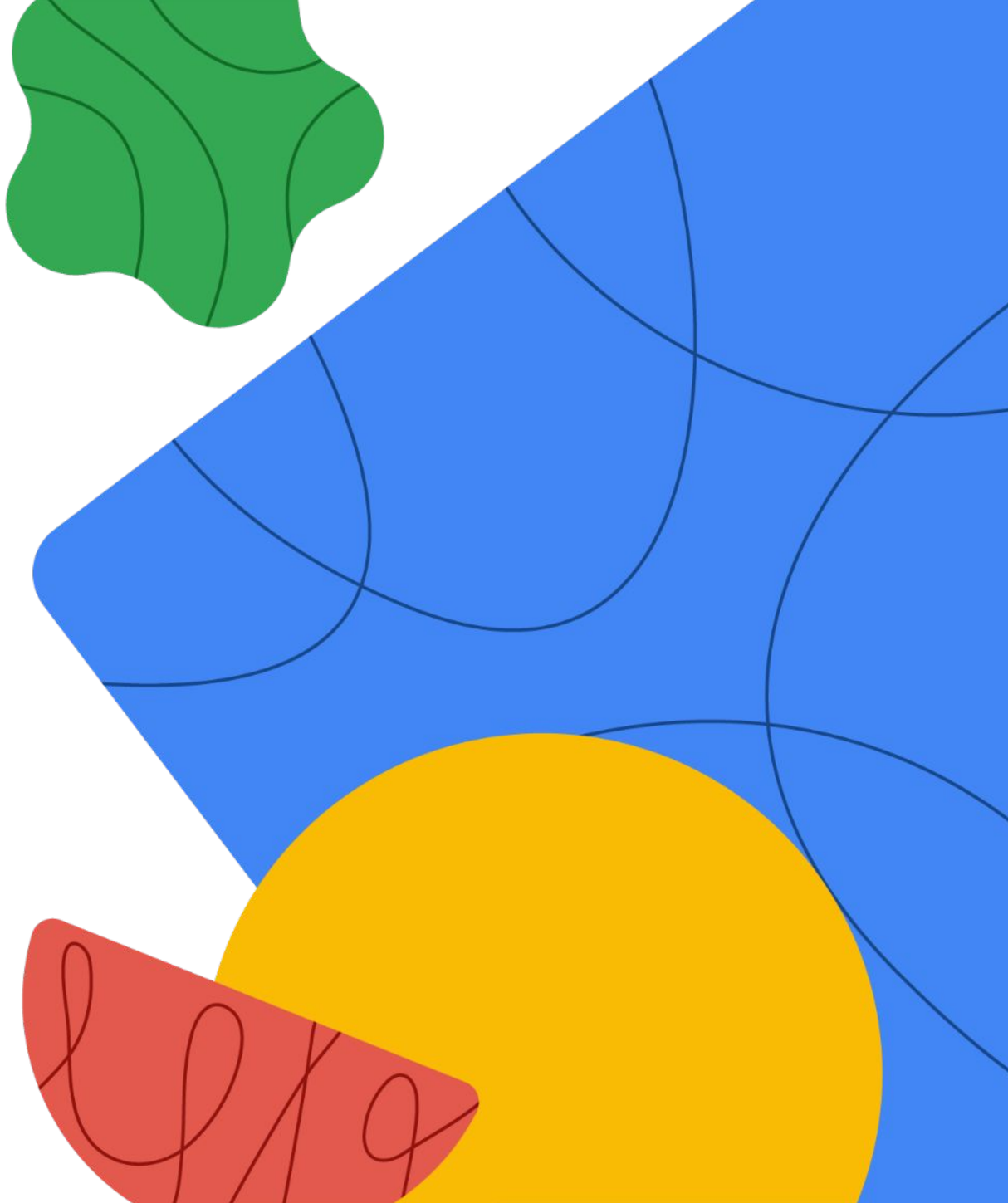
Google Cloud

# Networking in Google Cloud

## Caching and Optimizing Load Balancing



# Today's agenda

01 Internal Network Load Balancers as next hops

02 Cloud CDN

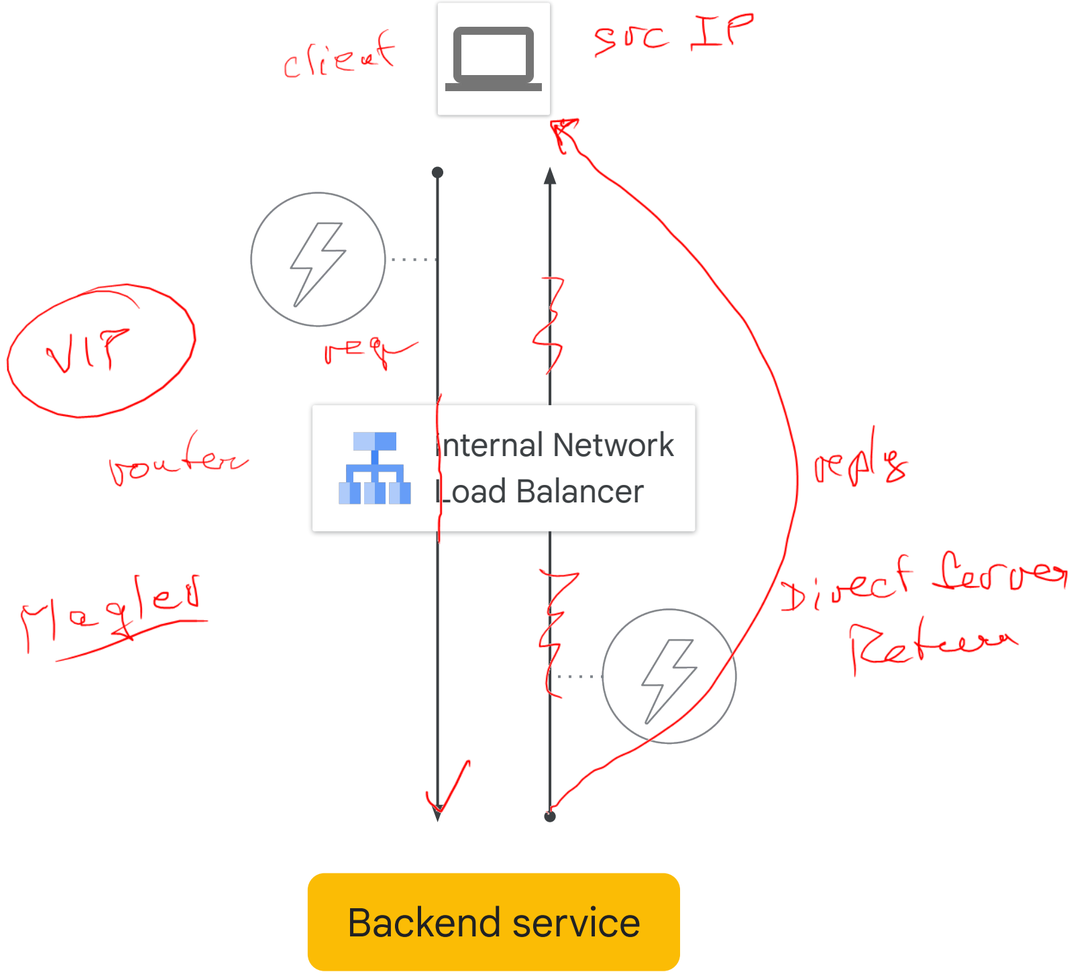
03 Lab: Defending Edge Cache with Cloud Armor

04 Load balancer optimization strategies

05 Quiz

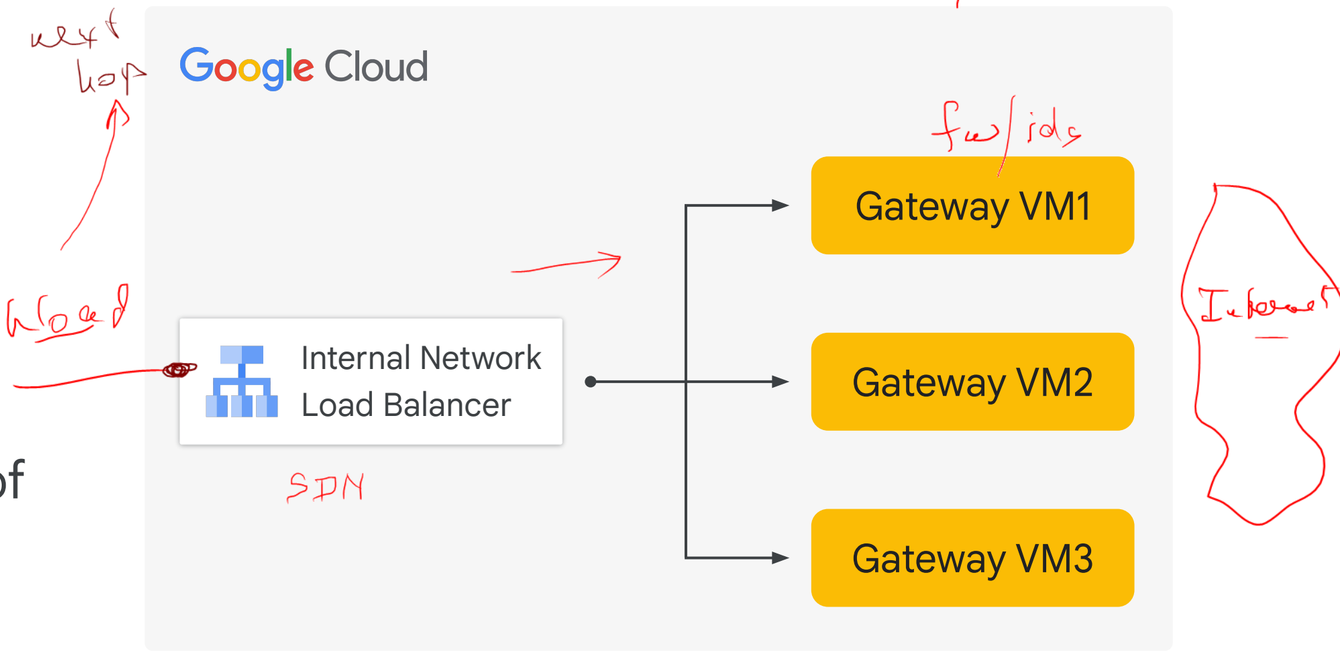
# Internal Network Load Balancers are fast

- Internal Network LBs are high-performance, pass-through Layer 4 load balancers.
- Client requests to the load balancer IP address go directly to the healthy backend VMs. Responses from the healthy backend VMs go directly to the clients, not back through the load balancer.



# Use cases

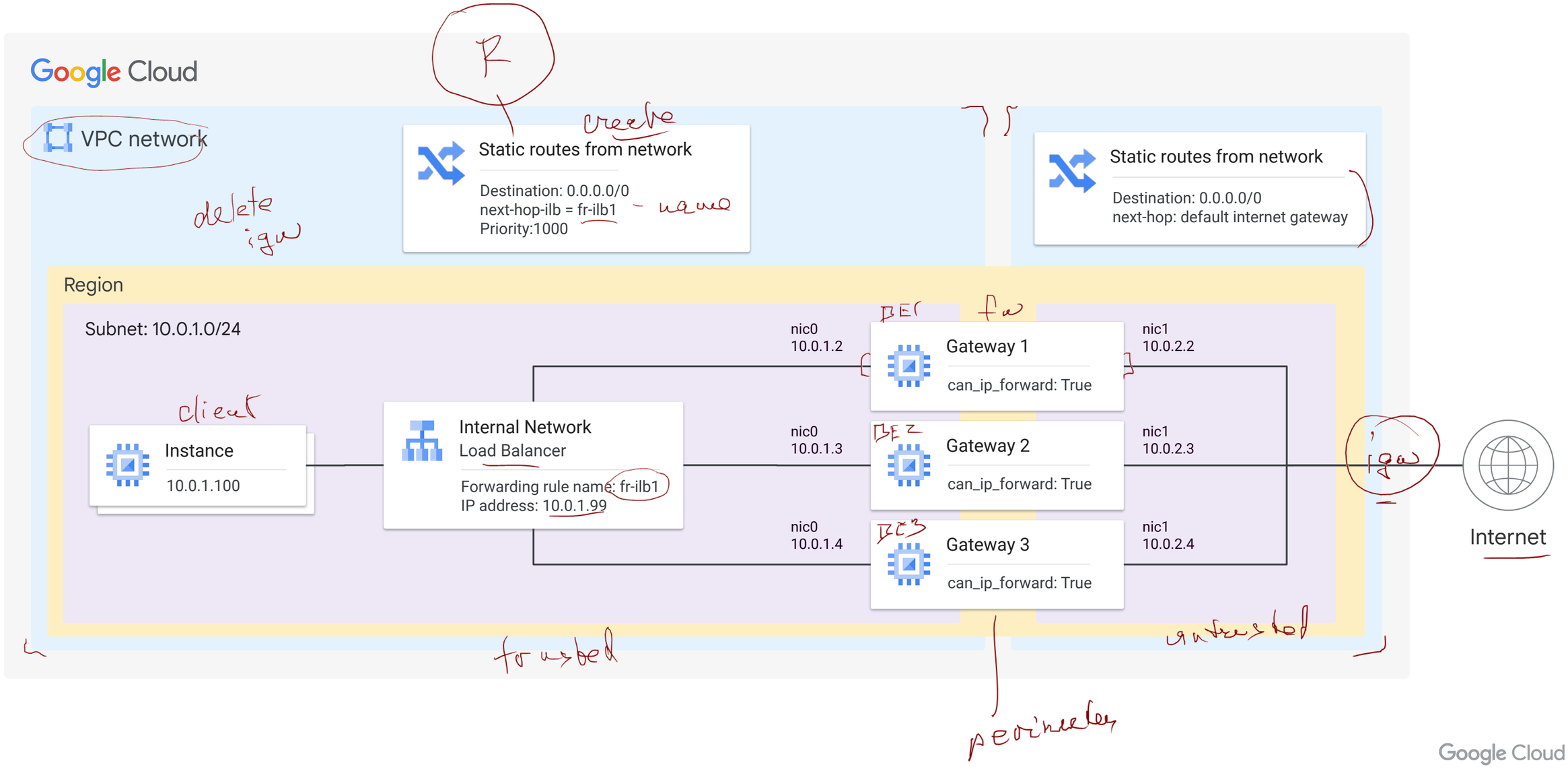
- Load-balance traffic across multiple VMs that are functioning as gateway or router VMs.
- Use gateway virtual appliances as a next hop for a default route.
- Send traffic through multiple load balancers in two or more directions by using the same set of multi-NIC gateway or router VMs as backends.



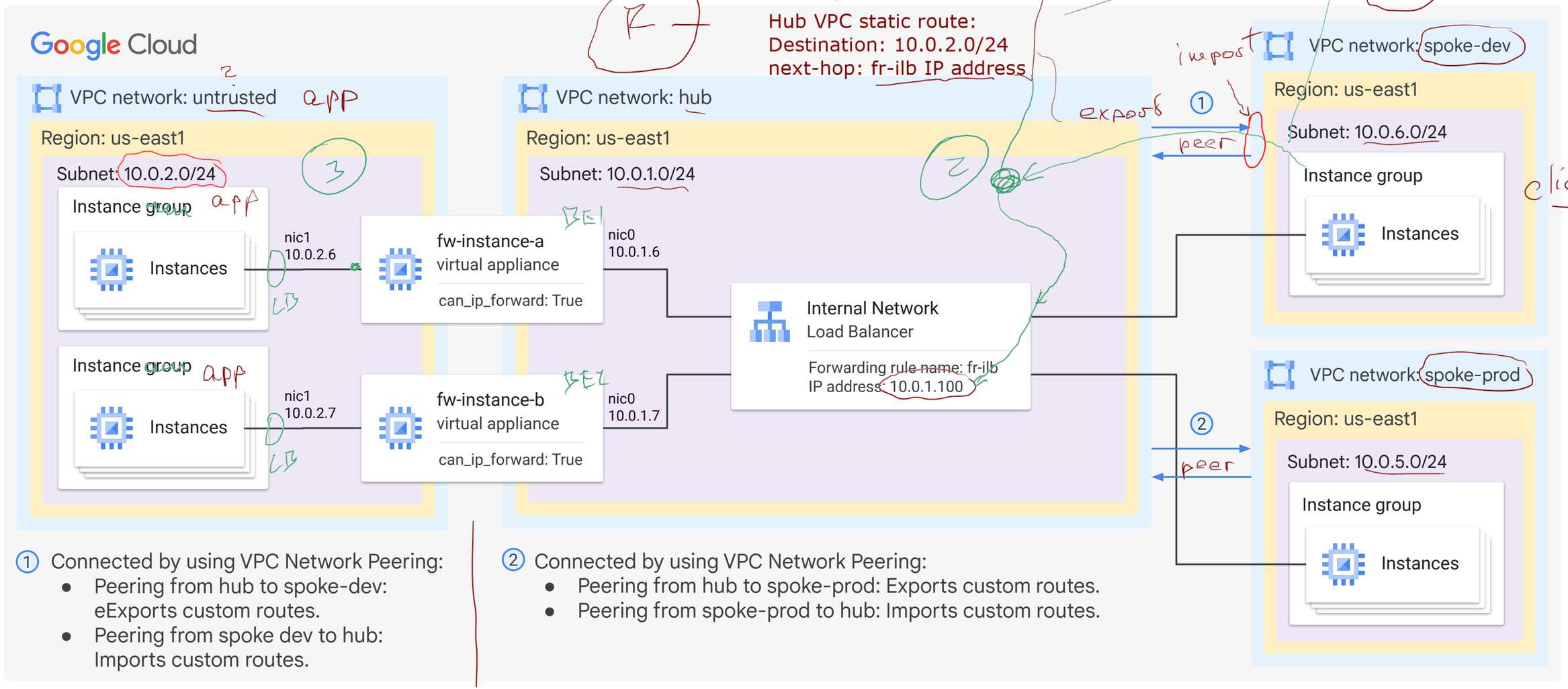
# Specifying the next hop

| Specification option | Next hop network |
| --- | --- |
| Forwarding rule name and the load balancer region | The next hop load balancer and route must be in the same VPC network. |
| Internal IP address of the forwarding rule | The next hop load balancer can be in the same VPC network as the route or in a peered VPC network. |
| Forwarding resource link | The forwarding rule's network must match the route's VPC network. |

# Next hop to a NAT gateway



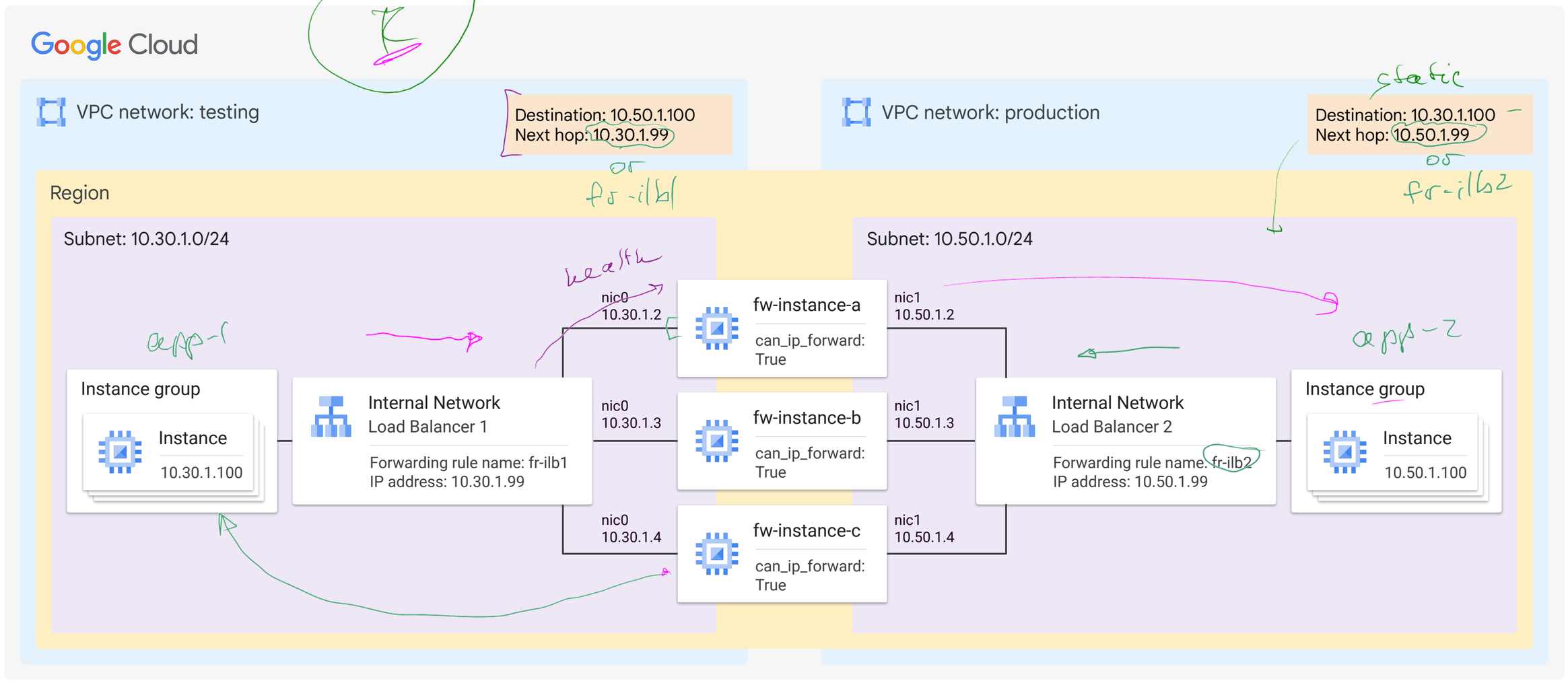
# Using a hub and spoke topology



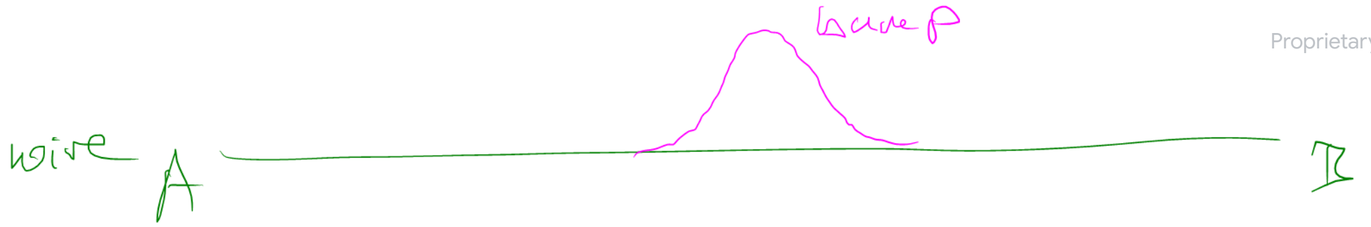

1 Connected by using VPC Network Peering:
- Peering from hub to spoke-dev: eExports custom routes.
- Peering from spoke dev to hub: Imports custom routes.

2 Connected by using VPC Network Peering:
- Peering from hub to spoke-prod: Exports custom routes.
- Peering from spoke-prod to hub: Imports custom routes.

# Load balancing to multiple NICs

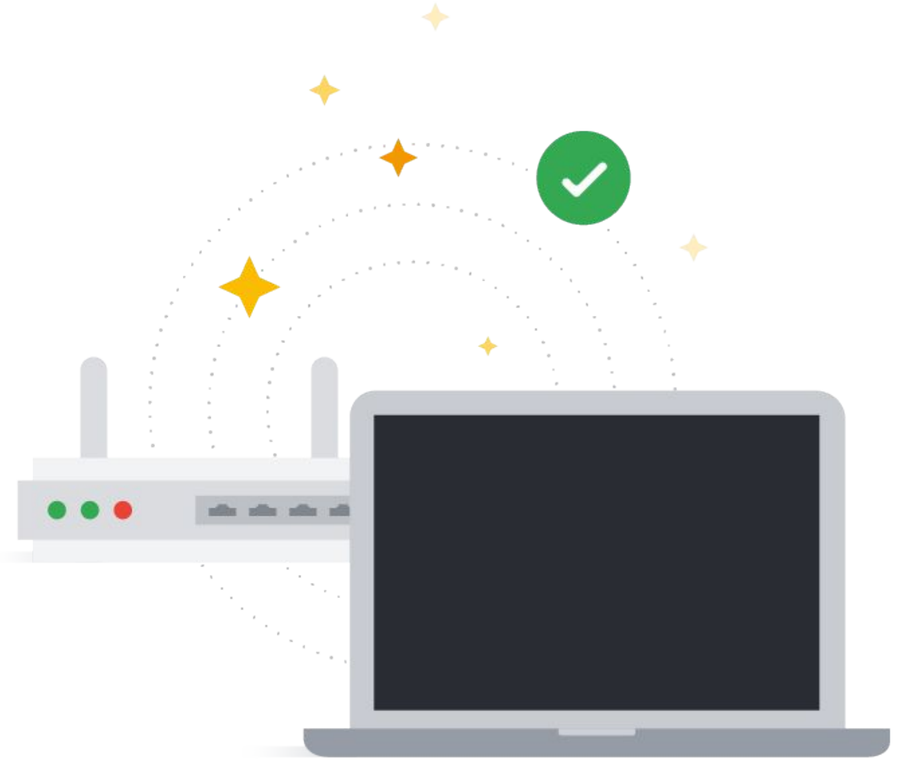


# Benefits




When the load balancer is a next hop for a static route:

- No special configuration is needed within the guest operating systems of the client VMs in the VPC network where the route is defined.
- Client VMs send packets to the load balancer backends through VPC network routing, in a bump-in-the-wire fashion.
- It also provides the same benefits as standalone internal passthrough Network Load Balancer.



# Caveats: Internal Network Load Balancers as next hops

01 Enable global access on the VPC network so that the next hop is usable from all regions.

02 Even if all health checks fail, the load balancer next hop is still in effect.

03 The load balancer must use an IP address that is unique to a load balancer forwarding rule.

# Caveats: Internal Network Load Balancers as next hops

04 Two or more custom static route next hops with the same destination that use different load balancers are never distributed by using ECMP.

05 To route identical source IP addresses to the same backend, use the client IP, no destination (CLIENT_IP_NO_DESTINATION) session affinity option.

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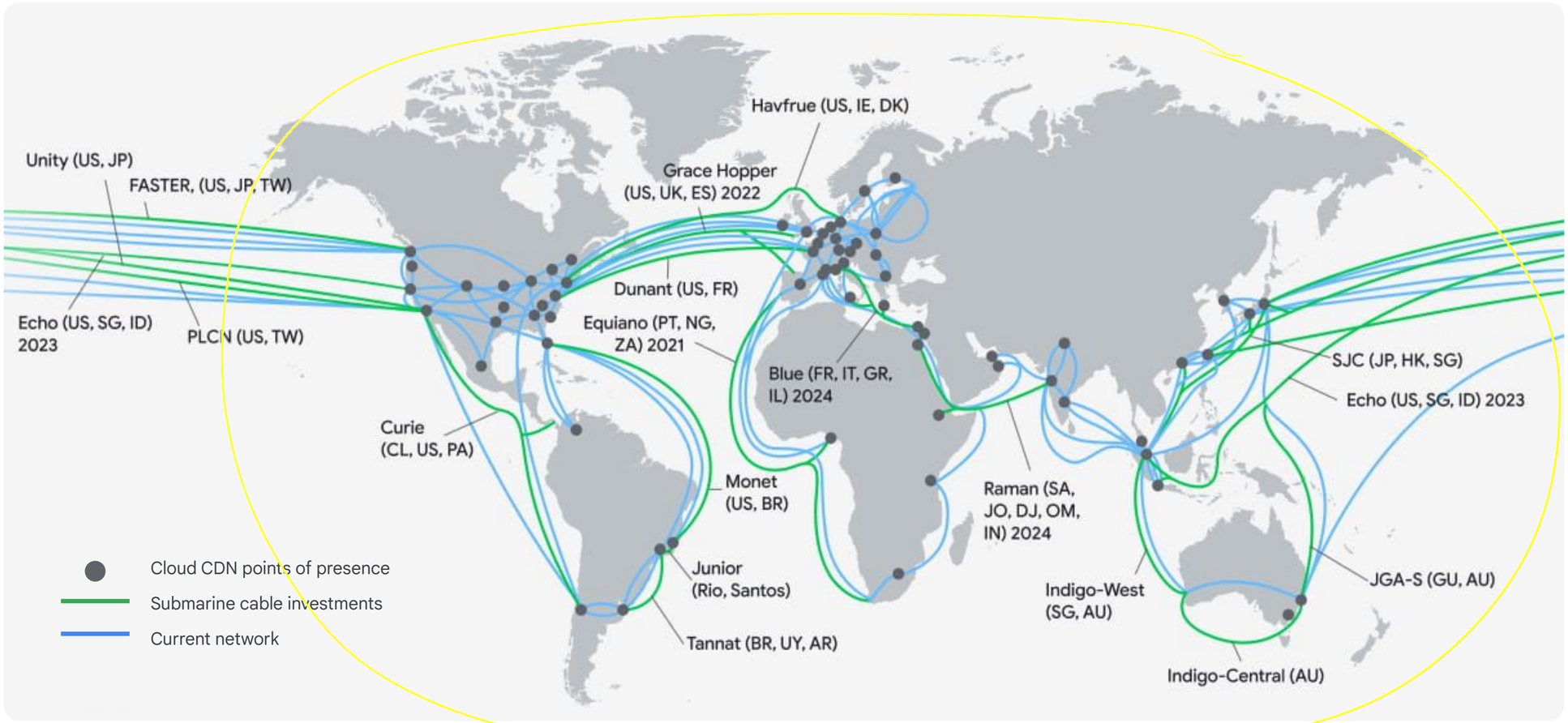
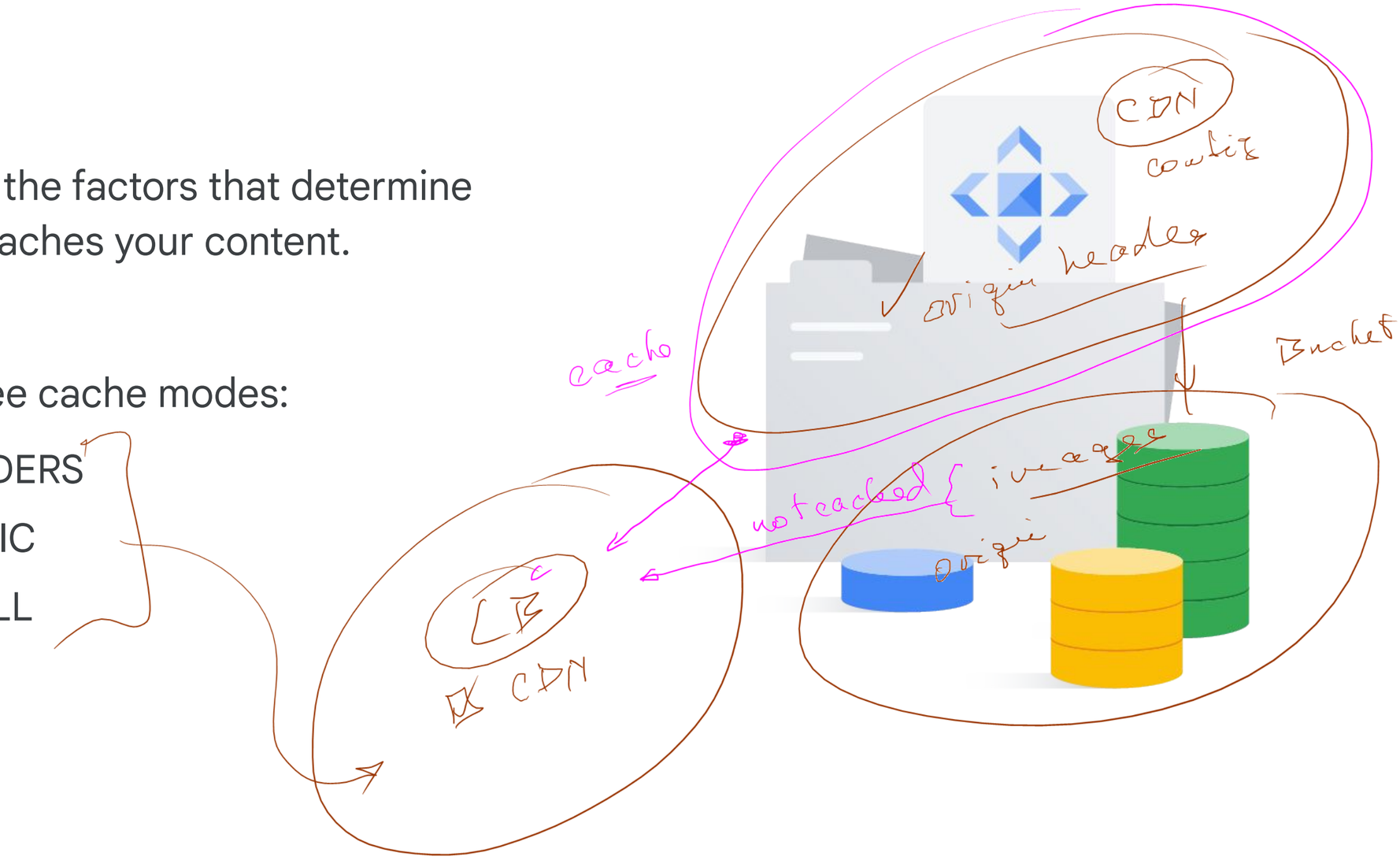
# Cloud CDN (content delivery network)



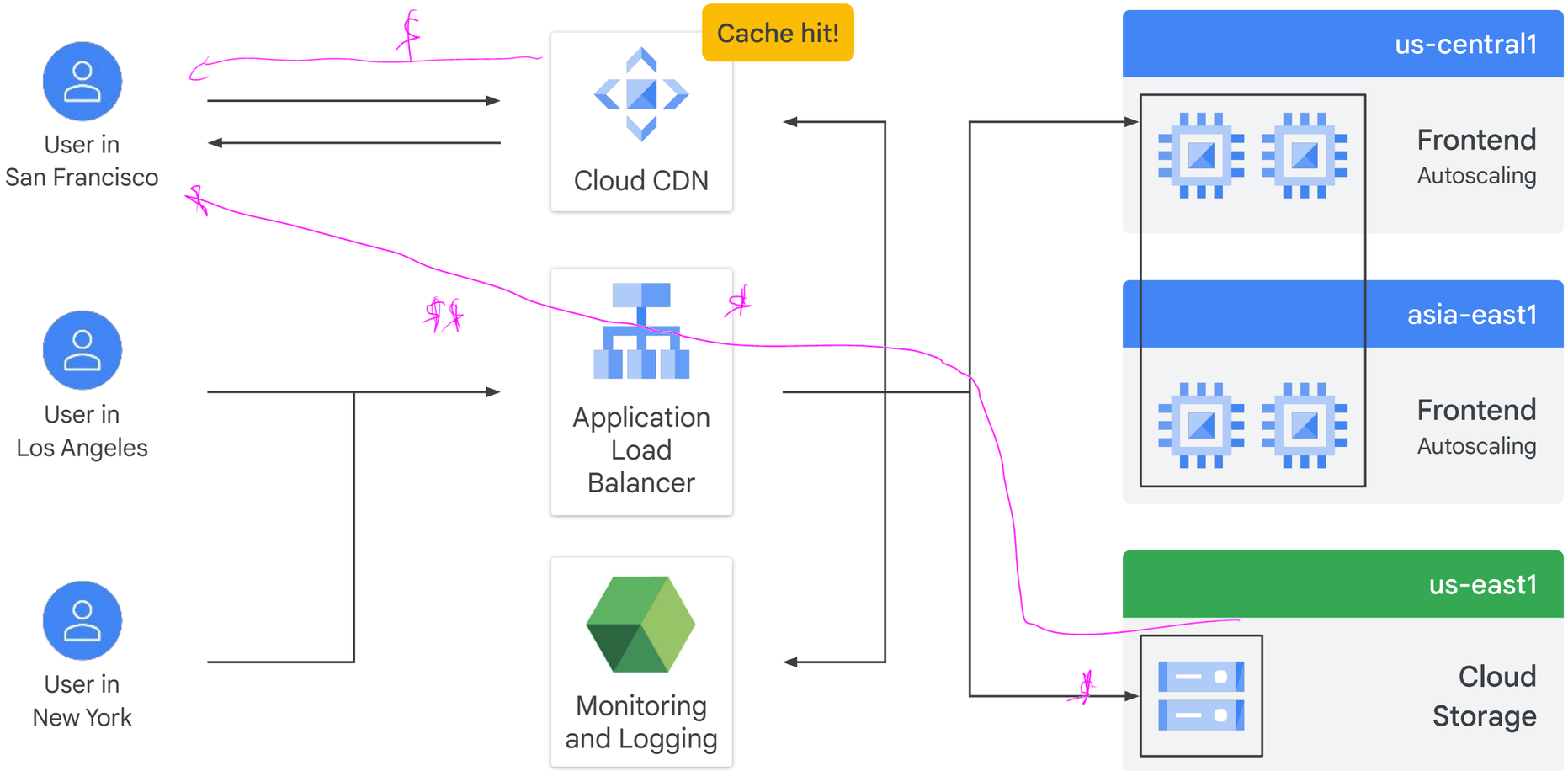
# Cloud CDN cache modes

- Cache modes control the factors that determine whether Cloud CDN caches your content.

- Cloud CDN offers three cache modes:
  - USE_ORIGIN_HEADERS
  - CACHE_ALL_STATIC
  - FORCE_CACHE_ALL



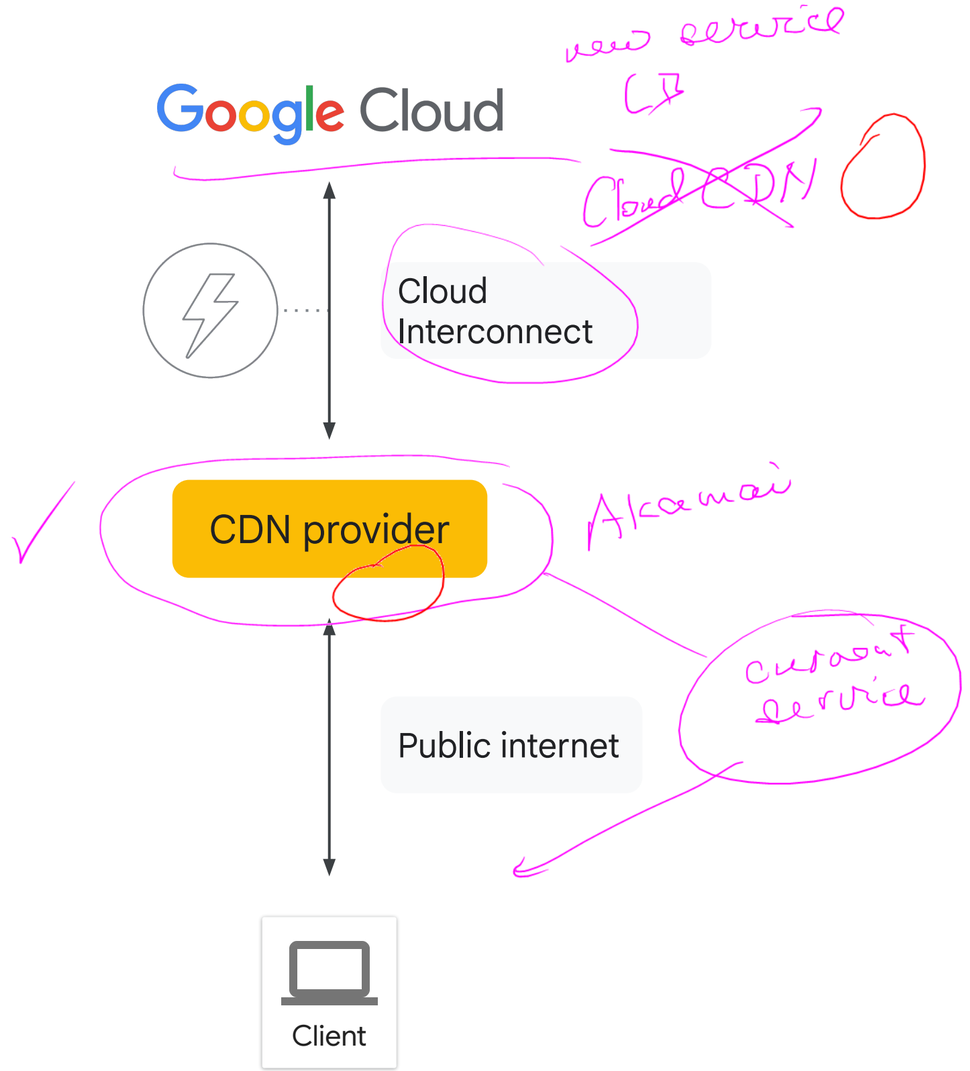
# Caching Content with Cloud CDN



# CDN Interconnect

CDN Interconnect lets you:

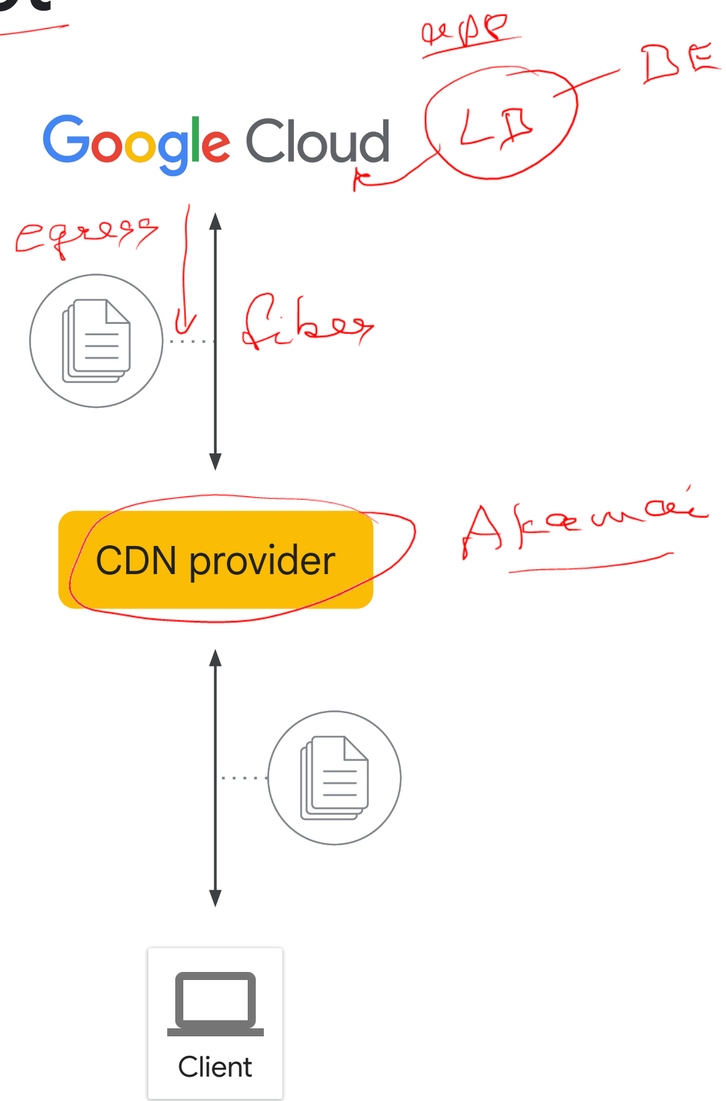
- Select third-party Cloud CDN providers to establish Direct Interconnect links at edge locations in the Google network.
- Direct your traffic from your VPC networks to a provider network.
- Optimize your Cloud CDN cache population costs.



# Typical use cases for CDN Interconnect

01 High-volume egress traffic.

02 Frequent content updates.



# CDN Interconnect traffic billing

- Ingress traffic is free for all regions.
- Egress traffic rates apply only to data that leaves Compute Engine or Cloud Storage.
- The reduced price applies only to IPv4 traffic.
- Egress charges for CDN Interconnect appear on the invoice as Compute Engine Network Egress via Carrier Peering Network.

# Setting up CDN Interconnect

- CDN Interconnect does not require any configuration or integration with Cloud Load Balancing.
- **Work with your supported CDN provider to:**
  - Learn which locations are supported.
  - Correctly configure your deployment to use intra-region egress routes.

work w/ Google

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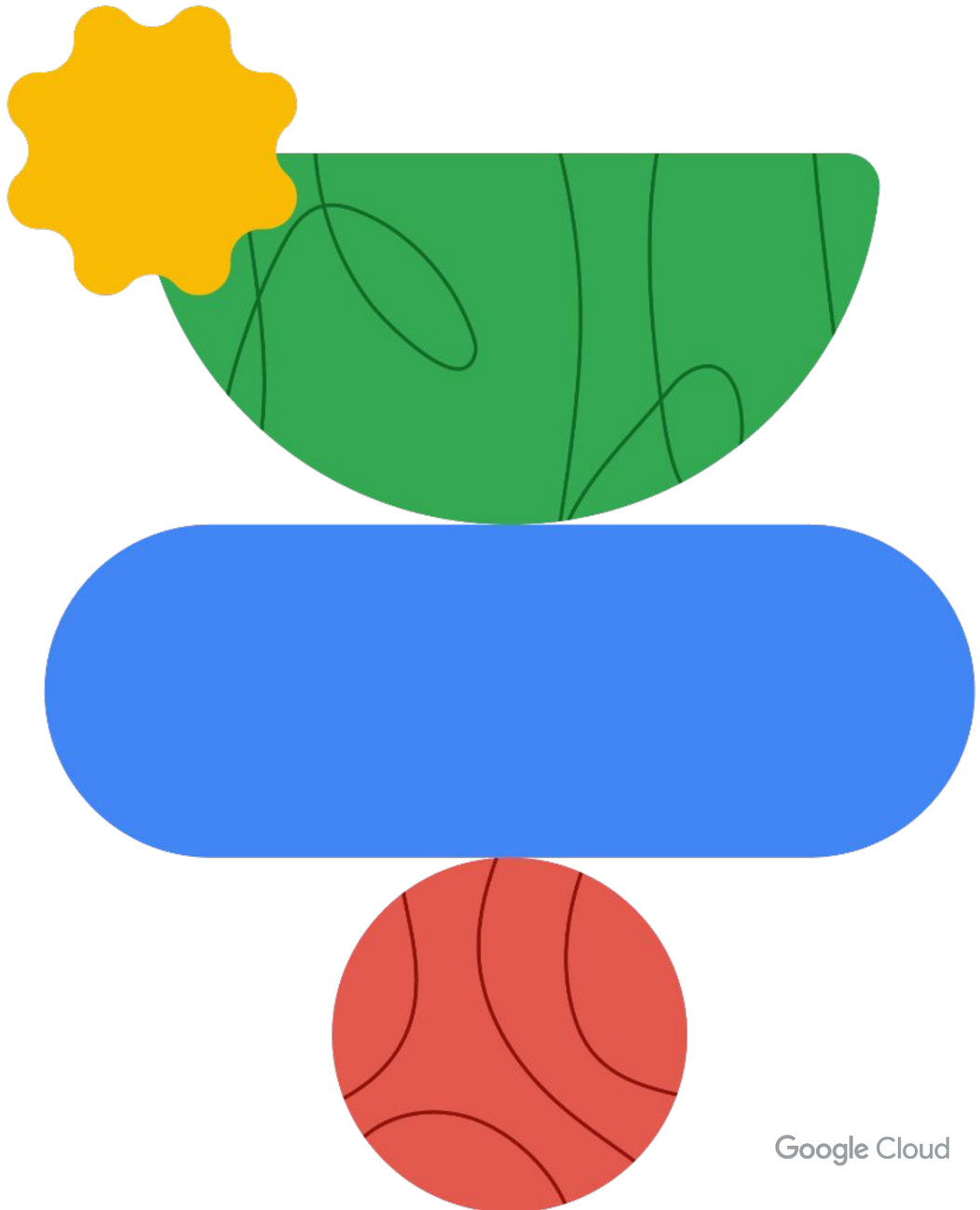
# Lab intro

Defending Edge Cache with Cloud Armor



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# Cost optimization strategies:

## Autoscaling

01 Dynamically adjust resources.

02 Define scaling threshold.

03 Utilize custom metrics.

# Cost optimization strategies: Rightsizing

01 Choose the right load balancer based on your traffic type and requirements.

02 Match resources to workload.

03 Regularly review resource utilization.

# Cost optimization strategies: Using monitoring and management tools

01 Use Cloud Monitoring to gain insights into load balancer and backend instance performance.

02 Leverage Cloud Billing and Cloud cost management tools to track load balancing costs.

03 Implement cost allocation tags to categorize costs for tracking and optimization.

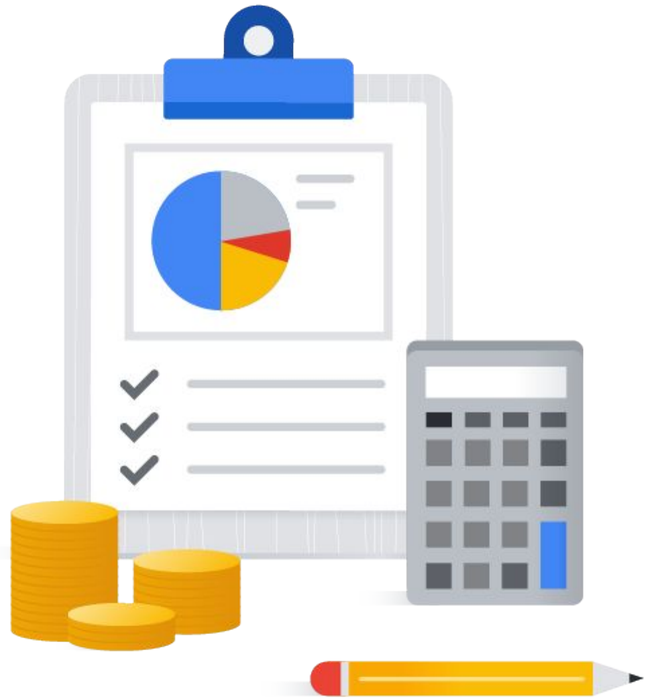
# Other cost optimization strategies

01 Schedule downtimes for non-critical workfload during low traffic time.

02 Use reserved instances for predictable workloads.

03 Use spot instances for non-critical workloads.

04 Integrate Cloud CDN with a load balancer to reduce load on backend instances.



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# Quiz | Question 1

## Question

When you use the internal IP address of the forwarding rule to specify an internal Network Load Balancer next hop, the load balancer can only be:

A. In the same VPC network as the next hop route.

B. In the same VPC network as the next hop route or in a peered VPC network.

C. In the same subnet as the next hop route.

D. In the same subnet as the next hop route or a shared VPC network.

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# Quiz | Question 3

## Question

CDN Interconnect provides:

A. A direct connection between your origin servers and Google's Cloud Load Balancing service.

B. A direct peering connection between third-party content delivery networks (CDNs) and Google's edge network.

C. A private connection between your on-premises network and Google Cloud

D. A virtual private network (VPN) tunnel between your VPC network and Google's global network.

# Quiz | Question 2

## Answer

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# Quiz | Question 3

## Question

Which of the following best practices help optimize load balancing cost?

A. Choosing a load balancer based on your traffic type.

B. Choosing a load balancer type that closely matches your traffic patterns.

C. Implementing a caching layer with a content delivery network (CDN).

D. Increasing your timeout periods for load balancer health checks.

# Quiz | Question 3

## Answer

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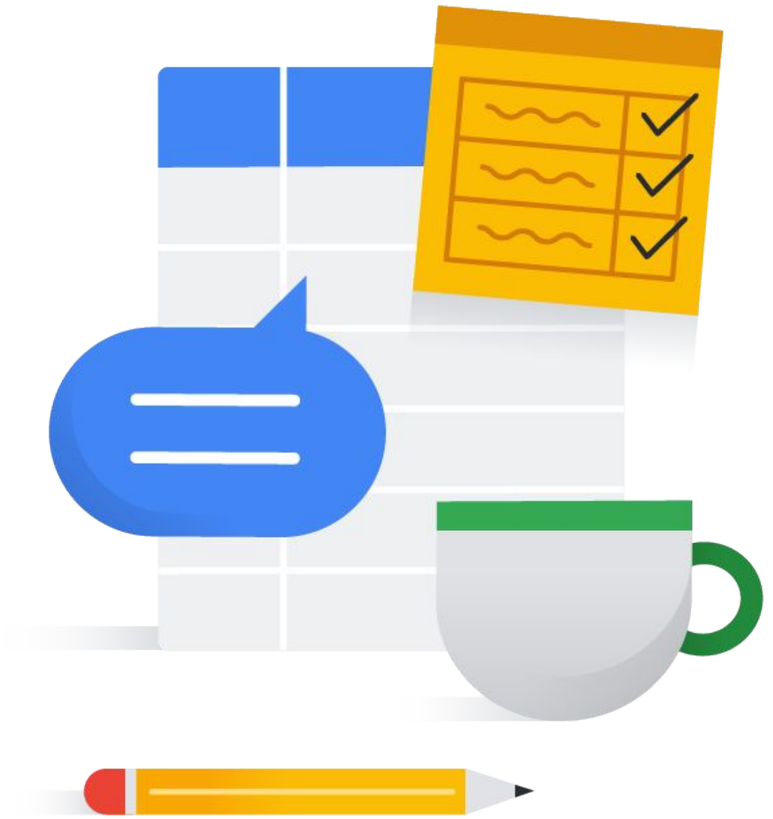
# Debrief



Thank you.