Load Balancing 101 & Building a Traditional Linux Load Balancer

About me

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loadbalancer.org

Scalable application delivery
from the load balancer experts

www.loadbalancer.org

Contents

- What is load balancing?
- Why would you use a load balancer?
- Load balancing methods (x 4)
- Building a Linux load balancer

Contents

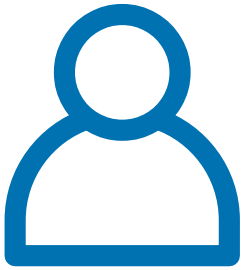
- What is load balancing?
- Why would you use a load balancer?
- Load balancing methods (x 4)
- Building a Linux load balancer
- Something for everyone!

What is load balancing?


Customer
Cashier

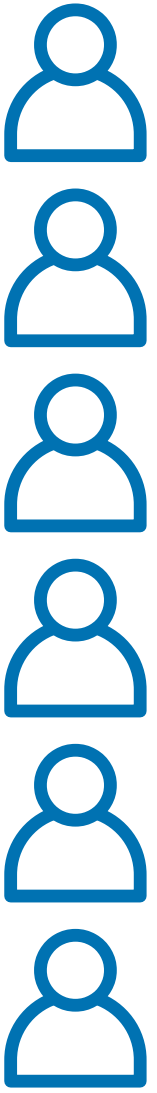
Customers

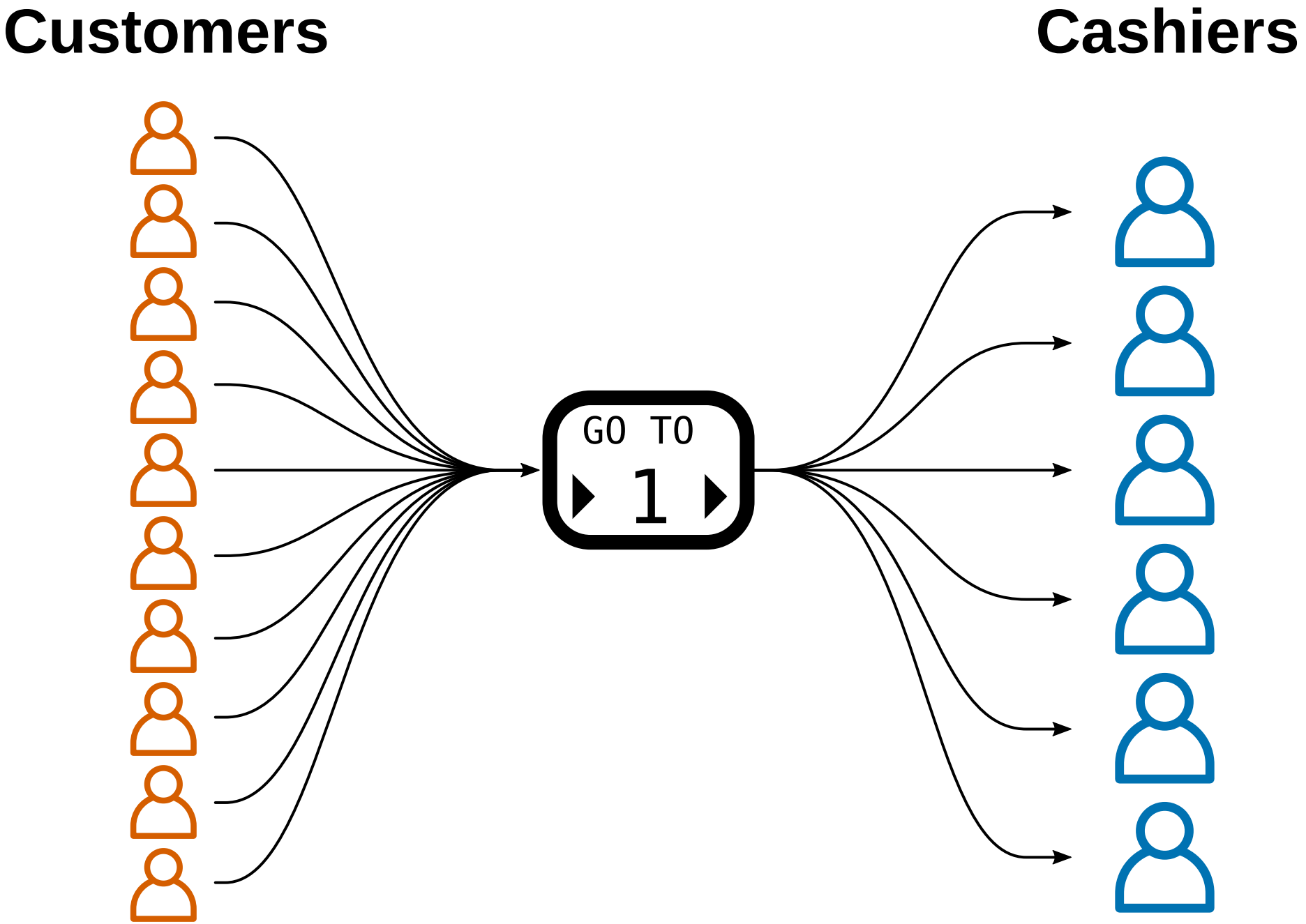
Cashier



Customers

Cashiers

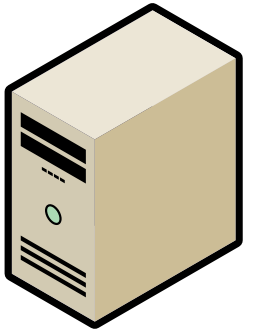


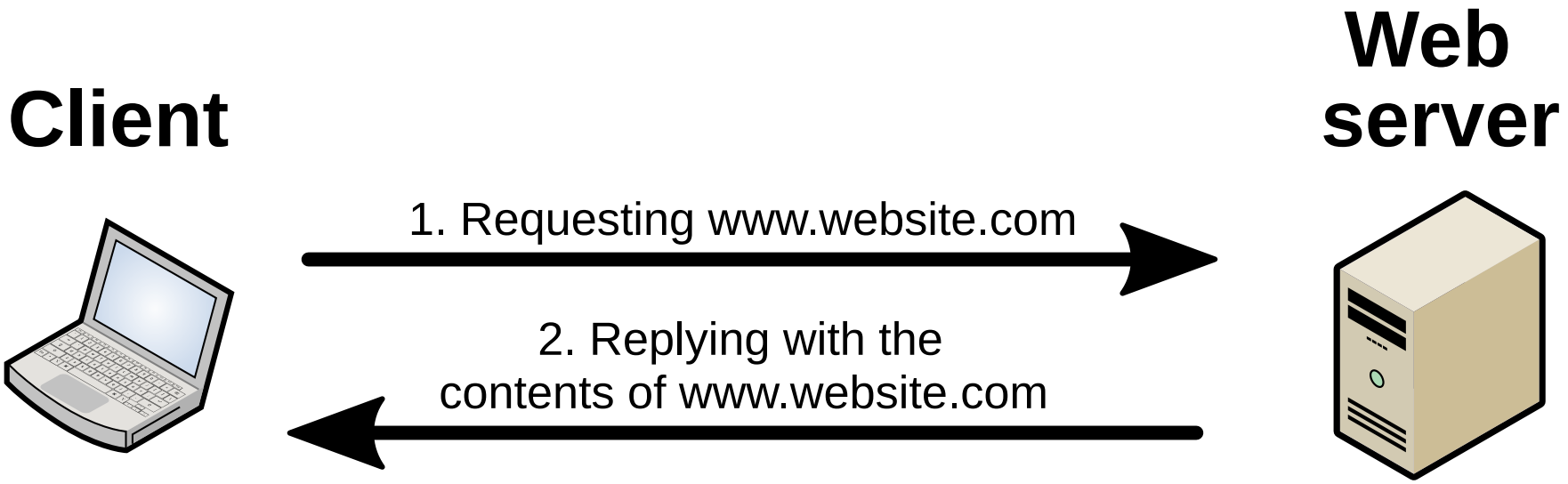

Customers
Cashiers
GO TO
1

Client

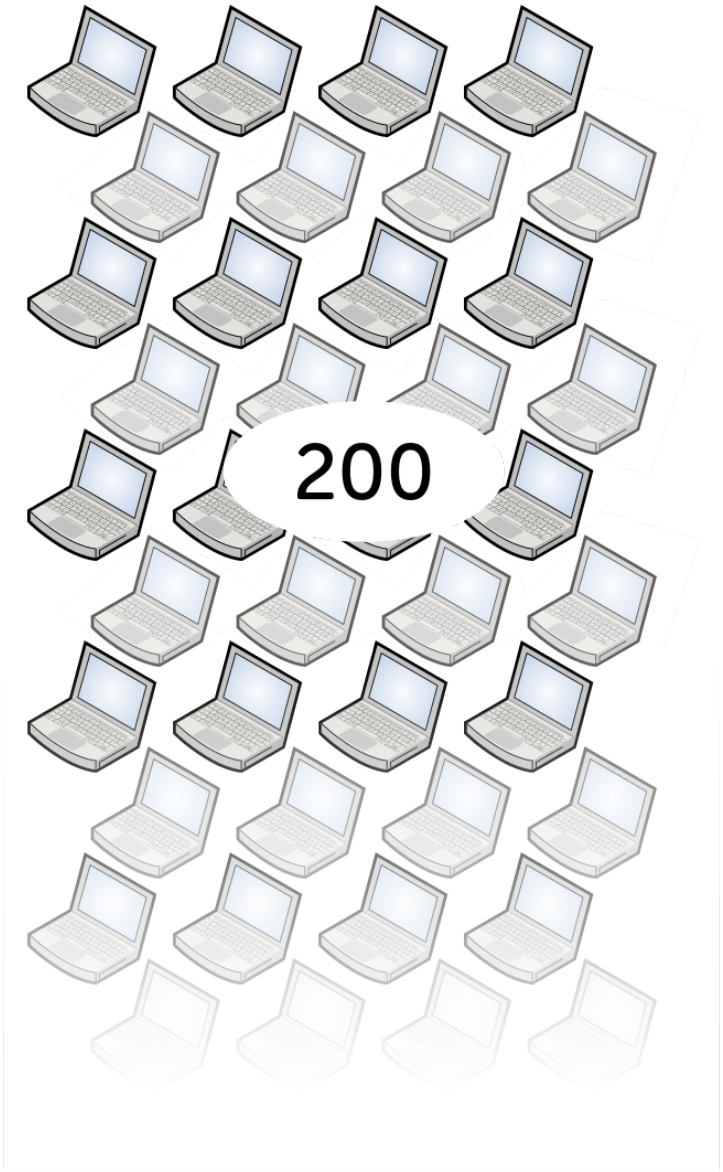
Web server

1. Requesting www.website.com

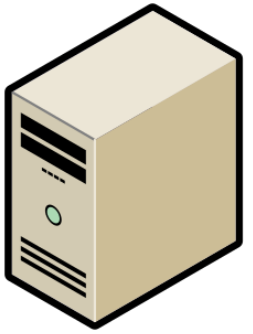



Client
Web server
1. Requesting www.website.com
2. Replying with the contents of www.website.com

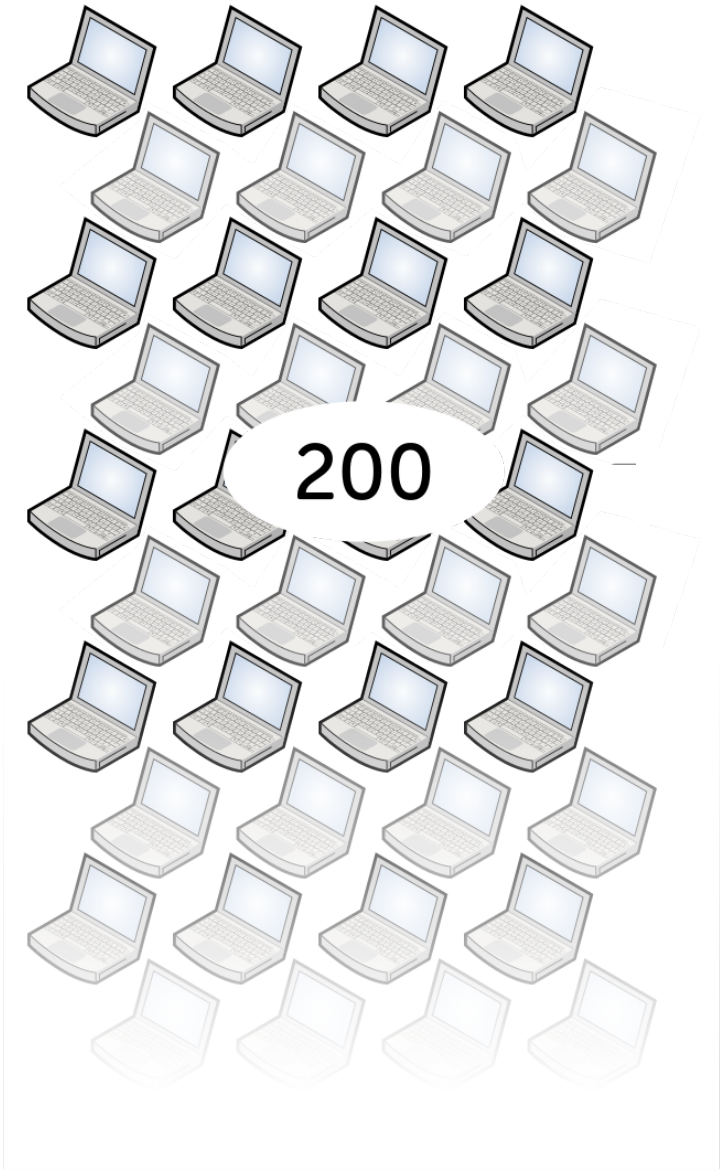
Clients



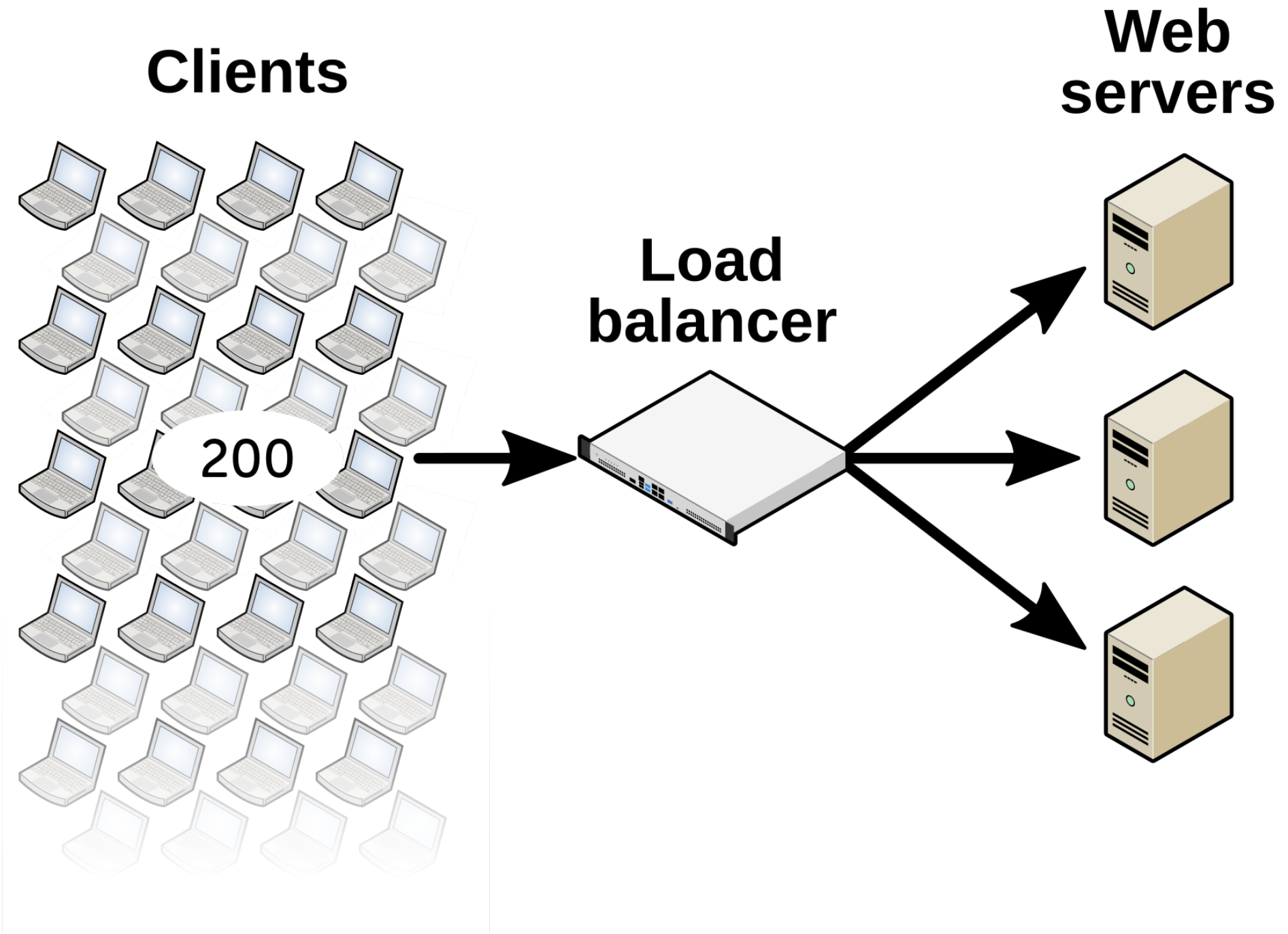
Web server



Clients



Web servers


Clients
Web servers
Load balancer
200

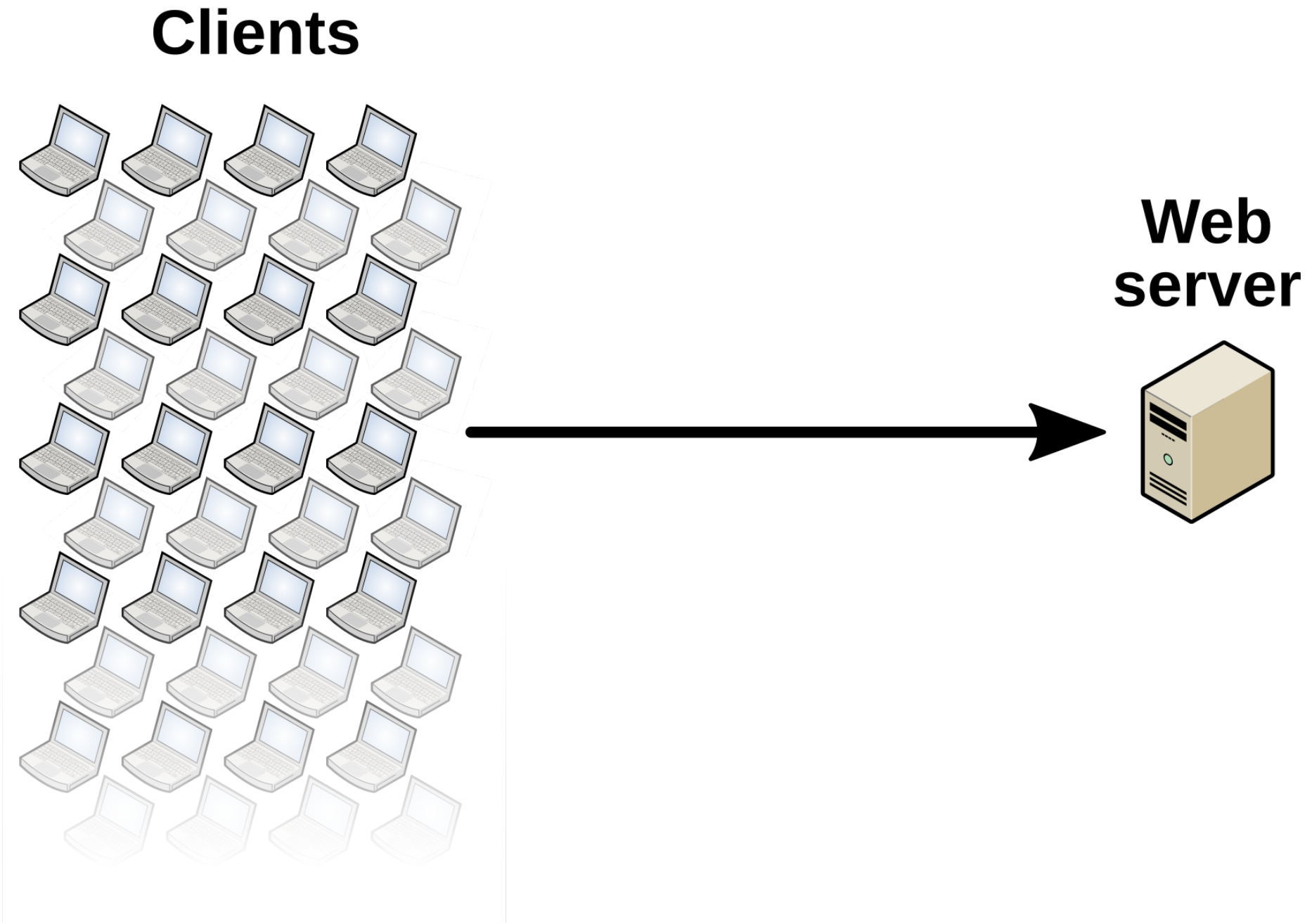
Why would you use a load balancer?

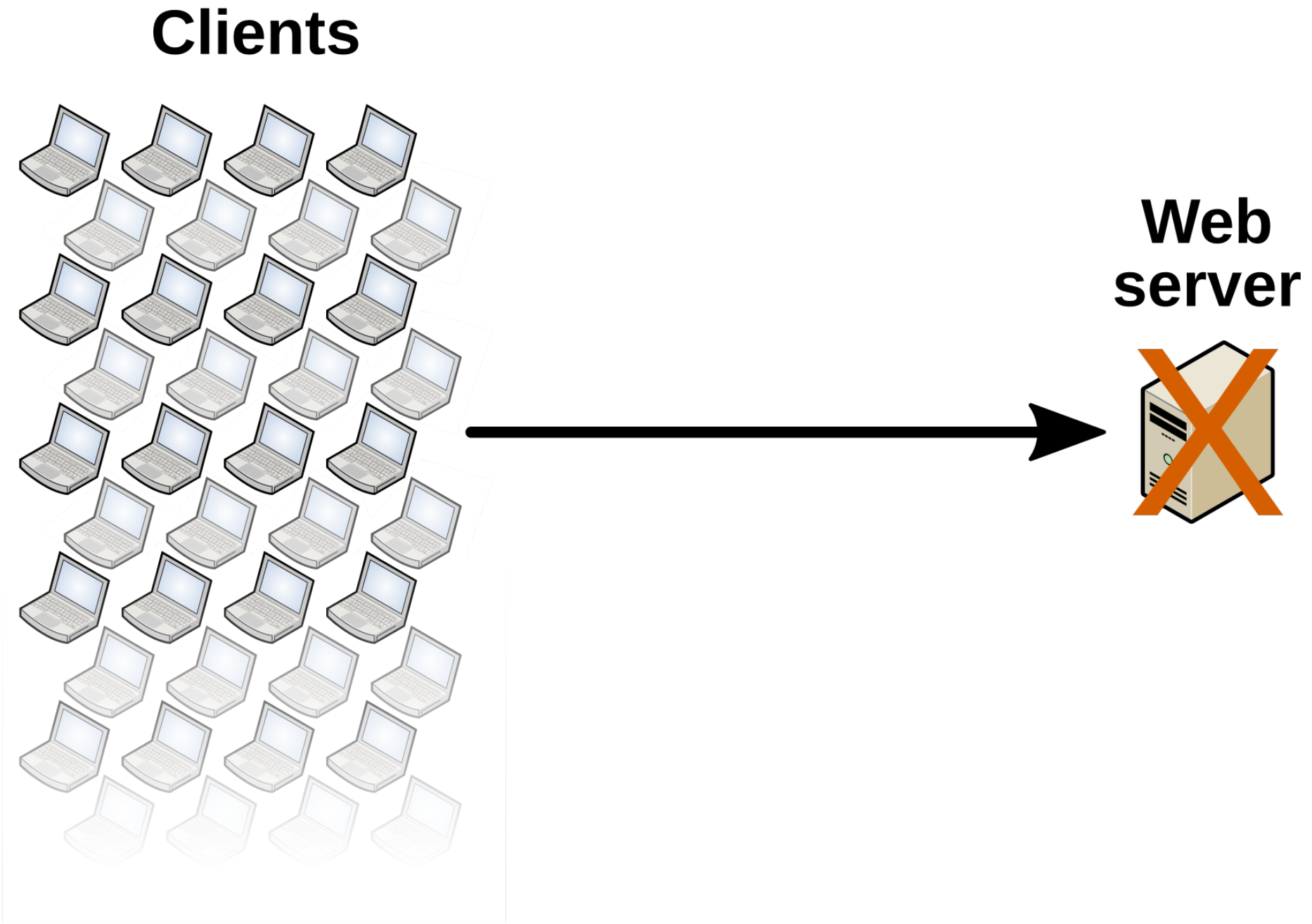
Why would you use a load balancer?

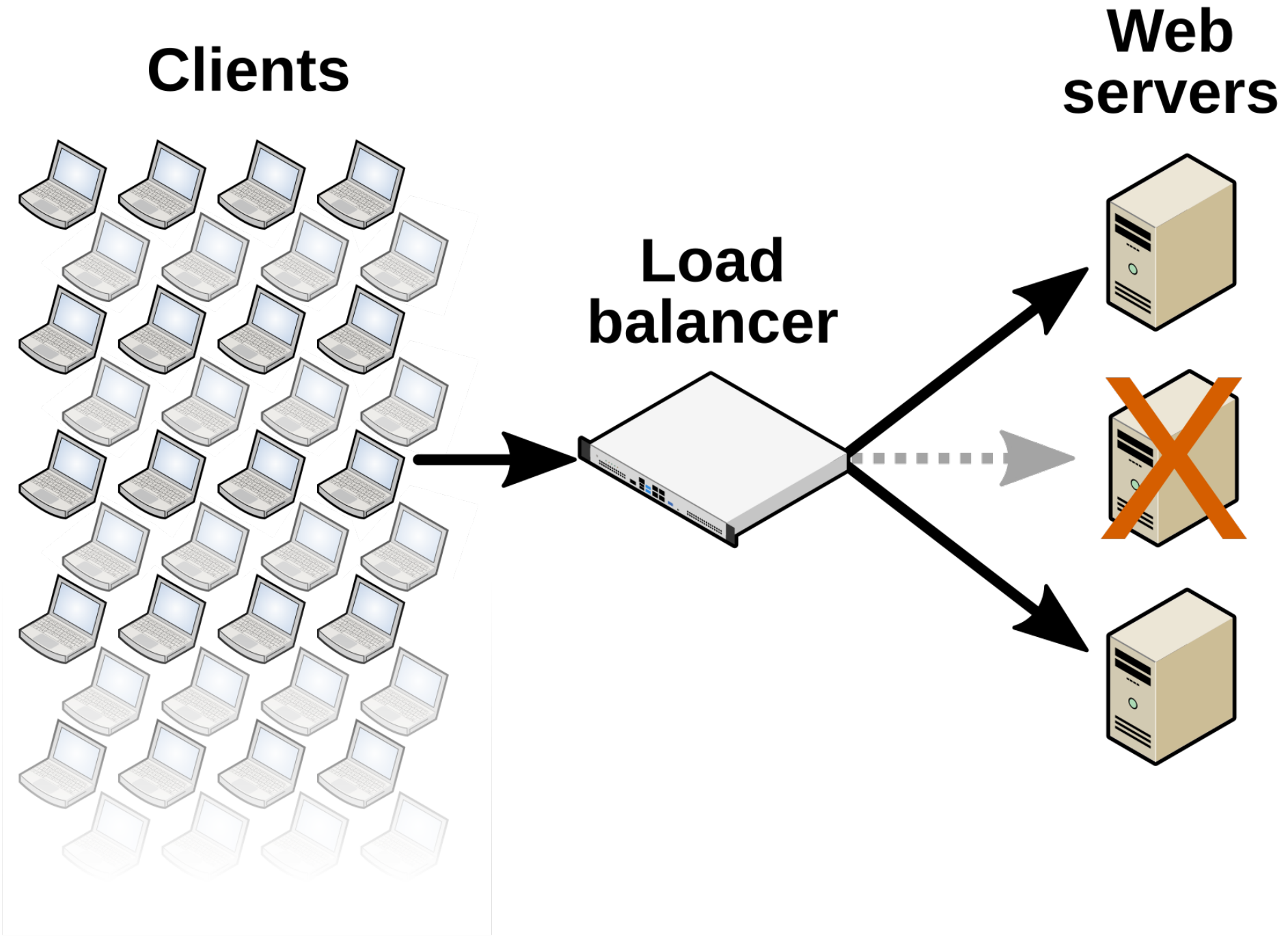
- Scalability

Why would you use a load balancer?

- Scalability
- High availability


Clients
Web
server


Clients
Web server


Clients
Load balancer
Web servers

Why would you use a load balancer?

- Scalability
- High availability
- Easy server maintenance

What services might you load balance?

- Web servers
- E-mail servers
- Web proxies
- Remote desktop services
- Print servers

Load balancing methods

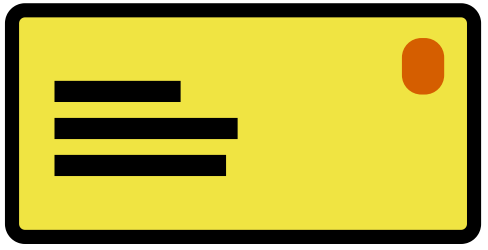
Layer 4

Layer 7

Load balancing methods

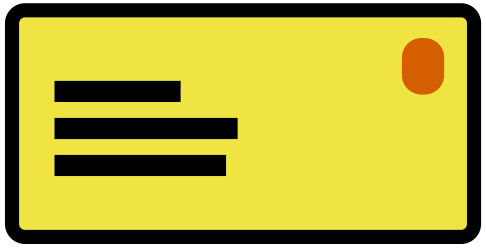
Layer 4

Layer 7



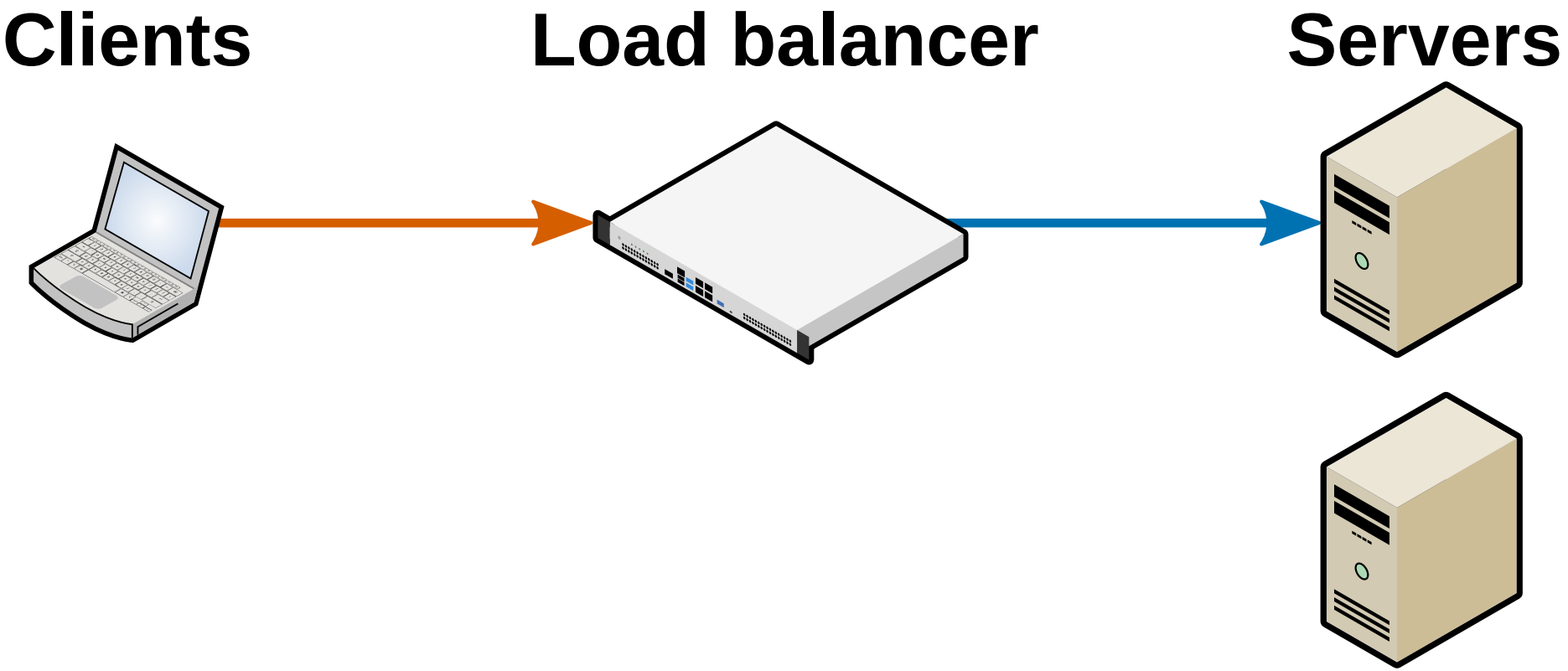
Load balancing methods

Layer 4

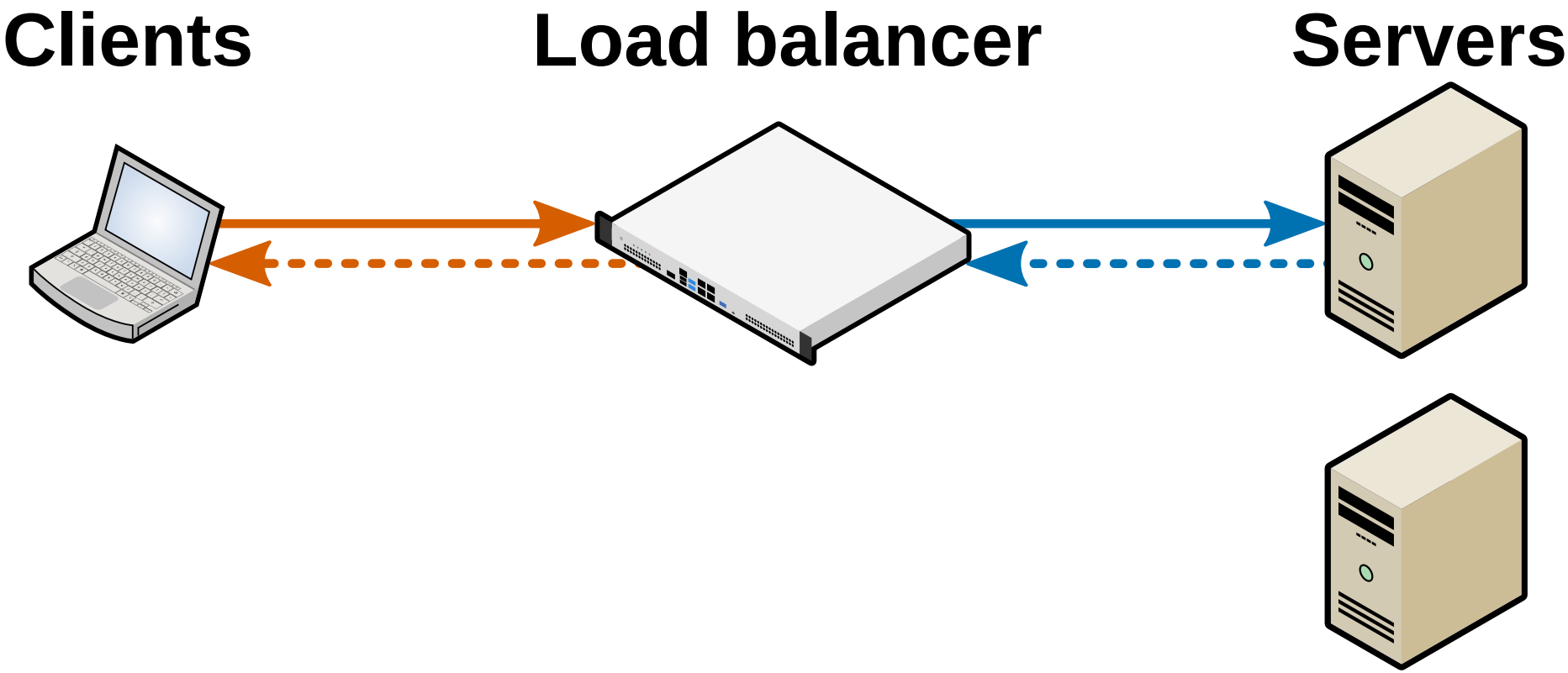


Layer 7

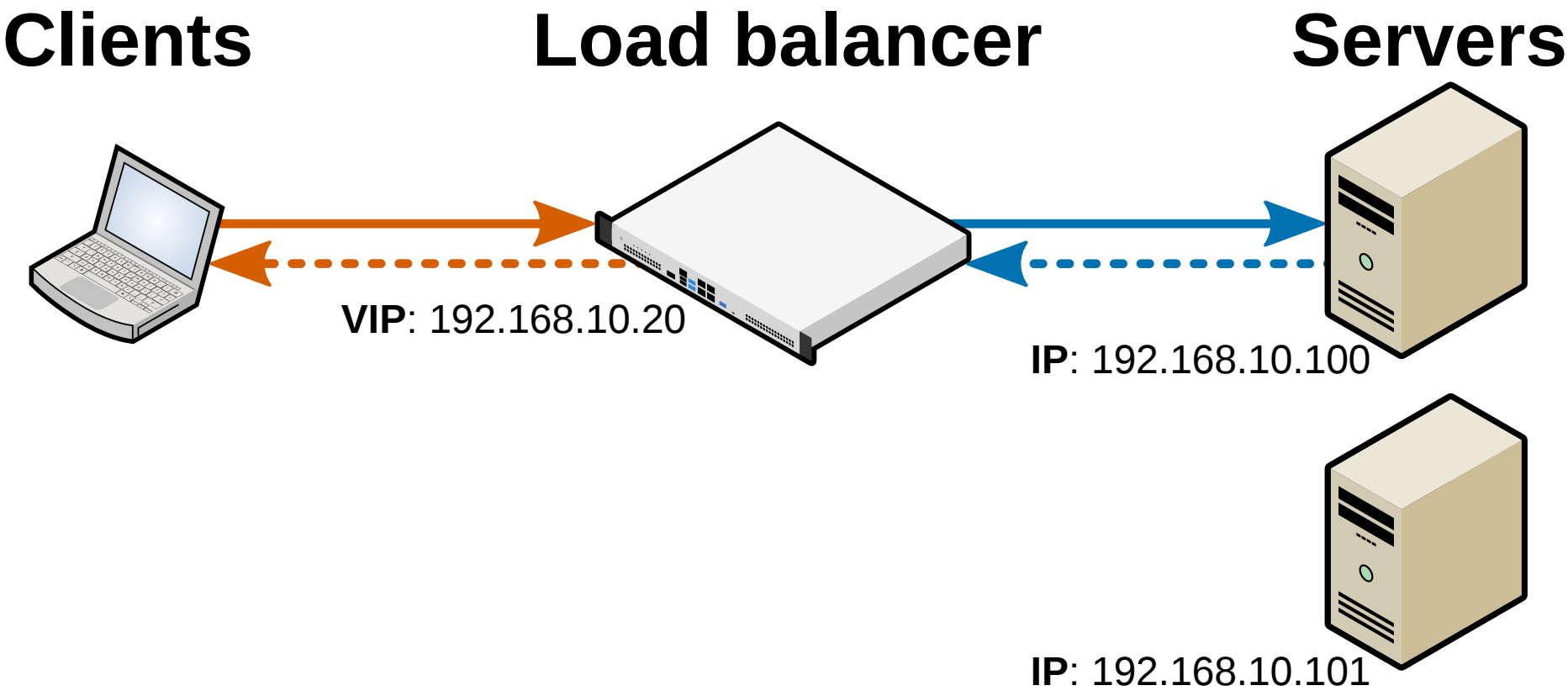
Layer 7 load balancing



Layer 7 load balancing



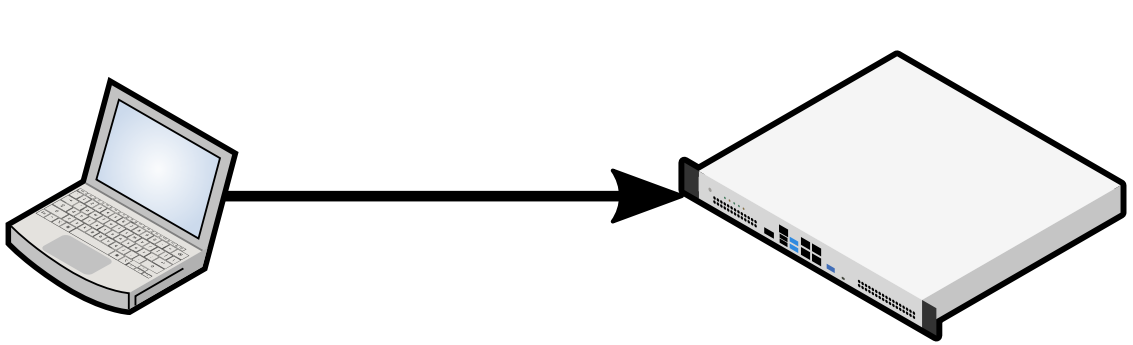
Layer 7 load balancing



Layer 4 load balancing: NAT mode

- **NAT mode** (Network Address Translation)
- Changing the destination IP address of load balanced traffic

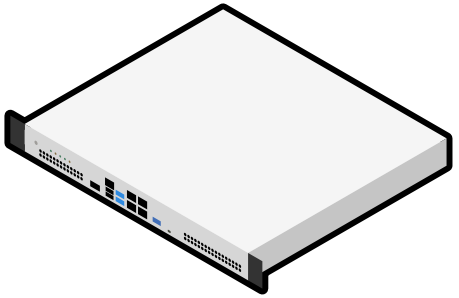
Client **Load balancer** **Servers**



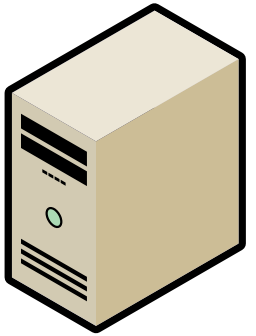
Src:	Client's IP
Dst:	Load balancer's IP

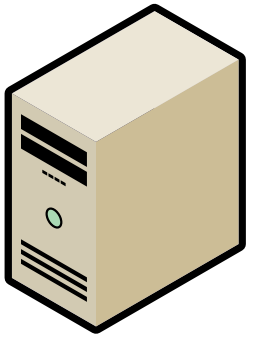
Client

Load balancer



Servers



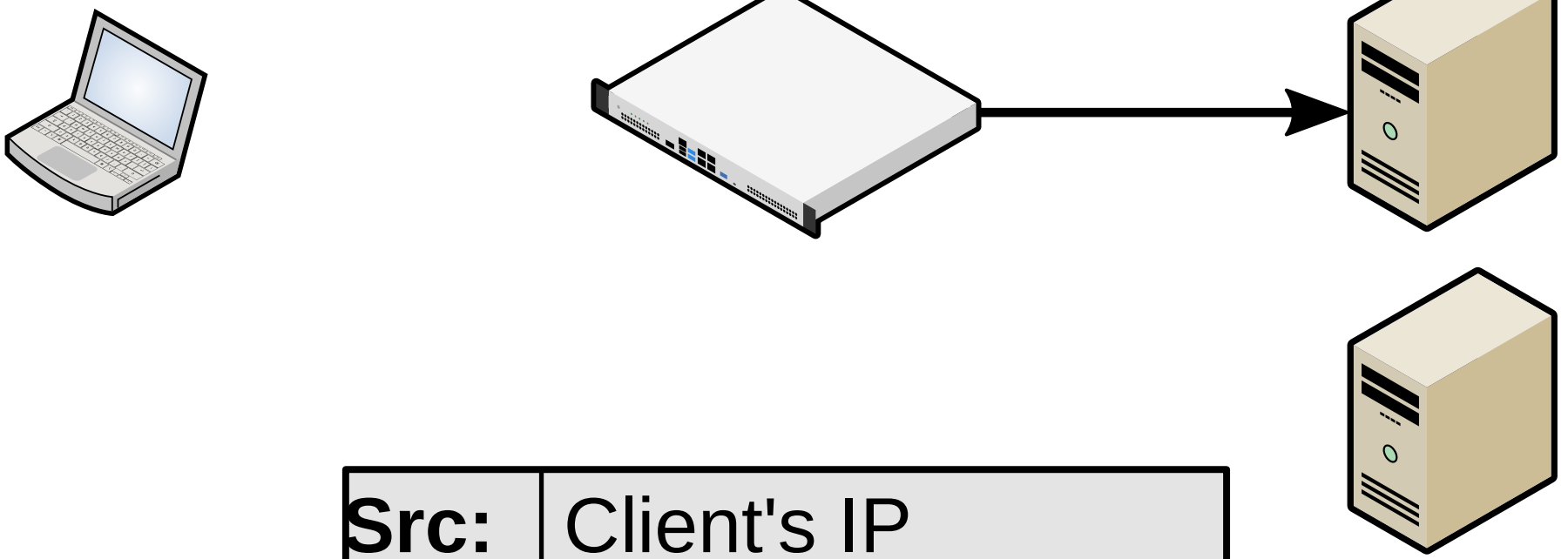


Src:	Client's IP
Dst:	

Client

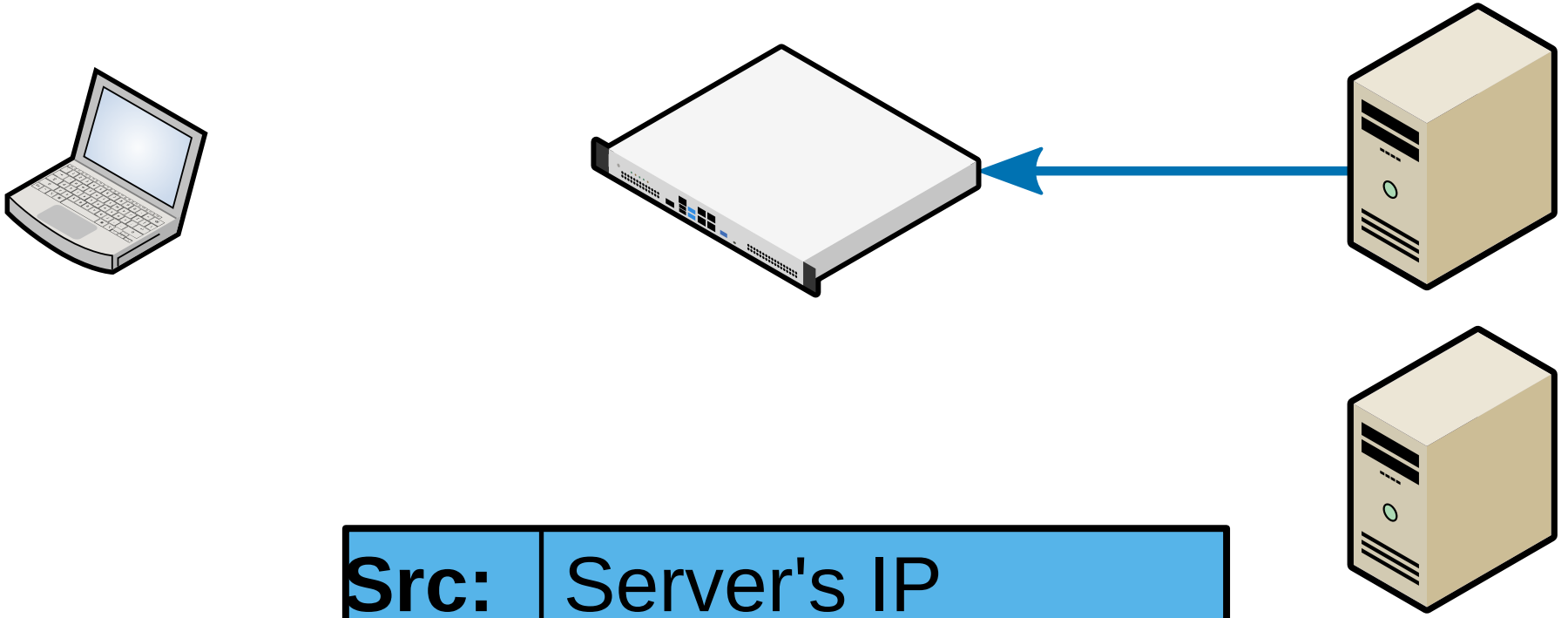
Load balancer

Servers



Src:	Client's IP
Dst:	Server's IP

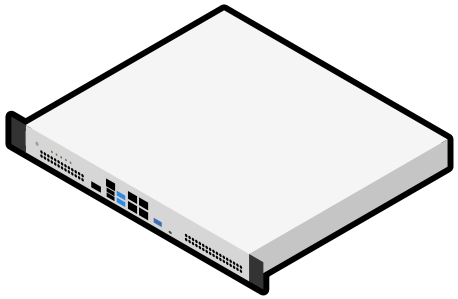
Client **Load balancer** **Servers**



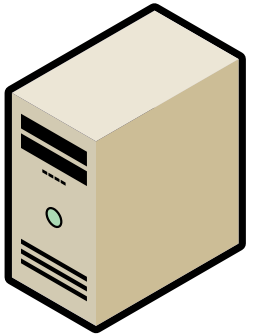
Src:	Server's IP
Dst:	Client's IP

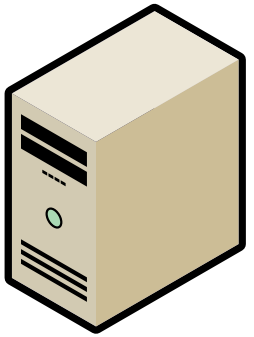
Client

Load balancer



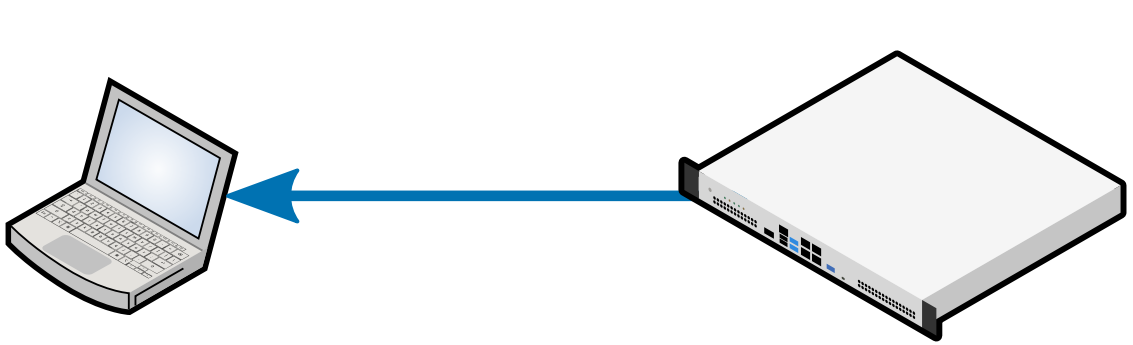
Servers





Src:	
Dst:	Client's IP

Client **Load balancer** **Servers**

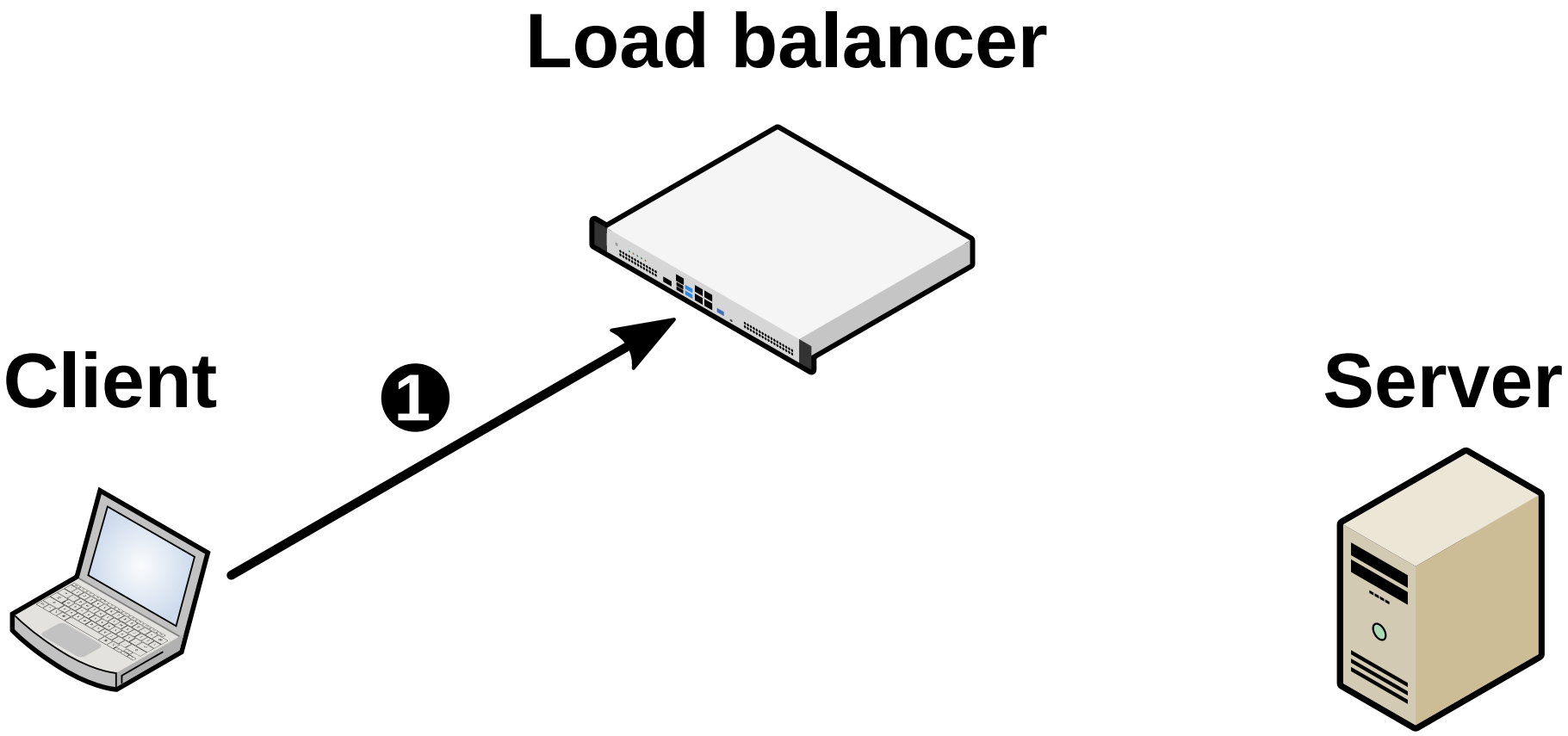


Src:	Load balancer's IP
Dst:	Client's IP

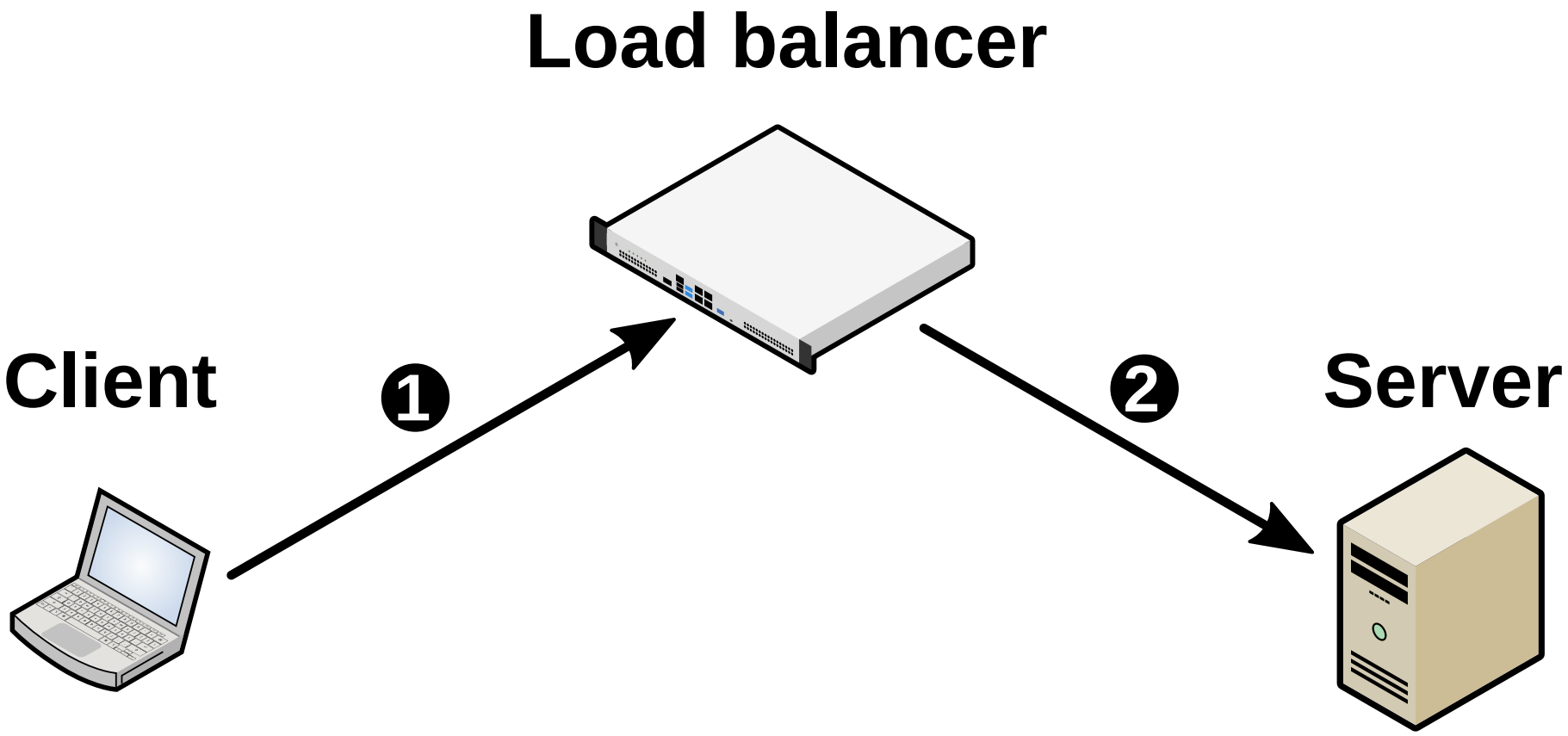
Layer 4 load balancing: DR mode

- **DR mode** (Direct Routing)
- Some vendors refer to this as DSR, ‘Direct Server Return’
- Changing the destination MAC address of load balanced traffic

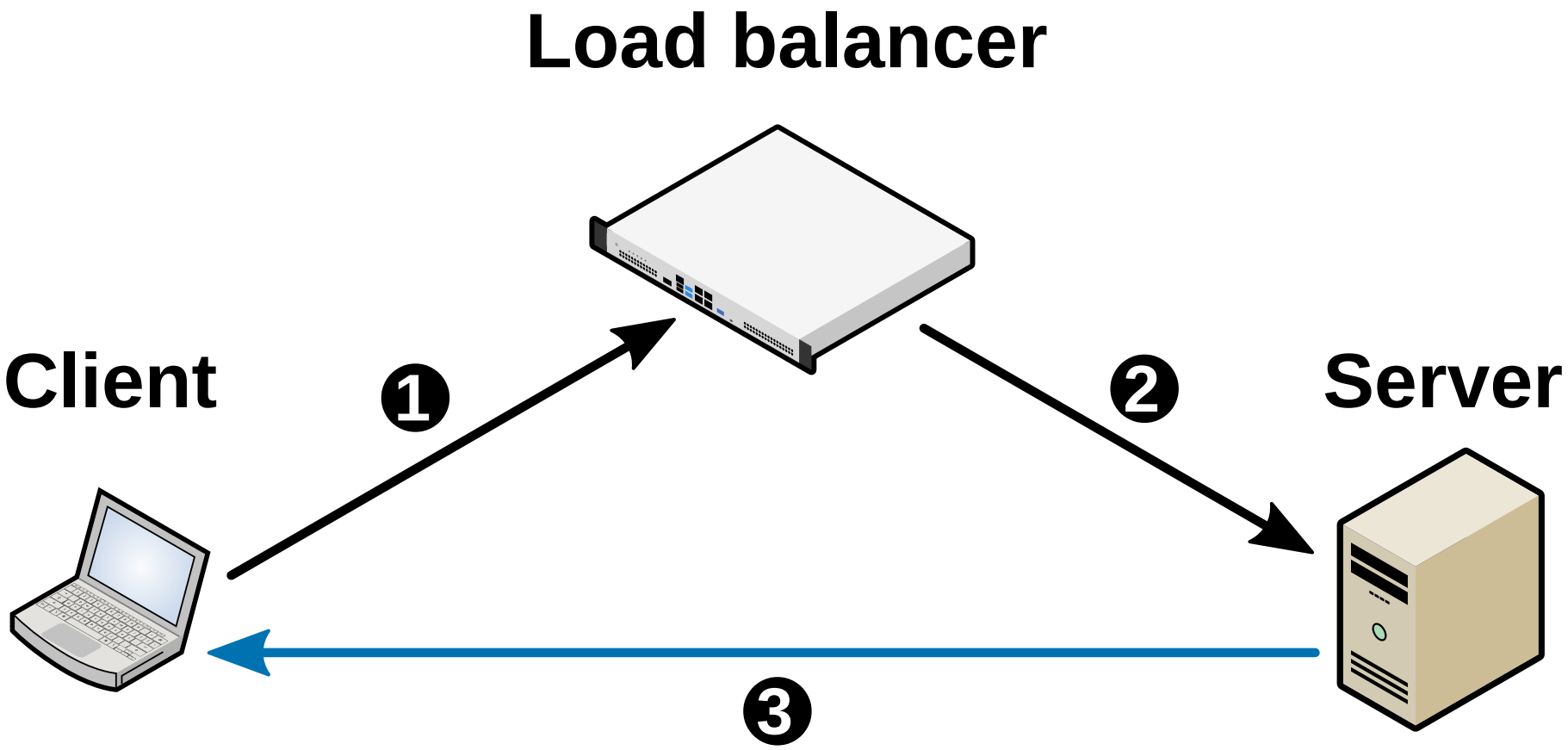
Layer 4 load balancing: DR mode



Layer 4 load balancing: DR mode



Layer 4 load balancing: DR mode



Layer 4 load balancing: TUN mode

- **TUN mode** (Tunnel)
- Similar to DR (Direct Routing) mode, but the back end servers don’t have to be located on the same network segment as the load balancer
- Uses IP in IP tunnels (not Microsoft friendly)

Building a Linux load balancer

- The component parts are all free & open source!

Building a Linux load balancer

Layer 4 load balancing

- **LVS**: Linux Virtual Server

Building a Linux load balancer

Layer 4 load balancing

- **LVS**: Linux Virtual Server
- **IPVS**: IP Virtual Server

Building a Linux load balancer

Layer 4 load balancing

- **LVS**: Linux Virtual Server
- **IPVS**: IP Virtual Server
- **ipvsadm**

Building a Linux load balancer

Layer 4 load balancing

- **LVS**: Linux Virtual Server
- **IPVS**: IP Virtual Server
- **ipvsadm**
- **ldirectord**: Linux Director Daemon

Building a Linux load balancer

Layer 7 load balancing

- **HAProxy**

Summary

- What is load balancing

Many clients

Accessing the same service at once

Distributing the load

Multiple instances (servers)

Summary

- Why you would use a load balancer

- Scalability
- High availability
- Easy maintenance
- Load balancing is used everywhere!

Summary

- Load balancing methods

- Layer 7
- Layer 4 (NAT, DR, & TUN)

Summary

- Building a Linux load balancer

Thanks for listening! :)

Andrew Howe

@AndrewXanadu

Useful sites:

www.haproxy.org

www.linuxvirtualserver.org