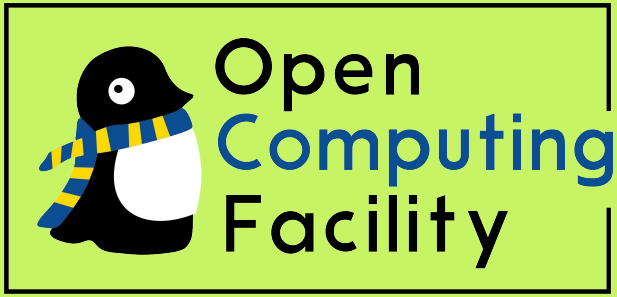


Lecture 6

lemurseven & oliverni

Web Servers

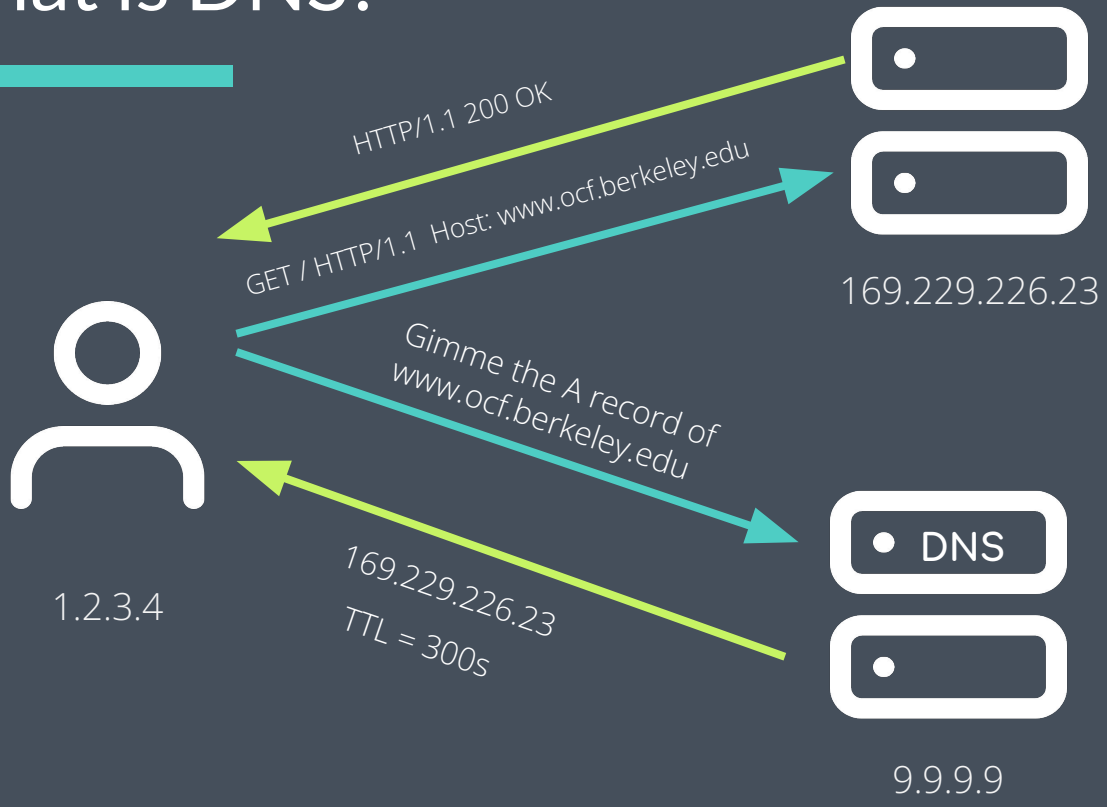
What happens when we visit a website?

Overview

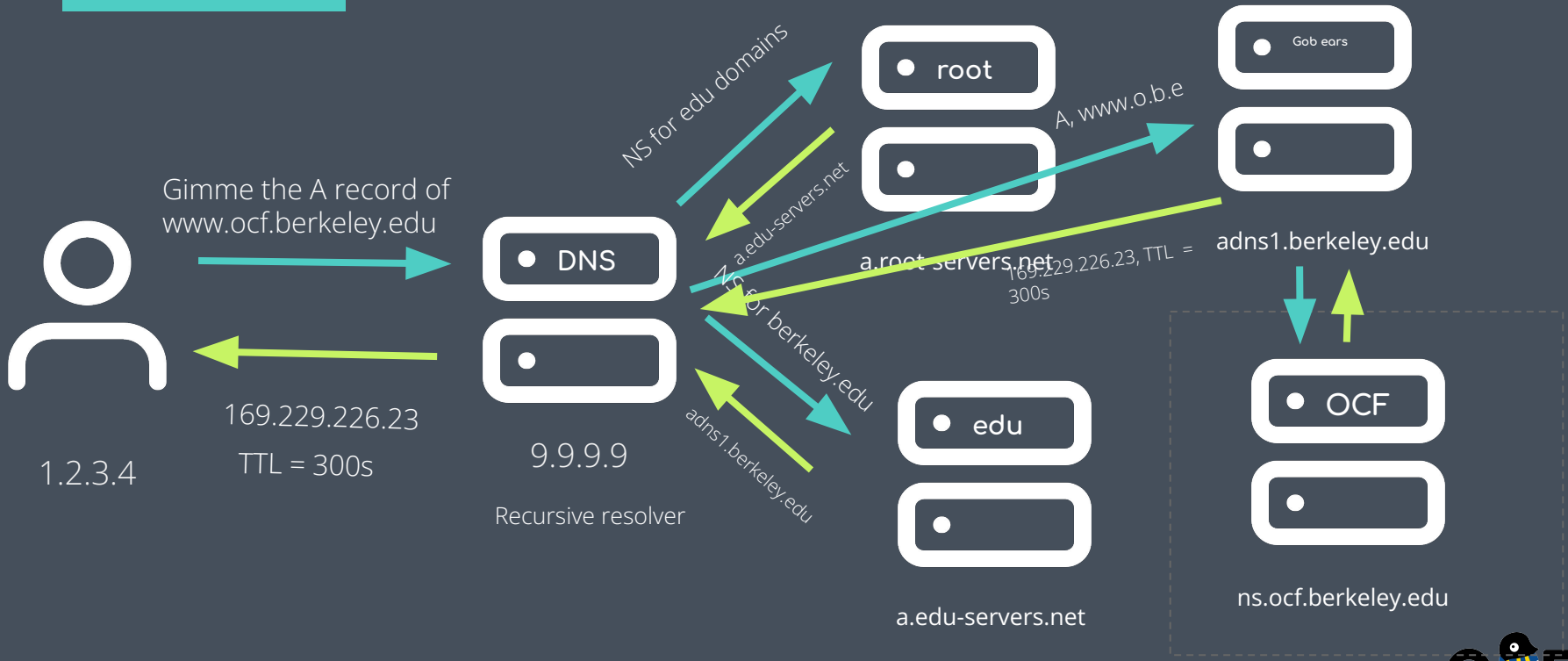
- Domain Name System
- Web servers
- Load balancing

Domain Name System

What is DNS?


HTTP/1.1 200 OK
GET / HTTP/1.1 Host: www.ocf.berkeley.edu
169.229.226.23
Gimme the A record of
www.ocf.berkeley.edu
DNS
1.2.3.4
169.229.226.23
TTL = 300s
9.9.9.9

What is actually happening?



Types of DNS records

- A: returns an IPv4 address (e.g. 74.125.142.147)
- AAAA: returns an IPv6 address (e.g. 2607:f140:0:32::70)
- CNAME: returns the canonical domain name (e.g. uptime.ocf.io points to stats.uptimerobot.com)
- MX: redirects email to a mail server (e.g. MX ocf.b.e points to aspmx.l.google.com etc.)
- NS: stores the authoritative name server for a domain (e.g. ocf.io's NS record points to ns1.o.b.e)

More types of DNS records

- TXT: contains information about the domain (e.g. site verification, etc.)
- SRV: specifies a host and port for specific services
- SOA: stores administrative information about a domain (such as the email address of the admin, when the domain was last updated, and how long the server should wait between refreshes)

The DNS records of OCF

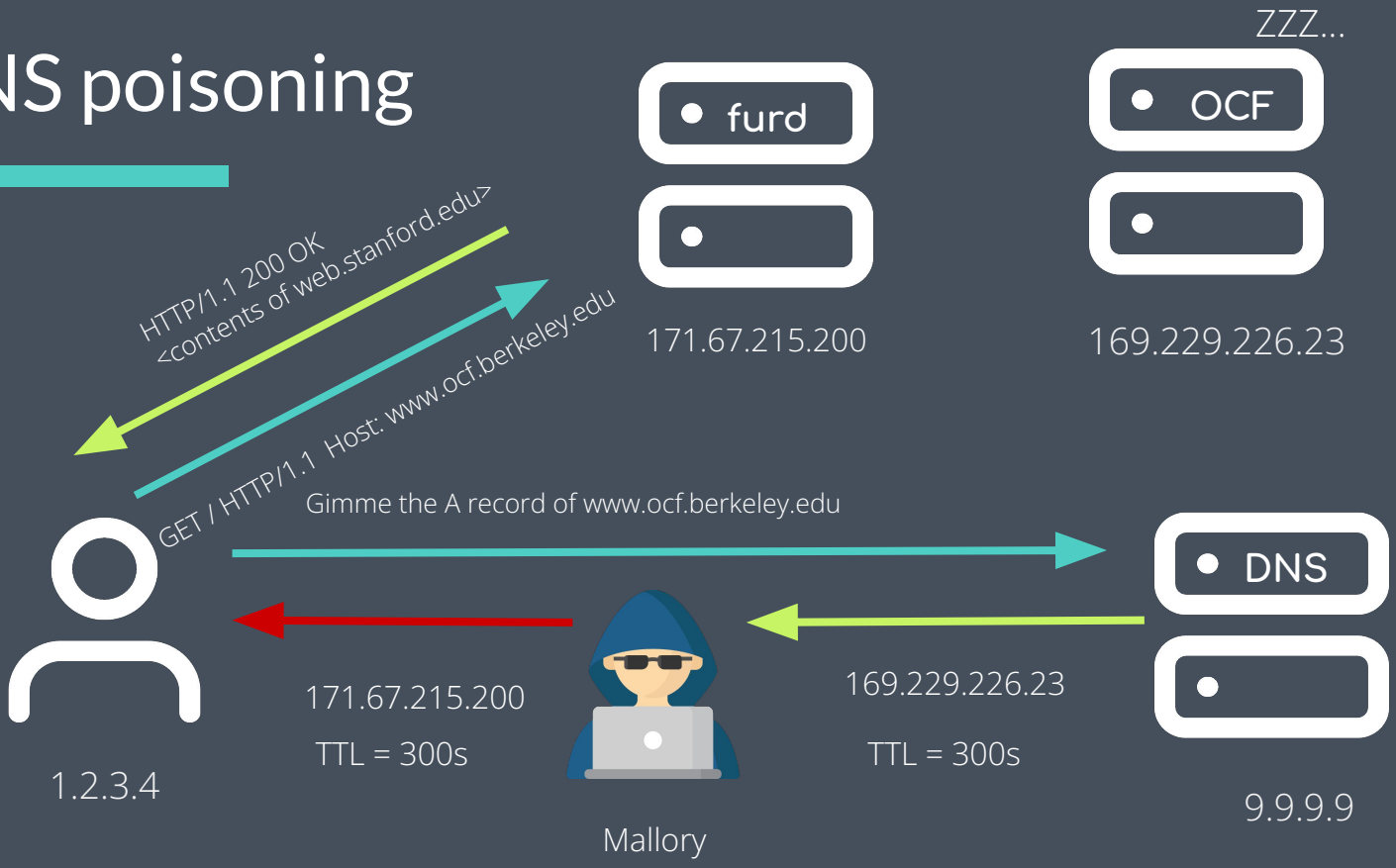
https://github.com/ocf/dns

```
death              IN A        169.229.226.23
death              IN AAAA     2607:f140:8801::1:23
www                IN CNAME    death
fallingrocksIN A        169.229.200.70
fallingrocksIN AAAA     2607:f140:0:32::70
apt                IN CNAME    fallingrocks
mirrors            IN CNAME    fallingrocks
lb                 IN A        169.229.226.79
lb                 IN AAAA     2607:f140:8801::1:79
auth               IN CNAME    lb
...
```

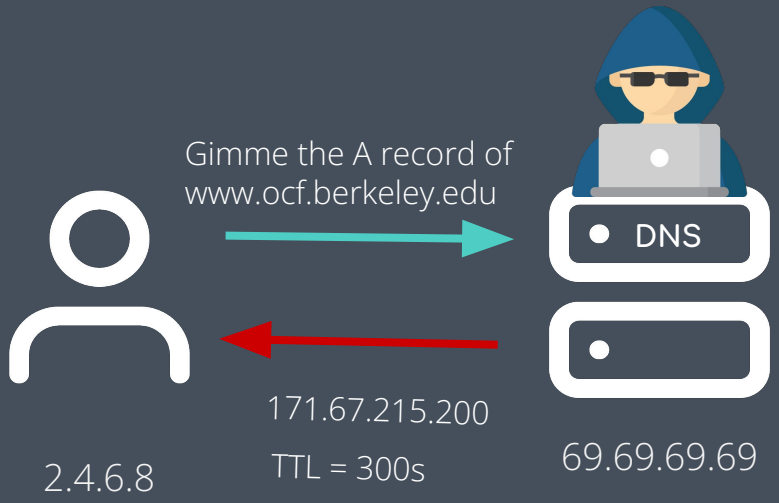
TTL record

- Time to live
- Tells a DNS server or the local resolver how long it should keep the record in its cache
- Longer TTLs can speed up DNS resolution but causes updates to the zone to take longer to propagate to users

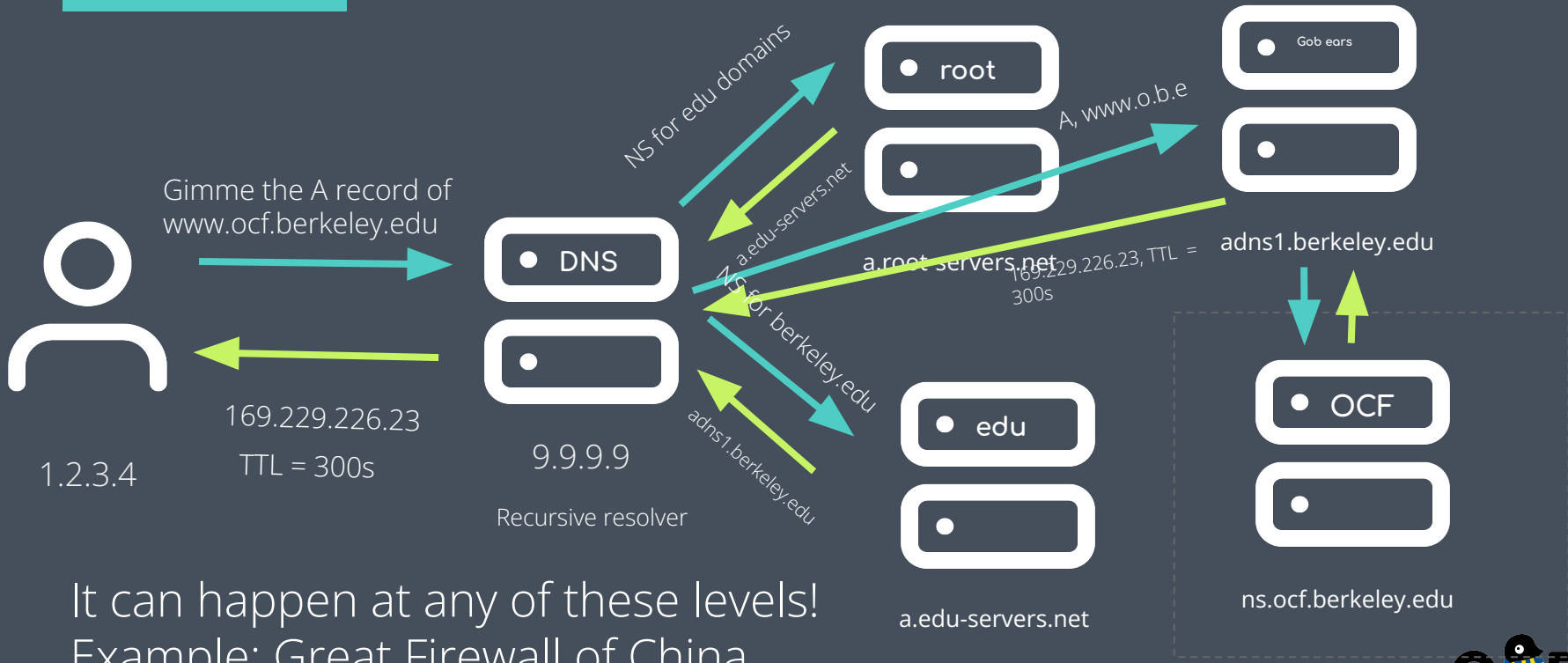
DNS poisoning



More DNS poisoning



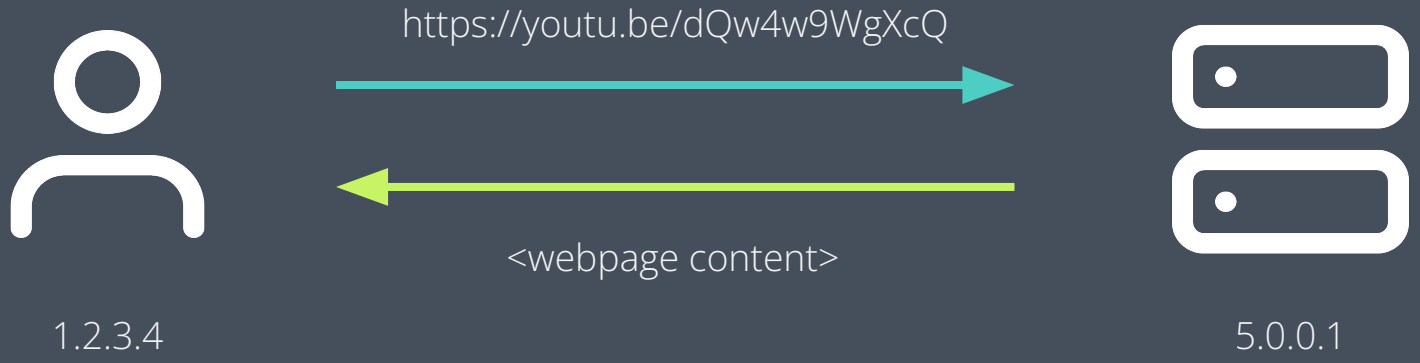
More DNS poisoning



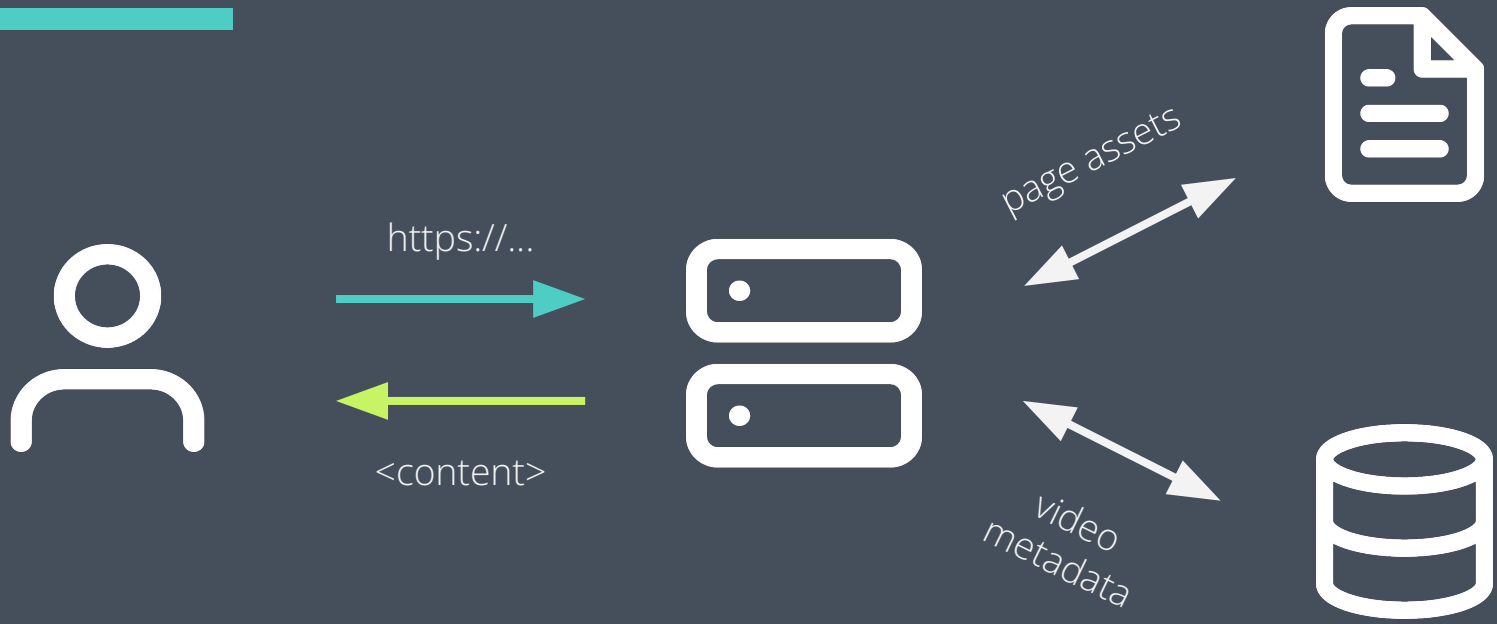
It can happen at any of these levels!
Example: Great Firewall of China

Web Servers

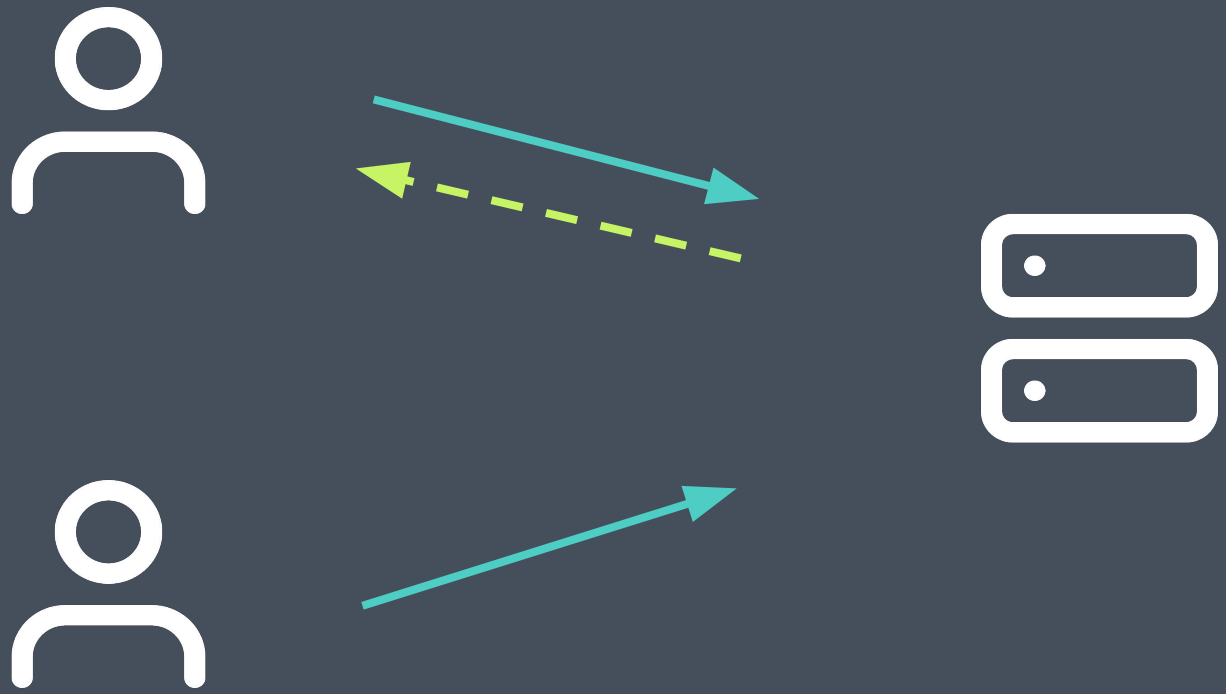
What do web servers do?



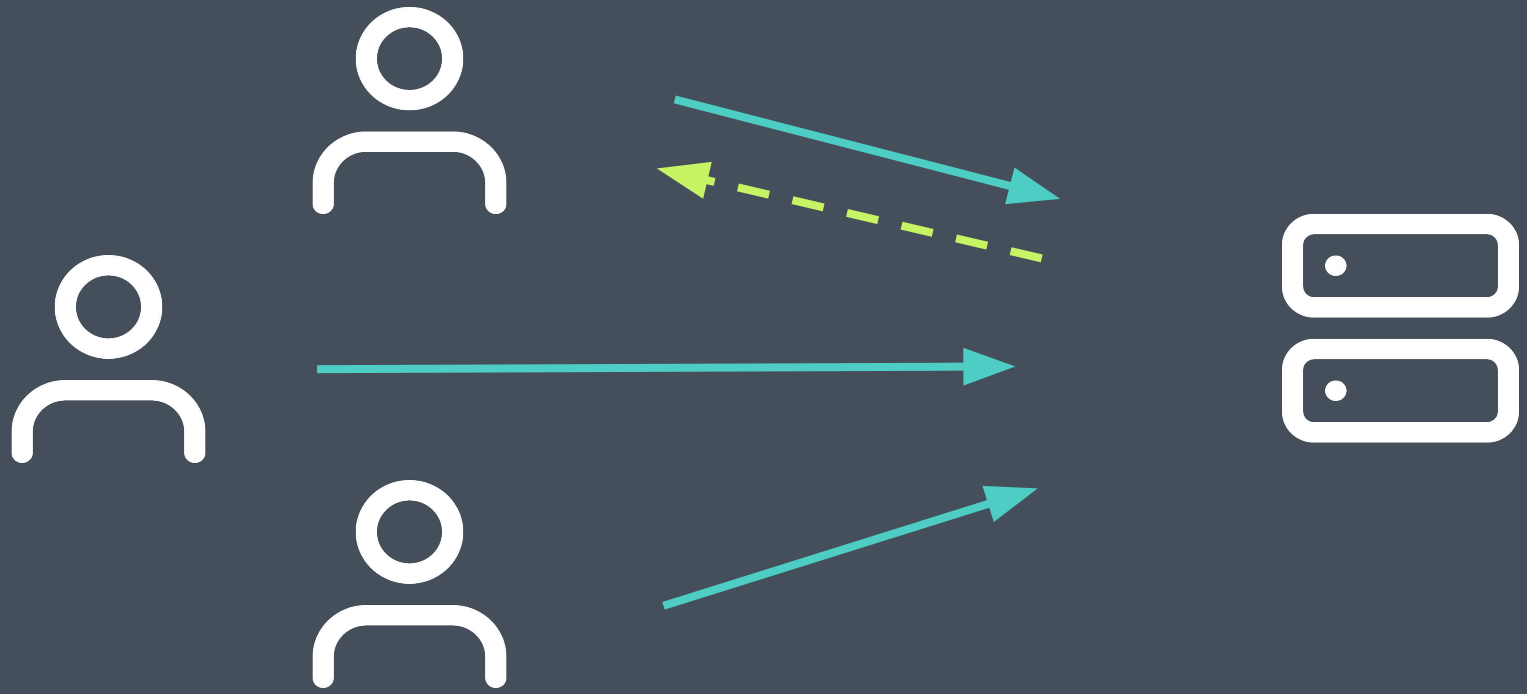
What do web servers do?



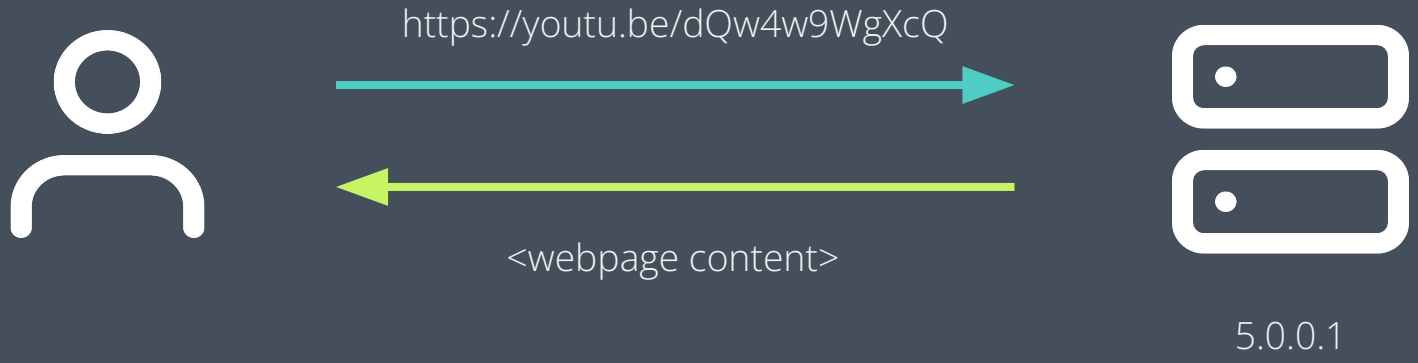
How do web servers scale?



How do web servers scale?

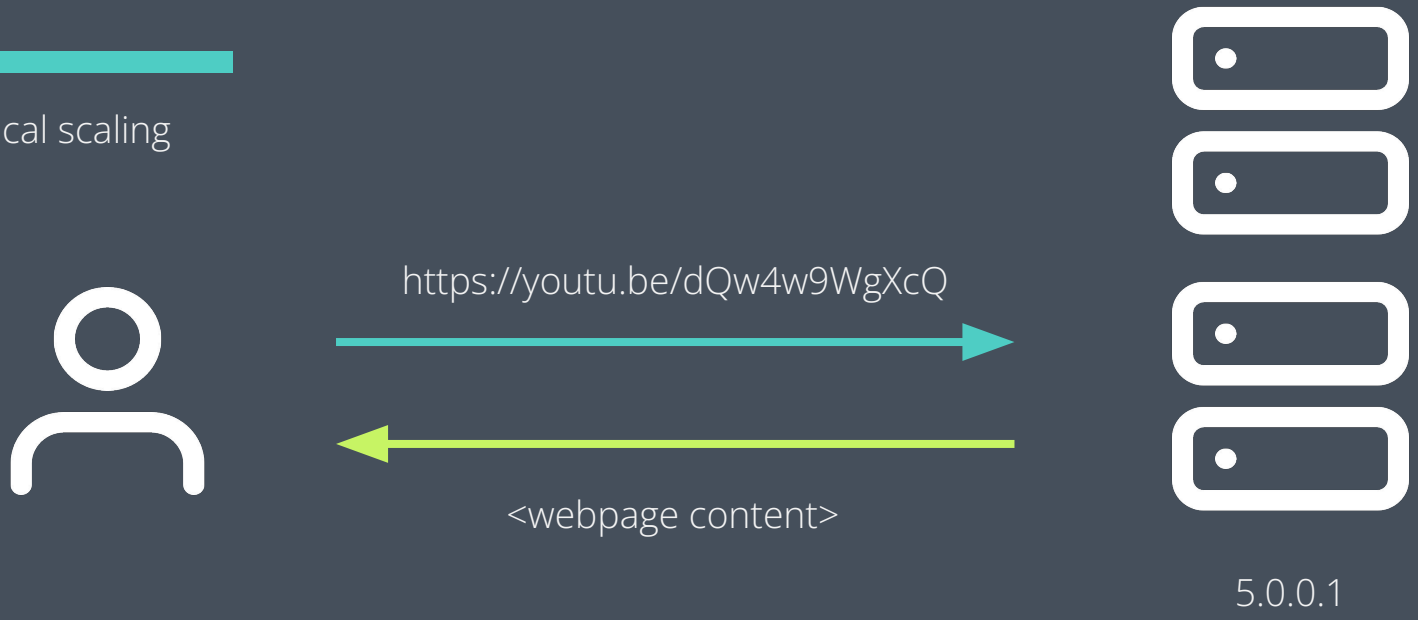


How do web servers scale?



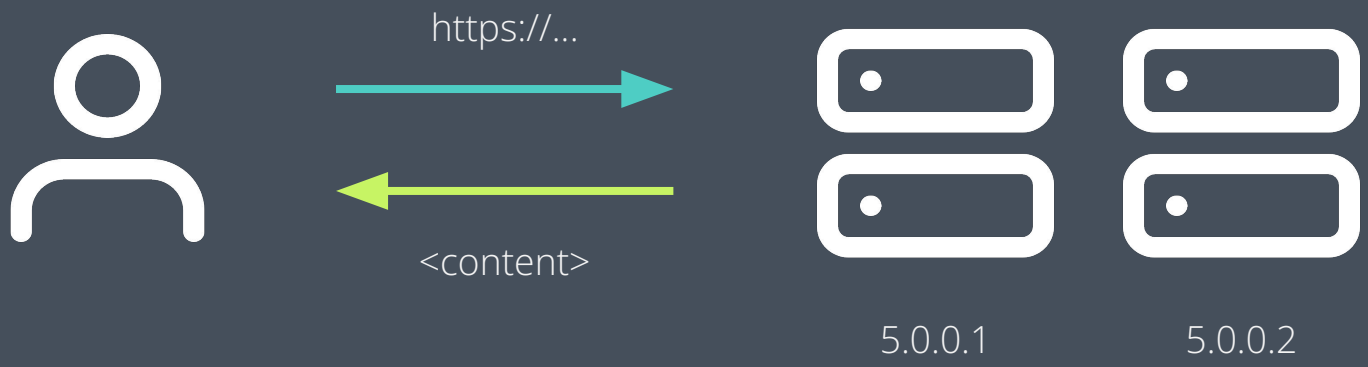
How do web servers scale?

vertical scaling



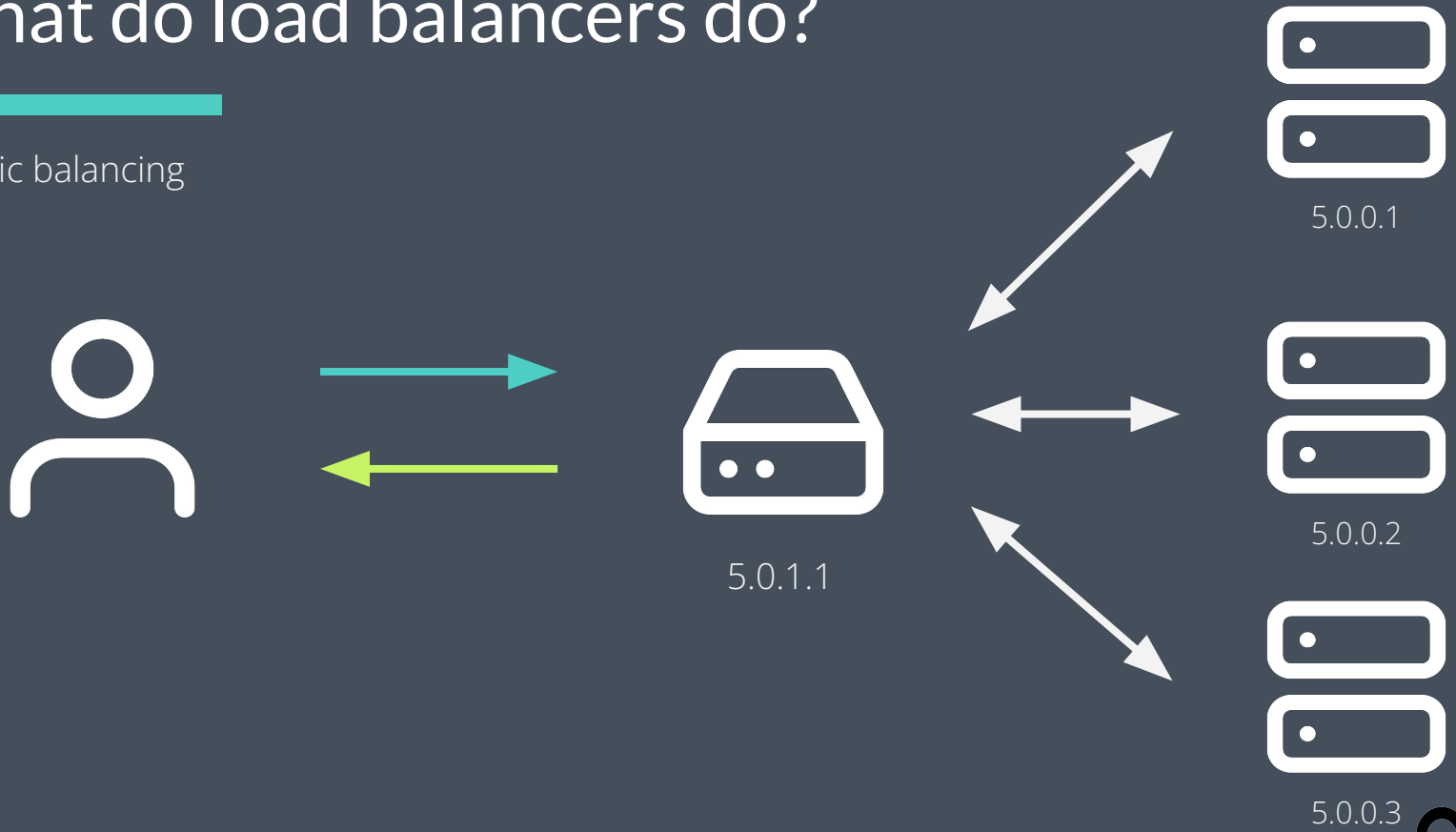
How do web servers scale?

horizontal scaling

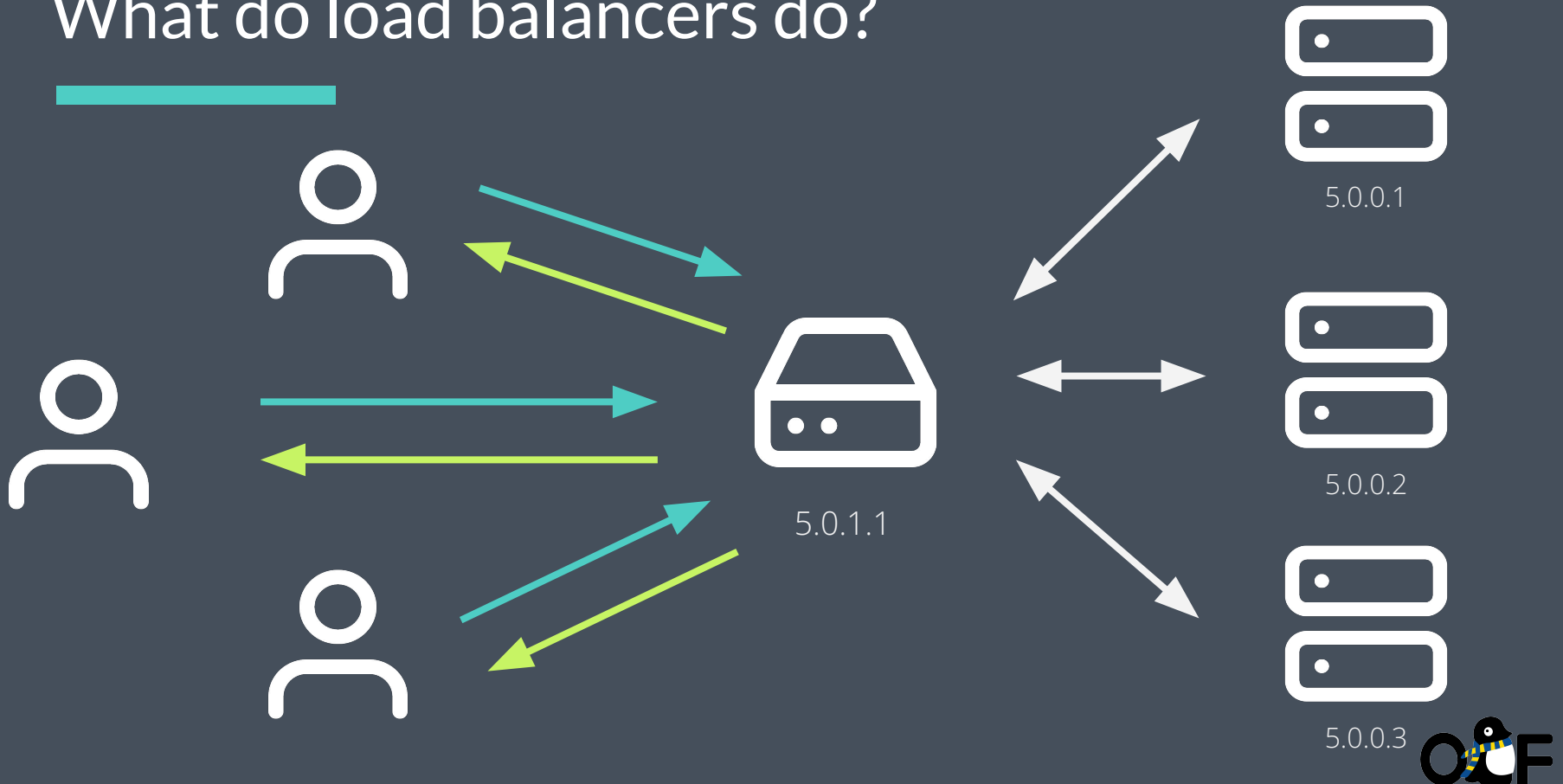


What do load balancers do?

traffic balancing

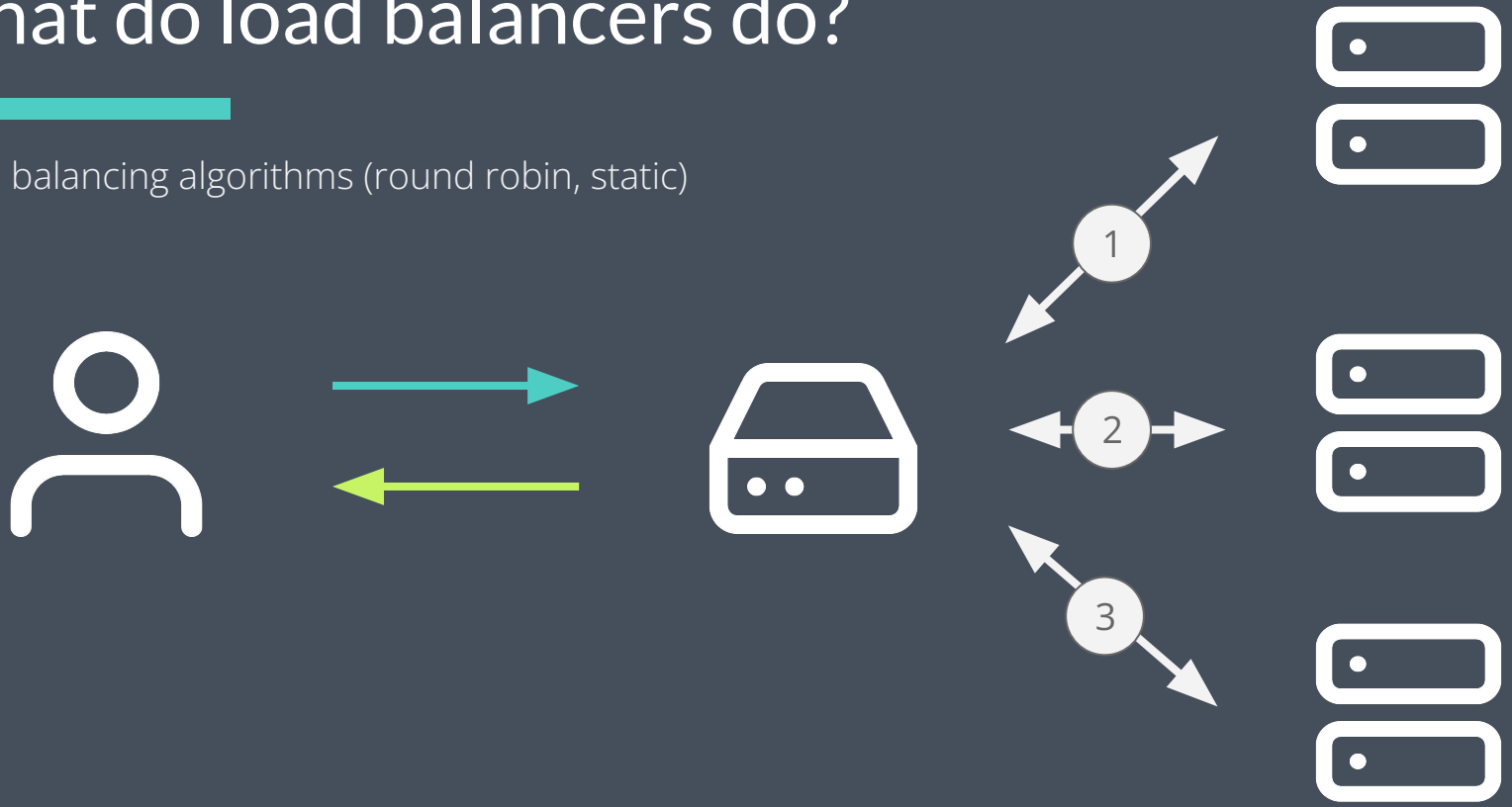


What do load balancers do?



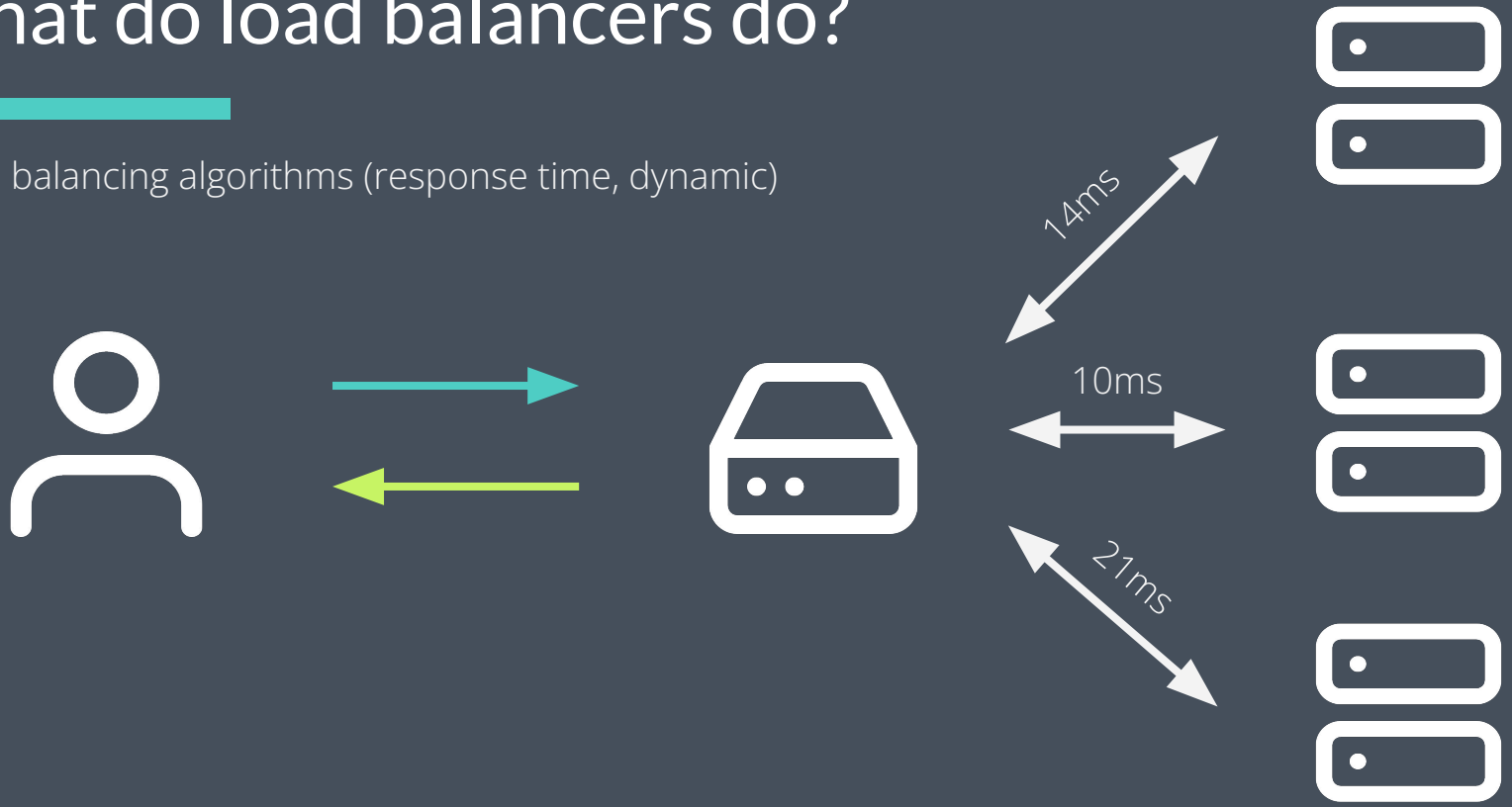
What do load balancers do?

load balancing algorithms (round robin, static)



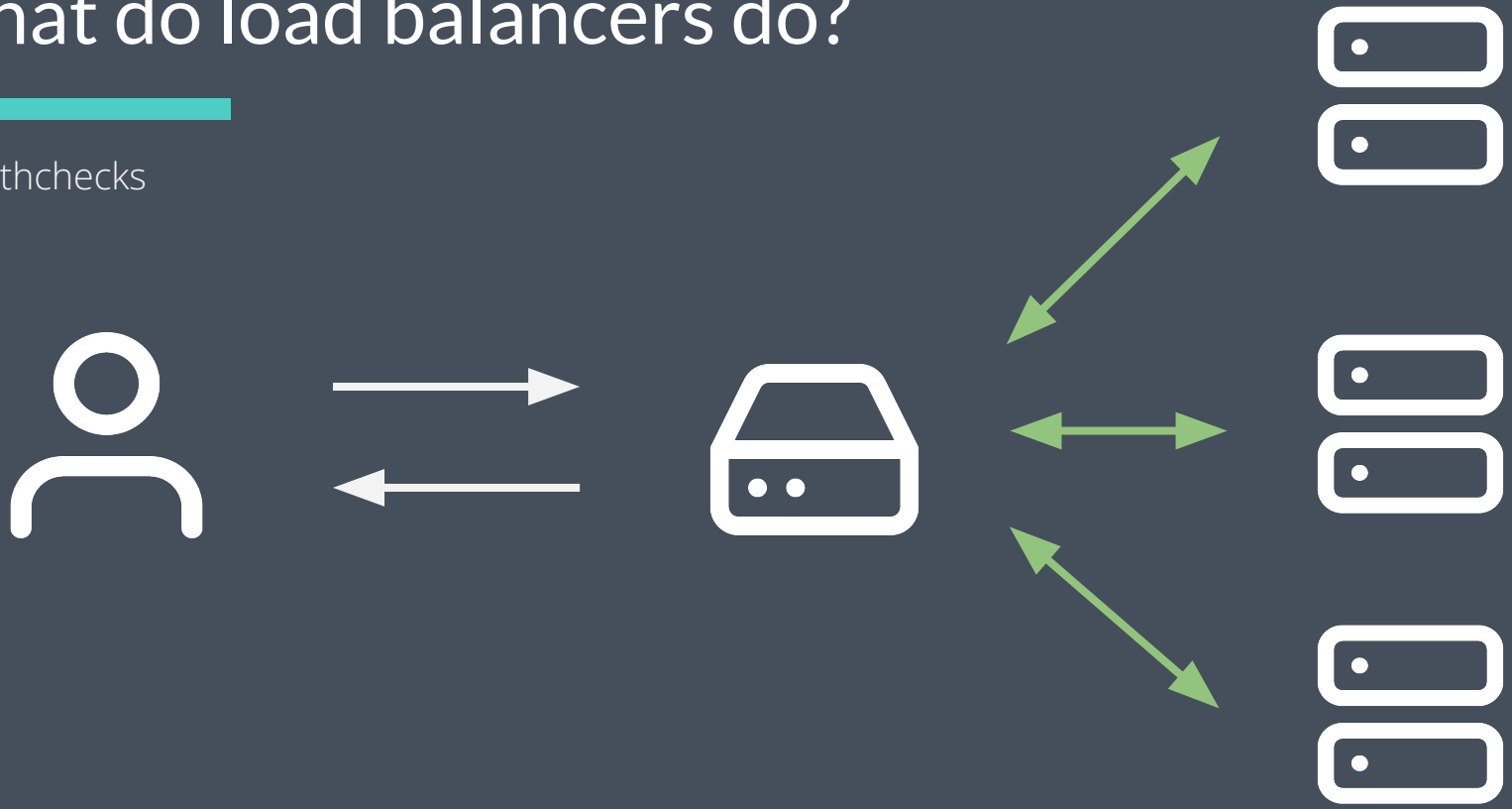
What do load balancers do?

load balancing algorithms (response time, dynamic)



What do load balancers do?

healthchecks



What do load balancers do?

healthchecks