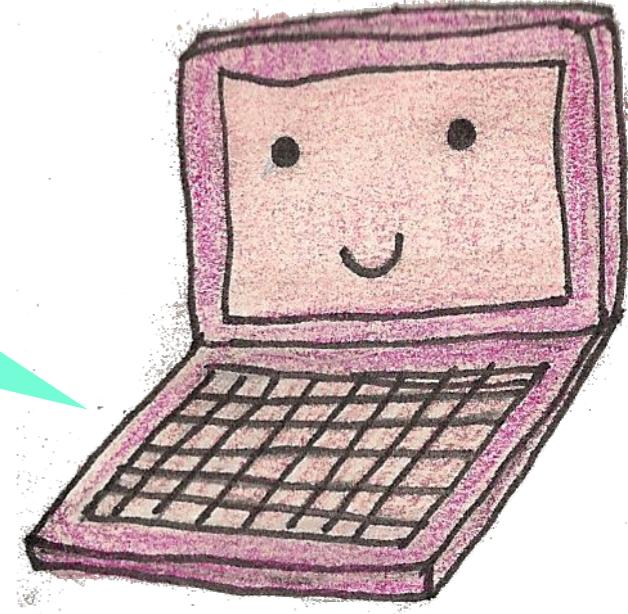


Server Farm to Table

(or, how the Internet works)

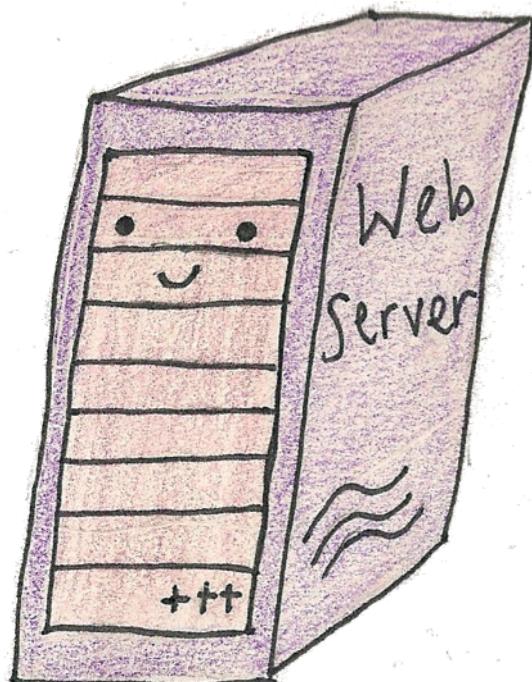
Jenna Zeigen
@zeigenvector
June 24, 2016



hey, sup?

Server Farm to Table

(or, how the Internet works)



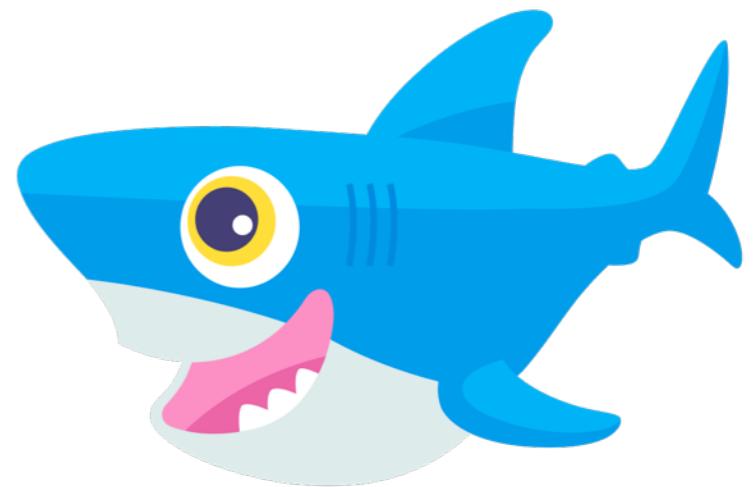
nm, u?

Jenna Zeigen
@zeigenvector
June 24, 2016

Engineering Manager
@ DigitalOcean



zeigenvector

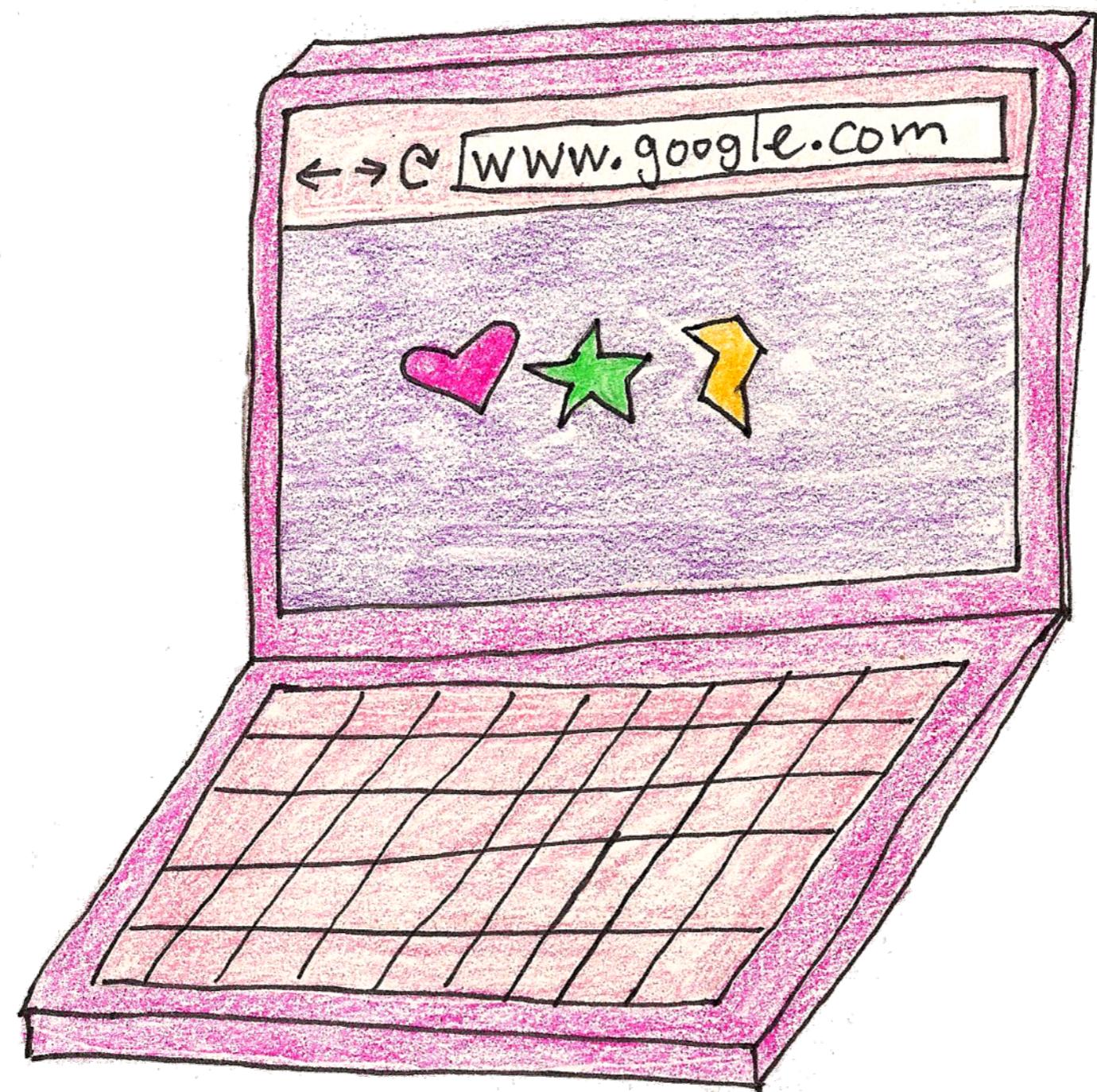


Engineering Manager
@ DigitalOcean



zeigenvector



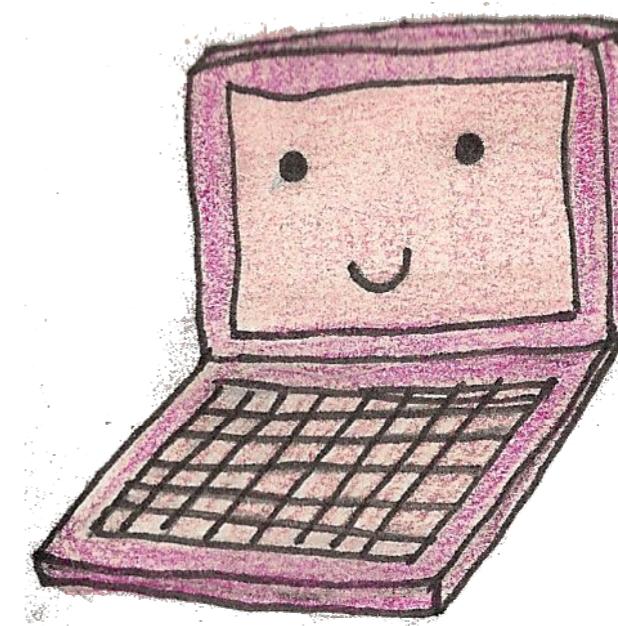
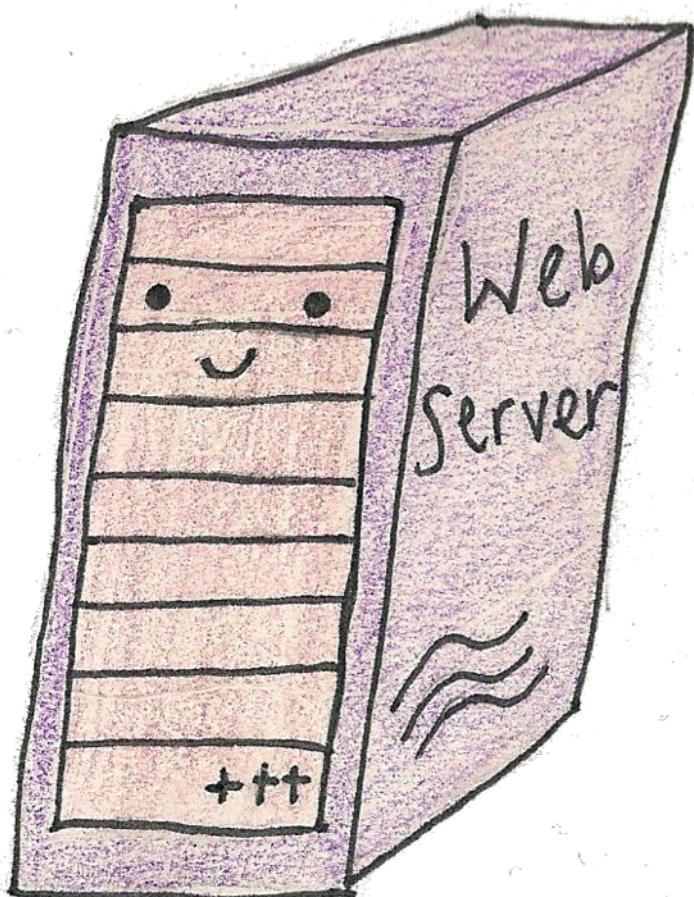


Overview

1. IP Address Lookup
2. Opening a socket
3. Security Stuff
4. HTTP Request
5. Server Things
6. HTTP Response
7. Parsing
8. Rendering

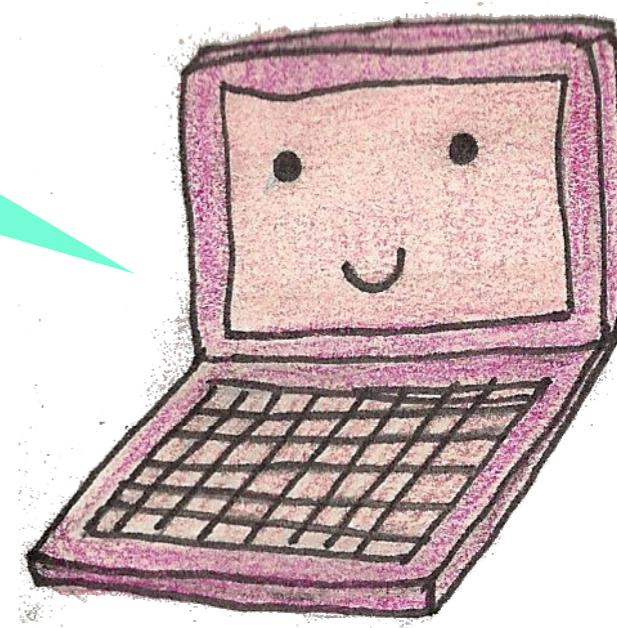
IP Address Lookup

You know my name
Look up the number



IP Address Lookup

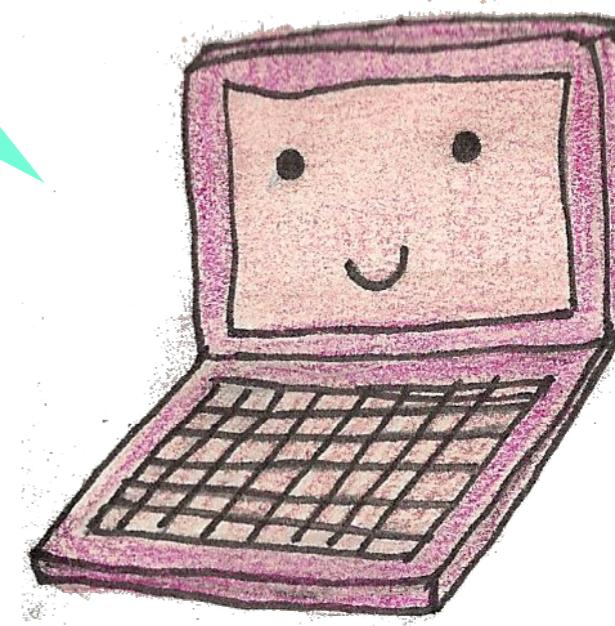
Hey, I just met you
This is easy
I still know your number
Super breezy!



IP Address Lookup

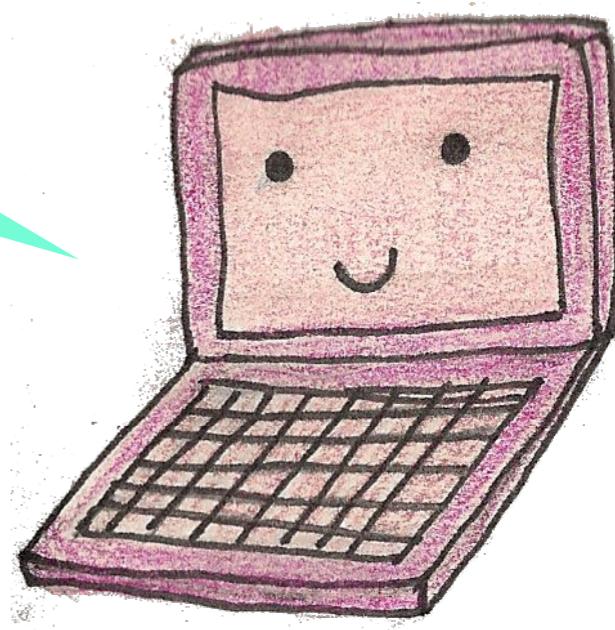
Is this name special?
So very special?

♪ ♪ ♪



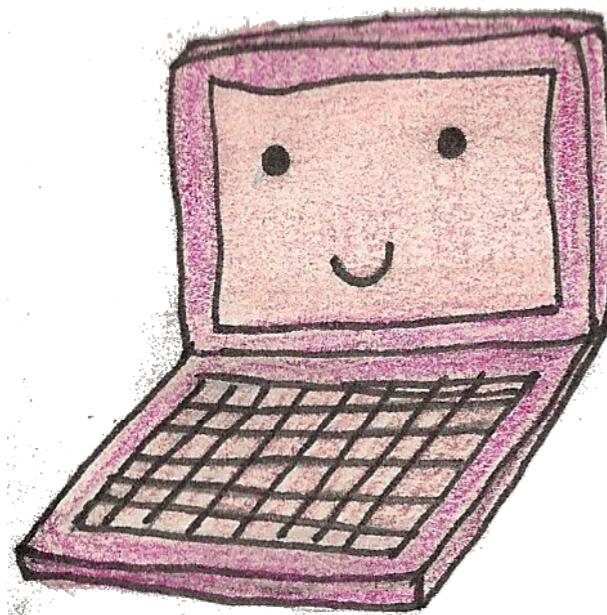
IP Address Lookup

Nope!

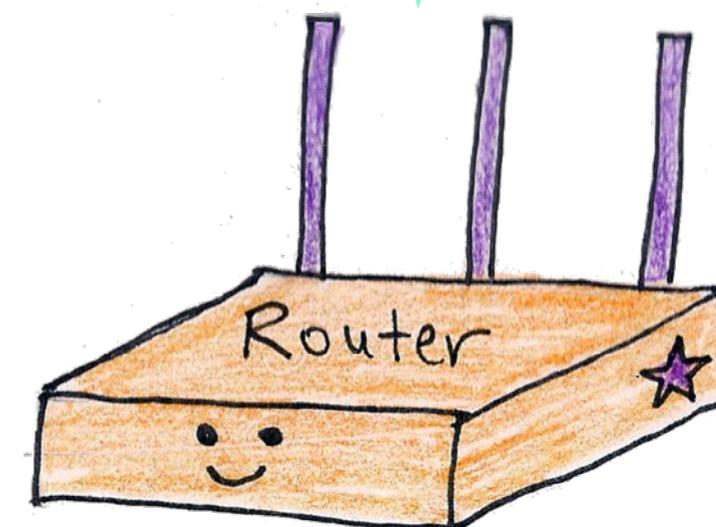


IP Address Lookup

Do you have
a www.google.com?

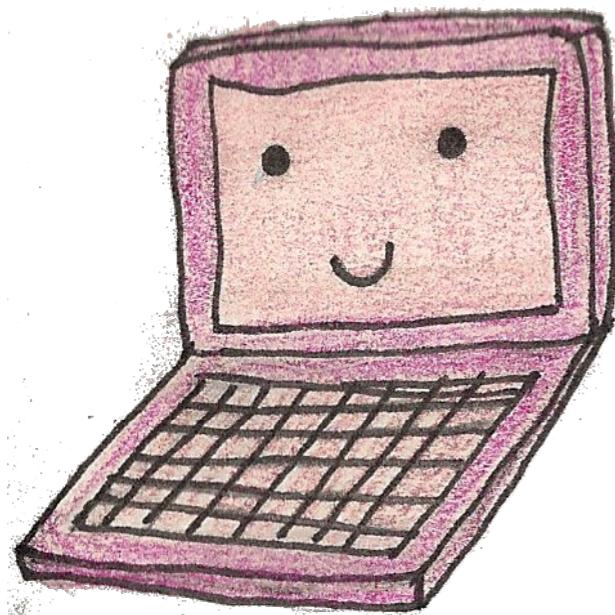


You weren't asking
me, but I know
where that is!
173.194.46.84!

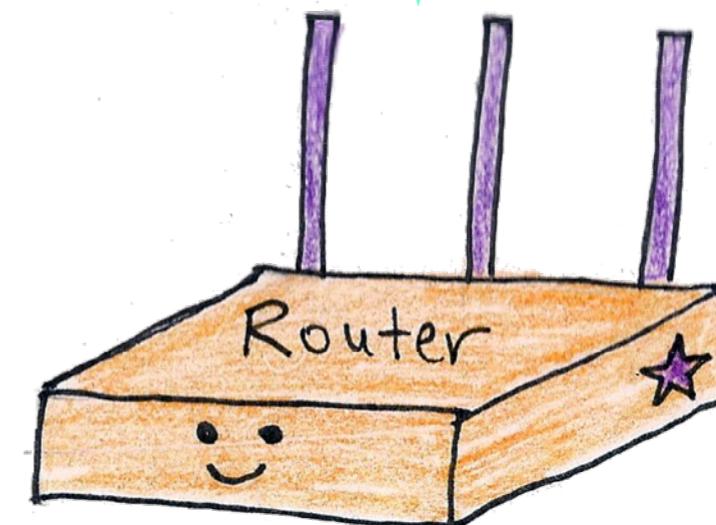


IP Address Lookup

Do you have
a www.google.com?

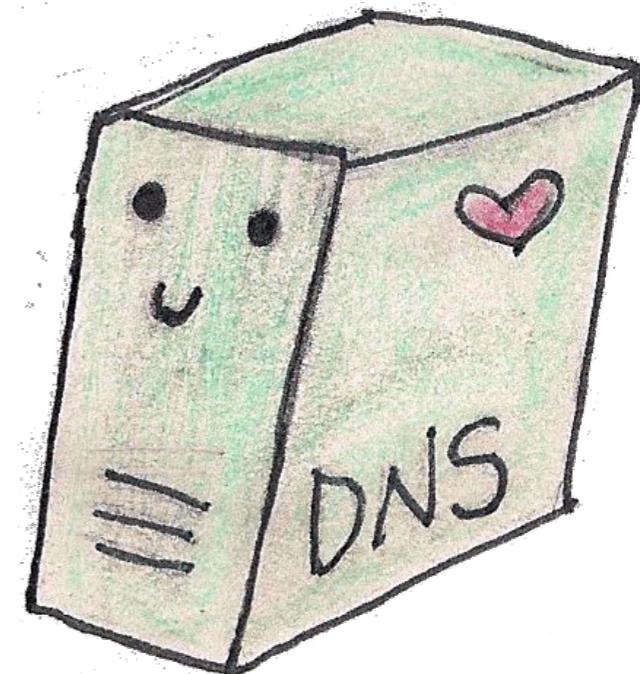
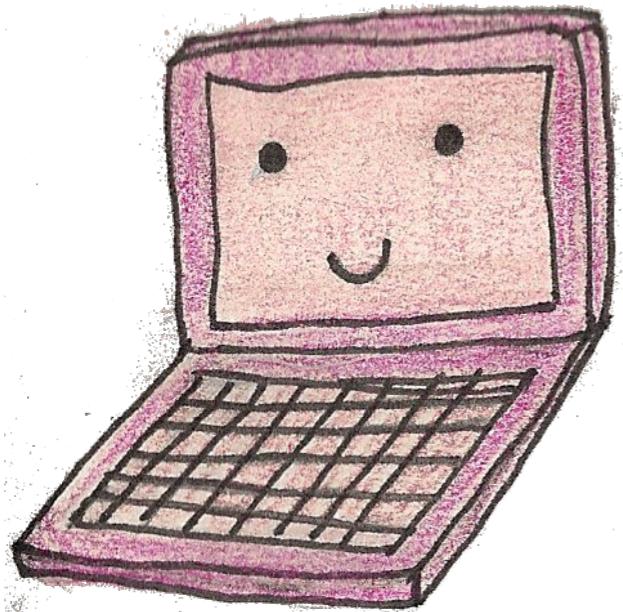


<LANsplaining>



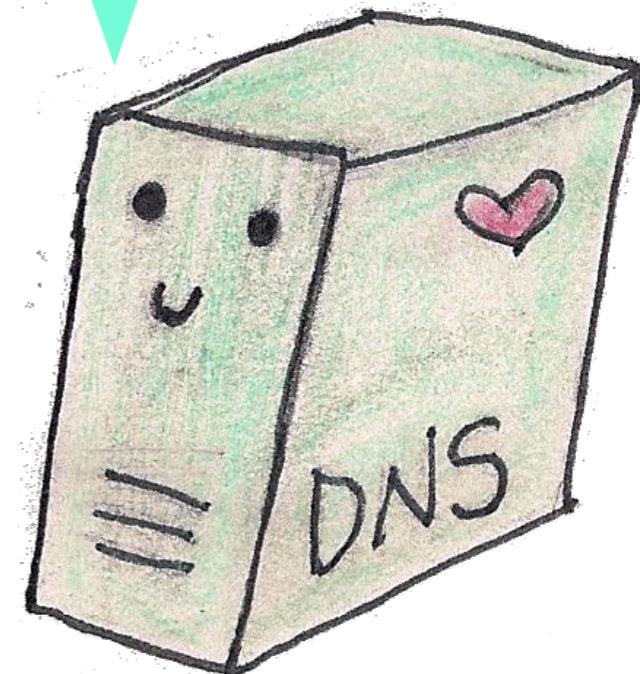
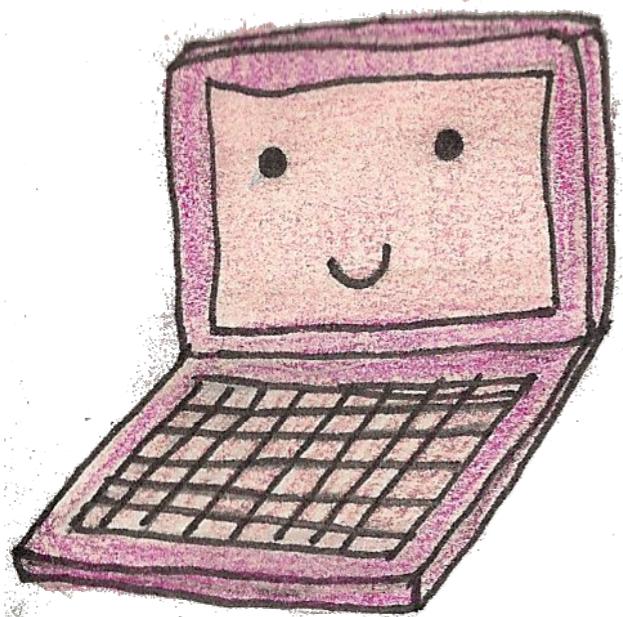
IP Address Lookup

Do you have
a www.google.com?



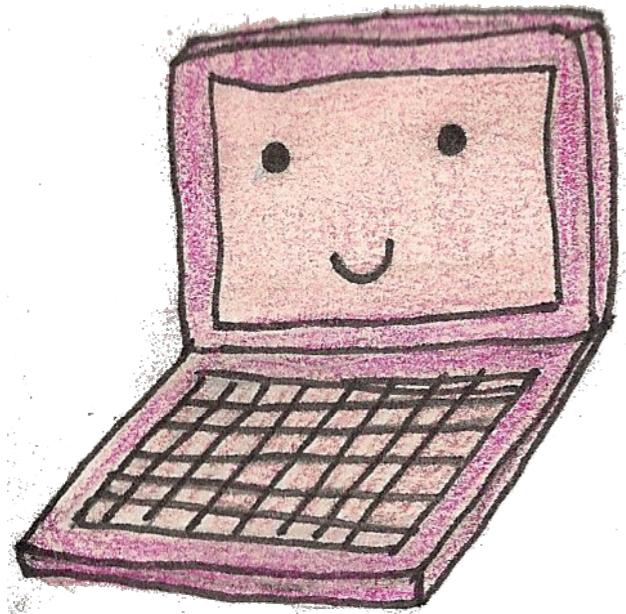
IP Address Lookup

Got a long list of these numbers
But if it's not in my "brain"
I'll ask some servers
And we'll find it by name

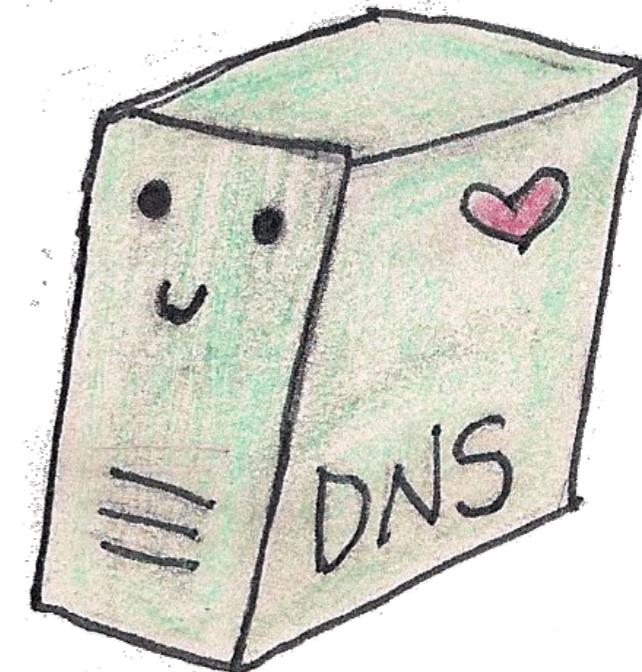


IP Address Lookup

Do you have
a www.google.com?

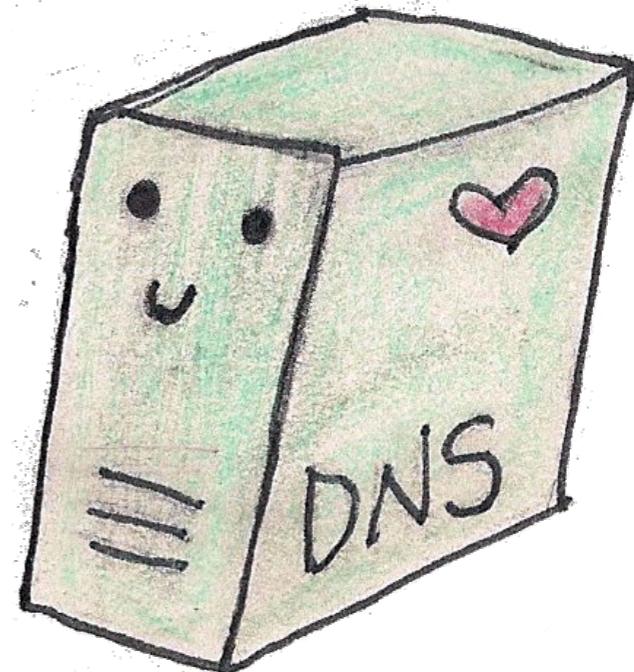
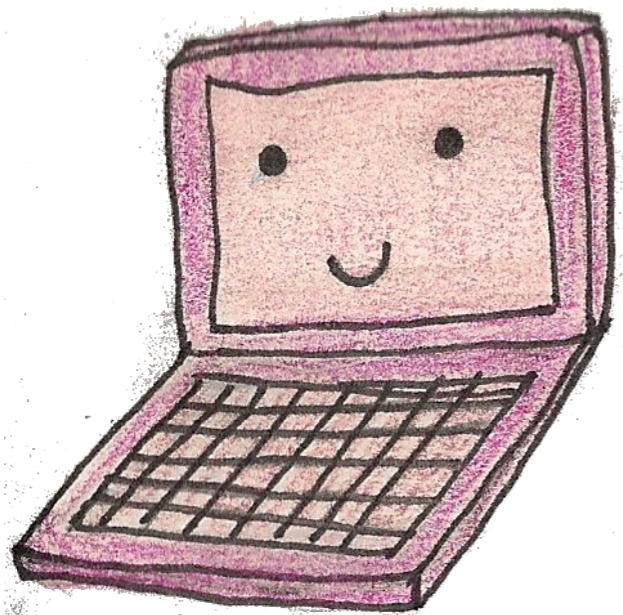


Hold on, lemme
phone a friend...



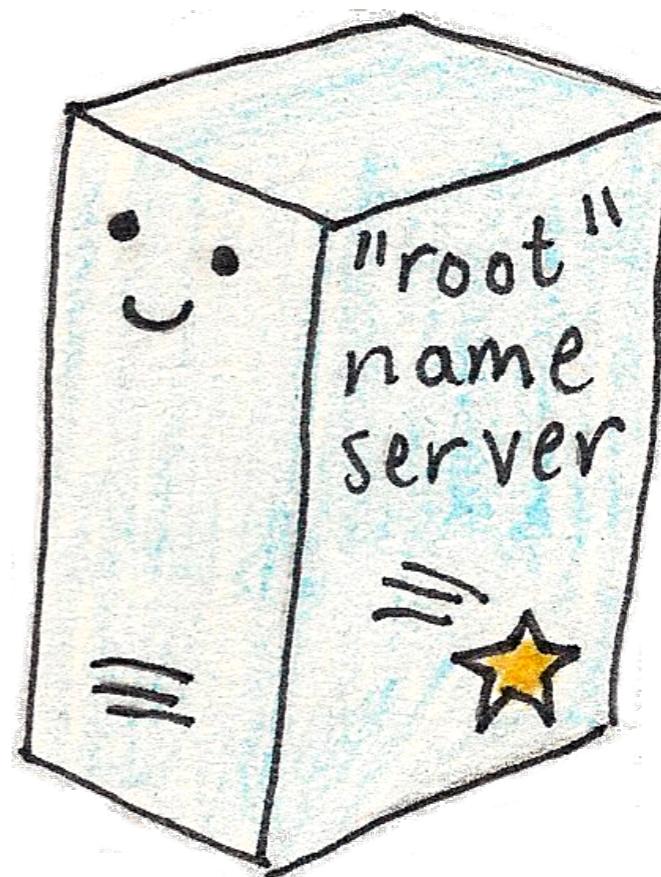
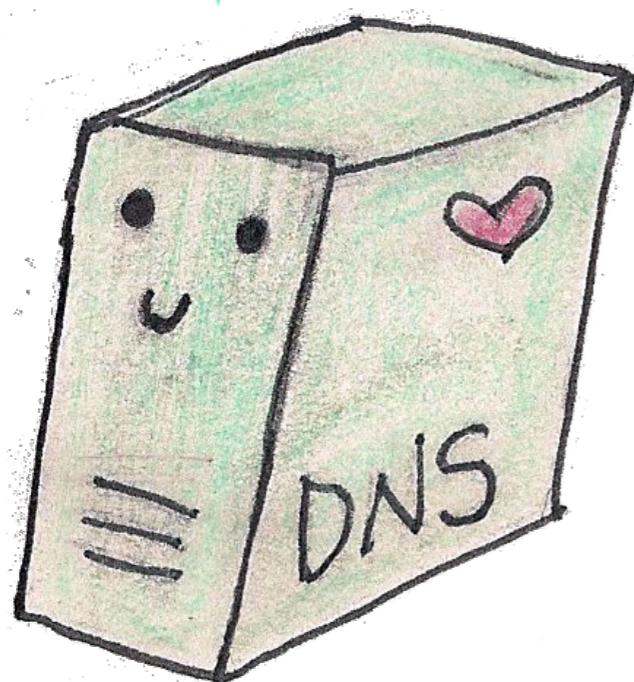
IP Address Lookup

You go talk to your friends,
talk to more friends,
talk to me



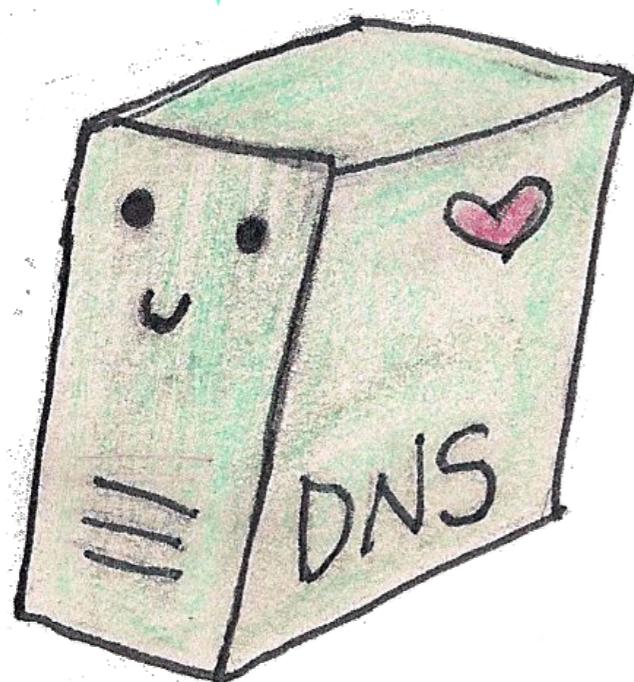
IP Address Lookup

Do you know where
www.google.com is?

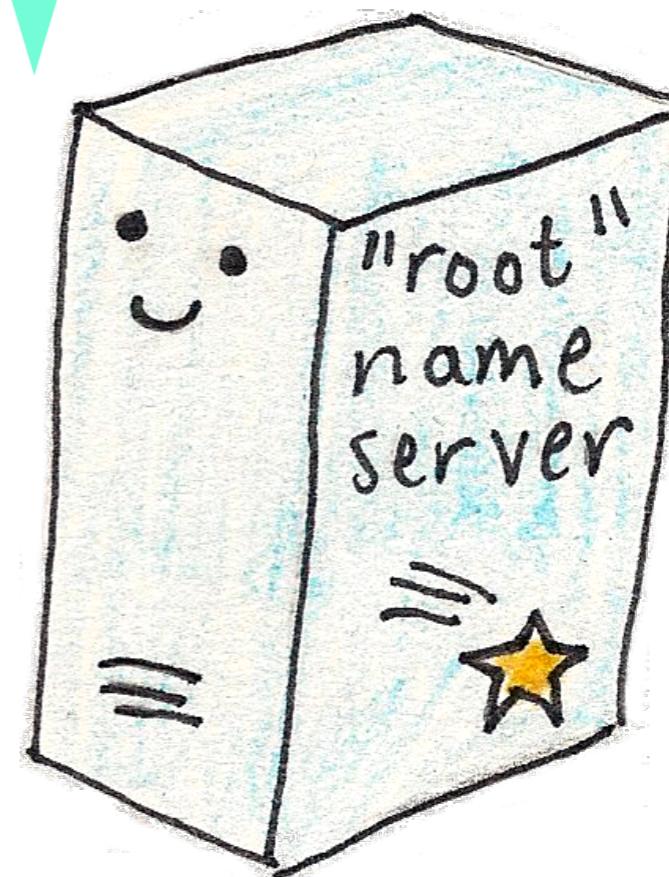


IP Address Lookup

Do you know where
www.google.com is?

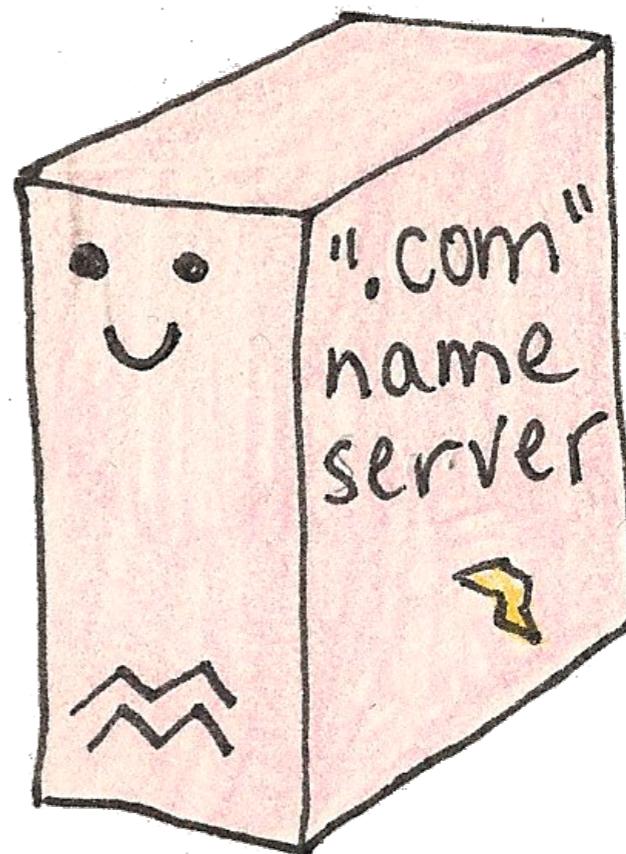
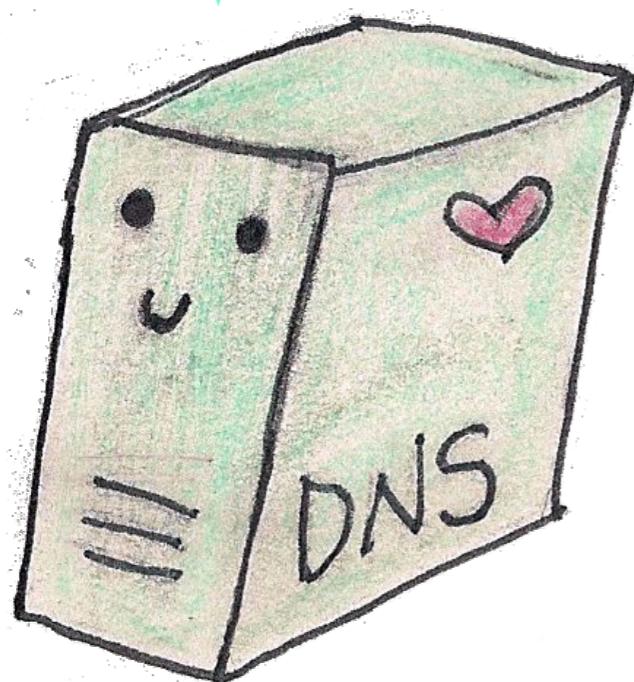


No, but maybe ask
.com?



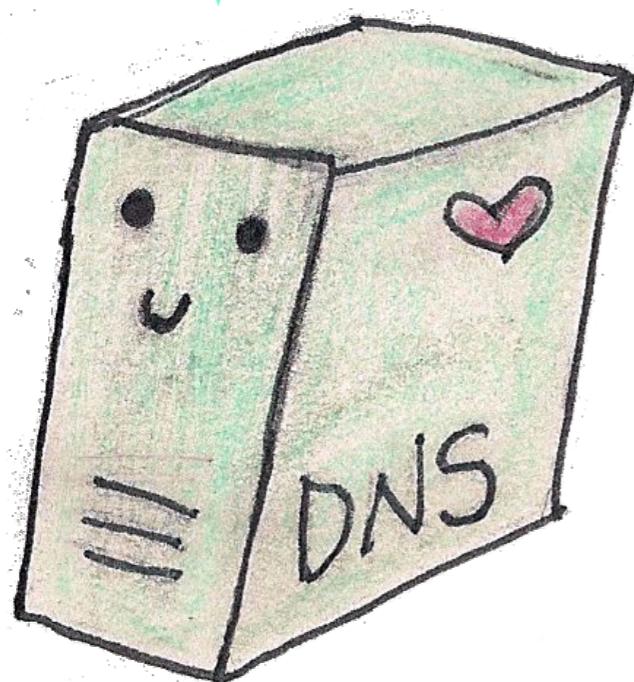
IP Address Lookup

Do you know where
www.google.com is?

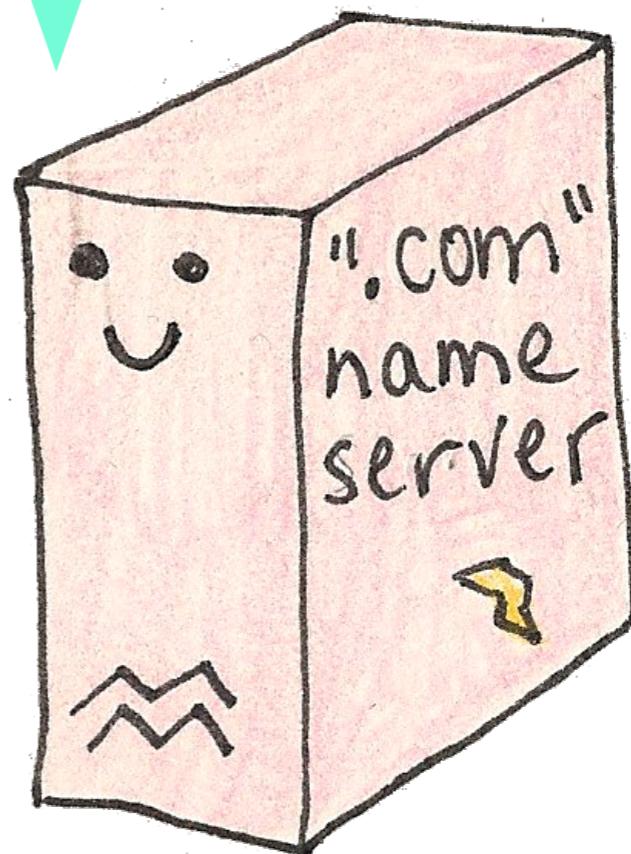


IP Address Lookup

Do you know where
www.google.com is?

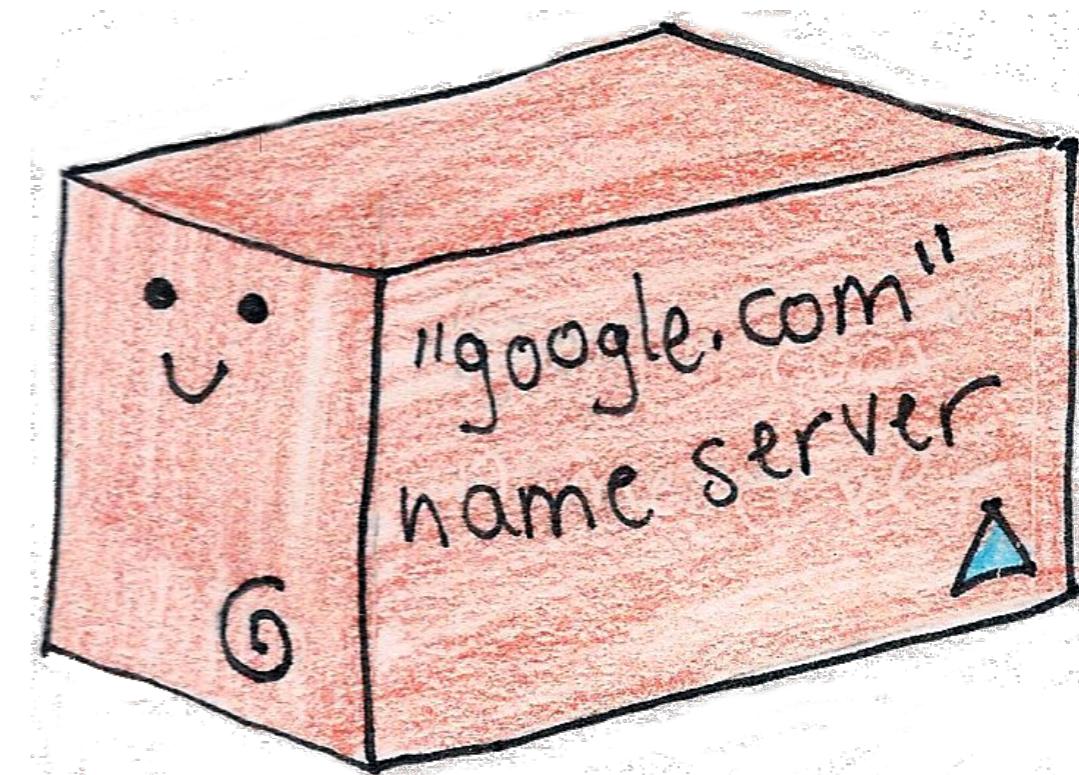
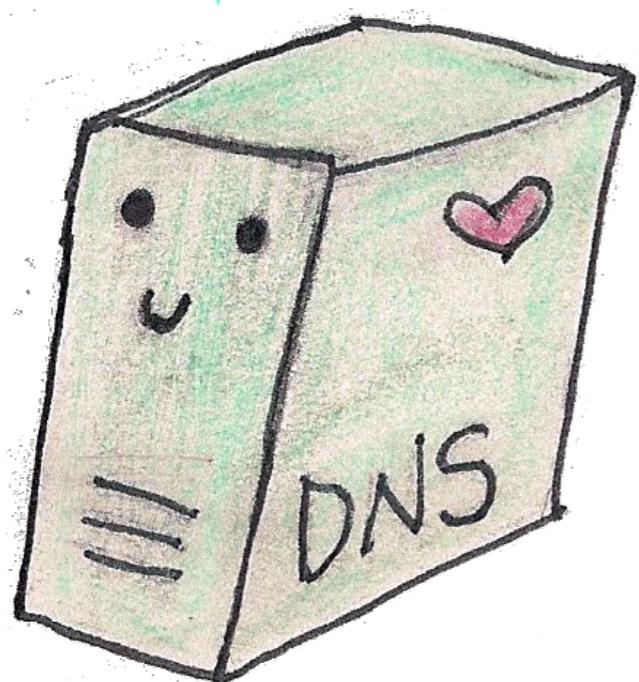


No, but maybe ask
“google.com”?



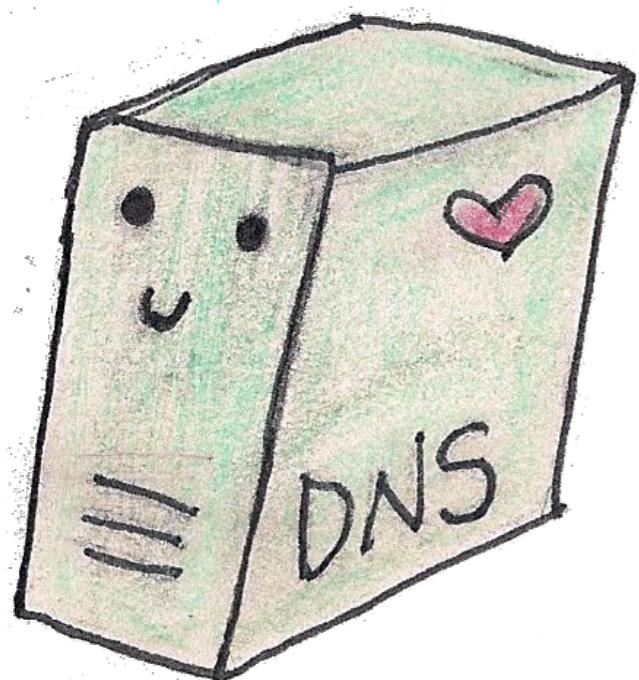
IP Address Lookup

Do you know where
www.google.com is?

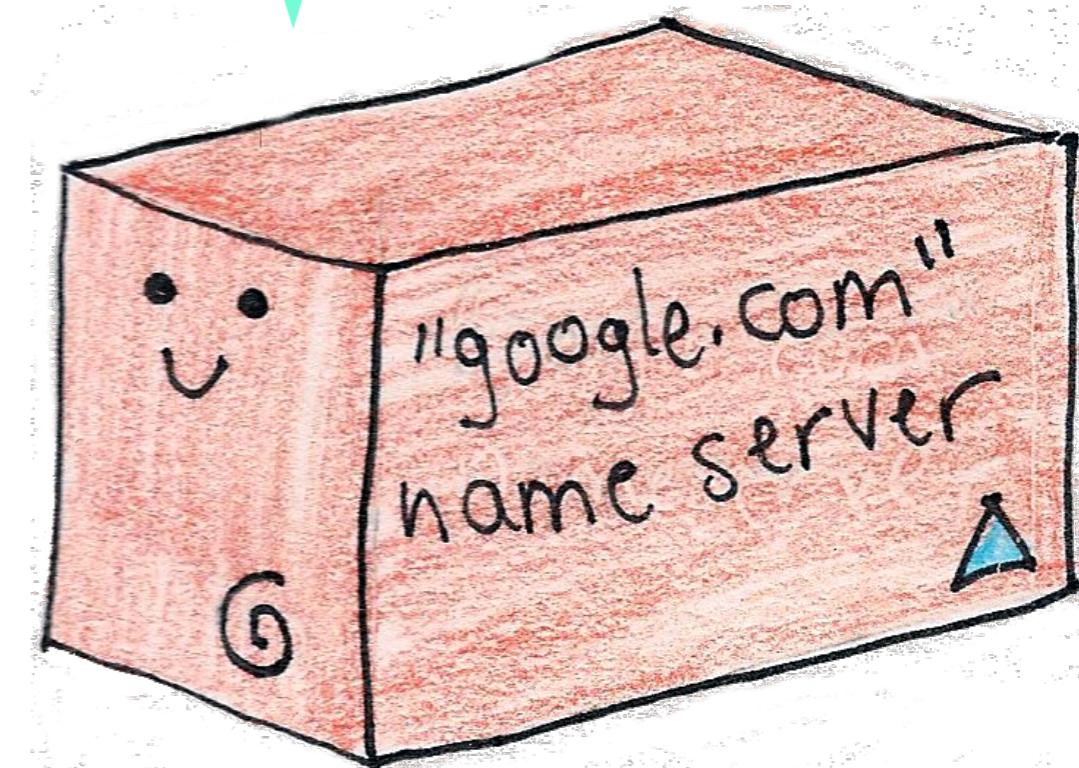


IP Address Lookup

Do you know where
www.google.com is?

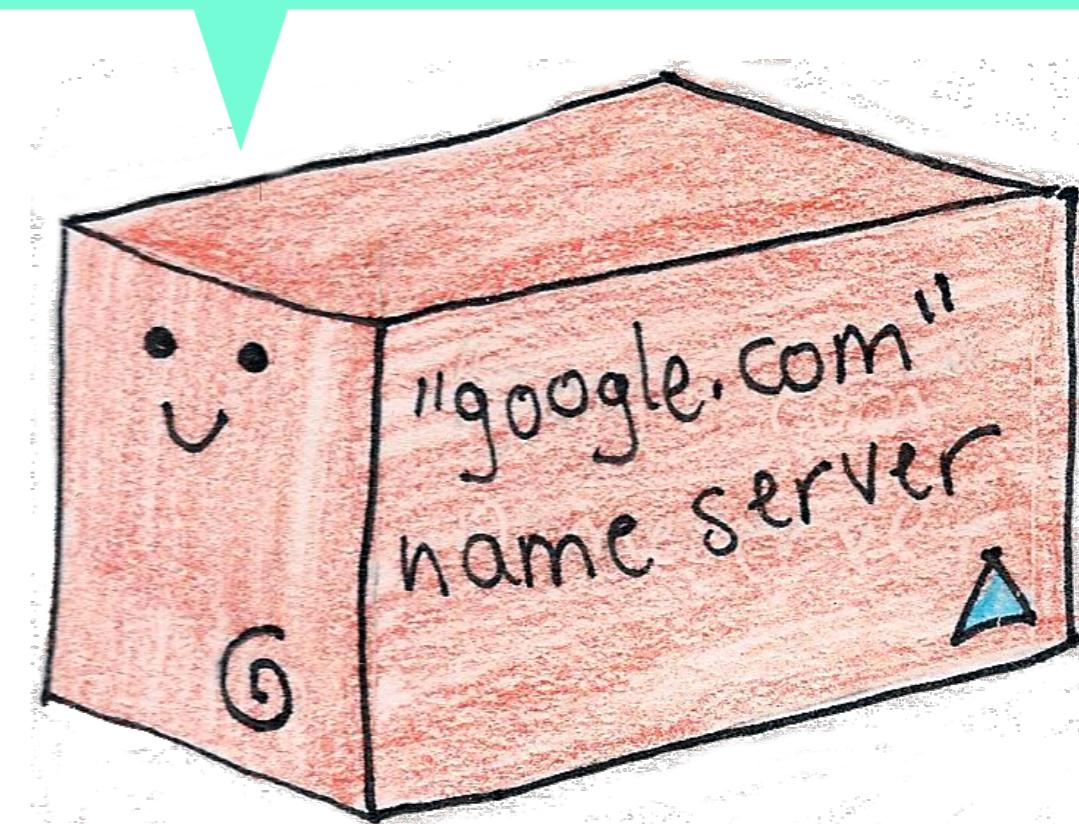
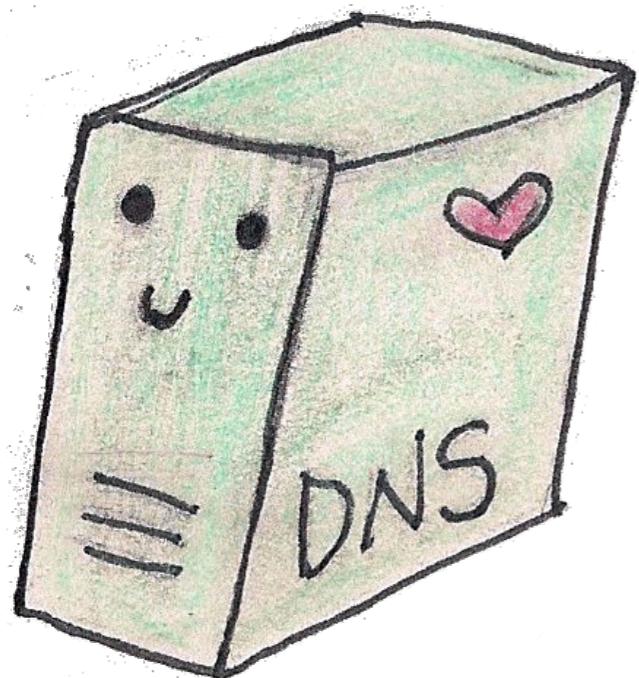


Yep!
173.194.46.84!



IP Address Lookup

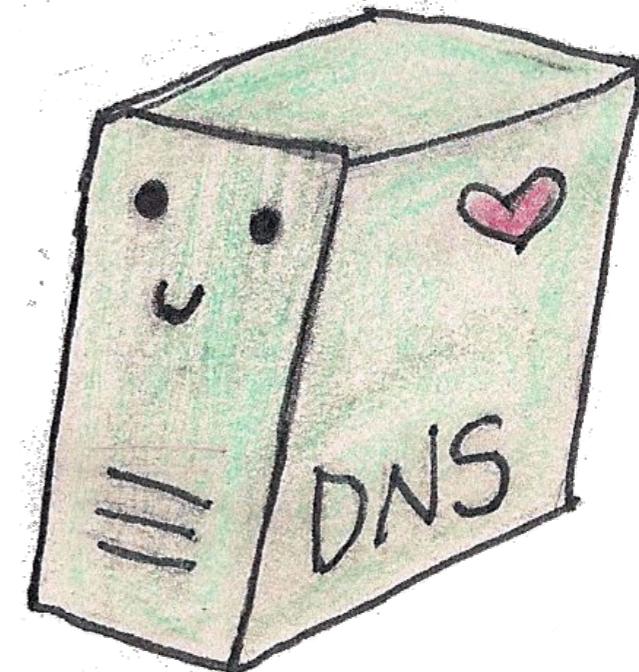
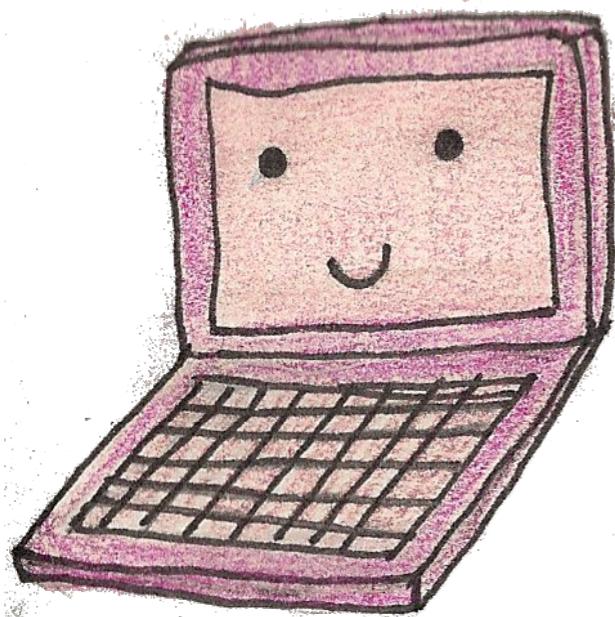
Say you'll remember me
Or at least this IP address
So we don't have to relive this mess



IP Address Lookup

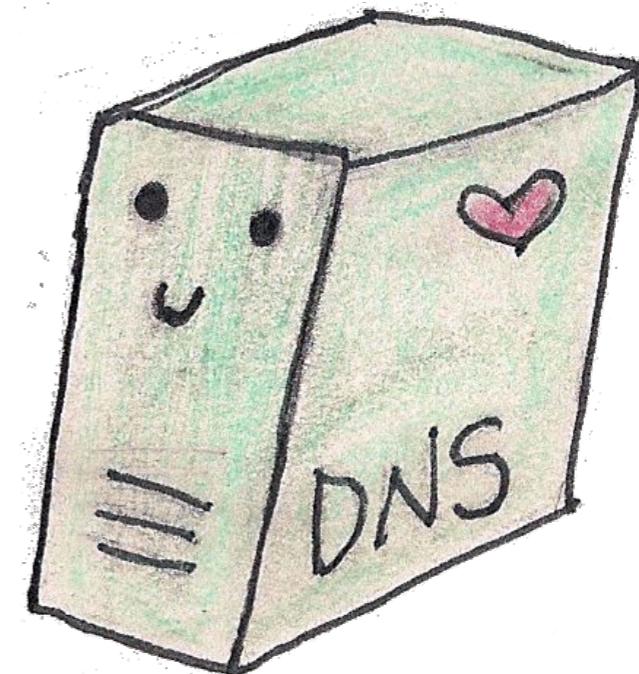
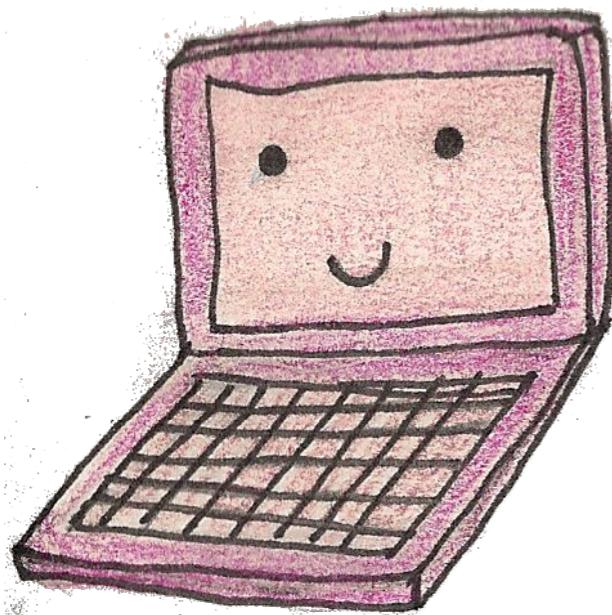
Yep!

173.194.46.84 !



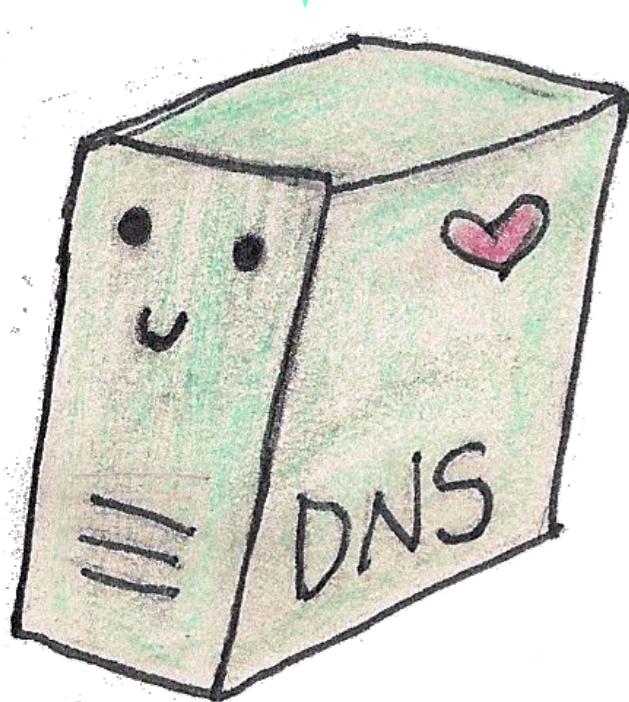
IP Address Lookup

I will remember youuuuu
♪ ♪ ♪



IP Address Lookup

I dig it.



```
zeigenspace:~ jenna$ dig www.google.com
```

```
; <>> DiG 9.8.3-P1 <>> www.google.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 45898
;; flags: qr rd ra; QUERY: 1, ANSWER: 5, AUTHORITY: 0, ADDITIONAL: 0
```

```
;; QUESTION SECTION:
```

```
;www.google.com. IN A
```

```
;; ANSWER SECTION:
```

| | | | | |
|-----------------|-----|----|---|---------------|
| www.google.com. | 251 | IN | A | 74.125.226.48 |
| www.google.com. | 251 | IN | A | 74.125.226.50 |
| www.google.com. | 251 | IN | A | 74.125.226.51 |
| www.google.com. | 251 | IN | A | 74.125.226.49 |
| www.google.com. | 251 | IN | A | 74.125.226.52 |

```
;; Query time: 16 msec
```

```
;; SERVER: 209.18.47.61#53(209.18.47.61)
```

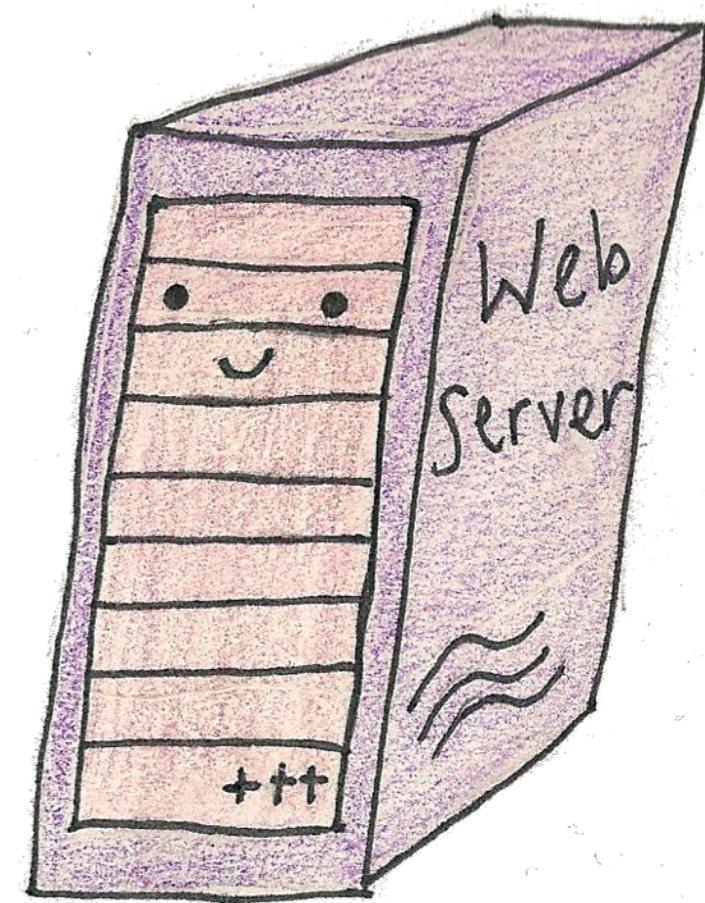
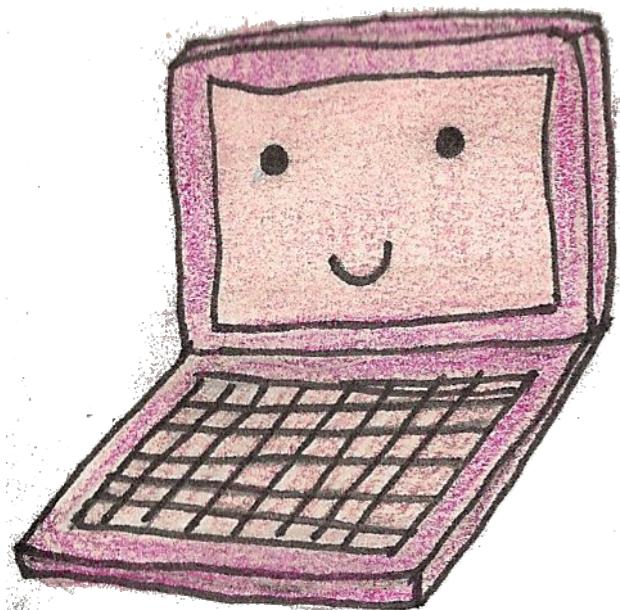
```
;; WHEN: Sun Nov 1 17:10:36 2015
```

```
;; MSG SIZE rcvd: 112
```

```
zeigenspace:~ jenna$ _
```

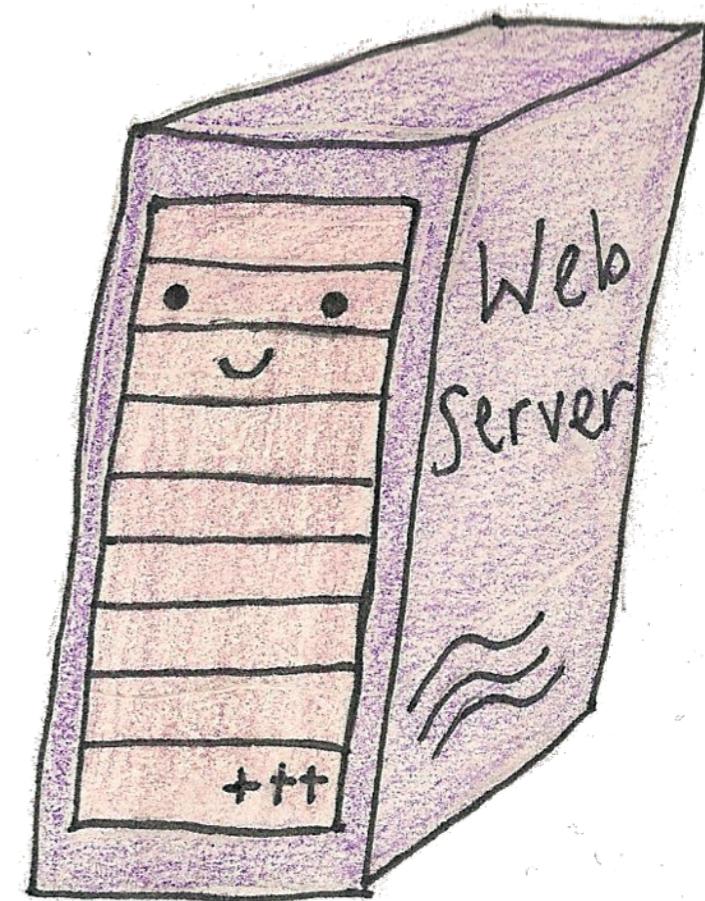
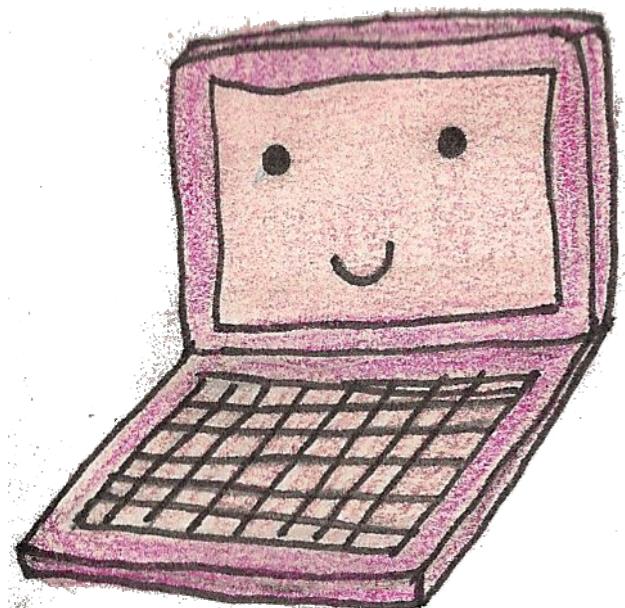
Opening a socket

Socket to me.



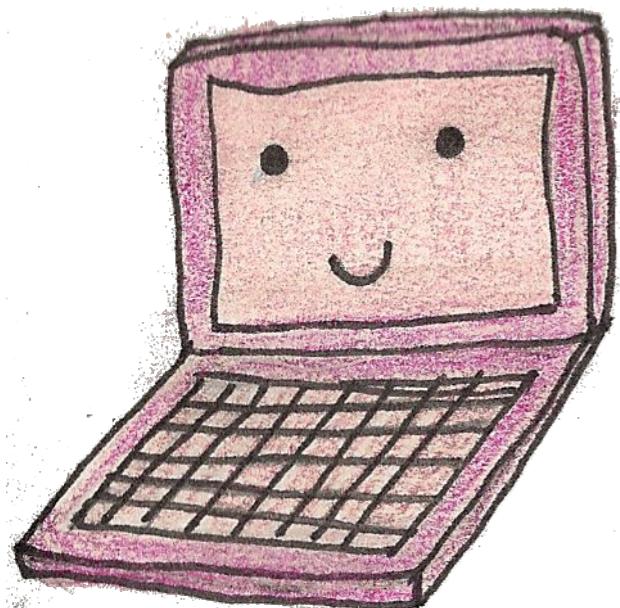
Opening a socket

Hey! Will you
talk to me?

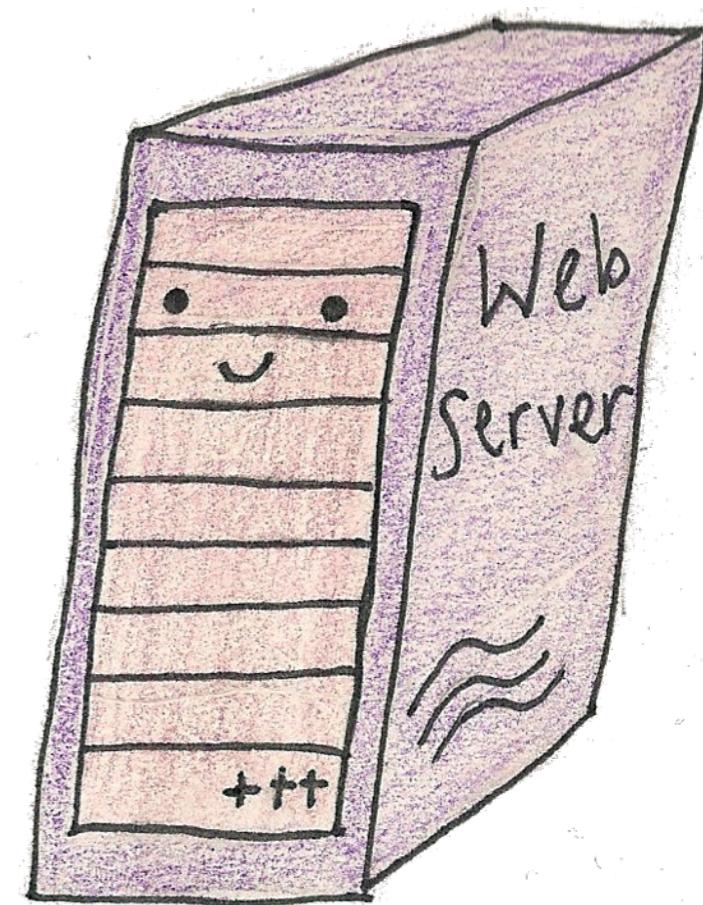


Opening a socket

Hey! Will you
talk to me?

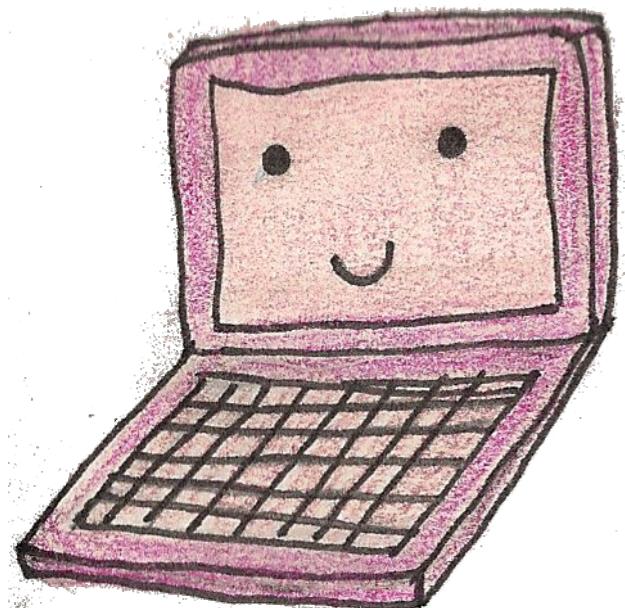


Sure!



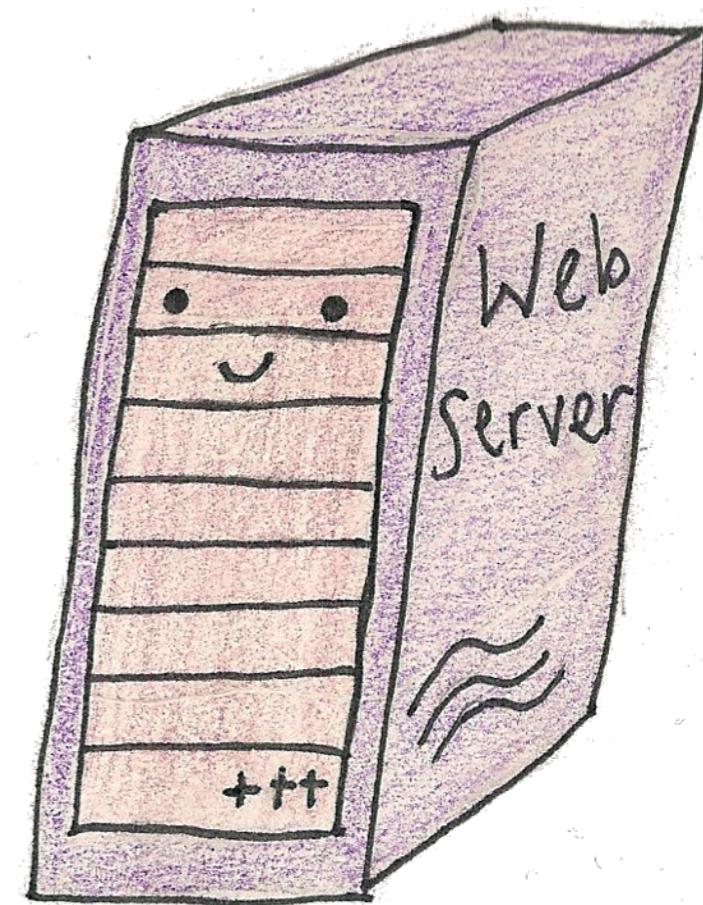
Opening a socket

Hey! Will you
talk to me?

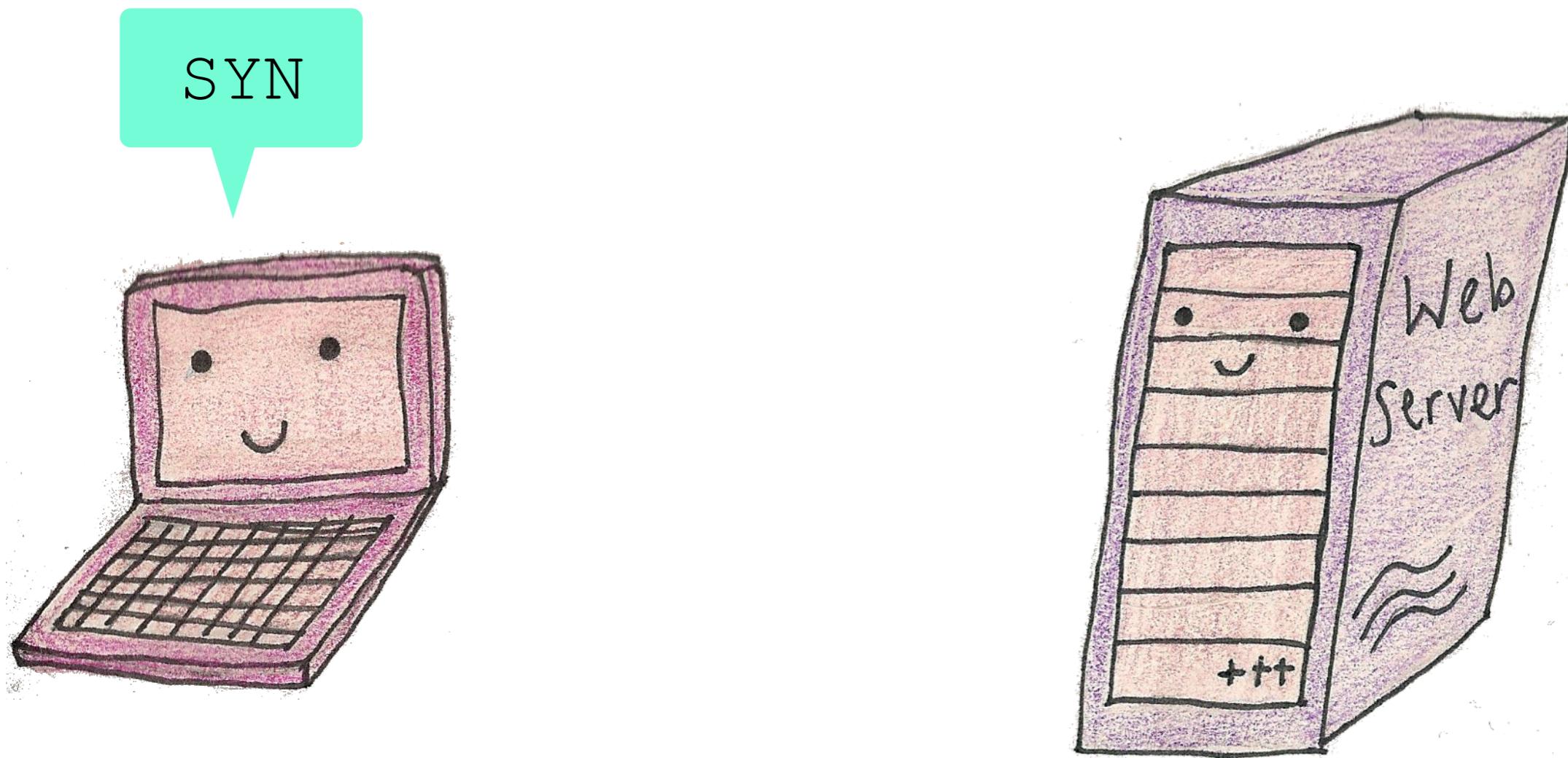


Sweet.

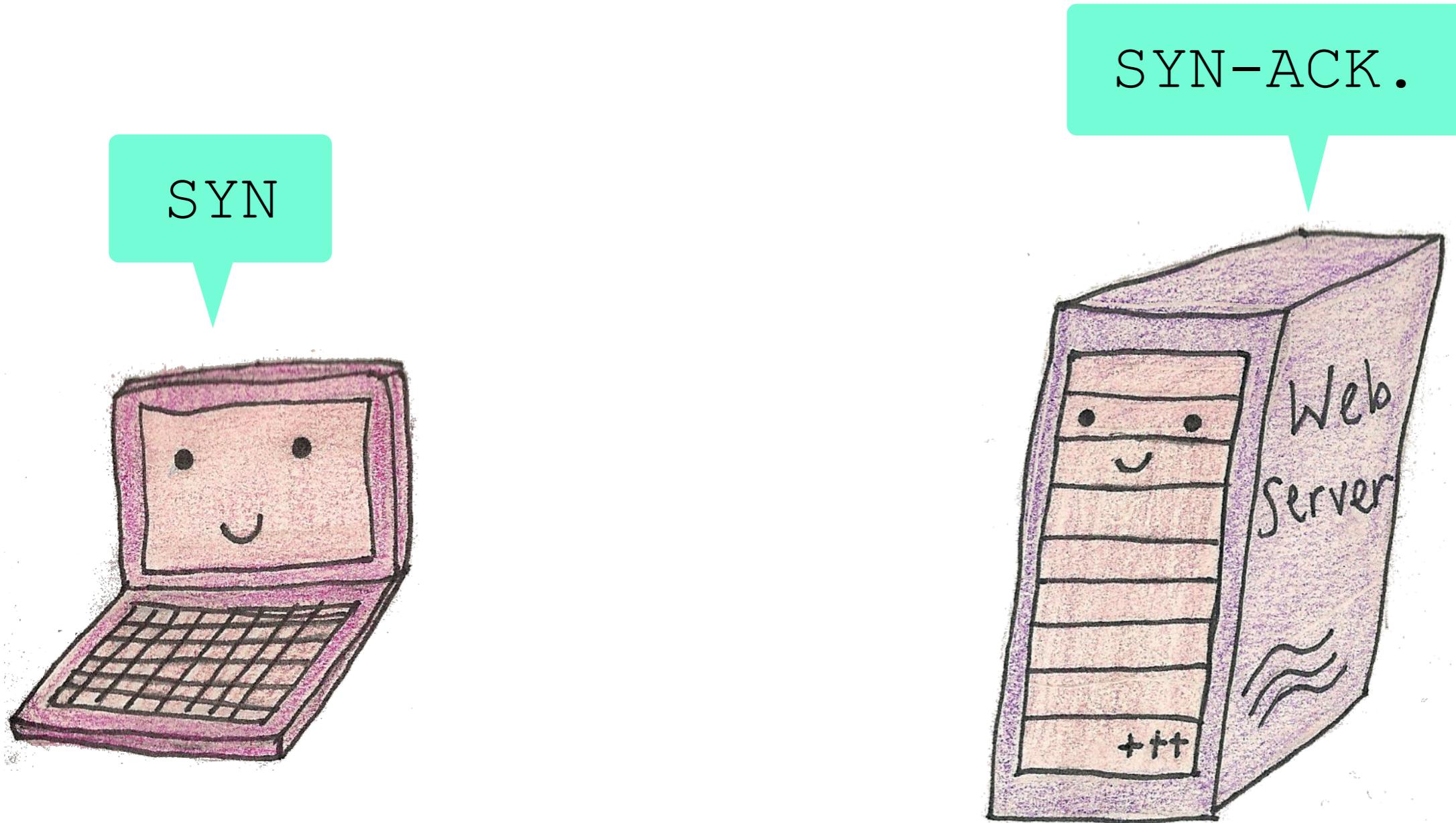
Sure!



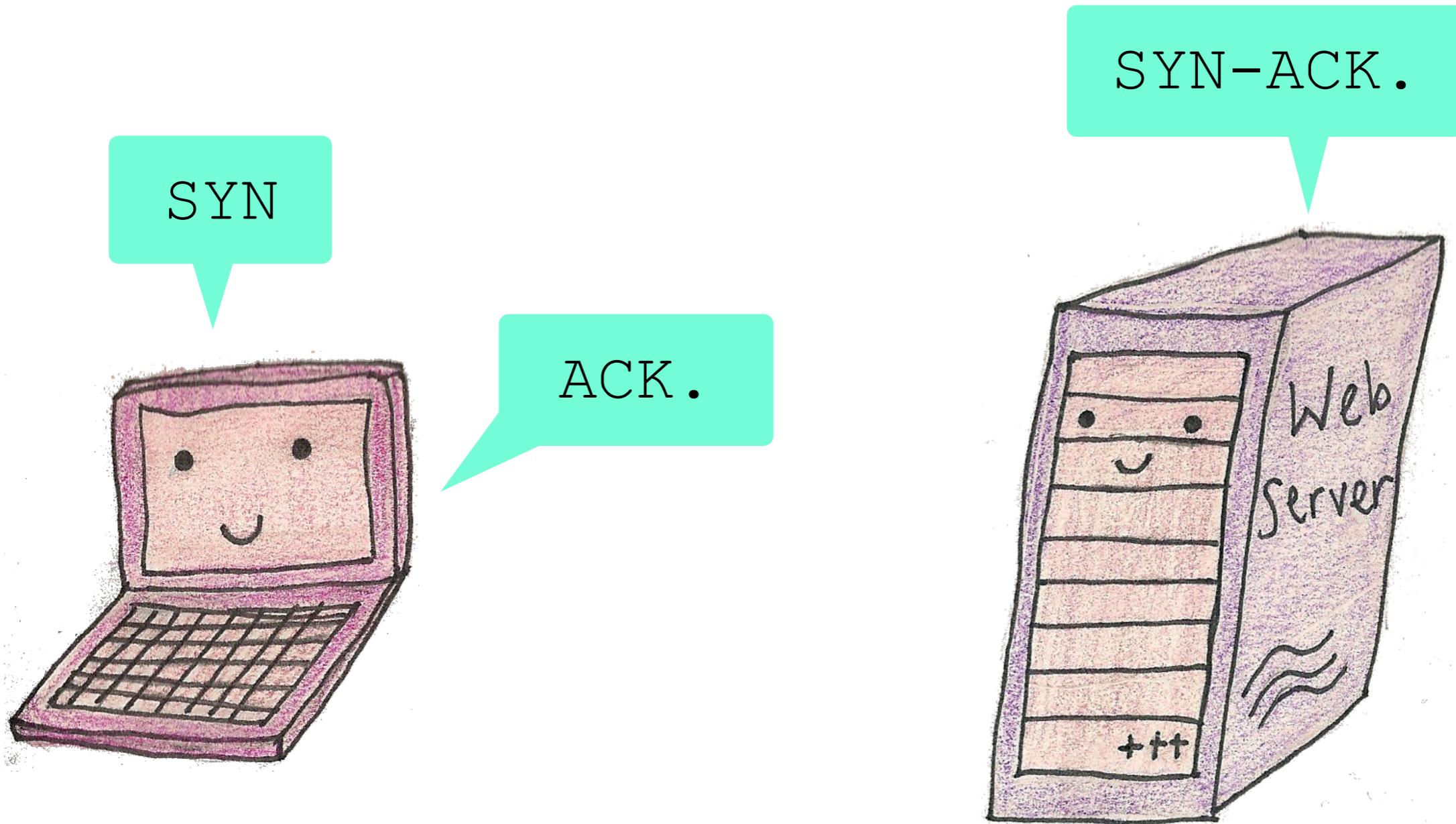
Opening a socket



Opening a socket



Opening a socket



Opening a socket

```
zeigenspace:~ jenna$ sudo tcpdump -c3 host www.google.com
```

```
tcpdump: data link type PKTAP
```

```
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode  
listening on ptkap, link-type PKTAP (Packet Tap), capture size 65535 bytes
```

```
01:05:42.209216 IP 192.168.0.23.52293 > lga25s40-in-f196.1e100.net.https: UDP, length 190
```

```
01:05:42.249138 IP lga25s40-in-f196.1e100.net.https > 192.168.0.23.52293: UDP, length 35
```

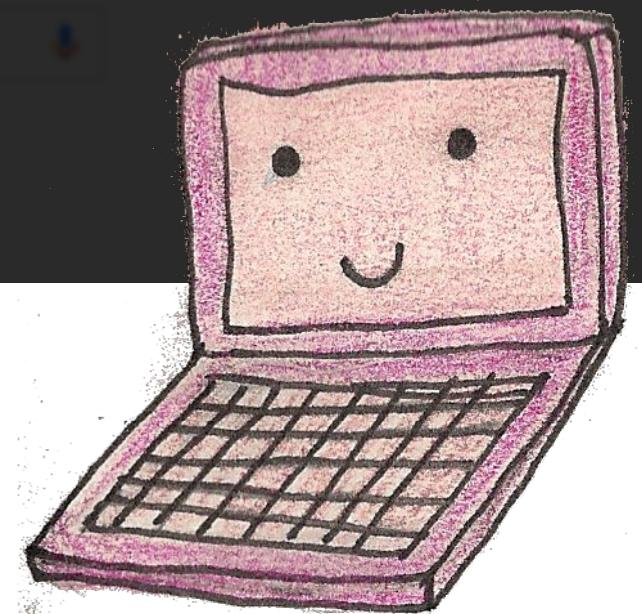
```
01:05:42.259526 IP lga25s40-in-f196.1e100.net.https > 192.168.0.23.52293: UDP, length 221
```

```
3 packets captured
```

```
16 packets received by filter
```

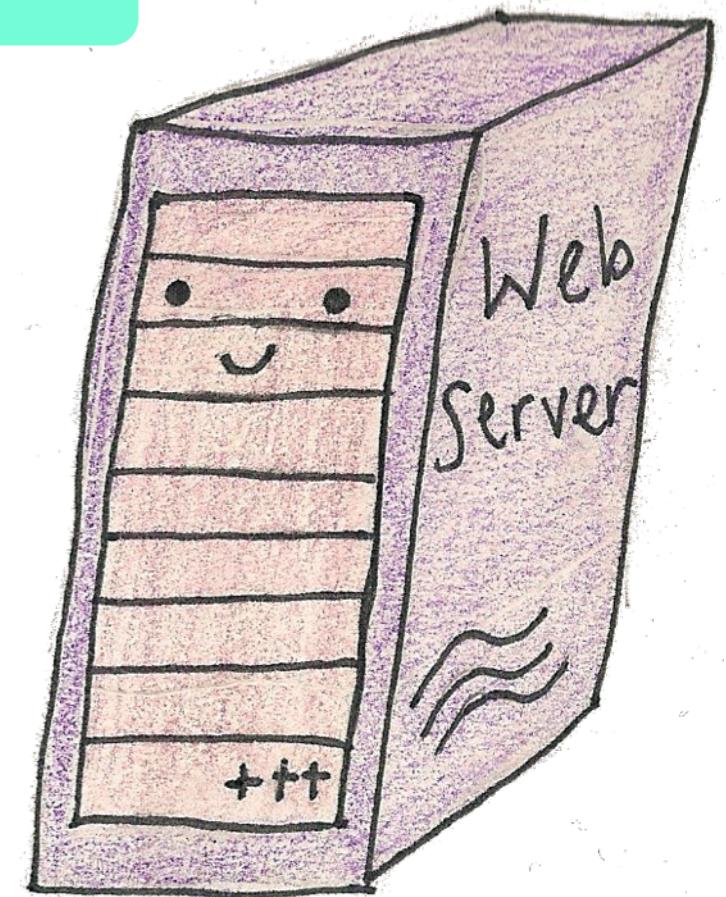
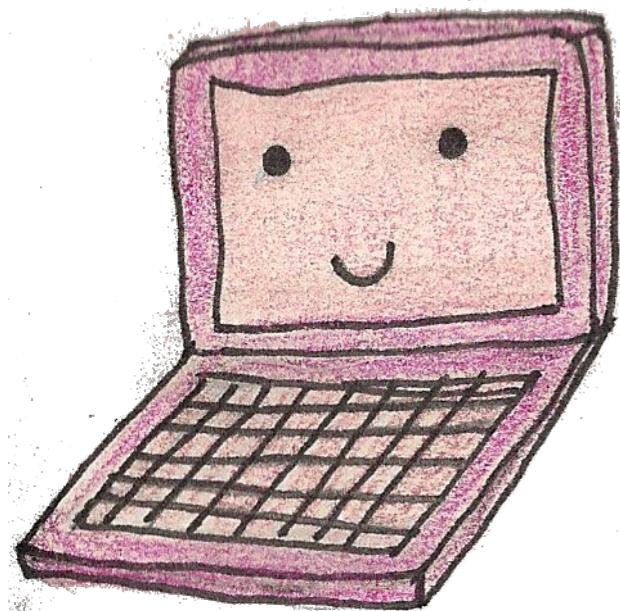
```
0 packets dropped by kernel
```

```
zeigenspace:~ jenna$ _
```



Security Stuff

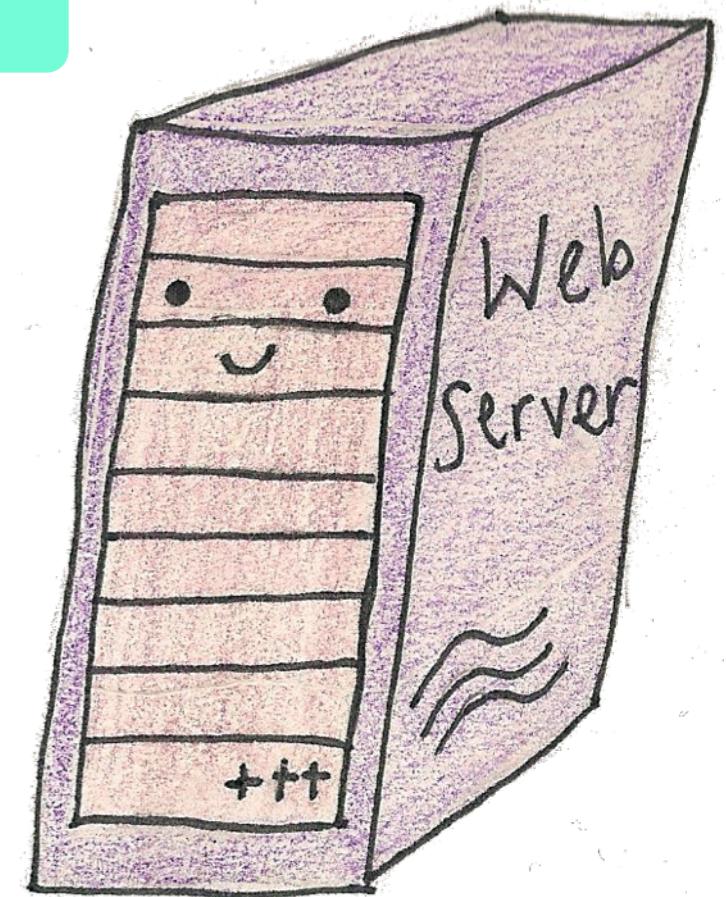
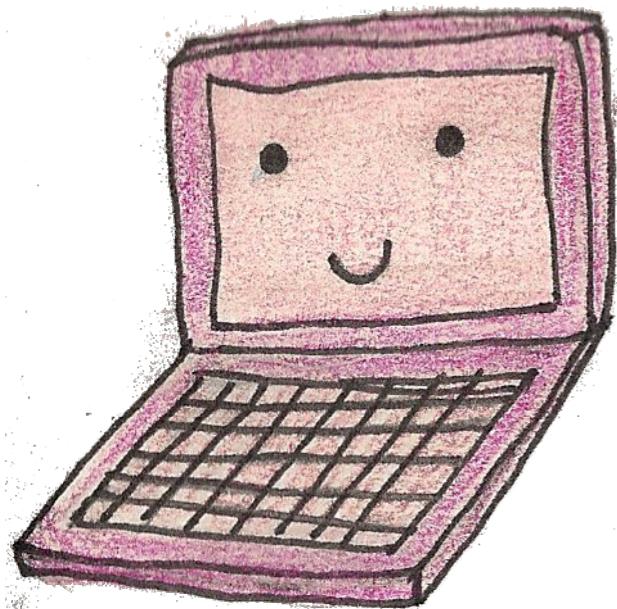
After all this goes down,
I know that we'll be safe and sound
♪ ♪ ♪



Security Stuff

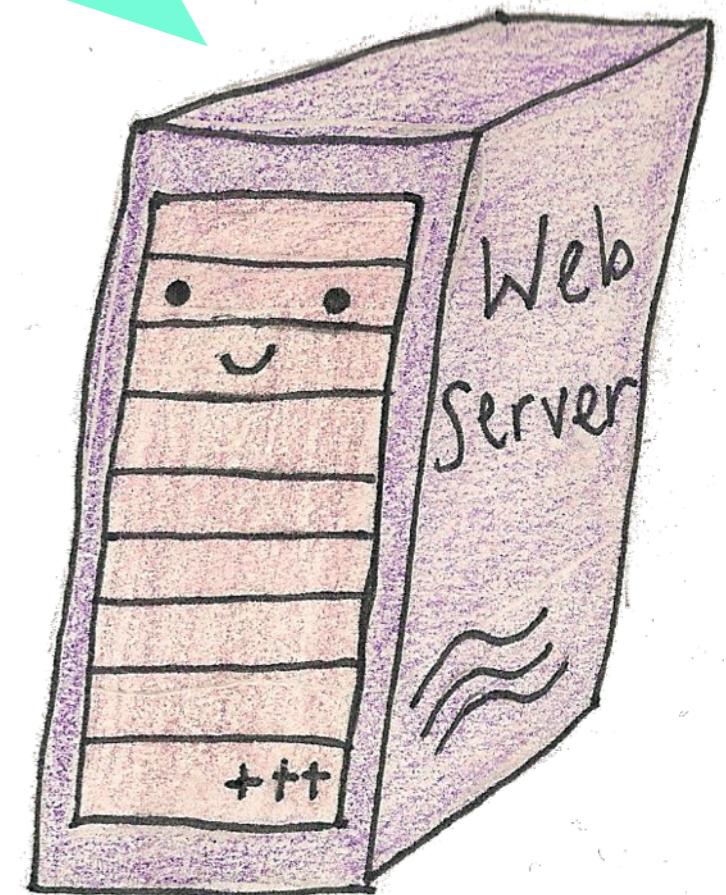
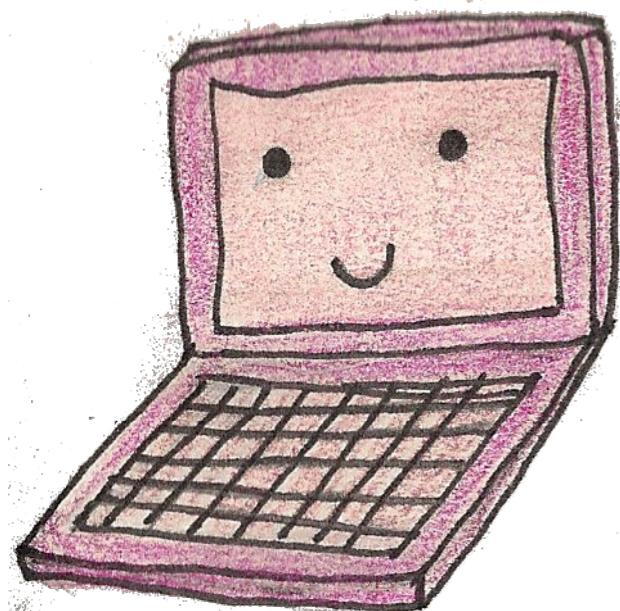
ClientHello! It's me,
I wish to make this exchange safe
And hope that you'll agree

♪ ♪ ♪

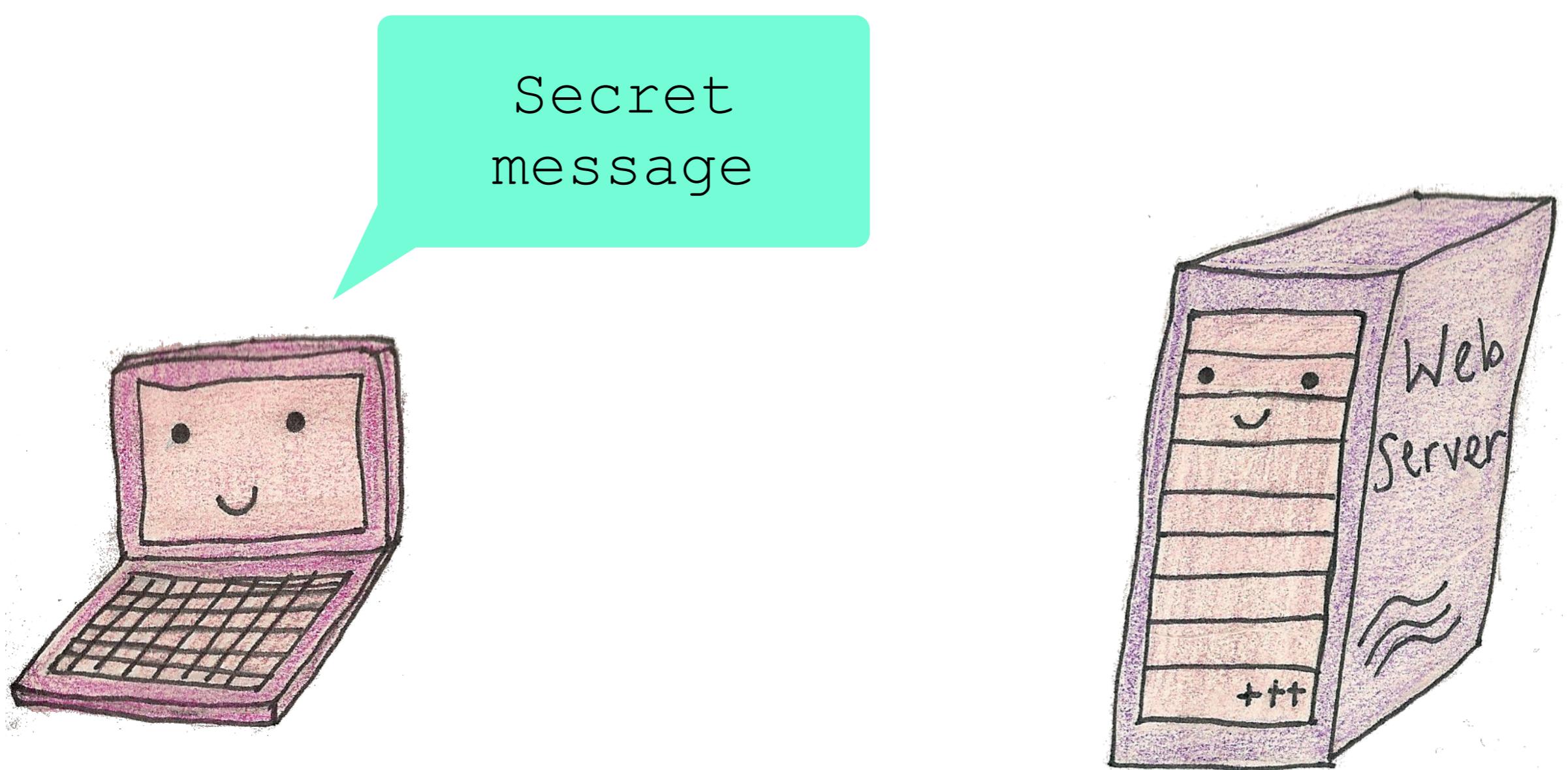


Security Stuff

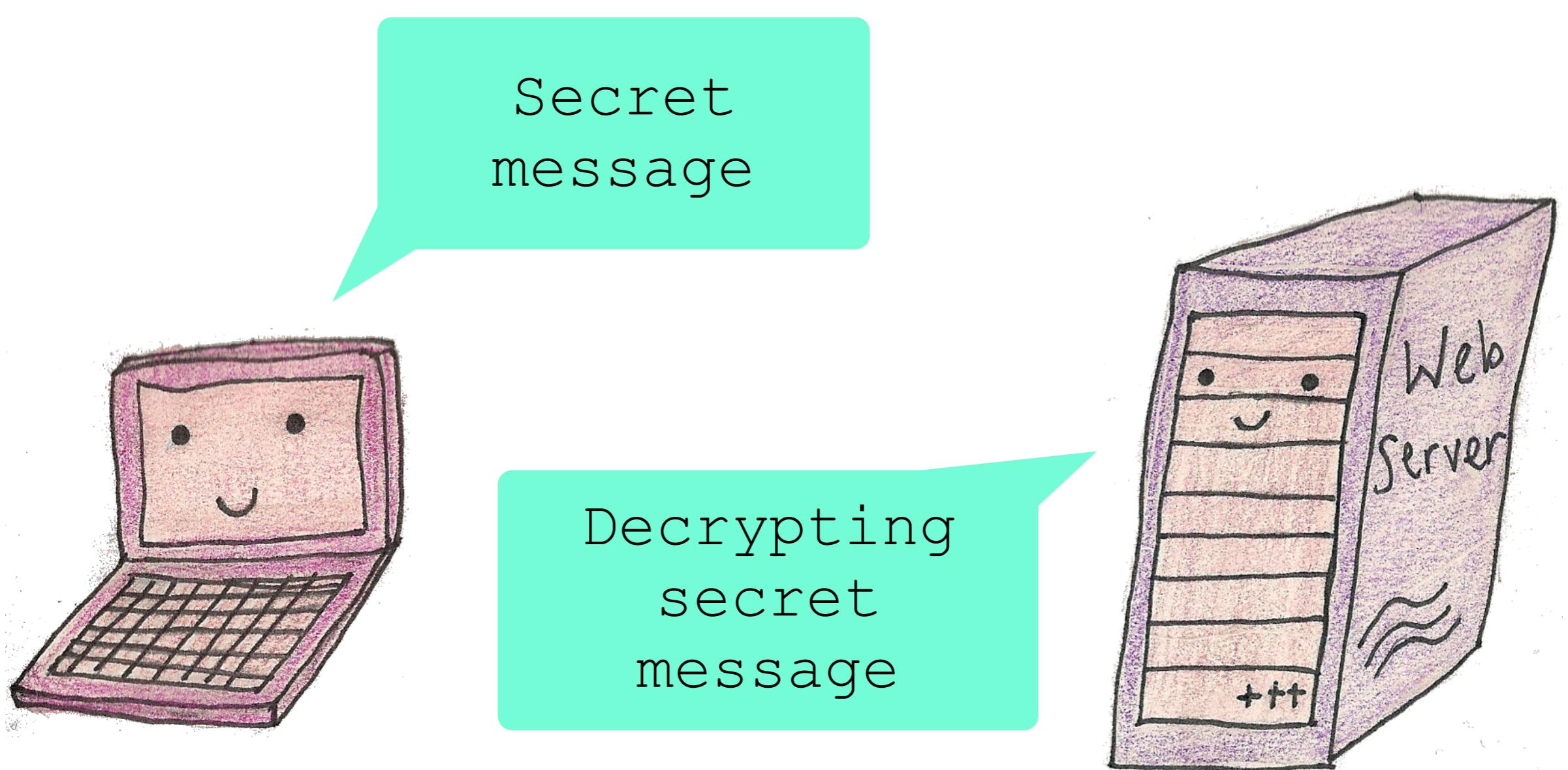
ServerHello from the other side!
Here's a certificate and public key!
Let's try!



Security Stuff

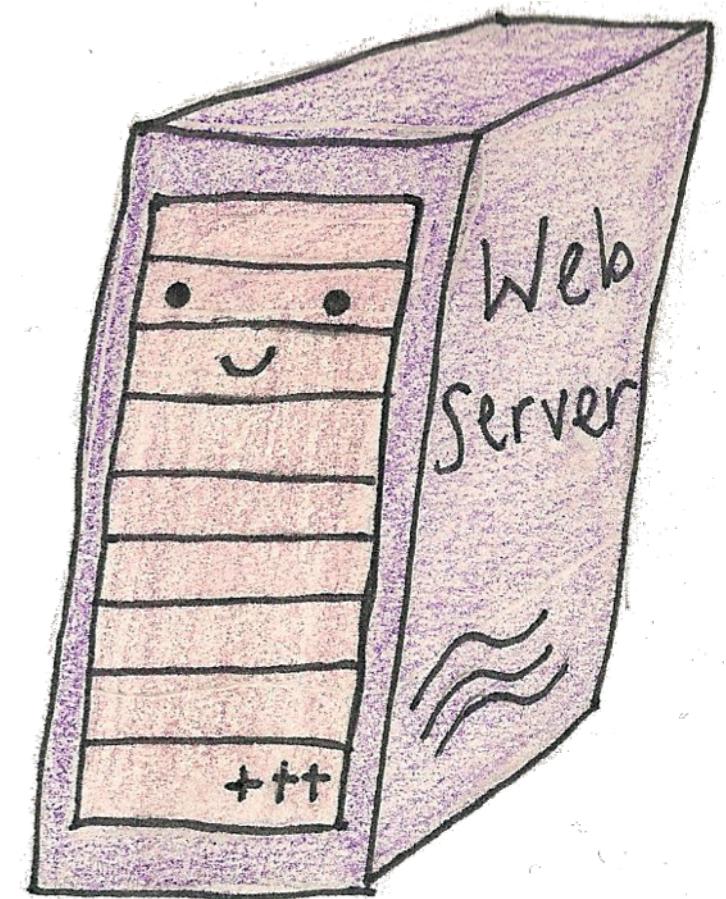
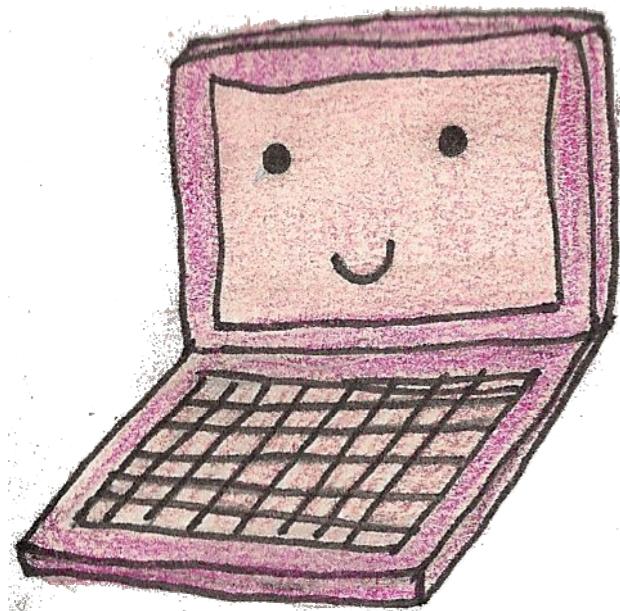


Security Stuff

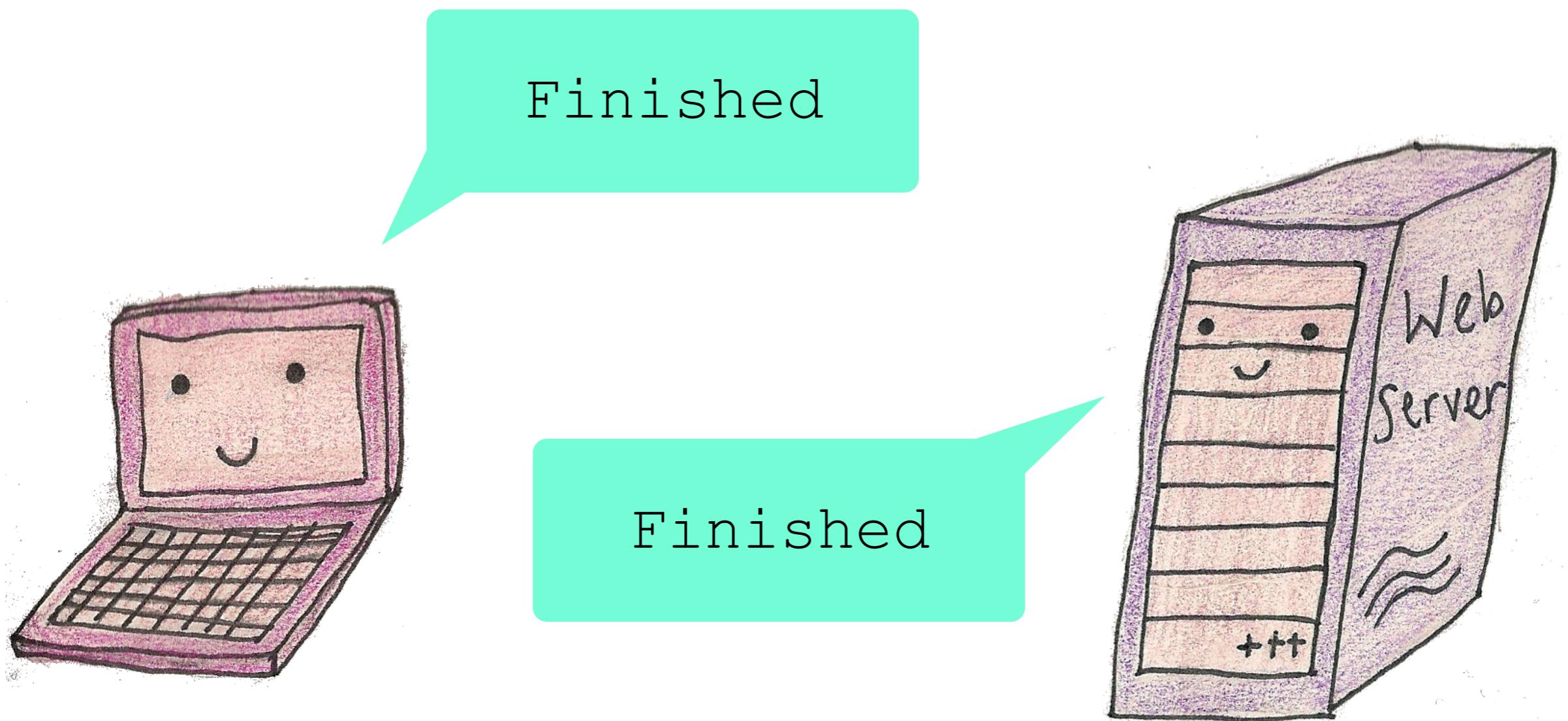


Security Stuff

Finished

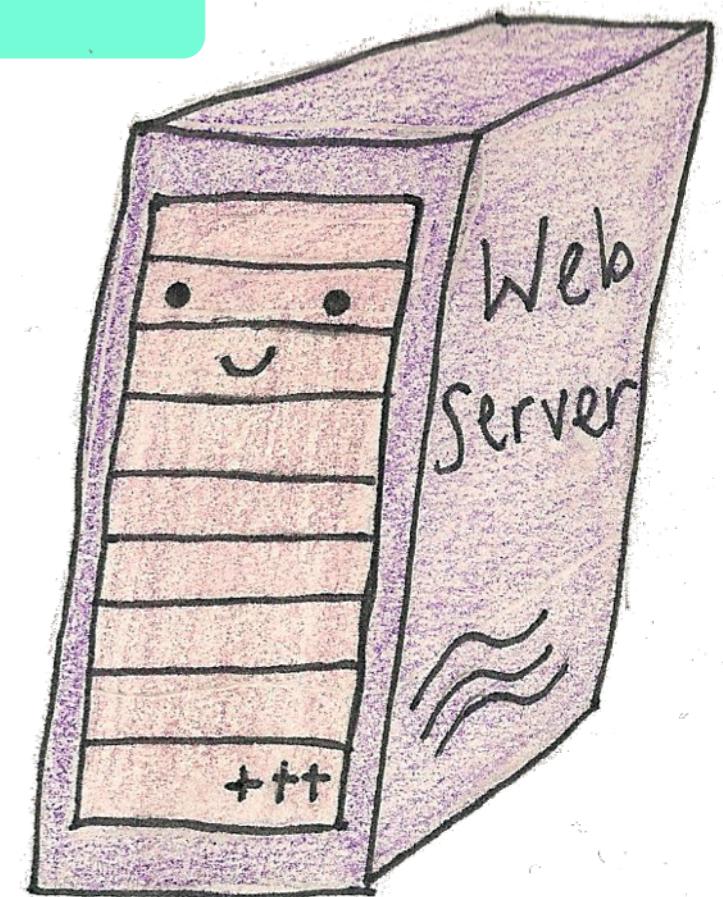
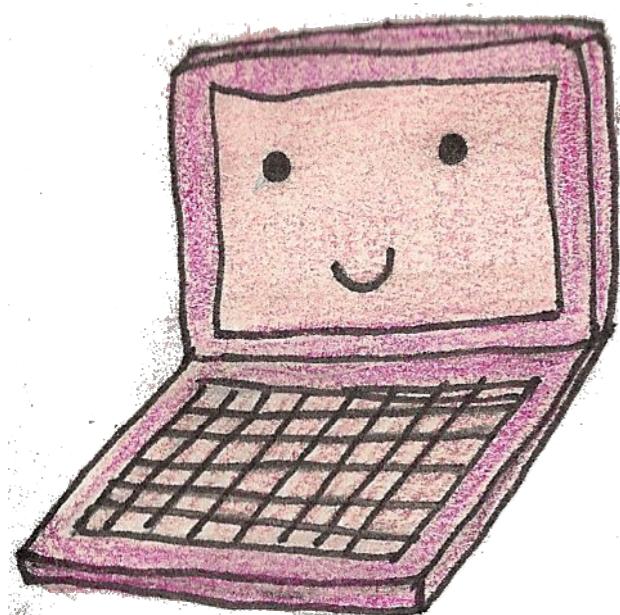


Security Stuff



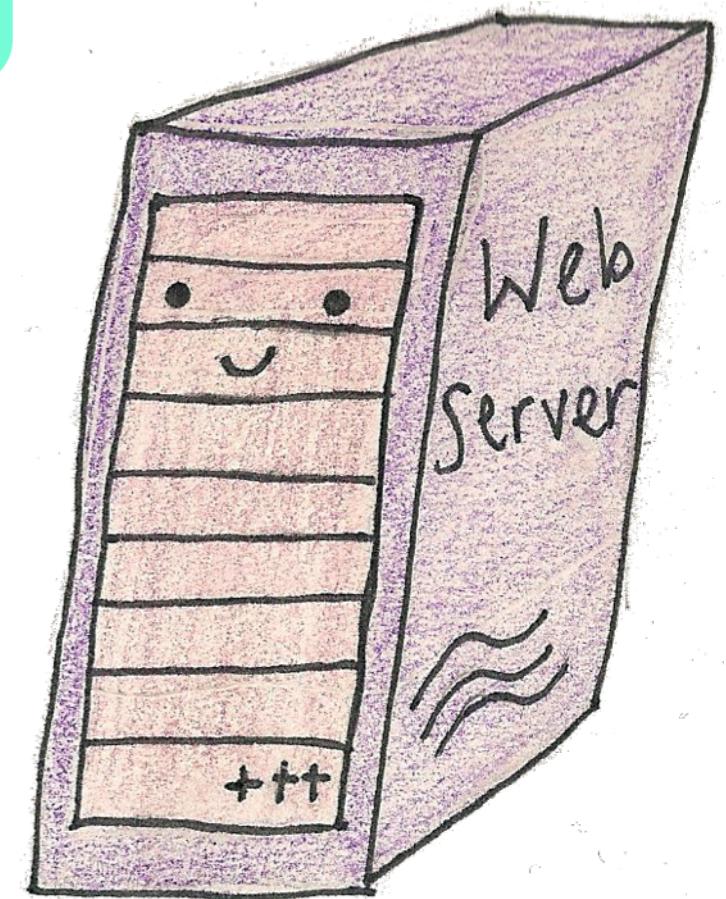
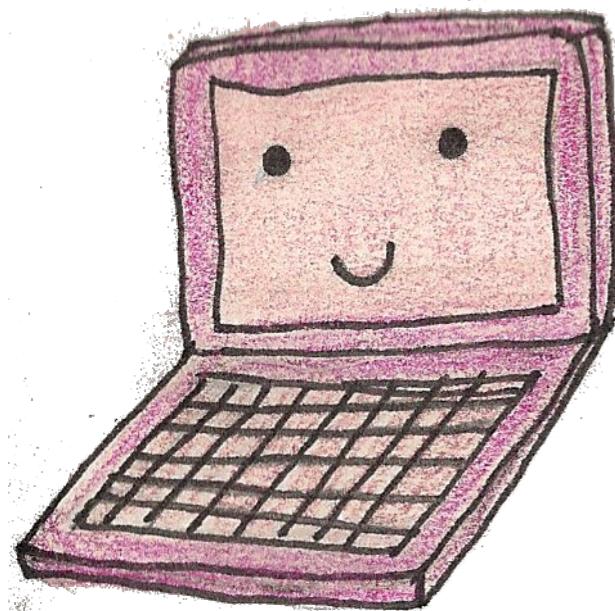
HTTP Request

You, you got what I need,
It's that page, hey, can you send?
It's that page, hey, can you send?
Maybe?



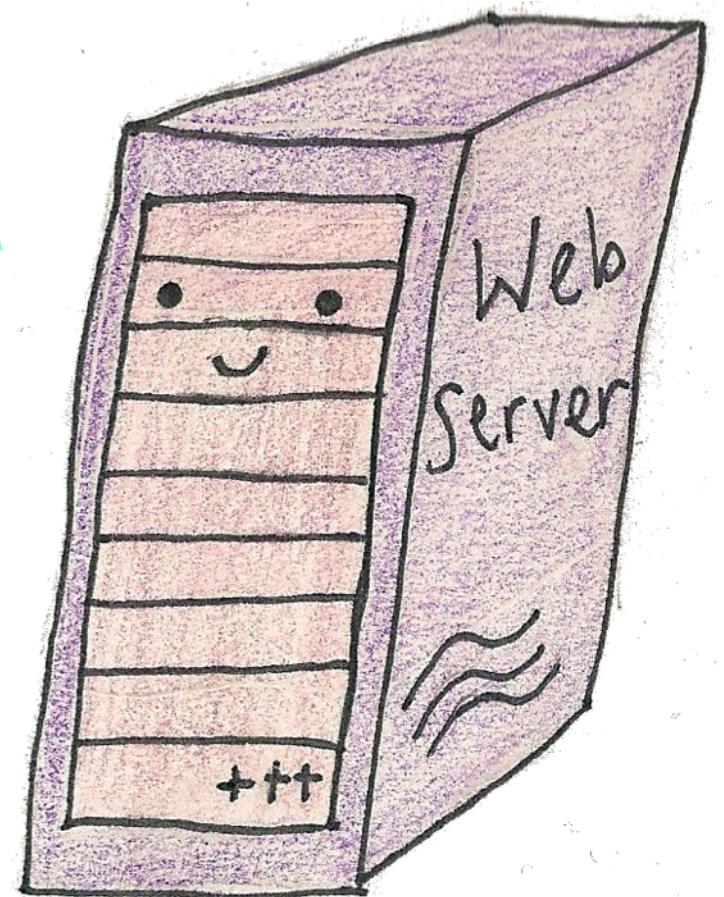
HTTP Request

```
> GET / HTTP/1.1  
> Host: google.com  
> Connection: close  
> [other headers]
```



Server Things...

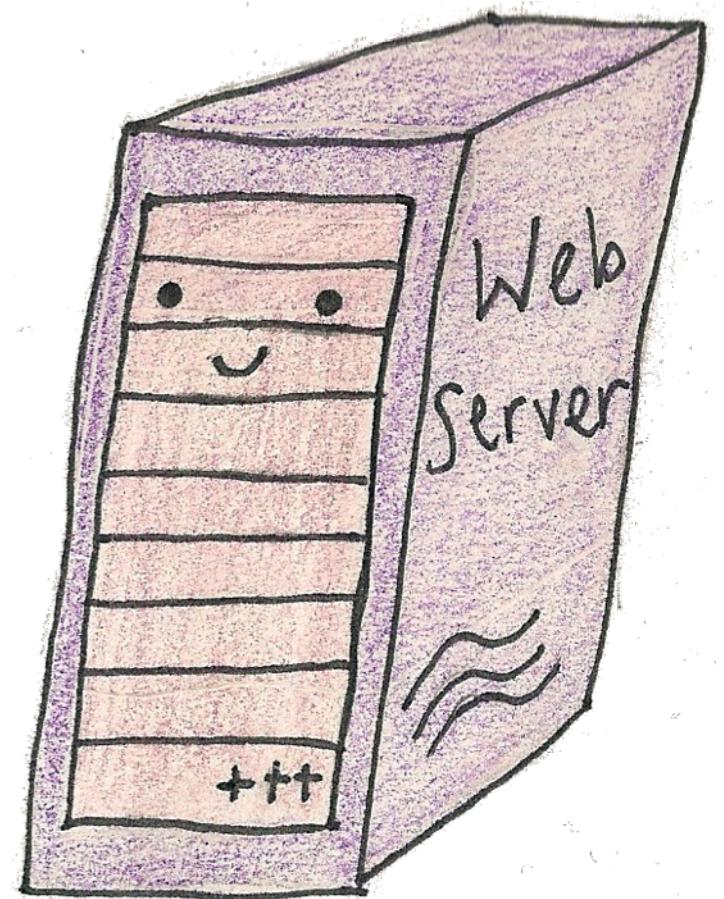
Look inside
It's where my daemon hides
♪ ♪ ♪



Server Things...

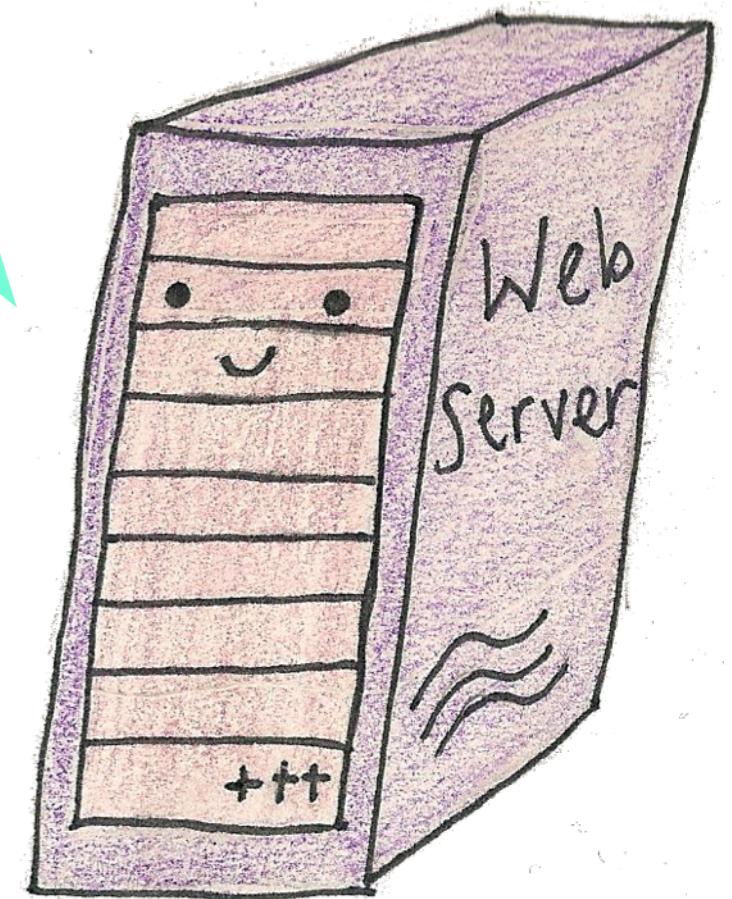
I got racks on
racks on racks

♪ ♪ ♪



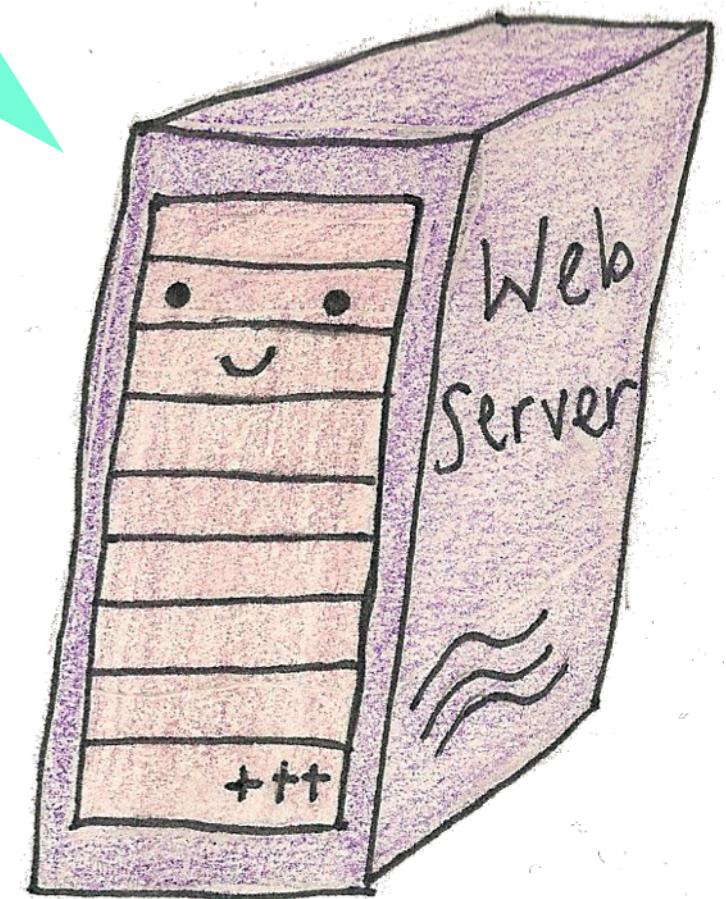
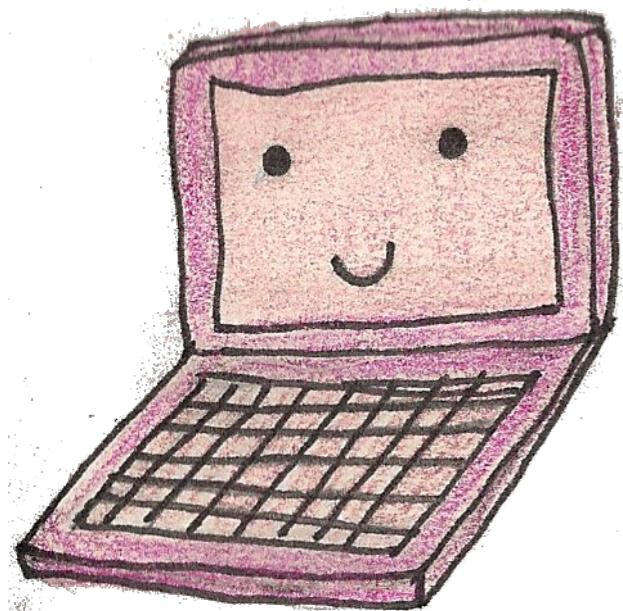
Server Things...

Whatcha, whatcha,
whatcha want?
(Whatcha want?!)



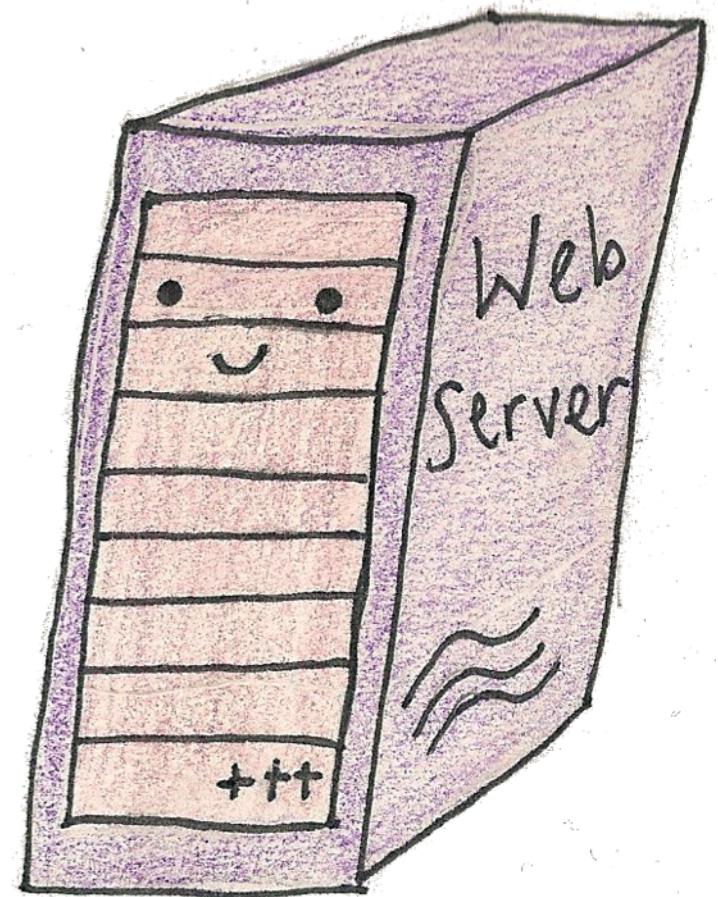
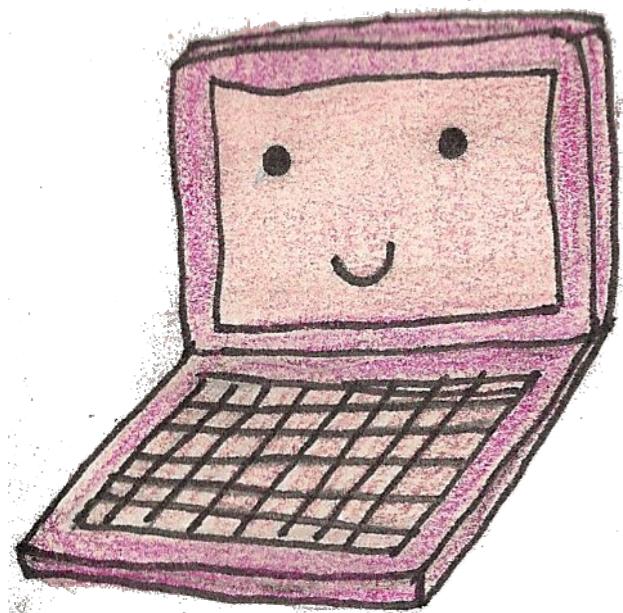
HTTP Response

< HTTP/1.1 304 Not Modified
[other headers]



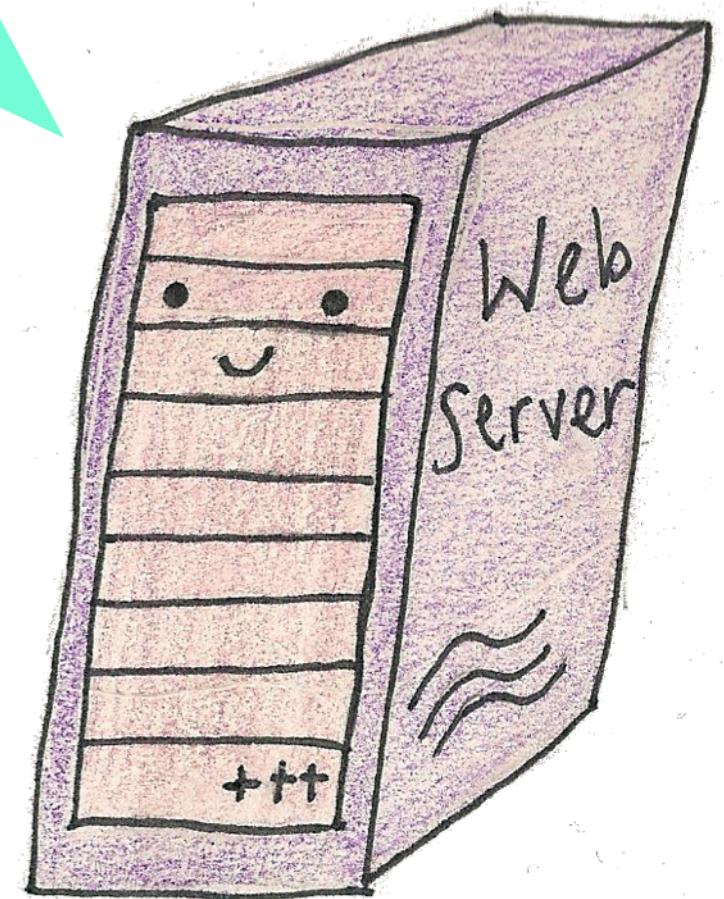
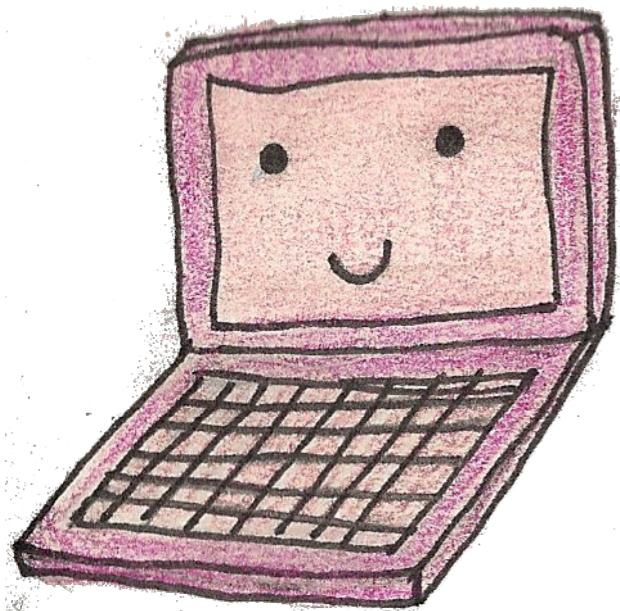
HTTP Response

Sorry, we had to change to that code
Updated that file and then changed its number
I guess you need the new stuff though
Now it's just some page that you used to know



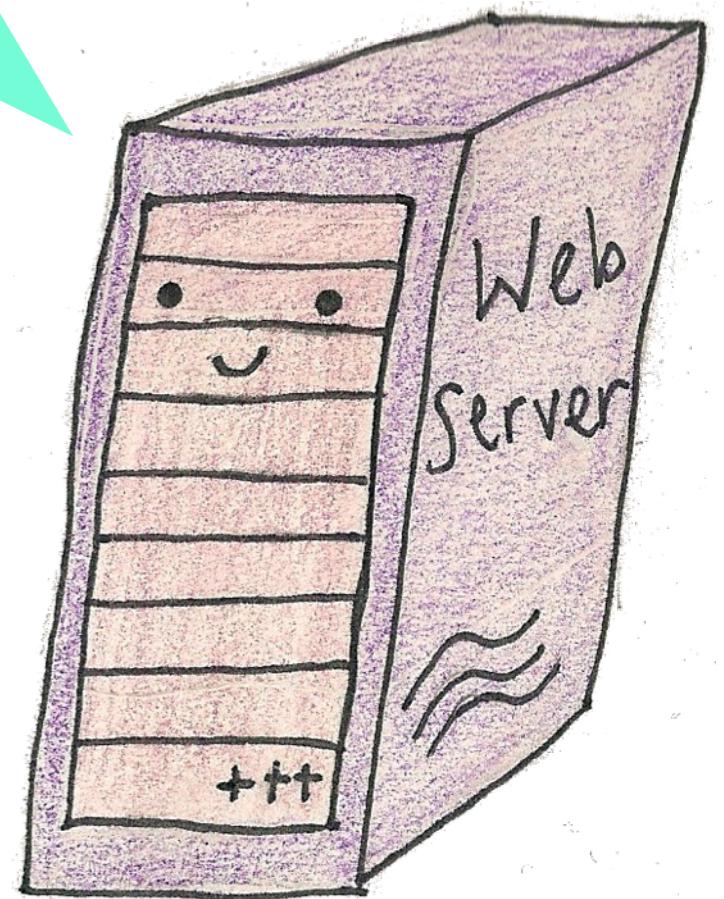
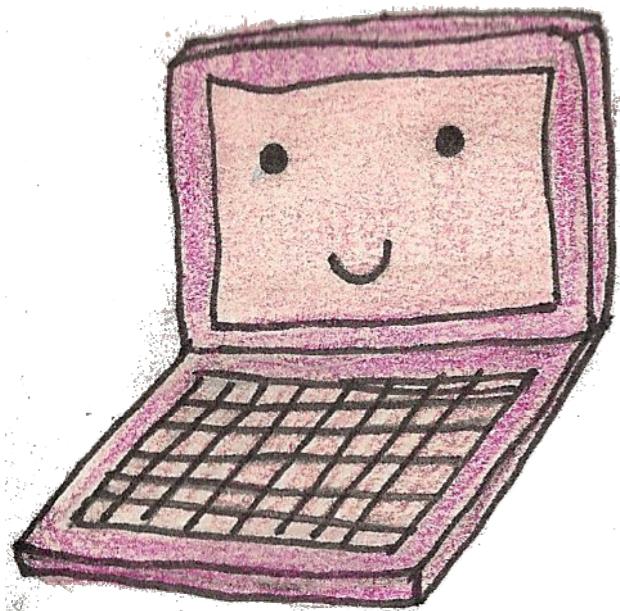
HTTP Response

All this HTML
I will send to you
All this HTML
You'll know what to do
♪ ♪ ♪



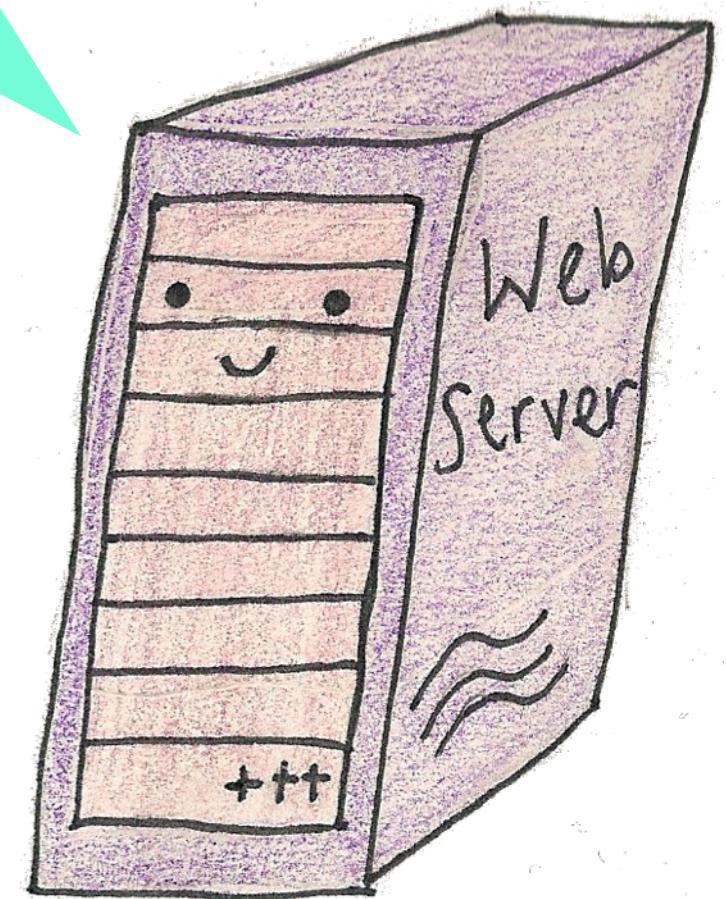
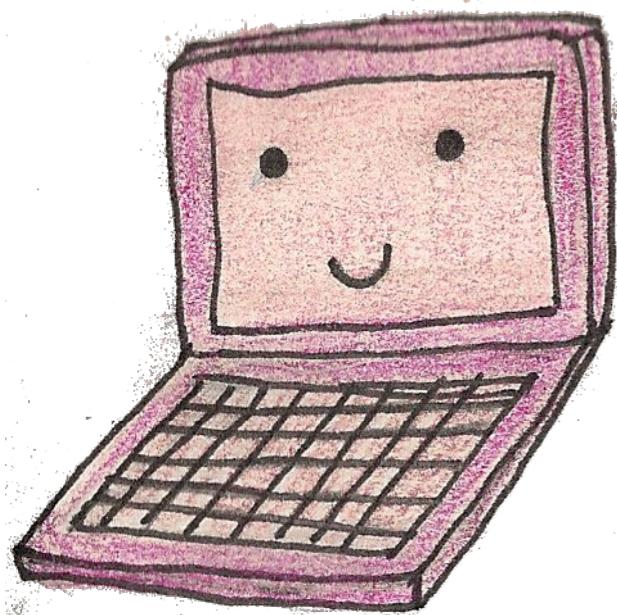
HTTP Response

```
< HTTP/1.1 200 OK  
[other headers]  
<  
<!DOCTYPE html><html>...</html>
```



HTTP Response

It didn't work, work,
work, work, work, work!



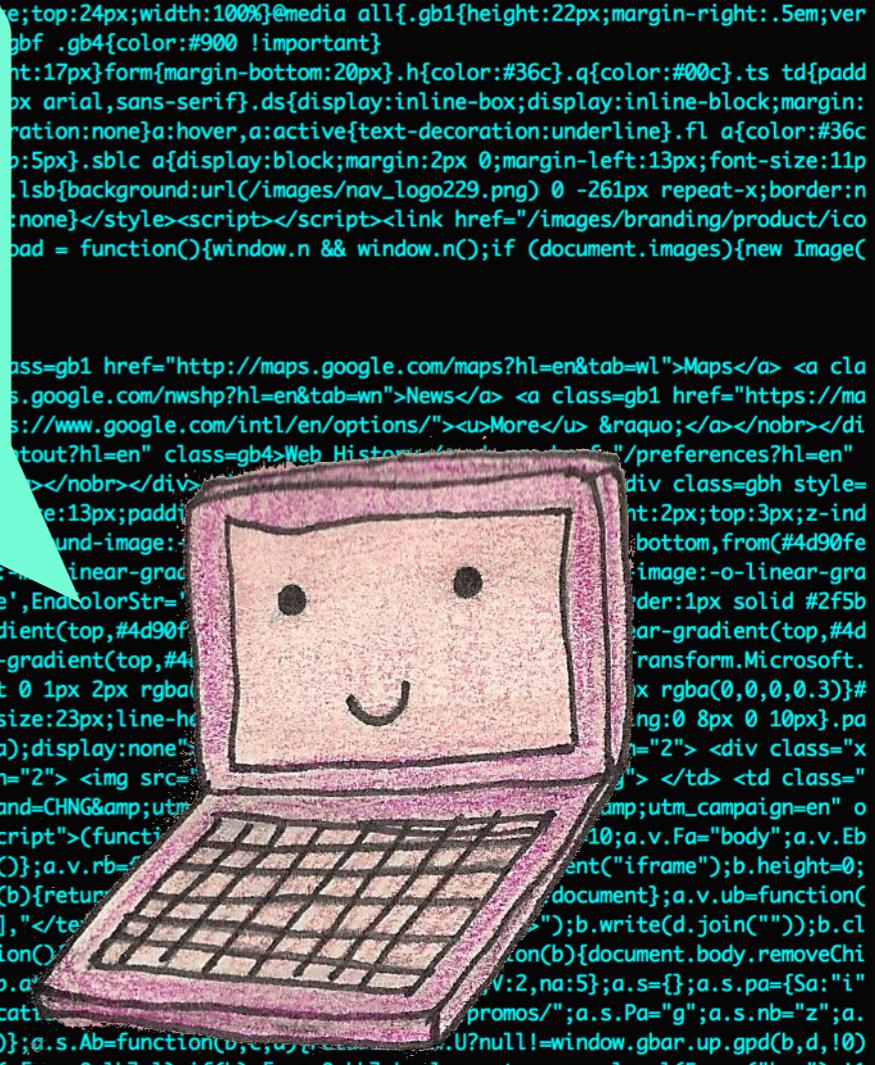
HTTP Response

```
<!doctype html><html itemscope="" itemtype="http://schema.org/WebPage" lang="en"><head><meta content="Search the world's information, including webpages, images, videos and more. Google has many special features to help you find exactly what you're looking for." name="description"><meta content="noodp" name="robots"><meta content="/images/branding/googleleg_1x/googleleg_standard_color_128dp.png" itemprop="image"><title>Google</title><script>(function(){window.google={kEI:'sey2VrLI04nUmAGIrCYDg',kEXPI:'4029815,4031109,4032677,4033307,4033344,4036527,4037333,4037569,4038012,4041440,4041837,4041898,4042492,4043255,4043457,4043458,4043492,4044246,4044606,4045841,4046304,4046400,4047930,4048007,4048011,4048141,4048144,4048346,4048452,4048570,4048770,4048854,4048901,4048909,4048972,4049250,4049597,4050323,4050735,4050766,4050802,4050814,4050891,4050912,4050916,4050927,4051115,4051155,4051195,4051290,8300096,8300227,8300272,8502095,8502221,8502312,8502315,8502342,8502444,8502468,8502482,8502529,8502537,8502552,10200083',authuser:0,kscs:'c9c918f0_10'};google.kHL='en';})();(function(){google.lc=[];google.li=0;google.getEI=function(a){for(var b;a&&(!a.getAttribute||!(b=a.getAttribute("eid"))));}a=a.parentNode;return b||google.kEI};google.getLEI=function(a){for(var b=null;a&&(!a.getAttribute||!(b=a.getAttribute("leid"))));}a=a.parentNode;return b};google.https=function(){return "https":=window.location.protocol};google.ml=function(a,b){try{google.ml(Error(a),!1,b)}catch(d){}};google.time=function(){return(new Date).getTime()};google.log=function(a,b,d,e,g){a=google.logUrl(a,b,d,e,g);if("!=a){b=new Image;var c=google.lc,f=google.li;c[f]=b;b.onerror=b.onload=b.onabort=function(){delete c[f]};window.google&&window.google.vel&&window.google.vel.lu&&window.google.vel.a;b.src=a;google.li=f+1};google.logUrl=function(a,b,d,e,g){var c="",f=google.ls||"";if(!d&&-1==b.search("&ei")){var h=google.getEI(e),c+="&ei="+h;-1==b.search("&lei")&&(!e.google.getLEI(e))?c+="&lei="+e:h!=google.kEI&&(c+="&lei="+google.kEI))}a=d||"/"+(g||"gen_204")+"?atyp=i&ct="+a+"&cad="+b+c+f+"&zx="+google.time()}/^http:/i.test(a)&&google.https()&&(google.ml(Error("a"),!1,{src:a,glmm:1}),a="");return a};google.y={};google.x=function(a,b){google.y[a.id]=[a,b];return!1};google.load=function(a,b,d){google.x({id:a+k++},function(){google.load(a,b,d)});var k=0};}();var _gjwl=location;function _gjuc(){var a=_gjwl.href.indexOf("#");if(0<a&&a=_gjwl.href.substring(a,0<a.indexOf("&q="))&&(a=a.substring(1,-1==a.indexOf("#"))){for(var d=0;d<a.length;){var b;"&==a.charAt(b)&++b;var c=a.indexOf("&",b);-1==c&&(c=a.length);b=a.substring(b,c);if(0==b.indexOf("fp"))a=a.substring(0,d)+a.substring(c,a.length),c=d;else if("cad=h"==b) return 0;d=c}_gjwl.href="/search?" +a+"&cad=h";return 1}return 0}function _gjh(){!_gjuc()&&window.google&&google.x({id:"GJH"},function(){google.nav&&google.nav.gjh&&google.nav.gjh})};window._gjh&&_gjh();</script><style>#gbar,#guser{font-size:13px;padding-top:1px !important;}#gbar{height:22px}#guser{padding-bottom:7px !important;text-align:right}.gbh,.gbd{border-top:1px solid #c9d7f1;font-size:1px}.gbh{height:0;position:absolute;top:24px;width:100%}@media all{.gb1{height:22px;margin-right:.5em;vertical-align:top}#gbar{float:left}}a.gb1,a.gb4{text-decoration:underline !important}a.gb1,a.gb4{color:#00c !important}.gb1 .gb4{color:#dd8e27 !important}.gbf .gb4{color:#900 !important}</style><style>body,td,a,p,.h{font-family:arial,sans-serif}body{margin:0;overflow-y:scroll}#gog{padding:3px 8px 0}td{line-height:.8em}.gac_m td{line-height:17px}form{margin-bottom:20px}.h{color:#36c}.q{color:#00c}.ts td{padding:0}.ts{border-collapse:collapse}em{font-weight:bold;font-style:normal}.lst{height:25px;width:496px}.gsfi,.lst{font:18px arial,sans-serif}.gsfs{font:17px arial,sans-serif}.ds{display:inline-block;margin:3px 0 4px;vertical-align:top}input{font-family:inherit}a.gb1,a.gb2,a.gb3,a.gb4{color:#11c !important}body{background:#fff;color:black}a{color:#11c;text-decoration:none}a:hover,a:active{text-decoration:underline}.fl a{color:#36c}a:visited{color:#551a8b}a.gb1,a.gb4{text-decoration:underline}a.gb3:hover{text-decoration:none}#ghead a.gb2:hover{color:#fff !important}.sblc{padding-top:5px}.sblc a{display:block;vertical-align:top;outline:0;outline-color:#000;outline-width:2px;outline-style:solid;outline-offset:1px}.lsbb{background:#eee;outline:0;outline-color:#000;outline-width:2px;outline-style:solid;outline-offset:1px}.ftl,#ftl a{display:inline-block;vertical-align:top;outline:0;outline-color:#000;outline-width:2px;outline-style:solid;outline-offset:1px}.lsb{background:url(/images/nav_logo229.png) 0 -261px repeat-x;outline:0;outline-color:#000;outline-width:2px;outline-style:solid;outline-offset:1px}.lsb:active{background:#ccc}.lst:focus{outline:none}</style></script><link href="/images/branding/product/icon/gogleleg_lodp.ico" rel="shortcut icon"></head><body bgcolor="#fff"><script>(function(){var src='/images/nav_logo229.png';var iesg=false;document.body.onload = function(){window.n && window.n();if (document.images){new Image().src=src;}};if (!iesg){document.f&&document.f.q.focus();document.gbqf&&document.gbqf.q.focus();}}();</script><div id="mngb"><div id=gbar><nobr><b class=gb1>Search</b> <a class=gb1 href="http://www.google.com/imghp?hl=en&tab=wi">Images</a> <a class=gb1 href="http://maps.google.com/maps?hl=en&tab=wl">Maps</a> <a class=gb1 href="https://play.google.com/?hl=en&tab=w8">Play</a> <a class=gb1 href="http://www.youtube.com/?tab=w1">YouTube</a> <a class=gb1 href="http://news.google.com/nwshp?hl=en&tab=wn">News</a> <a class=gb1 href="https://mail.google.com/mail/?tab=wm">Gmail</a> <a class=gb1 href="https://drive.google.com/?tab=wo">Drive</a> <a class=gb1 style="text-decoration:none" href="https://www.google.com/intl/en/options/"><u>More</u>&quo;</a></nobr></div><div id=guser width=100%><nobr><span id=gbn class=gb1></span><span id=gbf class=gbf></span><span id=gbe></span><a href="http://www.google.com/history/optout?hl=en" class=gb4>Web History</a> | <a href="/preferences?hl=en"
```

HTTP Response

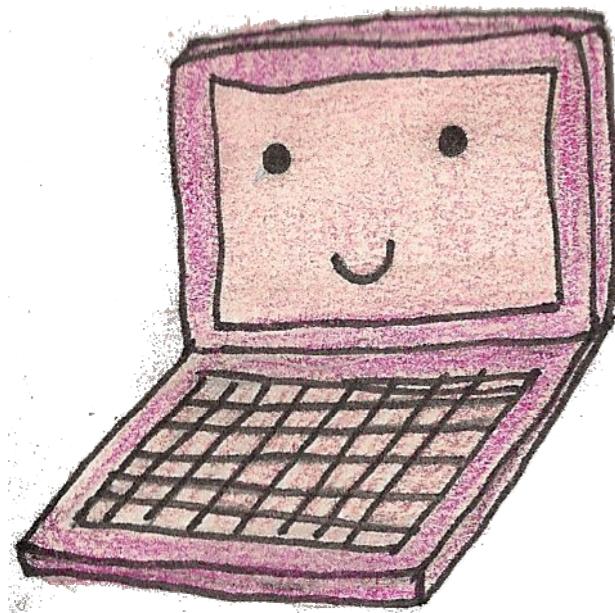
zeigenspace:~ jenna\$ curl www.google.com
<!doctype html><html itemscope="" itemtype="

My curl, my curl, my curl
Talkin' 'bout my curl.
My curl!

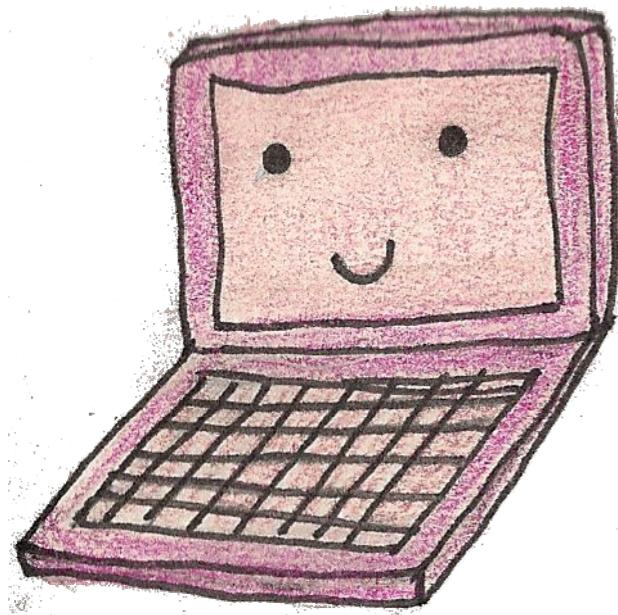


HTTP Response

Shrink it down,
gzip it
(Don't reverse it...)
♪ ♪ ♪



HTML Parsing

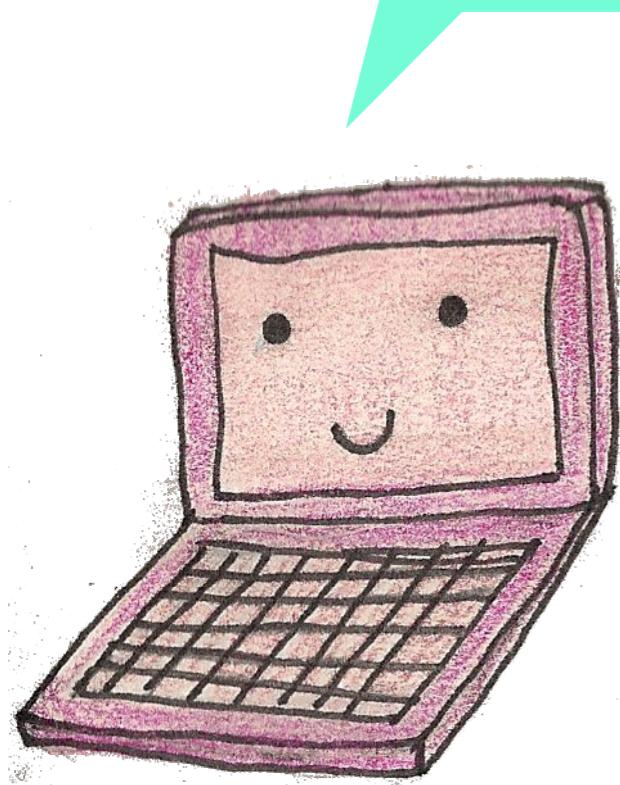


We did everything right,
Bytes are on the client side

♪ ♪ ♪

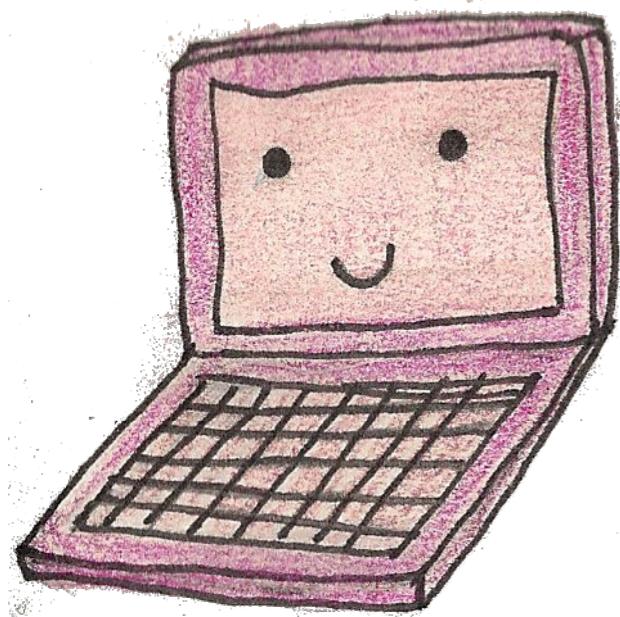
HTML Parsing

Are you listening? (Whoa-oh-oh-oh-oh)
Please come back. (Whoa-oh-oh-oh-oh)
I'll tell you what do I need
I'll tell you what do I need
Whoa-oh, whoa-oh
♪ ♪ ♪



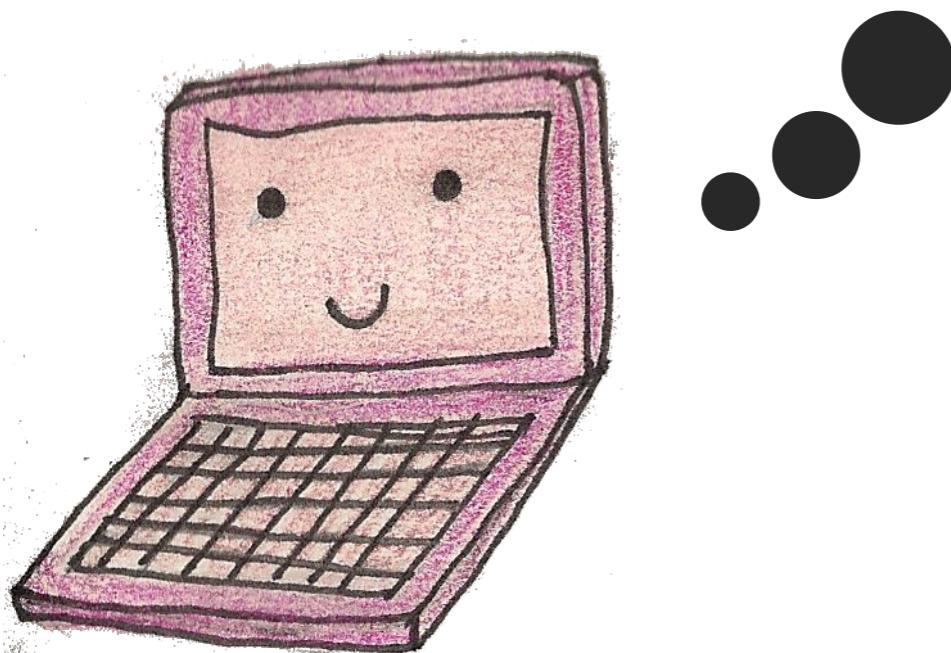
HTML Parsing

I begin to parse,
To split the text apart
Break it down into sections
Tokens into selectors

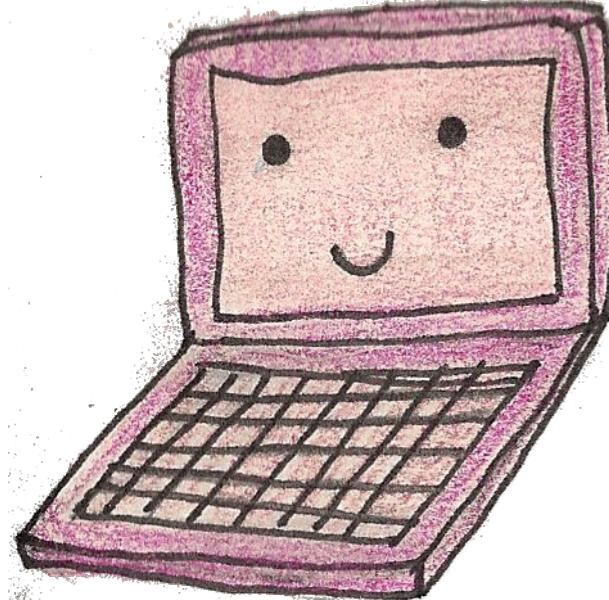


HTML Parsing

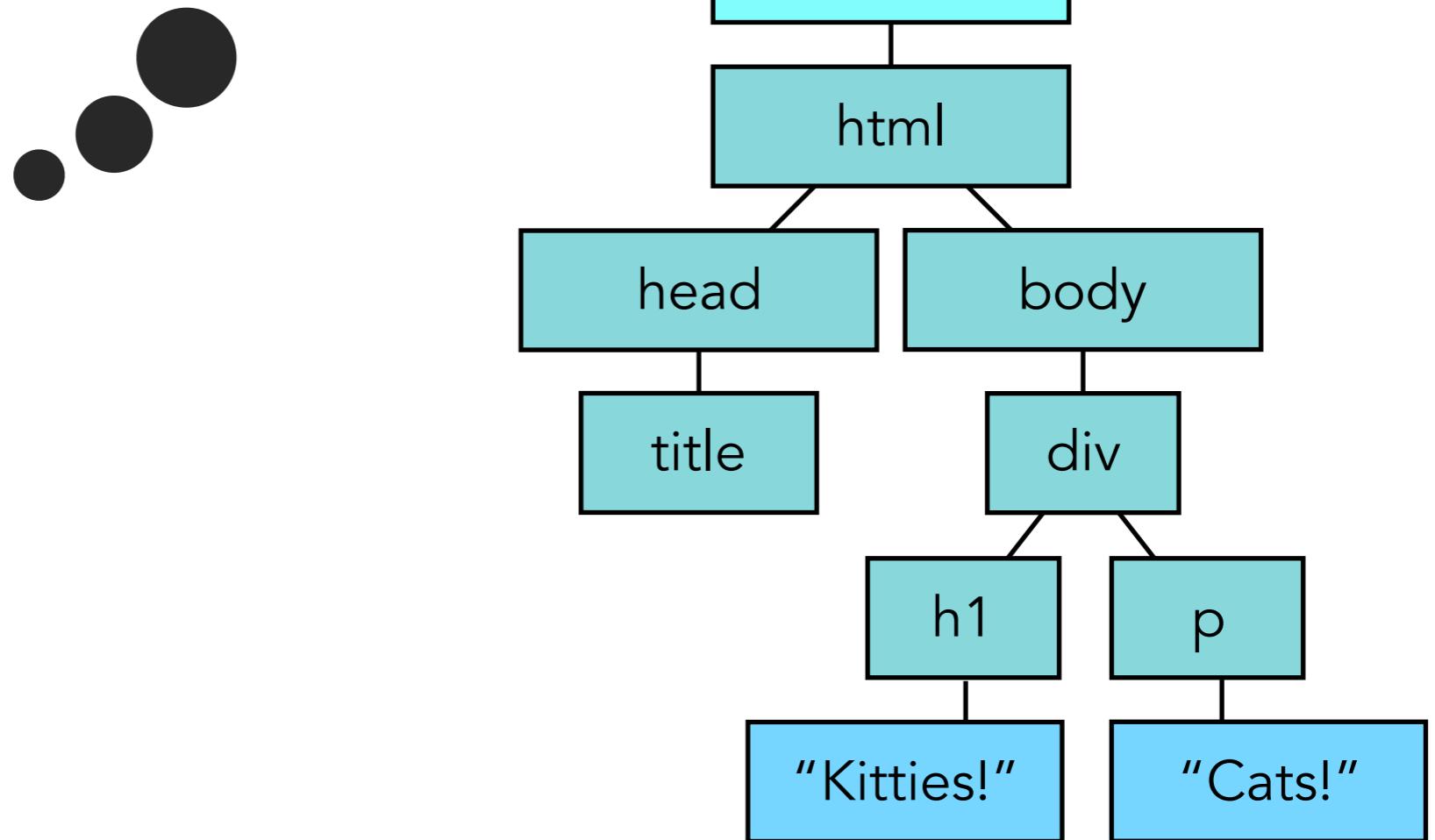
```
1 <!doctype html>
2 <html>
3   <head>
4     <script type="text/javascript" src="library.js"></script>
5     <link rel="stylesheet" type="text/css" href="styles.css">
6     <script type="text/javascript" src="website.js"></script>
7   </head>
8   <body>
9     <div>Let's pretend this is all of google</div>
10   </body>
11 </html>
```



HTML Parsing

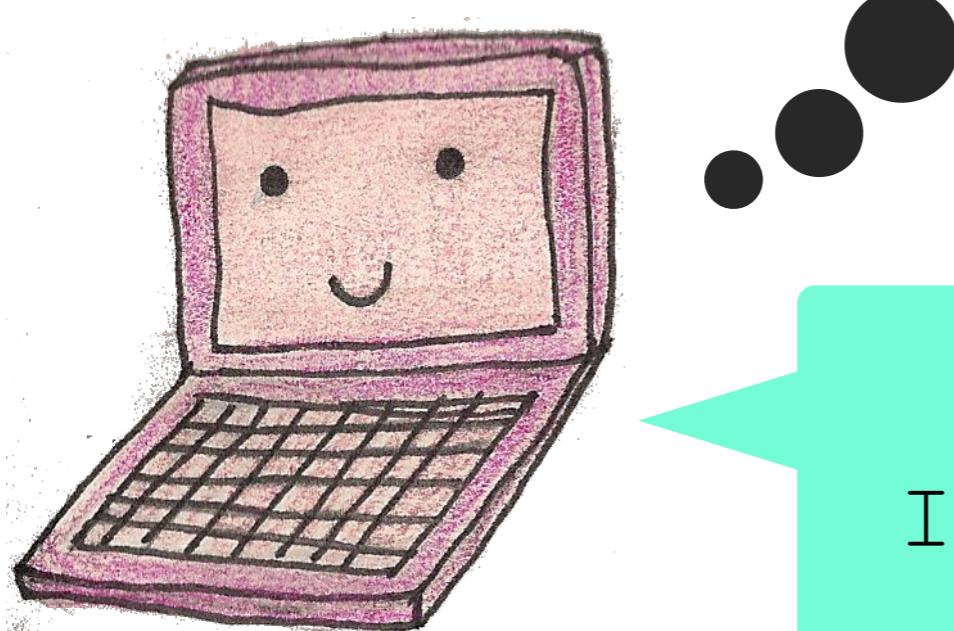


```
1 <!doctype html>
2 <html>
3   <head>
4     <script type="text/javascript" src="library.js"></script>
5     <link rel="stylesheet" type="text/css" href="styles.css">
6     <script type="text/javascript" src="website.js"></script>
7   </head>
8   <body>
9     <div>Let's pretend this is all of google</div>
10  </body>
11 </html>
```



HTML Parsing

```
1 <!doctype html>
2 <html>
3   <head>
4     <script type="text/javascript" src="library.js"></script>
5     <link rel="stylesheet" type="text/css" href="styles.css">
6     <script type="text/javascript" src="website.js"></script>
7   </head>
8   <body>
9     <div>Let's pretend this is all of google</div>
10  </body>
11 </html>
```

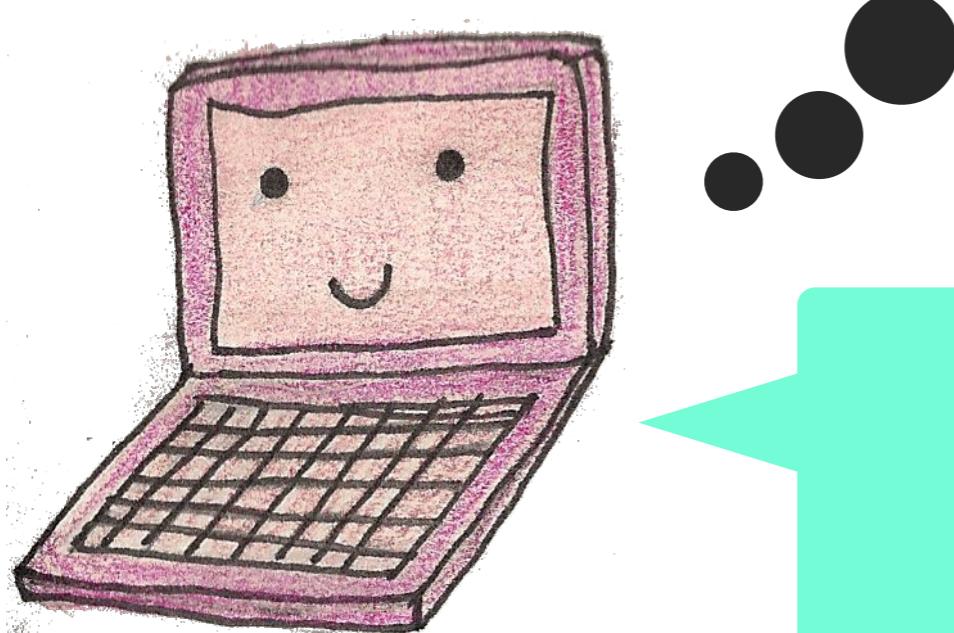


Whatever, wherever
I'm gonna make it render!

♪ ♪ ♪

HTML Parsing

```
1 <!doctype html>
2 <html>
3   <head>
4     <script type="text/javascript" src="library.js"></script>
5     <link rel="stylesheet" type="text/css" href="styles.css">
6     <script type="text/javascript" src="website.js"></script>
7   </head>
8   <body>
9     <div>Let's pretend this is all of google</div>
10  </body>
11 </html>
```



All the right tags
In all the right places

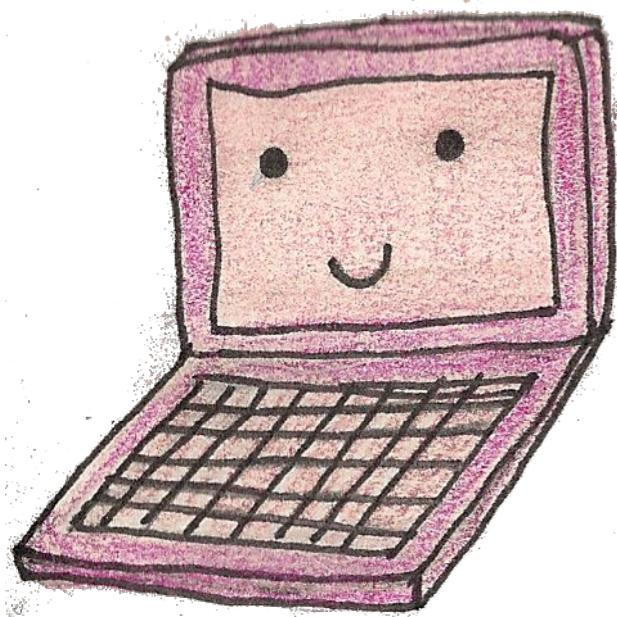


HTML Parsing

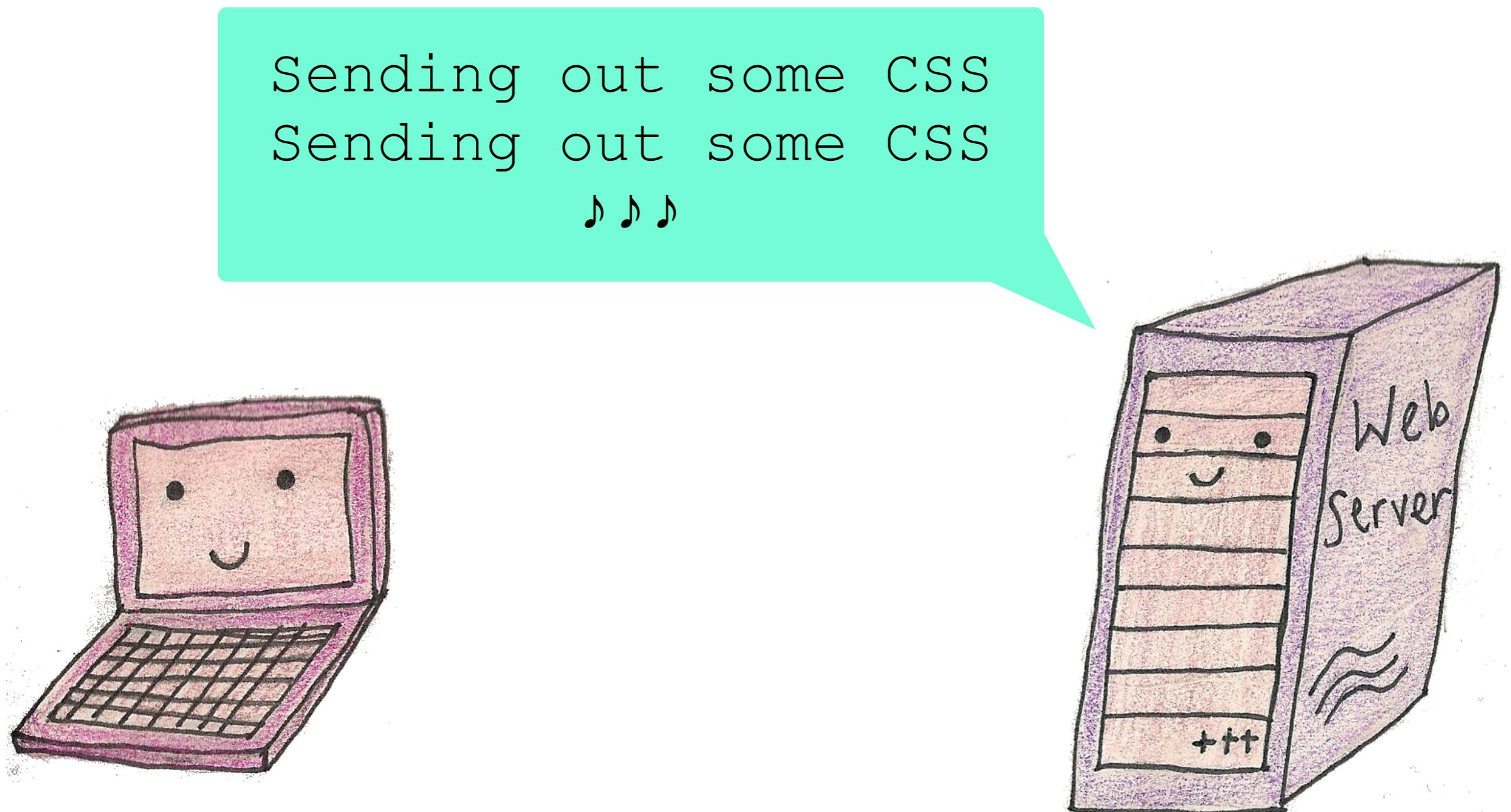
Yeah, my momma she told me don't worry
about your size

She says I'm this big 'cause sometimes
humans just aren't so bright

♪ ♪ ♪

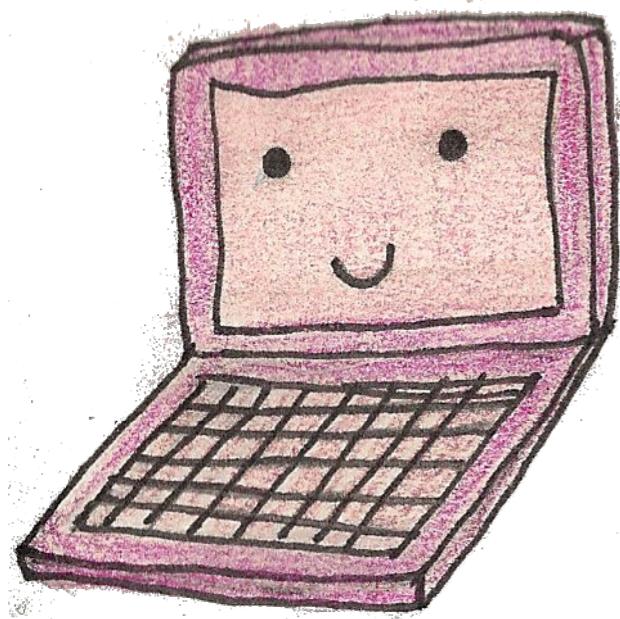


HTML Parsing



HTML Parsing

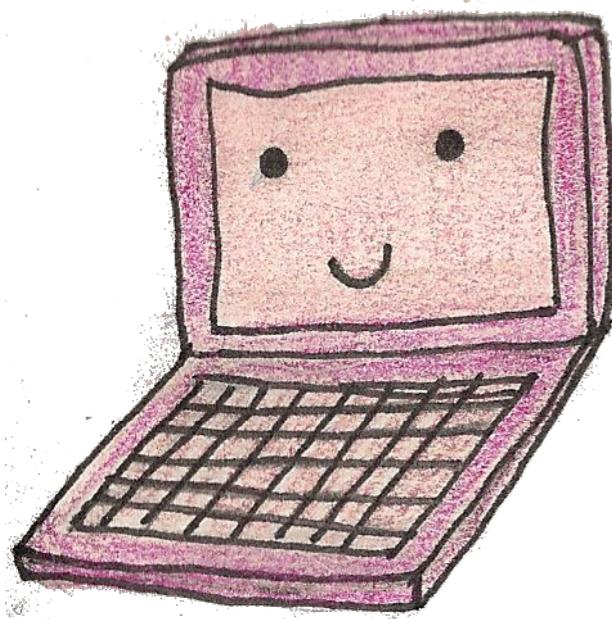
Harder, Better,
Faster, Smaller
♪ ♪ ♪



HTML Parsing

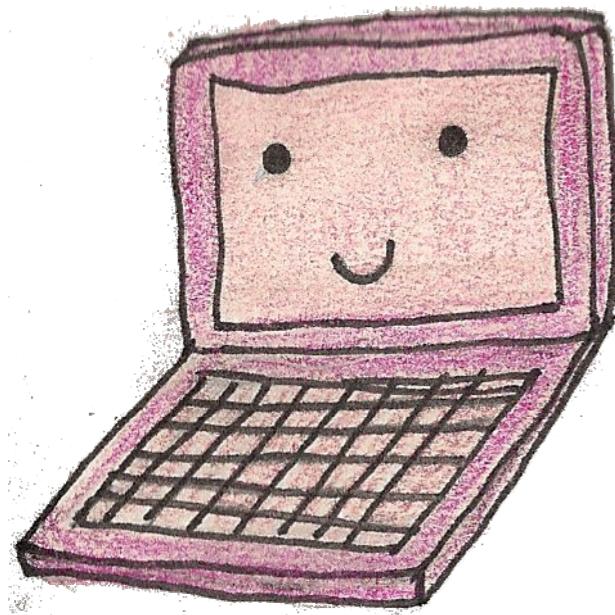
There's only so much I can do
All else goes in the queue

♪ ♪ ♪



HTML Parsing

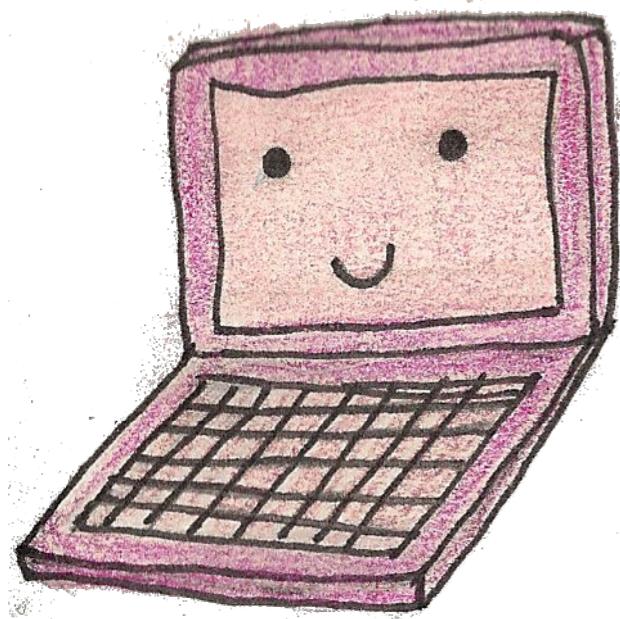
Come together, right now
Up the speed



HTML Parsing

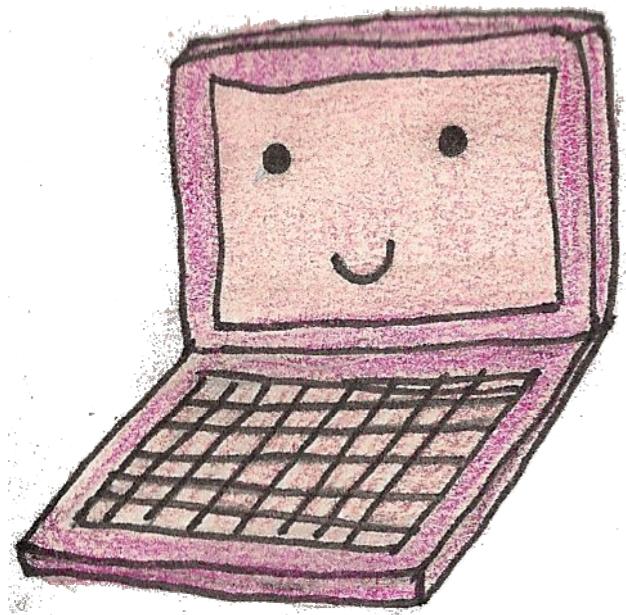
Pull it down, I'm yelling timber
Unless it moves or gets enhanced
This data, I'm told to remember
Until it tells me to forget

♪ ♪ ♪



HTML Parsing

Stop, JavaScript time!

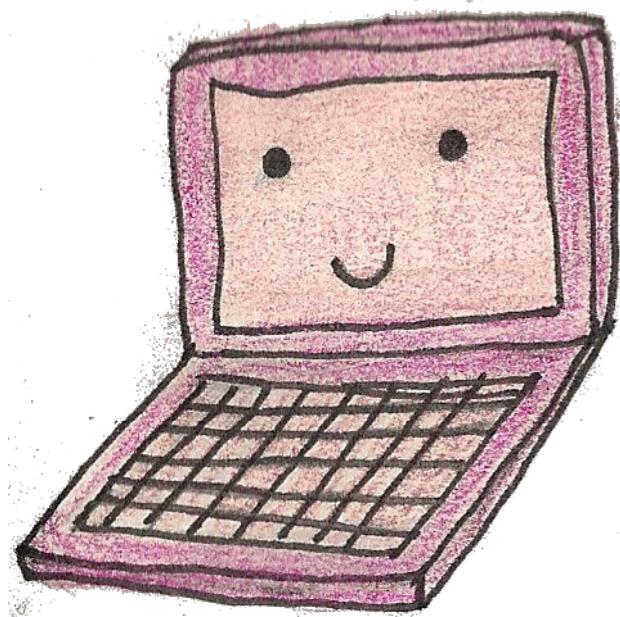


```
<head>
  <script src="library.js"></script>
  <link href="styles.css">
  <script src="website.js"></script>
</head>
<body></body>
```

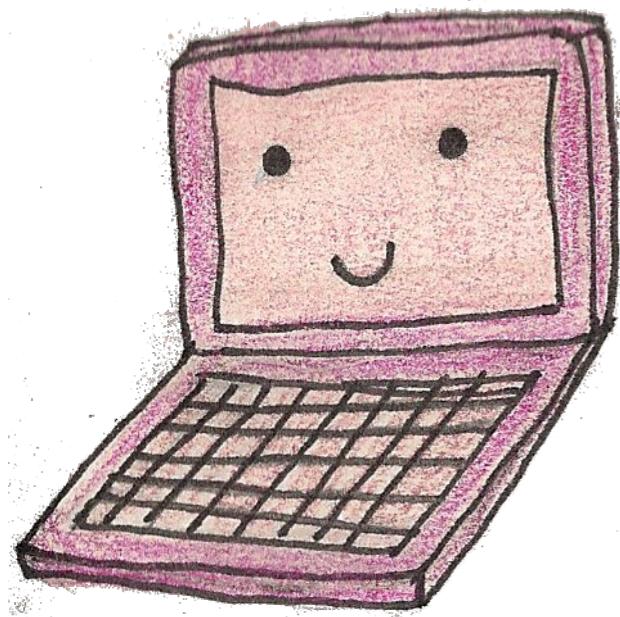
HTML Parsing

Scripts go at the bottom
Not up here

Scripts go at the bottom
So the whole page freakin' here
♪ ♪ ♪



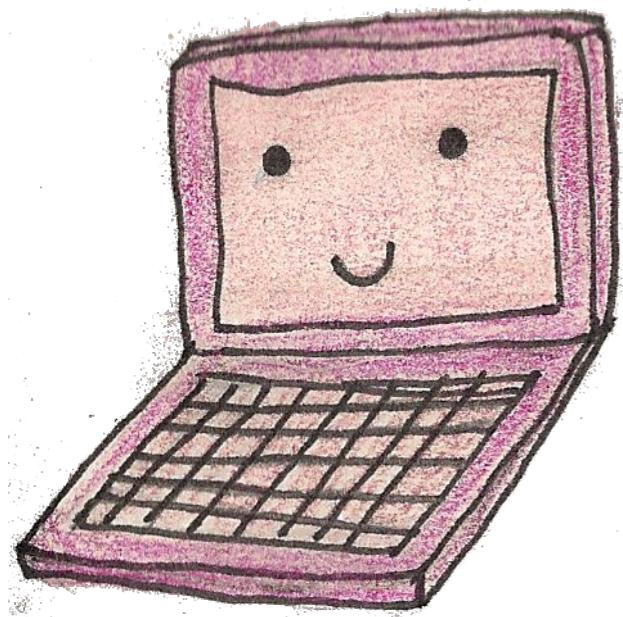
HTML Parsing



We can't stop
♪ ♪ ♪

```
<head>
  <script defer src="library.js"></script>
  <link href="styles.css">
  <script src="website.js"></script>
</head>
<body></body>
```

HTML Parsing

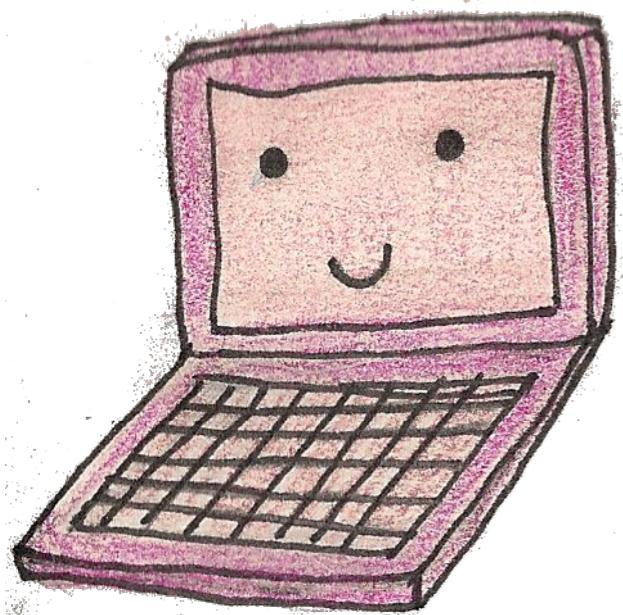


And we won't stop
♪ ♪ ♪

```
<head>
  <script async src="library.js"></script>
  <link href="styles.css">
  <script src="website.js"></script>
</head>
<body></body>
```

HTML Parsing

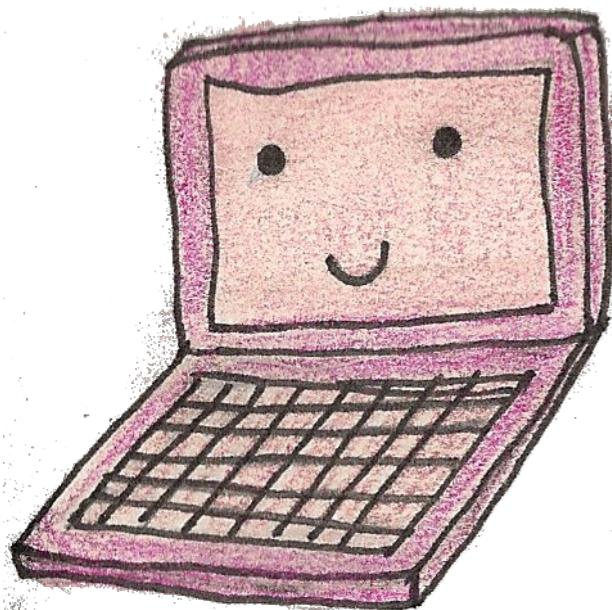
Stop right now
Thank you very much
I need all the CSS downloaded and such
♪ ♪ ♪



```
<head>
  <script src="library.js"></script>
  <link href="styles.css">
  <script src="website.js"></script>
</head>
<body></body>
```

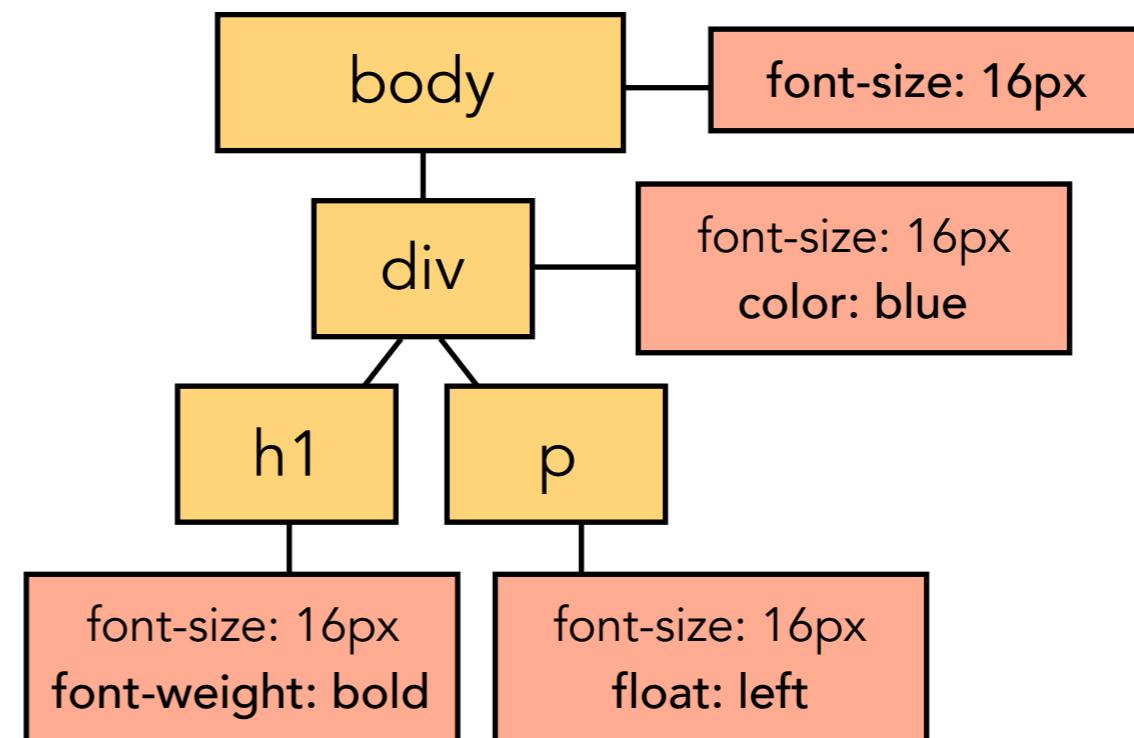
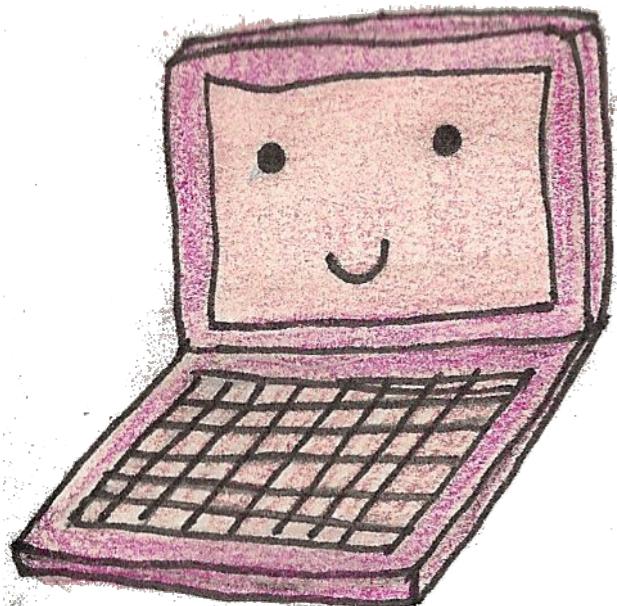
CSS Parsing

This parser's young and wild
and context-free



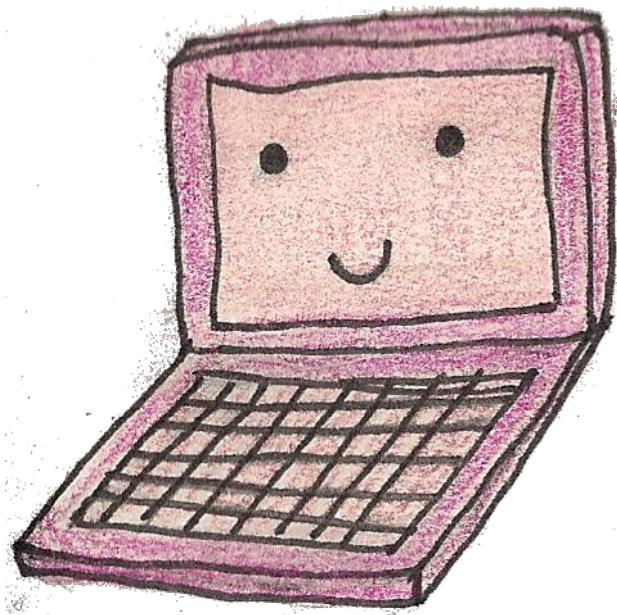
CSS Parsing

'Cause we know how to style
We know how to style



HTML Parsing

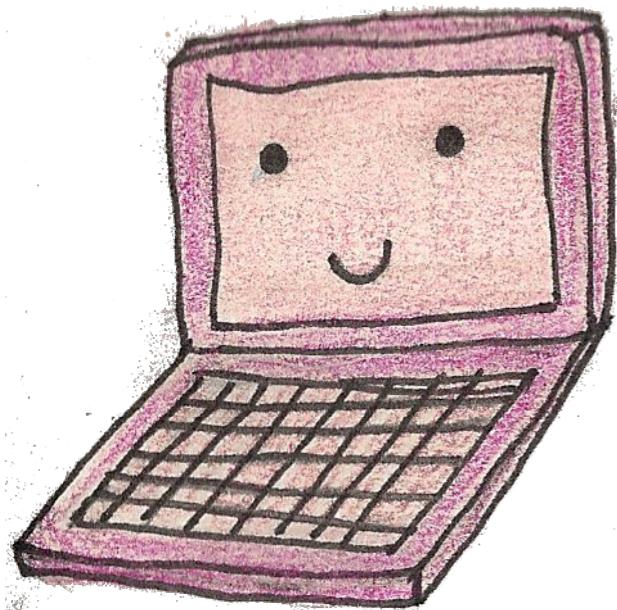
Stop right now
Thank you very much
I need all the CSS downloaded and such
♪ ♪ ♪



```
<head>
  <script src="library.js"></script>
  <link href="styles.css">
  <script src="website.js"></script>
</head>
<body></body>
```

HTML Parsing

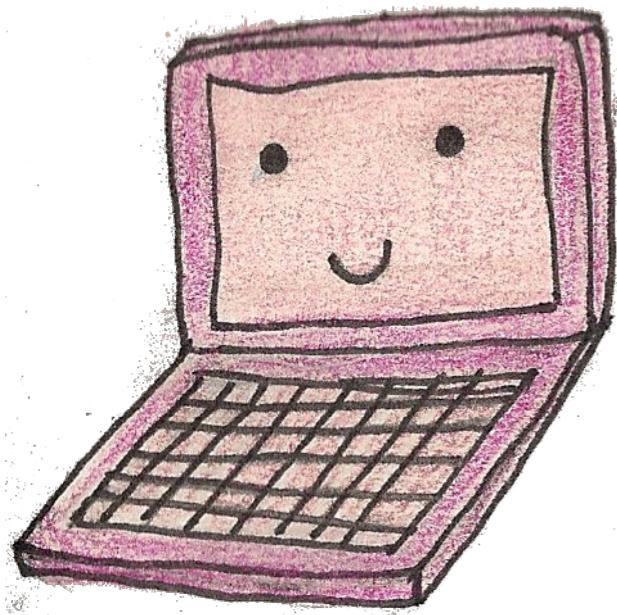
Keep on parsing
'Til the page ends
♪ ♪ ♪



```
<head>
  <script src="library.js"></script>
  <link href="styles.css"> ✓
  <script src="website.js"></script>
</head>
<body></body>
```

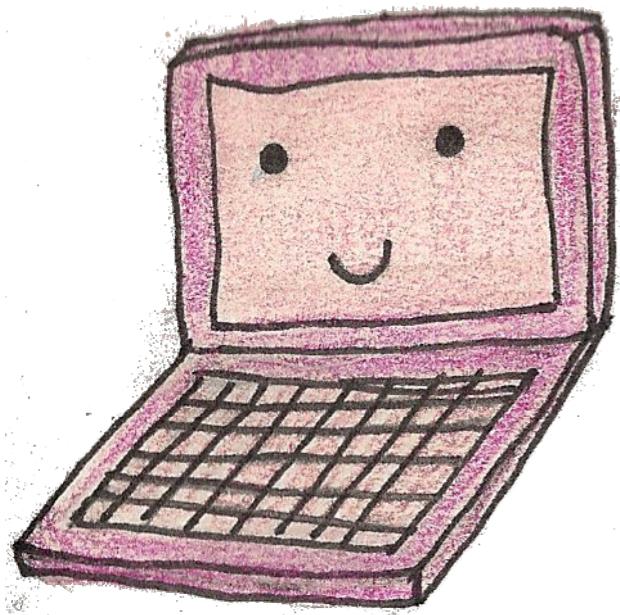
HTML Parsing

Keep on parsing
'Til the page ends
♪ ♪ ♪



```
<head>
  <script src="library.js"></script> ✓
  <link href="styles.css"> ✓
  <script src="website.js"></script>
</head>
<body></body>
```

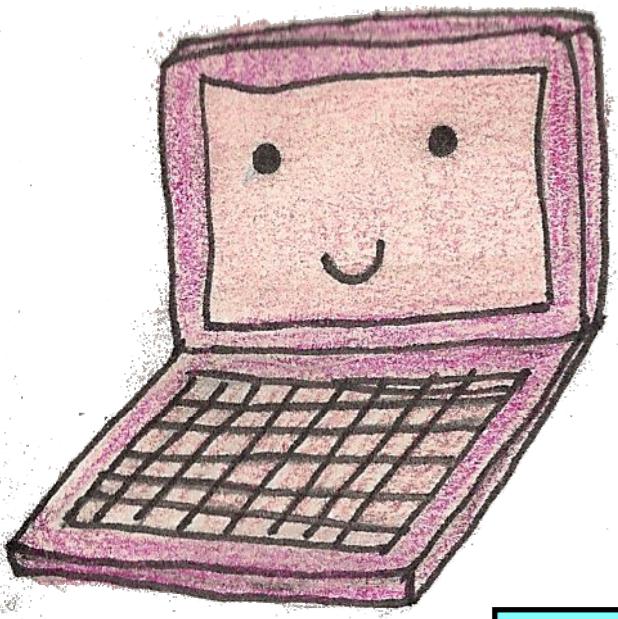
HTML Parsing



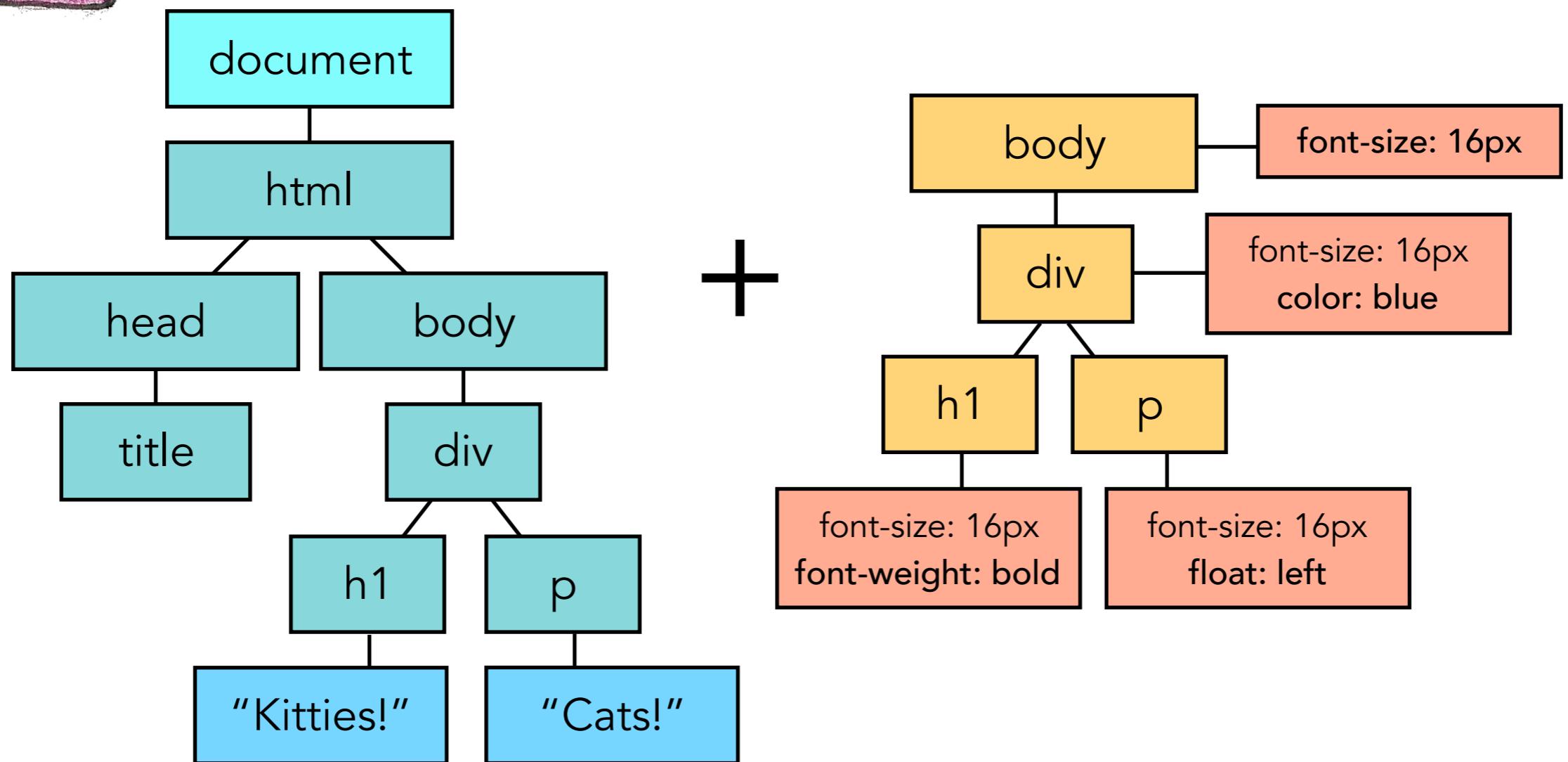
Closing tagggg...

♪ ♪ ♪

```
<head>
  <script src="library.js"></script> ✓
  <link href="styles.css"> ✓
  <script src="website.js"></script> ✓
</head>
<body></body>
```

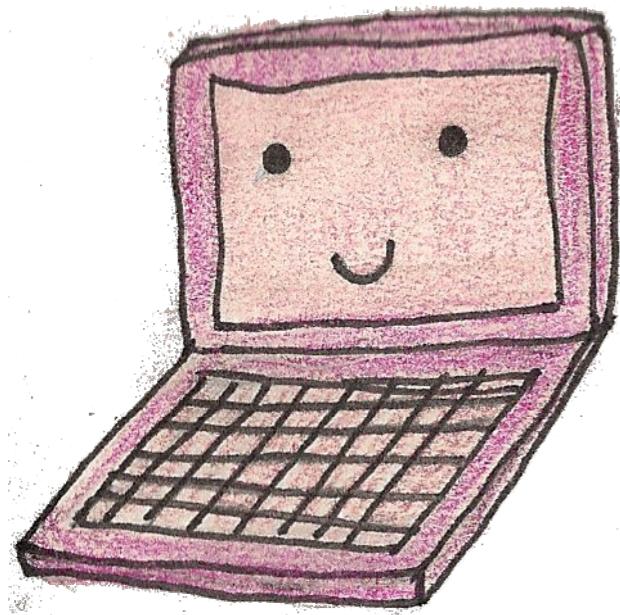


Rendering

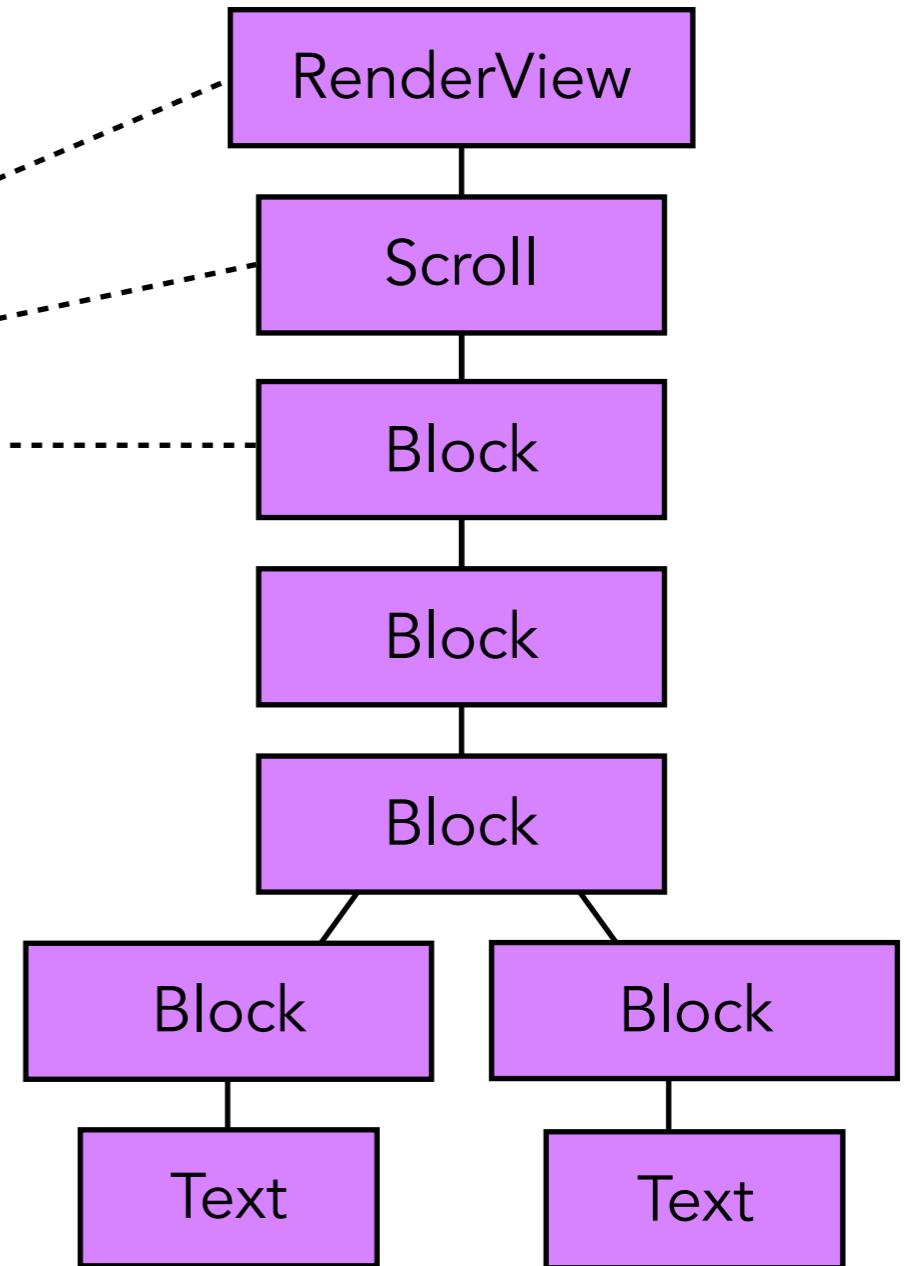
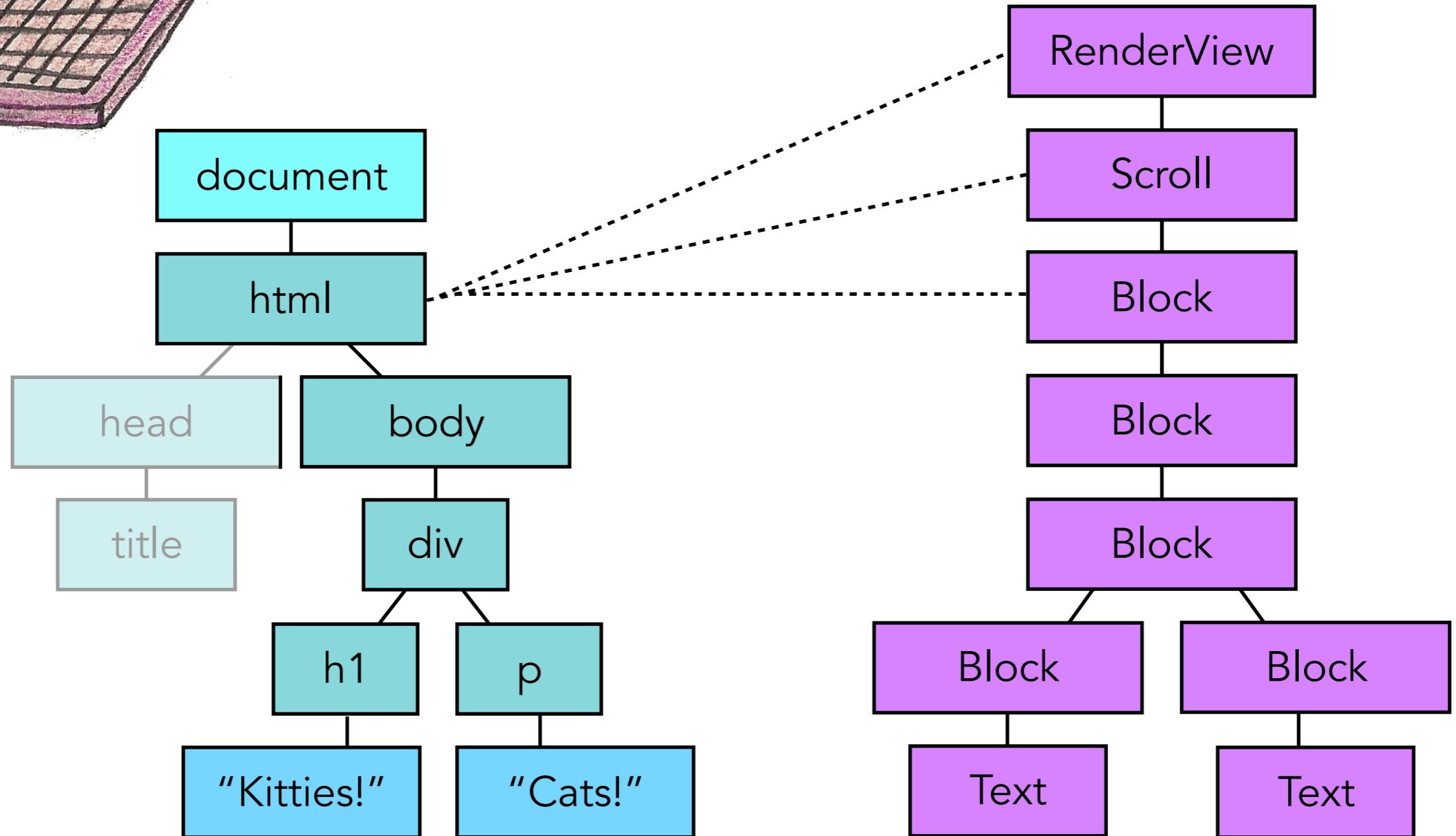
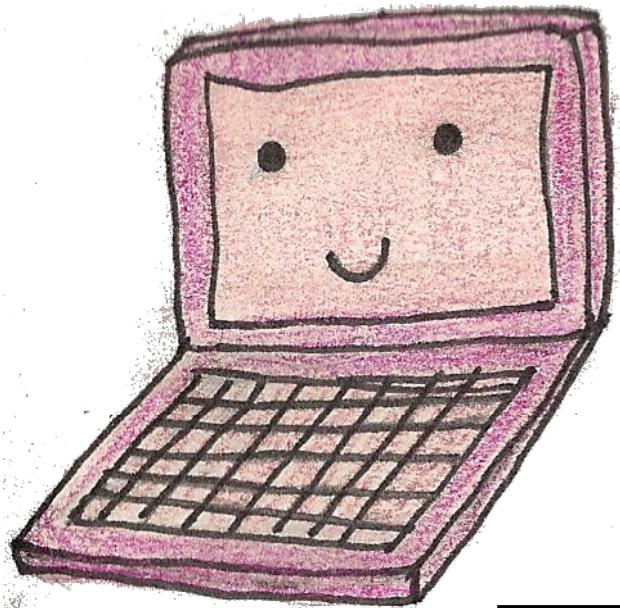


Rendering

In your <head>
In your <head>
Stylesheet, stylesheet,
eet, eet, eet
♪ ♪ ♪

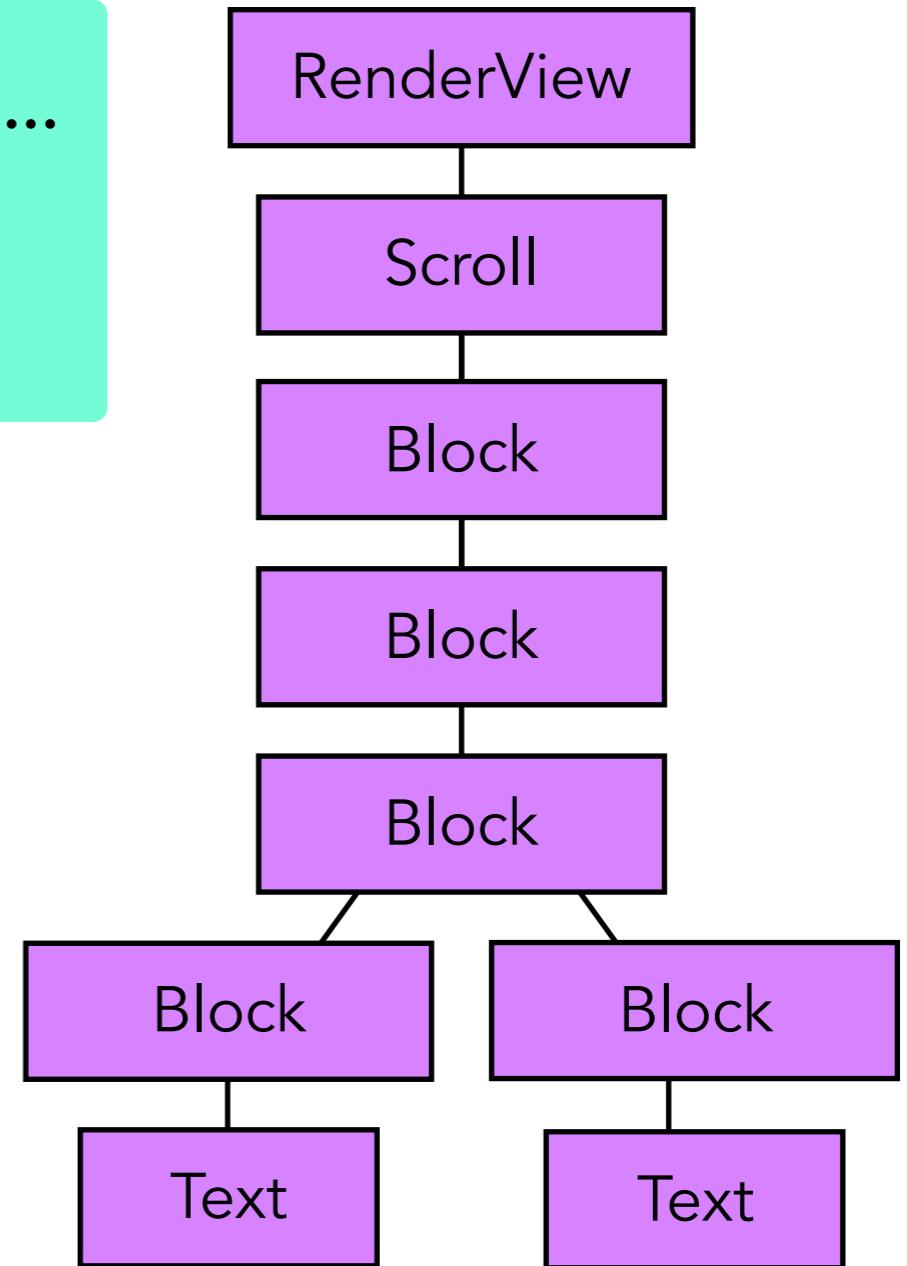
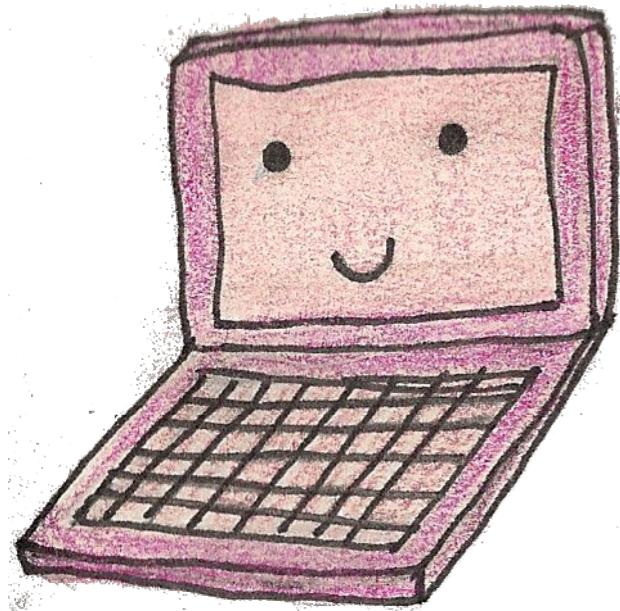


Rendering



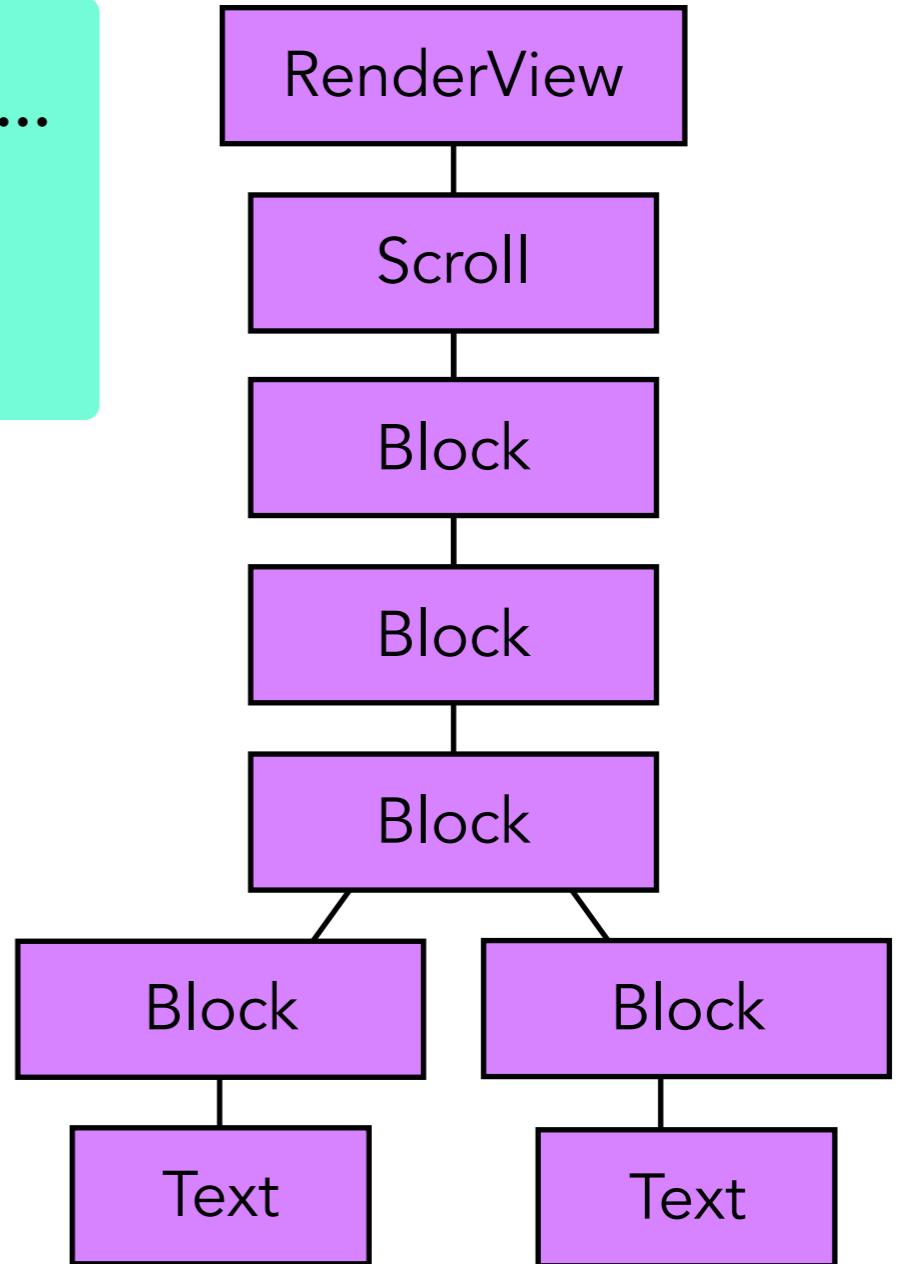
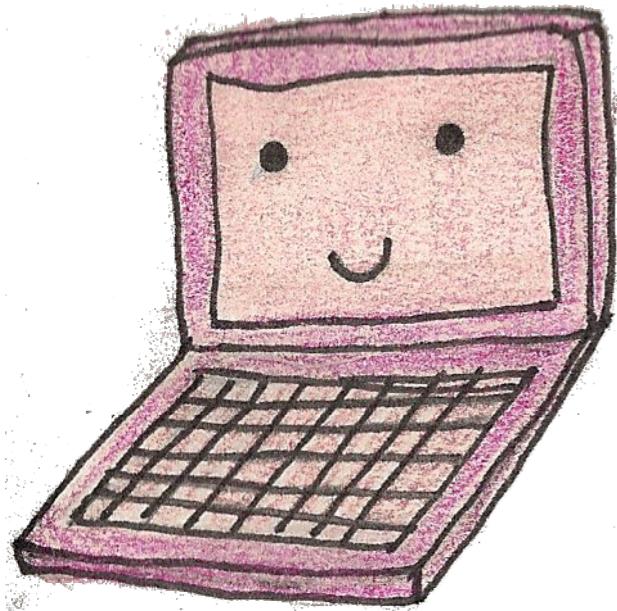
Rendering

'Cause the render's gonna...
rend, rend, rend?
♪ ♪ ♪



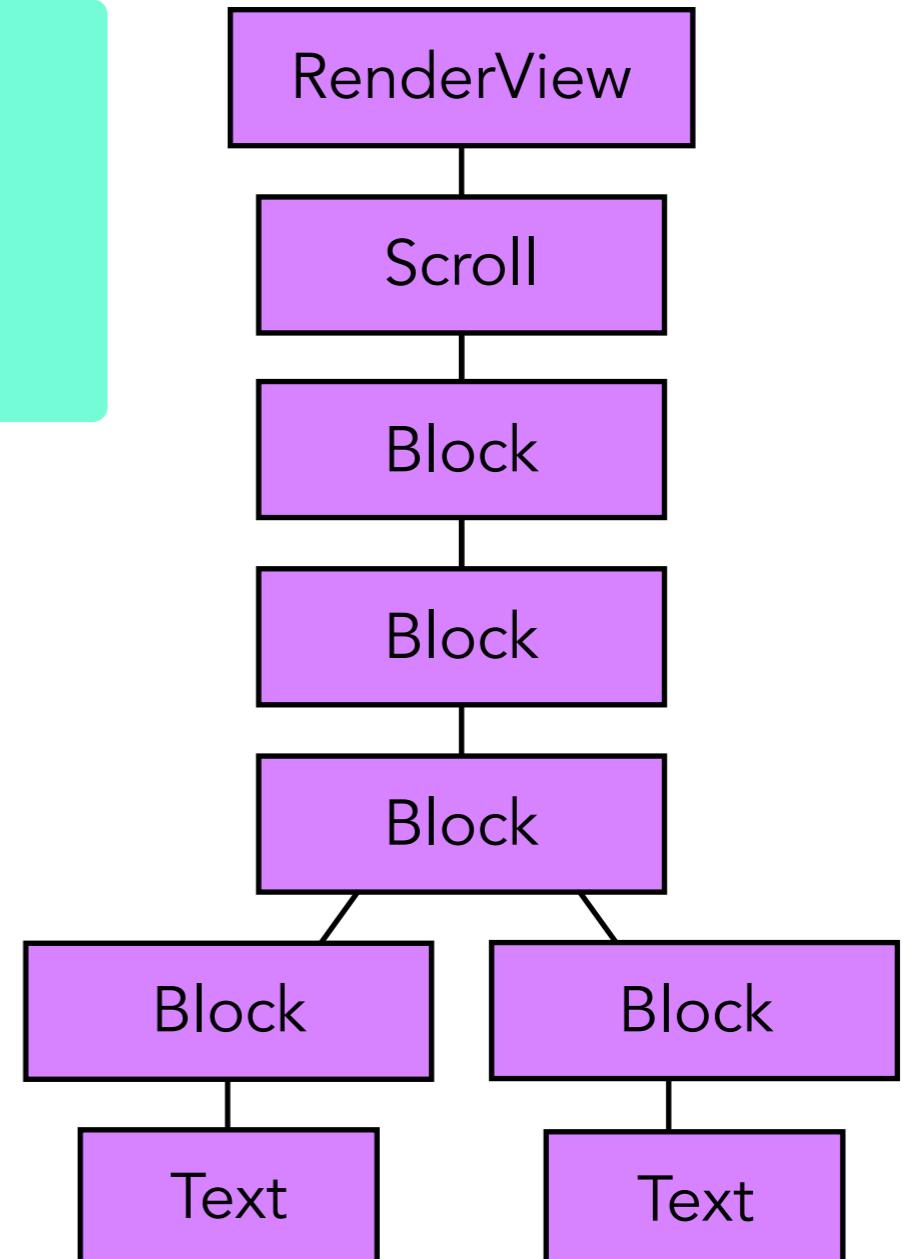
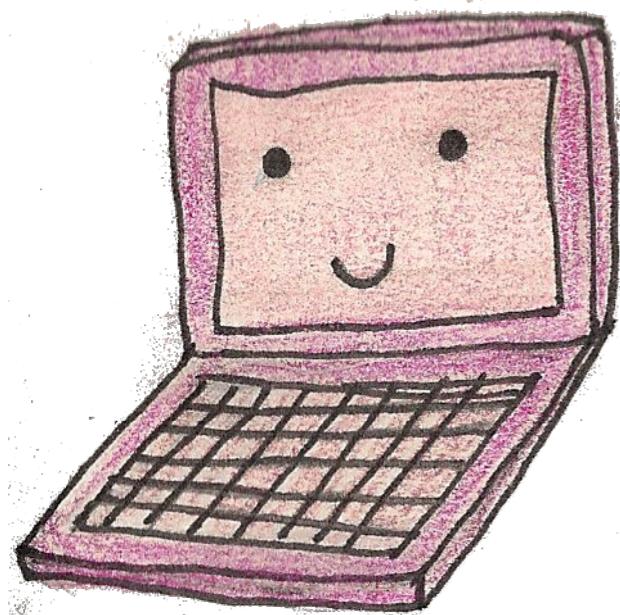
Rendering

'Cause the render's gonna...
rend, rend, rend?
♪ ♪ ♪

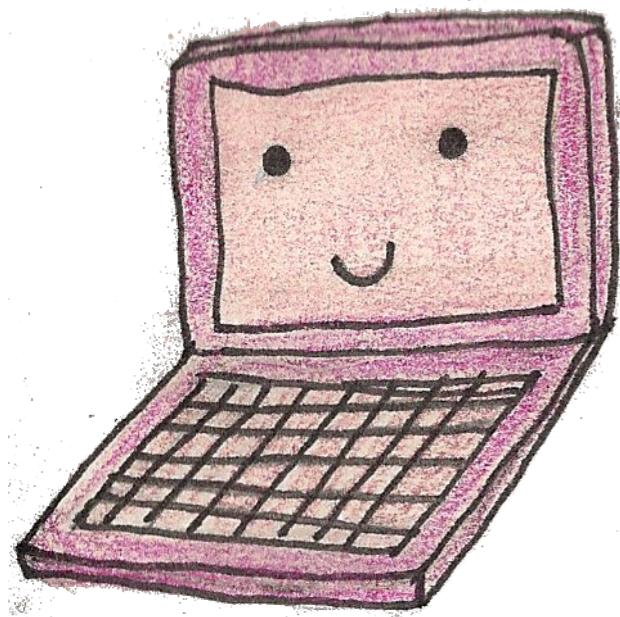


Rendering

And the painter's gonna
paint, paint, paint...



HTML Parsing

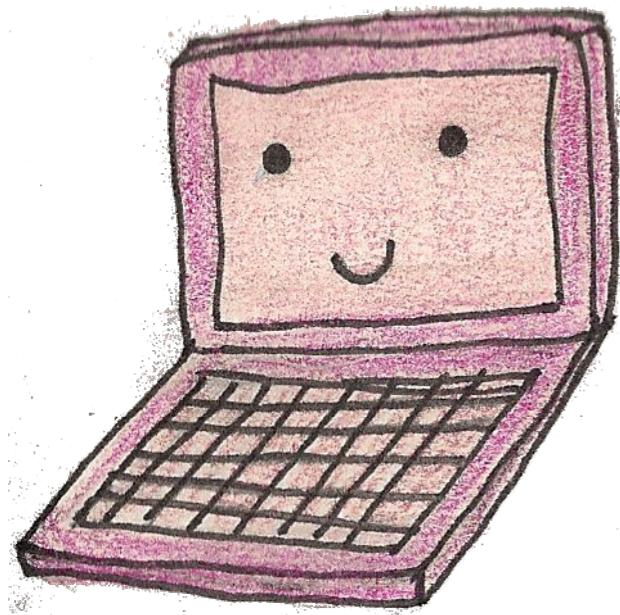


Whoa, oh, oh, oh, oh
Whoa, oh, oh, oh,
The DOM's interactive
DOM's interactive

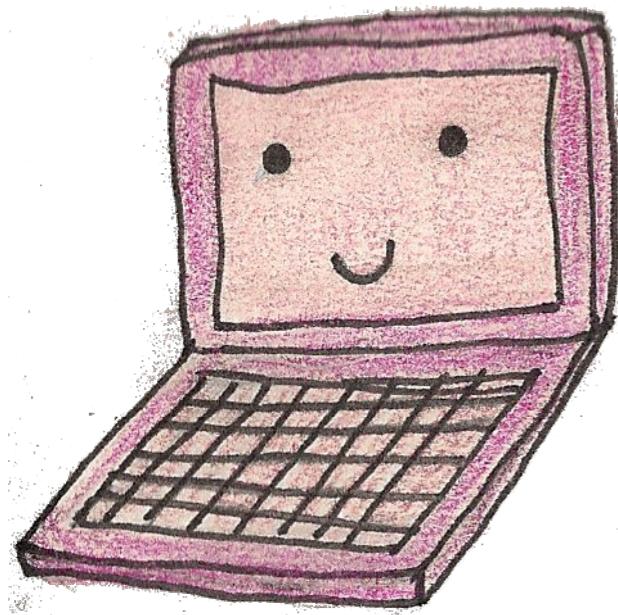
♪ ♪ ♪

HTML Parsing

Now that that was fired,
fired, fired,
We can load scripts marked
defer, 'fer, 'fer



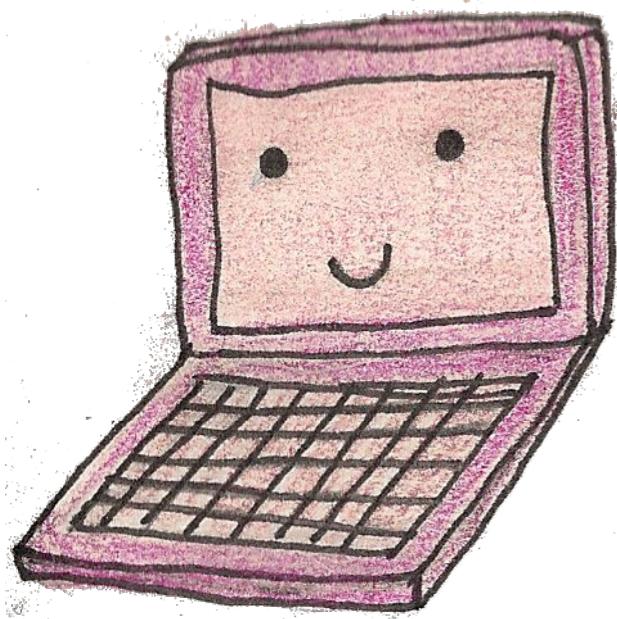
HTML Parsing



In your eyes
The light, the heat
In your eyes
The DOM's complete
♪ ♪ ♪

HTTP/2

How you gonna upgrade me?
What's higher than one point one?



Overview

1. IP Address Lookup
2. Opening a socket
3. Security Stuff
4. HTTP Request
5. Server Things
6. HTTP Response
7. Parsing
8. Rendering

Resources

General

- [What Happens When \(Github\)](#)

Transport

- [DNS \(Wikipedia\)](#)
- [UDP \(Wikipedia\)](#)
- [TCP \(Wikipedia\)](#)
- [TLS \(Wikipedia\)](#)

Parsing, Rendering, and Painting

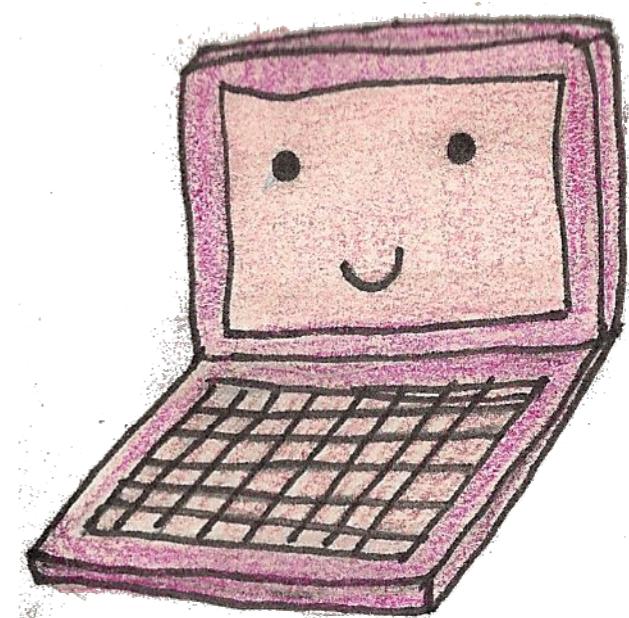
- [How Browsers Work \(HTML5 Rocks\)](#)
- [Critical Rendering Path \(Google Developers\)](#)

Performance

- [Best Practices for Speeding Up Your Web Site \(Yahoo Developer Network\)](#)
- [Raul Fraile: How GZIP compression works \(JSConfEU 2014\)](#)

HTTP/2

- [Andy Davies: The Case for HTTP/2 \(TXJS 2015\)](#)



Complete Tracklist

The Beatles - You Know My Name (Look Up The Number)

Carly Rae Jepsen - Call Me Maybe

Radiohead - Creep

Taylor Swift - Blank Space

Taylor Swift - We Are Never Ever Getting Back Together

Taylor Swift - Wildest Dreams

Sarah McLachlan - I Will Remember You

Capital Cities - Safe and Sound

Adele - Hello

Biz Markie - Just A Friend

Imagine Dragons - Demons

Young Chris – Racks

Beastie Boys - So What'cha Want

Gotye - Somebody That I Used To Know

The Beatles - All My Lovin'

Rihanna - Work

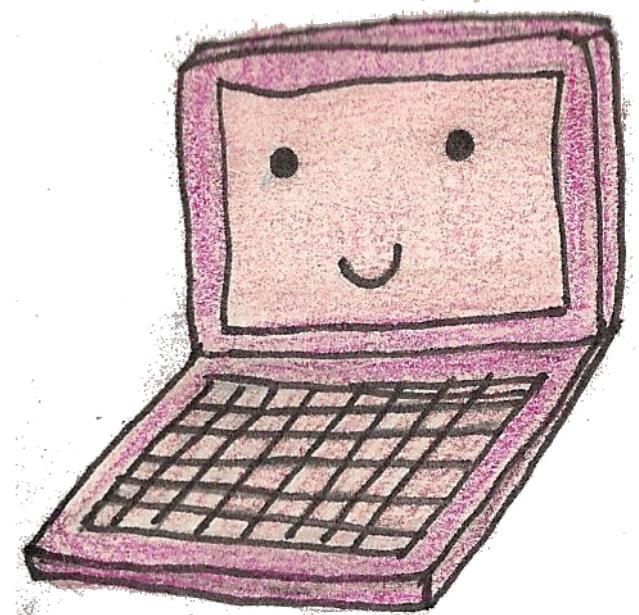
The Temptations - My Girl

Missy Elliot - Work It

Calvin Harris ft. Ellie Goulding - Outside

Jimmy Eat World - Sweetness

The Notorious B.I.G. – Sky's The Limit



Complete Tracklist (continued)

Shakira - Whenever, Wherever

Meghan Trainor = All About That Bass

The Police - Message in a Bottle

Daft Punk – Harder, Better, Faster, Stronger

Mary J Blige - Not Loving You

The Beatles - Come Together

Pitbull ft. Ke\$ha - Timber

MC Hammer - U Can't Touch This

Drake - Started from the Bottom

Miley Cyrus - We Can't Stop

Spice Girls - Stop

Snoop Dogg & Wiz Khalifa ft. Bruno Mars - Young, Wild, & Free

Taylor Swift - Style

Britney Spears - Till the World Ends

Semisonic - Closing Time

The Cranberries - Zombie

Taylor Swift - Shake It Off

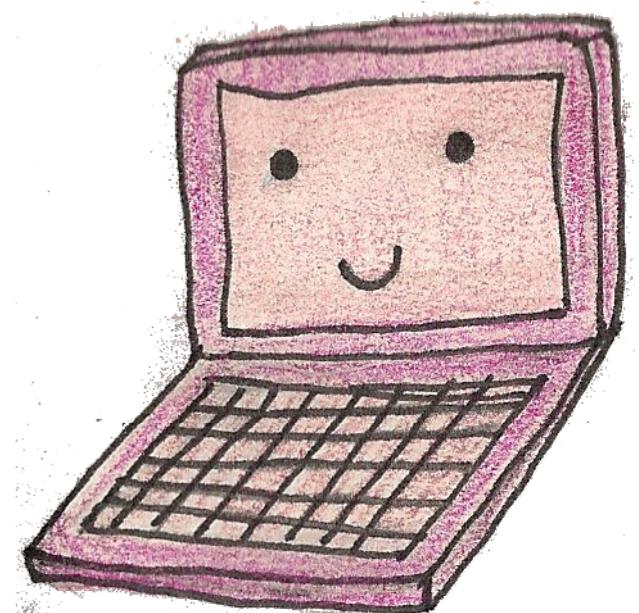
Imagine Dragons - Radioactive

Ellie Goulding - Burn

Peter Gabriel - In Your Eyes

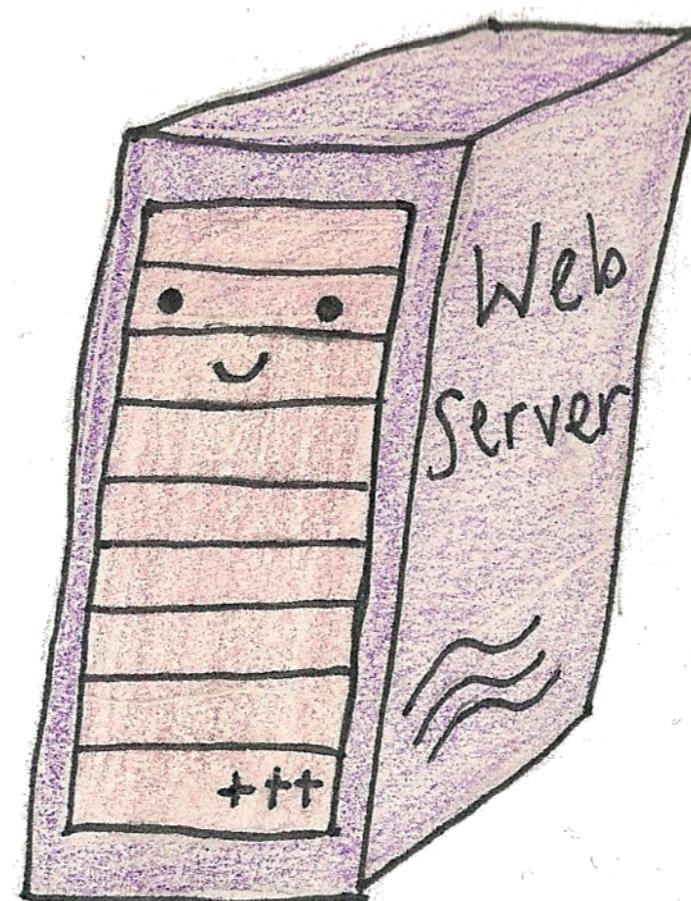
Beyoncé - Upgrade U

*something
witty about a
POP server...*



jenna.is/at-dinosaurjs

jenna.is/server-farm-to-table-annotated



Thanks!

