## 1. Welcome to Preparing for the Professional Cloud Architect Exam

* Establish basic knowledge about the certification exam and eliminate any confusion or misunderstandings about the process and nature of the exam itself.
* Understanding the Certification 6 minutes - https://youtu.be/B9ekY1lTB9E
* Module 1
  + The recommended test-taking strategy is:
    - Bookmark those questions for which you don't know the answer or don't feel confident in your answer, and return to them iteratively.
  + The Certification Exam is:
    - Practical, based on the skills required of the job.
  + This course helps you prepare using:
    - Sample questions, case studies, and top-down concepts that require knowledge of many dependent concepts.

## 2. Sample Case Studies

* In-depth review of the Case Studies provided for exam preparation
* Sample case studies for the Professional Cloud Architect exam 1 minute - https://youtu.be/\_vjmgwdAKFI
* Case Study Analysis Template (PDF)
* EHR Healthcare case study
* EHR Healthcare 3 minutes - https://youtu.be/TPEyHKl09bY
  + Table

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* EHR Healthcare sample solution 4 minutes - https://youtu.be/NA98a7lEaaM
* Helicopter Racing League case study
* Helicopter Racing League 2 minutes - https://youtu.be/wxs68YxV6wQ
* Helicopter Racing League sample solution 3 minutes - <https://youtu.be/em8dkZv_6-s>
  + Table

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* Mountkirk Games Case Study
* Mountkirk Games 4 minutes - https://youtu.be/Z3GGyX05xwo
* Mountkirk Games sample solution 1 minute - <https://youtu.be/XcZSx_0q8Rs>
  + Graphical user interface, text, application

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* TerramEarth Case Study
* TerramEarth 4 minutes - https://youtu.be/bijNpNjd8IQ
* TerramEarth Solution 1 minute - <https://youtu.be/L2qlHC_bcjY>
  + Graphical user interface

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* Exam Tips #2
* Preparing with Case Studies Quiz
  + The recommended case analysis method taught in this course is:
    - 1.Identify the requirements
    - 2.Technical Watchpoints (items that imply parts of the solution)
    - 3.Propose solution
  + The case study solution provided is:
    - Just an example. Your solution might be better.
  + Why are case studies important preparation?
    - Because you practice skills needed to identify solutions from circumstances -- skills needed on the exam and on the job.

## 3. Designing and Implementing

* This module covers designing and implementing infrastructure solutions.
* Exam Tips #3
* Designing and Implementing 2 minutes - https://youtu.be/IbthO\_6OBDU
* Designing a solution infrastructure that meets business requirements 3 minutes - https://youtu.be/vlJjb9S9V-M
* Case Study 1 2 minutes - https://youtu.be/YG0UnkXQ\_80
* Case Study 1
* Designing a solution infrastructure that meets technical requirements 6 minutes - https://youtu.be/x8uzK3K3YrY
* Designing Network, Storage, and Compute Resources 1 minute - https://youtu.be/iIyumziGz3U
* Creating a Migration Plan 2 minutes - https://youtu.be/VQ3IHnyCzMc
* Practice Exam Questions 1 1 minute - https://youtu.be/edYncSv\_9Fw
* Managing and provisioning solution infrastructure 2 minutes - https://youtu.be/swu3IFAOCjY
* Case Study 2 1 minute - https://youtu.be/wgjv5PDI69M
* Case Study 2 -
* Configuring individual Storage Systems 4 minutes - https://youtu.be/edt88zH9KRc
* Data transfer 1 minute - https://youtu.be/rDoIOkFNoOI
* Cloud Storage 1 minute - https://youtu.be/0NzJAjQZ9fA
* More details about Cloud Storage
* Cloud Bigtable
* Data processing to Machine Learning 1 minute - https://youtu.be/PeYr0XovMHo
* Cloud AI
* Configuring Compute Systems 4 minutes - https://youtu.be/oCmmzf\_JSog
* Microservices, Containers, Data Processing, and IoT 4 minutes - https://youtu.be/gL4ApUtN0rc
* Cloud Functions
* Containers and Google Kubernetes Engine
* Experiment: Containers and GKE Video (Like/Dislike)? 6 minutes - https://youtu.be/aC86\_sG4QBg
* BigQuery
* Practice Exam Questions 2 2 minutes - https://youtu.be/Juv9E8CzAxs
* PCA Prep - Google Cloud Essential Skills: Challenge Lab 45 minutes - https://www.cloudskillsboost.google/focuses/42799658/reviews?parent=course\_session
* Exam Tips #4
* Preparing for Design Quiz
  + Why is knowledge of a layered model a recommended preparation?
    - Because it helps organize information and prevent confusion.
  + Which Cloud Storage type is best for data accessed on average once or less during a 30 to 90 day period?
    - Nearline
  + When you prepare using tables that compare different technologies...
    - Read from the table-up. So that if you see a keyword in a question, you will recognize which associated technology in the heading row is a candidate for the solution.

## 4. Optimizing and Operating

* This module covers the sections of the exam outline on optimizing and operating.
* Case Study 3 3 minutes - https://youtu.be/4jZhbiOMMj8
* Case Study 3
* Designing for Security 2 minutes - <https://youtu.be/nx0XctD0vmI>
  + https://storage.googleapis.com/cloud-training/
* Network and Security
* Designing for Legal Compliance 4 minutes - https://youtu.be/5110Wrj4V0s
* Practice Exam Questions 3 1 minute - https://youtu.be/WqzVj3eKTu0
* Case Study 4 3 minutes - https://youtu.be/ByEyEOXHmCA
* Case Study 4
* Analyzing and defining technical processes 4 minutes - https://youtu.be/lif-utd8o-U
* Network and performance
* Analyzing and defining business processes 4 minutes - https://youtu.be/idBjW82q0d4
* Developing procedures to test resilience 2 minutes - https://youtu.be/KA5aYZI9KAQ
* Practice Exam Questions 4 2 minutes - https://youtu.be/OXtaEq3ZmrM
* Case Study 5 3 minutes - https://youtu.be/mBxvFjBBOw4
* Case Study 5
* Advising development operation teams 3 minutes - https://youtu.be/d8dbY2T70Do
* Practice Exam Questions 5 2 minutes - https://youtu.be/jP3Cmtsnsoo
* Ensuring solution and operations reliability 7 minutes - https://youtu.be/fsoQCC\_dWuU
* Infrastructure Automation and Workflow Orchestration
* Monitoring, Alerting, and Uptime
* Case Study 6 1 minute - https://youtu.be/w1Xmc513TxM
* Case Study 6
* Practice Exam Questions 6 1 minute - https://youtu.be/NYCk63wz2RQ
* PCA Prep - Update and Scale Out a Containerized Application on a Kubernetes Cluster 1 hour 3 minutes
  + Topics tested
    - Update a docker application and push a new version to a container repository.
    - Deploy the updated application version to a Kubernetes cluster.
    - Scale out the application so that it is running 2 replicas.
  + Challenge scenario
    - You are taking over ownership of a test environment and have been given an updated version of a containerized test application to deploy. Your systems' architecture team has started adopting a containerized micro-service architecture. You are responsible for managing the containerized test web applications. You will first deploy the initial version of a test application, called echo-app to a Kubernetes cluster called echo-cluster in a deployment called echo-web.
    - Before you get started, open the Navigation menu and select Cloud Storage.
    - Check to make sure your GKE cluster has been created before continuing.
    - To deploy your first version of the application:
      * gcloud container clusters get-credentials echo-cluster --zone=us-central1-a
      * kubectl create deployment echo-web --image=gcr.io/qwiklabs-resources/echo-app:v1
      * kubectl expose deployment echo-web --type=LoadBalancer --port 80 --target-port 8000
  + Your challenge
    - You need to update the running echo-app application in the echo-web deployment from the v1 to the v2 code you have been provided with. You must also scale out the application to 2 instances and confirm that they are all running.
    - Build and deploy the updated application with a new tag
      * The updated sample application, including the Dockerfile and the application context files, are contained in an archive called echo-web-v2.tar.gz. The archive has been copied to a Google Cloud storage bucket in your lab project called gs://[PROJECT\_ID]. V2 of the application adds a version number to the output of the application.
    - Push the image to the Google Container Registry
      * Your organization uses the Google Container Registry to host Docker images for deployments, and uses the gcr.io Google Container Registry hostname for all projects. You must push the updated image to the Google Container Registry before deploying it.
      * gcloud builds submit --tag gcr.io/${GOOGLE\_CLOUD\_PROJECT}/echo-app:v2 .
* PCA Prep - Deploy a Compute Instance with a Remote Startup Script 1 hour 4 minutes
  + Topics tested
    - Create a storage bucket for startup scripts.
    - Create a virtual machine that runs a startup script from cloud storage.
    - Configure HTTP access for the virtual machine.
    - Deploy an application on an instance.
  + Challenge scenario
    - You have been given the responsibility of managing the configuration of your organization's Google Cloud virtual machines. You have decided to make some changes to the framework used for managing the deployment and configuration machines - you want to make it easier to modify the startup scripts used to initialize a number of the compute instances. Instead of storing startup scripts directly in the instances metadata, you have decided to store the scripts in a Cloud Storage bucket and then configure the virtual machines to point to the relevant script file in the bucket.
    - A basic bash script that installs the Apache web server software called install-web.sh has been provided for you as a sample startup script. You can download this from the Student Resources links on the left side of the page.
  + Your challenge
    - Configure a Linux Google Compute Engine instance that installs the Apache web server software using a remote startup script. In order to confirm that Apache has successfully installed, the Compute Engine instance must be accessible via HTTP from the internet.
    - Note: In order to ensure accurate activity tracking you should not modify or change any of the pre-created lab resources, in particular the lab-monitor Compute Engine instance.
    - Tips and Tricks
      * Note: In cloud storage to enable the edit premission option disable the public access prevention.
      * Configure Instance Metadata. The Running Startup Scripts documentation page explains how Compute Engine instance metadata can be used to configure startup scripts.
      * Check if your Compute Engine instance is executing the startup script. Use the Serial Console for the running virtual machine to look at the startup events to make sure that the startup script is being executed.
      * Check permissions. Your Compute Engine instance might not have the correct permissions required to read the startup-script from the storage bucket. The virtual machine needs to be given permissions that align with the storage permissions.
      * Check firewalls. If the startup script has installed the software you may be unable to connect if a firewall has not been correctly configured.
      * Check the URL and address. You will be unable to connect to the Apache web server if you are trying to access the Compute Engine instance using an https address rather than http or you are using the incorrect IP address. Check that your URL is http://[EXTERNAL\_IP] rather than https://[EXTERNAL\_IP] or <http://[INTERNAL_IP>]
    - Under Metadata, specify the following:
      * Key Value
      * startup-script-url gs://mak-03-09-2022/resources-install-web.sh
* Exam Tips #5
* Preparing for Optimizing and Operating Quiz
  + What was the key point made about resilient failover design?
    - If the load changes, the capacity has to be revisited, or the ability of the design to handle a failover could be lost.
  + Customer Supplied Encryption Keys (CSEK) is for which purpose:
    - Keep keys on premises, and use them to encrypt your cloud services.
  + What is the feature that bridges monitoring and incident response in the Site Reliability Engineering model?
    - Alerts
  + What service was recommended as a way to model solution resources and generate a general cost estimation?
    - Pricing calculator

## 5. Resources and next steps

* Resources and next steps 1 minute - <https://youtu.be/heo9rRqNVfY>
  + Graphical user interface, text, application, email

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* Instructions for GRADED and UNGRADED Practice Exam Quizzes
* Ungraded Practice Exam Quiz
  + How to store data to be accessed once a month and not needed after five years.
    - Nearline class, lifecycle policy to delete after 5 years.
    - correct because the access pattern is Nearline. "Not needed" means delete, not archive.
  + How will the application parts developed by separate project teams communicate over RFC1918 addresses?
    - Shared VPC, each project a service of the Shared VPC project
    - This is correct. Each team has their own project but communicates securely over a single RFC1918 address space.
  + A company’s security team has decided to standardize on AES256 for storage device encryption. Which strategy should be used with Compute Engine instances?
    - Select SSDs rather than HDDs to ensure AES256 encryption.
    - This is correct. Selection of disk type determines the default method for whole-disk encryption. HDDs use AES128 and SDDs use AES256.
  + Which Cloud IAM roles would you assign for security auditors requiring visibility across all projects?
    - Org viewer, project viewer
    - This is correct. This gives read-only access across the company.
  + Which service should be used in the icon with the question mark in the diagram to keep VM file data in sync across regions?
    - Diagram

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    - Cloud Storage
    - This is correct. Cloud Storage Standard Storage buckets stay in sync between regions automatically. The other services listed are in a single region.
  + Simply and reliably clone a Linux VM to another project in another region.
    - Snapshot the root disk, create an image, and use the image for the new VM root disk.
    - This is correct. It will work across project and region, and it is a simple and reliable method.
  + What security strategy would you recommend for PII (Personally Identifiable Information) data on Cloud Storage?
    - No Cloud IAM roles to users, and granular ACLs on bucket.
    - This is correct because it provides the most restrictive access among the options.
  + A sales company runs weekly resiliency tests of the current build in a separate environment by replaying the last holiday sales load. What can improve resiliency?
    - Develop a script that mimics a zone outage and add it to the test.
    - This is correct. The goal is resiliency -- to see that the application continues to run and "bounces back" after the outage is over. Simulating a zone outage is one way to ensure that the application can really handle the loss of a zone.
  + How can you minimize the cost of storing security video files that are processed repeatedly for 30 days?
    - Standard Storage, then move to Coldline Storage or Archive Storage after 30 days.
    - This is correct. Standard Storage for lowest access costs over the 30 days, then Coldline Storage or Archive Storage because it is unlikely to be read after the 30 days.
  + You need to implement back-out/rollback for a website with 100s of VMs. The site has frequent critical updates. Which of the following is the correct solution?
    - Use managed instance groups with the “update-instances” command when starting a rolling update.
    - This is correct. Allows Compute Engine to handle updates. Easy management of VMs.
  + Which platform features of Google Cloud support TerramEarth's business requirements?
    - Vertex AI and BigQuery are designed for petabyte scale.
    - This is correct. TerramEarth already has 200TB+ of data and is in a growth phase. Therefore they must be concerned that the solution will be supportable as they "undergo the next wave of transformations in our industry". Also, TerramEarth seeks a competitive advantage through "incremental innovations" which can come from data insights using BigQuery and Vertex AI.
  + A company is building an image tagging pipeline. Which service should be used in the icon with the question mark in the diagram?
    - Diagram

      Description automatically generated
    - Pub/Sub
    - This is correct. Cloud Storage upload events can push Pub/Sub to trigger a Cloud Function to ingest and process the image.
  + How do you automatically and simultaneously deploy new code to each cluster?
    - Diagram

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    - Use an automation tool, such as Jenkins.
    - This is correct. Jenkins handles automation and simultaneous deployment.
  + A company has this business requirement: "Improve security by defining and adhering to a set of security and Identity and Access Management (IAM) best practices for cloud." Company security has locked out SSH access to production VMs. How can operations manage the VMs?
    - Grant operations team access to use Cloud Shell.
    - Correct. The operations team doesn't actually need SSH access to manage VMs. All it needs is Cloud Shell with the Cloud SDK and gcloud tools. Cloud Shell provides all the tools for managing Compute Engine instances. In this case the assumption that SSH access is needed is incorrect.
  + A microservice has intermittent problems that bursts logs. How can you trap it for live debugging?
    - Set a log metric in Cloud Logging, alert on it past a threshold.
    - This is correct. A Cloud Logging metric can identify a burst of log lines. You can set an alert. Then connect to the machine while the problem is happening.
  + How can MountKirk Games meet its scaling requirements while providing insights to investors?
    - Use Cloud Monitoring custom metrics for autoscaling and reporting.
    - This is correct. Cloud Monitoring custom metrics can be crafted to expose specific game activities, which can be useful for autoscaling and provide a more detailed source of indicators for the targeted marketing investors require. Cloud Operations is a fully managed service.
  + An existing application uses websockets. To help migrate the application to cloud you should:
    - Do nothing to the application. HTTP(S) load balancing natively supports websocket proxying.
    - This is correct because HTTP(S) Load Balancing has native support for the WebSocket protocol. Backends that use WebSocket to communicate with clients can use the HTTP(S) load balancer as a front end, for scale and availability. The load balancer does not need any additional configuration to proxy WebSocket connections.
  + A company wants penetration security testing that primarily matches an end user perspective. What action would you take?
    - Use on prem scanners over public Internet.
    - This is correct. On prem scanners will approach from outside, and over the public internet is where the users are.
  + Which service completes the CI/CD pipeline? Which service should be used in the icon with the question mark in the diagram?
    - Diagram

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    - Cloud Build
    - This is correct because Cloud Build builds docker images from source repositories.
  + A company has a new IoT pipeline. Which services will make this design work? Select the services that should be used to replace the icons with the number "1" and number "2" in the diagram.
    - Diagram

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    - Cloud IoT Core, Pub/Sub
    - This is correct because device data captured by Cloud IoT Core gets published to Pub/Sub
  + Last week a region had a 1% failure rate in web tier VMs? How should you respond?
    - Perform a root cause analysis, reviewing cloud provider and deployment details to prevent similar future failures.
    - This is correct. Perform root cause analysis, because you don't know from the information given whether the issue had to do with the Cloud Provider or was in the application or something to do with the interface between the application and cloud resources. The goal of identifying the root cause is to prevent future failures, that might include changing procedures.
  + A car reservation system has long-running transactions. Which one of the following deployment methods should be avoided?
    - Introduce a blue-green deployment model.
    - This is correct. Switching the load balancer from pointing at the green "good" environment to the blue "new" environment is a fast way to rollback if there is a problem during release. However, long-running transactions will be disrupted by that switch.
  + How to test a risky update to an App Engine application requiring live traffic?
    - Deploy a new version, use traffic splitting to test a percentage.
    - That is correct. Deploying a new version, but not as default, is easily reversed. Traffic splitting enables testing with some live traffic, meeting the requirement.
  + Multi-petabyte database for analysts that only know SQL and must be available 24 x 7.
    - BigQuery
    - correct because BigQuery SLA is 99.9%, meeting the uptime requirement, and it has an SQL interface.
  + Release failures keep causing rollbacks in a web application. Fixes to the QA process reduced rollbacks by 80%. What additional steps can you take?
    - Fragment the monolithic platform into microservices.
    - This is correct. Smaller functional units means smaller releases with less "surface area" for problems to occur. More incremental rollouts. Fewer rollbacks.
* Resources 2 minutes - https://youtu.be/rifNxb0v7mo
* Review of Exam Tips
* Course Summary Quiz Prep for the Exam with Answers