Preparing for the Associate Cloud Engineer (ACE) Exam: Planning and configuring a cloud solution

1. **Section 2.1 - Planning and estimating using the Pricing Calculator**
2. Section 2.2 - Planning and configuring Compute resources
3. Section 2.3 - Planning and configuring data storage options
4. Section 2.4 - Planning and configuring network resources

Exam Guide: Section 2.1

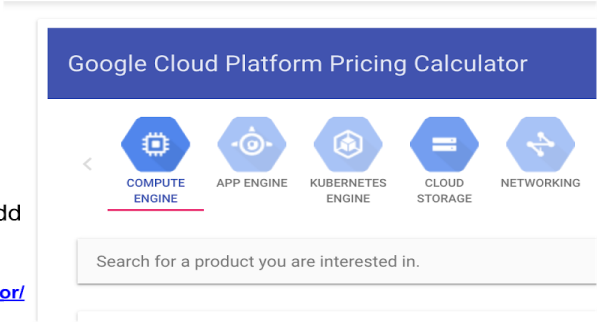
2.1 Planning and estimating GCP product use using the Pricing Calculator.

One of the first stages in setting up a new project is budgeting.
Because there can be quite a number of variables that go into pricing a particular Cloud product, having a way to pull all of that information together into a unified report - without having to actually configure that product first - is very helpful.
This is where Google's Pricing Calculator comes into play.

GCP Pricing Calculator

- Select a product from the scrolling list at the top of the form
- The variables for that product will then be shown in the form below
- Fill out the form with your target configuration
- Submit each section filled out to add it to your overall estimate

https://cloud.google.com/products/calculator/



https://cloud.google.com/products/calculator/

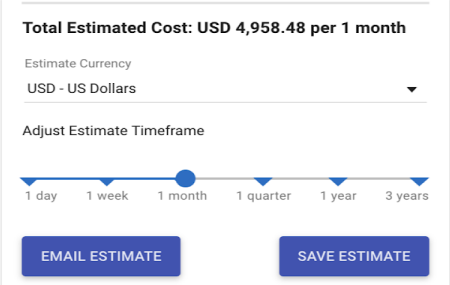
The pricing calculator is a multi-section form.
Once you have some possible configurations in mind, you can use it to estimate costs for the

different products you will be using,

GCP Pricing Calculator

The Pricing Calculator gives you a total estimated cost that you can view in daily, weekly, monthly, quarterly, yearly and 3-year increments.

This cost is only an estimate, however. Total costs may differ depending on how closely your estimated usage matches your actual usage. The estimate is also not a binding contract, it is just a planning tool.



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Exam Guide: Section 2.2

2.2 Planning and configuring compute resources. Considerations include:

- Selecting appropriate compute choices for a given workload (e.g., Compute Engine, Kubernetes Engine, App Engine).
- Using preemptible VMs and custom machine types as appropriate.

Exam Guide: Section 2.2

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Compute Options and Use Cases

Option	Use When You Need...	Typical Use Cases
Google App Engine Flexible, zero-ops platform for building apps	• To just focus on writing code • Developer velocity • To minimize operational overhead	• Web sites • Apps (of course!) • Gaming back ends • IoT applications
Google Compute Engine Virtual machines running in Google's global data centers	• Complete control • Ability to make OS level changes • To be able to move to the cloud without rewriting your code • To use custom VM images	• Any workload requiring a specific OS or configuration. • On-premises software that you want to run in the cloud.
Google Kubernetes Engine Logical infrastructure powered by Kubernetes, the open source container orchestration system	• No dependencies on a specific OS • Increased velocity and operability • To manage containers in production	• Containerized workloads. • Cloud-native distributed systems. • Hybrid applications.

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Exam Guide: Section 2.3

2.3 Planning and configuring data storage options. Considerations include:

- Product choice (e.g., Cloud SQL, BigQuery, Cloud Spanner, Cloud Bigtable)
- Choosing storage options (e.g., Regional, Multi-regional, Nearline, Coldline)

Exam Guide: Section 2.3

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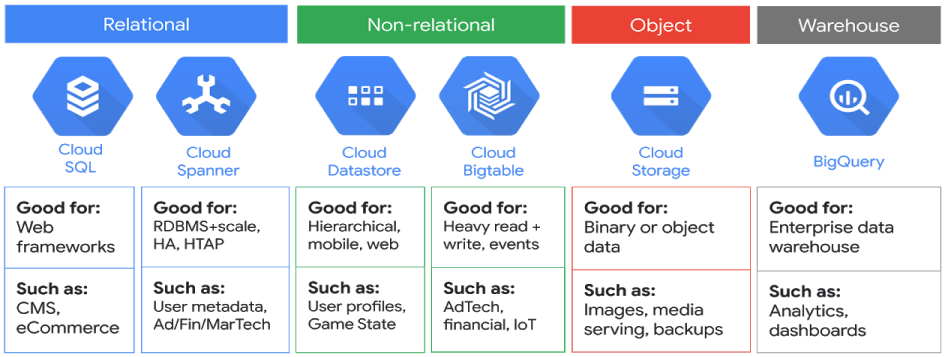
Comparing Data Storage and Database Options



Data Storage Options and Use Cases

Option	Use When You Need...	Typical Use Cases
Cloud SQL	Fully managed MySQL and PostgreSQL database service	• Web frameworks • Structured data • OLTP workloads
BigQuery	A scalable, fully managed enterprise data warehouse (EDW) with SQL and fast ad-hoc queries.	• OLAP workloads up to petabyte scale • Big data exploration and processing
Cloud Spanner	Mission-critical, relational database service with transactional consistency, global scale, and high availability.	• Adtech • Financial services • Global supply chain • Retail
Cloud BigTable	A scalable, fully managed NoSQL wide-column database that is suitable for both low-latency single-point lookups and precalculated analytics.	• IoT, finance, adtech • Monitoring • Geospatial datasets • Graphs

Exam Guide: Section 2.3

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- Product choice (e.g., Cloud SQL, BigQuery, Cloud Spanner, Cloud Bigtable)
- **Choosing storage options (e.g., Regional, Multi-regional, Nearline, Coldline)**

Choosing among Cloud Storage classes

	Multi-regional	Regional	Nearline	Coldline
Intended for data that is...	Most frequently accessed	Accessed frequently within a region	Accessed less than once a month	Accessed less than once a year
Availability SLA	99.95%	99.90%	99.00%	99.00%
Access APIs	***Consistent APIs***			
Access time	***Millisecond access***			
Storage price	Price per GB stored per month			
Retrieval price	Total price per GB transferred			
Use cases	Content storage and delivery	In-region analytics, transcoding	Long-tail content, backups	Archiving, disaster recovery

Cloud Storage lets you choose among four different types of storage classes: Regional, Multi-regional, Nearline and Coldline. Here's how to think about them: Multi-regional and Regional are high-performance object storage, whereas Nearline and Coldline are backup and archival storage. That's why I placed that heavy dividing line between these two groups. All of the storage classes are accessed in analogous ways using the Cloud Storage API, and they all offer millisecond access times. Now let's talk about how they differ.

Regional Storage lets you store your data in a specific GCP region, us-central1, europe-west1

or asia-east1. It's cheaper than multi-regional storage, but it offers less redundancy.

Multi-Regional Storage, on the other hand, costs a bit more, but it's geo-redundant. That means you pick a broad geographical location, like United States, the European Union, or Asia, and Cloud Storage stores your data in at least two geographic locations separated by at least 160 kilometers.

Multi-Regional Storage is appropriate for storing frequently accessed storing data: website content, interactive workloads, or data that's part of mobile and gaming applications. People use regional storage, on the other hand, to store data close to their Compute Engine virtual machines or their Kubernetes Engine clusters. That gives better performance for data-intensive computations.

Now let's talk about backup and archival.

Nearline storage is a low-cost, highly durable storage service for storing infrequently accessed data. This storage class is a better choice than Multi-Regional Storage or Regional Storage in scenarios where you plan to read or modify your data on average once a month or less. For example, if you want to continuously add files to Cloud Storage and plan to access those files once a month for analysis, Nearline Storage is a great choice.

Coldline Storage is a very-low-cost, highly durable storage service for data archiving, online backup, and disaster recovery. Coldline Storage is the best choice for data that you plan to access at most once a year, due to its slightly lower availability, 90-day minimum storage duration, costs for data access, and higher per-operation costs. For example, if you want to archive data or have access in the event of a disaster recovery event.

The availability of these storage classes varies, with multi-regional having the highest availability of 99.95%, followed by regional with 99.9% and nearline and coldline with 99.9%.

As for pricing, all storage classes incur a cost per gigabyte of data stored per month, with multi-regional having the highest storage price and coldline the lowest storage price. Egress and data transfer charges may also apply.

In addition to those charges, Nearline storage also incurs an access fee per gigabyte of data read, and Coldline storage incurs a higher fee per gigabyte of data read.

Storage Classes and use cases summary

Option	Use When You Need...	Typical Use Cases
Regional Lower cost	• Lower cost per GB stored • Data stored in a narrow geographic region • **Redundant across zones**	Storing **frequently** accessed data **in the same region** as your instances that use it, such as for data analytics.
Multi-Regional Lower cost, geo-redundant	• **Redundant across regions**	Storing data that is **frequently** accessed **around the world**, such as website content, streaming videos or gaming content
Nearline Very low storage cost, has data retrieval costs	• Very low cost per GB stored • Higher per-operation costs • **30-day minimum storage duration**	**Infrequently** (i.e., no more than once per month) accessed data. Ideal for back-up and serving long-tail multimedia content.
Coldline Lowest storage cost of all, takes longer to retrieve, costs to retrieve data	• Lowest cost per GB stored • Higher per-operation costs • **90-day minimum storage duration**	**Very infrequently** accessed data - ie, once a year.Typically this is for disaster recovery, or for financial data that has to be kept for a certain length of time to meet regulatory needs.

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Exam Guide: Section 2.4

2.4 Planning and configuring network resources. Tasks include:

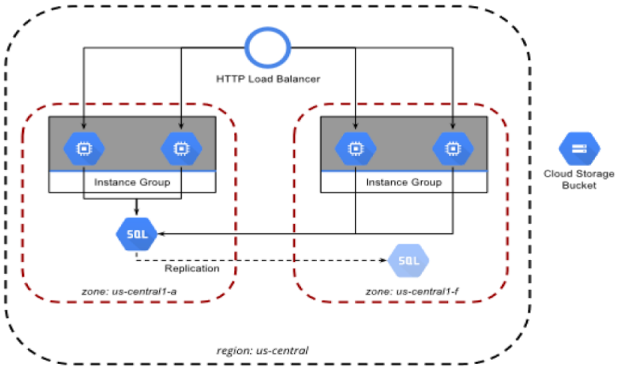
- Differentiating load balancing options.
- Identifying resource locations in a network for availability.
- Configuring Cloud DNS.

Exam Guide: Section 2.4

2.4 Planning and configuring network resources. Tasks include:

- **Differentiating load balancing options.**
- Identifying resource locations in a network for availability.
- Configuring Cloud DNS.

Load Balancing Overview



Load balancing is when two or more identical servers or server clusters have been created so that if the load becomes too great, or if one or more servers should fail, then the remainder can assist with or take over handling the load.
This is one way to create applications and services that are “highly available.”
Load balancing allows multiple servers (or clusters of servers) to function as a single computing resource.
Load balancers can also be configured to add, or remove, these servers or server clusters from the system to better meet demand.
This is known as “autoscaling.”

Google VPC offers a suite of load balancing options

Global HTTP(S)	Global SSL Proxy	Global TCP Proxy	Regional	Regional internal
Layer 7 load balancing based on load	Layer 4 load balancing of non-HTTPS SSL traffic based on load	Layer 4 load balancing of non-SSL TCP traffic	Load balancing of any traffic (TCP, UDP)	Load balancing of traffic inside a VPC
Can route different URLs to different backends	Supported on specific port numbers	Supported on specific port numbers	Supported on any port number	Use for the internal tiers of multi-tier applications

If you need cross-regional load balancing for a web application, use HTTP(S) load balancing.

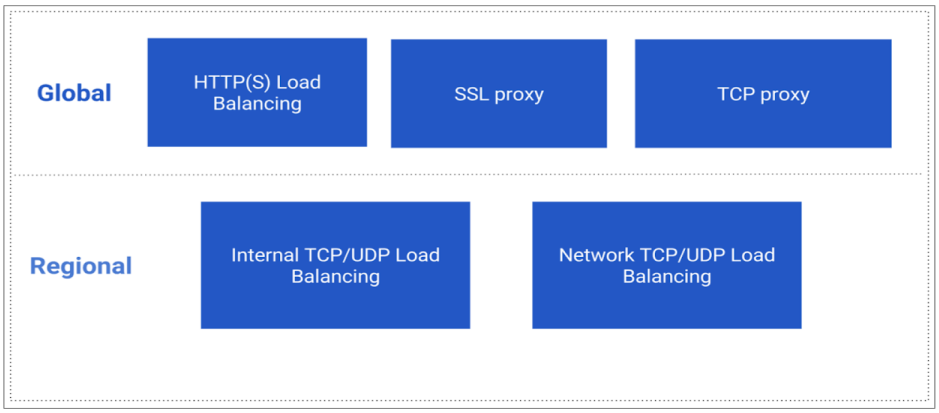
Deciding on Load Balancing Options

Cloud load balancer considerations can be divided up as follows:

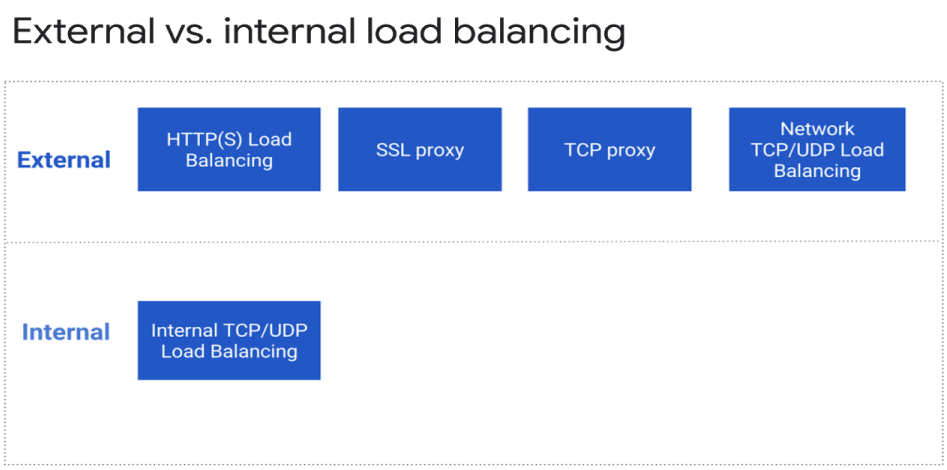
- Global versus regional load balancing
- External versus internal load balancing
- Traffic type

The slides that follow describe the use cases for different types of load balancers.

Global vs. regional load balancing



Cloud load balancer considerations can be divided up as follows:
Global versus regional load balancing
External versus internal load balancing
Traffic type
Use global load balancing when your users and instances are globally distributed, your users need access to the same applications and content, and you want to provide access using a single anycast IP address. Global load balancing can also provide IPv6 termination.
Use regional load balancing when your users and instances are concentrated in one region and you only require IPv4 termination.
Global load balancing requires you to use the Premium Tier of Network Service Tiers. For regional load balancing, you can use Standard Tier.



GCP's load balancers can also be divided into external and internal load balancers.
External load balancers distribute traffic coming from the internet to your GCP network.
Internal load balancers distribute traffic within your GCP network.

The type of traffic your load balancer will handle is another factor in determining which load balancer to use.
HTTP and HTTPS traffic require global, external load balancing.
TCP traffic can be handled by global, external load balancing; external, regional load balancing; or internal, regional load balancing.
UDP traffic can be handled by external regional load balancing or internal regional load balancing.

Lab

Set Up Network and HTTP Load Balancers

In this hands-on lab, you'll learn the differences between a network load balancer and a HTTP load balancer, and how to set them up for your applications running on Google Compute Engine virtual machines.

This lab is part of the Qwiklabs Cloud Architecture Quest.

Suggested study resources for this section

Google Cloud Pricing Overview: https://cloud.google.com/pricing/

Google Cloud Pricing Calculator: https://cloud.google.com/products/calculator/

Google's Pricing philosophy: https://cloud.google.com/pricing/philosophy/

Compute Engine Documentation: https://cloud.google.com/compute/docs/

Choosing the right compute option in GCP: https://cloud.google.com/blog/products/gcp/choosing-the-right-compute-option-in-gcp-a-decision-tree

Choosing a compute option: https://cloud.google.com/docs/choosing-a-compute-option

Storage Classes: https://cloud.google.com/storage/docs/storage-classes

Cloud Storage Options: https://cloud.google.com/storage-options/

Load Balancing: https://cloud.google.com/load-balancing/docs/load-balancing-overview