Google Cloud

Professional Cloud Architect

Certification exam guide

A Google Cloud Certified Professional Cloud Architect is able to leverage Google Cloud technologies to design, develop, and manage robust, secure, scalable, efficient, cost-effective, highly available, and flexible solutions that drive business objectives. The Professional Cloud Architect should be proficient in enterprise cloud strategy, solution design, workload migration approaches, deployment and orchestration, optimization, and architectural best practices. This individual is also experienced with common open-source technologies and software development methodologies for designing multi-tiered distributed applications across legacy, multi-cloud, or hybrid environments.

Familiarity with the Google Cloud Well-Architected Framework is a key requirement for this role. The Well-Architected Framework provides guidance and best practices on how to design, build, and operate reliable, secure, efficient, and cost-optimized workloads in Google Cloud. For a Professional Cloud Architect, understanding and applying the principles of the framework is paramount to designing and managing successful cloud solutions. The framework's pillars (operational excellence, security, reliability, performance optimization, cost optimization, and sustainability) are implicitly and explicitly woven throughout the exam objectives and should be a guiding principle in architectural decisions.

Case studies

During the Professional Cloud Architect exam, some of the questions may refer you to a case study that describes a fictitious business and solution concept. Several of the businesses are using Google Cloud's generative AI solutions to solve real-world challenges. These case studies are intended to provide additional context to help you choose your answers. Review the case studies that may be used in the exam.

Altostrat Media Case Study
Cymbal Retail Case Study
EHR Healthcare Case Study
KnightMotives Automotive Case Study

Section 1: Designing and planning a cloud solution architecture (~25% of the exam)

1.1 Designing a solution infrastructure that meets business requirements. Considerations include:

- Business use cases and product strategy
- Identifying functional and non-functional requirements
- Business continuity plan
- Cost optimization
- Supporting the application design
- Integration patterns with external systems
- Movement of data
- Design decision trade-offs
- Workload disposition strategies (e.g., build, buy, modify, or deprecate)
- Success measurements (e.g., key performance indicators [KPI], return on investment [ROI], metrics)
- Security and compliance
- Observability

1.2 Designing a solution infrastructure that meets technical requirements. Considerations include:

- Familiarity with the Google Cloud Well-Architected Framework (WAF)
- High availability and fail-over design
- Flexibility of cloud resources
- Scalability to meet growth requirements
- Performance and latency
- Gemini Cloud Assist
- Backup and recovery

1.3 Designing network, storage, and compute resources. Considerations include:

- Integration with on-premises / multicloud environments
- Google Cloud machine learning and artificial intelligence (ML/AI) solutions (e.g., Gemini LLMs, Agent Builder, Model Garden, Gemini models, AI Hypercomputer)
- Cloud-native networking (e.g., VPC, peering, firewalls, load balancers, routing, container networking, shared VPC, Private Service Connect)
- Choosing data processing solutions
- Choosing appropriate storage types (e.g., object, file, databases)

- Mapping compute needs to platform products (e.g., Google Kubernetes Engine [GKE], Cloud Run, Cloud Run functions)
- Choosing compute resources (e.g., spot VMs, custom machine types, specialized workload)

1.4 Creating a migration plan (i.e., documents and architectural diagrams). Considerations include:

- Integrating solutions with existing systems
- Assessing and migrating systems and data to support the solution (e.g., Migration Center)
- Using migration methodologies, workload testing, network planning, and dependency planning
- Determining software license implications and financial impact

1.5 Envisioning future solution improvements. Considerations include:

- Cloud and technology improvements
- Evolution of business needs
- Cloud-first design approach

Section 2: Managing and provisioning a solution infrastructure (~18% of the exam)

2.1 Configuring network topologies. Considerations include:

- Extending to on-premises environments (hybrid networking)
- Extending to a multi-cloud environment that may include Google Cloud to Google Cloud communication
- Security protection (e.g. intrusion protection, access control, firewalls)
- Virtual Private Cloud (VPC) design and load balancing (e.g., access to cloud, internet, and cloud adjacent services)

2.2 Configuring individual storage systems. Considerations include:

- Data storage allocation
- Data processing and compute provisioning
- Security and access management
- Configuration for data transfer and latency
- Data retention and data life cycle management

- Data growth planning
- Data protection (e.g., backup, recovery)

2.3 Configuring compute systems. Considerations include:

- Compute resource provisioning
- Compute volatility configuration (spot vs. standard)
- Cloud-native network configuration for compute resources (e.g., Compute Engine, GKE, serverless networking, Google Cloud VMware Engine)
- Infrastructure orchestration, resource configuration, and patch management
- Container orchestration
- Serverless computing

2.4 Leveraging Vertex AI for end-to-end ML workflows. Considerations include:

- Using Vertex AI Pipelines to automate and orchestrate the ML lifecycle
- Preparing for Vertex AI data integration
- Using AI Hypercomputer (e.g., using AI Hypercomputer, Cloud Run functions, and Vertex AI for ML/AI workloads; integrating GPUs and TPUs in ML model training and serving; optimizing for different consumption models, and running large scale AI model trainings)

2.5 Configuring pre-built solutions or APIs with Vertex AI. Considerations include:

- Differentiating between the Google AI APIs (e.g., Search, Conversation, Vision, Image, Video, and Audio)
- Differentiating between Google Agentspace and NotebookLM
- Integrating AI models from Model Garden into the solution

Section 3: Designing for security and compliance (~19% of the exam)

3.1 Designing for security. Considerations include:

- Identity and access management (IAM)
- Resource hierarchy (organizations, folders, projects)
- Data security (key management, encryption, secret management)
- Separation of duties (SoD)
- Security controls (e.g., auditing, VPC Service Controls, context aware access, organization policy, hierarchical firewall policy)

- Managing customer-managed encryption keys with Cloud Key Management Service (Cloud KMS)
- Secure remote access (e.g., Identity-Aware Proxy, service account impersonation, Chrome Enterprise Premium, Workload Identity Federation)
- Securing software supply chain
- Securing AI (e.g., Model Armor, Sensitive Data Protection, secure model deployment)

3.2 Designing for compliance. Considerations include:

- Legislation and regulation (e.g., health record privacy, children's privacy, data privacy, ownership, data sovereignty)
- Commercial (e.g., sensitive data such as credit card information handling, personally identifiable information [PII])
- Industry certifications (e.g., SOC 2)
- Audits (including logs)

Section 4: Analyzing and optimizing technical and business processes (~15% of the exam)

4.1 Analyzing and defining technical processes. Considerations include:

- Software development life cycle (SDLC)
- Continuous integration / continuous deployment
- Troubleshooting / root cause analysis best practices
- Testing and validation of software and infrastructure
- Service catalog and provisioning
- Disaster recovery

4.2 Analyzing and defining business processes. Considerations include:

- Stakeholder management (e.g., influencing and facilitation)
- Change management
- Team assessment / skills readiness
- Decision-making processes
- Customer success management
- Cost optimization / resource optimization (CapEx / OpEx)
- Business continuity

4.3 Developing procedures to ensure reliability of solutions in production (e.g., chaos engineering, penetration testing)

Section 5: Managing implementation (~11% of the exam)

5.1 Advising development and operation teams to ensure successful deployment of the solution. Considerations include:

- Application and infrastructure deployment
- API management best practices (e.g., Apigee)
- Testing frameworks (load / unit / integration)
- Data and system migration and management tooling
- Gemini Cloud Assist

5.2 Interacting with Google Cloud programmatically. Considerations include:

- Cloud Shell Editor, Cloud Code, and Cloud Shell Terminal
- Google Cloud SDKs (e.g., gcloud, gsutil and bq)
- Cloud Emulators (e.g., Bigtable, Spanner, Pub/Sub, Firestore)
- Infrastructure as code (e.g., IaC, Terraform)
- Accessing Google API best practices
- Google API client libraries

Section 6: Ensuring solution and operations excellence (~12% of the exam)

6.1 Understanding the principles and recommendations of the operational excellence pillar of the Google Cloud Well-Architected Framework

6.2 Familiarity with Observability solutions. Considerations include:

- Monitoring and logging
- Profiling and benchmarking
- Alerting strategies

6.3 Deployment and release management

6.4 Assisting with the support of deployed solutions

6.5 Evaluating quality control measures

6.6 Ensuring reliability of solutions in production (e.g., chaos engineering, penetration and load testing)