DE53 - Final exam 2025P

Duration: 1h30m

Model A

Note 1: Documents and electronic devices are not authorized.
Note 2: Given points are for information only.
Note 3: Indicate your model in the answer sheet (A or B).

Exercise 1 [5 points]: Choose <u>one single</u> answer per question.

A. Your organization plans to migrate its financial transaction monitoring application to Google Cloud. Auditors need to view the data and run reports in BigQuery, but they are not allowed to perform transactions in the application. You are leading the migration and want the simplest solution that will require the least amount of maintenance. What should you do?

1. Assign roles/bigquery.dataViewer to the individual auditors.
2. Create a group for auditors and assign roles/viewer to them.
3. Create a group for auditors, and assign roles/bigquery.dataViewer to them.
4. Assign a custom role to each auditor that allows view-only access to BigQuery.

B. You are managing your company's first Google Cloud project. Project leads, developers, and internal testers will participate in the project, which includes sensitive information. You need to ensure that only specific members of the development team have access to sensitive information. You want to assign the appropriate Identity and Access Management (IAM) roles that also require the least amount of maintenance. What should you do?

1. Assign a basic role to each user.
2. Create groups. Assign a basic role to each group, and then assign users to groups.
3. Create groups. Assign a Custom role to each group, including those who should have access to sensitive data. Assign users to groups.
4. Create groups. Assign an IAM Predefined role to each group as required, including those who should have access to sensitive data. Assign users to groups.

C. Which `gcloud` command deploys a Cloud Function named `hello-world` from a local directory, using Python 3.10 and an HTTP trigger?

1. `gcloud functions deploy hello-world --runtime python310 --trigger-http`
2. `gcloud functions deploy hello-world --language python310 --trigger-http`
3. `gcloud functions deploy hello-world --runtime python3.10 --trigger-http`
4. `gcloud functions deploy hello-world --runtime python --trigger-http`

D. Your application needs to process a significant rate of transactions. The rate of transactions exceeds the processing capabilities of a single virtual machine (VM). You want to spread transactions across multiple servers in real time and in the most cost-effective manner. What should you do?

1. Send transactions to BigQuery. On the VMs, poll for transactions that do not have Othe 'processed' key, and mark them 'processed when done.
2. Set up Cloud SQL with a mernory cache for speed. On your multiple servers, poll for transactions that do not have the 'processed' key, and mark them 'processed' when done.
3. Send transactions to Pub/Sub. Process them in VMs in a managed instance group.
4. Record transactions in Cloud Bigtable, and poll for new transactions from the VMs.

E. Which `gcloud` command creates a Compute Engine VM instance named `my-instance` in the `us-central1-a` zone?

1. `gcloud compute create instance my-instance --zone=us-central1-a`
2. `gcloud compute instances create my-instance --region=us-central1`
3. `gcloud compute instances create my-instance --zone=us-central1-a`
4. `gcloud instances create my-instance --zone=us-central1-a`

Exercise 2 [8 points]: Choose between (True/False) for the following statements. Leave it empty if not sure because the wrong answers are noted negatively (you lose points for this exercise).

A. Cluster computing is often used for parallel processing where low-latency communication is required while Grid computing focuses more on resource sharing and coordination than on high-speed interconnects.

B. Under-provisioning: To minimize the cost paid to the cloud provider, the Application Service Provider (ASP) does not rent enough resources. Consequently, the service provided to the service user is degraded. Leads to client-churn and penalties paid.

C. Elasticity management is an ASP-centric problem. It concerns finding an optimal tradeoff between the satisfaction of the ASP customers and the ASP business goals.

D. The Quality of Experience (QoE) is a provider-centric quality metric that expresses supplier profit.

E. Mashups: are applications built by free assembly in the manner of "lego" using the APIs of other services to integrate them and create a new service.

F. Cluster computing always involves geographically distant nodes.

G. In cloud computing a Service Level Objective (SLO) is composed of a set of Service Level Agreements (SLAs).

H. Grid computing allows sharing of geographically distributed resources over a network. It connects resources from multiple locations to solve large-scale computational problems.

I. Rich Internet Applications, is based on a runtime/executing environment built into the web browser.

Exercise 3 [7 points]:

PART A: Architecture Explanation

You are deploying a containerized application to a Google Kubernetes Engine (GKE) cluster. The application includes a frontend, backend API, and MongoDB database.

1. Explain the role of **three** Kubernetes components (e.g., API Server, etcd, kube-scheduler, kube-controller-manager, kube-proxy, CNI).
2. Describe how Kubernetes ensures Service discovery, Load balancing, and Persistent storage [2–3 sentences].

PART B: Architecture Diagram

Draw a labeled diagram showing:

1. Kubernetes control plane components (API Server, etcd, Scheduler, Controller Manager).
2. Worker nodes hosting Pods and Services.
3. Communication flow.

PART C: Google Cloud Integration

1. Short Answer [2–3 sentences]:

Describe the workflow for deploying a containerized application from source code to a GKE cluster. Mention two GCP services used in the process.

2. Diagram Interpretation [Simple diagram or 1–2 sentences]:

Describe how these components (GKE Cluster, Source Code, Artifact Registry, Cloud Build) interact during deployment.

End of exam