MAC0352 - Redes de Computadores e Sistemas Distribuídos

Daniel Macêdo Batista

IME - USP, 13 de Maio de 2021

Roteiro

HTTP (Cookies)

Proxy

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Maintaining user/server state: cookies

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- no notion of multi-step exchanges of HTTP messages to complete a Web "transaction"

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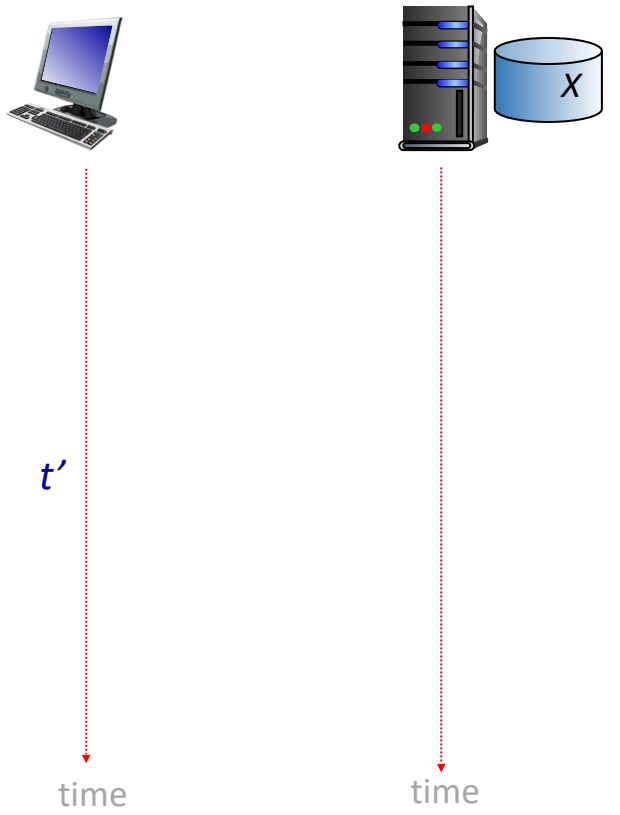

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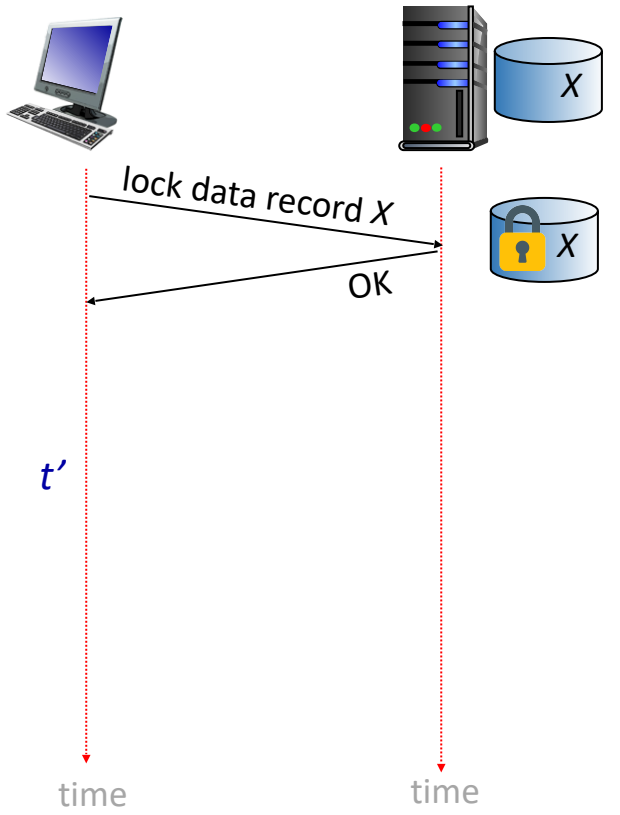

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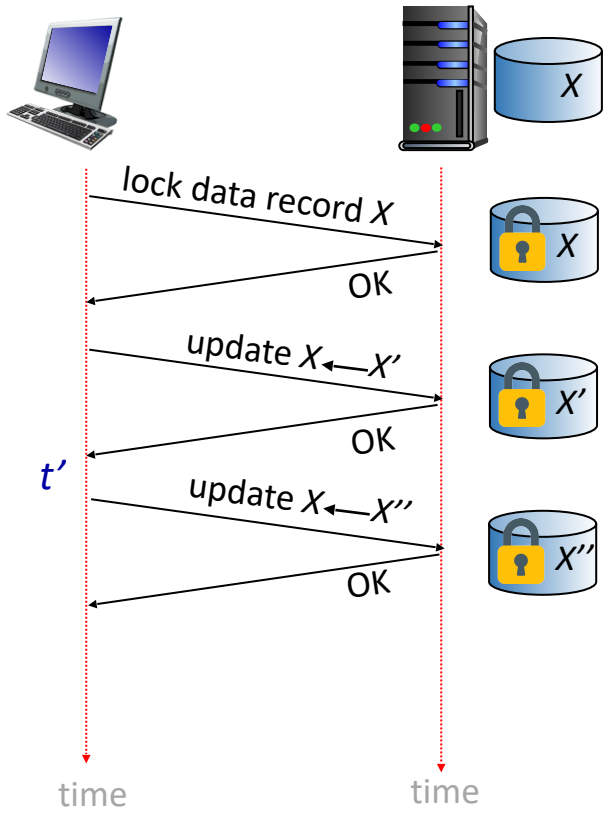

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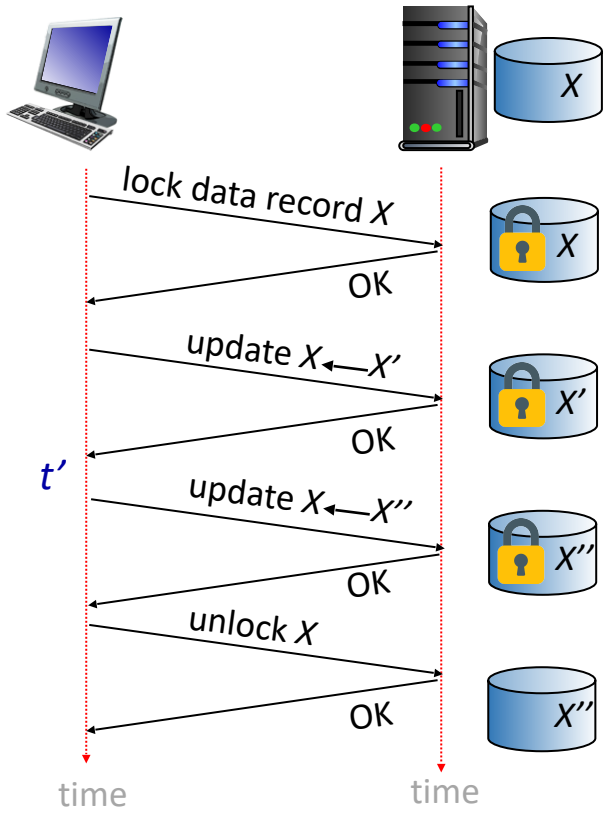

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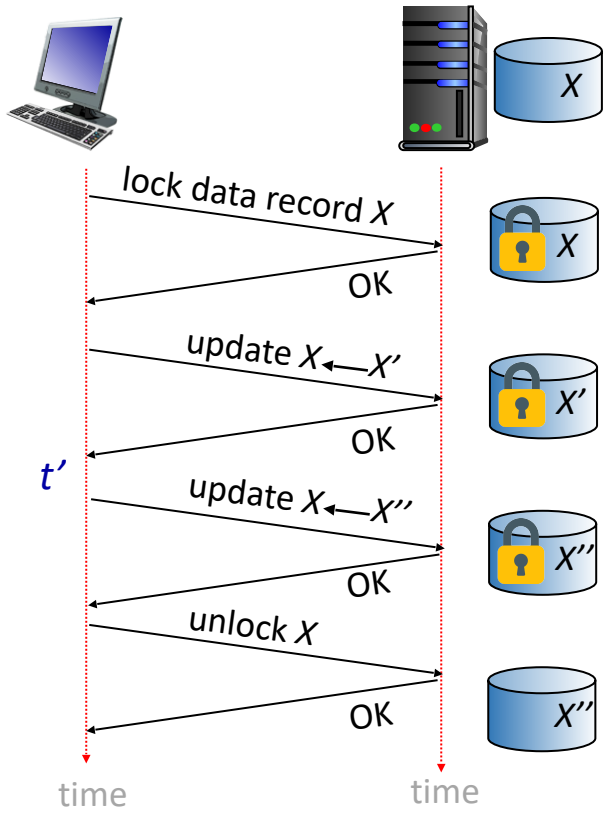

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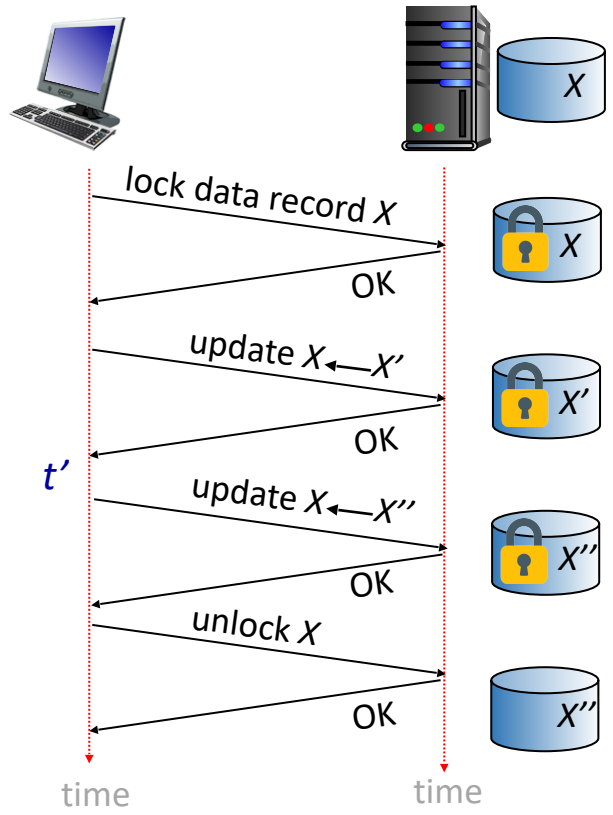

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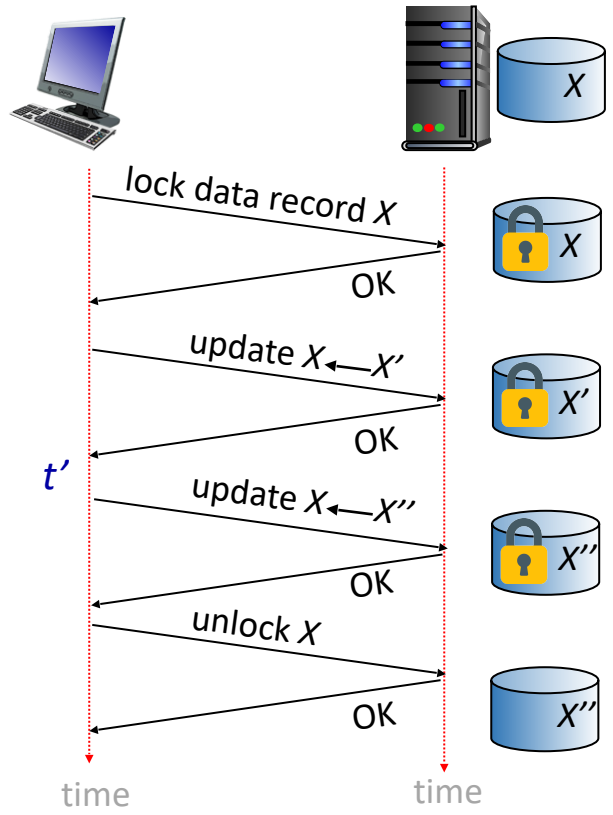

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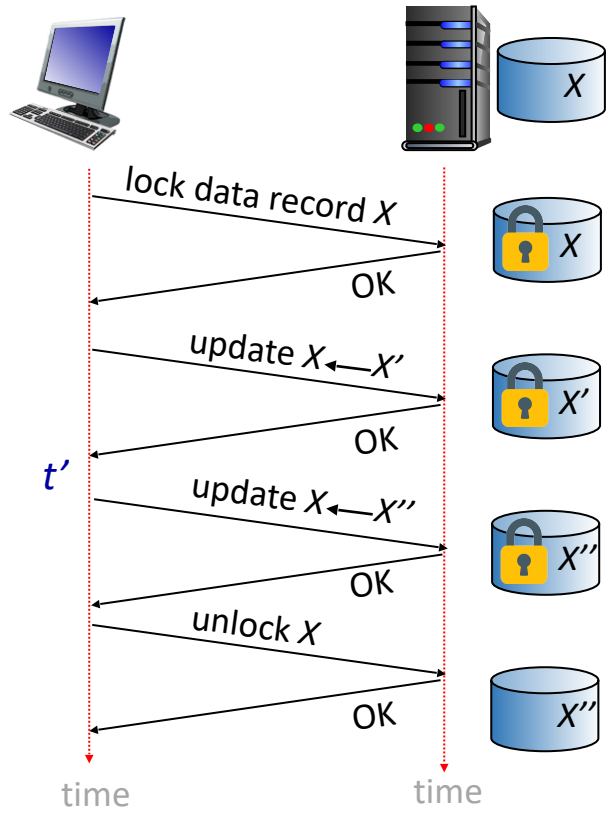

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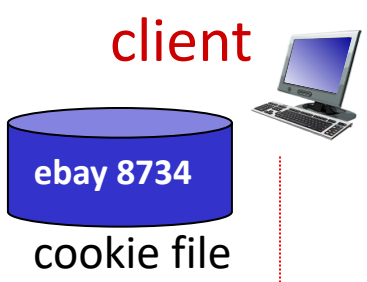
Example:

- Susan uses browser on laptop, visits specific e-commerce site for first time
- when initial HTTP requests arrives at site, site creates:
  - unique ID (aka "cookie")
  - entry in backend database for ID
- subsequent HTTP requests from Susan to this site will contain cookie ID value, allowing site to "identify" Susan

Maintaining user/server state: cookies



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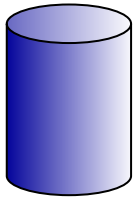

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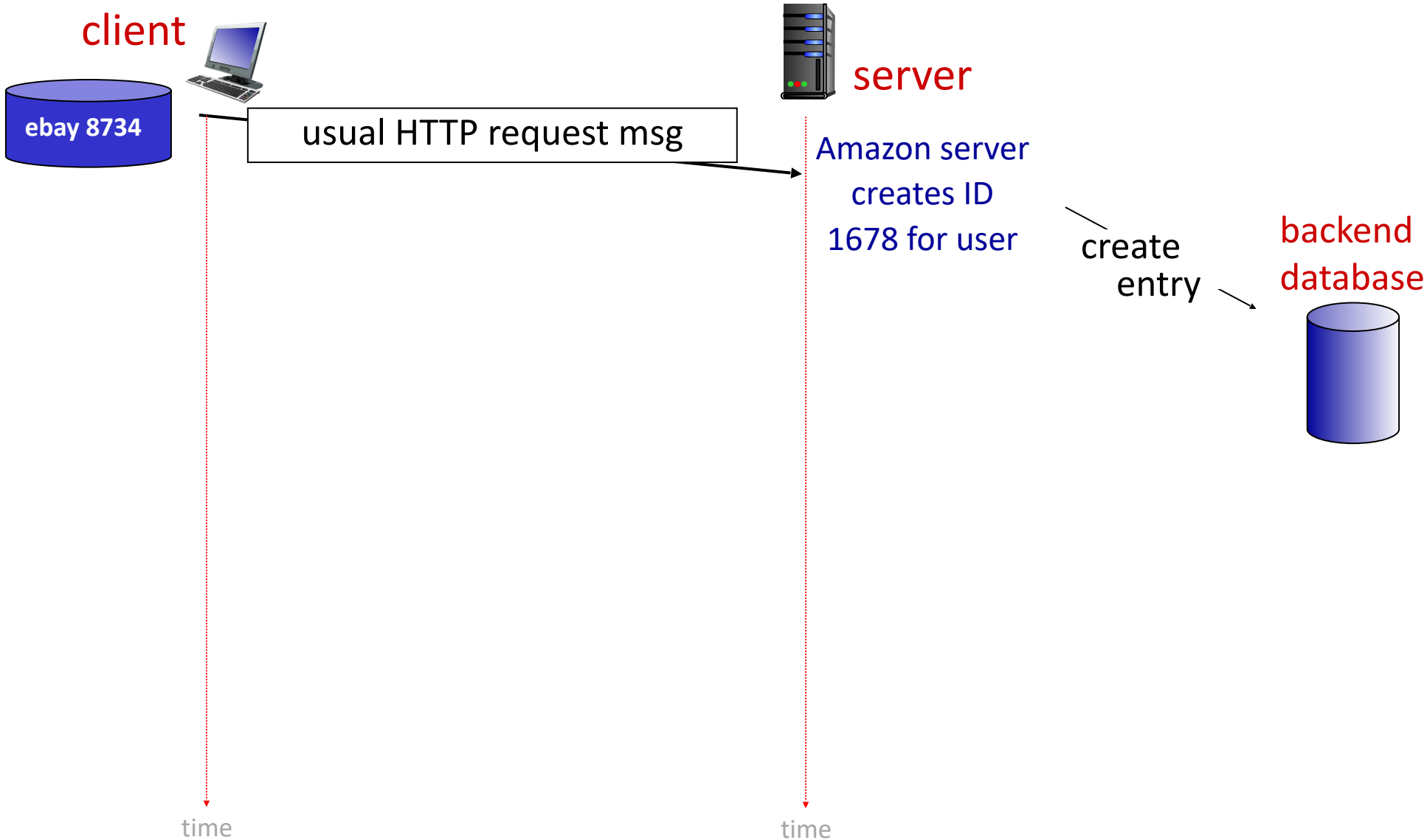

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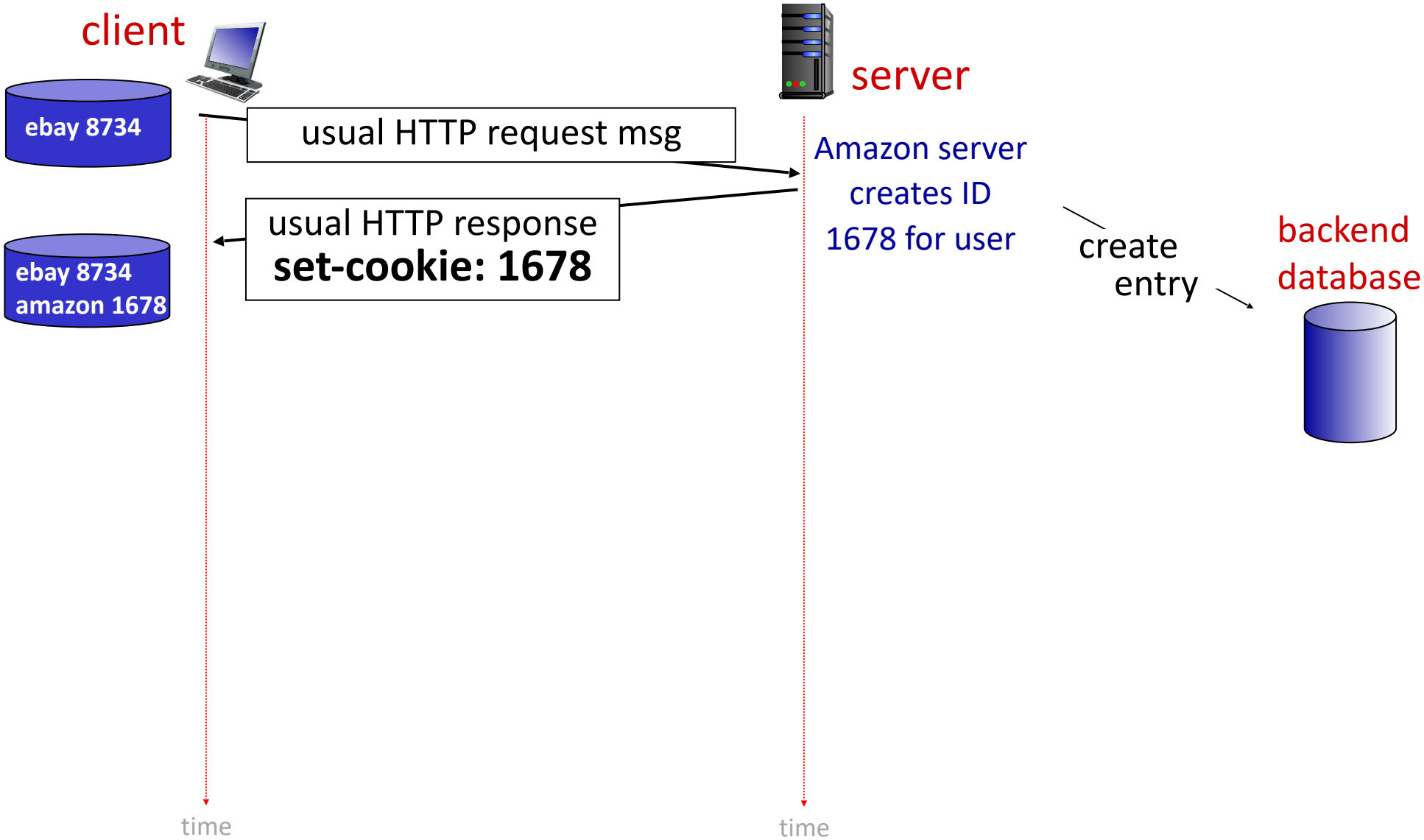

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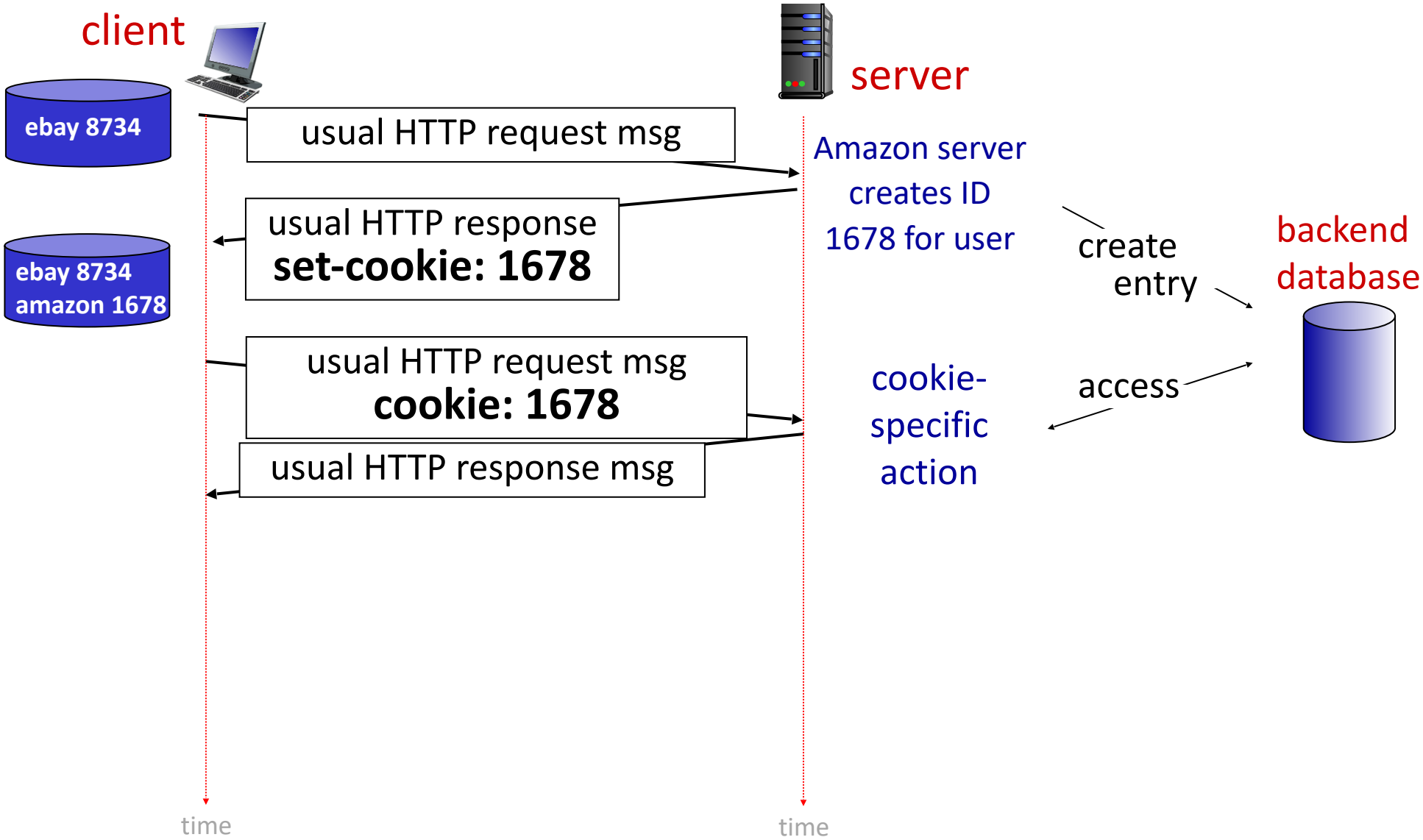

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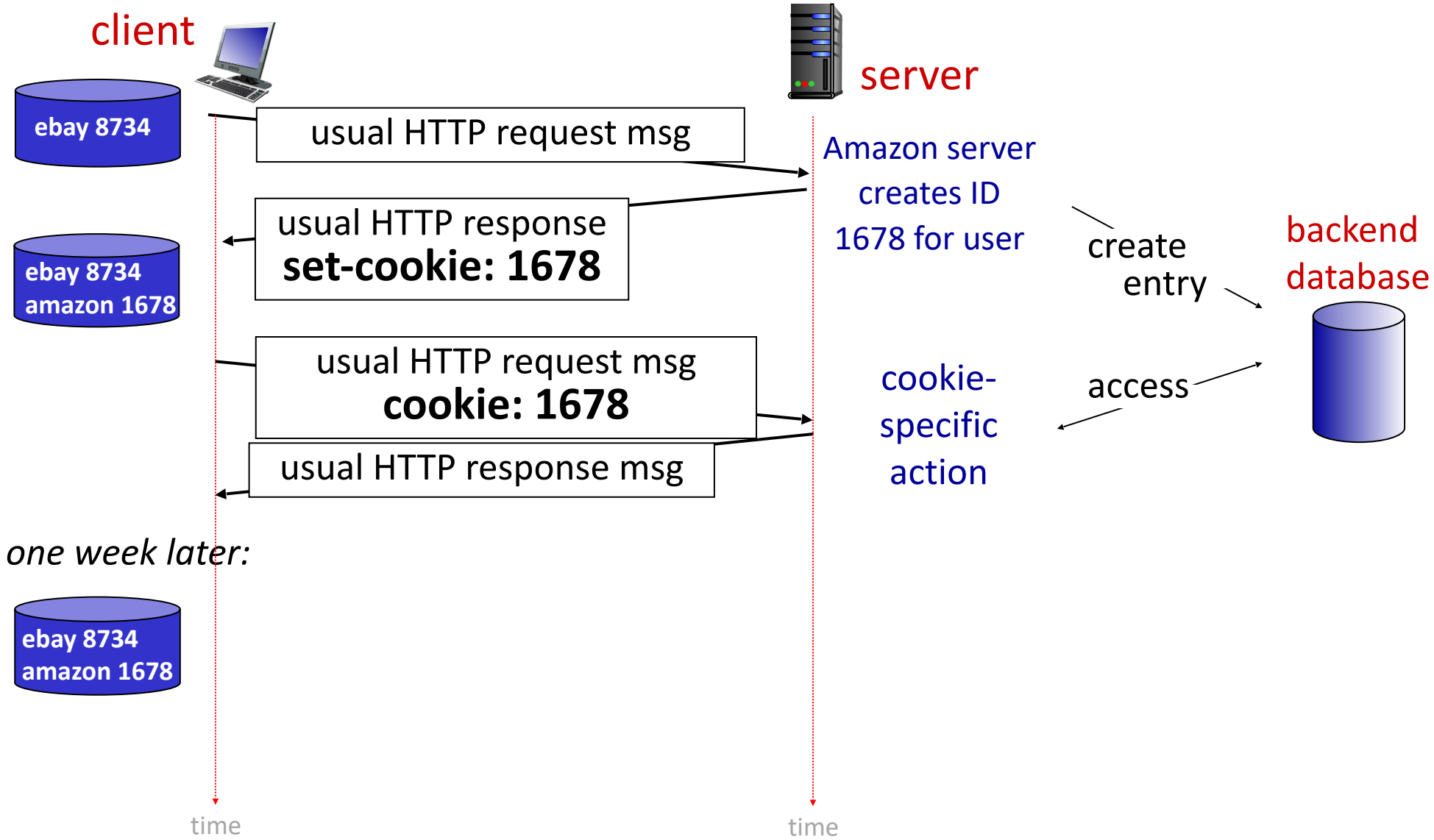

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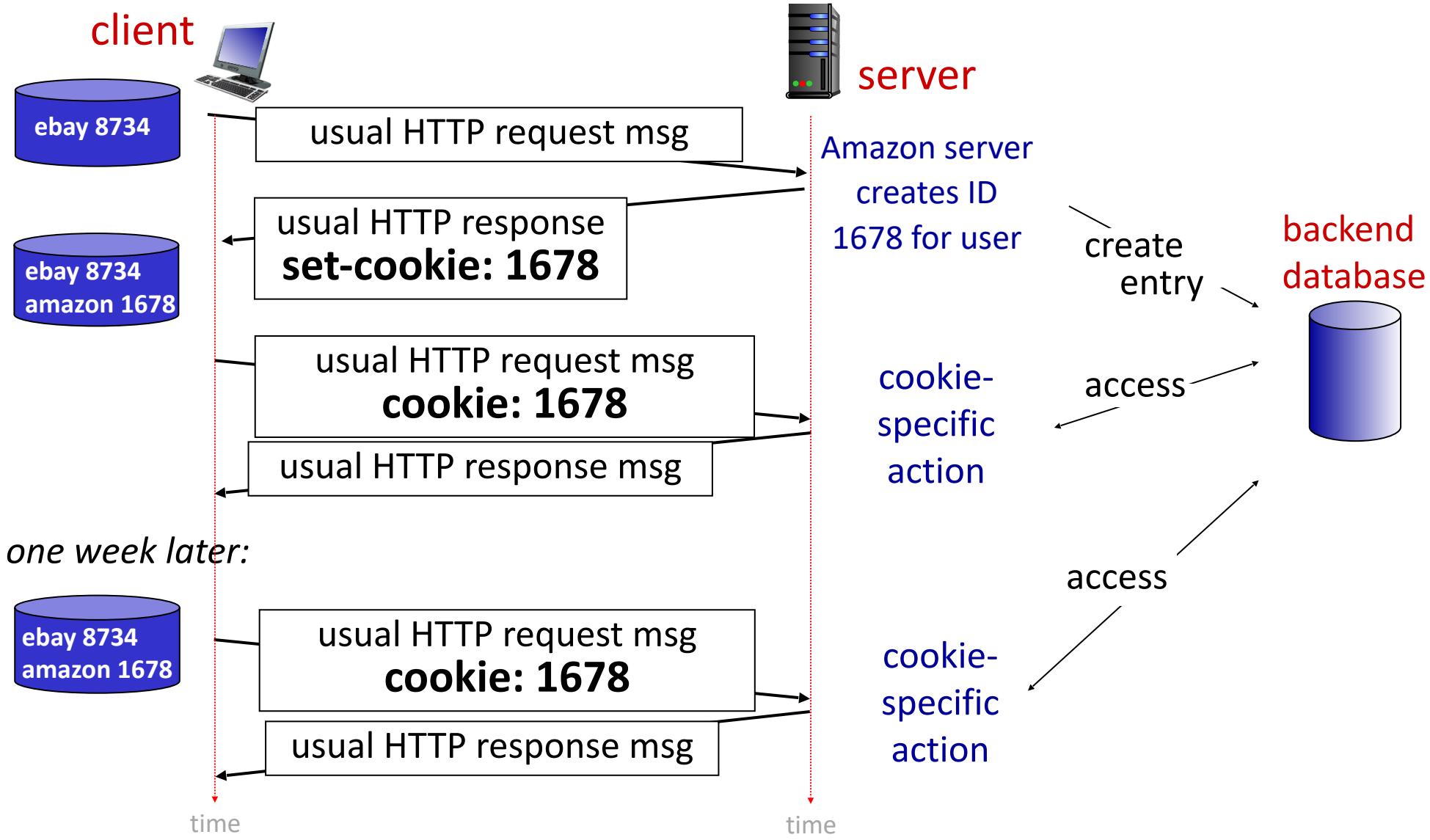

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aside

cookies and privacy:

- cookies permit sites to *learn* a lot about you on their site.
- third party persistent cookies (tracking cookies) allow common identity (cookie value) to be tracked across multiple web sites

Resumo de HTTP

HTTP (Cookies)
Proxy

- Modelo Cliente/Servidor
- Requisições do cliente em ASCII
- Protocolo sem estado se não utilizar cookies
- Persistente X Não-persistente
- Em termos de sockets
  - O cliente envia o primeiro `write`
  - O servidor pode manter a mesma conexão TCP aberta

HTTP (Cookies)

▷ Proxy

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Web caches

Goal: satisfy client requests without involving origin server

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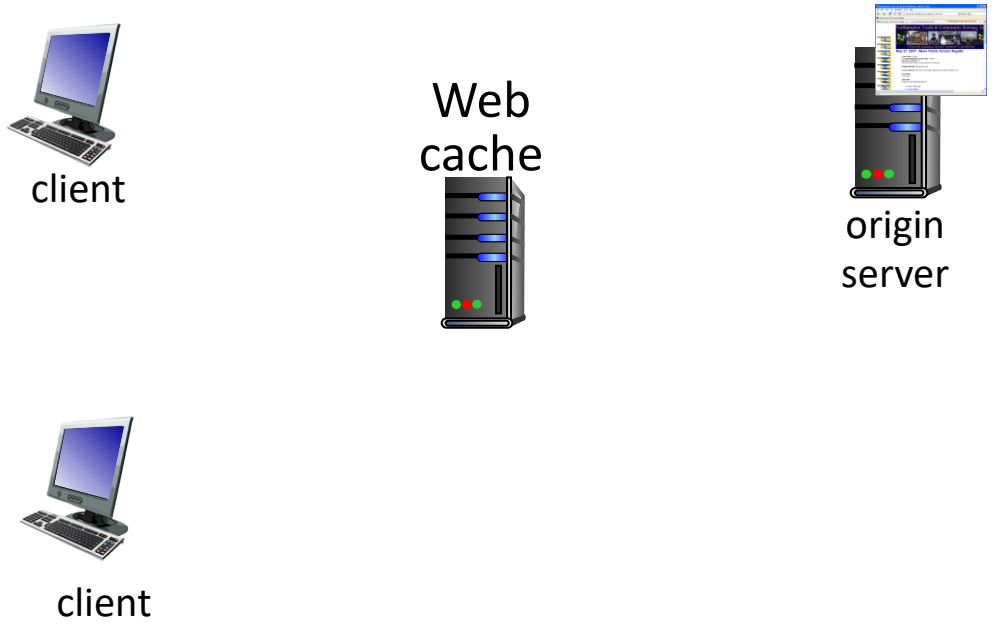

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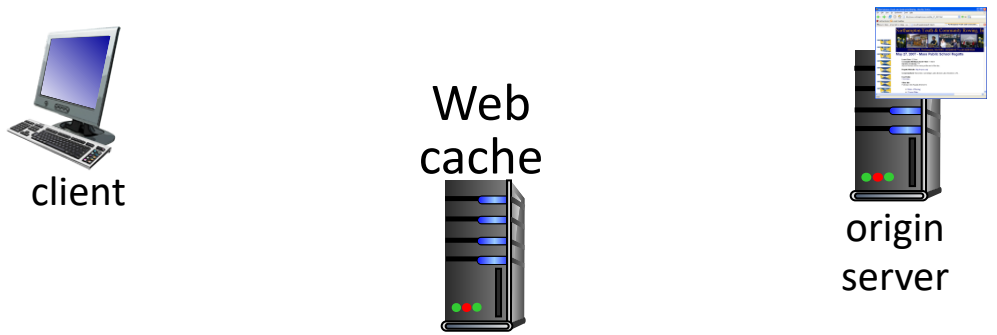

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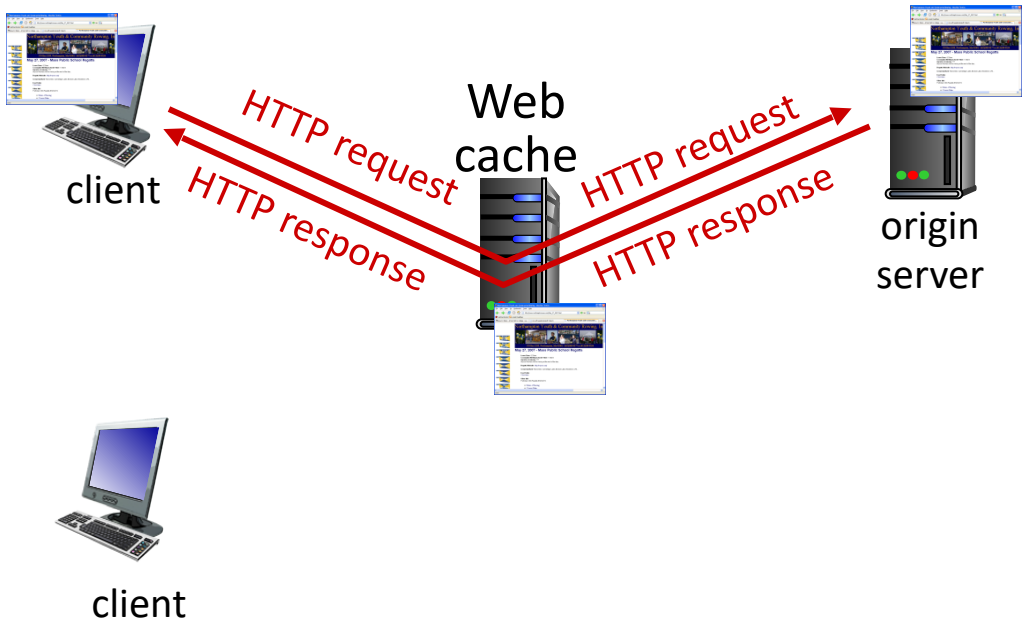

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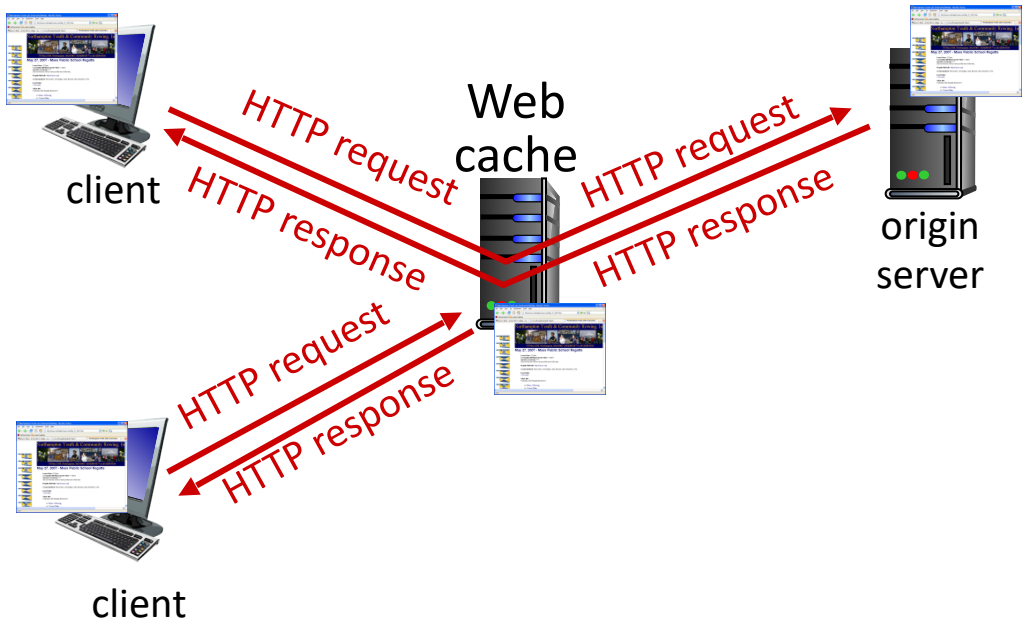

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- Internet is dense with caches
  - enables "poor" content providers to more effectively deliver content

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Scenario:

- access link rate: 1.54 Mbps
- RTT from institutional router to server: 2 sec
- web object size: 100K bits
- average request rate from browsers to origin servers: 15/sec
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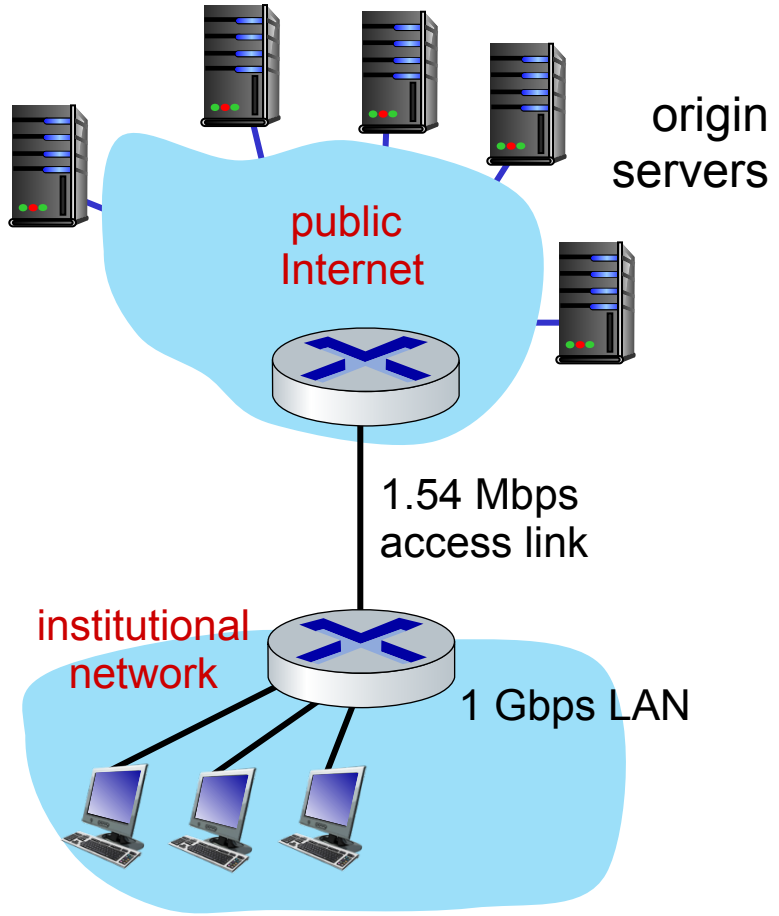

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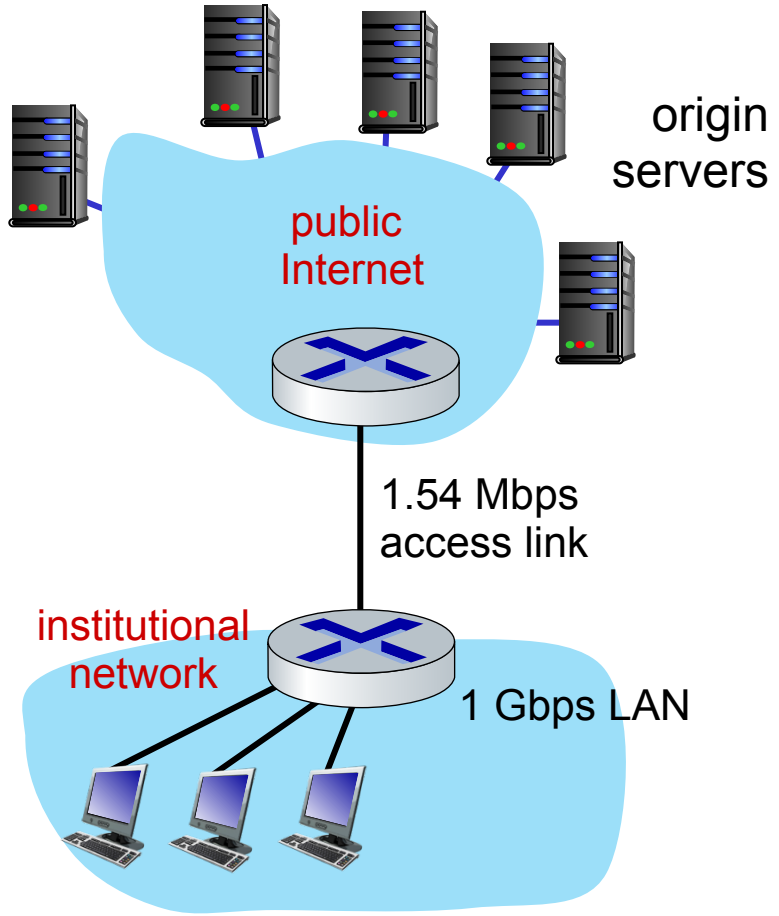

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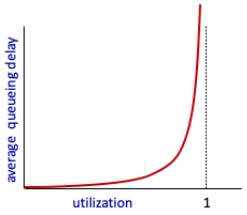

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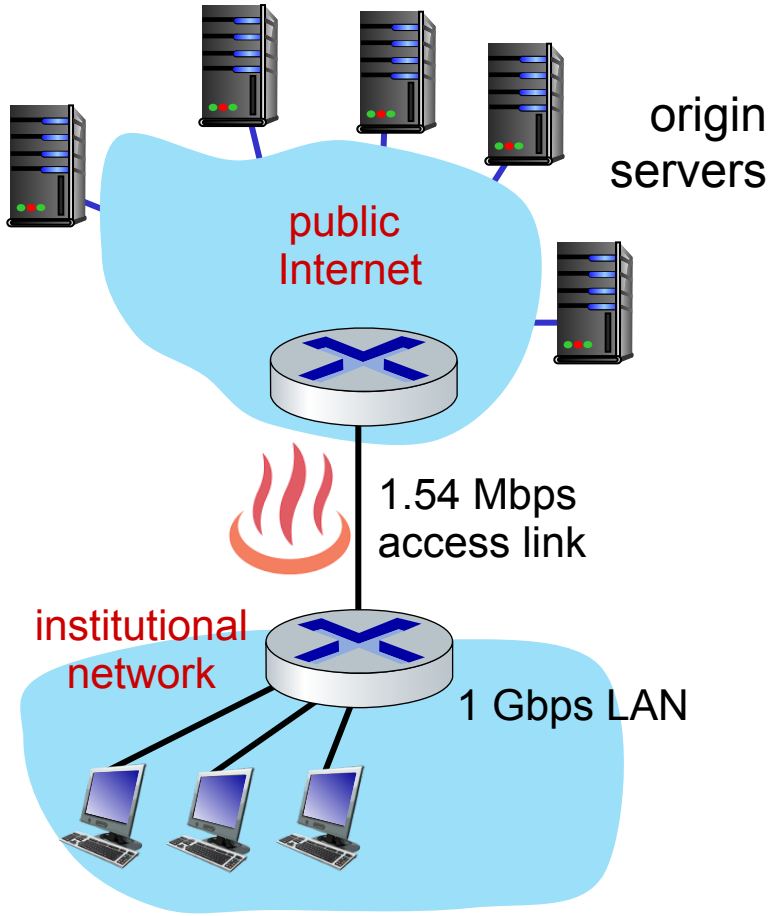

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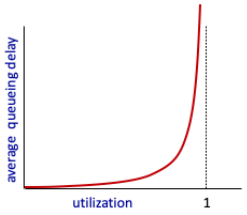

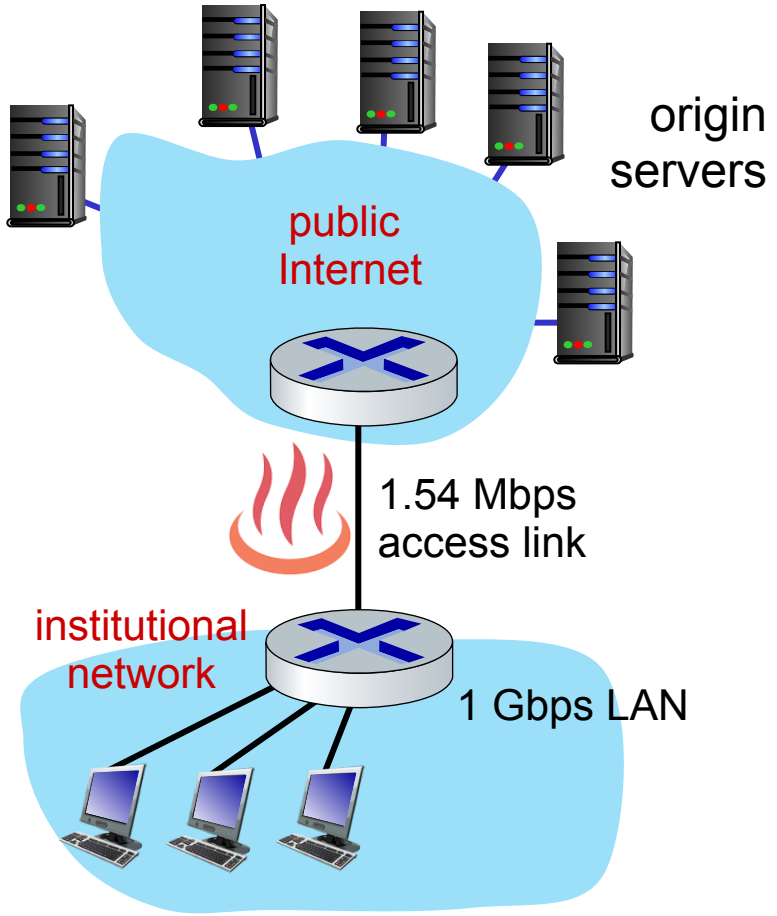

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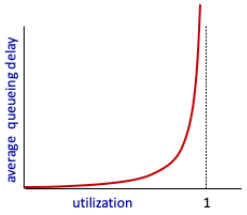

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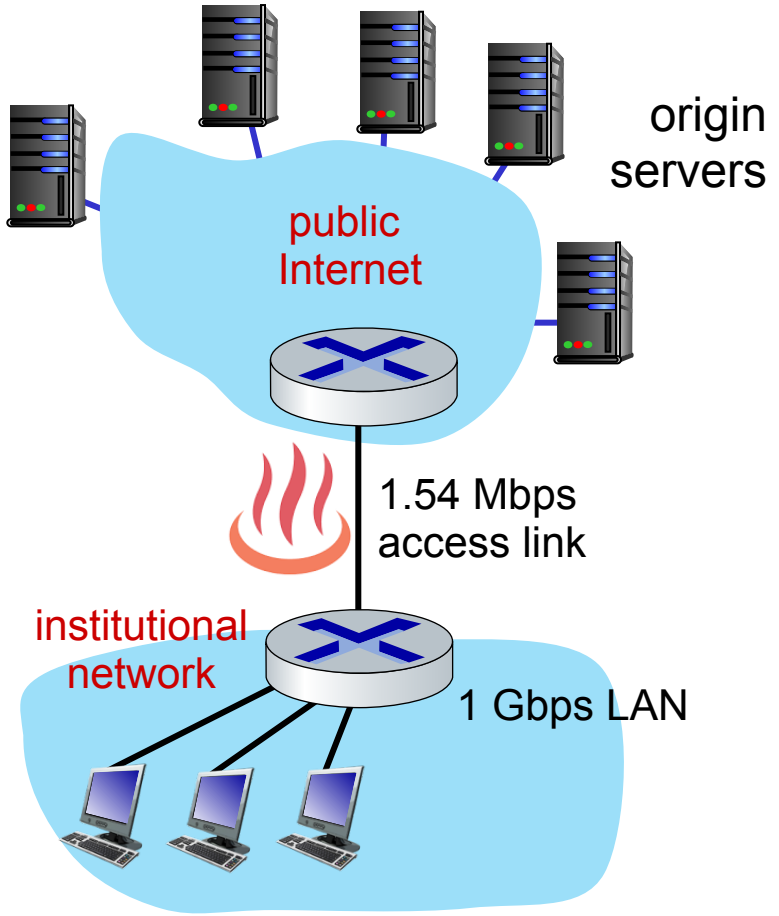

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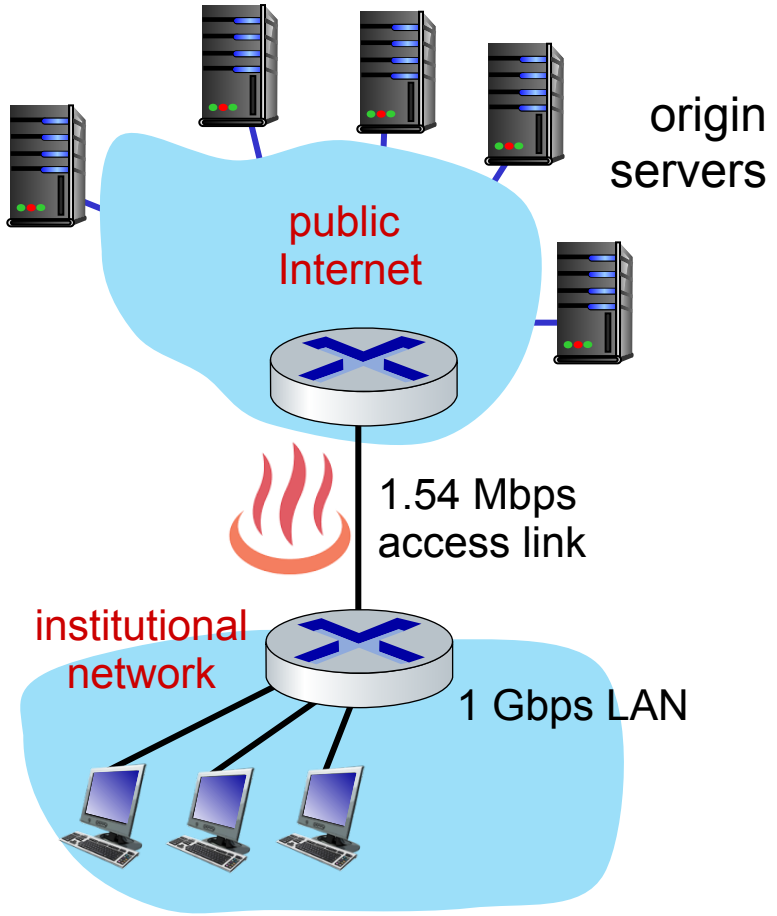

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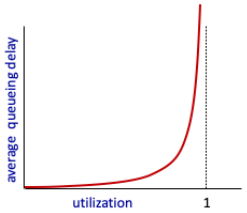

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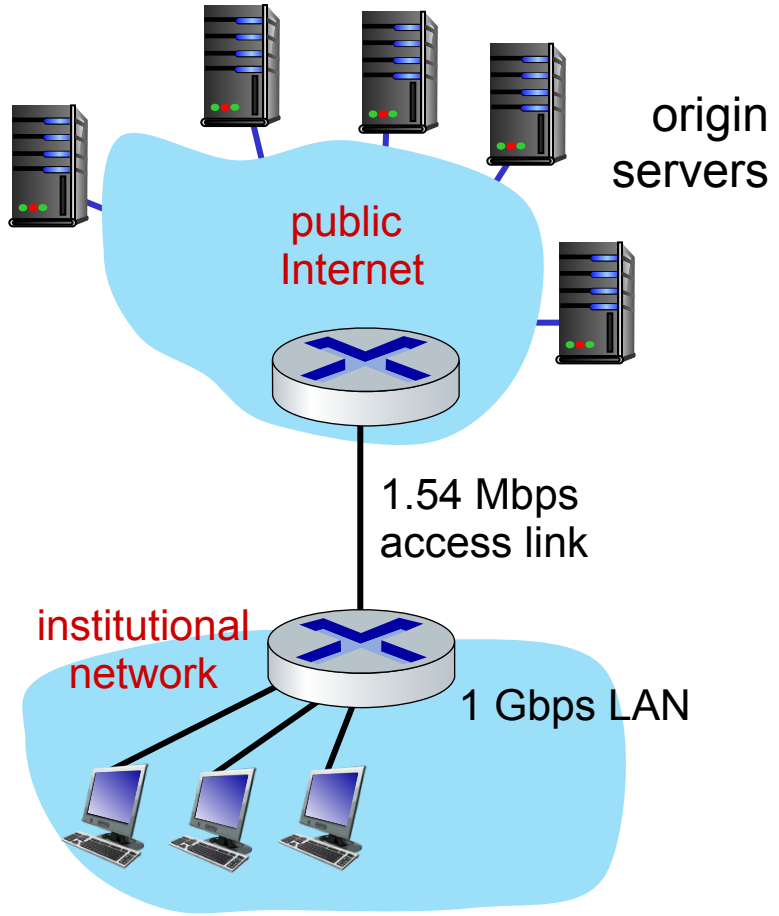

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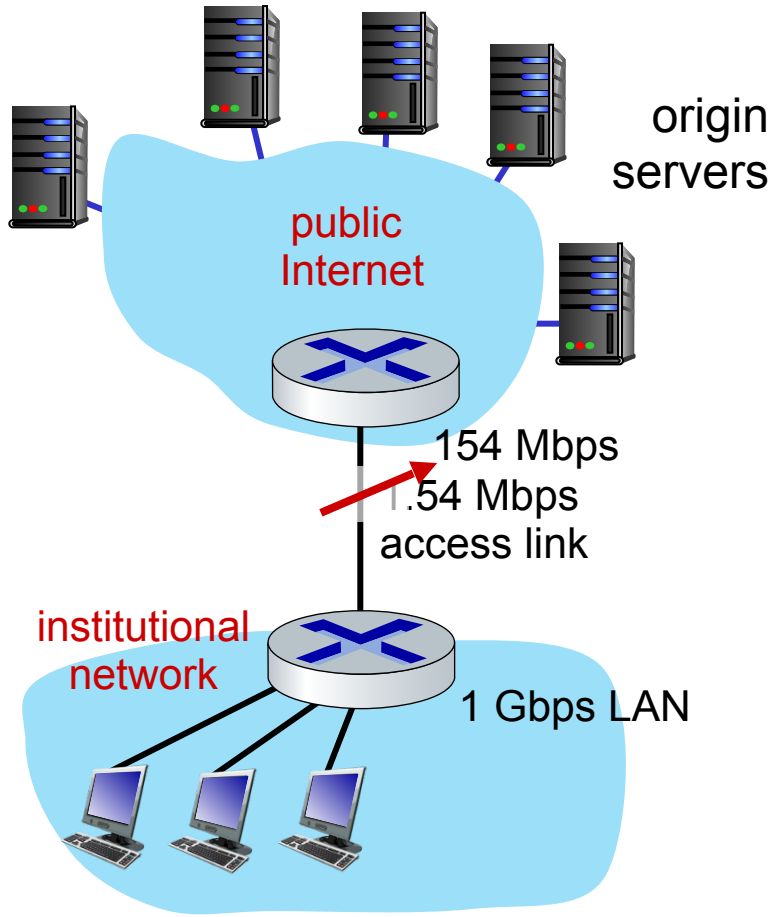

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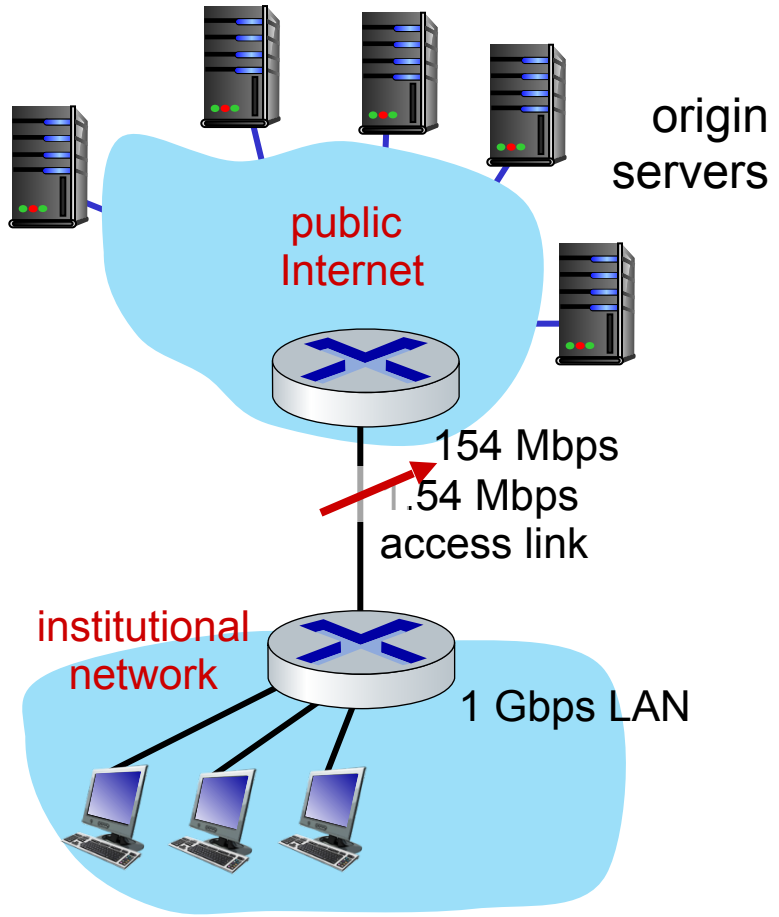

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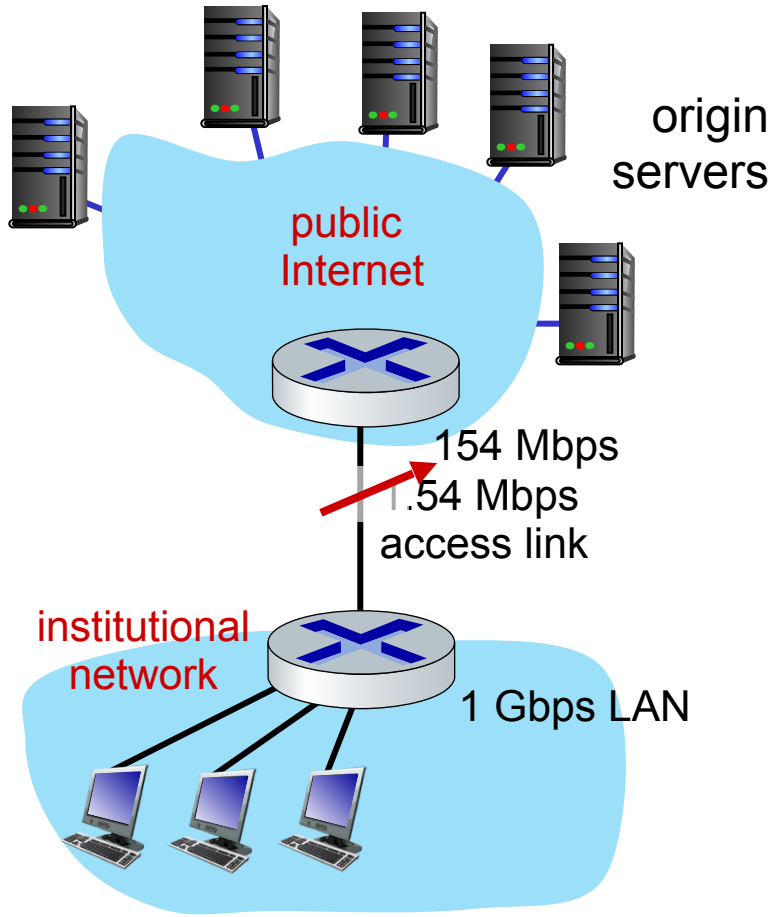
- access link utilization = ~~.97~~ .0097
- LAN utilization: .0015
- end-end delay = Internet delay + access link delay + LAN delay
  = 2 sec + ~~minutes~~ + usecs msecs



Option 1: buy a faster access link

Scenario:

- access link rate: 1.54 Mbps → 154 Mbps
- RTT from institutional router to server: 2 sec
- web object size: 100K bits
- average request rate from browsers to origin servers: 15/sec
  - avg data rate to browsers: 1.50 Mbps

Performance:

- access link utilization = .97 → .0097
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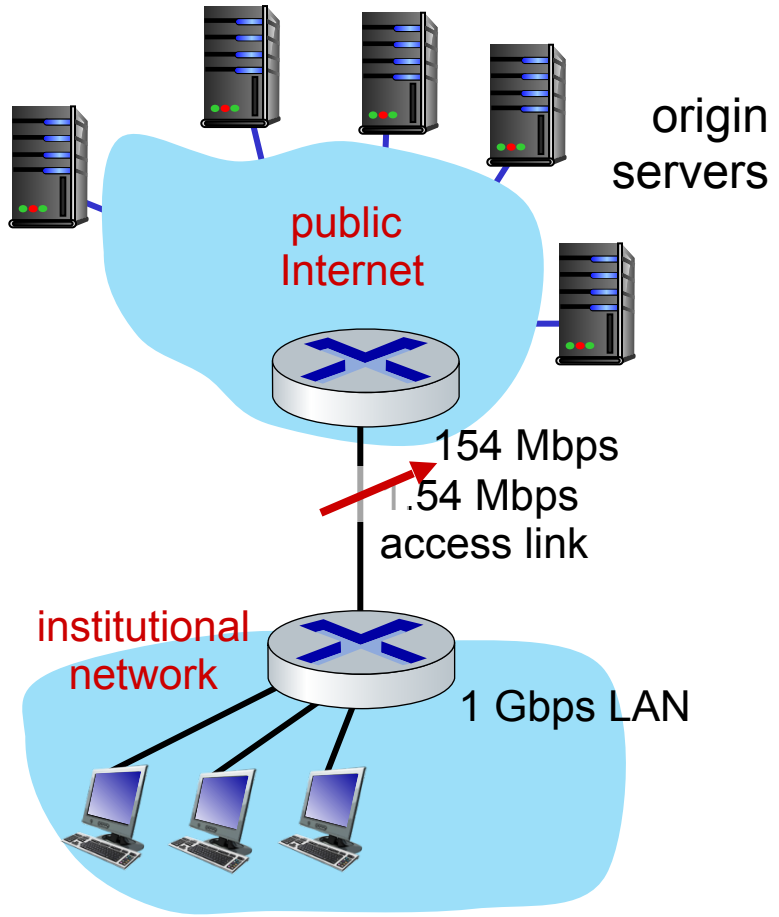
- end-end delay = Internet delay + access link delay + LAN delay
  = 2 sec + minutes + usecs → msecs

Cost: faster access link (expensive!)



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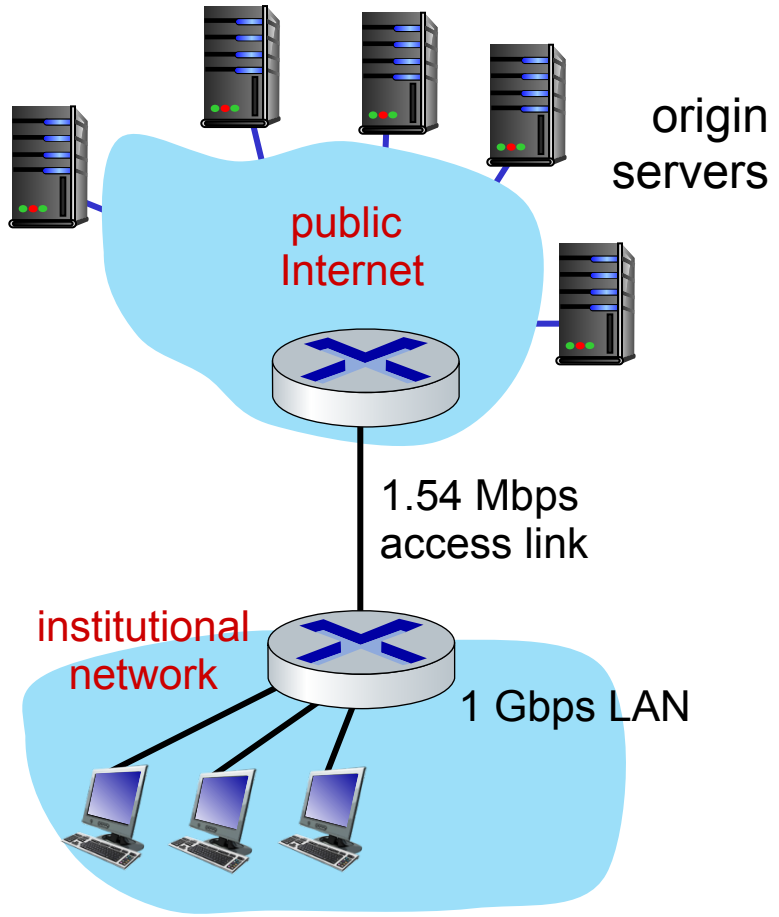

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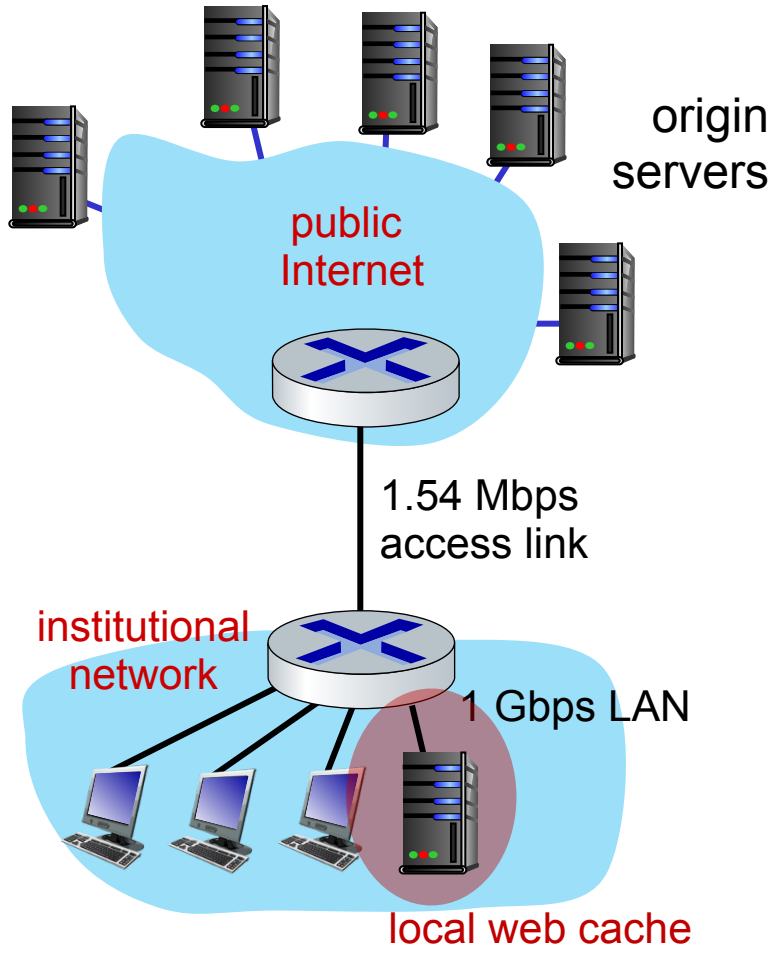

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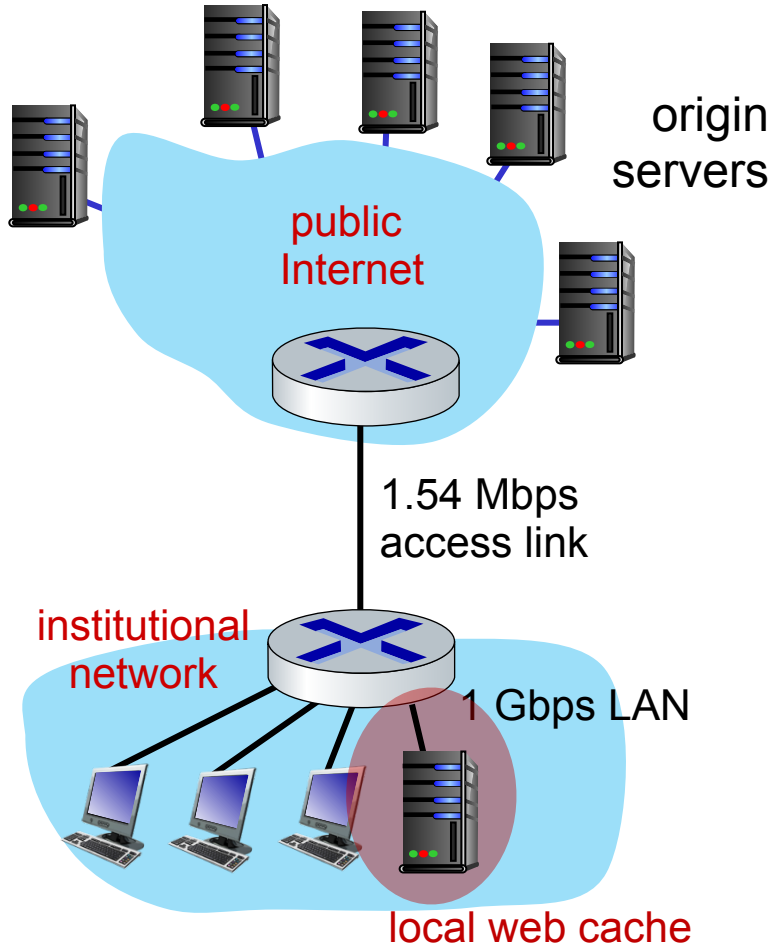

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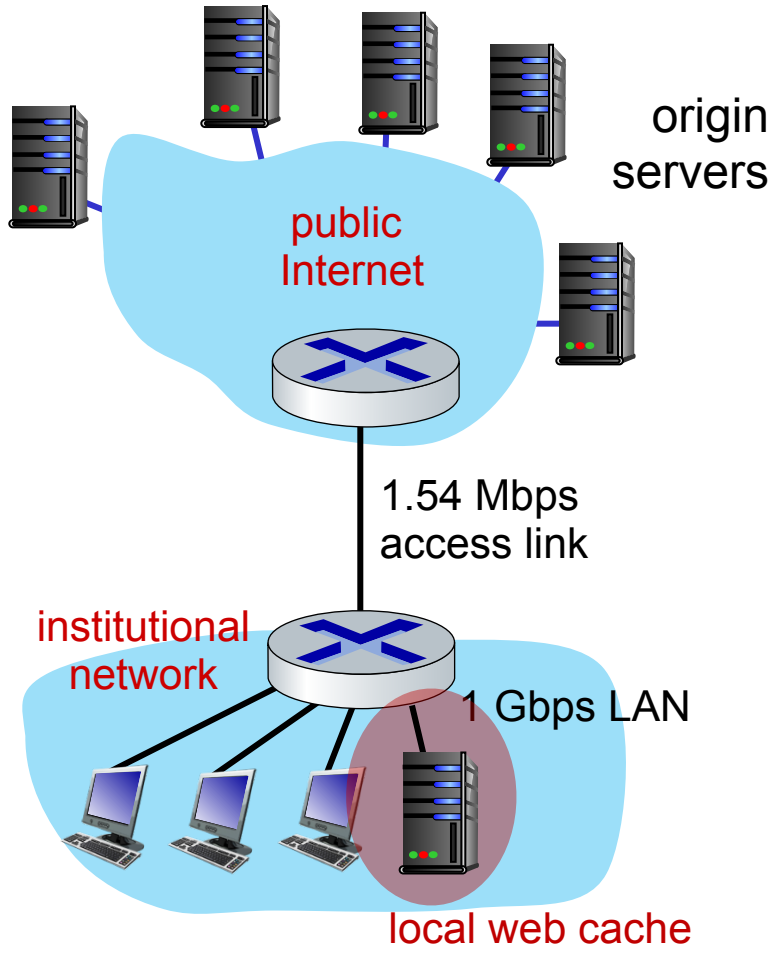

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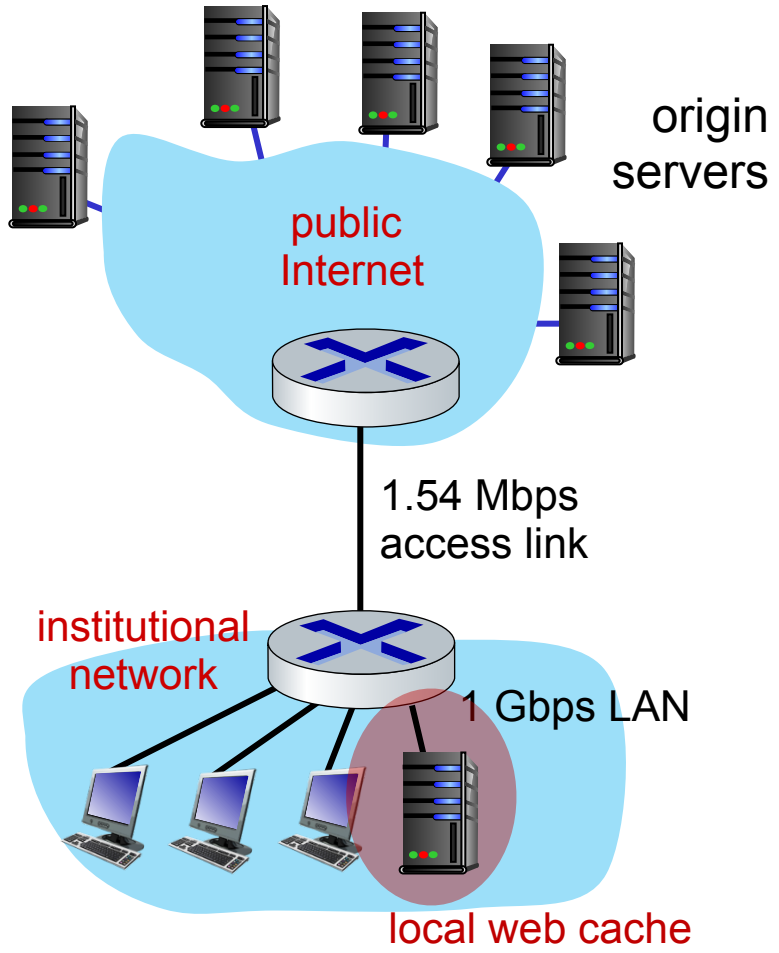

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How to compute link utilization, delay?

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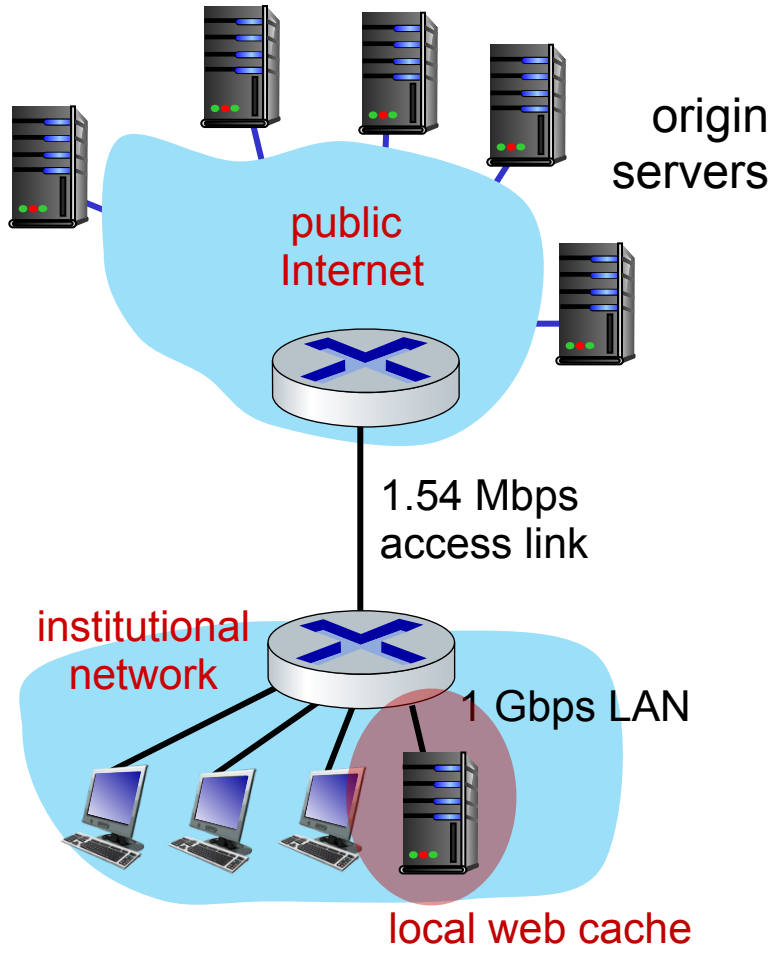
suppose cache hit rate is 0.4:

- 40% requests served by cache, with low (msec) delay



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  - rate to browsers over access link

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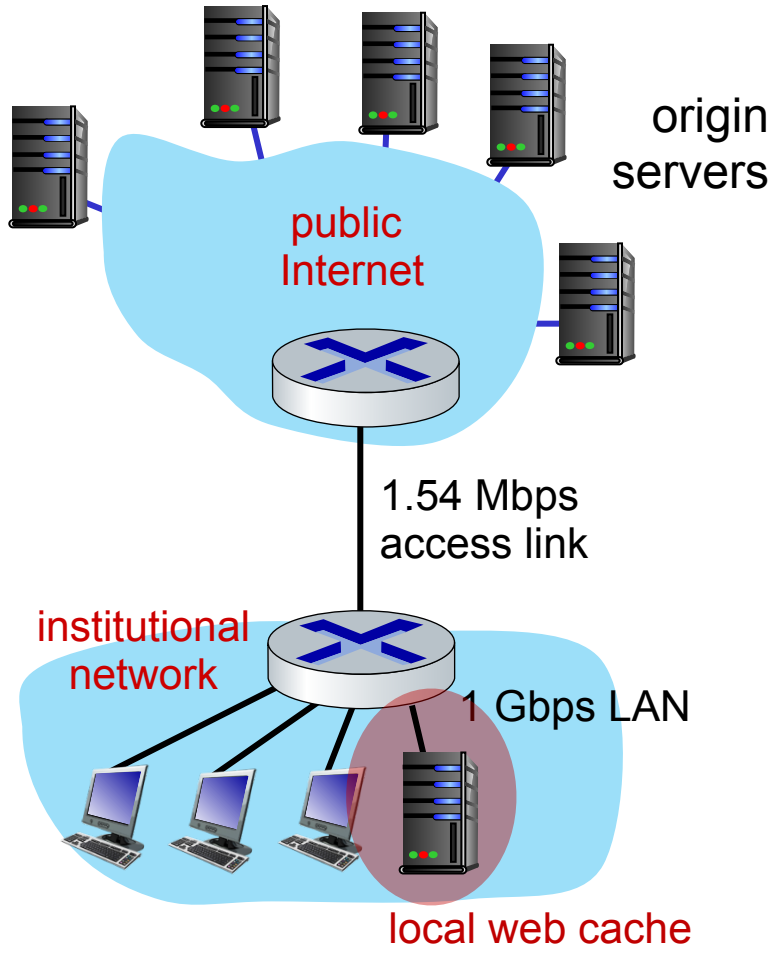
  - access link utilization = 0.9/1.54 = .58 means low (msec) queueing delay at access link



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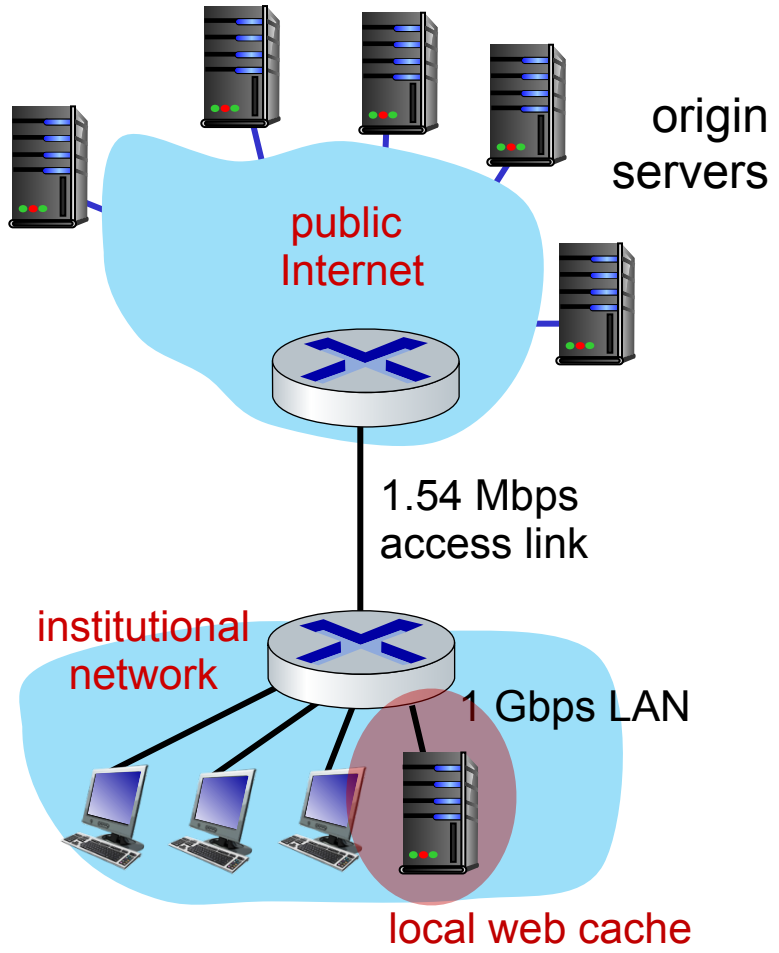

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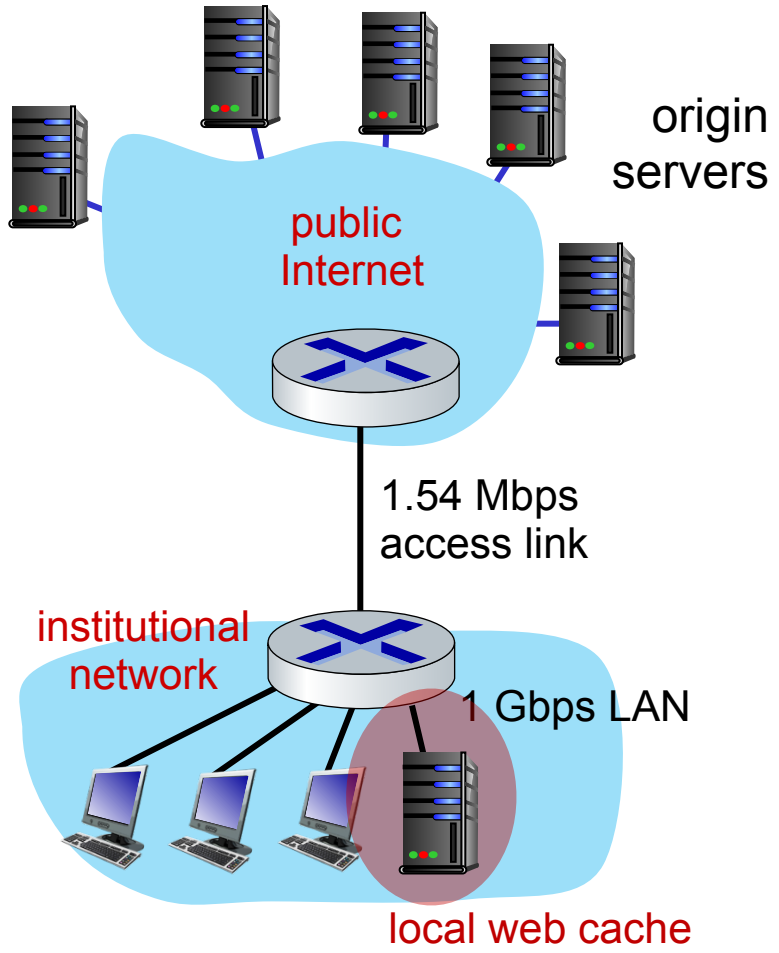

lower average end-end delay than with 154 Mbps link (and cheaper too!)

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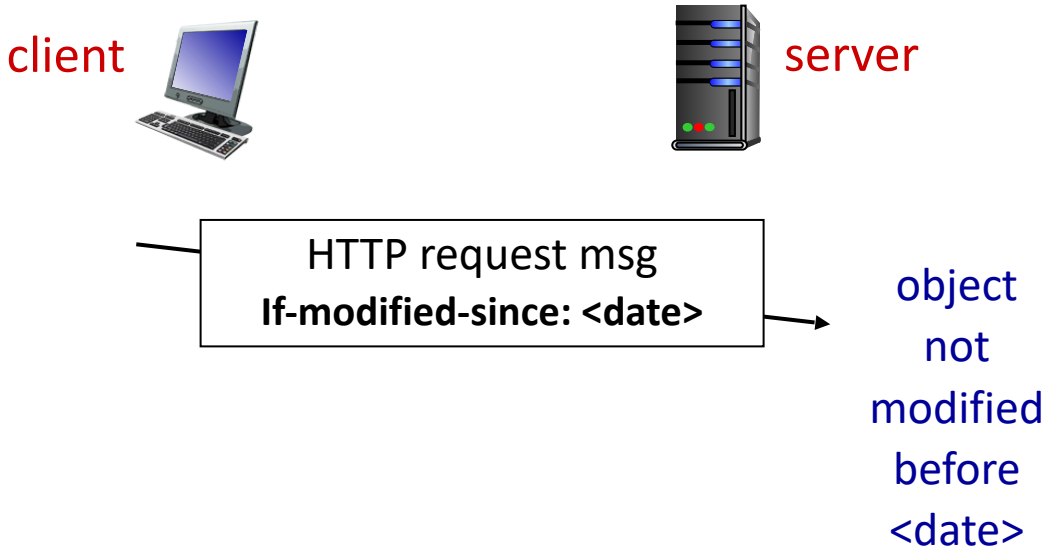

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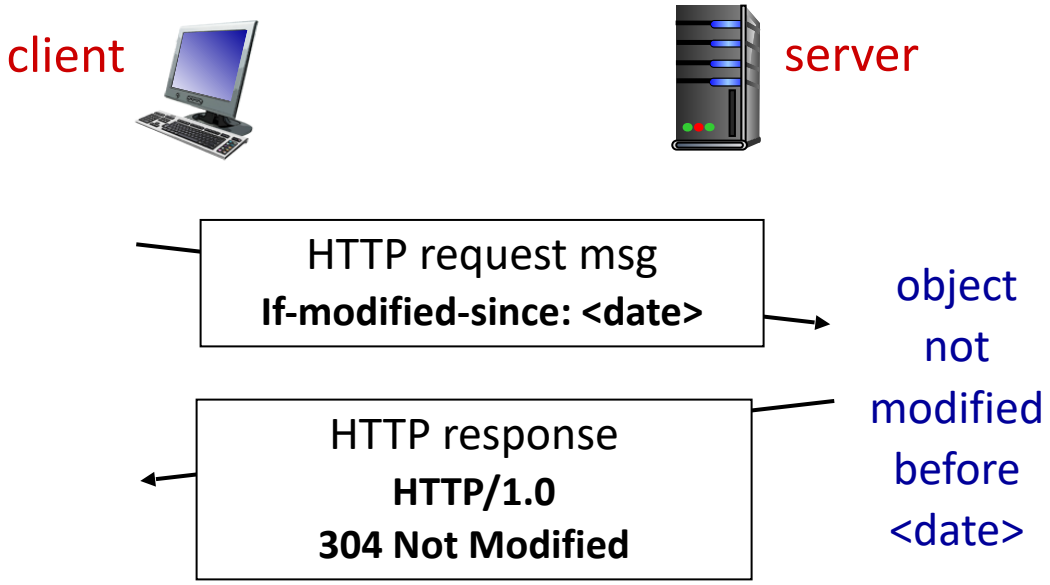

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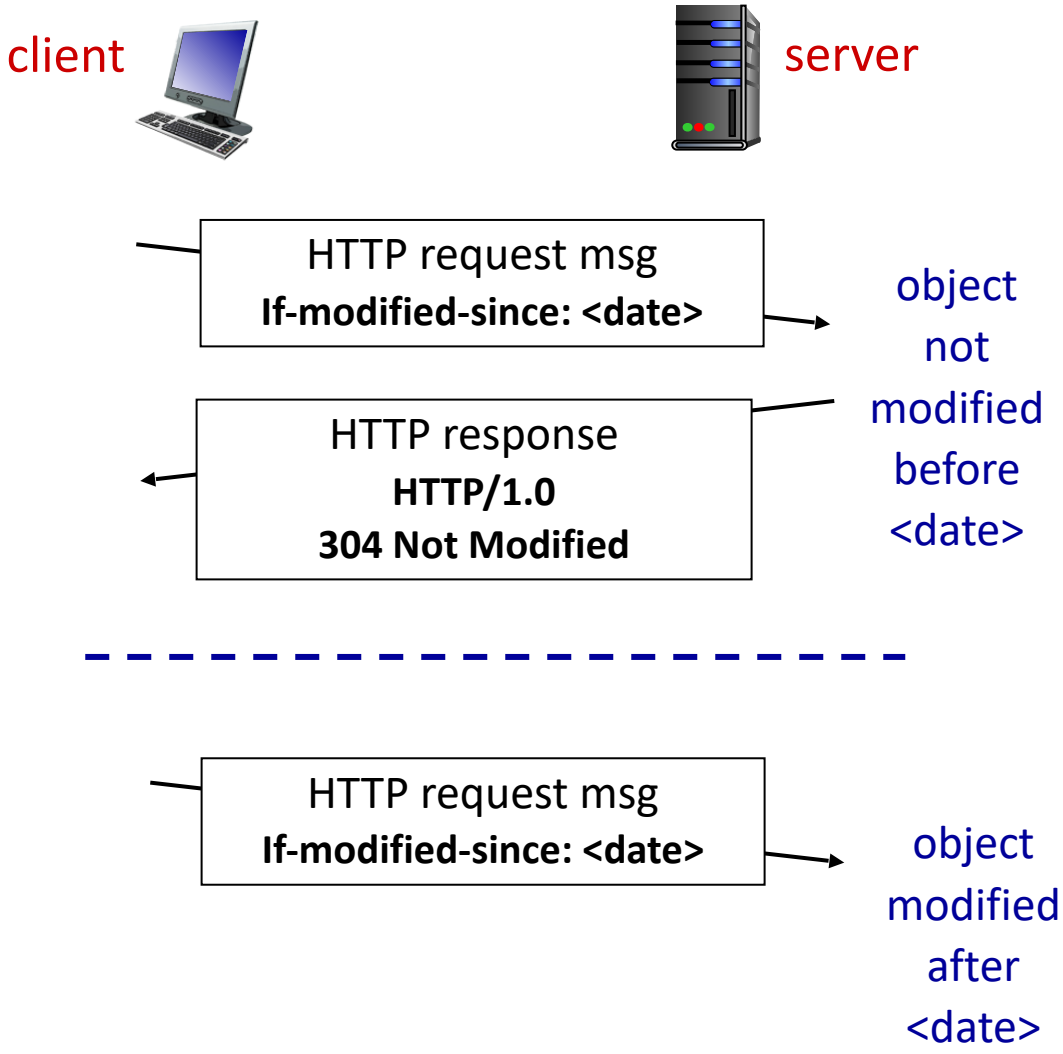

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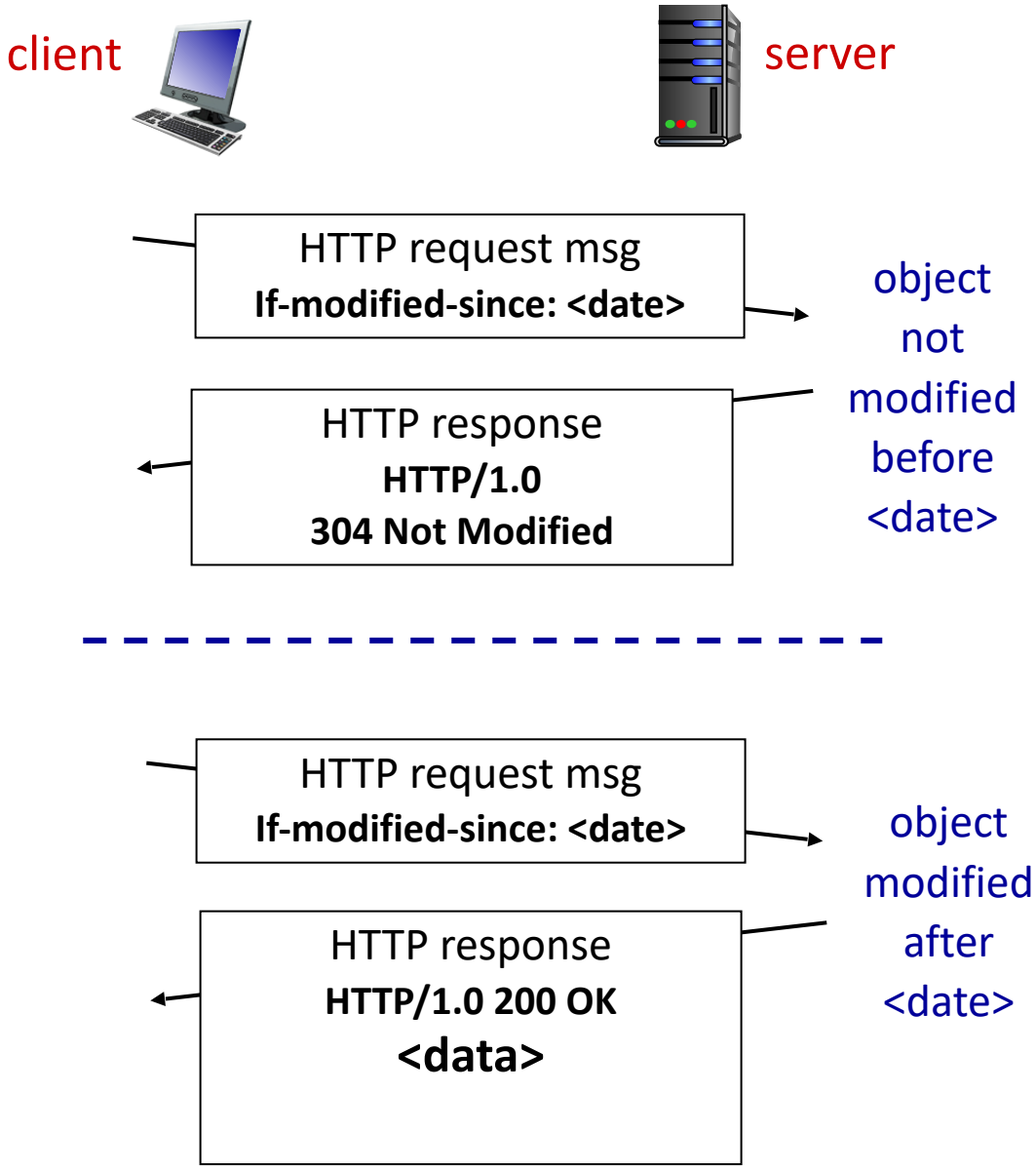

Resumo de Proxy

- Atende o cliente sem envolver o servidor Web
- Transparente $\times$ Configurado pelo usuário
- Utilidade
  - Cache
  - Controle de acesso
  - Acesso a conteúdo restrito para determinados países (IPs)
- Pelo menos dois sockets envolvidos
  - 1 socket do cliente para o servidor proxy
  - 1 socket do servidor proxy para o servidor HTTP