Google Cloud

Networking in Google Cloud

Hybrid Load Balancing and Traffic Management

Today's agenda

01 Load balancing

02 Hybrid load balancing

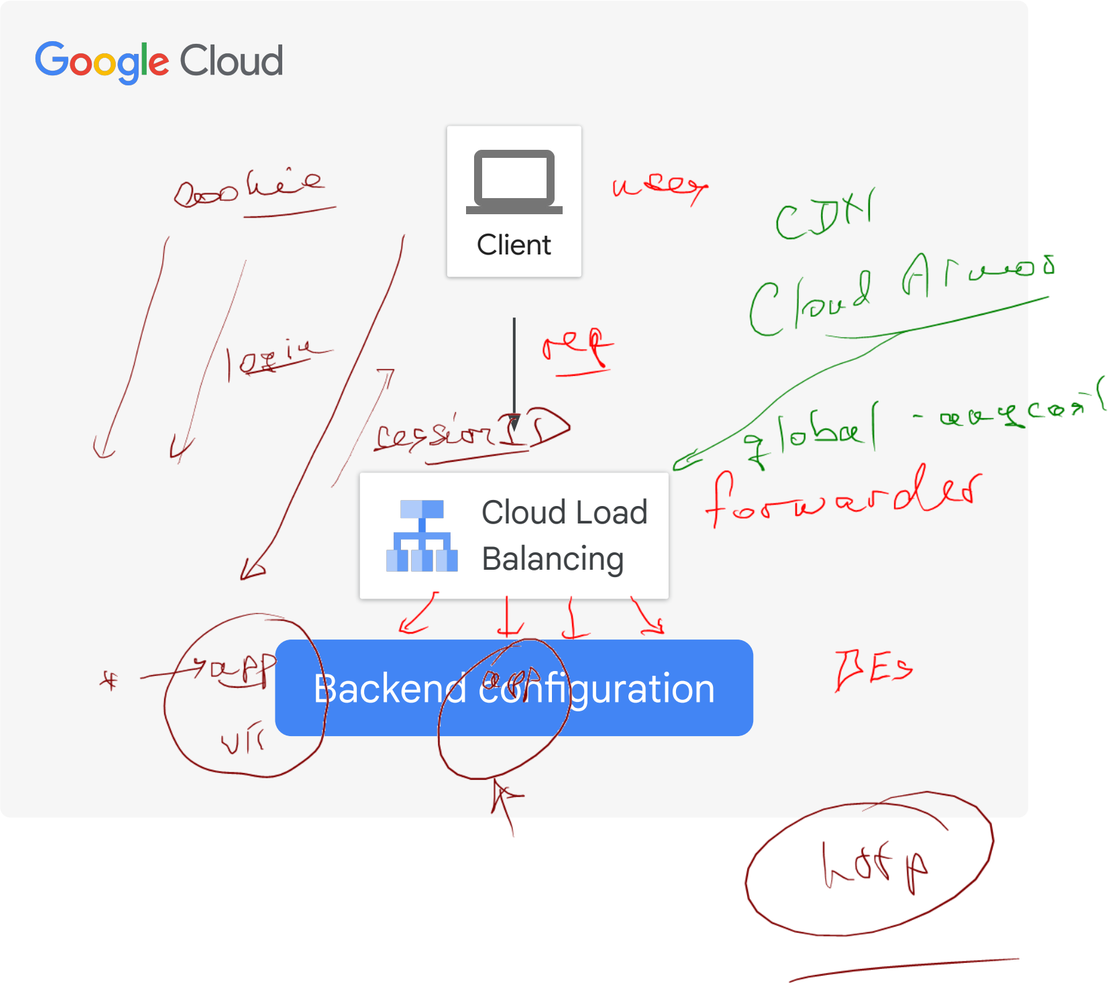
03 Traffic management

04 Lab: Configuring Traffic Management with a Load Balancer

05 Quiz

Overview of Cloud Load Balancing

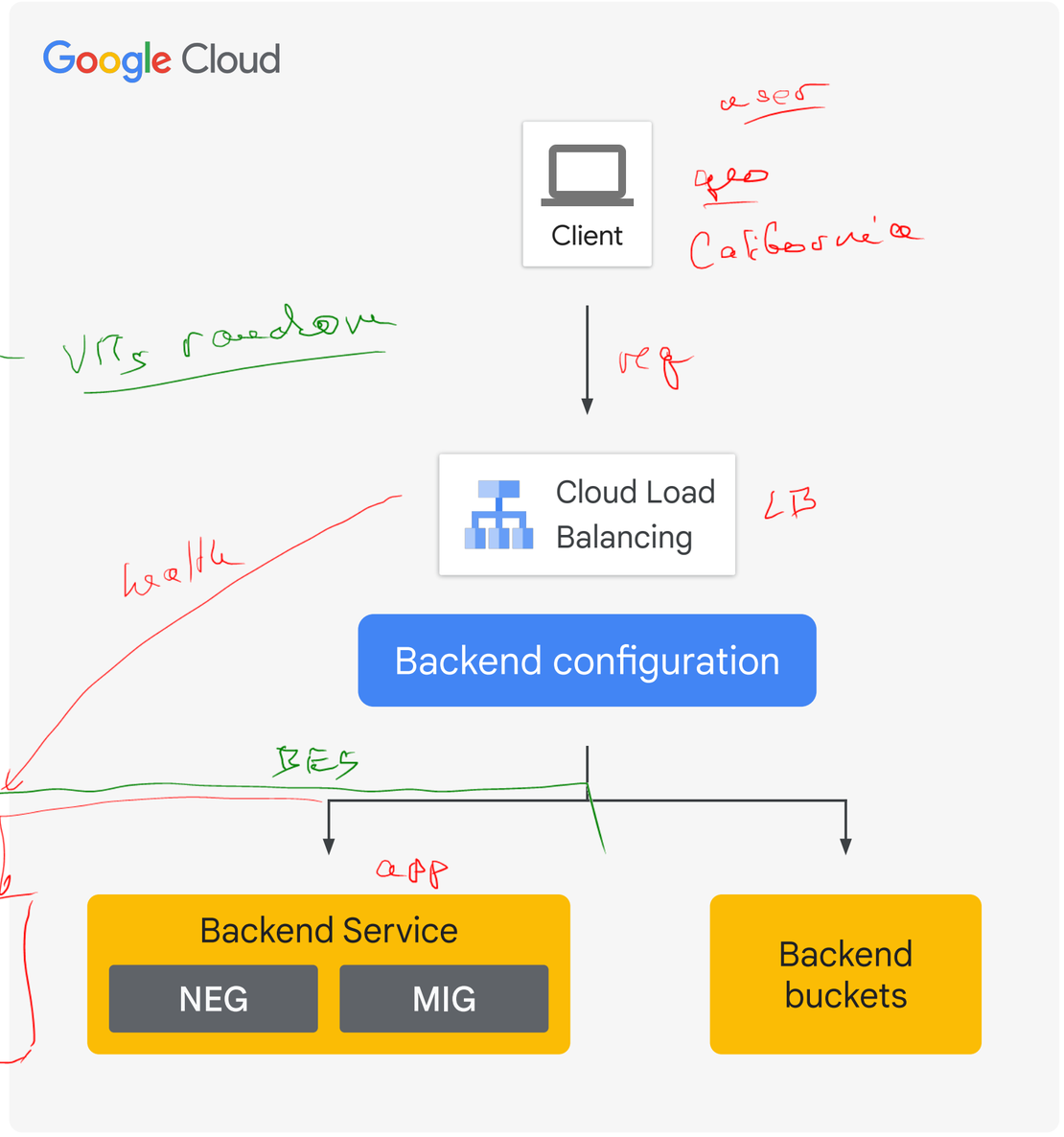
- Cloud Load Balancing receives client traffic.
- The backend can be a backend service or a backend bucket.
- Backend configuration defines:
  - How traffic is distributed.
  - Which health check to use.
  - If session affinity is used.
  - Which other services are used (such as Cloud CDN or Identity-Aware Proxy).



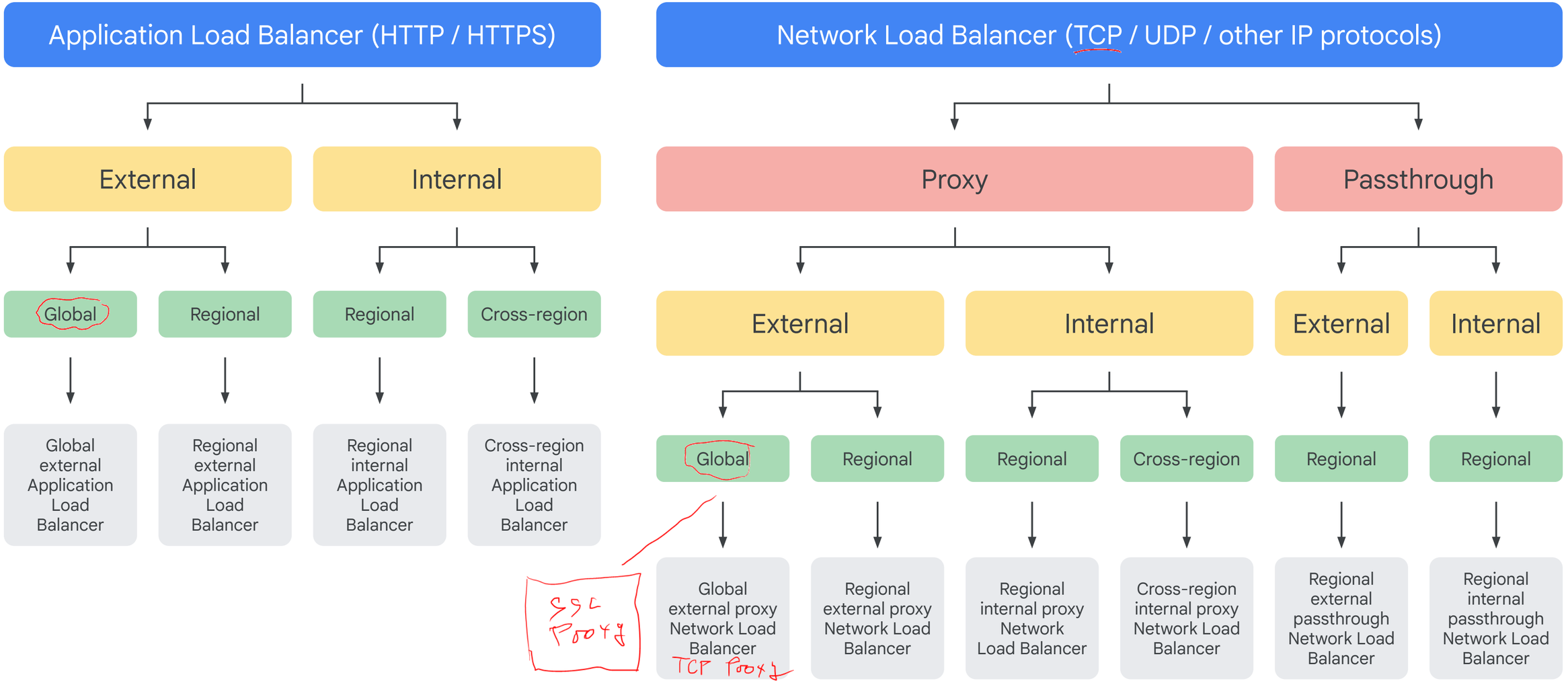
Backend configuration

Cloud Load Balancing can route traffic to:

- Backend Services:
  - Managed instance groups: a group of virtual machines created from a template.
  - Network endpoint groups (NEGs): a group of services or workloads.
- Cloud Storage backend buckets.

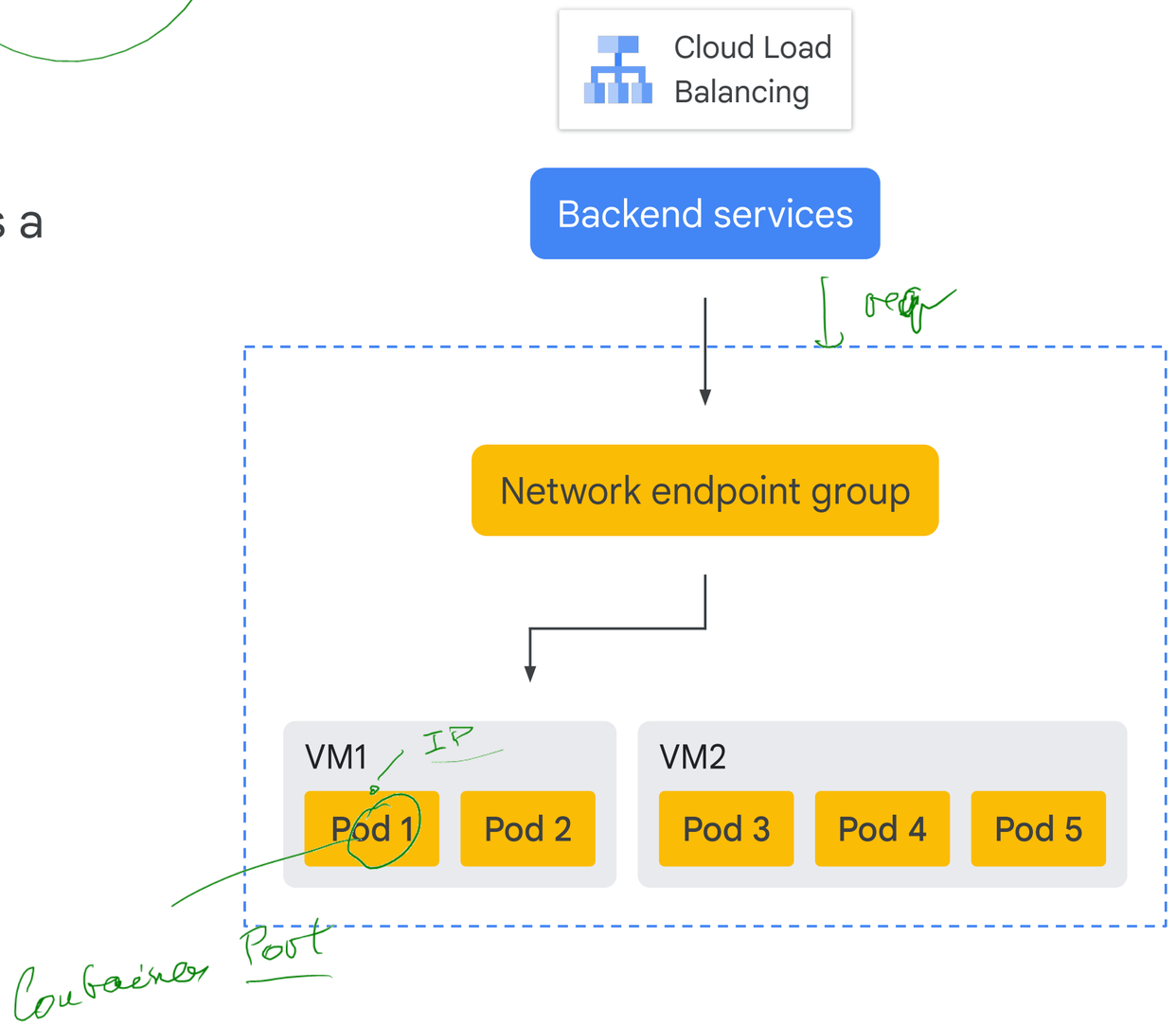


Types of load balancers



Network endpoint groups (NEGs)

- A NEG is a configuration object that specifies a group of backend endpoints or services.
- A common use case for this configuration is deploying services in GKE.
- There are five types of NEGs:
  - Zonal
  - Internet
  - Serverless
  - Private Service Connect
  - Hybrid connectivity



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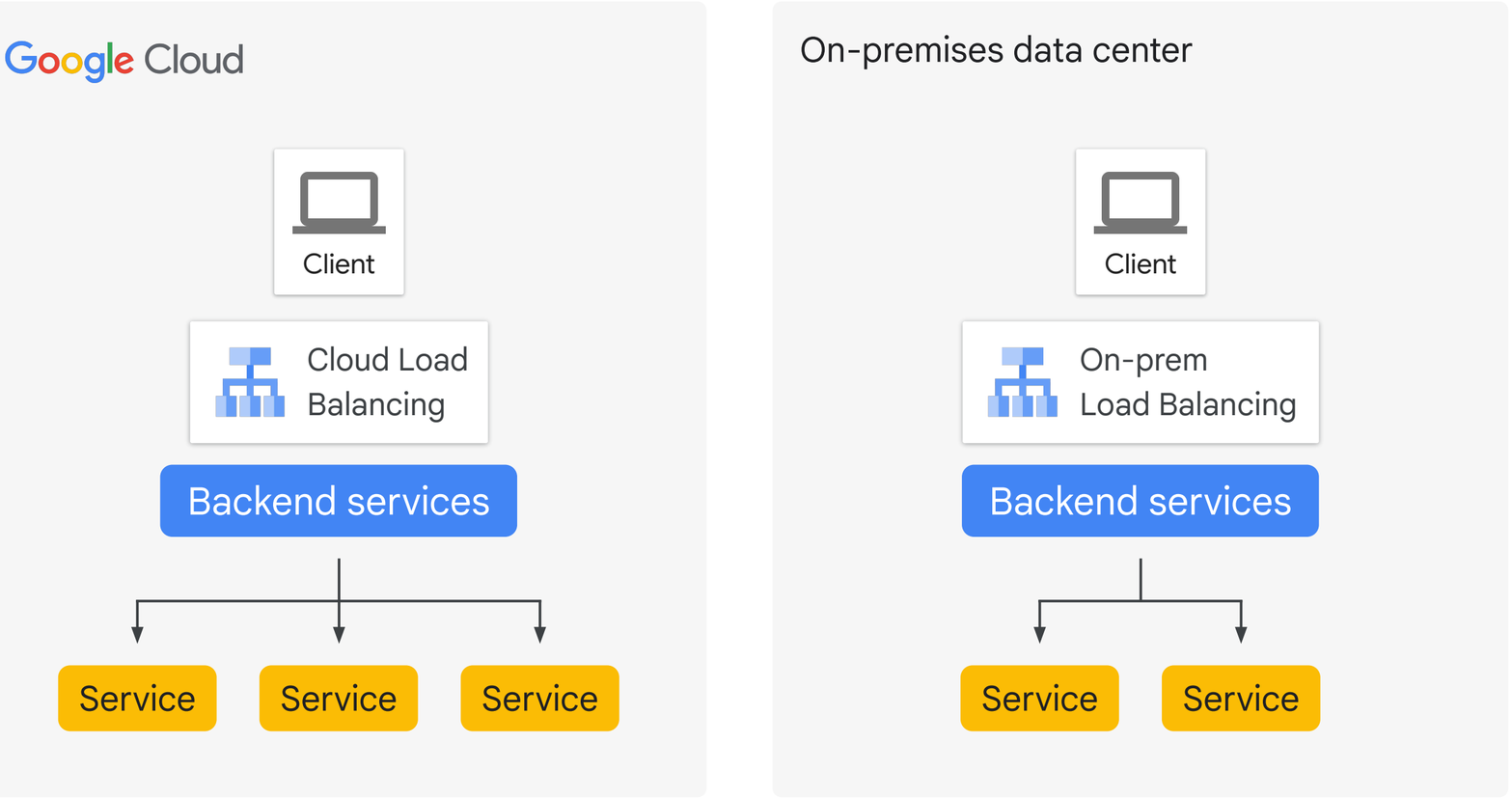
Hybrid connectivity and load balancing

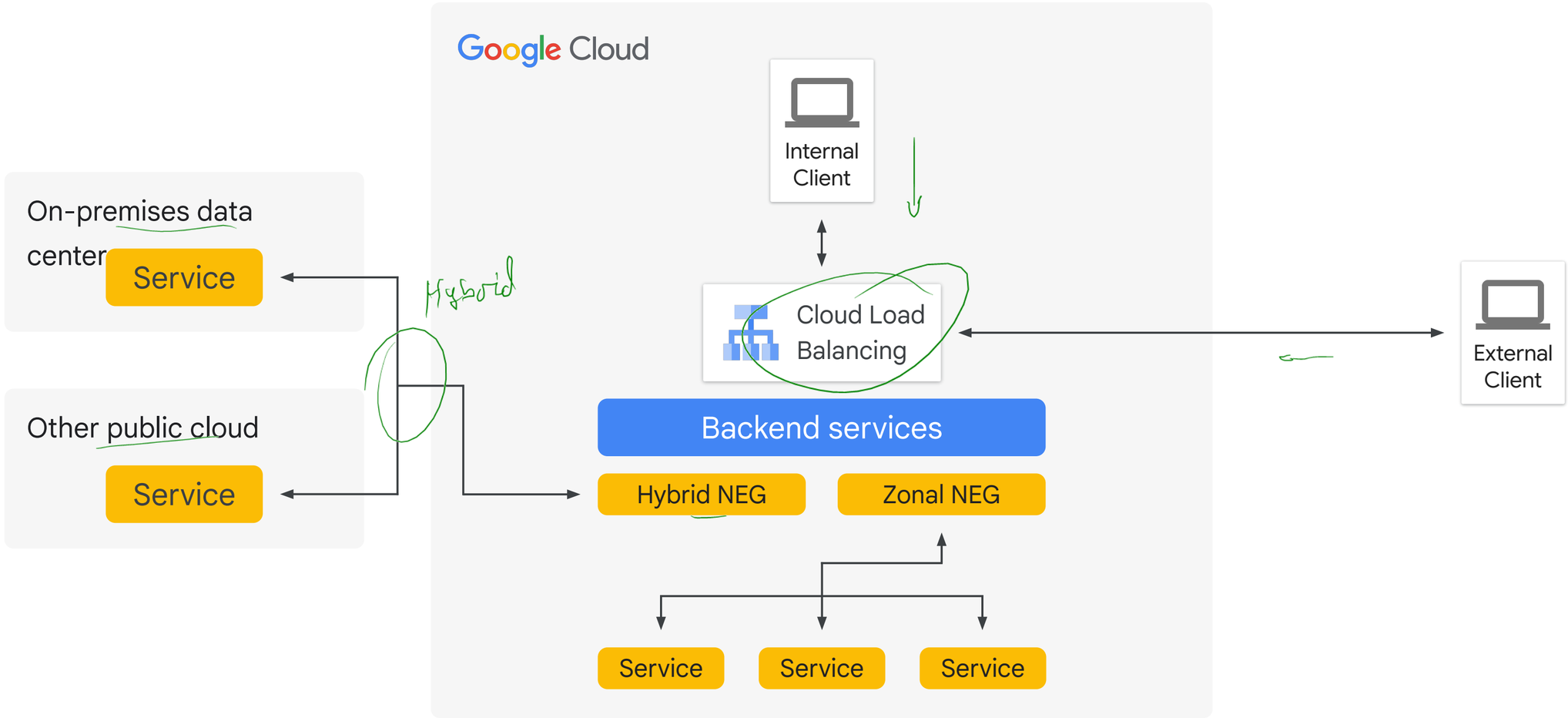
- A hybrid strategy lets you extend Cloud Load Balancing to workloads that run on your existing infrastructure outside of Google Cloud.
- This strategy could be:
  - Permanent to provide multiple platforms for your workloads.
  - Temporary as you prepare to migrate your internal or external workload to Google Cloud.

Use case: Complexity distributing load in hybrid environment



- Maintaining two load balancers
- Routing traffic from on-prem to cloud

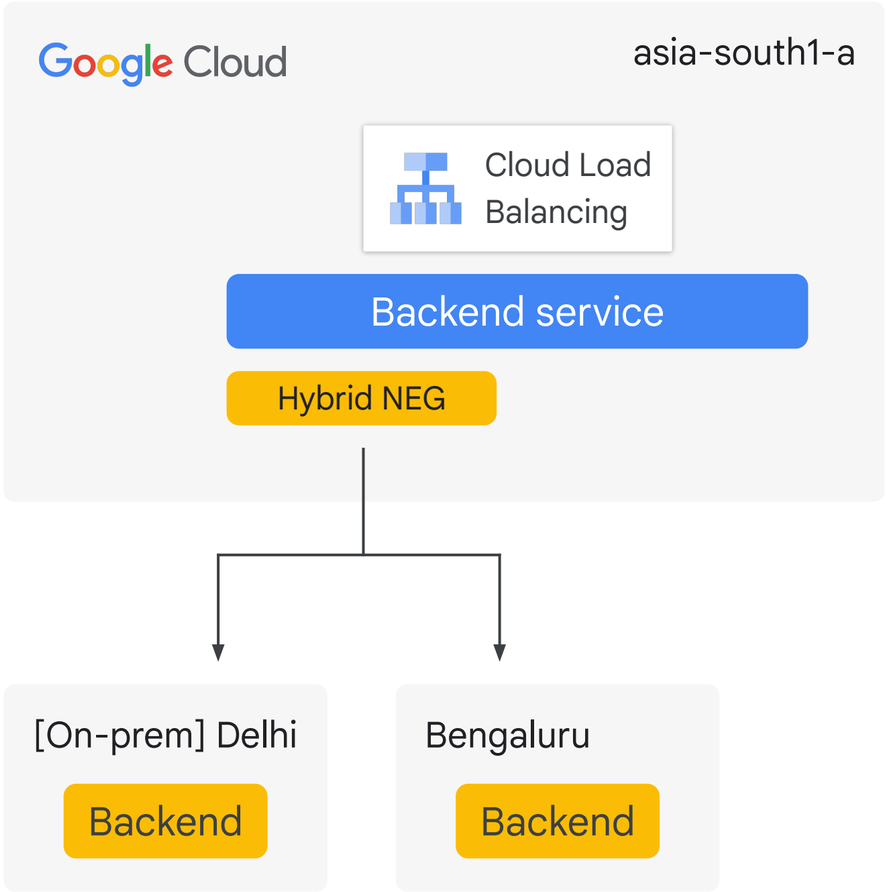
Use case: Jie can benefit from hybrid load balancing



Configuring backend services outside of Google Cloud

- Configure one or more hybrid connectivity network endpoint groups (NEGs):
  - Add the IP address
  - Specify a Google Cloud zone
  - Add a health check to the NEG.

- Add the hybrid connectivity NEGs to a hybrid load balancer backend service.



Types of load balancers that support hybrid load balancing – NEG

- Global external Application Load Balancer
- Classic Application Load Balancer
- Regional external Application Load Balancer
- Cross-region internal Application Load Balancer
- Regional internal Application Load Balancer
- Global External proxy Network Load Balancer
- Regional External proxy Network Load Balancer
- Regional internal proxy Network Load Balancer
- Cross-region internal proxy Network Load Balancer

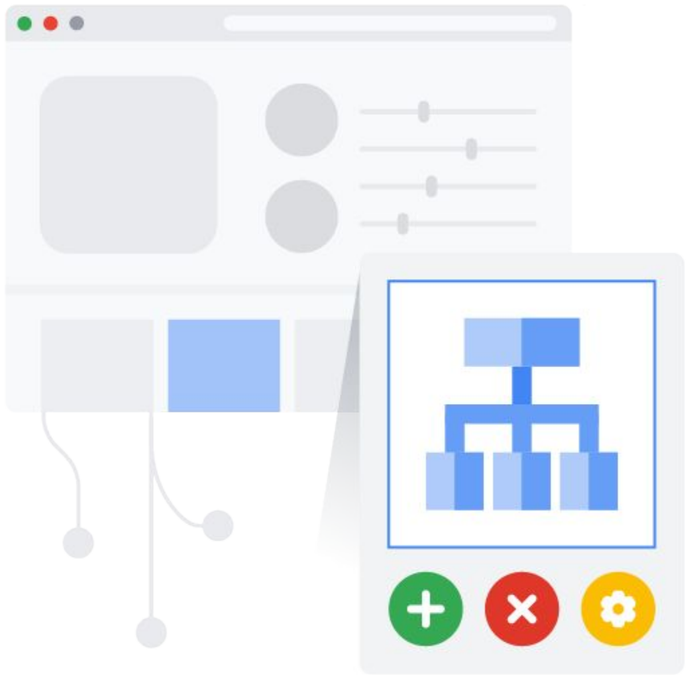
Caveats: Hybrid load balancing

01 To create, delete, or manage a load balancer with mixed zonal and hybrid connectivity NEGs backends in a single backend service, use the Google Cloud CLI or the REST API.

02 Regional dynamic routing and static routes are not supported.

03 The internal Application Load Balancer and hybrid connectivity must be configured in the same region.

04 Ensure that you also review the security settings on your hybrid connectivity configuration.



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03 Traffic management – URL 나누기

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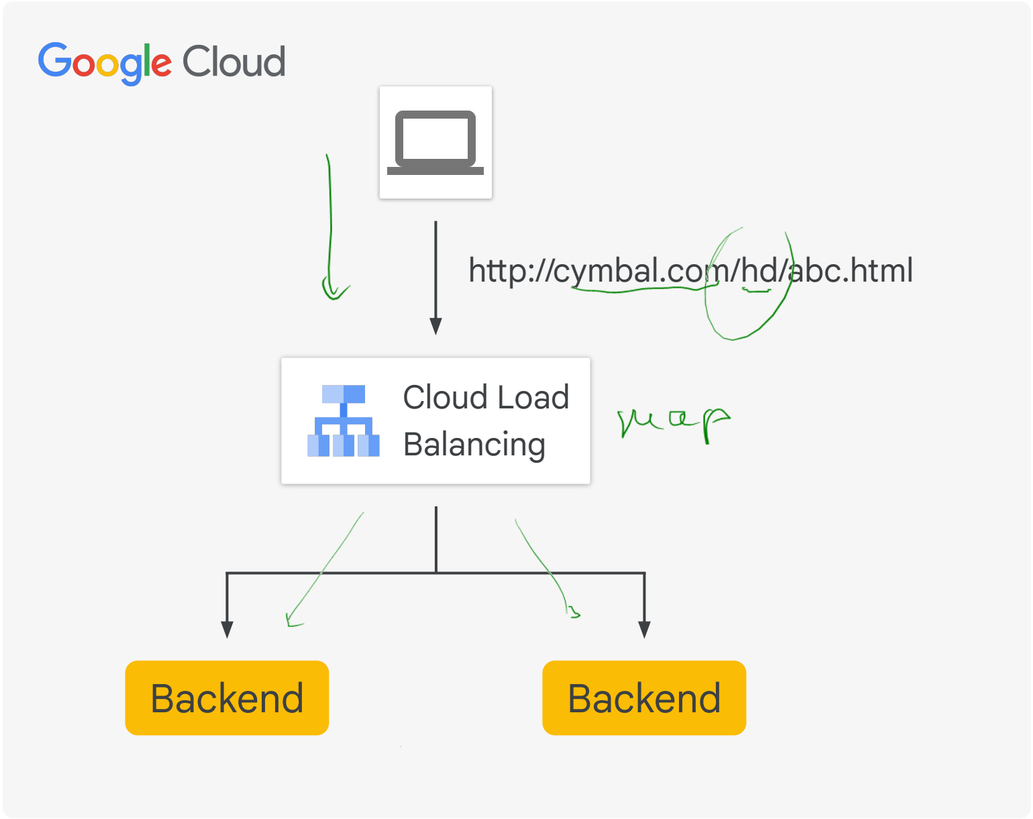
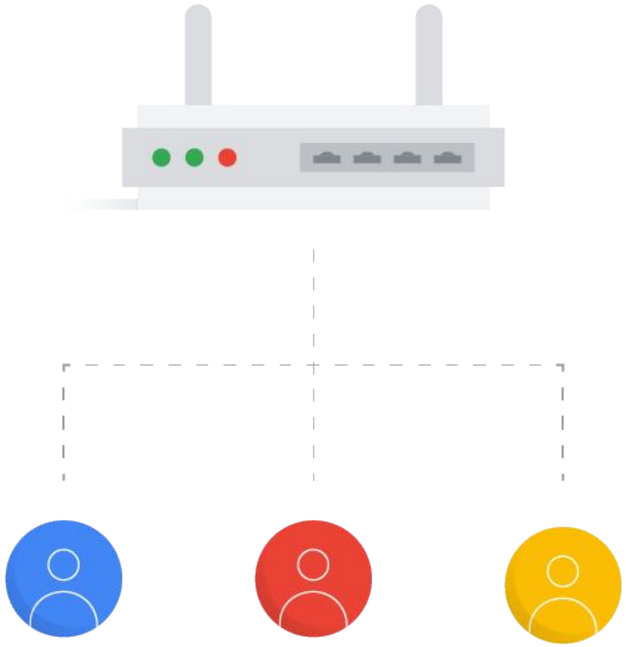
Use case: Distribute traffic by using URL map



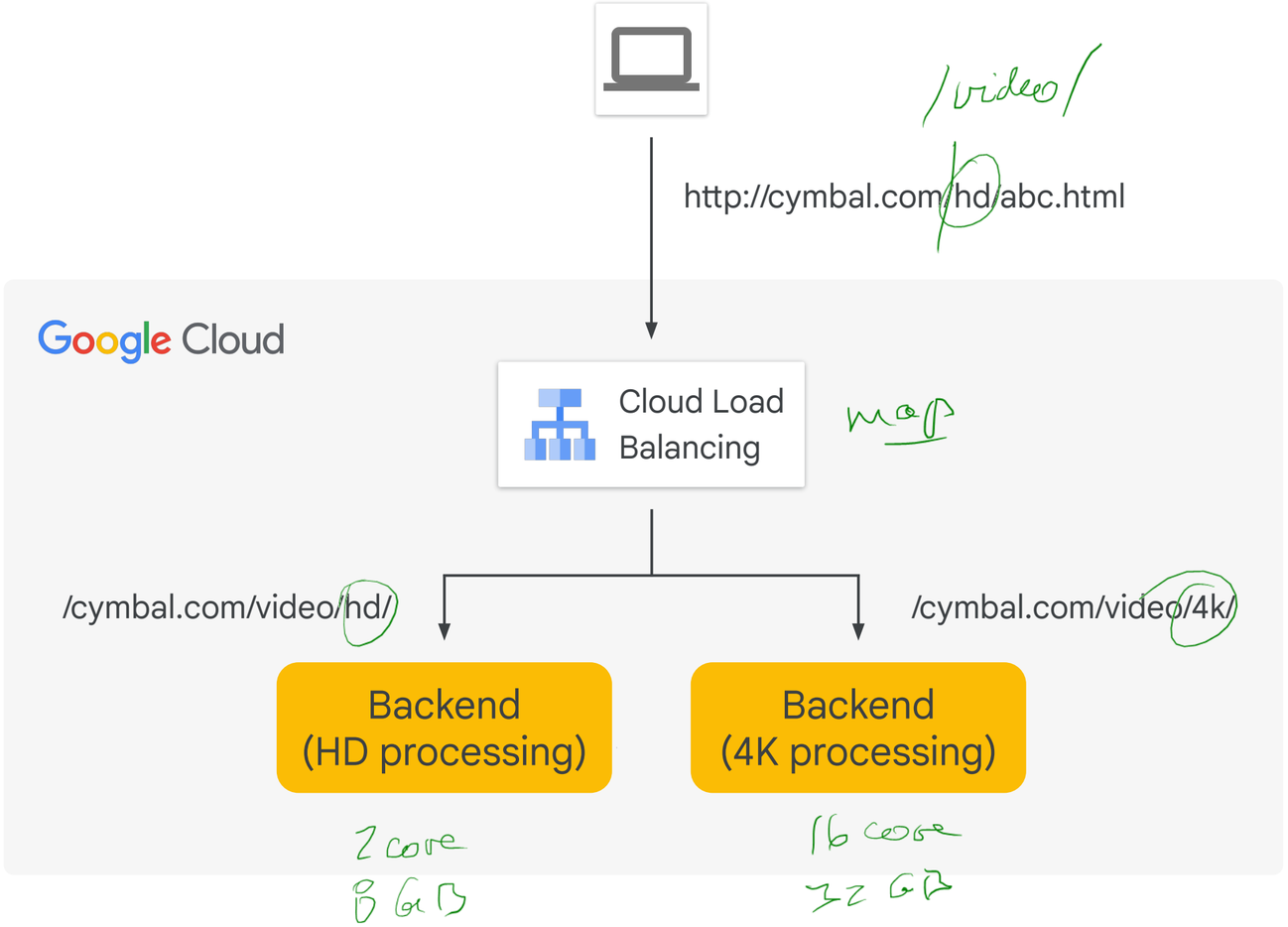


Distribute traffic based on video quality to optimizing performance

Traffic management

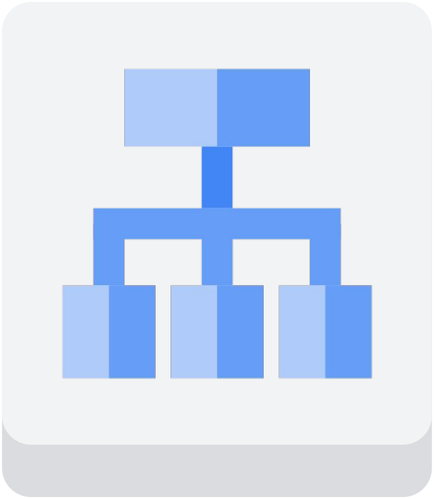
- Traffic management provides enhanced features to route load balancer traffic based on criteria that you specify.

- With traffic management, you can:
  - Direct traffic to a backend based on HTTPS parameters.
  - Perform request-based and response-based actions.
  - Use traffic policies to fine-tune load balancing behavior.



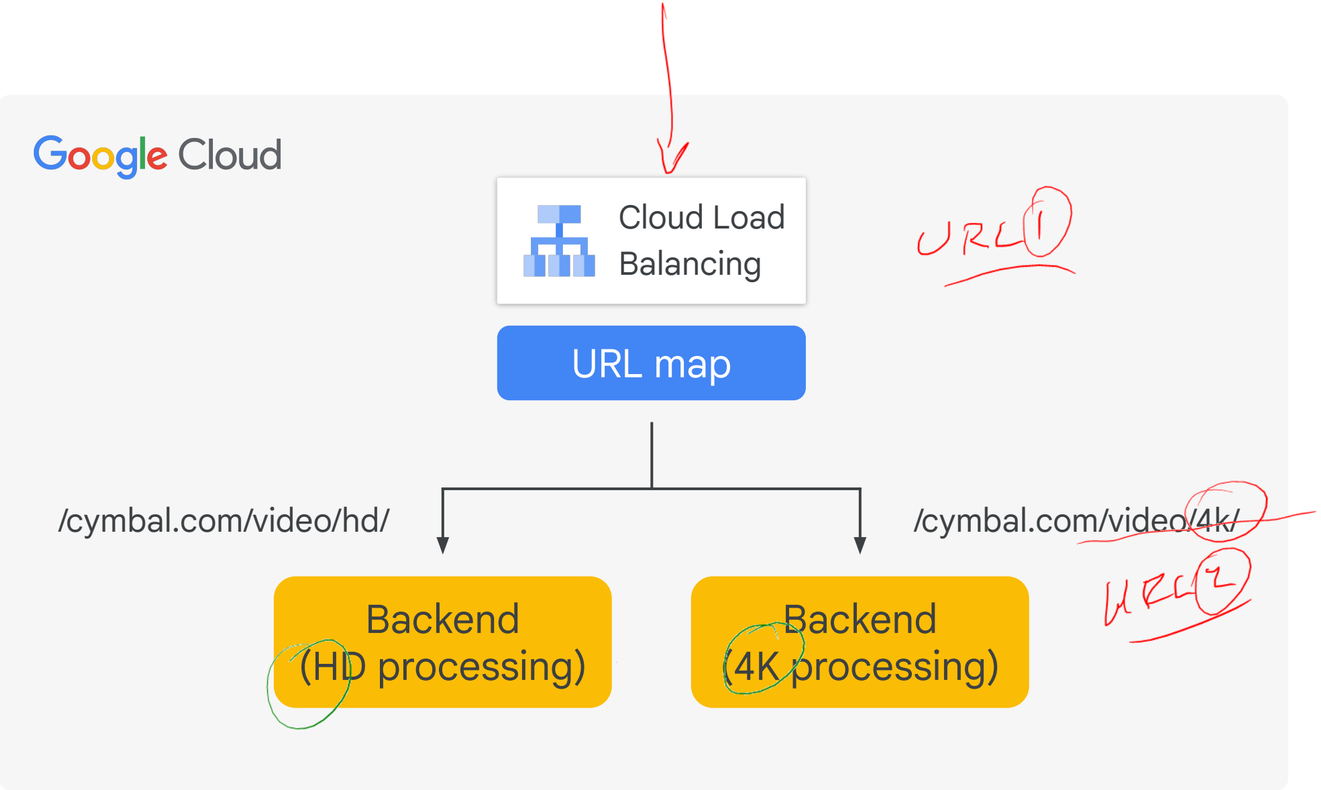
Supported load balancers

- These load balancers support traffic management features:
  - Global external Application Load Balancer
  - Global external classic Application Load Balancer
  - Regional external Application Load Balancer
  - Internal Application Load Balancer
- Other load balancers have access only to traffic features that are available in backend services, such as balancing mode and session affinity.
- For a complete list of features supported by each load balancer, refer to Routing and traffic management.

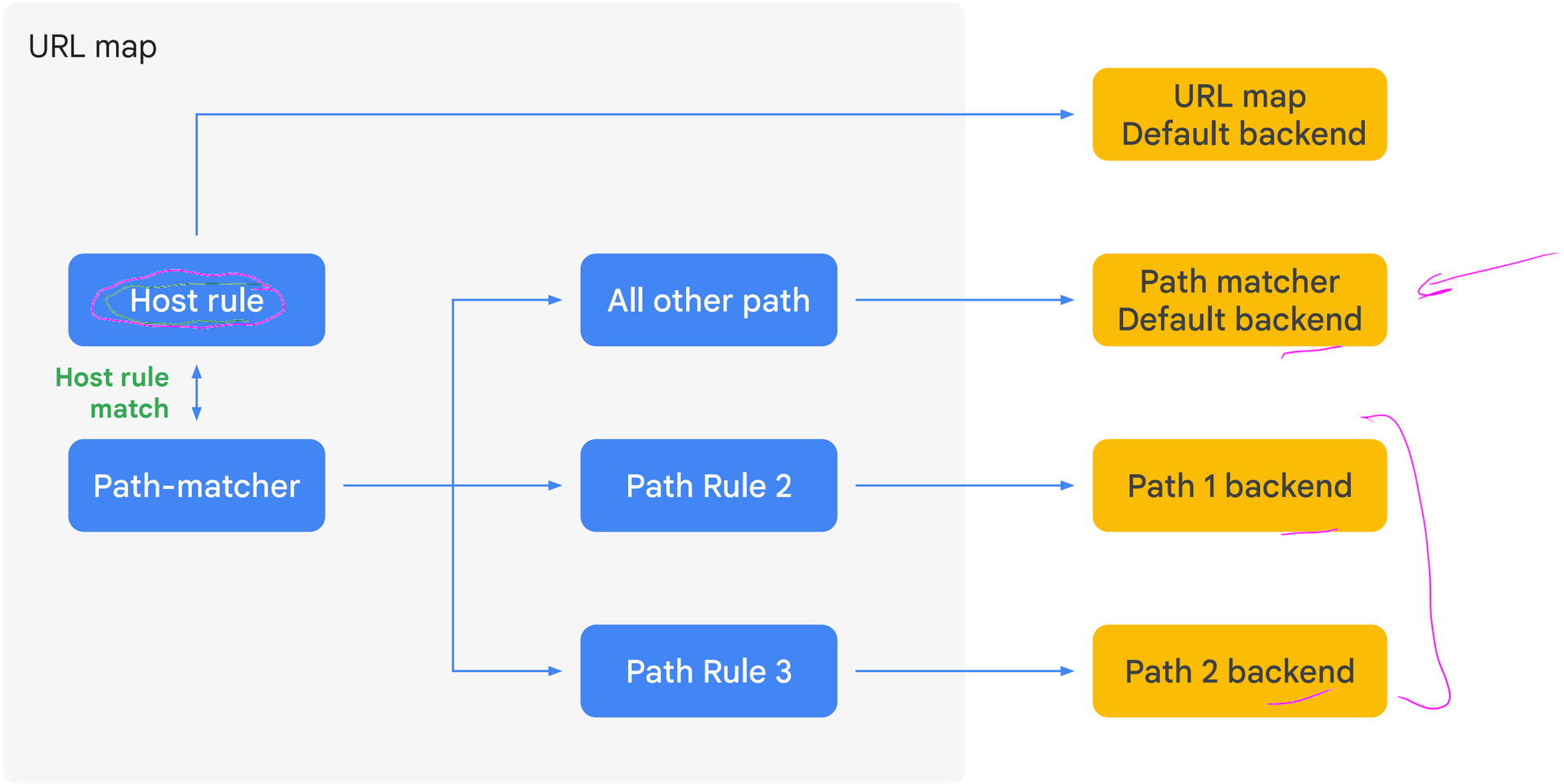


URL map

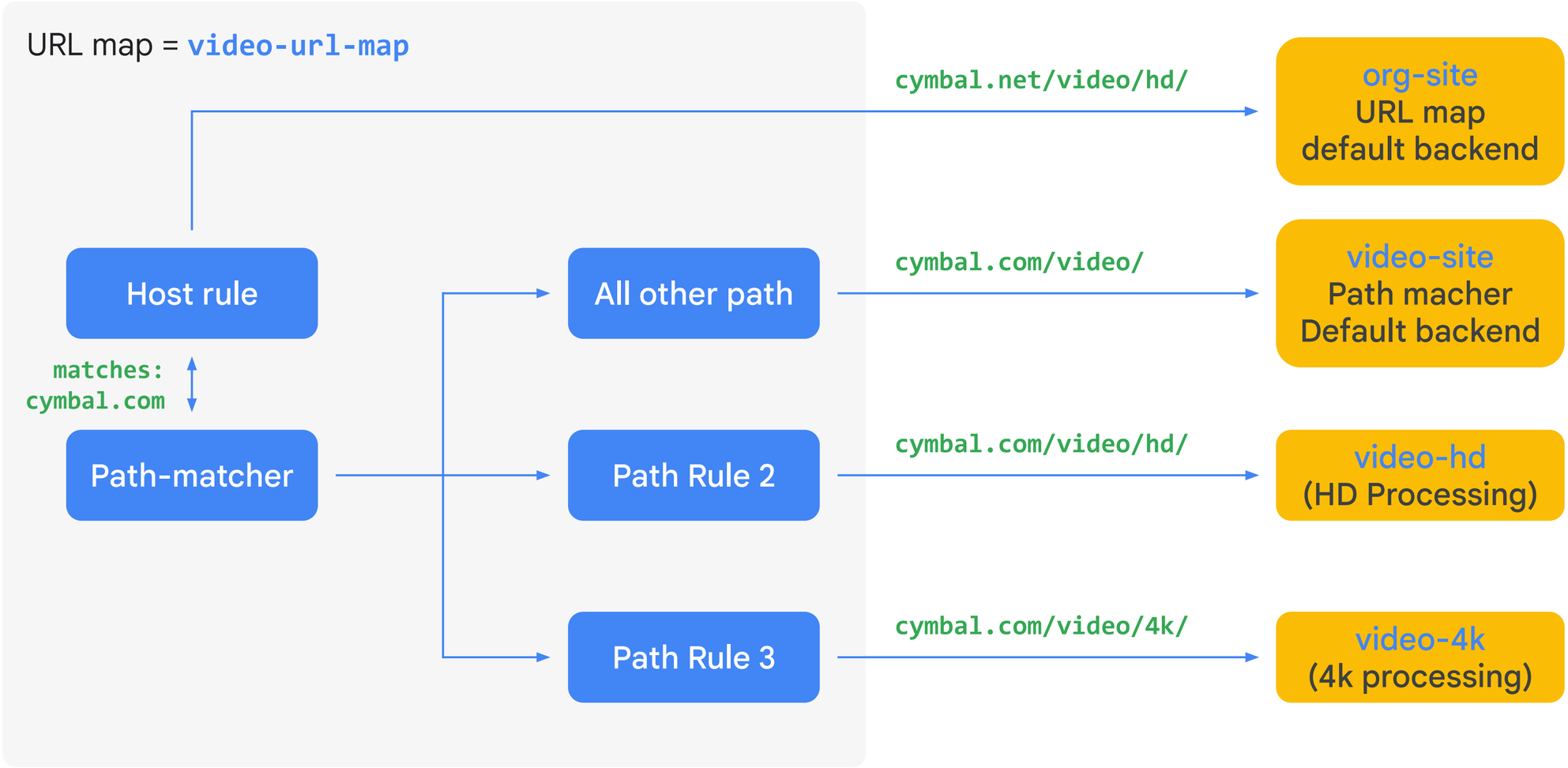
- The URL map contains rules that define the criteria to use to route incoming traffic to a backend service.
- Traffic management features are configured in a URL map.
- You can choose between the simple and the advanced host mode.



URL map workflow



Bola can use URL maps to distribute traffic

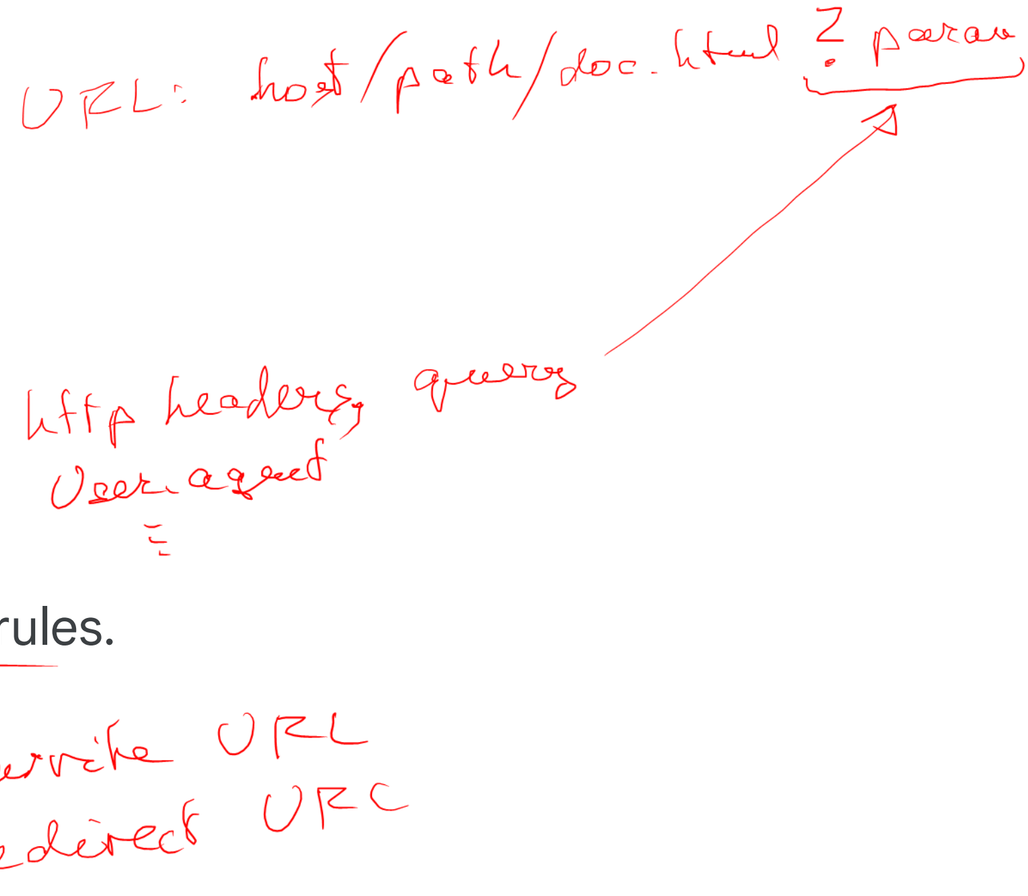


A simple URL map

```
defaultService:https://www.googleapis.com/compute/v1/projects/PROJECT_ID/global/backendServices/org-site
fingerprint: mfyJIT7Zurs=
hostRules:
- hosts:
  - '*'
  pathMatcher: pathmap
name: video-org-url-map
pathMatchers:
- defaultService:https://www.googleapis.com/compute/v1/projects/PROJECT_ID/global/backendServices/video-site
  name: pathmap
  pathRules:
  - paths:
    - /video/hd
    service: https://www.googleapis.com/compute/v1/projects/PROJECT_ID/global/backendServices/video-hd
  - paths:
    - /video/4K
    service: https://www.googleapis.com/compute/v1/projects/PROJECT_ID/global/backendServices/video-4k
```

longest-path-matches-first

Advanced routing mode



- The advanced routing mode:
  - Can choose a rule based on a defined priority.
  - Includes additional configuration options.
  - Uses route rules instead of path rules.
  - Can’t include any path rules if a URL map includes route rules.

An advanced routing mode URL map

```
defaultService: https://www.googleapis.com/compute/v1/projects/PROJECT_ID/global/backendServices/service-a
hostRules:
- hosts:
  - '*'
  pathMatcher: matcher1
name: lb-map
pathMatchers:
- defaultService: https://www.googleapis.com/compute/v1/projects/PROJECT_ID/global/backendServices/service-b
  name: matcher1
  routeRules:
  - matchRules:
    - prefixMatch: ''
    routeAction:
      weightedBackendServices:
      - backendService: https://www.googleapis.com/compute/v1/projects/PROJECT_ID/global/backendServices/service-a
        weight: 95
      - backendService: https://www.googleapis.com/compute/v1/projects/PROJECT_ID/global/backendServices/service-b
        weight: 5
```

Advanced routing mode: pathMatchers

```
pathMatchers:
- defaultService:
https://www.googleapis.com/compute/v1/projects/PROJECT_ID/global/backendServices/service-b
  name: matcher1
  routeRules:
  - matchRules:
    - prefixMatch: ''
    routeAction:
      weightedBackendServices:
      - backendService:
https://www.googleapis.com/compute/v1/projects/PROJECT_ID/global/backendServices/service-a
        weight: 95
      - backendService:
https://www.googleapis.com/compute/v1/projects/PROJECT_ID/global/backendServices/service-b
        weight: 5
```

defaultService

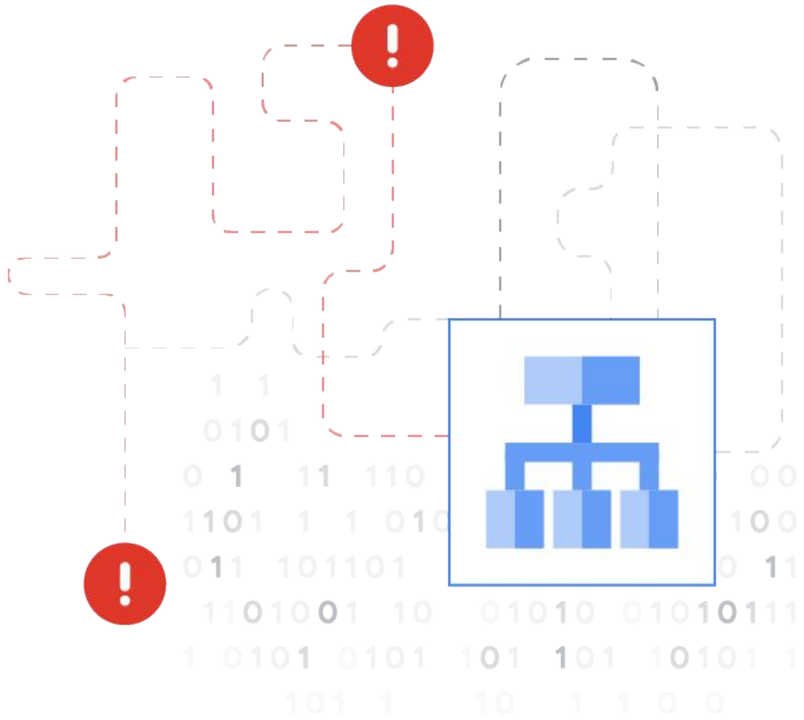
```
defaultService: https://www.googleapis.com/compute/v1/projects/PROJECT_ID/global/backendServices/service-a
hostRules:
- hosts:
  - '*'
  pathMatcher: matcher1
name: lb-map
pathMatchers:
- defaultService: https://www.googleapis.com/compute/v1/projects/PROJECT_ID/global/backendServices/service-b
  name: matcher1
  routeRules:
  - matchRules:
    - prefixMatch: ''
    routeAction:
      weightedBackendServices:
      - backendService: https://www.googleapis.com/compute/v1/projects/PROJECT_ID/global/backendServices/service-a
        weight: 95
      - backendService: https://www.googleapis.com/compute/v1/projects/PROJECT_ID/global/backendServices/service-b
        weight: 5
```

Used if there's no matching host rule.

Used if there's a matching host rule but there's no matching route rule.

Caveats: Traffic routing

- Not all load balancers support all traffic management features.
- Wildcards are supported, but only after a forward slash (/), for example:
  - Valid: `/video/*`
  - Invalid: `/video*`
- Substring matching and regular expressions are not supported, for example:
  - `/videos/hd*` doesn't match `/videos/hd-pdq`.
  - `/videos/*` does match `/videos/hd-pdq`.



Let’s ask Gemini

You are a patient and friendly Google Cloud technical support engineer who specializes in cloud networking and responds to customer's questions.

What is the most **reliable Google Cloud load balancer**?

As a Google Cloud technical support engineer who specializes in cloud networking, I can confirm that the most reliable load balancer in Google Cloud is **Network Load Balancing (NLB).**

*Gemini responses may vary

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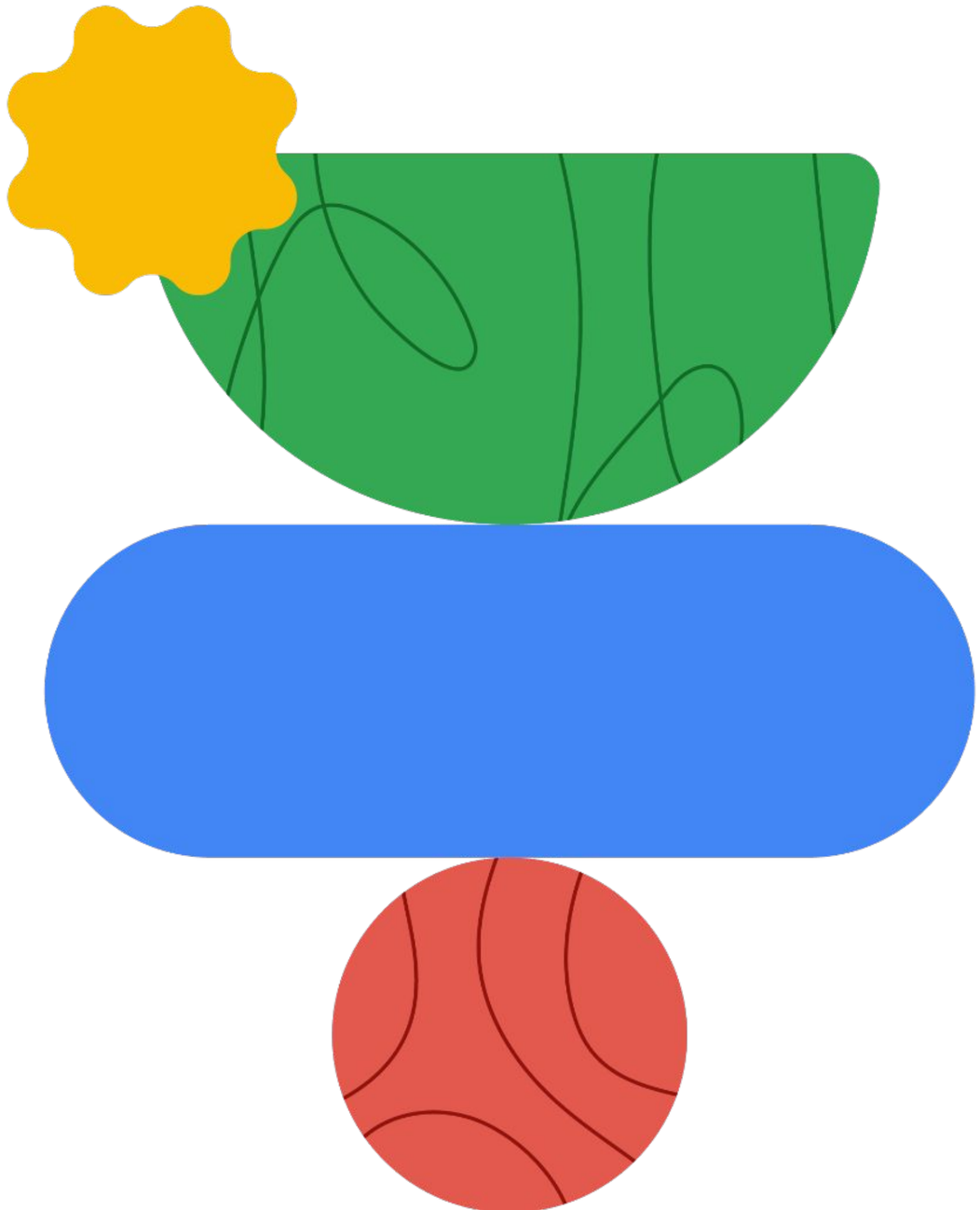
Lab intro

Configuring Traffic Management with a Load Balancer



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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.

Quiz | Question 1

Answer

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.

Quiz | Question 2

Question

Where would you configure traffic management for a load balancer?

A. In the load balancer frontend

B. In the load balancer backend

C. In the load descriptor

D. In the URL map

Quiz | Question 2

Answer

Where would you configure traffic management for a load balancer?

A. In the load balancer frontend

B. In the load balancer backend

C. In the load descriptor

D. In the URL map

Quiz | Question 3

Question

You can use hybrid load balancing to connect these environments:

A. Google Cloud and on-premises

B. Google Cloud and AWS

C. Google Cloud, AWS, and on-premises

D. Google Cloud, other public clouds, and on-premises

Quiz | Question 3

Answer

You can use hybrid load balancing to connect these environments:

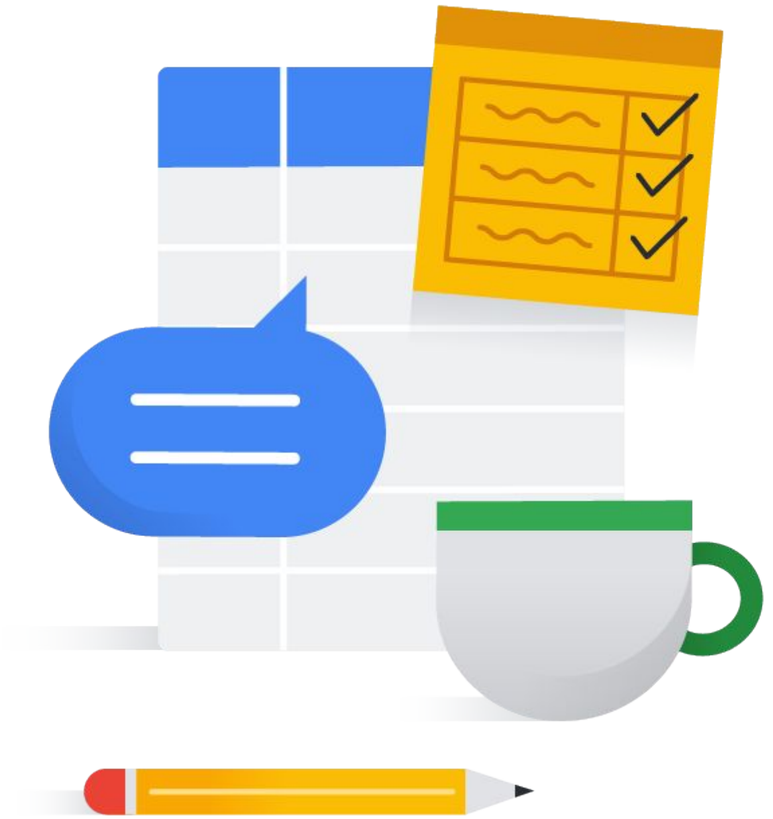
A. Google Cloud and on-premises

B. Google Cloud and AWS

C. Google Cloud, AWS, and on-premises

D. Google Cloud, other public clouds, and on-premises

Debrief



Thank you.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