Google Cloud

Professional Cloud Architect

Certification exam guide

A 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 multitiered distributed applications across legacy, multicloud, 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 following 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 cloud 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], and metrics)
- Security and compliance
- Observability

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

- Familiarity with the Google Cloud Well-Architected Framework
- 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 AI and machine learning solutions (e.g., Gemini LLMs, Agent Builder, Model Garden, Gemini models, and AI Hypercomputer)
- Cloud-native networking (e.g., virtual private cloud [VPC], peering, firewalls, load balancers, routing, container networking, shared VPC, and Private Service Connect)
- Choosing data processing solutions
- Choosing appropriate storage types (e.g., object, file, and databases)

- Mapping compute needs to platform products (e.g., Google Kubernetes Engine [GKE], Cloud Run, and Cloud Run functions)
- Choosing compute resources (e.g., spot VMs, custom machine types, and 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., Google Cloud 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 cloud solution infrastructure (~17.5% of the exam)

2.1 Configuring network topologies. Considerations include:

- Extending to on-premises environments (hybrid networking)
- Extending to a multicloud environment that may include Google Cloud-to-Google Cloud communication
- Security protection (e.g. intrusion protection, access control, and firewalls)
- 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 lifecycle management
- Data growth planning
- Data protection (e.g., backup and 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, and 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 prebuilt solutions or APIs with Vertex AI. Considerations include:

- Differentiating between the Google AI APIs (e.g., Search, Conversation, Vision, Image, Video, and Audio)
- Integrating Gemini Enterprise features (AI Agents and NotebookLM) to enhance workflows
- Integrating AI models from Model Garden into the solution

Section 3: Designing for security and compliance (~17.5% of the exam)

3.1 Designing for security. Considerations include:

- Identity and Access Management (IAM)
- Resource hierarchy (organizations, folders, and projects)
- Data security (key management, encryption, secret management)
- Separation of duties
- Security controls (e.g., auditing, VPC Service Controls, context aware access, organization policy, and 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, and Workload Identity Federation)
- Securing software supply chain
- Securing AI (e.g., Model Armor, Sensitive Data Protection, and secure model deployment)

3.2 Designing for compliance. Considerations include:

- Legislation and regulation (e.g., health record privacy, children's privacy, data privacy, ownership, and data sovereignty)
- Commercial (e.g., sensitive data such as credit card information handling and 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 lifecycle (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

Section 5: Managing implementation (~12.5% of the exam)

5.1 Advising development and operation teams to ensure the 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, and Firestore)
- Infrastructure as Code (e.g., IaC and Terraform)
- Accessing Google API best practices
- Google API client libraries

Section 6: Ensuring solution and operations excellence (~12.5% 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 Google Cloud 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 the reliability of solutions in production (e.g., chaos engineering, penetration testing, and load testing)