HTTP

Getting What We Ask For
• HTTP: How Browsers & Servers Communicate
  • HTTP 1.1 - http://www.w3.org/Protocols/

• TCP Connection, usually over port 80

• Text Based Instructions

• Simple Verbs
  • GET, POST, PUT, DELETE, HEAD, CONNECT, OPTIONS, TRACE

• Optional Headers
• Basic GET Example

GET / HTTP/1.1
Host: www.example.com

• HOST header is required for HTTP/1.1

• Two CRLF to indicate the request has finished

  • CRLF = \r\n  Although most Web Servers will accept \n
“Although the line terminator for the start-line and header fields is the sequence CRLF, a recipient MAY recognize a single LF as a line terminator and ignore any preceding CR.”

• Verbs and HTTP versions **are** Case Sensitive

```plaintext
get / HTTP/1.1
host: example.com

HTTP/1.1 501 Not Implemented
```

```plaintext
get / http/1.1
host: example.com

HTTP/1.0 505 HTTP Version Not Supported
```

• Headers **are not** Case Sensitive

```plaintext
GET / HTTP/1.1
hoSt: exAMPle.cOm

HTTP/1.1 200 OK
```
Basic HTTP Example

GET / HTTP/1.1
host: example.com

HTTP/1.1 200 OK
Accept-Ranges: bytes
Cache-Control: max-age=604800
Content-Type: text/html
Date: Mon, 21 Jul 2014 05:04:02 GMT
Etag: "359670651"
Expires: Mon, 28 Jul 2014 05:04:02 GMT
Last-Modified: Fri, 09 Aug 2013 23:54:35 GMT
Server: ECS (cpm/F858)
X-Cache: HIT
x-ec-custom-error: 1
Content-Length: 1270

<!doctype html>
<html>
<head>
  <title>Example Domain</title>
</head>

<body>
  <div>
    <h1>Example Domain</h1>
    <p>This domain is established to be used for illustrative examples in documents. You may use this domain in examples without prior coordination or asking for permission.</p>
    <p><a href="http://www.iana.org/domains/example">More information...</a></p>
  </div>
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Basic HTTP Example

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Command Line Basics

Program Name: `telnet`  
Program Arguments: `example.com 80`

Command Prompt: (don’t type this part)

Press the **return** key at the end to run the program.
HTTP With Telnet

- `telnet` is a very simple program that basically opens a TCP connection to a host

- Key parts: `host` and `port`
HTTP With Telnet

We typed in this stuff

Local **telnet** program prints this

Remote server sends this back

```shell
> telnet example.com 80
Trying 93.184.216.34...
Connected to example.com.
Escape character is '^]'.
GET / HTTP/1.1
host: example.com

HTTP/1.1 200 OK
Accept-Ranges: bytes
Cache-Control: max-age=604800
Content-Type: text/html
Date: Mon, 21 Jul 2014 05:04:02 GMT
Etag: "359670651"
Expires: Mon, 28 Jul 2014 05:04:02 GMT
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```
HTTP With Telnet

This part is **NOT** part of an HTTP request!
This is just setting up telnet to issue a request

This part is the HTTP request

```bash
> telnet example.com 80
Trying 93.184.216.34...
Connected to example.com.
Escape character is '^]'.
GET / HTTP/1.1
host: example.com

HTTP/1.1 200 OK
Accept-Ranges: bytes
Cache-Control: max-age=604800
Content-Type: text/html
Date: Mon, 21 Jul 2014 05:04:02 GMT
Etag: "359670651"
Expires: Mon, 28 Jul 2014 05:04:02 GMT
Last-Modified: Fri, 09 Aug 2013 23:54:35 GMT
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```
Telnet Example
Telnet On a Mac

- Applications folder → Utilities Folder
- Terminal
- Just type in `telnet example.com 80` and hit return
Telnet On a Windows

• Windows ships with telnet, but its disabled.

• Search: “enable telnet on windows X”
  • where X is your version of Windows.

• Here’s a great explanation for Windows 10
  • https://www.rootusers.com/how-to-enable-the-telnet-client-in-windows-10/
Telnet On Linux

• If you’re running linux on your desktop, you already know how to use telnet. 😎
$ curl -v http://example.com
* Adding handle: conn: 0x7f8ba0804000
* Adding handle: send: 0
* Adding handle: recv: 0
* Curl_addHandleToPipeline: length: 1
  * - Conn 0 (0x7f8ba0804000) send_pipe: 1, recv_pipe: 0
* About to connect() to example.com port 80 (#0)
* Trying 93.184.216.119...
* Connected to example.com (93.184.216.119) port 80 (#0)
> GET / HTTP/1.1
> User-Agent: curl/7.30.0
> Host: example.com
> Accept: */*
>
< HTTP/1.1 200 OK
< Accept-Ranges: bytes
< Cache-Control: max-age=604800
< Content-Type: text/html
< Date: Mon, 21 Jul 2014 05:36:25 GMT
< Etag: "359670651"
< Expires: Mon, 28 Jul 2014 05:36:25 GMT
< Last-Modified: Fri, 09 Aug 2013 23:54:35 GMT
* Server ECS (cpm/F858) is not blacklisted
* Server: ECS (cpm/F858)
< X-Cache: HIT
< x-ec-custom-error: 1
< Content-Length: 1270
<
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curl Example
Examine Requests in Chrome
Response Codes

- Informational: 1xx
- Successful: 2xx
  - 200 OK
- Redirection: 3xx
  - 301 Moved
- Client Error: 4xx
  - 404 Not Found
- Server Error: 5xx
  - 500 Internal Server Error

http://tools.ietf.org/html/rfc7231#page-4
HTTP/2.0

• New binary method of allowing multiple requests through a single TCP socket

• More of a change to how the protocol is implemented on the wire than in the concepts of how the protocol works

• Advanced topic, if you’re interested in more details:

• Otherwise, just know its a thing