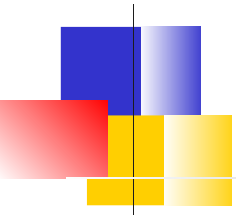


HTTP in Action

Some experiments using HTTP

Exercises

1. Use netcat as HTTP server. Send a request from web browser. Send HTTP response using netcat.

   So you can see what a web browser really sends.

2. Use netcat as web client. Send a request to a real web server.

   So you can see what a web server really sends.

3. Redirect a web browser using HTTP response codes and Location header.

Send & view HTTP using netcat

netcat (nc) or ncat are tools that let you:

- manually send and receive TCP packets
- act like a server that accepts client connections

- "netcat" (nc) is a Linux command.
  There is a version for Windows. MacOS?

- "ncat" is newer implementation that supports IPv6.

Exercise 1: Use netcat as a server

In a terminal window. run netcat as a TCP server listening on port 8080

```
netcat -v -l -p 8080
```

- `-l` means listen for connections, `-v` means verbose
- You can use any free port number 1024 - 65535. You must be *root* (*admin*) to use ports 1-1024.
- To receive a request from a **different** host, make sure there is no firewall blocking tcp port 8080 (or 80).

What is my browser sending?

Open a web browser and send a request to netcat:

`http://localhost:8080/make-my-day`

or, if netcat is using the standard http port (80):

`http://localhost/make-my-day`

you can request anything you like instead of "make-my-day".

What did the server receive?

The "netcat" console should print something like this:

```
GET /make-my-day HTTP/1.1
Host: localhost
Connection: keep-alive
User-Agent: Mozilla/5.0 (X11; Linux x86_64)
  AppleWebKit/537.36 (KHTML, like Gecko)
  Chrome/69.0.3497.81 Safari/537.36
Accept:
  text/html,application/xhtml+xml,application/xml;
  q=0.9,image/webp,image/apng,*/*;q=0.8
Accept-Encoding: gzip, deflate, br
Accept-Language: en-US,en;q=0.9,th;q=0.8
```

The Browser is Waiting for a Reply

You can see the browser is waiting for a reply.

We will use netcat to send a reply.

We are a human web server!

Send a Reply using HTTP protocol

In the netcat cmd window, type a reply using HTTP.

First line **must** be "`HTTP/1.1 200 OK`"

The body of the reply is HTML.

```
HTTP/1.1 200 OK
Content-type: text/html
                                <--blank line
<html><body>
<h1>Hello, Nerd</h1>
(you can send more stuff as html)
```

(more stuff and will be appended to the browser page as you send it). Press CTRL-C to stop the server.

What does a *real* web server send?

Now we know what a request from a web browser looks like.

What does a *real* reply from a ***real*** web server look like?

Exercise 2: Use netcat to send http request

Use netcat to send an HTTP request to http://www.ku.ac.th/

You have to enter the HTTP request yourself !

```
cmd> netcat -v www.ku.ac.th 80
GET / HTTP/1.1
Host: www.ku.ac.th
(enter a blank line)
```

- -v means verbose. Netcat will print when you are connected.
- Another way: **`curl -v http://se.cpe.ku.ac.th/`**
  curl can also use https.

What does server's reply mean?

What does the reply mean?

```
HTTP/1.1 301 Moved Permanently
Server: Apache
Location: https://www.ku.ac.th/
Content-Length: 229
Content-Type: text/html
... (more header and body)
```

- Status codes 301, 302, and 303 are redirects
- A web browser will automatically go to new URL.
- KU "leaked" some info: its running Apache server

Plain "http" sites are hard to find

Entire web is moving to https only.

Almost any http request will be redirected to an https URL.

But there are a few. Try: `www.rd.go.th`

```
cmd> netcat -v www.rd.go.th 80
GET / HTTP/1.1
Host: www.rd.go.th
```

What does the response say?

Whose web site is this?

Can We Redirect a Browser?

Exercise: Use netcat to redirect web requests to Facebook.

1. Start netcat in listening (server) mode:

```
cmd> netcat -v -l -p 8080
```

2. Use a web browser, goto **`http://localhost:8080`**

Redirect the Browser

3. Redirect the browser to Facebook (or anyplace).
   Send status code 302 Moved Temporarily (not 301).

```
cmd> netcat -v -l -p 8080
Listening on 0.0.0.0 (family 0, port 80)
Connection from localhost 44240 received!
HTTP/1.1 302 Don't Bother Me
Location: https://facebook.com
(blank line)
```

If you send status code 301[Moved Permanently] the web browser will always go to Facebook instead of localhost.

Did the Browser obey your redirect?

Browser should follow 302 Redirect to new Location.

You can also send a message in the response body.
In case the browser doesn't follow the redirect.

```
HTTP/1.1 302 Sorry, humans not allowed
Location: https://facebook.com
Content-type: text/plain

Only robots allowed.
Try https://facebook.com instead. :-)
```

Optional Exercises

1. Redirect a friend's web browser.
2. Redirect from inside a web page.
3. How many requests on a page?
4. View page-load statistics using Chrome or Firefox Developer Tools.
    - see how much stuff is downloaded for a single page!

Can you Redirect your Friend's Browser?

Can you get a friend to connect to your netcat server,

and redirect his browser to facebook.com?

Some issues:

1. Friend needs to know your IP address.
   Type `ifconfig` or `ipconfig` to view it.

2. Your TCP port must not be blocked by firewall running on your computer. Windows: use Control Panel to create an exception .

3. KUWIN may block wifi-to-wifi connections (called Wifi isolation)

Redirect inside a Web Page?

In some situations you may want to use redirect a single web page.

You can also add a delay and display a text message:

```
<html>
<head>
<meta http-equiv="refresh"
   content="5; URL='https://facebook.com'" />
</head>
<body>
<h2>You will be redirected in 5 seconds.</h2>
</body>
</html>
```

One page, many http requests

How many HTTP requests are needed to show this page?

```
<HTML>
<link rel="stylesheet" href="stylesheet.css">
<!-- Bootstrap makes my page look cool. -->
<link rel="stylesheet"
  href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/bootstrap.min.c
  ss">
<BODY>
<h1>My vacation</h1>
<p>
For vacation we went to <a
  href=”http://www.unseen.com/bangkok”>Bangkok</a>.
We visited <em>Wat Phra Kaeo</em>, and took this photo:
<br/>
<IMG src="images/watprakaew.jpeg" alt="Wat Phra Keao"/>
```

How Many Requests to Load a Site?

Use web developer tools to see requests, size, & time.

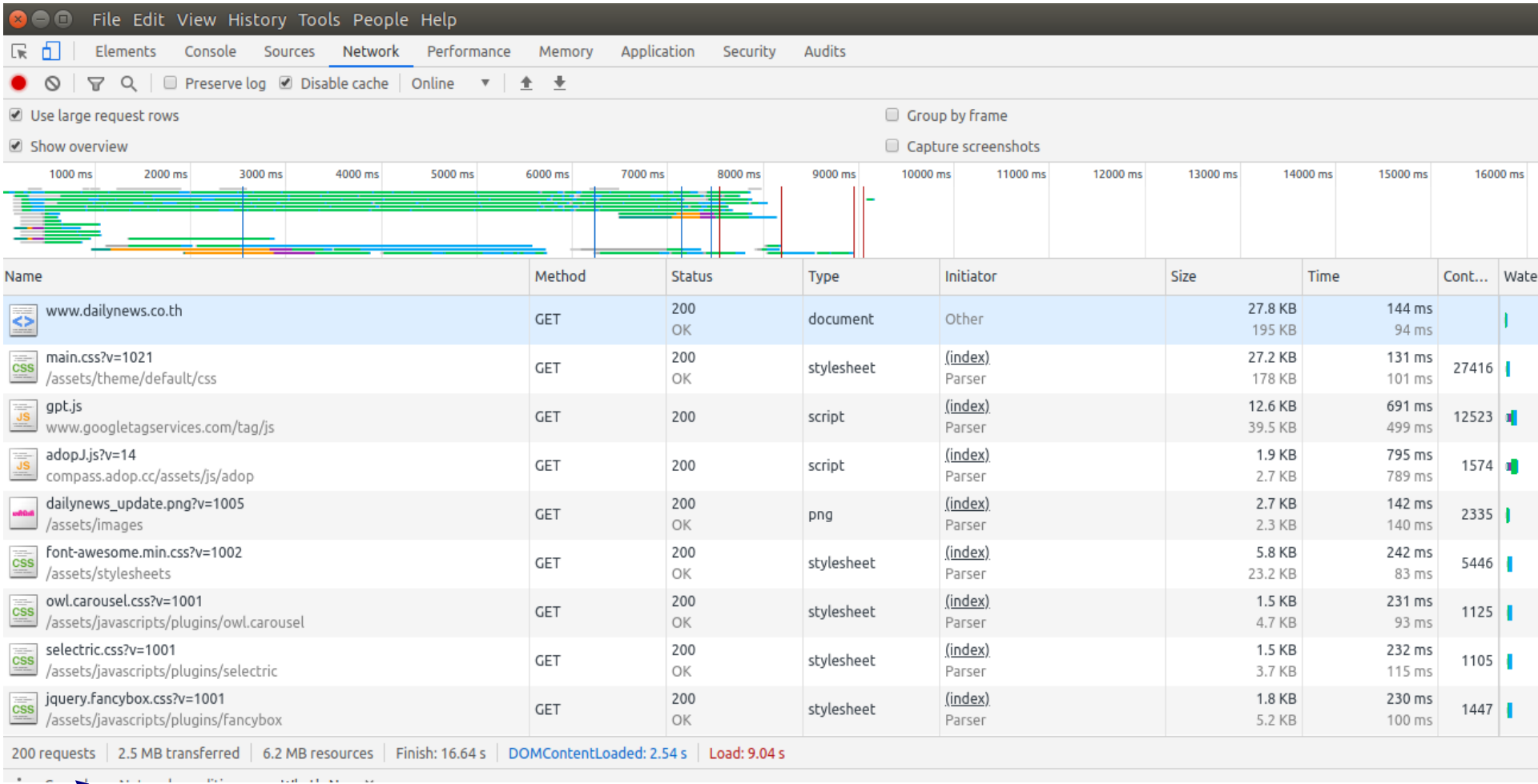
In Chrome:

1. Use *Incognito* window to avoid caching (or check a box to disable cache)
2. From "dots" menu choose More Tools -> Developer Tools
3. In "Developer Tools" window, choose Network tab.
4. In Chrome, enter a URL (such as dailynews.co.th)

How many requests? How many MB?

For just one web page!

network stats for www.dailynews.co.th



201 requests, 2.5 MB transferred, 6.2 MB resources, Load: 9.04s