HTTP:
Hypertext Transfer Protocol

CS 241

Nov. 15, 2013

System calls for sockets

Server Socket

Client Socket

HTTP Request

- Sent from a client (eg: web browser) to a server.

```
GET /index.html HTTP/1.1
Host: linux4.ews.illinois.edu
User-Agent: Mozilla/5.0 (Windows NT[...]
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Connection: keep-alive
```

Network Frame

- In networking, you must identify when a packet ends.
  - **Network frame**: The region of data that consists of one request for a given protocol.

- In HTTP:
  - **Header**: Always ends with `\r\n\r\n`
  - **Body**: If a body exists, the header will always specify a `Content-Length` field that specifies the number of bytes in the body

HTTP Response

- Sent in response to an HTTP request.

```
GET /cs241/ HTTP/1.1
Content-Length: 23774
Content-Type: text/html
Server: Microsoft-IIS/7.5
Set-Cookie: ASPSESSIONIDAEEESRAB=PN[...]
X-Powered-By: ASP.NET
Date: Fri, 15 Nov 2013[...]
Connection: close

[23.22 KB of HTML]
```

Optimizing HTTP

- Consider loading a website:
  - You request a single HTML page
  - The HTML page contains 5 images
  - (Since the HTML page contains the 5 images, you don't know about them before you receive the images.)

- In terms of RTTs (assume it takes no time to transmit the actual data), how long would it take to completely load the webpage given:
  - You had to make a new connection for every request, **and**
  - You can only have one active connection at any time

Optimizing HTTP

Optimizing HTTP

- In HTTP, the **`Connection`** header requests the server to keep the TCP connection active.
  - **`Connection: keep-alive`**
  - **`Connection: close`**

- Using **`Connection: keep-alive`**, how many RTTs would it take to load the same website?

Optimizing HTTP

Optimizing HTTP

- Nearly all modern browsers make at least 2 connections to every web server. This allows for requests to be made in parallel.

- Using **`Connection: keep-alive`** and three (3) parallel connections, how many RTTs would it take to load the same website?

Optimizing HTTP

Optimizing HTTP

- In HTTP/1.1, a new feature called HTTP Pipelining allows multiple requests to be made in one header.
  - Request all five images at once!

- Using **`Connection: keep-alive`**, HTTP pipelining, and only one connection, how many RTTs would it take to load the same website?

Optimizing HTTP