HTTP:
Hypertext Transfer Protocol

CS 241
Nov. 15, 2013
System calls for sockets

<table>
<thead>
<tr>
<th>Server Socket</th>
<th>Client Socket</th>
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HTTP Request

- Sent from a client (e.g., 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: ASPSESSIONIDAEESRAB=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

• 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