Architecting with Google Cloud Platform: Design and Process

Module 1: Defining the Service

- Describe users in terms of roles and personas
- Write qualitative requirements with user stories
- Write quantitative requirements using key performance indicators (KPIs)
- Evaluate KPIs using SLOs and SLIs
- Determine the quality of application requirements using SMART criteria

Module 2: Microservice Design and Architecture

- Decompose monolithic applications into microservices
- Recognize appropriate microservice boundaries
- Architect stateful and stateless services to optimize scalability and reliability
- Implement services using 12-factor best practices
- Build loosely coupled services by implementing a well-designed REST architecture
- Design consistent, standard RESTful service APIs

Module 3: DevOps Automation

- Automate service deployment using CI/CD pipelines
- Leverage Cloud Source Repositories for source and version control
- Automate builds with Cloud Build and build triggers
- Manage container images with Google Container Registry
- Create infrastructure with code using Deployment Manager and Terraform

Module 4: Choosing Storage Solutions

- Choose the appropriate Google Cloud data storage service based on use case, durability, availability, scalability and cost
- Store binary data with Cloud Storage
- Store relational data using Cloud SQL and Spanner
- Store NoSQL data using Firestore and Cloud Bigtable
- Cache data for fast access using Memorystore
- Build a data warehouse using BigQuery

Module 5: Google Cloud and Hybrid Network Architecture

- Design VPC networks to optimize for cost, security, and performance
- Configure global and regional load balancers to provide access to services
- Leverage Cloud CDN to provide lower latency and decrease network egress
- Evaluate network architecture using the Cloud Network Intelligence Center
- Connect networks using peering and VPNs
- Create hybrid networks between Google Cloud and on-premises data centers using Cloud Interconnect

Module 6: Deploying Applications to Google Cloud

- Choose the appropriate Google Cloud deployment service for your applications
- Configure scalable, resilient infrastructure using Instance Templates and Groups
- Orchestrate microservice deployments using Kubernetes and GKE
- Leverage App Engine for a completely automated platform as a service (PaaS)
- Create serverless applications using Cloud Functions

Module 7: Designing Reliable Systems

- Design services to meet requirements for availability, durability,and scalability
- Implement fault-tolerant systems by avoiding single points of failure, correlated failures, and cascading failures
- Avoid overload failures with the circuit breaker and truncated exponential backoff design patterns
- Design resilient data storage with lazy deletion
- Analyze disaster scenarios and plan for disaster recovery using cost/risk analysis

Module 8: Security

- Design secure systems using best practices like separation of concerns, principle of least privilege, and regular audits
- Leverage Cloud Security Command Center to help identify vulnerabilities
- Simplify cloud governance using organizational policies and folders
- Secure people using IAM roles, Identity-Aware Proxy, and Identity Platform
- Manage the access and authorization of resources by machines and processes using service accounts
- Secure networks with private IPs, firewalls, and Private Google Access
- Mitigate DDoS attacks by leveraging Cloud DNS and Cloud Armor

Module 9: Maintenance and Monitoring

- Manage new service versions using rolling updates, blue/green deployments, and canary releases
- Forecast, monitor, and optimize service cost using the Google Cloud pricing calculator and billing reports and by analyzing billing data
- Observe whether your services are meeting their SLOs using Cloud Monitoring and Dashboards
- Use Uptime Checks to determine service availability
- Respond to service outages using Cloud Monitoring Alerts