Front End Performance

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Front End Performance?

- Load time of a web page
- Performance after page load
- Small devices?

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Importance

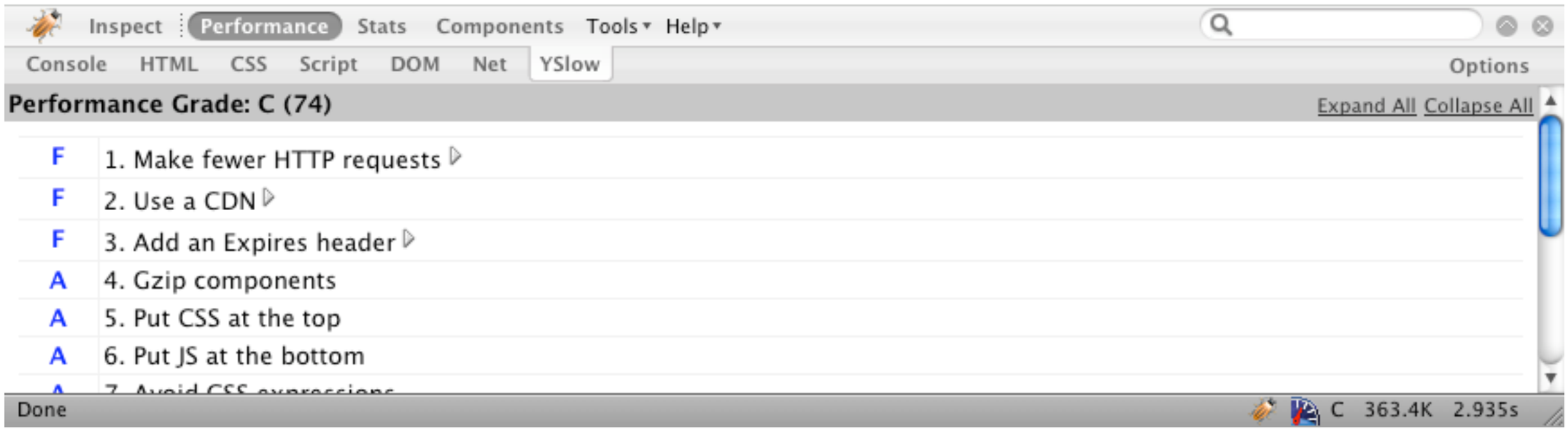
- 80-90% is spent on loading components
- Absolute load time vs. Perception
- Render page as early as possible

Anatomy of a web page

- HTML
- CSS
- Scripts
- Background images
- Images
- Other media

Firebug + YSlow

- Rates a webpage based on 13 criterias
- Determines overall load time
- Provides suggestions
- Statistics



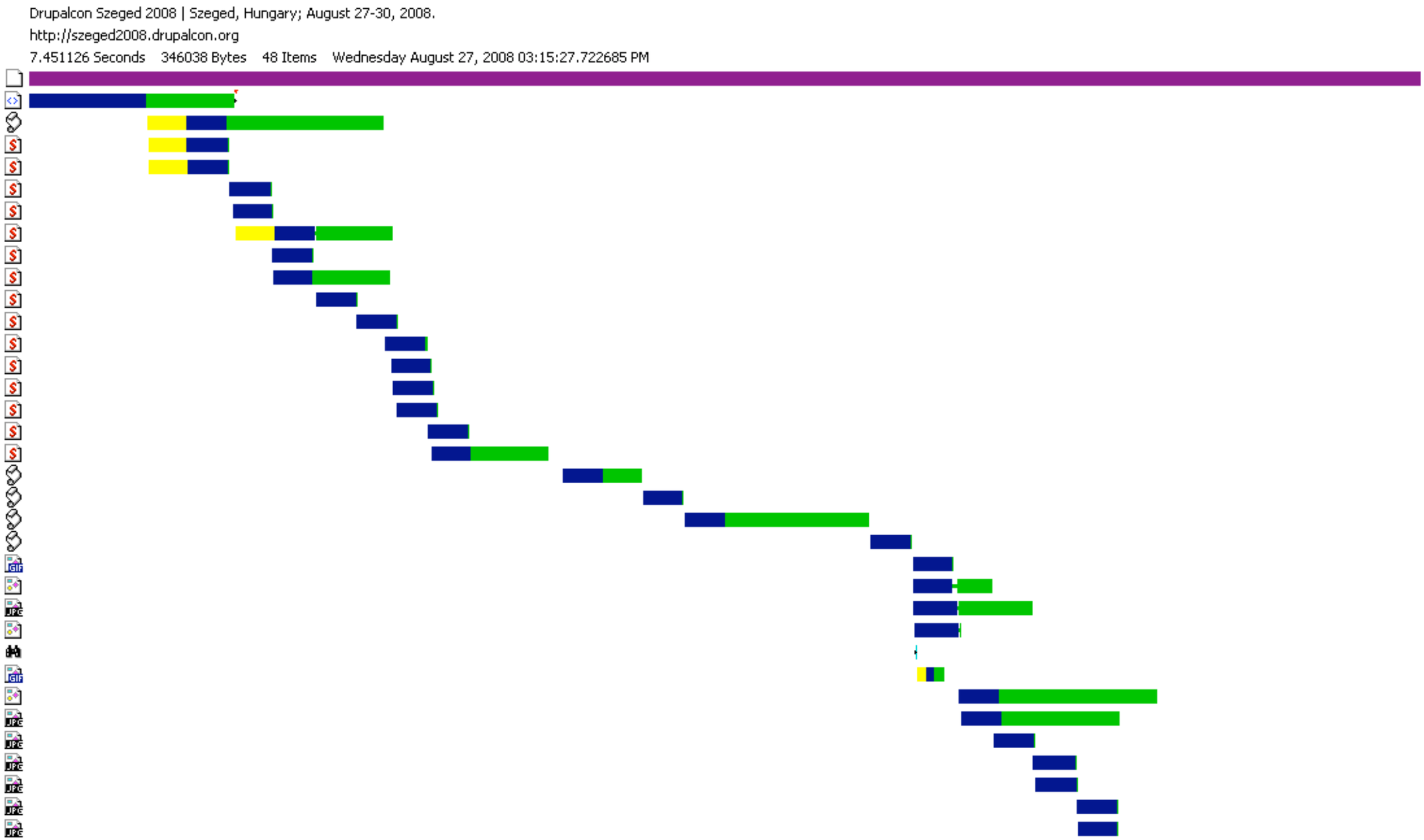
AOL Pagetest

- Creating waterfall diagrams
- Online version: http://webpagetest.org
- Grabs data from Internet Explorer
- Website not working in this venue :(

IBM Page Detailer

- http://www.alphaworks.ibm.com/tech/pagedetailer
- Detailed waterfalls directly from IE
- Extremely detailed statistics

IBM Page Detailer



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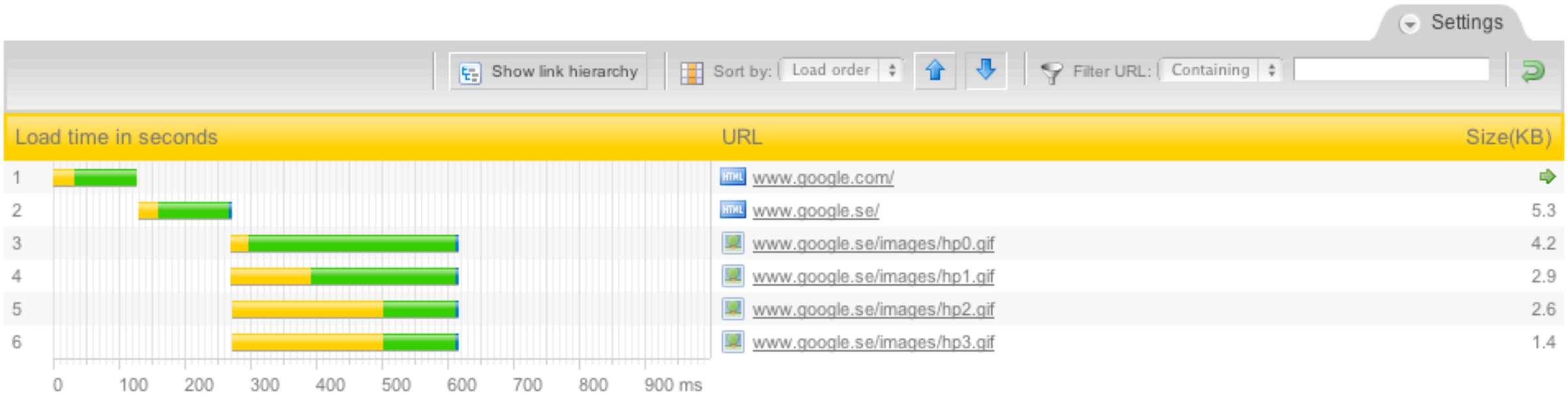
IBM Page Detailer

Events

```
                        HAS_DELIVERY_IDLE
                        HAS_SERVER_RESPONSE



--- WD_CV_WS2_HTTP_HEADER_REQUEST(1057) CSTRING(7) Length=678
      GET /sites/all/themes/szeged2008/images/calendar.png HTTP/1.1
      Accept: */*
      Referer: http://szeged2008.drupalcon.org/
      Accept-Language: en-us
      UA-CPU: x86
      Accept-Encoding: gzip, deflate
      User-Agent: Mozilla/4.0 (compatible; MSIE 7.0; Windows NT 5.1; .NET CLR 2.0.50727; .NET CLR 3.0.4506.2152; .
      Host: szeged2008.drupalcon.org
      Connection: Keep-Alive
      Cache-Control: no-cache
      Cookie: SESSd140531[redacted]cdb; __utma=37076706.4146334446790


--- WD_CV_WS2_HTTP_HEADER_REPLY(1056) CSTRING(7) Length=450
      HTTP/1.0 200 OK
      Date: Wed, 27 Aug 2008 13:15:34 GMT
      Server: Apache
      Last-Modified: Tue, 19 Aug 2008 14:05:09 GMT
      ETag: "1cfdcc-a3fb-454d0935b2f40"
      Accept-Ranges: bytes
      Content-Length: 41979
      Cache-Control: max-age=1209600
      Expires: Wed, 10 Sep 2008 13:15:34 GMT
      Content-Type: image/png
      X-Cache: MISS from www3.drupal.org
      X-Cache-Lookup: HIT from www3.drupal.org:80
      Via: 1.0 www3.drupal.org:80 (squid/2.6.STABLE17)
```

Pingdom

- http://tools.pingdom.com/
- Waterfall diagram
- Mimics web browser load order

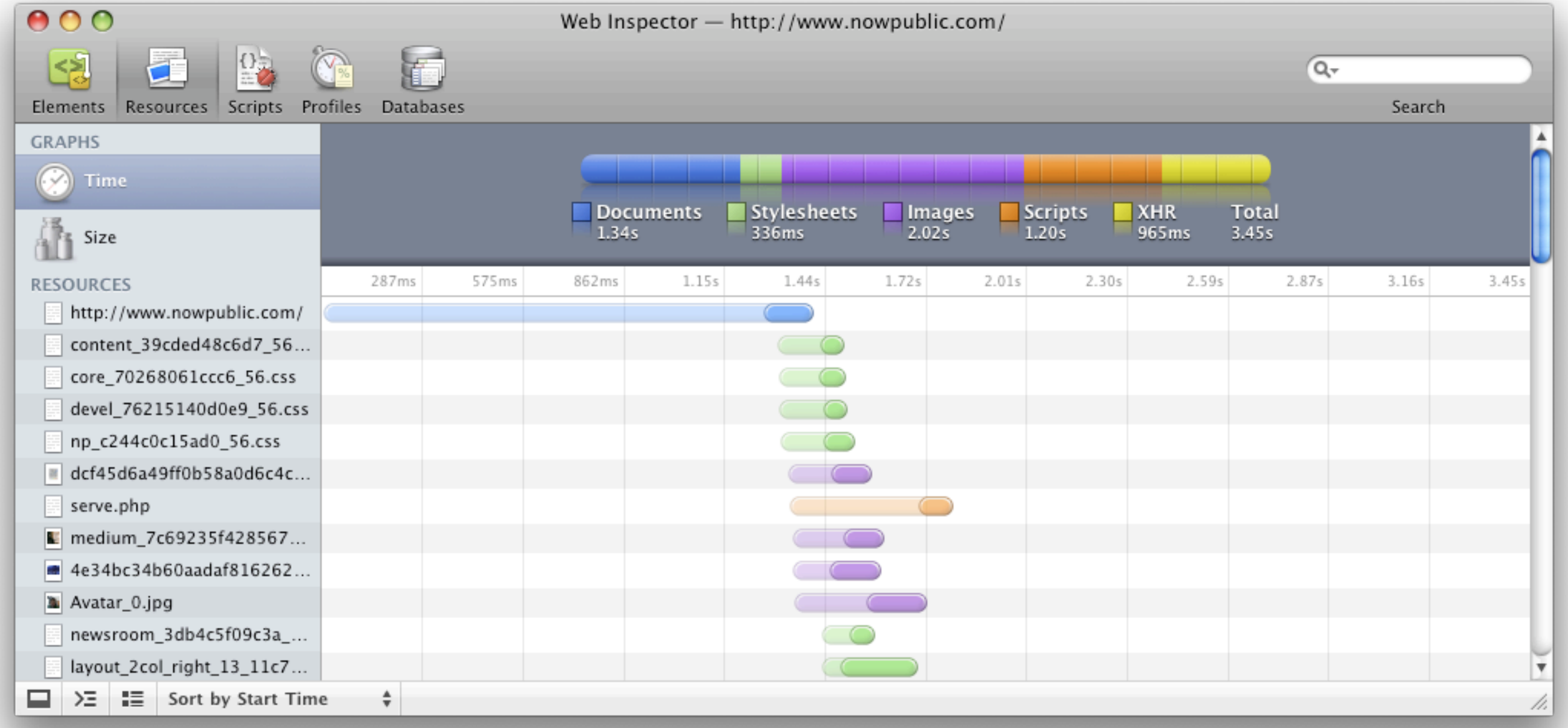


Waterfall diagrams

- Lower all three phases

WebKit's Web Inspector

- http://webkit.org



Loading components

- HTTP 1.1: 2 components per host in parallel
- Waterfall diagrams show load order
- Ideally:
  - Short connect times
  - Narrow waterfall

TCP

- Transmission Control Protocol
- Stateful: Three Way Handshakes
- Round trip time has high effect

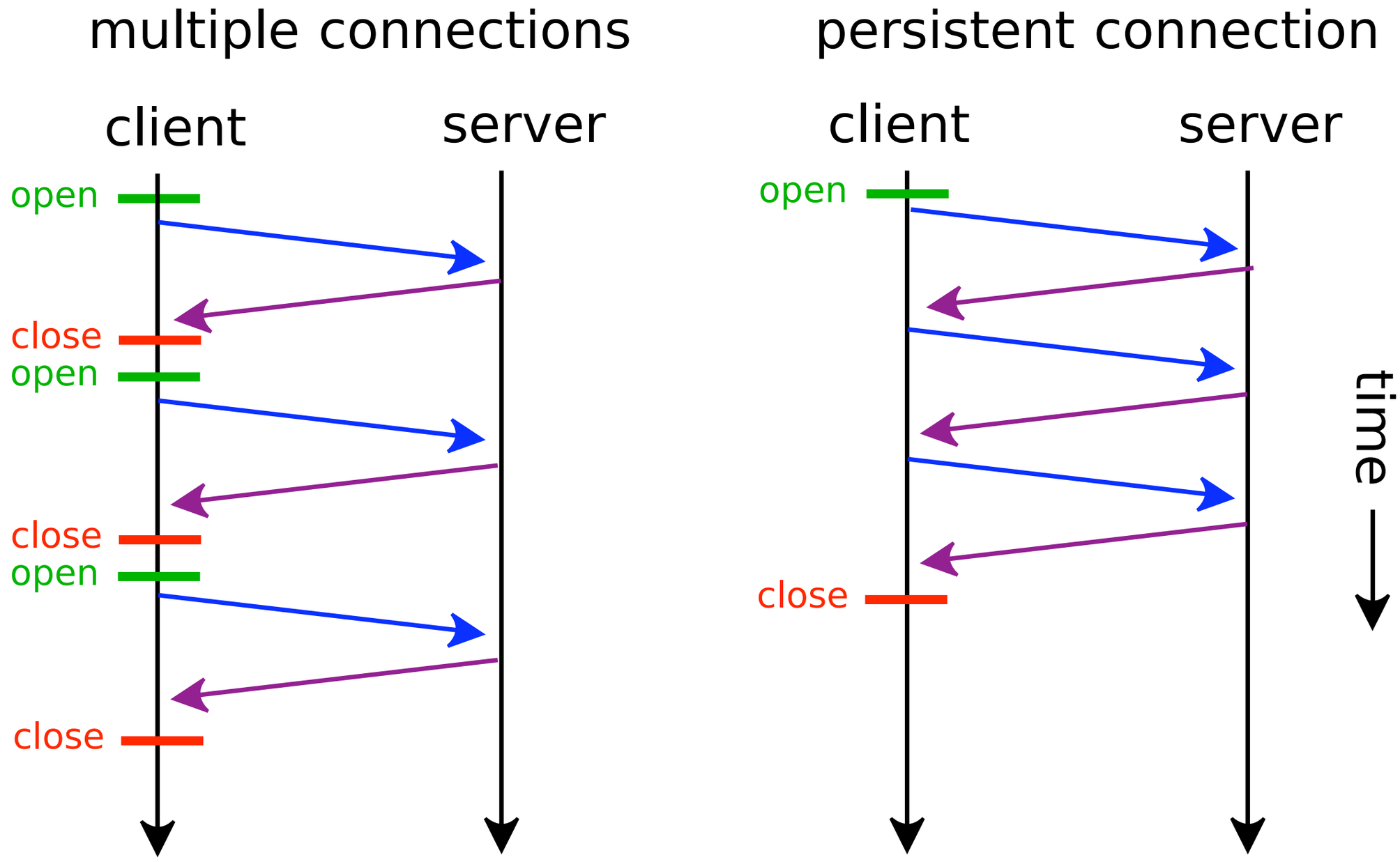
HTTP

- **Stateless** protocol on top of TCP
- Request/Response mechanism
- Header and Body have separate TCP packets
- POST involves >= 2 packets, GET only 1
- Lots of different headers
- http://www.w3.org/Protocols/rfc2616/rfc2616.html

HTTP *(II)*

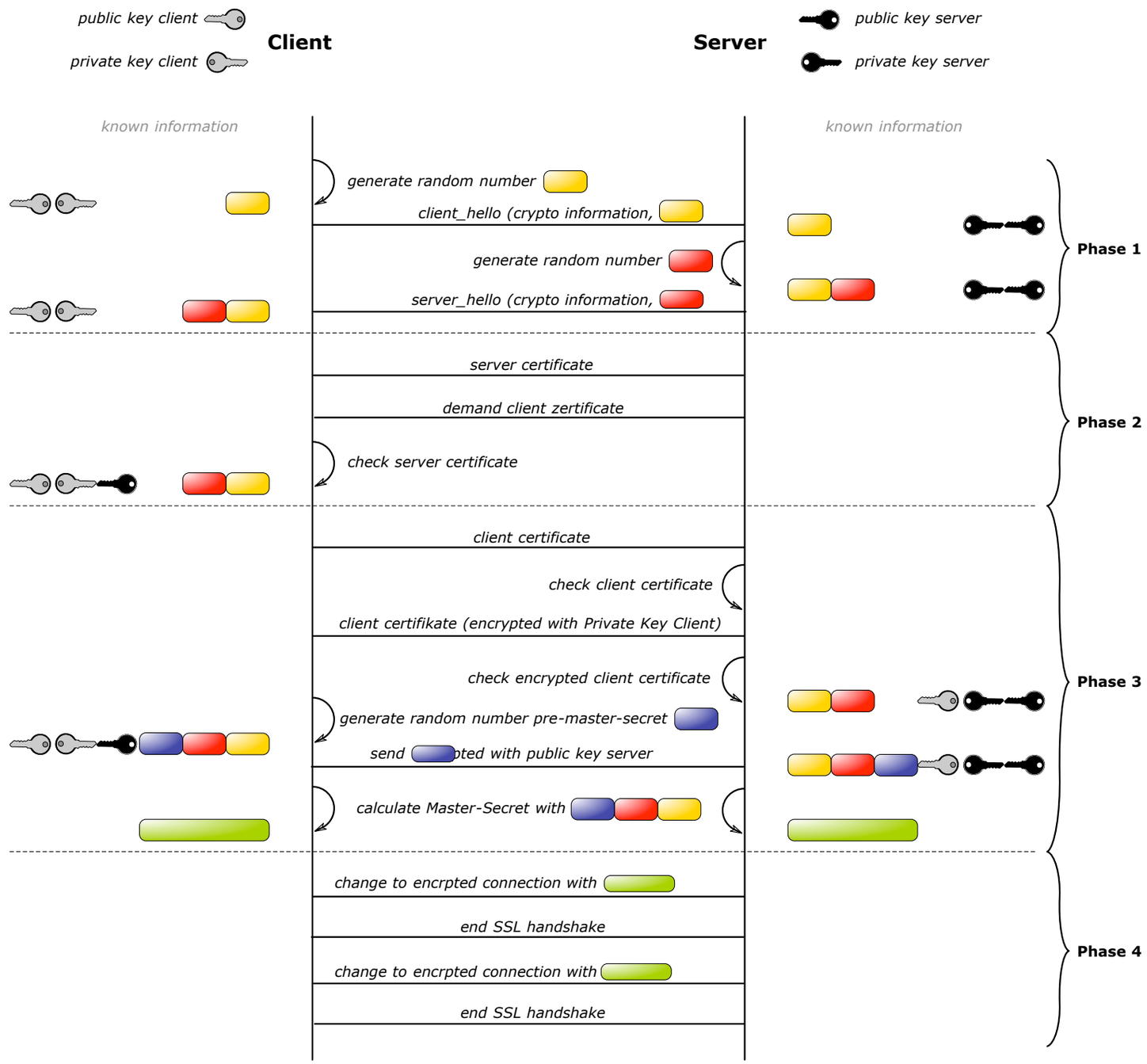
- **Cookies** are sent in HTTP header on each request
  - Reduce cookie size
- Cookies are set per host name
  - Move components to a cookieless host
- **Keep-Alive/Persistent connections**
  - Reuse TCP connections
  - Supported by most browsers/servers

HTTP Persistent connections



HTTPS

- Complex and time-consuming handshake



DNS

- Resolves host names to IP addresses
- Each host name has to be looked up
- Fewer host names → fewer lookups
- `dig` command

Now what?

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1. Reduce HTTP requests

- Sprites
  - Many images into one file
  - Shift into view with `background-position`

- **Aggregate** scripts and styles
  - Built into Drupal
  - Sophisticated: http://drupal.org/project/sf_cache
- No redirects

2. Use a CDN

- Content Delivery Network
- Lots of servers scattered around the world
- Reduces roundtrip times (ping)
- Comparably cheap: $0.07 - $0.80 per GB
  - http://www.simplecdn.com
  - http://pantherexpress.com/
  - http://cachefly.com/

3. Caching

- Controlled by HTTP headers
- Browsers check whether content is fresh
- Set `Expires` header to a date in the far future
- Change filenames/URLs when updating

4. GZip

- Compress text content (don't use for images!)
- Vastly reduces page size
- NowPublic.com: 700 KB → 300 KB
- Compress scripts and styles as well

5. CSS to the top

- == in <head>
- Page renders when all header CSS is loaded
- Loading CSS later causes re-rendering and FOUC

6. Scripts on the bottom

- == right before </body>
- Scripts block page rendering
- Scripts are loaded sequentially!
- Don’t use onfoo handlers in HTML code
- Graceful degradation

7. Minify CSS and JS

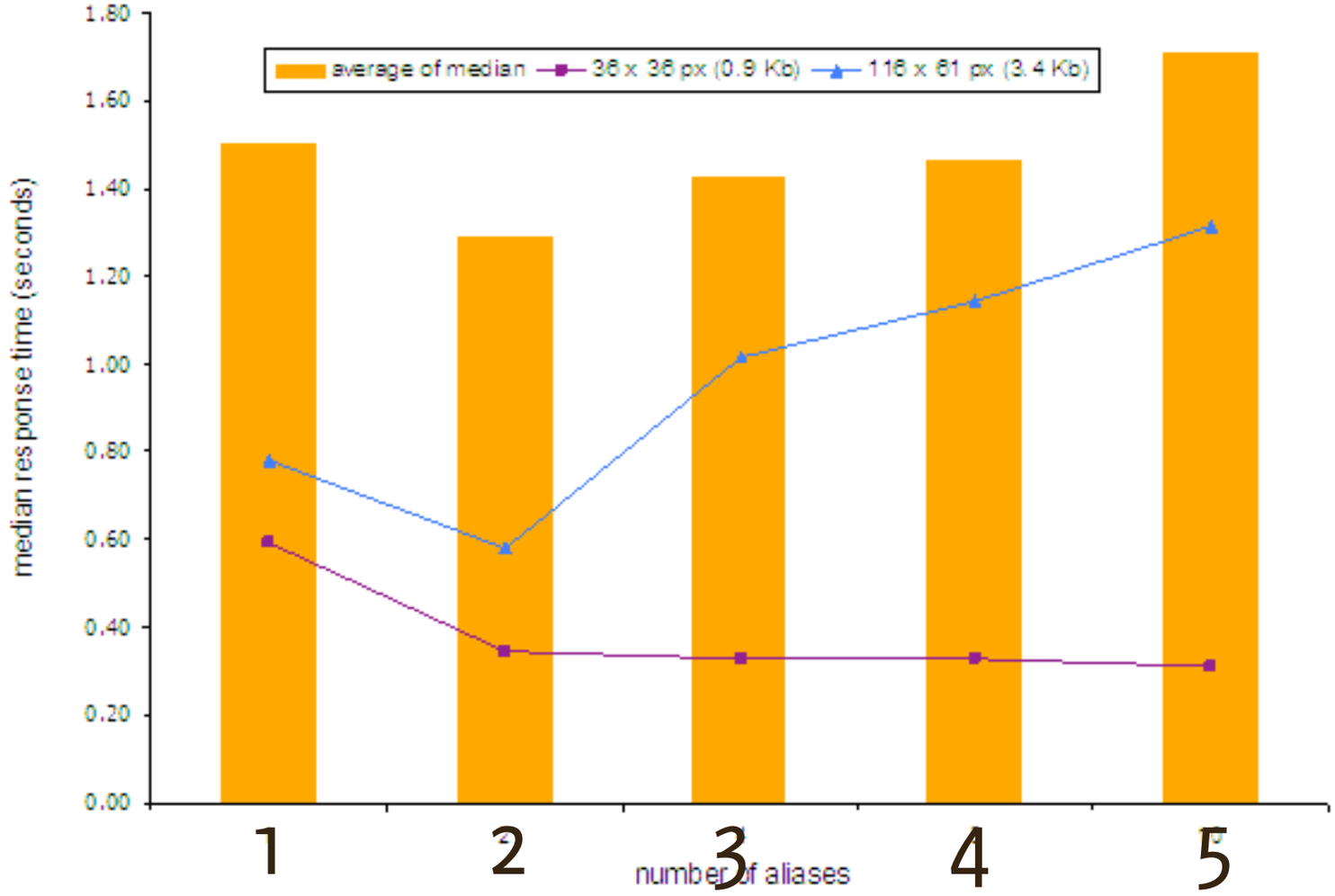
- Remove comments and whitespace
- Still savings, even with GZip
- Drupal's aggregator or sf_cache.module

8. Parallelization + DNS

- HTTP 1.1: 2 requests per hostname in parallel
- Use multiple host names → higher parallelization
- Don’t use too many hosts (DNS lookup time)

HTTP connections

- “A single-user client SHOULD NOT maintain more than 2 connections with any server or proxy.” (RFC 2616, 8.1.4)



9. Reduce image weight

- **OptiPNG**, PNGCrush, ...
  - Removes non-visible content
  - Lossless recompression
- **JPEGtran/ImageMagick**
  - Remove color profiles, meta data, ...
  - Lossless JPEG operations

Resources

- High Performance Websites, *Steve Souders*, 2007.
- http://stevesouders.com/examples/rules.php
- http://developer.yahoo.com/performance/
- http://yuiblog.com/blog/category/performance