

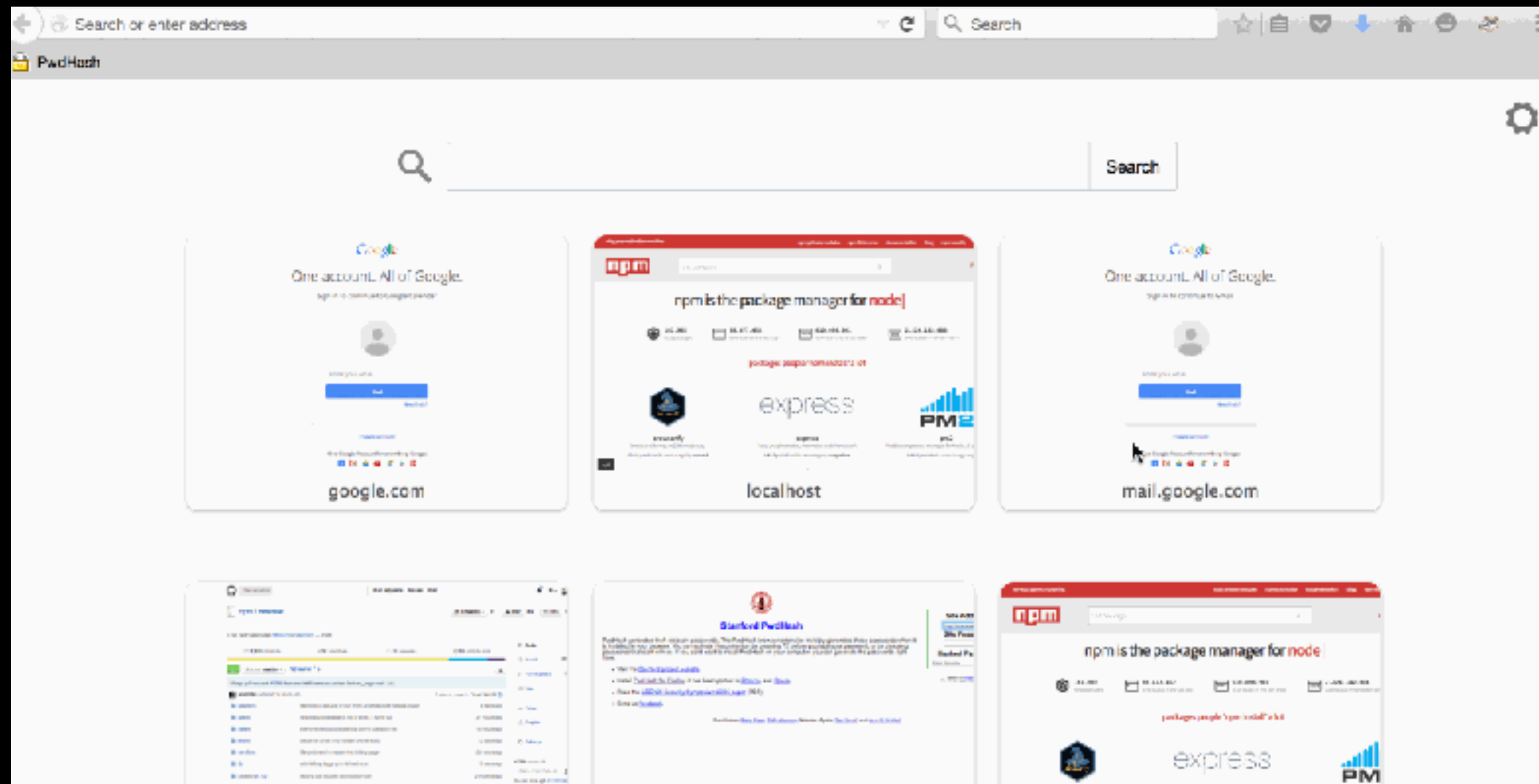
HTTP and me



How Does Opera Mini Work?



The Densest
Interview Question ever



DNS

Domain Name System

An IPv4 address (dotted-decimal notation)

172 . 16 . 254 . 1



10101100 ,00010000 ,11111110 ,00000001

└────────┘ └────────┘

One byte =Eight bits

└──┘

Thirty-two bits (4 x 8), or 4 bytes



MAKE GIFS AT GIFSOUP.COM



Resolver! (usually ISP)

Resolver knows where the root server is

{a-m}.root-servers.net

Root server knows where TLD is for
say, .com

Top Level Domain

TLD might not know IP address, but knows
the name server

It knows because that's what Domain Registrars do -
tell the TLD where the name servers are for an address

ns1.nameserver.com (and its IP address via
glue record)

IP Address and Port!

HTTP Request

GET / HTTP/1.1

Host: www.google.com

User-Agent: Mozilla/5.0 (Macintosh; Intel Mac
OS X 10.10; rv:40.0) Gecko/20100101 Firefox/
40.0

Headers

Header field name	Description	Example
Accept	Content-Types that are acceptable for the response. See Content negotiation .	Accept: text/plain
Accept-Charset	Character sets that are acceptable	Accept-Charset: utf-8
Accept-Encoding	List of acceptable encodings. See HTTP compression .	Accept-Encoding: gzip, deflate
Accept-Language	List of acceptable human languages for response. See Content negotiation .	Accept-Language: en-US
Accept-Datetime	Acceptable version in time	Accept-Datetime: Thu, 31 May 2007 20:35:00 GMT
Authorization	Authentication credentials for HTTP authentication	Authorization: Basic QWxhZGRhbjpwYXN1b3R1c2PtZQ==
Cache-Control	Used to specify directives that <i>must</i> be obeyed by all caching mechanisms along the request-response chain	Cache-Control: no-cache
Connection	Control options for the current connection and list of hop-by-hop request fields ^[8]	Connection: keep-alive Connection: Upgrade
Cookie	An HTTP cookie previously sent by the server with Set-Cookie (below)	Cookie: \$Version=1; Skin=new;
Content-Length	The length of the request body in octets (8-bit bytes)	Content-Length: 348
Content-MD5	A Base64 -encoded binary MD5 sum of the content of the request body	Content-MD5: Q2hlY2agSW50ZWdyaxR5IQ==
	The MIME type of the body of the request (used with POST and PUT)	Content-Type: application/x-www-form-

Telnet. Oooo

~ \$ █

I



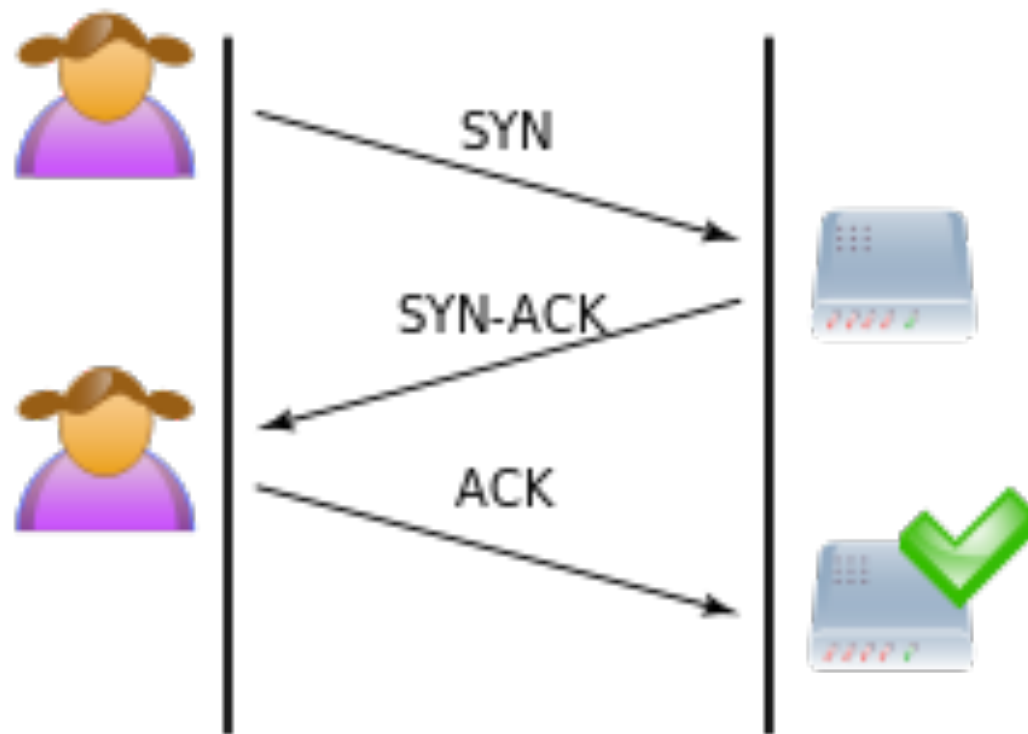
THE LITTLE COUPLE
ALL NEW
TUESDAY 10P

TLC

TCP

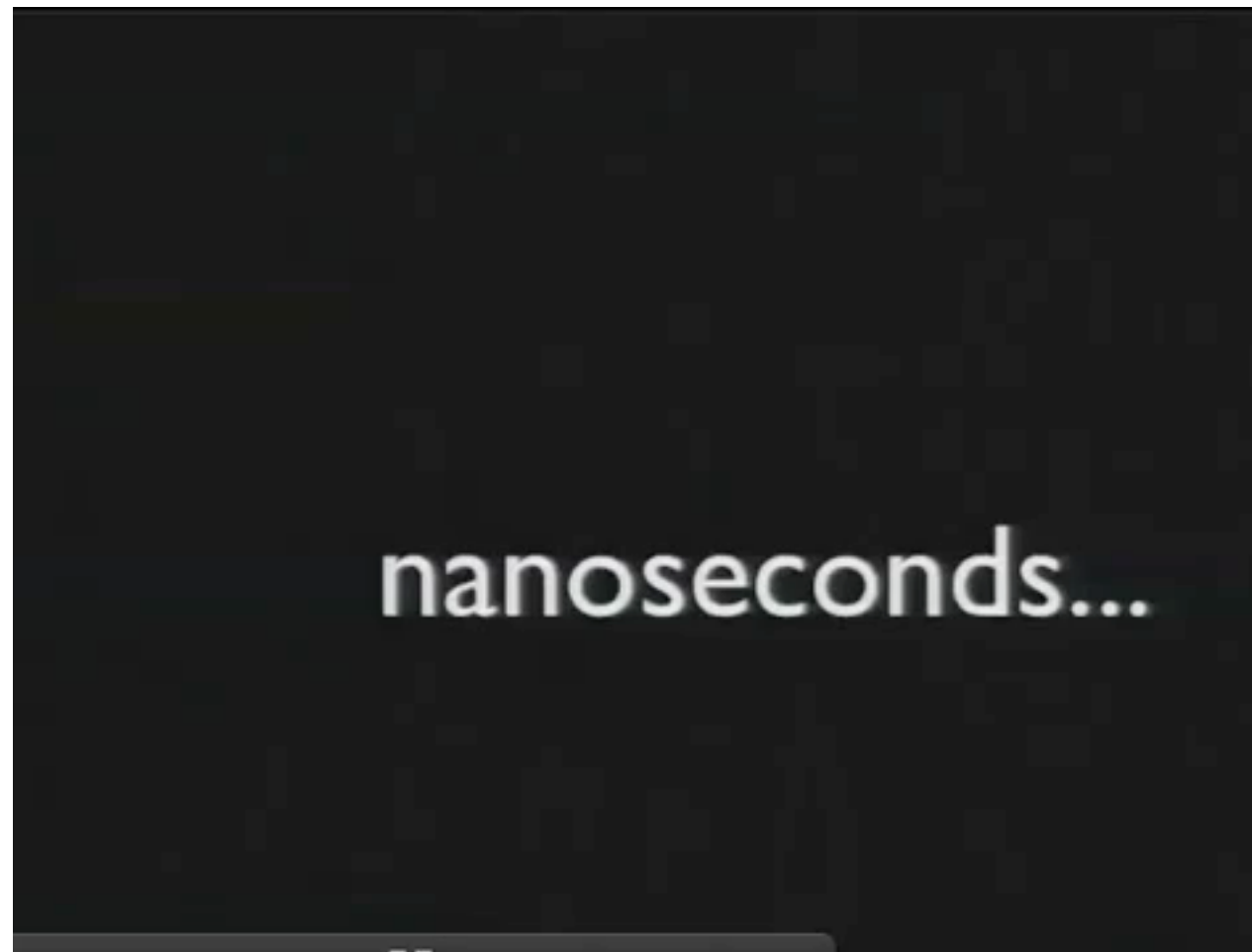
Transmission Control Protocol

Synchronize/Acknowledge



Latency?

Grace Hopper





1. ~ (bash)

~ \$ traceroute adadevelopersacademy.org

Load Balancer

Example: HAProxy

Web Server

Example: NGINX

App Server

Here's where your app comes in

Let's talk API design

REST

HTTP Request Methods

GET

POST

PUT

DELETE

...

GET /users/jefflembbeck

App server router

MVC

Model

Database queries

View

JSON, HTML, XML, etc. etc.

Normally requested by Accept
header on HTTP Request

Can be generated with templating
languages and helpers!

Controller

Grab data to be presented from models -> use
view to respond

/users/jefflembeck

Route points us to `/users/:userId`

User model has static method `find`

User.find(userId)

munge data as seen fit, then send it back
with the appropriate response code

HTTP Response Codes

2xx = Success!

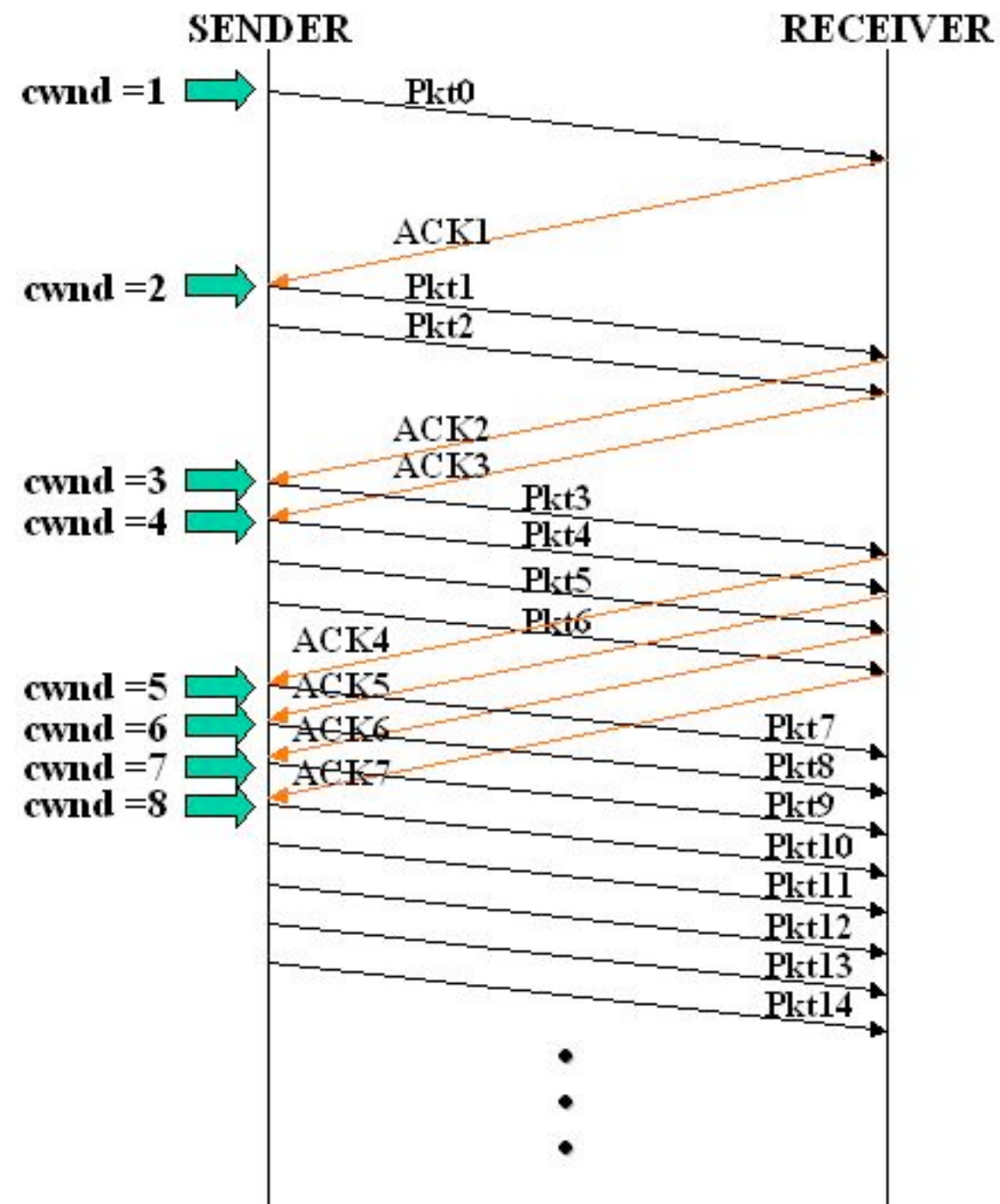
3xx = Redirection

4xx = Client Errors

5xx = Server Errors

Back to the Network

Slow Start

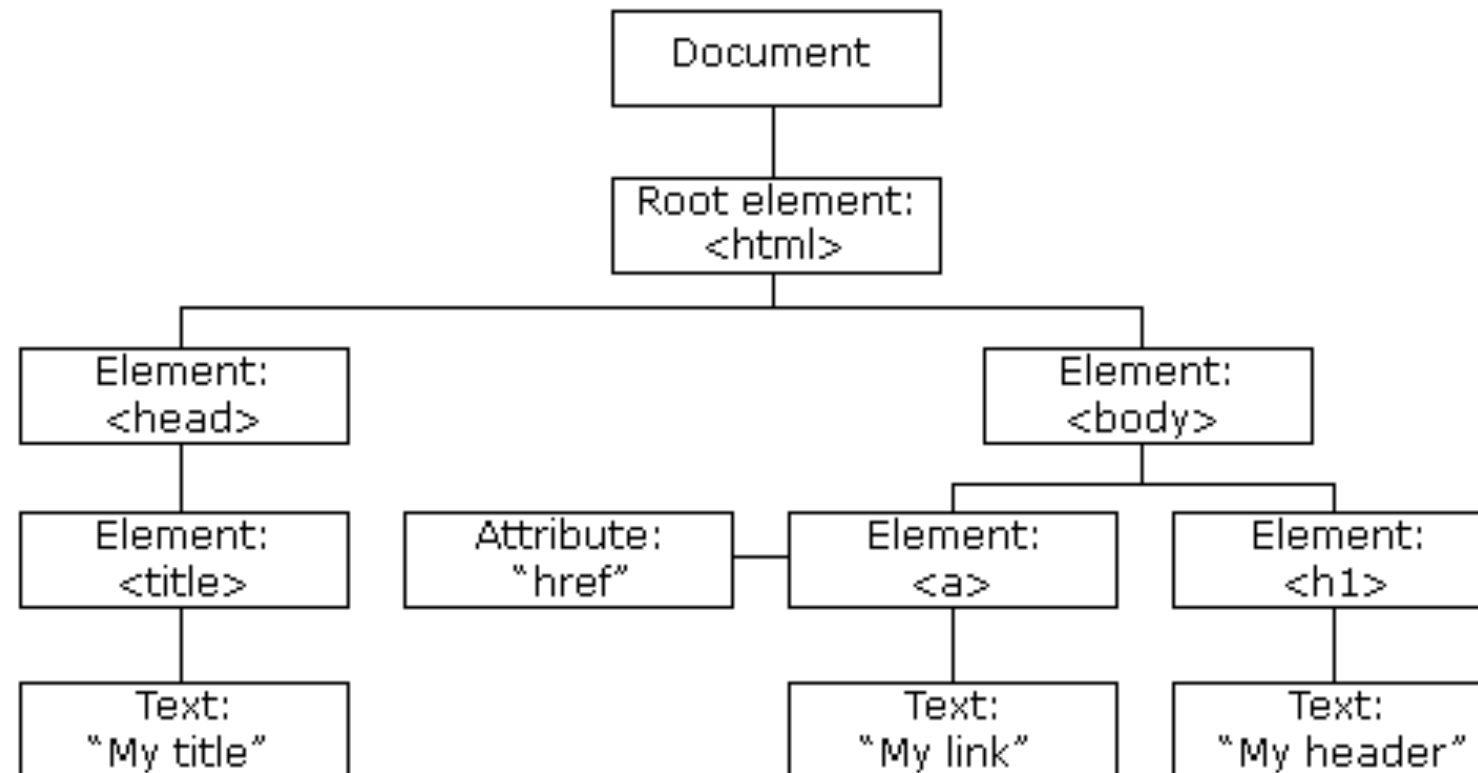


14KB

HTML

Parse

DOM Tree



Fetch External Resources

CSS files/style tags/style attributes

CSSOM

CASCADING

Weight, then Specificity,
then Order

!important

IDs, classes, tags oh my

What's next in line?

CSS BLOCKS

Rendering

Render page

Position (box model)

Position (floats, absolutes, relatives)

Layer

Render

Make small changes for faster renders

JavaScript

Parse + Execution Time?

Compilers (overview)

```
// Add feature flags to request
request.features = {};
Object.keys(process.env)
  .filter(function(key) {
    return key.match(/^feature_/);
  })
  .forEach(function(key) {
    key = key.replace(/^feature_/, "").toLowerCase();
    request.features[key] = featureFlag(key, request);
  });

// Generate 'request.packageName' for global and scoped package requests
if (request.params.package || request.params.scope) {
  request.packageName = request.params.package ||
    request.params.scope + "/" + request.params.project;
}

request.metrics = metrics;
request.redis = request.server.app.cache._cache.connection.client;
request.logger = bole(request.id);
request.timing = {
  start: Date.now(),
};
```

Tokeniser





Parser





Translator

010100

100011

000111

010100
100011
000111

Interpreter

```
EntryPoint:
0000000000000ef0      push    0x0
0000000000000ef2      mov     rbp, rsp
0000000000000ef5      and     rsp, 0xfffffffffffffff0
0000000000000ef9      mov     rdi, qword [ss:rbp+0x8]
0000000000000efd      lea     rsi, qword [ss:rbp+0x10]
0000000000000ef1      mov     edx, edi
0000000000000ef3      add     edx, 0x1
0000000000000ef6      shl     edx, 0x3
0000000000000ef9      add     rdx, rsi
0000000000000efc      mov     rcx, rdx
0000000000000ef7      jnp     0x1000000f15

0000000000000f11      add     rcx, 0x8

0000000000000f15      cmp     qword [ds:rcx], 0x0
0000000000000f19      jnz     0x1000000f11

0000000000000f1b      add     rcx, 0x0
0000000000000f1f      call    _main
0000000000000f24      mov     edi, eax
0000000000000f26      call    imp__stubs__exit
; endp

0000000000000f2b      hlt
0000000000000f2c      nop
0000000000000f2d      nop
0000000000000f2e      nop
0000000000000f2f      nop
```

Sloooooowwww

JIT Compiler

Very smart people made JS a lot faster

V8 first, then others quickly followed suit

We done yet?

Images

Fonts

How do I make my stuff faster?

HTTP 1.1

Concatenate

```
project/  
  |_ js/  
    |_ lib/  
      |_ jquery.js  
    |_ posts.js  
    |_ users.js  
    |_ admin.js
```

=>

```
project/  
  |_ build/  
    |_ js/  
      |_ all.js
```

JUST ONE REQUEST

Minify

```
(function( global, factory ) {  
  
    if ( typeof module === "object" && typeof  
        // For CommonJS and CommonJS-like envirc  
        // execute the factory and get jQuery  
        // For environments that do not inherent  
        // (such as Node.js), expose a jQuery-mc  
        // This accentuates the need for the cre  
        // e.g. var jQuery = require("jquery")(w  
        // See ticket #14549 for more info  
        module.exports = global.document ?  
            factory( global, true ) :  
            function( w ) {  
                if ( !w.document ) {  
                    throw new Error( "jQuery requires  
                }  
                return factory( w );  
            };  
    } else {  
        factory( global );  
    }  
})(window, function( window ) {
```

=>

```
/*! jQuery v1.11.2-pre | (c) 2005, 2014 jQuery Foundation  
!function(a,b){"object"==typeof module&&"object"==typeof  
}function Q(a,b,c){if(m.acceptData(a)){var d,e,f=a.nodeType  
}},Yb.prototype.init.prototype=Yb.prototype,Yb.propHooks=  
//# sourceMappingURL=jquery.min.map
```

MAKES FILE SMALLER

gzip

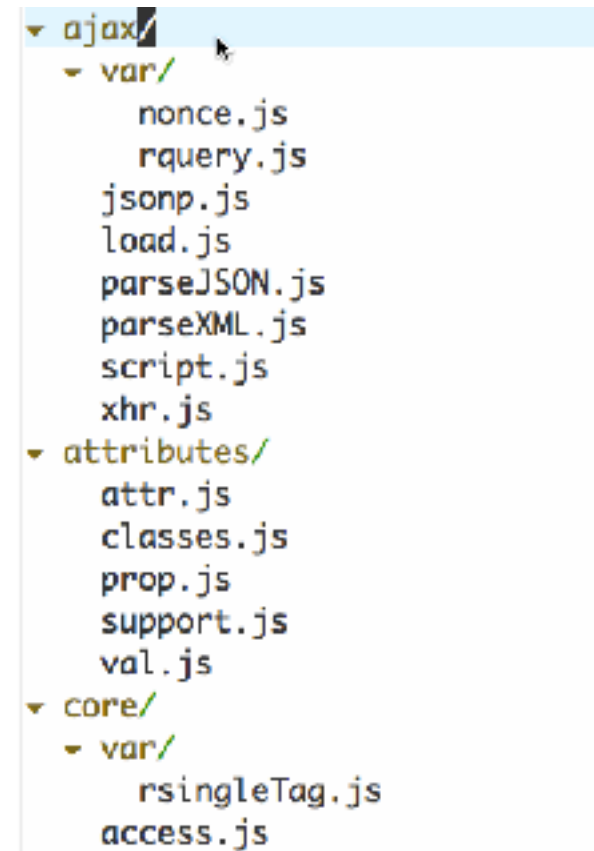
```
bork@kiwi:~/work/hackerschool/gzip.jl$ julia gunzip.jl raven.txt.gz
```



I

Example - jQuery

79 Files to Start!



Example - jQuery

CONCAT! =>

One File - 276.79KB

MINIFY! =>

One File - 93.66KB

GZIP! =>

One File - 32.55KB

Highlight: Your standard Webpack configurations are already set up for this

- Latency
- Warmup
- Parsing/Execution Time

Scripts Block Parsing!

Head vs. Bottom Block Example

Use async or defer
attributes

async runs only when fully available
and not blocking

defer runs only when the DOM
is completely built

Script not crucial for functionality?

async and defer 5ever

Async load Fonts

●○○○○○ T-Mobile



12:06 PM



100%



slate.com

Mitt Romney Is Officially Running for President

By Betsy Woodruff

●○○○○ T-Mobile



12:06 PM



100%



slate.com

Mitt Romney Is Officially *Not* Running for President

By Betsy Woodruff

The text was there all
along!

async load everything
not critical

<https://www.filamentgroup.com/lab/weight-wait.html>

Server-Side Rendering

Special Tangent

Progressive Enhancement

Single Point of Failure



Fallacies of Distributed Computing

- The network is reliable.
- Latency is zero.
- Bandwidth is infinite.
- The network is secure.
- Topology doesn't change.
- There is one administrator.
- Transport cost is zero.
- The network is homogeneous.

The network is reliable.

Frontend SPOF test	Chrome	Firefox	IE	Opera	Safari
External Script	blank below	blank below	blank below	blank below	blank below
Stylesheet	flash	flash	blank below	flash	blank below
inlined @font-face	delayed	flash	flash	flash	delayed
Stylesheet with @font-face	delayed	flash	totally blank*	flash	delayed
Script then @font-face	delayed	flash	totally blank*	flash	delayed



Yoav Weiss
@yoavweiss



Following

Periodic reminder: Don't let 3rd party scripts block your site's rendering and don't rely on scripts for basic functionality.

RETWEETS

18

FAVORITES

12



12:21 AM - 3 Sep 2015





Yoav Weiss

@yoavweiss



Following

Reminder brought to you courtesy of a router to the US that died somewhere, rendering all sites that don't do that inaccessible from France

RETWEETS

8

FAVORITES

6



12:24 AM - 3 Sep 2015



Fun client/server examples