

# COMP90007 Internet Technology

Week11

Yiran (Scott) Ruan

Email: [yrrua@unimelb.edu.au](mailto:yrrua@unimelb.edu.au)

GitHub: <https://yiranruan.github.io>

# Tutor feedback

- Google 'Casma's tutor feedback'
- Choose COMP90007
- Line:  
<https://apps.eng.unimelb.edu.au/casmas/index.php?r=qoct/feedback&subjCode=COMP90007>

# Question 1

- What are the disadvantages of having only one central DNS server that serves all machines connected to the internet?

# DNS——The Domain Name System

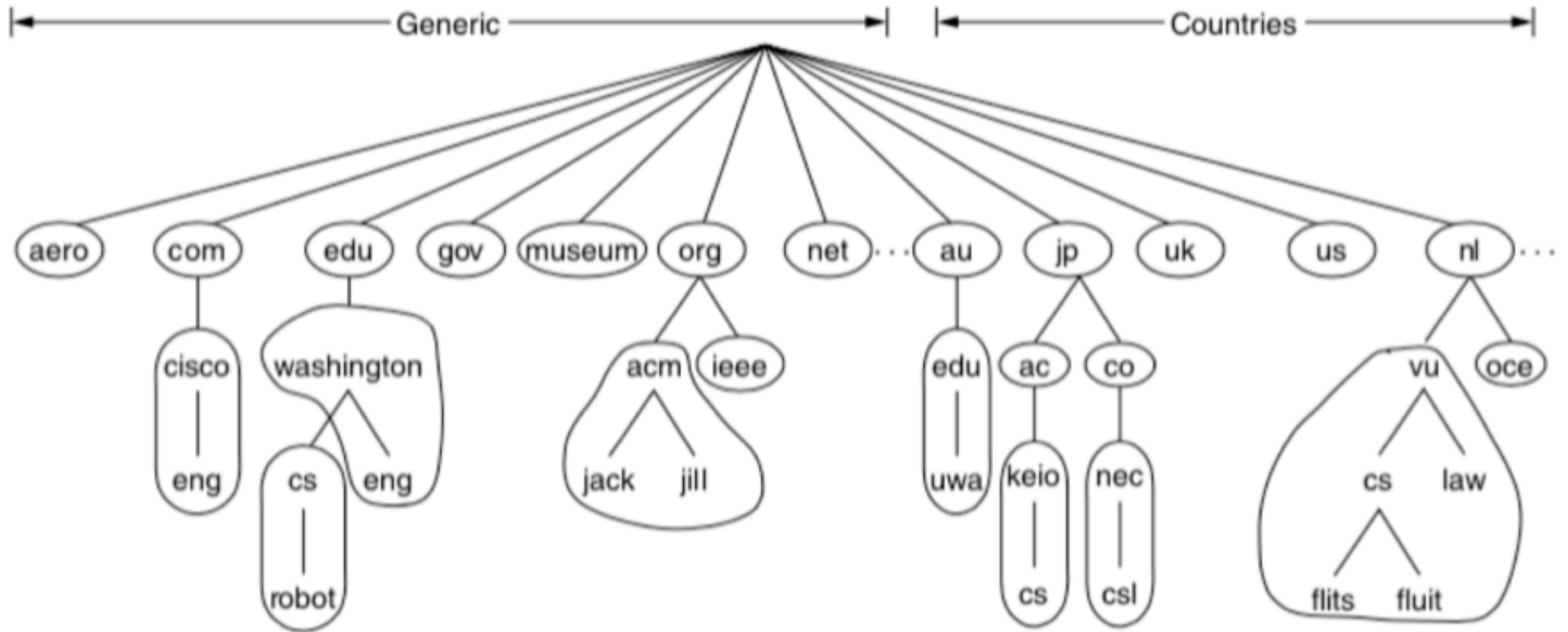
- IP addresses are hard for human beings to remember
- How about the companies decide to move their Web server to a different machine with a different IP address ?

# DNS——The Domain Name System

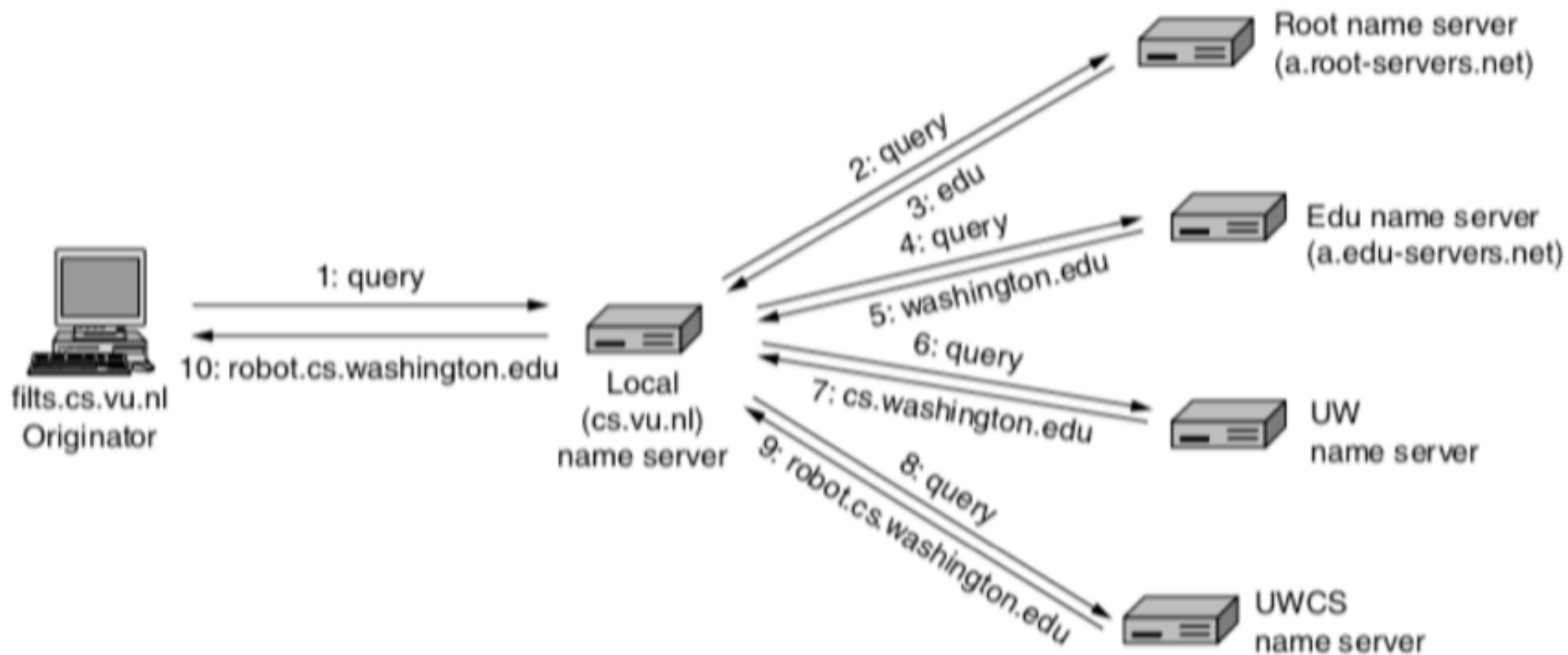
- IP addresses are hard for human beings to remember
- How about the companies decide to move their Web server to a different machine with a different IP address ?

Everyone need to be told the new IP address

- The process of looking up a name and finding an address is called name resolution.



**Figure 7-5.** Part of the DNS name space divided into zones (which are circled).



**Figure 7-6.** Example of a resolver looking up a remote name in 10 steps.

# Question 1

- What are the disadvantages of having only one central DNS server that serves all machines connected to the internet?



# Solution 1

Some of the disadvantages of a single DNS are:

- Single point of failure
- Traffic congestion at server
- Distant centralised server for remote queries
- Maintenance issues, not only for keeping large amount of data up to date but also the prospect of simple service maintenance could cause big disruptions.
- May not be able to service all queries fast enough, also scaling on the computation front may be an issue.

## Question 2

- What does iterative mode of execution when querying a DNS mean? Where is it used? What is the recursive mode? Please explain with an example.

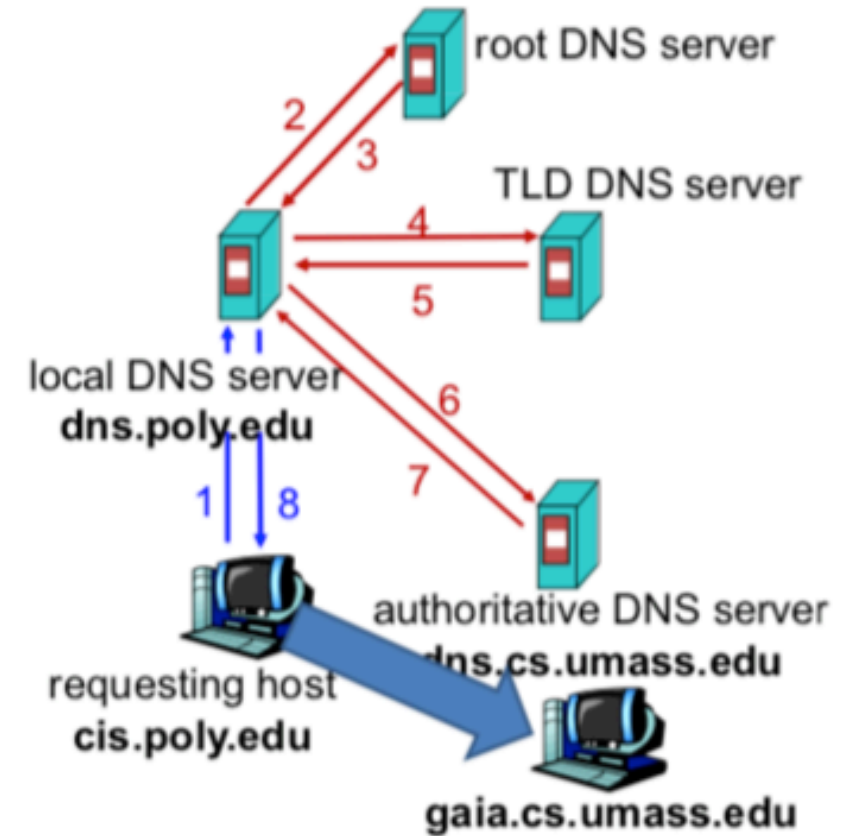
- ■ host at cis.poly.edu wants IP address for gaia.cs.umass.edu

- ■ **iterated query:**

- contacted server replies
- with name of server to contact
- “I don’t know this name, but ask this server”

- ■ **recursive query:**

- server obtains mapping
- on client’s behalf



## Solution 2

- Iterative queries are requests that are propagated from one name server to another, gathering partial results in the form of which name server might know the location of the authoritative record till we reach that location. At which point, we return the final answer (Resource record mapping) to our end user who requested the domain initially, this is referred to as recursive, where we return the final answer only to the end user and not partial answers. For ex, refer to Week 10 slide 19.

## Question 3

- What is non-persistent HTTP connections? Explain with an example request.

# Non-persistent HTTP (I)

suppose user enters URL:

**`www.someSchool.edu/someDepartment/home.index`**

contains text and  
references to 10 images

1a. HTTP client initiates TCP connection to HTTP server (process) at `www.someSchool.edu` on port 80

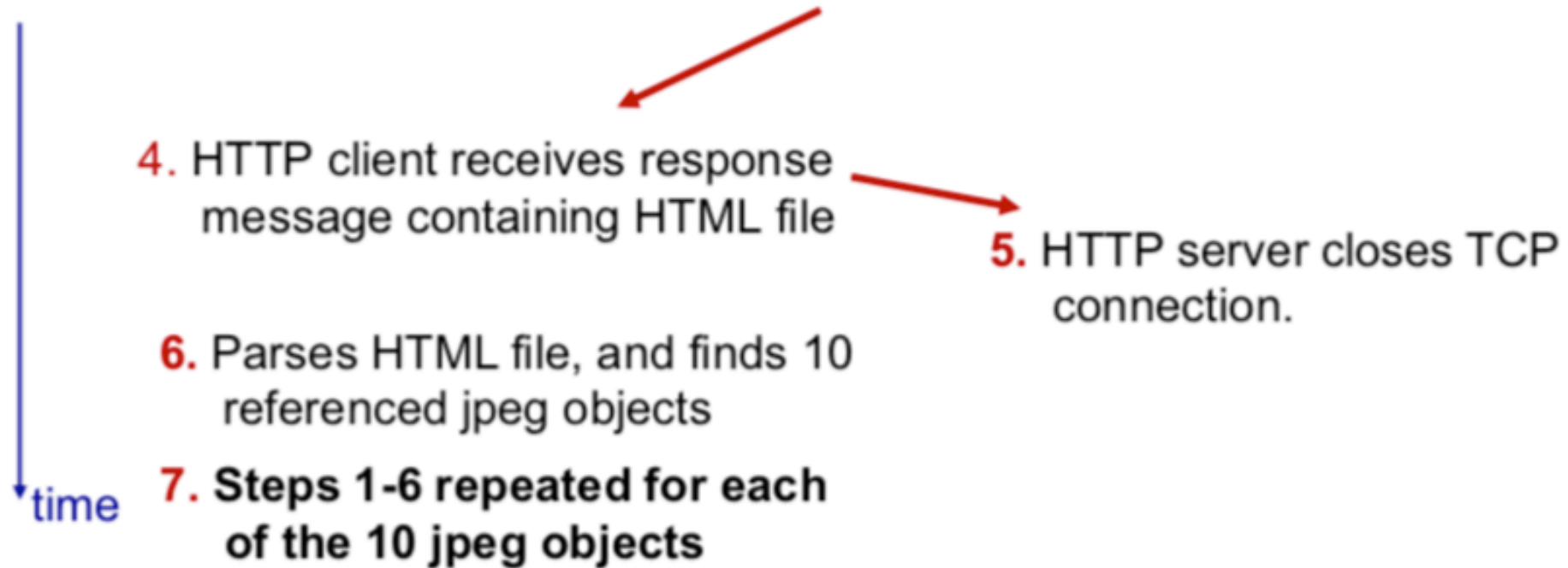
1b. HTTP server at host `www.someSchool.edu` waiting for TCP connection at port 80. Accepts connection, notifying client

2. HTTP client sends a HTTP ***request message*** (containing URL) into TCP connection socket. Message indicates that client wants object `someDepartment/home.index`

3. HTTP server receives request message, forms ***response message*** containing requested object, and sends message into its socket

time

# Non-persistent HTTP (II)



# Solution 3

- Sessions where only one object/response is returned and a new connection is established for every response to be provided.
- See Week 10 slide 5-9 for example.



# Persistent HTTP

- Server leaves connection open after sending response
- Server closes a connection if it hasn't been used for some time

## Question 4

- What are the benefits of a persistent HTTP connection?

## Solution 4

- A connection established remains open for some time after the transmission of an object, allowing multiple objects to be sent using the same connection as opposed to tearing down an existing connection and recreating it for every response to be sent.

## Question 5

- Give an example execution of an HTTP request with a cookie being used?

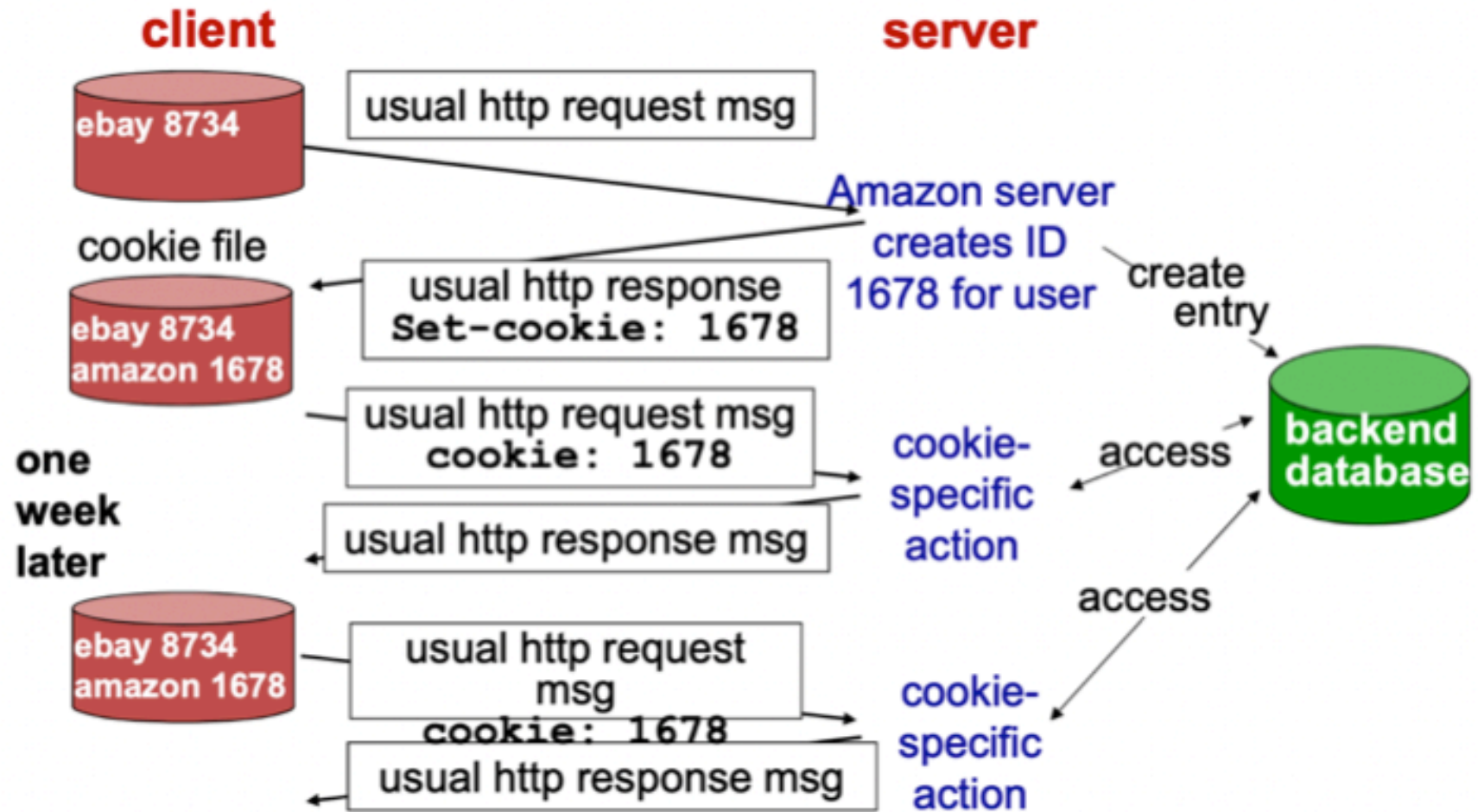
# Cookies

- The cookie is a rather small, named string (of at most 4 KB) that the server can associate with a browser.
- Use: to help server to track users

Domain	Path	Content	Expires	Secure
toms-casino.com	/	CustomerID=297793521	15-10-10 17:00	Yes
jills-store.com	/	Cart=1-00501;1-07031;2-13721	11-1-11 14:22	No
aportal.com	/	Prefs=Stk:CSCO+ORCL;Spt:Jets	31-12-20 23:59	No
sneaky.com	/	UserID=4627239101	31-12-19 23:59	No

**Figure 7-22.** Some examples of cookies.

# Solution 5



## Question 6

- Web Caching can cause problems such as stale data being served to clients. What are the benefits of web caching?

# Caching

- It would be very wasteful to fetch all of these resources for these pages each time they are displayed because the browser already has a copy.
- The difficult issue with HTTP caching is how to determine that a previously cached copy of a page is the same as the page would be if it was fetched again.

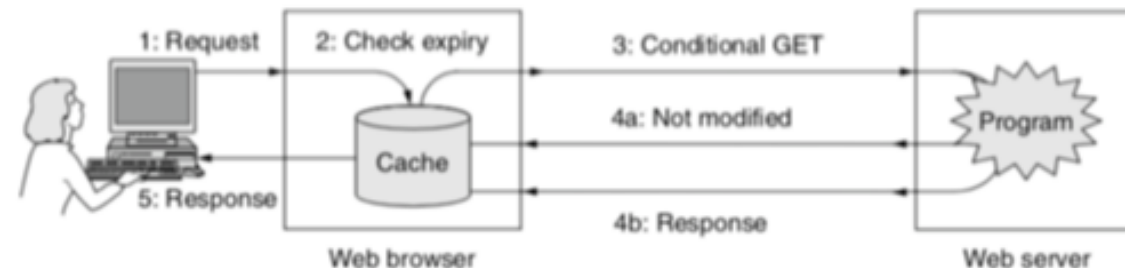


Figure 7-40. HTTP caching.



# Caching

- Two strategies:
  - page validation ----- Expires header
    - if the page has not been modified in the past year (as told by the Last-Modified header) it is a fairly safe bet that it will not change in the next hour. (no guarantee)
    - Servers must use the Expires header conservatively, since they may be unsure when a page will be updated.
    - Prediction is hard

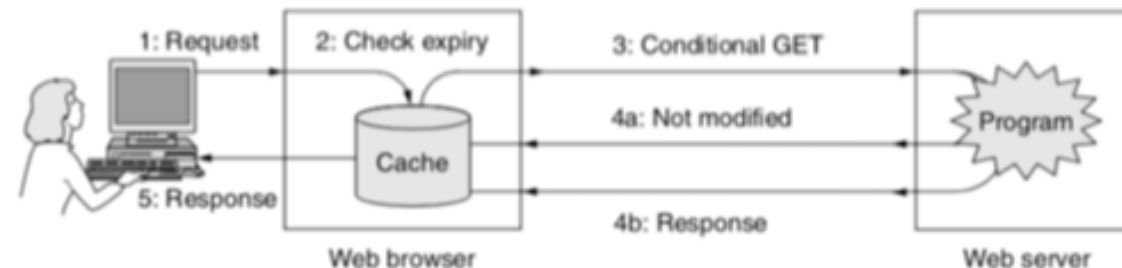


Figure 7-40. HTTP caching.

# Caching

- Two strategies:
  - conditional GET
    - ask the server whether the cached copy is still valid.
    - Valid -> 4a
    - Invalid -> 4b Full response

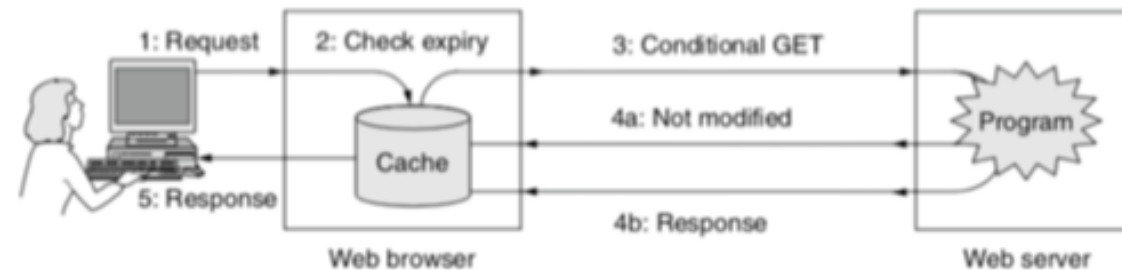


Figure 7-40. HTTP caching.

## Question 6

- Web Caching can cause problems such as stale data being served to clients. What are the benefits of web caching?

# Solution 6

- Reduced response time to distant servers.
- Reduced traffic to congested servers.

## Question 7

- What is perceptual coding in terms of compressing media to deliver data over the internet? Give two examples?

# Solution 7

- Perceptual coding is that some media content such as audio can be coded into digital form without loss of any perceived quality. For example some sounds can mask other sounds for human hearing and at that point those sounds that are identified can be used to reduce the data size to be transmitted.

# Solution 7

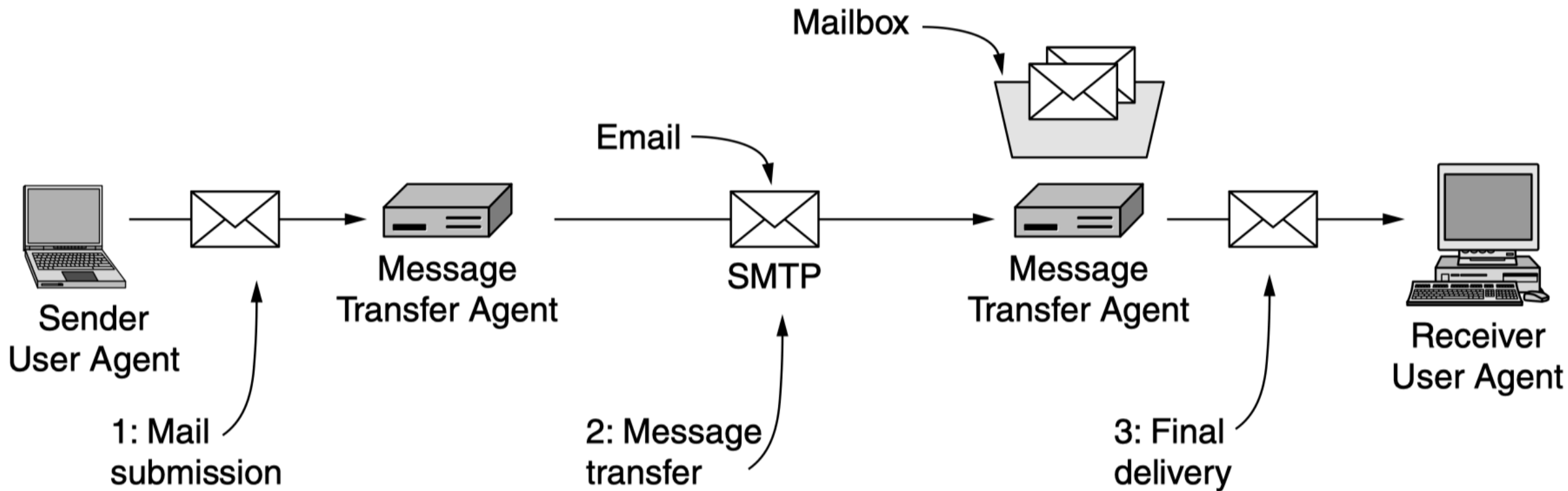
For example ,

- Frequency masking: Some sounds at certain frequencies can mask/hide others so there is no point encoding the ones humans cannot hear.
- Temporal masking: Human ears can miss soft sounds immediately after loud sounds, takes time for the ear to adjust, so no need to put these in the compressed data as well.

## Question 8

- What is SMTP protocol and where is it used?





**Figure 7-7.** Architecture of the email system.

# Solution 8

- SMTP is an application layer protocol for mail transfer. It is used from the user agent to the Mail transfer agent (MTA) and between MTAs.

## Question 9

- What are the two missing layers of the OSI protocol that we did not see in the Internet so far? Give one service for each.

## OSI

7	Application
6	Presentation
5	Session
4	Transport
3	Network
2	Data link
1	Physical

## TCP/IP

Application
Transport
Internet
Link

Not present  
in the model



# Solution 9

- Presentation and Session Layer.
- Services can be: formatting, encryption, compression for presentation layer and authentication, authorization, session management for the Session layer.