05

Servers

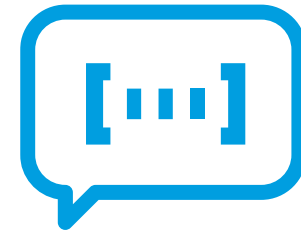# Objectives

In this module you will:

1. Know the fundations of diverse server types.
2. Learn the basics of servers configuration.

Where apps live in?

00

Servers...

Servers are **large data storage and processing devices** that exist either as hardware or as virtual storehouses located on the internet.

Computers or software systems act as servers that connect to a network.

A server can be any type of device that **shares and saves information**.

Servers can both store and process information **within their own system or request it from another**.

DISCUSSION

Is there only one type of server?

OBJECTIVE

Get insights about servers

INSTRUCTIONS

1. Think about different cases and scenarios of information and services that you consume from your mobile or laptop.

2. **Meet** with your partner and try to answer these **questions for each case**:
   - **What kind of service or information is delivered to you?**
   - **How you would you name this server?**
   - **What is more important in this case: memory, cpu, disk?**
   - **The service or information you are consuming is in the server or in another place?**

3. Use post-its to **gather** the ideas.

4. **Prepare** to share your insights with the rest of the class.
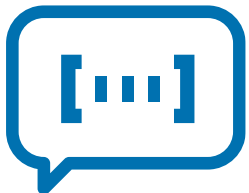
15 min

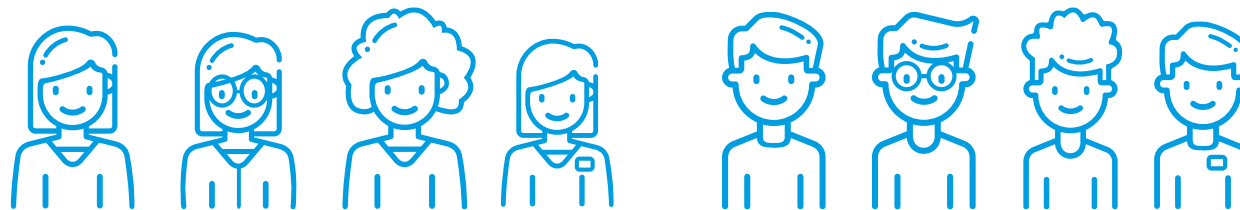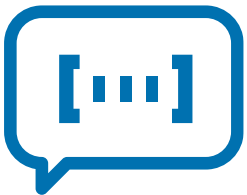| Case	Service or information	Name this server...	Memory, cpu, disk?	In or out the the server
<your case>				
<your case>				
<your case>				
<your case>				
<your case>				

OBJECTIVE

Share your insights!

INSTRUCTIONS

1. **Share** your insights with the rest of the class.

2. Generate **common conclussions**.

5 min

What is a server ? How does a server work? Types of Servers . Explain everything.

https://www.youtube.com/watch?v=V9K1l3OL-Iw

Servers architecture

A server's architecture can be defined by:

1. **How it communicates** with other devices
2. **The types of operating systems** it uses
3. **Hardware and software** components
4. **Storage and computing** capabilities
5. **The security functions** within its systems

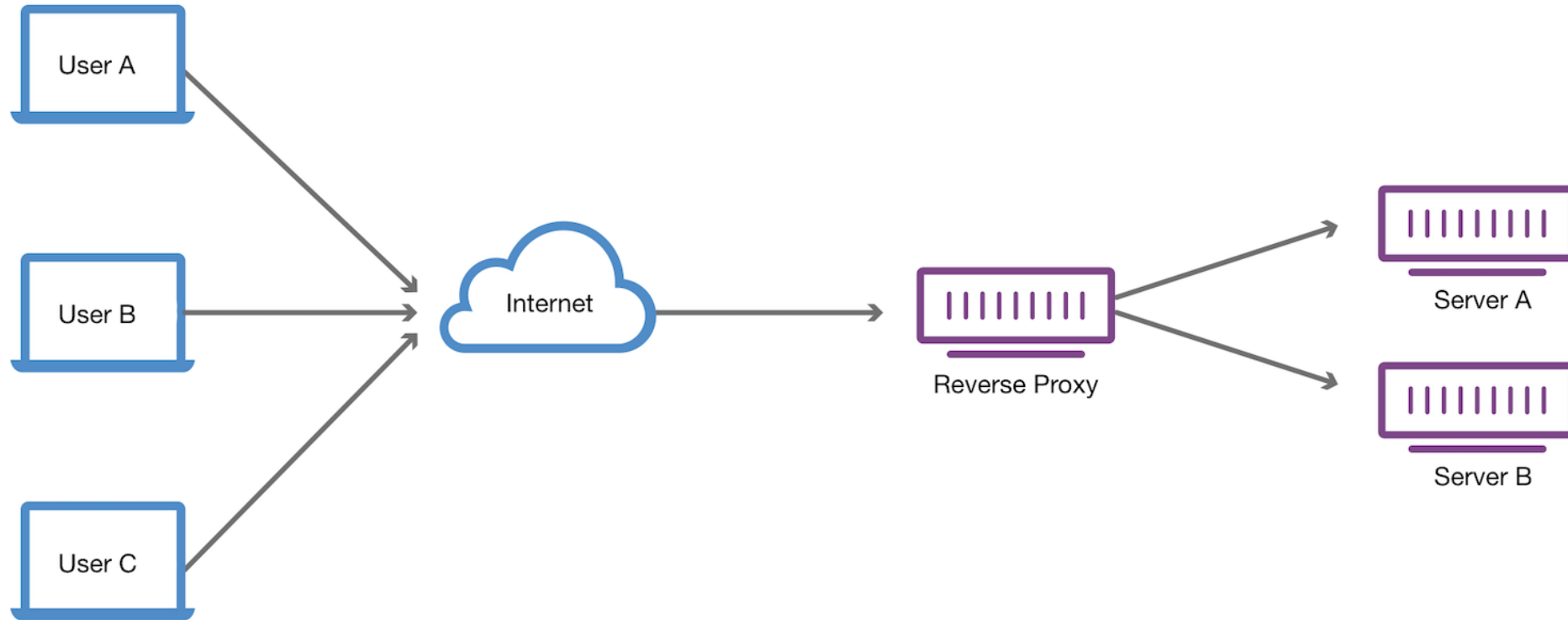# What server types can happen in a microservice architecture?
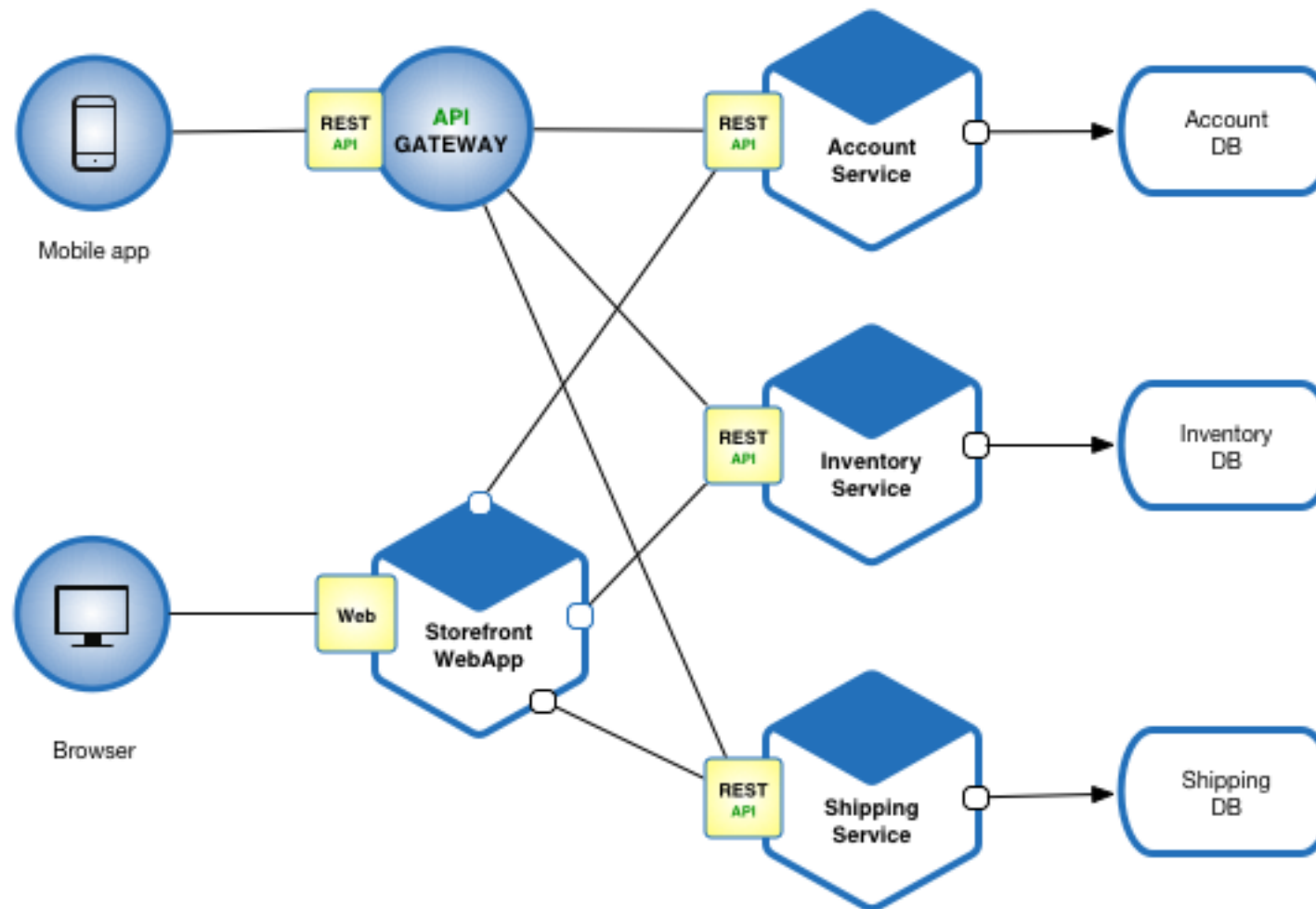
Reverse Proxy

01
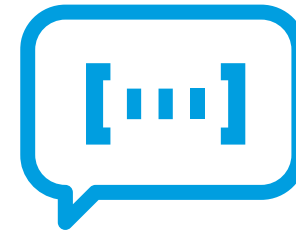
Reverse Proxy

Reverse proxies are implemented to help increase security, performance, and reliability.

Why Reverse Proxy?

1. Load Balancing
2. Security
3. Authentication
4. SSL Termination
5. Serving Static Content
6. Caching
7. Compression
8. Centralised Logging and Auditing
9. URL Rewriting
10. Aggregating Multiple Websites Into the Same URL Space

OBJECTIVE

Install reverse proxy - NGINX

INSTRUCTIONS

1. Download and install nginx from
   - http://nginx.org/en/download.html

2. Download and install xampp
   - https://www.apachefriends.org/download.html

3. Start xampp -> start apache

4. Access localhost port 80 in your browser

5. Stop xampp/apache

6. Start nginx

7. Access localhost port 80 in your browser

20 min

OBJECTIVE

Playing with reverse proxy - NGINX

INSTRUCTIONS

1. Review nginx basic configuration:
   - https://www.linode.com/docs/guides/how-to-configure-nginx/
   - Locate nginx.conf file

2. Review xampp quick start
   - http://www.phpknowhow.com/basics/working-with-xampp/
   - Locate httpd.conf file

3. Follow "reverse_proxy.txt" instructions
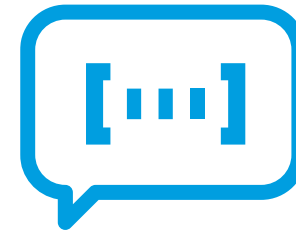
4. Access localhost port 80 in your browser.

30 min

Bonus exercise: path based routing

Configure nginx to root different sites depending on path:

1. http://localhost/base → to point xampp root app and to http://localhost

2. http://localhost/ddbb → to point xampp root app and to http://localhost/mysql

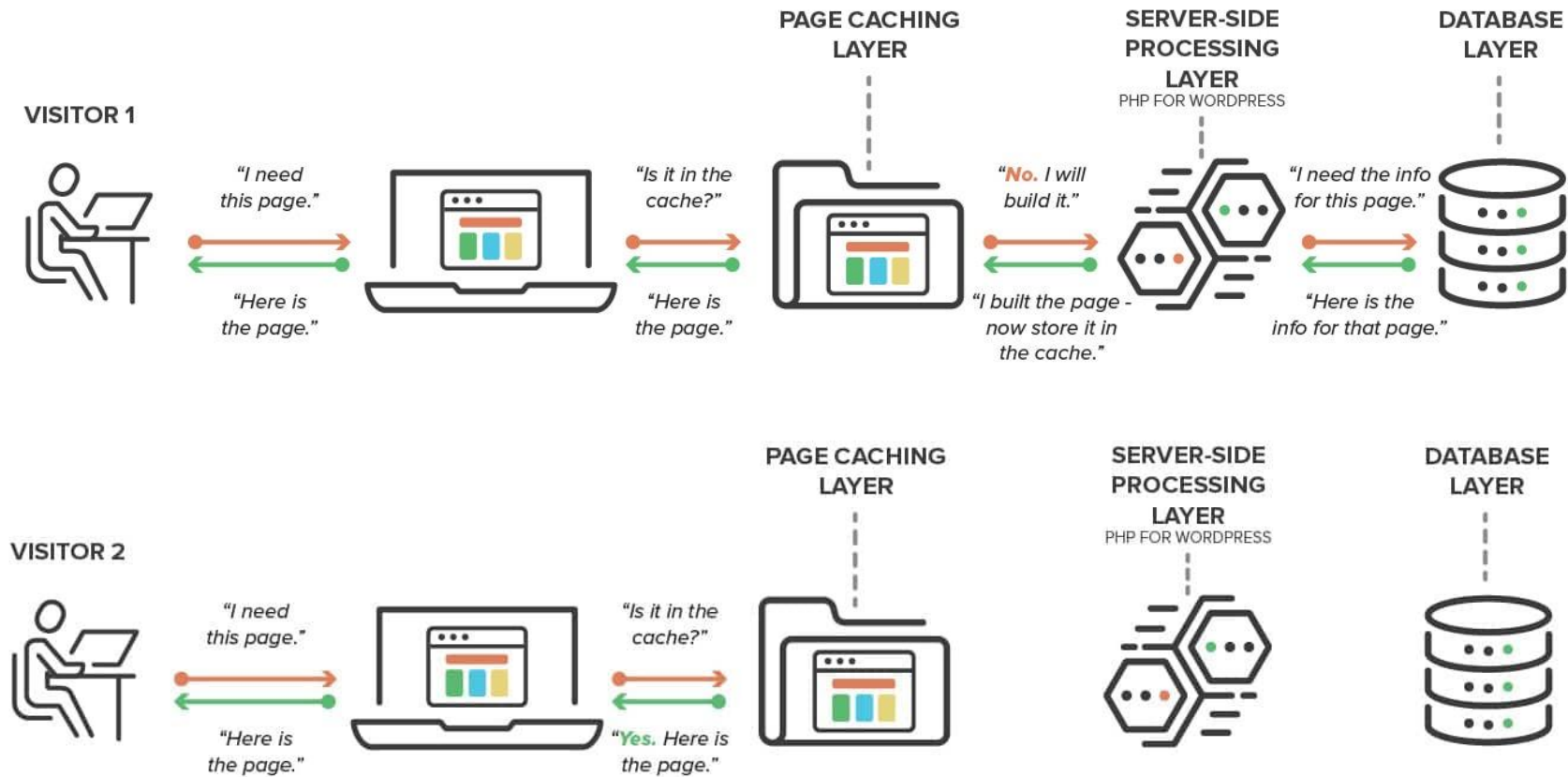   - For this part you will need to start mysql in xampp too.

Cache Server

Cache Server

By placing previously requested information in temporary storage, or cache, a cache server both speeds up access to data and reduces demand on an enterprise's bandwidth.

What is a Content Delivery Network (CDN)?

https://www.youtube.com/watch?v=Bsq5cKkS33I

Why Cache Server?

1. Improve Application Performance
2. Reduce Database Cost
3. Reduce the Load on the Backend
4. Predictable Performance
5. Eliminate Database Hotspots
6. Increase Read Throughput (IOPS)

OBJECTIVE

Implementing a cache server

INSTRUCTIONS

1. Follow the steps of the next article for implementing a cache server in python:

   - https://alexanderell.is/posts/simple-cache-server-in-python/

2. Use it as your web server cache for images.

3. Meet your class partner and test your new server.

   - Your computer will make your partner cache server and vice-versa.

30 min

Forward Proxy

03
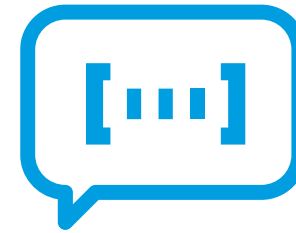
Cache Server
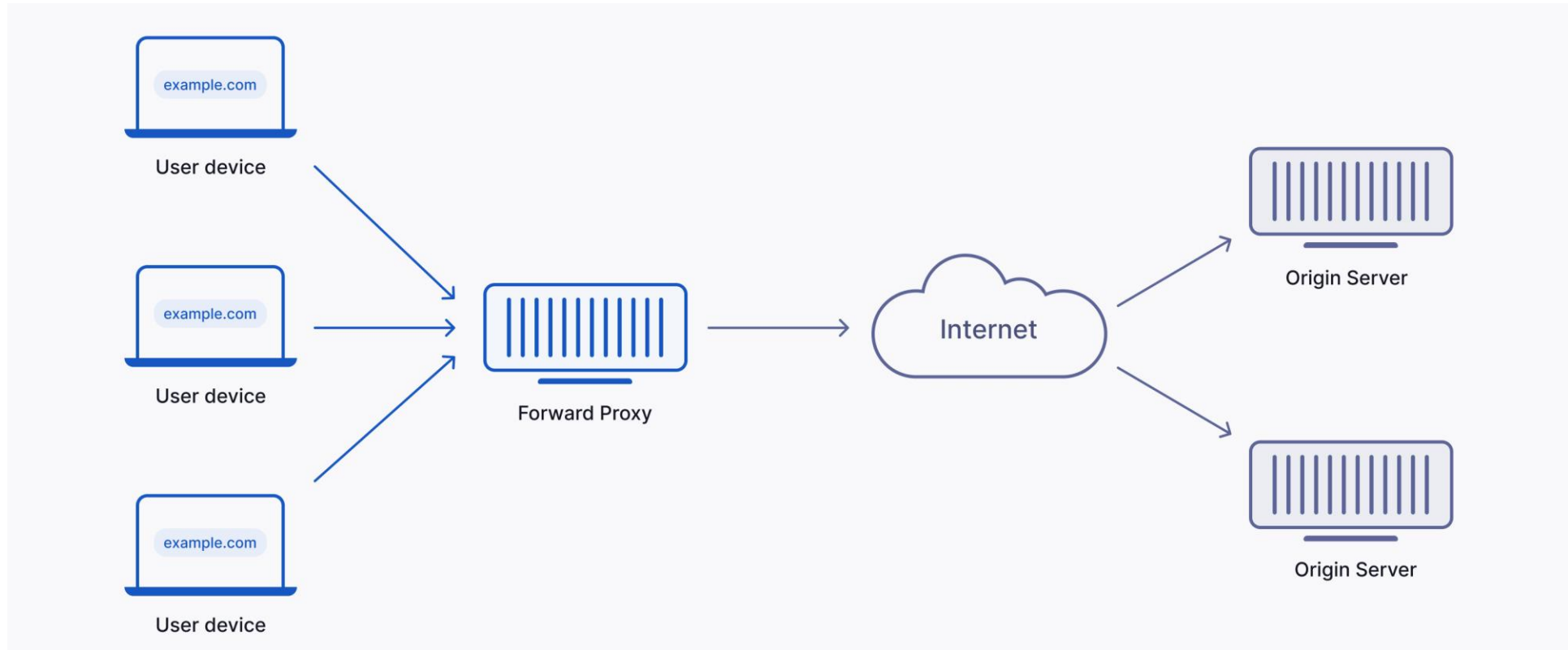
A forward proxy is far more than a traffic controller; in fact, as an intermediary, the proxy's value to security is in its ability to shield users from direct access to or from bad actors, as well as prevent them from compromising data and enterprise resources.

Forward Proxy vs Reverse Proxy
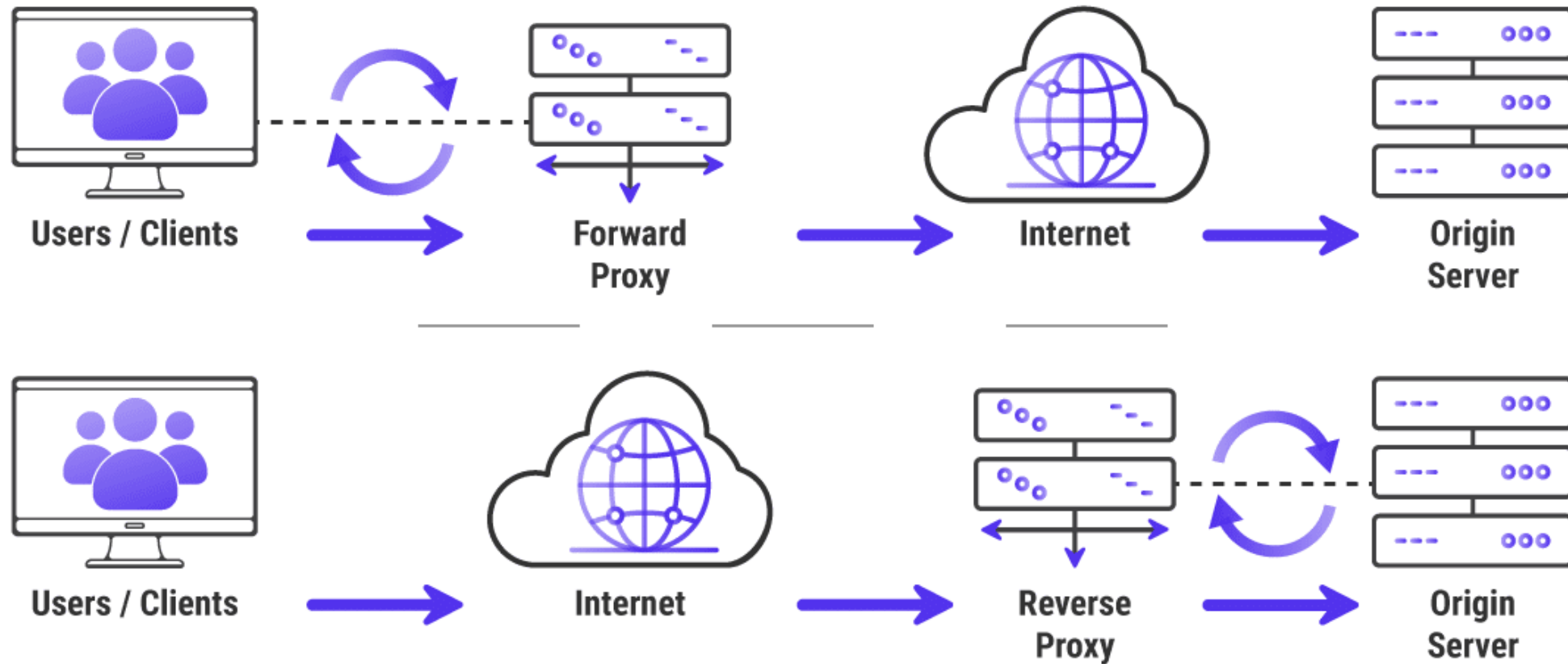
What do organizations use forward proxies for?

1. **Shadow IT discovery:** a forward proxy enables CASB functionality like shadow IT discovery.

2. **Data protection:** A cloud-based forward proxy, because it operates inline and has the scale to inspect all traffic, is the best way to prevent users from uploading sensitive information to risky cloud destinations.

3. **Threat prevention:** prevents infected files from being uploaded to cloud resources by enabling technologies like advanced threat protection (ATP) and cloud sandbox to operate inline so that they can intercept threats in transit.

OBJECTIVE

Using Nginx as a Forward Proxy

INSTRUCTIONS

1. Follow the steps of the next article to use nginx as a forward proxy:
   - https://www.baeldung.com/nginx-forward-proxy
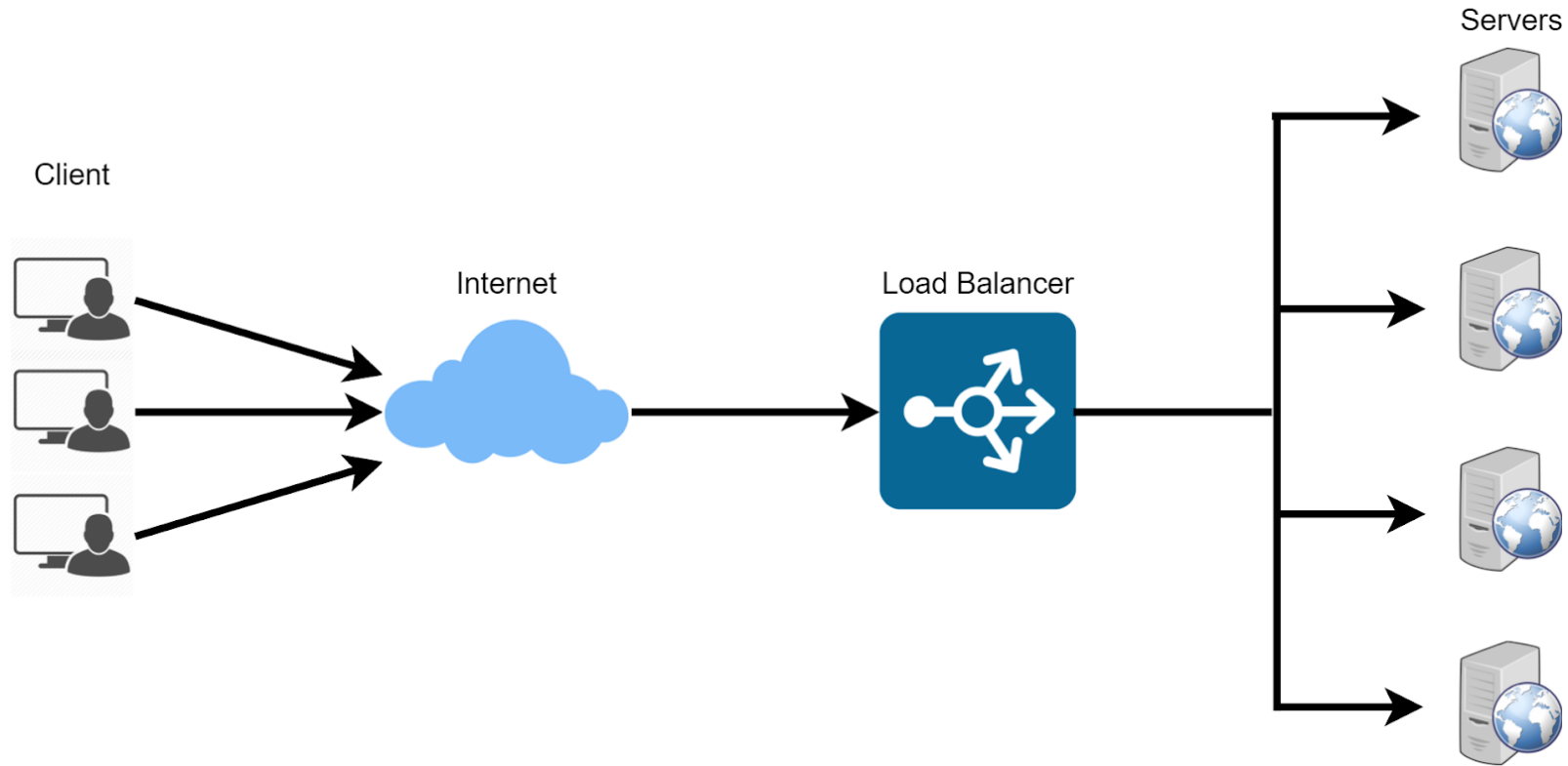2. Use it as your proxy for accessing your class partner server.

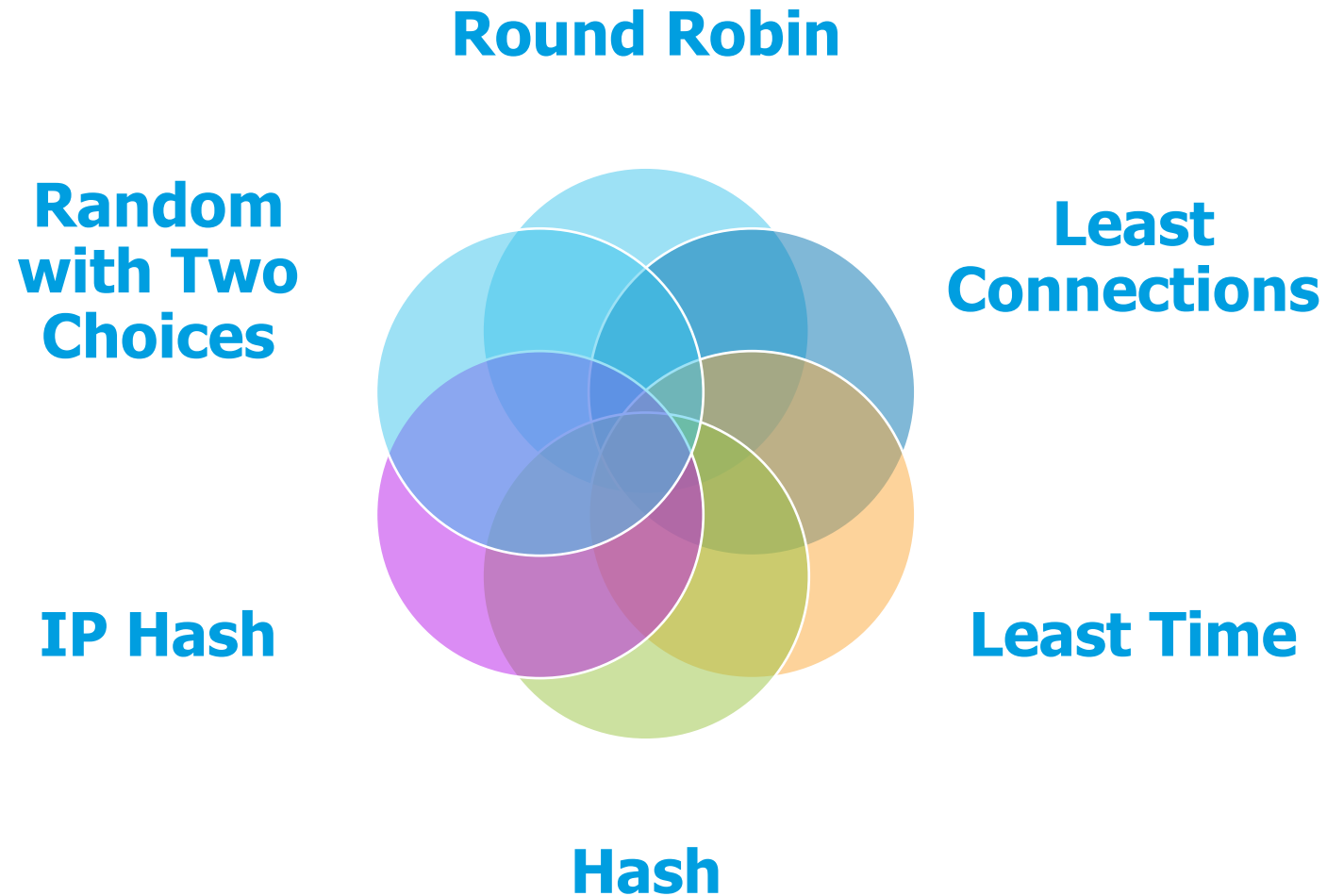**30 min**
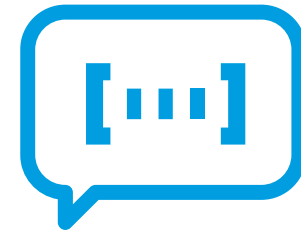
Load Balancer

Load Balancer

Load Balancer

1. Modern high-traffic websites must serve **hundreds of thousands, if not millions**, of concurrent requests.

2. To **cost-effectively scale** to meet these high volumes, modern computing generally **requires adding more servers**.

3. A load balancer acts as the **"traffic cop"**: maximizes speed and capacity utilization and ensures that no one server is overworked, which could degrade performance.

4. If a **single server goes down**, the load balancer **redirects traffic to the remaining** online servers.

5. When a **new server is added** to the server group, the load balancer **automatically** starts to **send requests to it**.

What is a Content Delivery Network (CDN)?

https://www.youtube.com/watch?v=Bsq5cKkS33I

Load Balancing Algorithms

Round Robin

Random with Two Choices

Least Connections

IP Hash

Least Time

Hash

Load Balancer vs Reverse Proxy

Reverse Proxy

1. A reverse proxy is specifically a **Level 7** load balancer, dealing exclusively with web requests.

2. A reverse proxy can **perform additional roles** to that of a load balancer. For example:
   1. Operate as a WAF.
   2. Perform web acceleration, e.g. caching, TLS/SSL offloading, compression
   3. Provide cybersecurity mechanisms, e.g. threat protection, IP concealment, web filtering

3. A reverse proxy can be used to **facilitate requests** between users and a single server.

Load Balancer

1. A load balancer can operate on **Levels 3-7**, handling numerous types of requests on top of web requests, e.g., DNS, SSL, TCP.

2. A load balancer's **main role is to distribute user requests** across **multiple servers**.

OBJECTIVE

NGIX as load balancer

INSTRUCTIONS

1. Meet your class partner and both share your network ips.

2. Start your apache web servers in xampp.

3. Follow next guide to configure one of your nginx as load-balancer:
   - http://nginx.org/en/docs/http/load_balancing.html#:~:text=It%20is%20possible%20to%20use,of%20web%20applications%20with%20nginx.

15 min

Netscaler
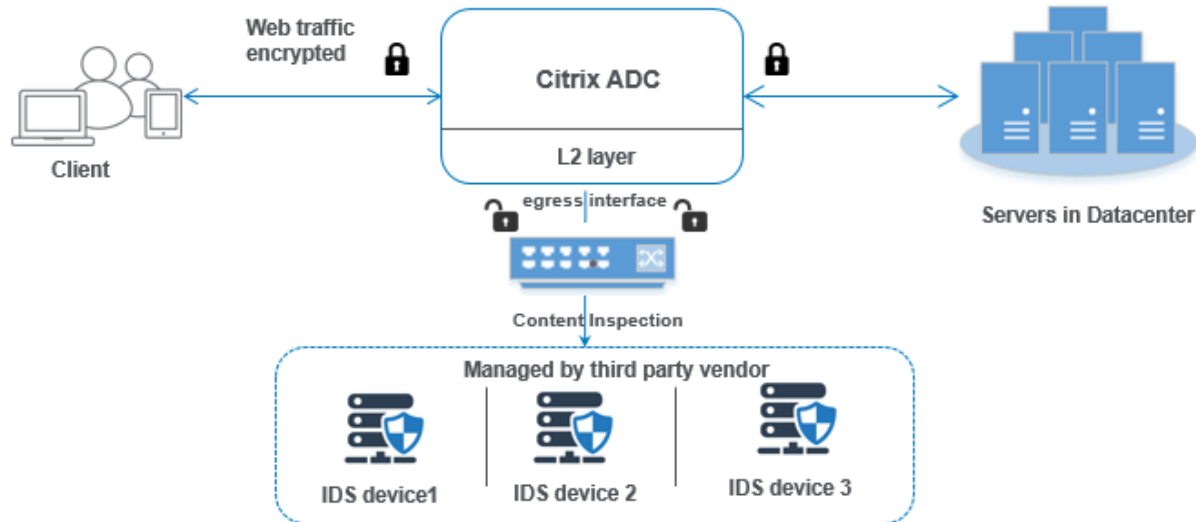
Netscaler is the load balancer used in Workplace Allianz.

Citrix NetScaler is an **Application Delivery Controller (ADC)** created to optimize, manage, and secure network traffic.

It **analyzes application-specific traffic** to distribute, optimize, and protect **Layer 4–Layer 7** (L4–L7) network traffic.

A Citrix ADC, for example, bases load balancing choices on individual HTTP requests rather than long-lived TCP connections, **allowing a server's failure or delay to be managed considerably more promptly** and with minor client inconvenience.

Switching features, security and protection features, and server-farm efficiency capabilities are all part of its feature set.

OBJECTIVE

Review netscaler configuration

INSTRUCTIONS

1. Access Netscaler demo page

   - https://www.citrix.com/products/citrix-adc/resources/click-through-demo.html

2. Follow the instructions for configuration.

15 min

Firewall

05
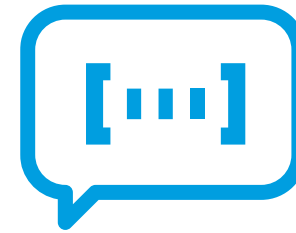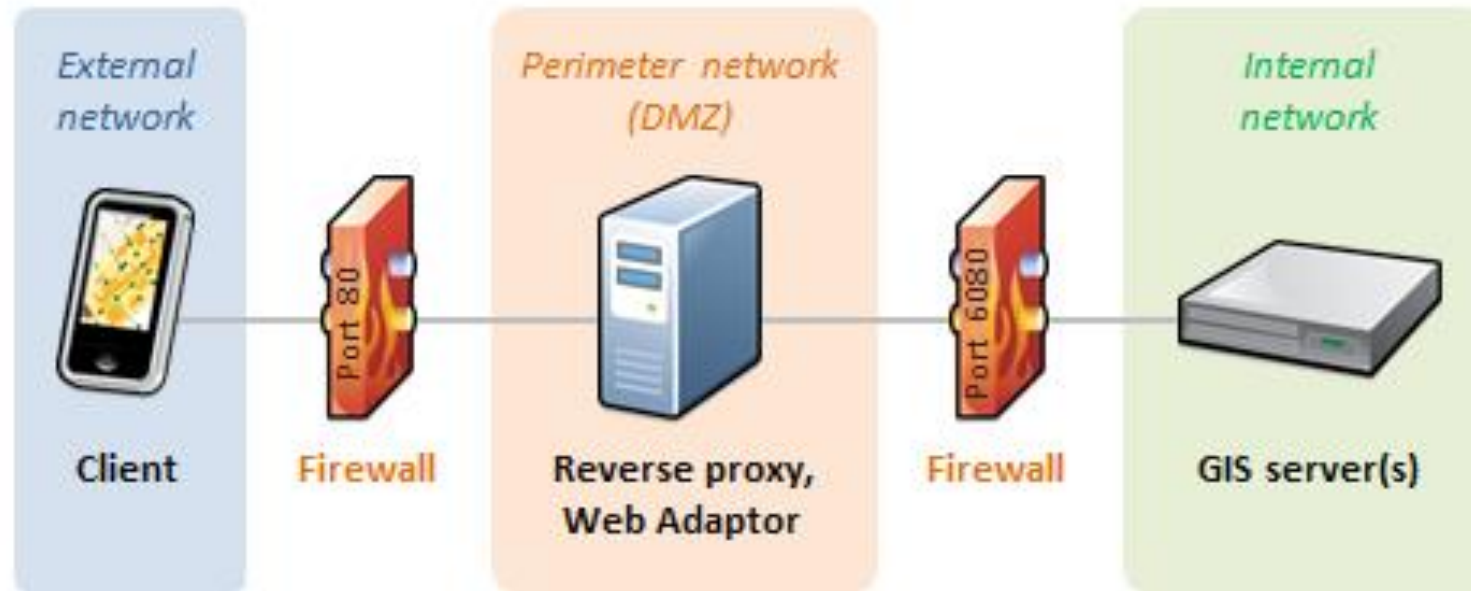
Firewall

A firewall is software or firmware that prevents unauthorized access to a network. It inspects incoming and outgoing traffic using a set of rules to identify and block threats.

Firewall rules

#	Protocol	Source address	Source port	Target address	Target port	Action	
1	ICMP/IPv4	Any	-	Any	-	accept	↓ ↑ ✏ 🗑
2	ICMP/IPv6	Any	-	Any	-	accept	↓ ↑ ✏ 🗑
3	UDP/IPv4	Any	53	Any	Any	accept	↓ ↑ ✏ 🗑
4	UDP/IPv6	Any	53	Any	Any	accept	↓ ↑ ✏ 🗑
5	TCP/IPv4	Any	Any	Any	22	accept	↓ ↑ ✏ 🗑
6	TCP/IPv6	Any	Any	Any	22	accept	↓ ↑ ✏ 🗑
7	TCP/IPv4	Any	Any	Any	80	accept	↓ ↑ ✏ 🗑
8	TCP/IPv6	Any	Any	Any	80	accept	↓ ↑ ✏ 🗑
9	TCP/IPv4	Any	Any	Any	443	accept	↓ ↑ ✏ 🗑
10	TCP/IPv6	Any	Any	Any	443	accept	↓ ↑ ✏ 🗑

1. **Determine what traffic** your firewall **allows and what is blocked.**

2. **Examine the control information** in individual packets, and either block or allow them according to the criteria that you define.

3. **Control how** the firewalls **protect your network** from malicious programs and unauthorized access.

4. **Managing your firewall** rules across your devices and throughout your network **is critical to network security**.

What is a Content Delivery Network (CDN)?

https://www.youtube.com/watch?v=Bsq5cKkS33I

OBJECTIVE

Configuring Windows Firewall

INSTRUCTIONS

1. Read next article on how to configure windows built-in firewall:

   • https://support.smartbear.com/testleft/docs/using/configuring/os/windows-firewall.html

2. Meet your class partner. Ask him to start his web server on xampp.

3. Modify your windows rules to reject port 80 from your partner ip.

4. Revert the rules to allow port 80.

5. Now interchange roles and do the same exercise.

20 min

EXERCISE

The servers quizz

OBJECTIVE

Challenge your classmates about protocols!

INSTRUCTIONS

Step 1: Create a small quiz of 5 questions for your classmates.

- **Be very evil in the questions you generate!**

Step 2: Send your questions with the right answer to the trainer.

Step 3: Participants will be organized into questioners and responders by trainers.

- If answer is OK, the responder will got 1 point.
- If not, another class member can answer and get 1 point.

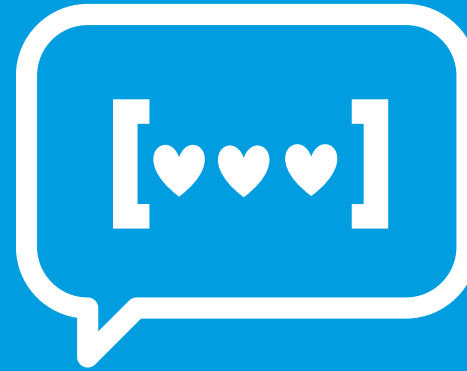**Step 4:** We will repeat this process with the +1 responders in various discarding rounds.

Step 5: The responder with the higher score wins!

30 min

Next steps

We would like to know your opinion!

Please, let us know what you think about the content.
From Netmind we want to say thank you, we appreciate time
and effort you have taking in answering all of that is
important in order to improve our training plans so that you
will always be satisfied with having chosen us
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Thanks!

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