Computer Networks

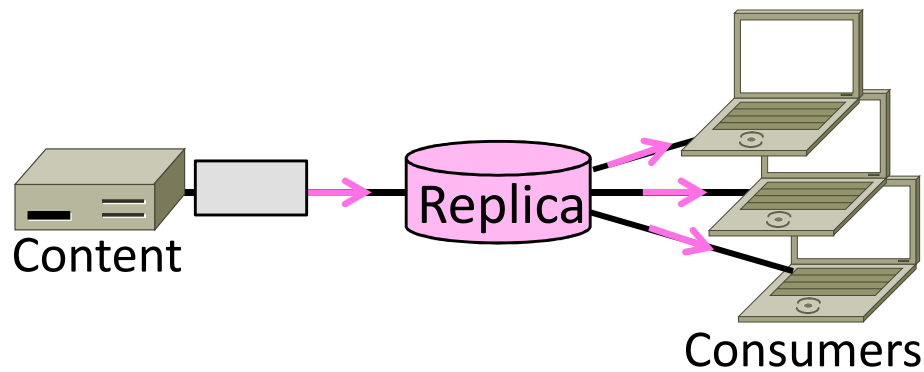## CDNs (Content Delivery Networks) (§7.5.3)

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Topic

- CDNs (Content Delivery Networks)
 - Efficient distribution of popular content; faster delivery for clients

Content

Replica

Consumers

Context

- As the web took off in the 90s, traffic volumes grew and grew. This:
  1. Concentrated load on popular servers
  2. Led to congested networks and need to provision more bandwidth
  3. Gave a poor user experience

- Idea:
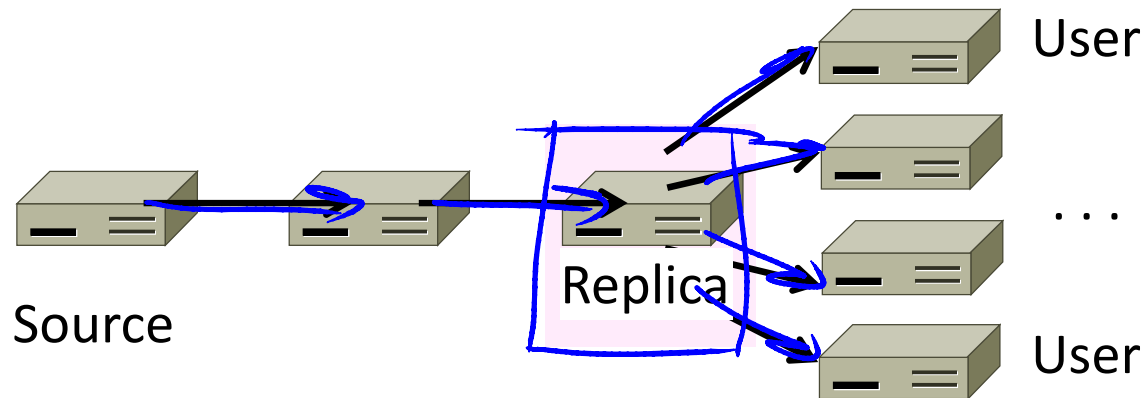 - Place popular content near clients
  - Helps with all three issues above

Before CDNs

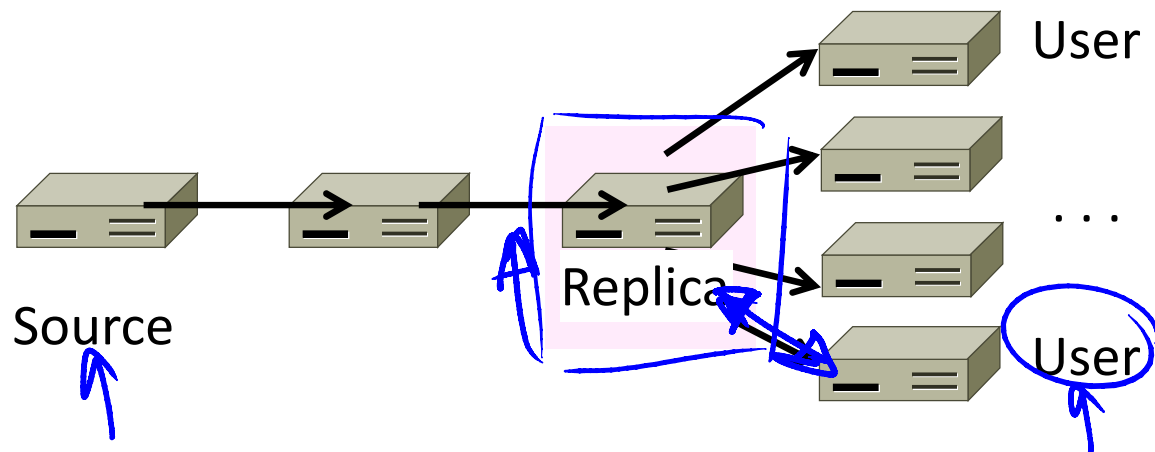- Sending content from the source to 4 users takes 4 x 3 = 12 "network hops" in the example
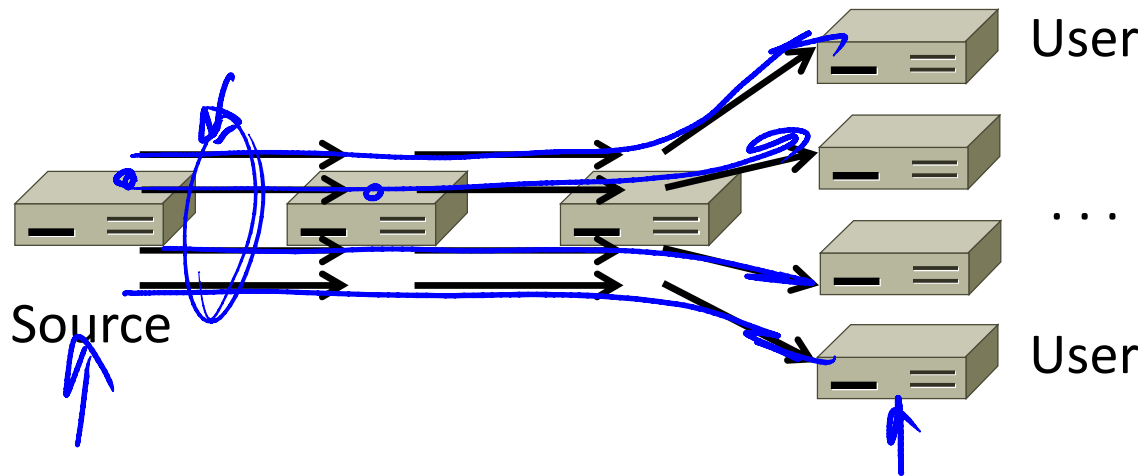
After CDNs

- Sending content via replicas takes only 4 + 2 = 6 "network hops"

Source

Replica

User

. . .

User

After CDNs (2)

- Benefits assuming popular content:
  - Reduces server, network load
  - Improves user experience (PLT)

Source

Replica

User
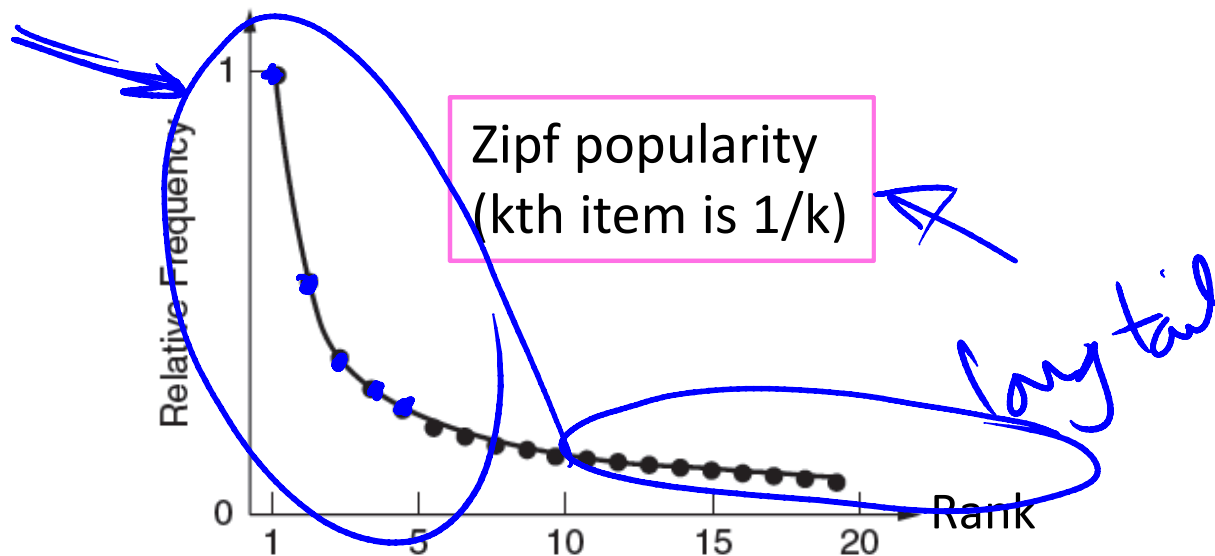
...

User

Popularity of Content

- Zipf's Law: few popular items, many unpopular ones; both matter

George Zipf (1902-1950)

Zipf popularity (kth item is 1/k)
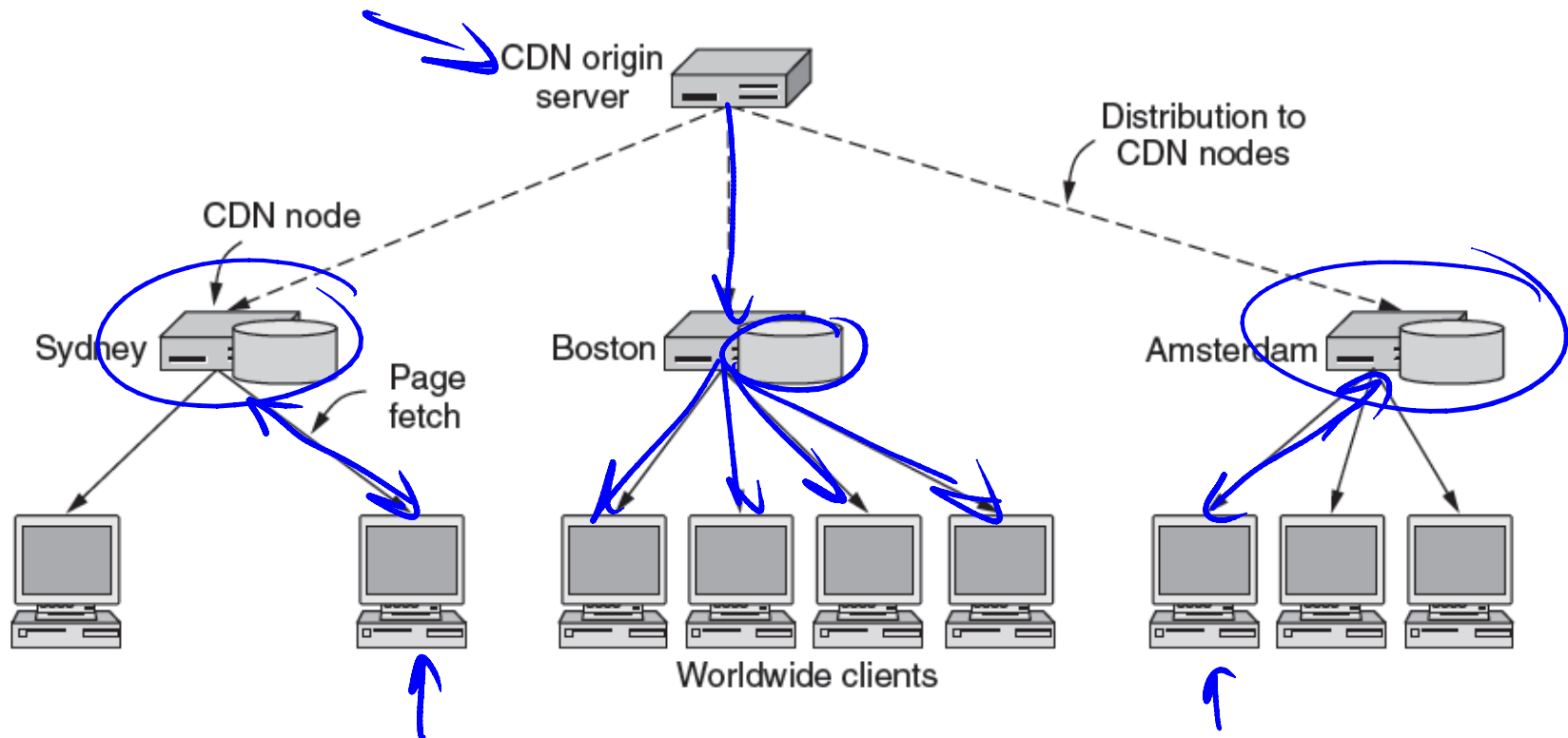
long tail

Source: Wikipedia

How to place content near clients?

- Use browser and proxy caches
  - Helps, but limited to one client or clients in one organization

- Want to place replicas across the Internet for use by all nearby clients
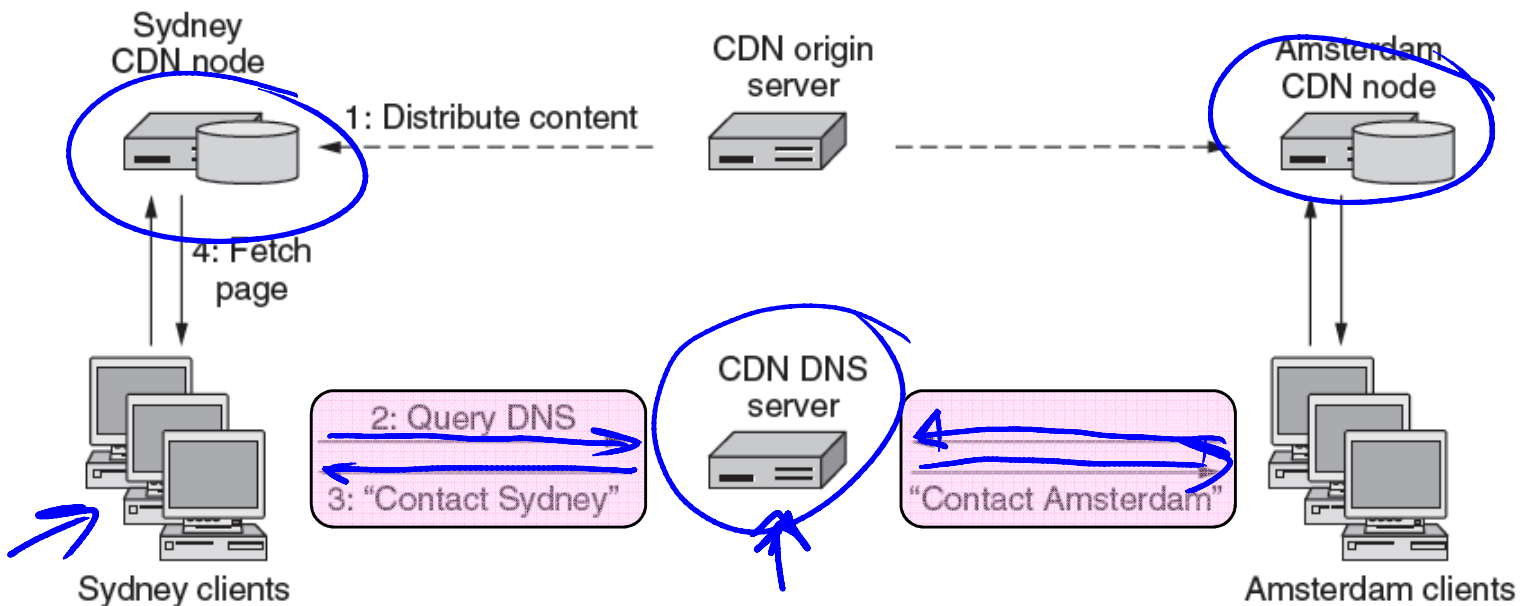 - Done by clever use of DNS
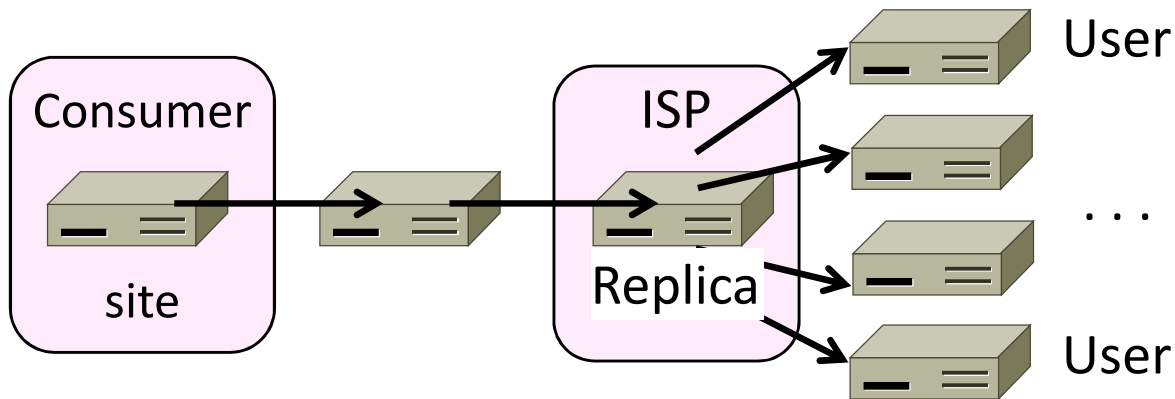
Content Delivery Network

Content Delivery Network (2)

- DNS resolution of site gives different answers to clients
  - Tell each client the site is the nearest replica (map client IP)

Business Model

- Clever model pioneered by Akamai
  - Placing site replica at an ISP is win-win
    - Improves site experience and reduces bandwidth usage of ISP

END

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