

DCC

GOOGLE CLOUD HANDBOOK

By:

41- Kanika- 1032221936 || 42- Chetana – 1032221956 || 43-Saylee -1032221968

44- Ananya-1032221993 || 49- Manasi Mali-1032222216 || 50- Suhani Choudary-1032222231



Google Cloud Platform (GCP) is a suite of cloud computing services provided by Google. It offers infrastructure, platform, and software services to help businesses, developers, and organizations build, deploy, and manage applications efficiently. GCP provides services across various domains, including computing, storage, networking, AI/ML, security, and DevOps.

Index

1. Introduction to Google Cloud
2. Core Google Cloud Services
3. Compute Services
4. Storage Services
5. Networking Services
6. Security and Compliance
7. AI and Machine Learning
8. DevOps and Monitoring
9. Pricing and Cost Management
10. Conclusion

1. Introduction to Google Cloud

Google Cloud Platform (GCP) is a comprehensive cloud computing suite launched by Google. It provides a range of infrastructure, platform, and software services that help businesses, developers, and organizations efficiently build, deploy, and manage applications on a highly scalable and secure cloud environment.

Key Benefits and Features:

Scalability & Performance

- GCP allows businesses to dynamically scale computing resources up or down based on demand.
- Uses Google's global network backbone for low-latency, high-performance computing.
- Offers Autoscaling features in services like Compute Engine and Kubernetes Engine.

Cost-Effective Pricing

-
- Pay-as-you-go pricing model ensures businesses pay only for what they use.
 - Sustained use discounts and committed use contracts provide cost savings.
 - Preemptible VMs offer significantly lower costs for short-lived workloads.

Global Infrastructure

- Google Cloud operates in over 35 regions and 100+ availability zones worldwide.
- Uses Google's high-speed fiber-optic network, reducing latency and downtime.
- Supports edge computing to process data closer to users.

Security & Compliance

- Provides multi-layered security with encryption at rest and in transit.
- Identity and Access Management (IAM) for fine-grained access control.
- Compliance with industry standards such as GDPR, HIPAA, ISO 27001, PCI DSS.
- DDoS protection via Cloud Armor and global load balancing.

Hybrid & Multi-Cloud Support

- Anthos allows seamless hybrid cloud and multi-cloud deployments across GCP, AWS, and Azure.
- Google Kubernetes Engine (GKE) simplifies containerized application management.
- Cloud VPN and Cloud Interconnect provide secure hybrid cloud connectivity.

Artificial Intelligence & Big Data

- Vertex AI for machine learning model training and deployment.
- BigQuery for real-time data analytics and SQL-based querying of large datasets.
- Pre-trained AI APIs (Vision AI, Speech-to-Text, Translation AI, etc.).

Sustainability & Energy Efficiency

- Google Cloud runs on 100% renewable energy, making it the greenest cloud provider.
- Uses carbon-neutral infrastructure and energy-efficient data centers.

2. Core Google Cloud Services

Google Cloud Platform (GCP) services are categorized into different cloud computing models to provide flexible solutions for various business needs. These models define how much control businesses have over infrastructure, applications, and development environments.

1. Infrastructure as a Service (IaaS)

Provides virtualized computing resources over the internet, allowing businesses to manage their own infrastructure without physical hardware.

Key GCP IaaS Services:

- **Compute Engine** – Scalable virtual machines for running applications.
- **Cloud Storage** – Object storage for backups, media, and large datasets.
- **Persistent Disk & Filestore** – High-performance block and file storage solutions.
- **Cloud Load Balancing** – Distributes network traffic for reliability and performance.
- **Cloud Networking (VPC, VPN, Interconnect)** – Secure and scalable networking options.

Use Cases:

- Hosting applications, websites, and databases.
- Running virtual desktops and enterprise applications.
- Disaster recovery and backup solutions.

2. Platform as a Service (PaaS)

Provides a fully managed platform for application development, deployment, and management, removing the need to manage underlying infrastructure.

Key GCP PaaS Services:

- **App Engine** – Fully managed platform for building and deploying web applications.
- **Cloud Run** – Serverless execution of containerized applications.
- **Cloud Functions** – Event-driven computing service for automation and microservices.
- **BigQuery** – Serverless data warehouse for analytics and business intelligence.
- **Firebase** – Backend-as-a-service (BaaS) for mobile and web app development.

Use Cases:

- Rapid development and deployment of web and mobile applications.
- Data processing and analytics without managing infrastructure.
- Automating backend services and real-time application management.

3. Software as a Service (SaaS)

Provides **ready-to-use software applications** over the internet without requiring installation, updates, or maintenance. GCP manages everything from infrastructure to security.

Key GCP SaaS Services:

- **Google Workspace (Gmail, Drive, Docs, Meet, etc.)** – Cloud-based productivity tools.
- **Cloud Identity** – Identity and access management for enterprises.
- **Looker** – Business intelligence and data analytics platform.
- **Google Maps Platform** – Location-based services for applications.

Use Cases:

- Enterprise collaboration and cloud-based office productivity tools.
- Location-based services for mobile and web applications.
- Business intelligence and advanced analytics.

4. Function as a Service (FaaS) / Serverless Computing

Allows developers to run code in response to events without managing servers, making applications more efficient and cost-effective.

Key GCP FaaS Services:

- **Cloud Functions** – Serverless execution of event-driven code.
- **Cloud Run** – Serverless execution of containerized applications.
- **Eventarc** – Enables event-driven architectures across cloud services.

Use Cases:

- Automating workflows such as real-time data processing.
- Building IoT applications that process events in real-time.

-
- Creating chatbots, notifications, and AI-powered automation.

Why GCP's Service Models Stand Out?

- Hybrid & Multi-Cloud Support – Seamless integration with AWS, Azure, and on-premise systems via Anthos.
- Security & Compliance – Industry-leading security with encryption, IAM, and DDoS protection.
- AI & ML Integration – GCP integrates AI-powered tools into cloud services.
- Cost Optimization – Flexible pricing models with sustained-use discounts and serverless billing.

3. Compute Services

Google Cloud provides various computing solutions tailored for different workload needs.

- **Compute Engine:**
 - Offers customizable Virtual Machines (VMs) with different OS support.
 - Provides auto-scaling and load balancing for optimized performance.
- **Google Kubernetes Engine (GKE):**
 - A fully managed Kubernetes platform for containerized applications.
 - Automates scaling, security, and workload distribution.
- **Cloud Functions:**
 - Serverless execution of small code functions in response to events.
 - Supports multiple programming languages.
- **App Engine:**
 - A managed PaaS for developing and deploying web applications.
 - Automatically scales applications based on traffic demand.

4. Storage Services

GCP provides scalable and reliable storage solutions.

- **Cloud Storage:**
 - Object storage solution with multiple redundancy options.

-
- Supports different storage classes: Standard, Nearline, Coldline, and Archive.
 - **Persistent Disk:**
 - High-performance block storage for Compute Engine VMs.
 - Provides SSD and HDD options with configurable IOPS.
 - **Filestore:**
 - Managed file storage service supporting NFS-based file shares.
 - Suitable for high-performance workloads.
 - **BigQuery:**
 - Serverless data warehouse for fast analytics on large datasets.
 - Uses SQL-like queries to process terabytes of data quickly.

5. Networking Services

Google Cloud ensures high-speed, secure, and reliable networking solutions.

- **Virtual Private Cloud (VPC):**
 - Allows creation of isolated network environments.
 - Supports subnets, VPN, and firewall management.
- **Cloud Load Balancing:**
 - Distributes traffic across multiple instances for high availability.
 - Supports global and regional load balancing.
- **Cloud CDN:**
 - Caches content at edge locations to improve performance and reduce latency.
 - Ideal for web applications and media delivery.
- **Cloud Interconnect:**
 - Provides private, high-bandwidth connections to GCP data centers.
 - Ensures low-latency and secure communication.

6. Security and Compliance

Google Cloud offers robust security features to protect applications and data.

- **Cloud IAM (Identity and Access Management):**

-
- Manages permissions and user authentication.
 - Supports role-based access control (RBAC) and multi-factor authentication (MFA).
 - **Security Command Center:**
 - Provides real-time security insights and threat detection.
 - Identifies misconfigurations and vulnerabilities.
 - **Cloud Key Management Service (KMS):**
 - Manages cryptographic keys for encryption and decryption.
 - Integrates with HSM for enhanced security.
 - **Chronicle Security Operations:**
 - AI-driven security analytics for detecting cyber threats.
 - Helps in forensic investigations and incident response.

7. AI and Machine Learning

Google Cloud provides industry-leading AI/ML solutions for enterprises.

- **Vertex AI:**

End-to-end AI platform for model training, deployment, and monitoring.

 - Supports TensorFlow, PyTorch, and AutoML.
- **Cloud AI APIs:**
 - Pre-trained AI models for vision, speech, natural language processing, and translation.
Examples: Vision AI, Speech-to-Text, and Translate API.
- **BigQuery ML:**
 - Allows machine learning modeling using SQL queries.
 - Eliminates the need for complex data science workflows.

8. DevOps and Monitoring

Google Cloud supports continuous integration, deployment, and monitoring solutions.

- **Cloud Build:**
 - Serverless CI/CD platform for automating builds and deployments.
 - Supports containerized and non-containerized applications.

-
- **Cloud Monitoring:**
 - Collects metrics, logs, and traces from applications and infrastructure.
 - Provides real-time alerts and performance insights.
 - **Cloud Logging:**
 - Centralized logging for monitoring and debugging.
 - Integrates with Cloud SIEM for security analysis.

9. Pricing and Cost Management

Google Cloud provides transparent and cost-effective pricing options.

- **Pricing Calculator:**
 - Helps estimate costs based on service usage.
 - Assists in budget planning.
- **Sustained Use Discounts:**
 - Provides automatic discounts for long-running workloads.
 - Reduces costs without requiring upfront commitments.
- **Committed Use Contracts:**
 - Offers significant discounts for 1-3 year commitments.
 - Ideal for predictable workloads.
- **Billing and Cost Management Tools:**
 - Provides insights into cloud spending.
 - Recommends cost-saving strategies.

10. Conclusion

Google Cloud is a robust and versatile cloud computing platform that empowers businesses with cutting-edge technologies. With AI-driven solutions, a global network, enterprise-grade security, and a cost-effective pricing model, GCP provides a solid foundation for businesses looking to modernize their IT infrastructure and accelerate cloud transformation.

Key Takeaways:

- **Comprehensive Cloud Services** – Offers a full suite of compute, storage, networking, AI, ML, security, DevOps, and database services to cater to diverse business needs.

-
- Scalability & Performance – Elastic infrastructure automatically scales based on workloads, ensuring high availability and optimal performance.
 - Cost-Effective & Flexible Pricing – Pay-as-you-go model, committed use discounts, and sustained use savings help businesses optimize costs.
 - Global Network & Low Latency – Operates one of the largest private cloud networks, with data centers in multiple regions for enhanced performance and reduced latency.
 - Advanced AI & Machine Learning – Provides pre-trained AI models and custom ML solutions, making AI integration seamless for businesses.
 - Enterprise-Grade Security & Compliance – Industry-leading security measures, including zero-trust architecture, encryption, and IAM policies, with compliance across GDPR, HIPAA, ISO 27001, and more.
 - Hybrid & Multi-Cloud Capabilities – Anthos and Kubernetes-based solutions enable seamless integration with AWS, Azure, and on-premises infrastructure.
 - Continuous Innovation & Future-Ready – Regular updates, AI-powered advancements, and serverless computing solutions make GCP a future-proof cloud choice.

Why Choose Google Cloud?

GCP's security, scalability, and AI-driven capabilities make it an excellent choice for enterprises, startups, and developers looking to modernize applications, enhance analytics, and improve operational efficiency. As businesses increasingly move towards cloud-first strategies, Google Cloud stands out as a leader in innovation, performance, and cost optimization.