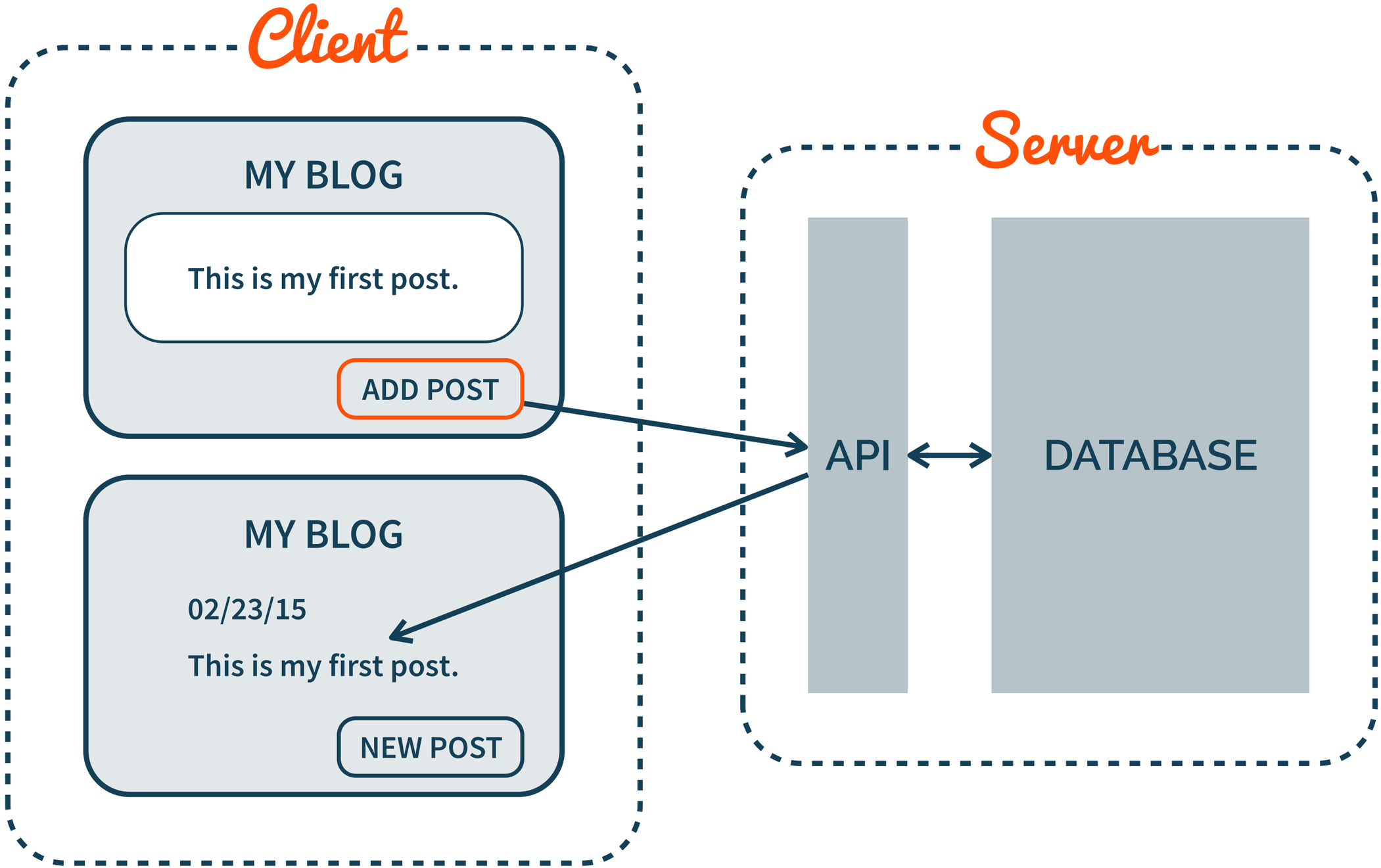
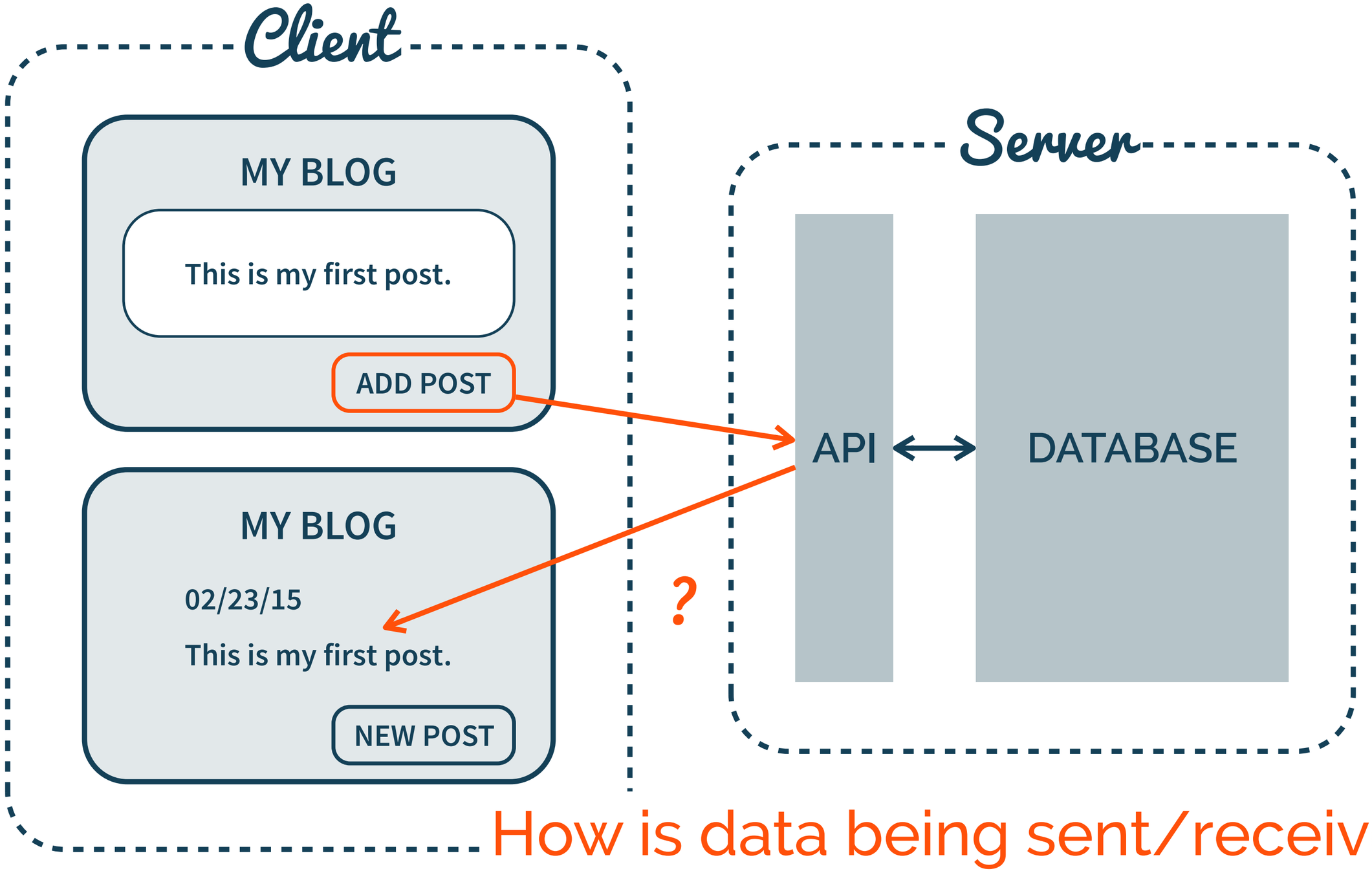
DATA BINDING


Client
MY BLOG
This is my first post.
ADD POST
MY BLOG
02/23/15
This is my first post.
NEW POST
Server
API
DATABASE


Client
MY BLOG
This is my first post.
ADD POST
MY BLOG
02/23/15
This is my first post.
NEW POST
?
Server
API
DATABASE
How is data being sent/received?

Http

HTTP

Hypertext Transfer Protocol

request-response protocol

sent using TCP/IP sockets

More details in Socket lecture

“all about applying verbs to nouns”

nouns: resources (*i.e.*, concepts)

verbs: GET, POST, PUT, DELETE

web.archive.org/web/20130116005443/http://tomayko.com/writings/rest-to-my-wife

URL

Uniform Resource Locator

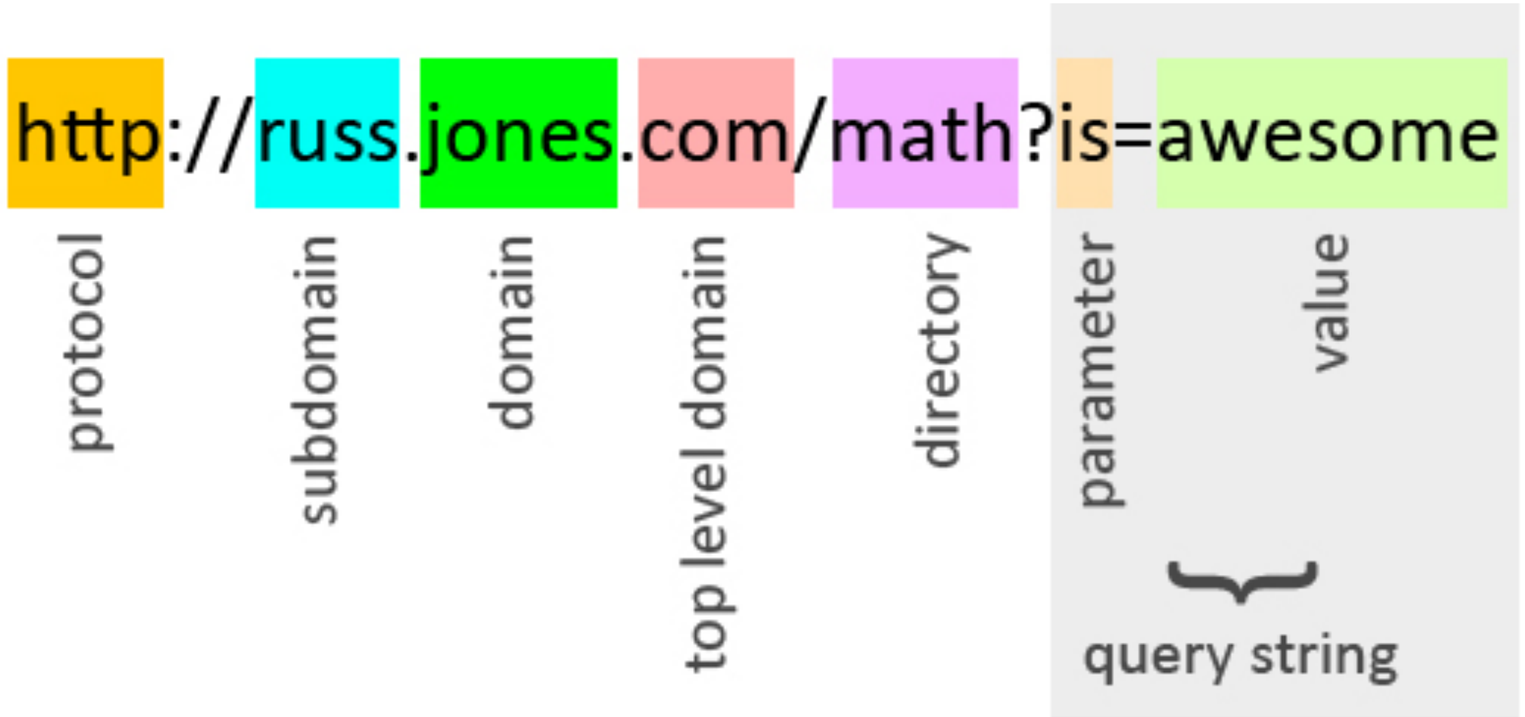
type of URI (Identifier)

specifies the location of a resource on a network

server responds with **representations** of resources and not the resources themselves

web.archive.org/web/20130116005443/http://tomayko.com/writings/rest-to-my-wife

URL ANATOMY



moz.com/blog/solving-the-subdomain-equation-predicting-traffic-and-value-when-merging-subdomains

LOADING A PAGE IN A BROWSER

representations of resources

Browser

HTML

Other Resources

http://creativecommons.org

HTTP GET

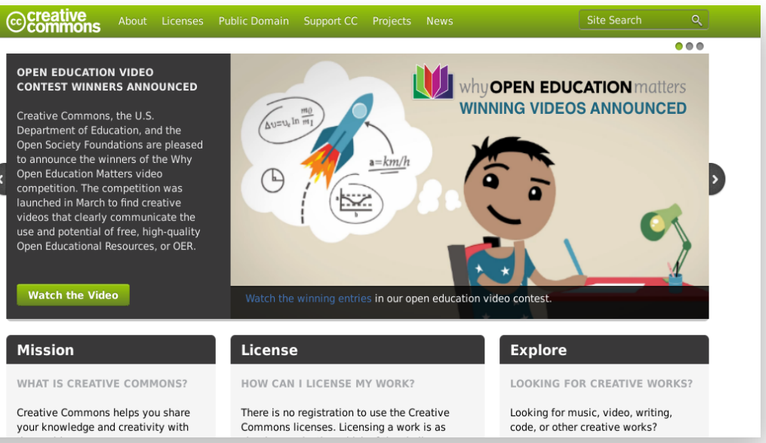
```
http://creativecommons.org
<a><span id="home-button">
</span></a>
<div id="logo">
 <span>
   Creative Commons
 </span>
```

HTTP GET

```
cforms.js
//Collap
String.p
function
  return
this.rep
```

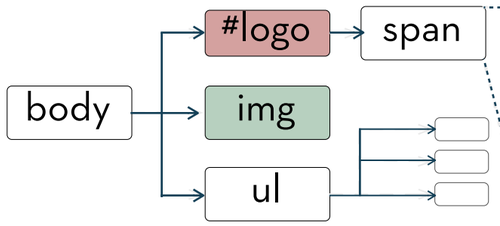
```
creativecommons.css
topbar #home-button{
 position: relative;
 float: lef
 display: b
 height: 40
 width: 150
```

cc-logo.png

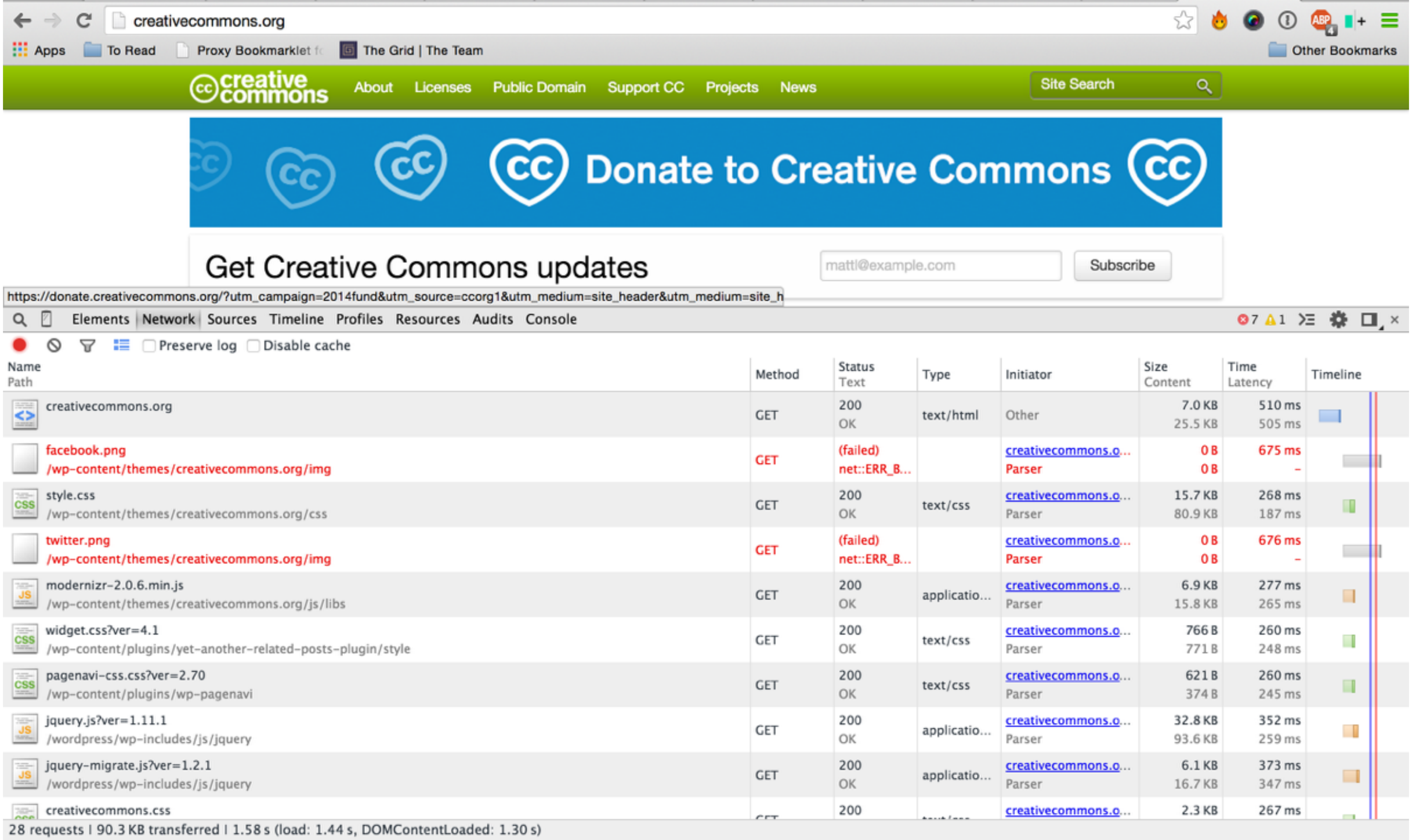


Rendered Page

Document Object Model (DOM)




```
topbar span {
  float: left;
  display: block;
  height: 40px;
  width: 150px;
  cursor:
pointer;
  z-index: 1;
  top:
```


creativecommons.org
Apps
To Read
Proxy Bookmarklet
The Grid | The Team
Other Bookmarks
creative commons
About
Licenses
Public Domain
Support CC
Projects
News
Site Search
Donate to Creative Commons
Get Creative Commons updates
matti@example.com
Subscribe
https://donate.creativecommons.org/?utm_campaign=2014fund&utm_source=ccorg1&utm_medium=site_header&utm_medium=site_h
Elements
Network
Sources
Timeline
Profiles
Resources
Audits
Console
Preserve log
Disable cache
Name
Path
Method
Status
Text
Type
Initiator
Size
Content
Time
Latency
Timeline
creativecommons.org
GET
200
OK
text/html
Other
7.0 KB
25.5 KB
510 ms
505 ms
facebook.png
/wp-content/themes/creativecommons.org/img
GET
(failed)
net::ERR_B...
creativecommons.o...
Parser
0 B
0 B
675 ms
-
style.css
/wp-content/themes/creativecommons.org/css
GET
200
OK
text/css
creativecommons.o...
Parser
15.7 KB
80.9 KB
268 ms
187 ms
twitter.png
/wp-content/themes/creativecommons.org/img
GET
(failed)
net::ERR_B...
creativecommons.o...
Parser
0 B
0 B
676 ms
-
modernizr-2.0.6.min.js
/wp-content/themes/creativecommons.org/js/libs
GET
200
OK
applicatio...
creativecommons.o...
Parser
6.9 KB
15.8 KB
277 ms
265 ms
widget.css?ver=4.1
/wp-content/plugins/yet-another-related-posts-plugin/style
GET
200
OK
text/css
creativecommons.o...
Parser
766 B
771 B
260 ms
248 ms
pagenavi-css.css?ver=2.70
/wp-content/plugins/wp-pagenavi
GET
200
OK
text/css
creativecommons.o...
Parser
621 B
374 B
260 ms
245 ms
jquery.js?ver=1.11.1
/wordpress/wp-includes/js/jquery
GET
200
OK
applicatio...
creativecommons.o...
Parser
32.8 KB
93.6 KB
352 ms
259 ms
jquery-migrate.js?ver=1.2.1
/wordpress/wp-includes/js/jquery
GET
200
OK
applicatio...
creativecommons.o...
Parser
6.1 KB
16.7 KB
373 ms
347 ms
creativecommons.css
200
creativecommons.o...
2.3 KB
267 ms
28 requests | 90.3 KB transferred | 1.58 s (load: 1.44 s, DOMContentLoaded: 1.30 s)

HTTP Request

method url version

```
GET /index.html HTTP/1.1
```

```
Host: www.example.com

User-Agent: Mozilla/5.0

Accept: text/xml,application/
xml,application/xhtml+xml,text/html*/*

Accept-Language: en-us

Accept-Charset: ISO-8859-1,utf-8

Connection: keep-alive
```

request headers

```
<blank line>
```

en.wikipedia.org/wiki/Hypertext_Transfer_Protocol#Example_session

GET *vs* POST

retrieve representations of resources

no side effects

no data in request body

upload data from the browser to server

returns information from the server

side effects are likely

data contained in request body

HTTP Response

version status code text explanation

```
HTTP/1.1 200 OK
```

```
Date: Mon, 23 May 2005 22:38:34 GMT
Server: Apache/1.3.3.7 (Unix) (Red-Hat/Linux)
Content-Type: text/html; charset=UTF-8
Content-Length: 131
```

response headers

```
<!DOCTYPE html>
<html>
…
</html>
```

content

en.wikipedia.org/wiki/Hypertext_Transfer_Protocol#Example_session

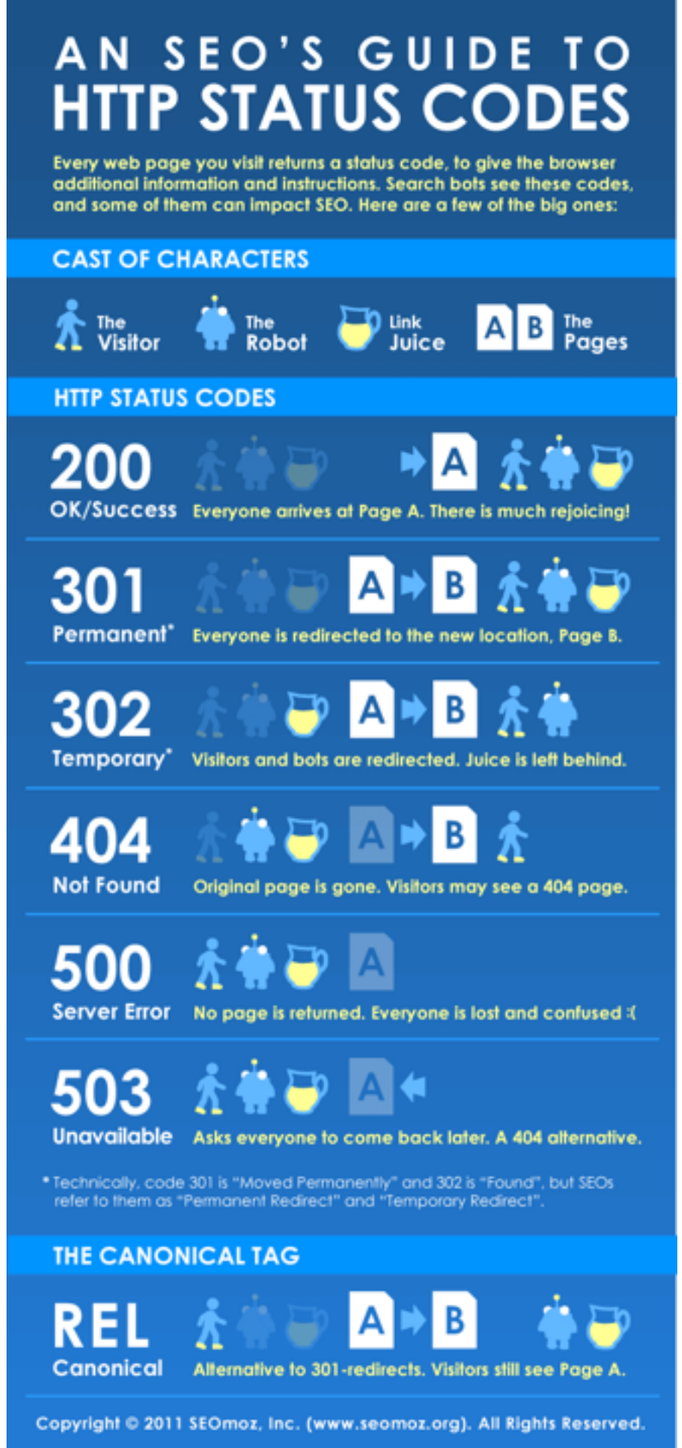
HTTP Response

```
HTTP/1.1 200 OK
Date: Mon, 23 May 2005 22:38:34 GMT
Server: Apache/1.3.3.7 (Unix) (Red-Hat/Linux)
Content-Type: text/html; charset=UTF-8
Content-Length: 131

<!DOCTYPE html>
<html>
…
</html>
```

MIME Type

en.wikipedia.org/wiki/Hypertext_Transfer_Protocol#Example_session



HTTP STATUS CODES

moz.com/learn/seo/http-status-codes

HTTPS

More details in Security lecture

request and response messages are transmitted securely using encryption

Ajax

AJAX

Asynchronous JavaScript and XML

send and receive data without reloading page

Before, every user interaction required the complete page to be reloaded

AJAX

Issue HTTP request to the server from Javascript

Process response with Javascript in the browser

AJAX TECHNOLOGIES

HTML and CSS

DOM

XML

`XMLHttpRequest` object

JavaScript

JSON

AJAX doesn’t require XML

JSON has become de facto standard data interchange format

lightweight and simple format

types: Number, String, Boolean, Array, Object, **`null`**

objects are key/value pairs

JSON CODE EXAMPLE

```
{
  "camelids": [
    {
      "name": "llama",
      "height": 1.8
    },
    {
      "name": "alpaca",
      "height": 0.9
    }
  ]
}
```

look familiar?

XMLHttpRequest

```
var xhr = new XMLHttpRequest();
xhr.onreadystatechange = xhrHandler;
xhr.open('get', 'llama.json');
xhr.send(null);
```

http://www.w3.org/TR/XMLHttpRequest/

XMLHttpRequest

```
function xhrHandler() {
   if (xhr.readyState == 4
         && xhr.status == 200) {
      var data = JSON.parse(xhr.responseText);
      myFunction(data);
   }
};
```

CODEPEN

AJAX CHALLENGES

hard to go back to a particular state

`URL fragment identifier`

content retrieved by AJAX not easily indexable

The same origin policy prevents some Ajax techniques from being used across domains

`JSONP`

callback-style programming is hard to maintain/test

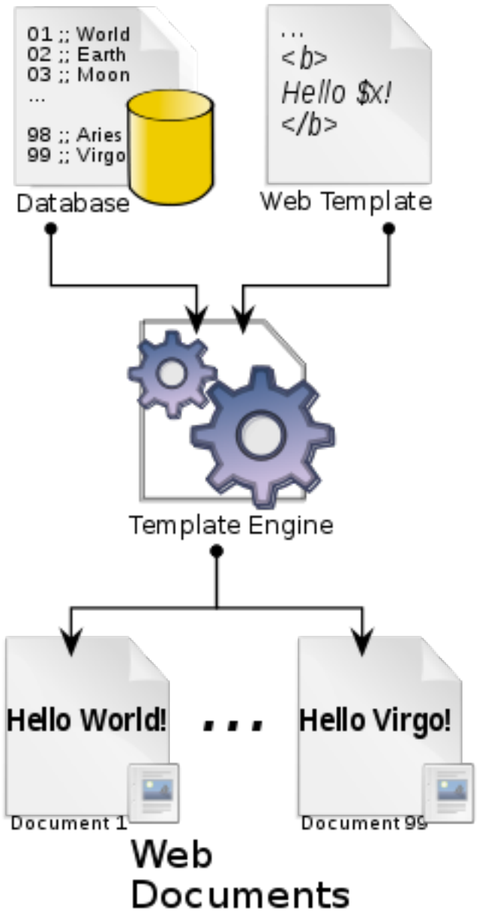
Client-side Templating

TEMPLATES

common way to generate dynamic HTML for multi-page web sites and apps

separation of markup and data (content)

SERVER-SIDE TEMPLATES



server puts HTML and data together and sends it to the browser

platforms like Rails, PHP, JSP

http://www.w3.org/TR/XMLHttpRequest/

CLIENT-SIDE TEMPLATES

browser receives HTML and data and puts it together

server serves templates and data required by the templates

made popular by AJAX

Model View Controller

MODEL VIEW CONTROLLER (MVC)

introduced in 1970s as part of SmallTalk

popular in desktop UI development (C++, Java)

more recently introduced to the Web

mental model makes it easier to extend, maintain, and test apps

MODEL VIEW CONTROLLER (MVC)

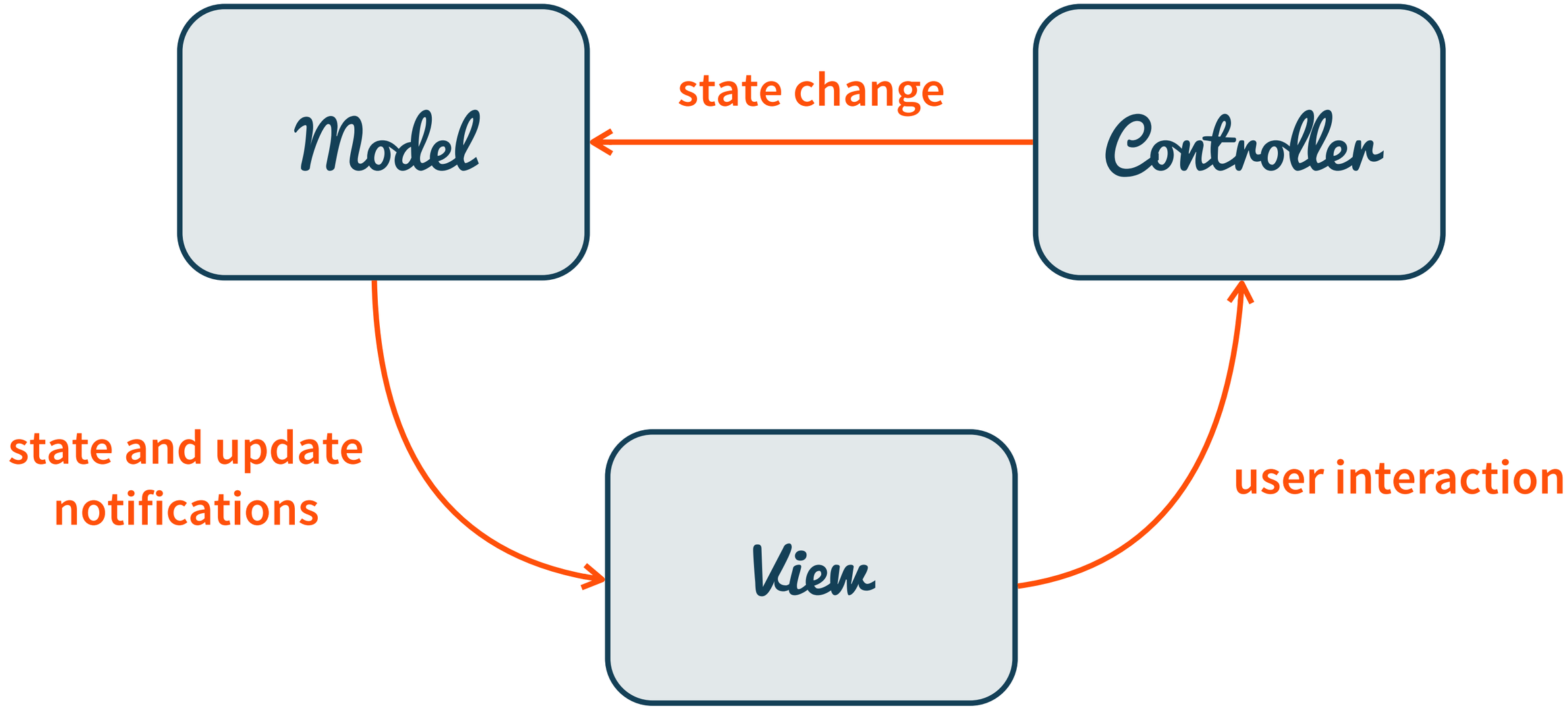
Separation between

Model managing data

Controller application logic

View presenting the data

MODEL VIEW CONTROLLER (MVC)



MVC CHALLENGE

non-trivial to get the data into the correct state, both in the *View* and in the *Model*

Data Binding

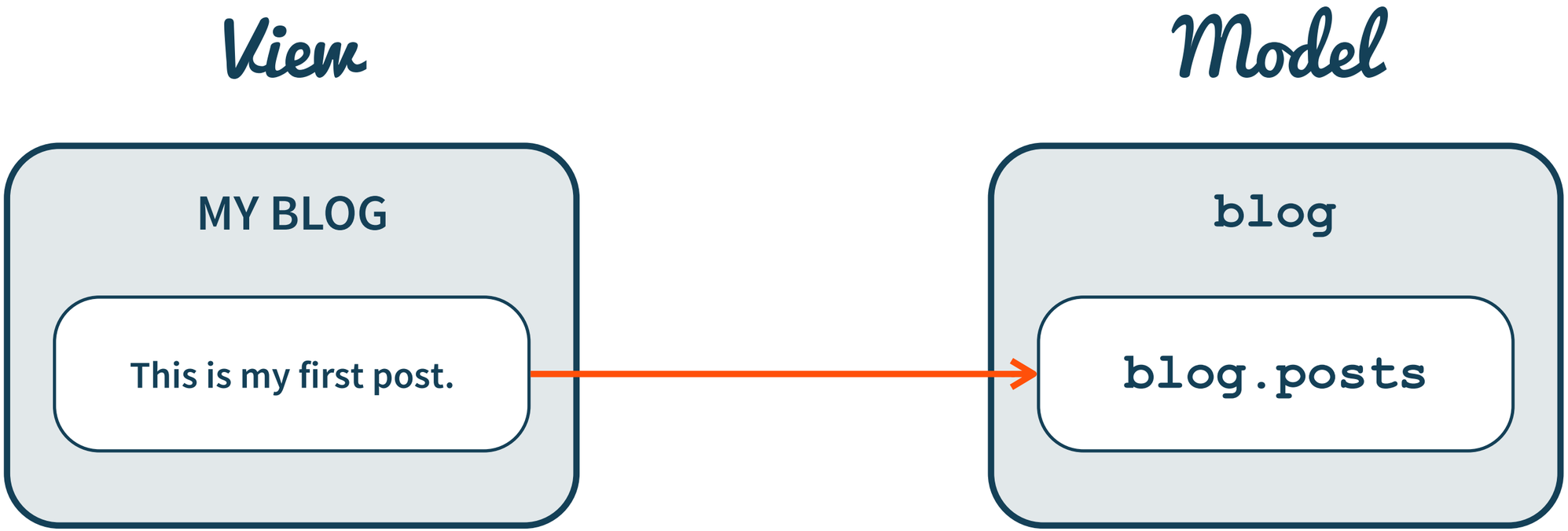
Just declare mapping between *View* and *Model* and have them **sync automatically**?

DATA BINDING

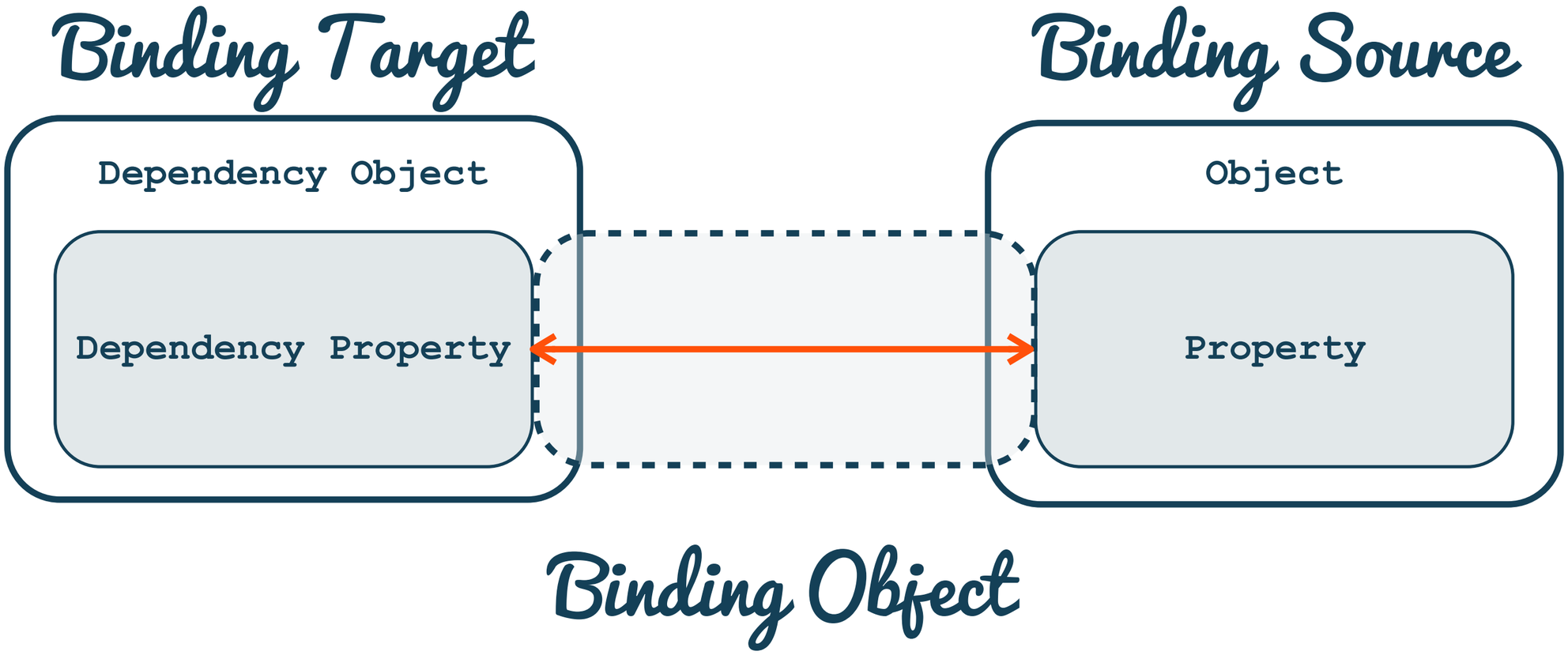
automatically keep state in View and Model in sync

frameworks provide scaffolding to eliminate a lot of code

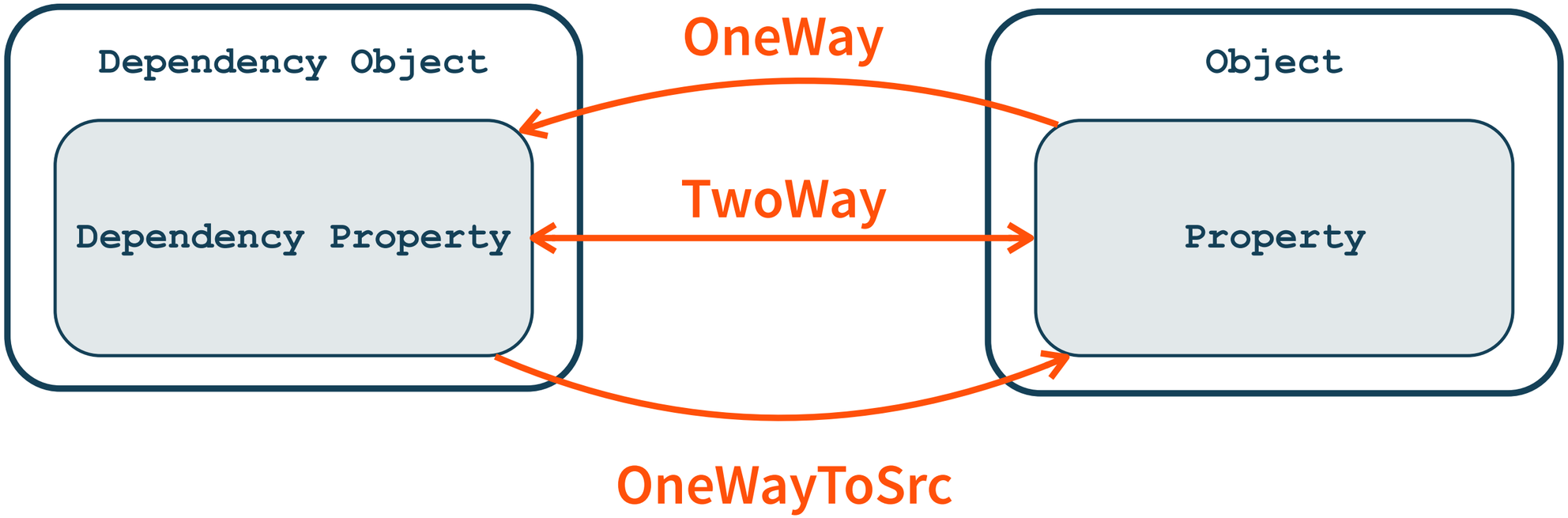
EXAMPLE



MENTAL MODEL



MENTAL MODEL



NEXT CLASS: ANGULARJS

courses.engr.illinois.edu/cs498rk1/