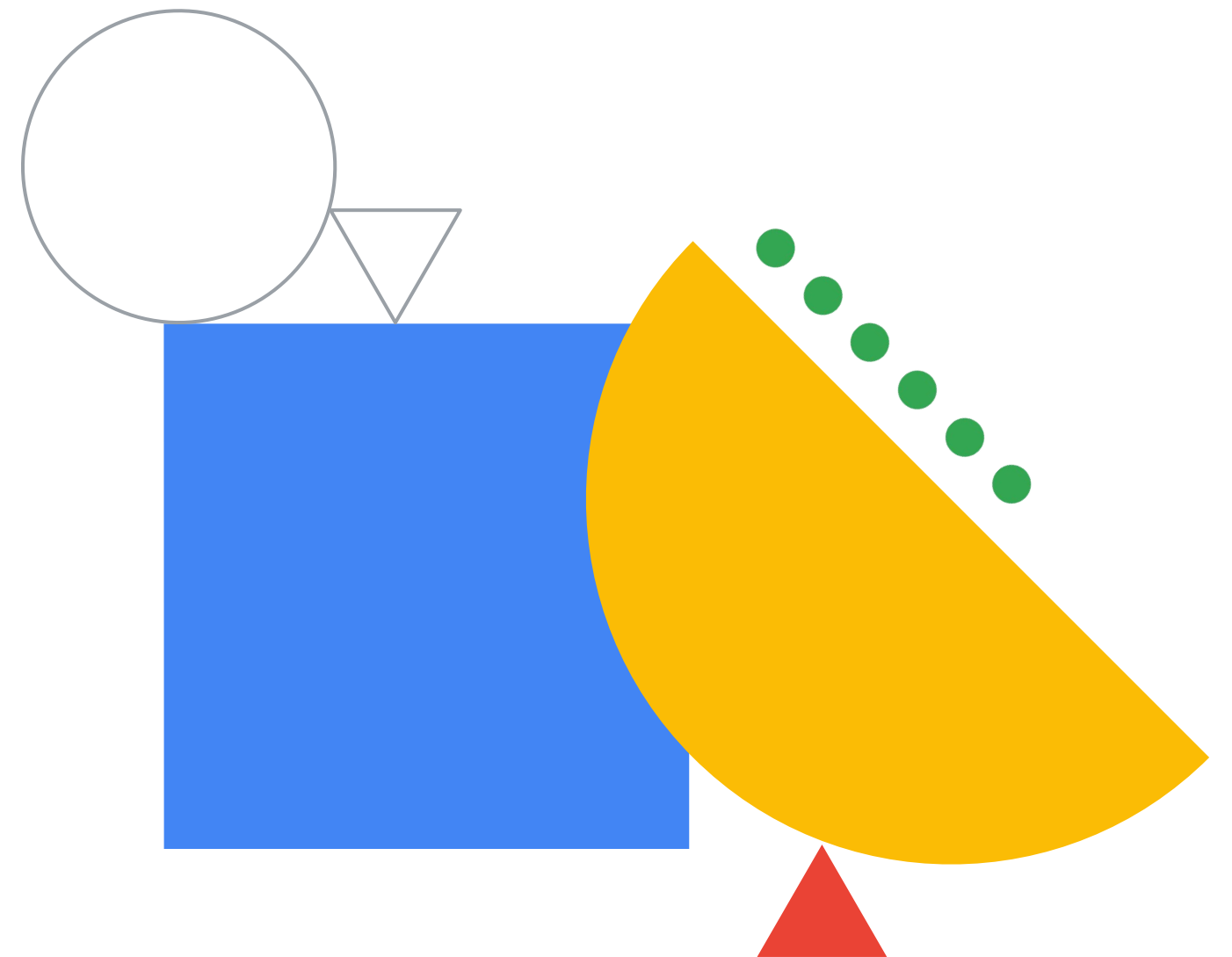


# Preparing for Your Associate Cloud Engineer Journey

Module 2: Planning and Configuring Cloud Solutions



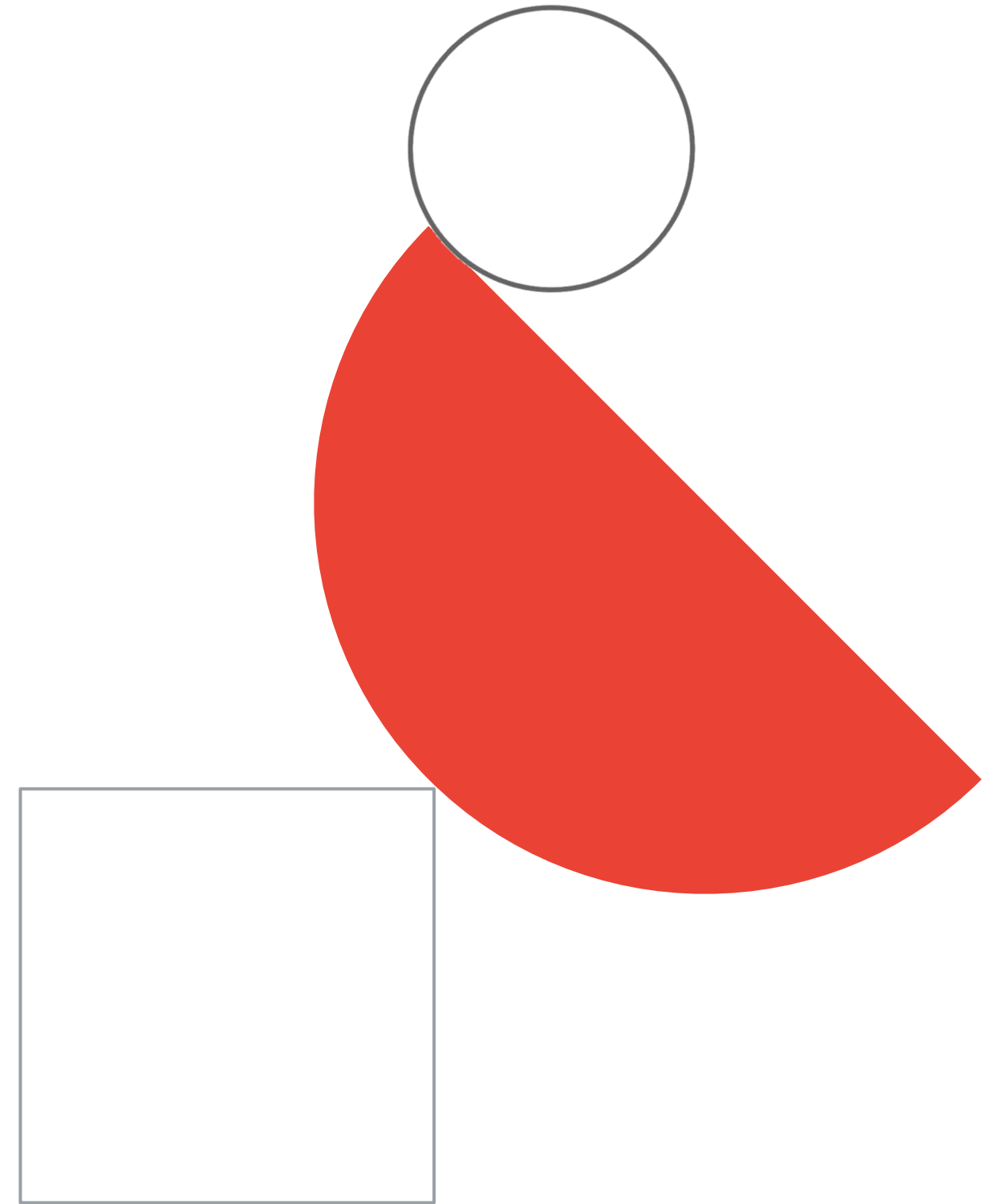


# Module agenda

- 01 Selecting resources for Cymbal Superstore's cloud solutions
- 02 Diagnostic questions
- 03 Review and study planning

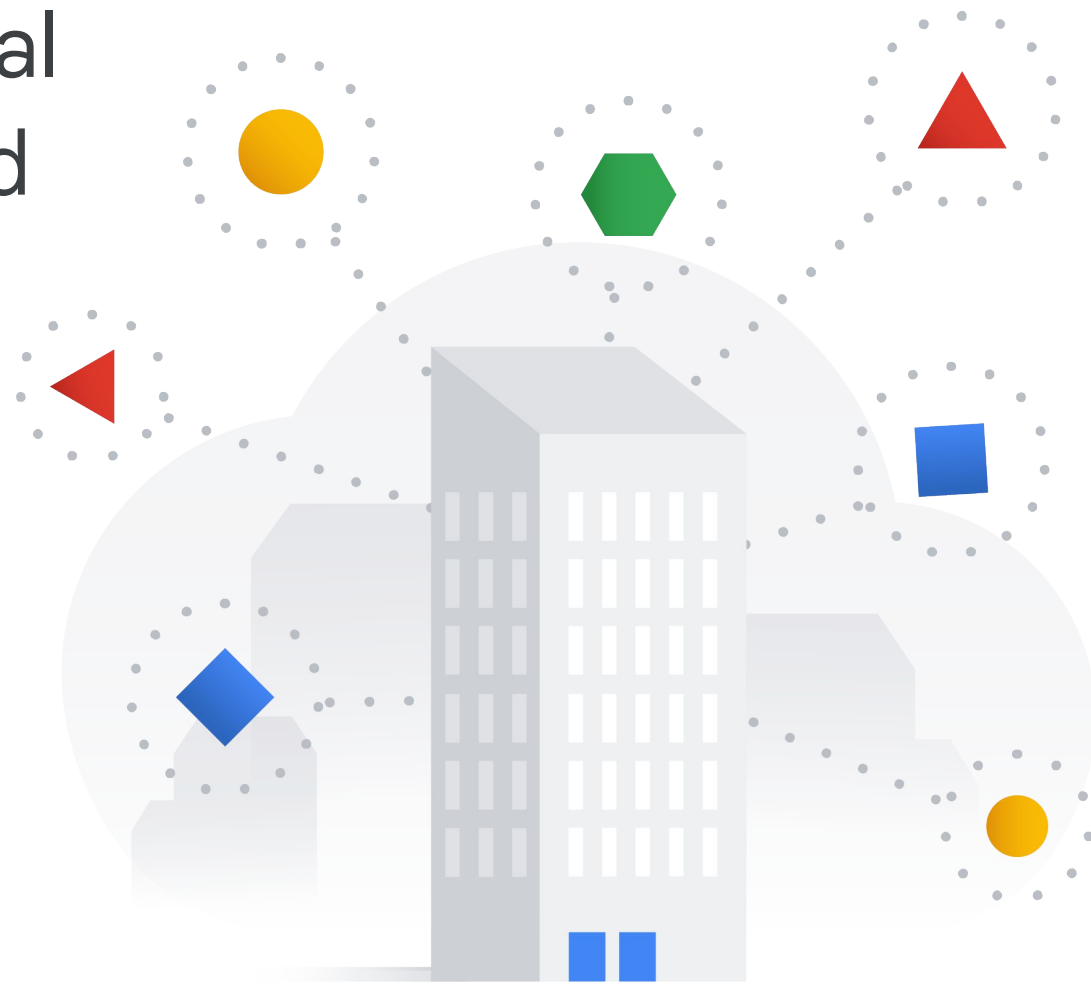


# Selecting resources for Cymbal Superstore's cloud solutions



# The next step:

planning and  
configuring Cymbal  
Superstore's cloud  
solutions



- Planning and estimating Google Cloud pricing using the Pricing Calculator
- Planning and configuring compute resources
- Planning and configuring data storage options
- Planning and configuring network resources



# Cymbal Superstore's existing applications



## Ecommerce

Cymbal Superstore has an existing web application that provides an interface for customers to look at and order products.

### Requirements:

- Compute: Container architecture
- Data: Relational backend
- Networking: Needs to be globally available
- Need analytical capabilities to inform marketing efforts



## Transportation Management

Delivery services is becoming an important aspect of Cymbal Superstore's customer interactions. Cymbal Superstore would like to use Google Services to keep track of truck location.

### Requirements:

- Dashboard of truck location in near real-time
- Analysis of truck mileage for preventive maintenance



## Supply Chain

Cymbal Superstore has decided to migrate their legacy supply chain application to the cloud

### Requirements:

- Available local to their HQ
- Currently implemented in virtual machines with a LINUX operating system and a LAMP stack

# Cymbal Superstore's ecommerce solution



## Ecommerce Requirements

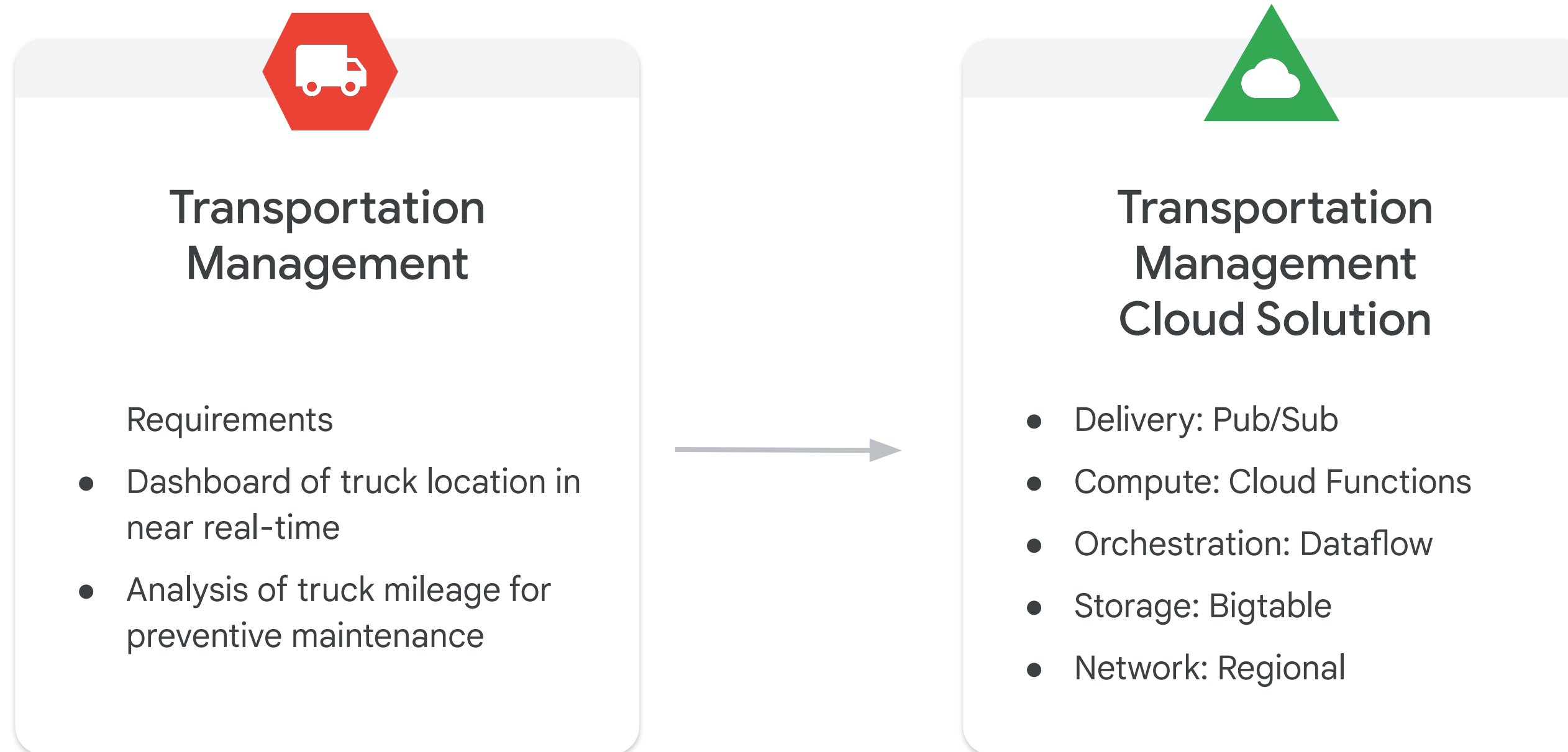
- Compute: Container architecture
- Data: Relational backend
- Networking: Needs to be globally available
- Need analytical capabilities to inform marketing efforts



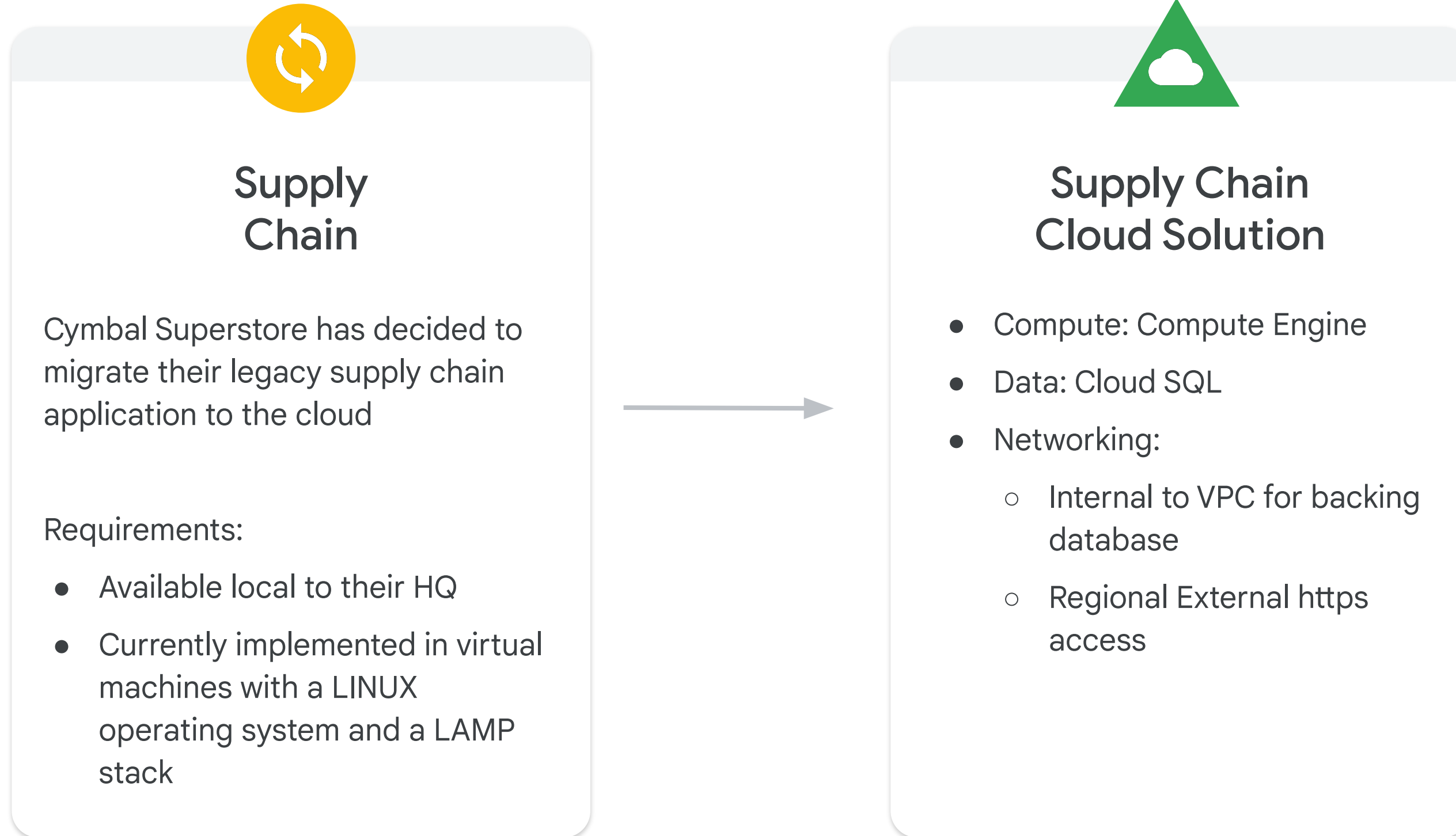
## Ecommerce Cloud Solution

- Compute: Google Kubernetes Engine
- Data: Cloud Spanner
- Networking: External http(s) load balancing
- Feed historic sales data to BigQuery

# Cymbal Superstore's transportation management solution

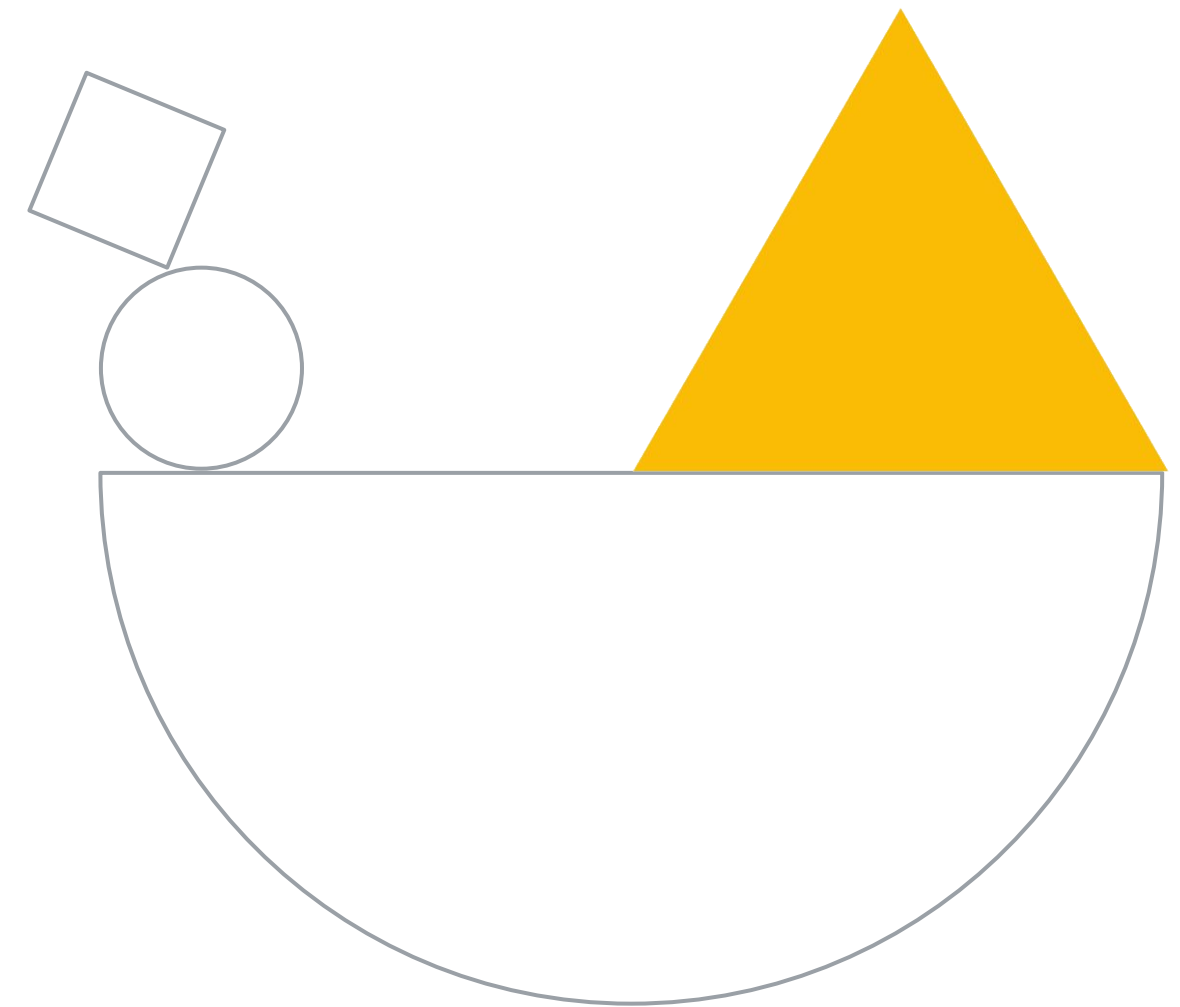


# Cymbal Superstore's supply chain solution





# Diagnostic questions

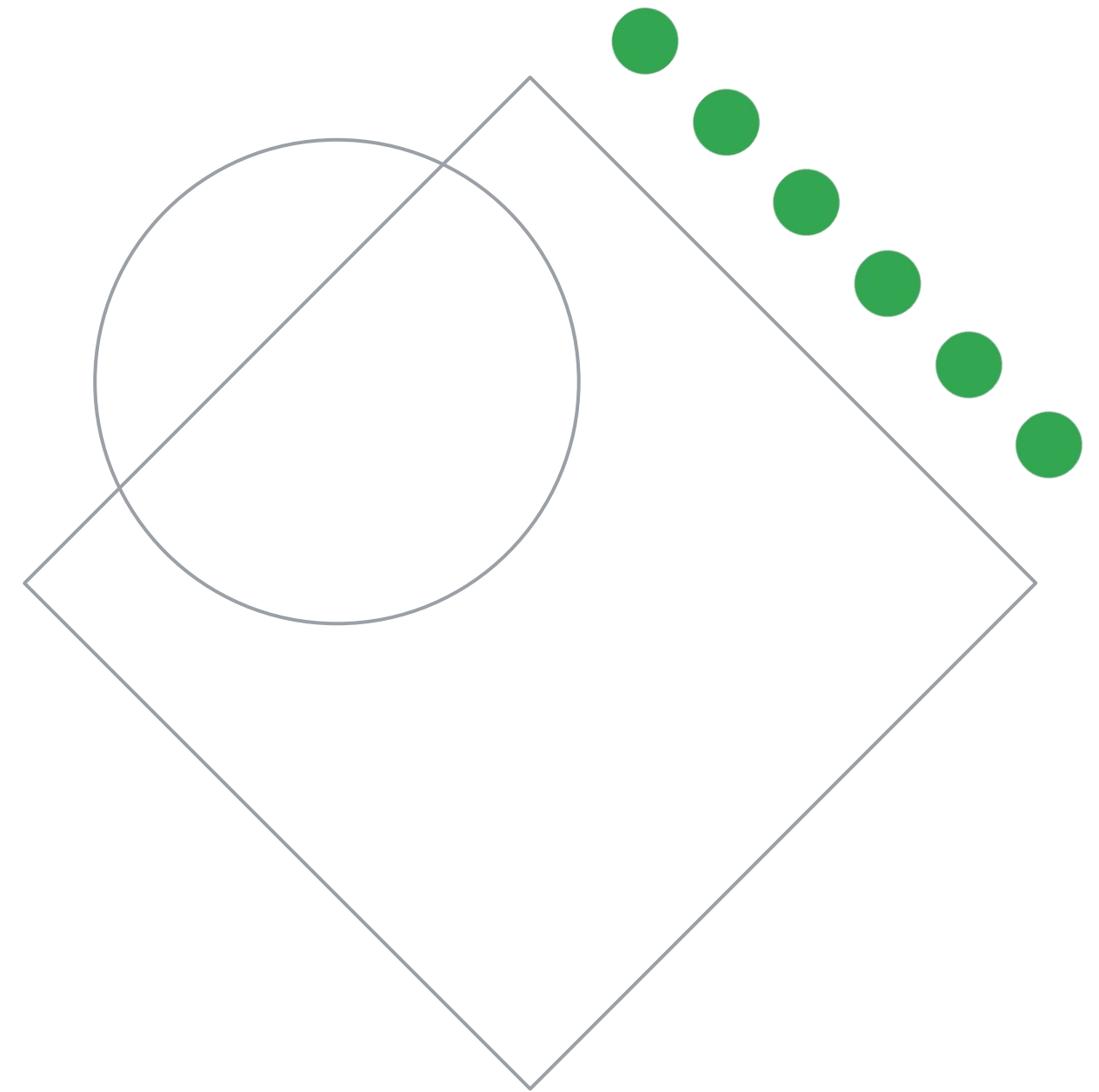


# Please complete the diagnostic questions now

- Forms are provided for you to answer the diagnostic questions
- The instructor will provide you a link to the forms
- The diagnostic questions are also available in the workbook

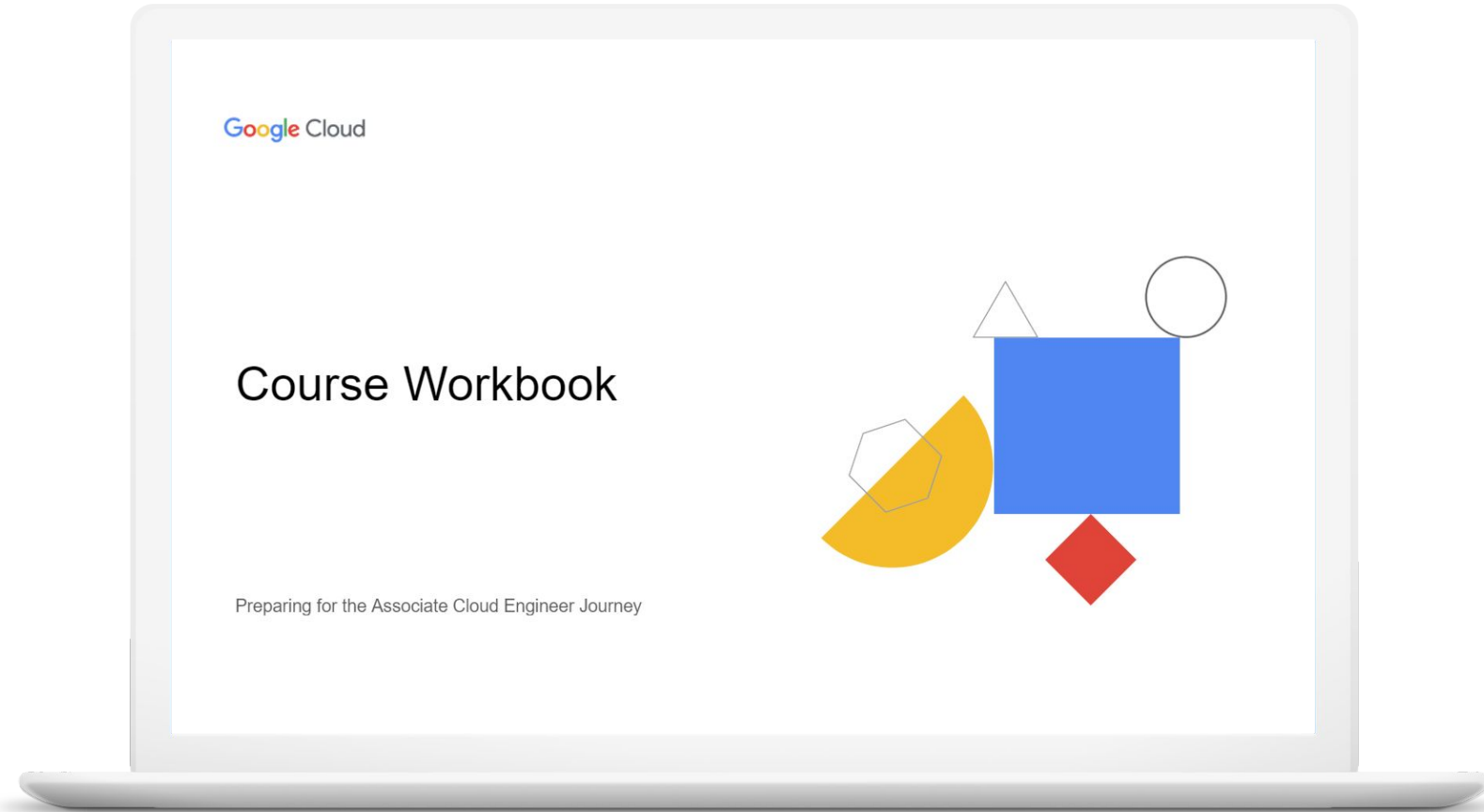


# Review and study planning



# Your study plan:

## Planning and configuring cloud solutions



2.1

Planning and estimating using the Pricing Calculator

2.2

Planning and configuring compute resources

2.3

Planning and configuring data storage options

2.4

Planning and configuring network resources

## 2.1 | Planning and estimating using the Pricing Calculator

## 2.1 | Diagnostic Question 01 Discussion

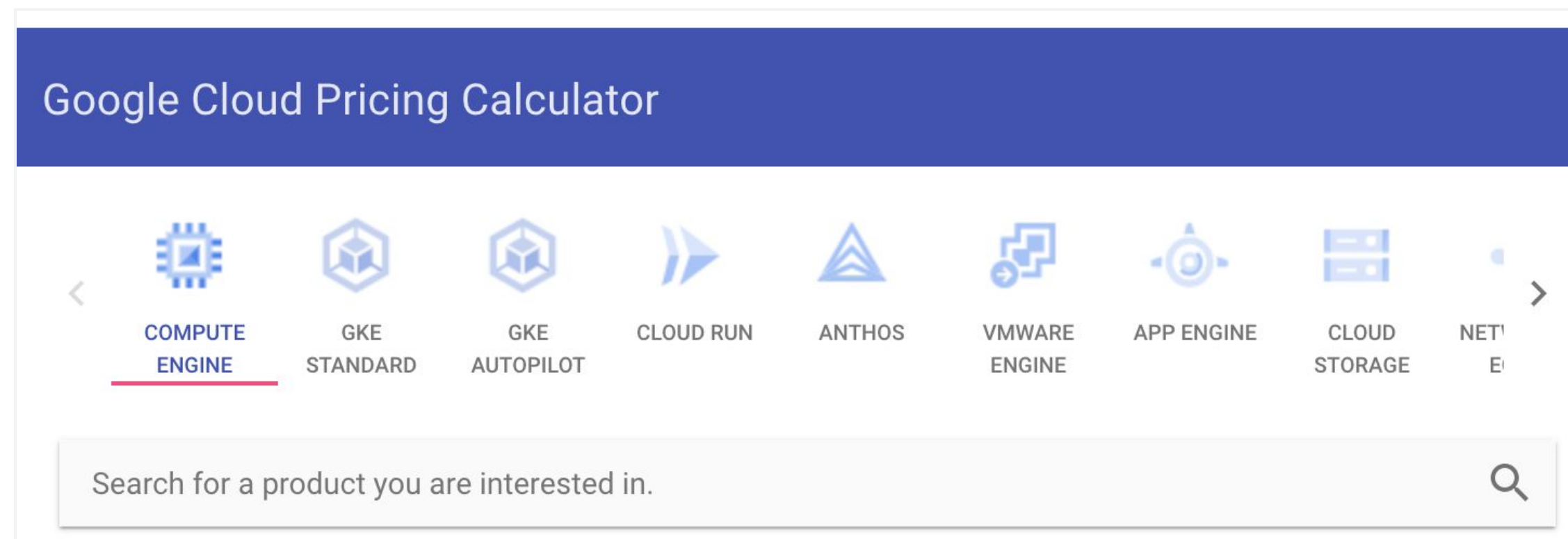
The projected amount of cloud storage required for Cymbal Superstore to enable users to post pictures for project reviews is 10 TB of immediate access storage in the US and 30 TB of storage for historical posts in a bucket located near Cymbal Superstore's headquarters. The contents of this bucket will need to be accessed once every 30 days. You want to estimate the cost of these storage resources to ensure this is economically feasible.

What should you do?

- A. Use the pricing calculator to estimate the costs for 10 TB of regional standard storage, 30 TB of regional Coldline storage, and egress charges for reads from storage.
- B. Use the pricing calculator to estimate the price for 10 TB of regional standard storage, 30 TB of regional Nearline storage, and ingress charges for posts to the bucket.
- C. Use the pricing calculator to estimate the price for 10 TB of multi-region standard storage, 30 TB for regional Coldline storage, and ingress charges for posts to the bucket.
- D. Use the pricing calculator to estimate the price for 10 TB of multi-region standard storage, 30 TB for regional Nearline, and egress charges for reads from the bucket.



# Pricing Calculator



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

1

Select a product from scrolling list at top of the form

2

Form for each product will show expense variables

3

Enter target configuration in form

4

Submit each section to add to your overall estimate

# Pricing Calculator

**Total Estimated Cost: USD 4,958.48 per 1 month**

Estimate Currency

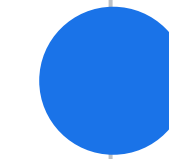
USD - US Dollars ▼

Adjust Estimate Timeframe

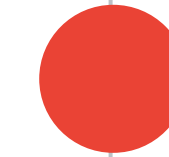
1 day 1 week 1 month 1 quarter 1 year 3 years

EMAIL ESTIMATE

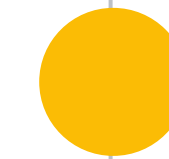
SAVE ESTIMATE



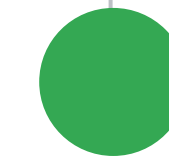
Total estimated cost:  
daily, weekly, monthly,  
quarterly, yearly and  
3-year increments



Cost is only an estimate



Question to ask:  
How closely your  
estimated usage  
matches your actual  
usage?



Not a binding contract,  
just a planning tool



# 2.1

## Planning and estimating using the Pricing Calculator

### Courses

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#### [Architecting with Google Compute Engine](#)

- M3 Virtual Machines
- M6 Resource Management



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#### [Essential Google Cloud Infrastructure: Foundation](#)

- M3 Virtual Machines

#### [Essential Google Cloud Infrastructure: Core Services](#)

- M3 Resource Management



### Documentation

[Google Cloud Pricing Calculator](#)

## 2.2 | Planning and configuring compute resources

Considerations include:

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

## 2.2 | Diagnostic Question 02 Discussion

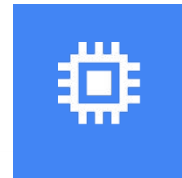


Cymbal Superstore decides to migrate their supply chain application to Google Cloud. You need to configure specific operating system dependencies.

What should you do?

- A. Implement an application using containers on Cloud Run.
- B. Implement an application using code on App Engine.
- C. Implement an application using containers on Google Kubernetes Engine.
- D. Implement an application using virtual machines on Compute Engine.

# Infrastructure as a service:



## Google Compute Engine

Virtual machines running in  
Google's global data centers

Use When You  
Need...

- 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

Typical Use Cases

- Any workload requiring a specific OS or configuration
- On-premises software that you want to run in the cloud



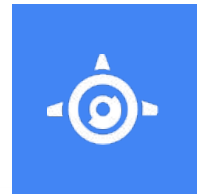
## Google Kubernetes Engine

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

# Platform as a service:



## 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

Use When You  
Need...

Typical Use Cases

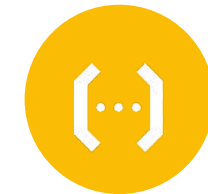


## Google Cloud Run

Deploy code or containers that  
listens for requests or events

- Scales to meet demand
- Pay for what you use
- Supports API endpoints

- Web frameworks
- Microservices



## Google Cloud Functions

Serverless execution environment for  
building and connecting cloud services

- For event-driven workloads
- Scales to meet demand
- Minimal configuration

- Statistical analysis
- Image thumbnail generation
- Post a comment to a Slack channel  
after a GitHub commit

## 2.2 | Diagnostic Question 03 Discussion



Cymbal Superstore decides to pilot a cloud application for their point of sale system in their flagship store. You want to focus on code and develop your solution quickly, and you want your code to be portable.

- A. SSH into a Compute Engine VM and execute your code.
- B. Package your code to a container image and post it to Cloud Run.
- C. Implement a deployment manifest and run `kubectl apply` on it in Google Kubernetes Engine.
- D. Code your solution in Cloud Functions.

How do you proceed?

## 2.2 | Diagnostic Question 04 Discussion



An application running on a highly-customized version of Ubuntu needs to be migrated to Google Cloud. You need to do this in the least amount of time with minimal code changes.

How should you proceed?

- A. Create Compute Engine Virtual Machines and migrate the app to that infrastructure.
- B. Deploy the existing application to App Engine.
- C. Deploy your application in a container image to Cloud Run.
- D. Implement a Kubernetes cluster and create pods to enable your app.

## 2.2 | Diagnostic Question 05 Discussion



You want to deploy a microservices application. You need full control of how you manage containers, reliability, and autoscaling, but don't want or need to manage the control plane.

- A. Cloud Run
- B. App Engine
- C. Google Kubernetes Engine
- D. Compute Engine

Which compute option should you use?



## 2.2 | Planning and configuring compute resources

### Courses

#### [Google Cloud Fundamentals: Core Infrastructure](#)

- M3 Virtual Machines in the Cloud
- M5 Containers in the Cloud
- M6 Applications in the Cloud

#### [Getting Started with Google Kubernetes Engine](#)

- M2 Introduction to Containers and Kubernetes

#### [Architecting with Google Compute Engine](#)

- M3 Virtual Machines



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#### [Essential Google Cloud Infrastructure: Foundation](#)

- M3 Virtual Machines



### Skill Badges



Google Cloud

[Set Up and Configure a Cloud Environment in Google Cloud Quest](#)

### Documentation

[Choosing the right compute option in GCP: a decision tree](#)

[Application Hosting Options](#)

[Tutorials | Compute Engine Documentation](#)

## 2.3 | Planning and configuring data storage options

Considerations include:

- Product choice  
(e.g., Cloud SQL, BigQuery, Firestore, Cloud Spanner, Cloud Bigtable)
- Choosing storage options  
(e.g., Zonal persistent disk, Regional balanced persistent disk, standard, Nearline, Coldline, Archive)

## 2.3 | Diagnostic Question 06 Discussion









Cymbal Superstore needs to analyze whether they met quarterly sales projections. Analysts assigned to run this query are familiar with SQL.

- A. BigQuery
- B. Cloud SQL
- C. Cloud Spanner
- D. Cloud Firestore

What data solution should they implement?

# Comparing Data Storage and Database Options

Relational		Non-relational		Object	Warehouse
					
Cloud SQL	Cloud Spanner	Cloud Datastore	Cloud Bigtable	Cloud Storage	BigQuery
Good for: Web frameworks	Good for: RDBMS+scale, HA, HTAP	Good for: Hierarchical, mobile, web	Good for: Heavy read + write, events	Good for: Binary or object data	Good for: Enterprise data warehouse
Such as: CMS, eCommerce	Such as: User metadata, Ad/Fin/MarTech	Such as: User profiles, Game State	Such as: AdTech, financial, IoT	Such as: Images, media serving, backups	Such as: Analytics, dashboards

## 2.3 | Diagnostic Question 07 Discussion

Cymbal Superstore's supply chain application frequently analyzes large amounts of data to inform business processes and operational dashboards.

What storage class would make sense for this use case?

- A. Multi-regional
- B. Regional
- C. Nearline
- D. Coldline



# Storage Classes and use cases summary

	Regional	Multi-Regional	Nearline	Coldline
	Lower cost	Lower cost, geo-redundant	Very low storage cost, has data retrieval costs	Lowest storage cost of all, takes longer to retrieve, costs to retrieve data
Use When You Need...	<ul style="list-style-type: none"><li>• Lower cost per GB stored</li><li>• Data stored in a narrow geographic region</li><li>• Redundant across zones</li></ul>	<ul style="list-style-type: none"><li>• Redundant across regions</li></ul>	<ul style="list-style-type: none"><li>• Very low cost per GB stored</li><li>• Higher per-operation costs</li><li>• 30-day minimum storage duration</li></ul>	<ul style="list-style-type: none"><li>• Lowest cost per GB stored</li><li>• Higher per-operation costs</li><li>• 90-day minimum storage duration</li></ul>
Typical Use Cases	Storing frequently accessed data in the same region as your instances that use it, such as for data analytics.	Storing data that is frequently accessed around the world, such as website content, streaming videos or gaming content	Infrequently (i.e., no more than once per month) accessed data. Ideal for back-up and serving long-tail multimedia content.	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.

## 2.3 | Diagnostic Question 08 Discussion



Cymbal Superstore has a need to populate visual dashboards with historical time-based data. This is an analytical use-case.

Which two storage solutions could they use?

- A. BigQuery
- B. Cloud Storage
- C. Cloud Firestore
- D. Cloud SQL
- E. Cloud Bigtable

# Comparing storage options: use cases

	Firestore	Cloud Bigtable	Cloud Storage	Cloud SQL	Cloud Spanner	BigQuery
Type	NoSQL document	NoSQL wide column	Blobstore	Relational SQL for OLTP	Relational SQL for OLTP	Relational SQL for OLAP
Best for	Storing, syncing, and querying data	"Flat" data, Heavy read/write, events, analytical data	Structured and unstructured binary or object data	Web frameworks, existing applications	Large-scale database applications (> ~2 TB)	Interactive querying, offline analytics
Use cases	Mobile, web, and server development	AdTech, Financial and IoT data	Images, large media files, backups	User credentials, customer orders	Whenever high I/O, global consistency is needed	Data warehousing



## 2.3

# Planning and configuring data storage options

### Courses

#### [Google Cloud Fundamentals: Core Infrastructure](#)

- M4 Storage in the Cloud

#### [Architecting with Google Compute Engine](#)

- M5 Storage and Database Services



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#### [Essential Google Cloud Infrastructure: Core Services](#)

- M2 Storage and Database Services



### Skill Badges



Google Cloud

[Perform Foundational Infrastructure Tasks in Google Cloud Quest](#)

### Documentation

[Cloud Storage Options](#)

[Storage classes](#)

[Data lifecycle | Cloud Architecture Center](#)

## 2.4 | Planning and configuring network resources

Considerations include:

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

## 2.4 | Diagnostic Question 09 Discussion

Cymbal Superstore is piloting an update to its ecommerce app for the flagship store in Minneapolis, Minnesota. The app is implemented as a three-tier web service with traffic originating from the local area and resources dedicated for it in us-central1. You need to configure a secure, low-cost network load-balancing architecture for it.

How do you proceed?

- A. Implement a premium tier pass-through external https load balancer connected to the web tier as the frontend and a regional internal load balancer between the web tier and backend.
- B. Implement a proxied external TCP/UDP network load balancer connected to the web tier as the frontend and a premium network tier ssl load balancer between the web tier and the backend.
- C. Configure a standard tier proxied external https load balancer connected to the web tier as a frontend and a regional internal load balancer between the web tier and the backend.
- D. Configure a proxied SSL load balancer connected to the web tier as the frontend and a standard tier internal TCP/UDP load balancer between the web tier and the backend.



# 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

## 2.4 | Diagnostic Question 10 Discussion

What Google Cloud load balancing option runs at Layer 7 of the TCP stack?

- A. Global http(s)
- B. Global SSL Proxy
- C. Global TCP Proxy
- D. Regional Network



# Summary of load balancers

Load balancer	Traffic type	Global/ Regional	External/ Internal	External ports for load balancing
HTTP(S)	HTTP or HTTPS	Global IPv4 IPv6	External	HTTP on 80 or 8080; HTTPS on 443
SSL Proxy	TCP with SSL offload			25, 43, 110, 143, 195, 443, 465, 587, 700, 993, 995, 1883, 5222
TCP Proxy	<ul style="list-style-type: none"> <li>TCP without SSL offload</li> <li>Does not preserve client IP addresses</li> </ul>			25, 43, 110, 143, 195, 443, 465, 587, 700, 993, 995, 1883, 5222
Network TCP/UDP	<ul style="list-style-type: none"> <li>TCP/UDP without SSL offload</li> <li>Preserves client IP addresses</li> </ul>	Regional IPv4	Internal	Any
Internal TCP/UDP	TCP or UDP			Any
Internal HTTP(S)	HTTP or HTTPS			HTTP on 80 or 8080; HTTPS on 443

## 2.4 | Planning and configuring network resources

### Courses

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#### [Google Cloud Fundamentals: Core Infrastructure](#)

- M3 Virtual Machines in the Cloud

#### [Architecting with Google Compute Engine](#)

- M2 Virtual Networks
- M9 Load Balancing and Autoscaling



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#### [Essential Google Cloud Infrastructure: Foundation](#)

- M2 Virtual Network

#### [Elastic Google Cloud Infrastructure: Scaling and Automation](#)

- M2 Load Balancing and Autoscaling



### Documentation

[Cloud Load Balancing overview](#)

[Cloud Load Balancing](#)

# Knowledge Check 1

Which storage class is designed for long term storage has a 365 day minimum storage agreement, and a lower storage price as compared to other storage types?

- A. Standard Storage
- B. Cold Line Storage
- C. Nearline Storage
- D. Archive storage





# Knowledge Check 1

Which storage class is designed for long term storage has a 365 day minimum storage agreement, and a lower storage price as compared to other storage types?

- A. Standard Storage
- B. Cold Line Storage
- C. Nearline Storage
- D. Archive storage



# Knowledge Check 2

Which serverless option is based on developing and executing small snippets of code?

- A. Cloud Functions
- B. Cloud Run
- C. BigQuery
- D. Dataflow



# Knowledge Check 2

Which serverless option is based on developing and executing small snippets of code?

A. Cloud Functions

B. Cloud Run

C. BigQuery

D. Dataflow

