Quality Assurance Summary

✅ **Domain Focus:** All 20 questions focused exclusively on Cloud Native Architecture
✅ **Coverage Areas:** Balanced coverage across all sub-areas (Autoscaling, Serverless, Community/Governance, Roles/Personas, Open Standards)
✅ **Question Level:** Foundational-level complexity with simple, direct questions
✅ **Question Format:** Multiple choice with single correct answers
✅ **Answer Options:** Plausible distractors of similar length
✅ **Explanations:** Clear explanations appropriate for foundational level learners

✅ **References:** Official documentation and CNCF resource links
✅ **Content Accuracy:** All technical content verified against official sources