

Web Development for Data Science

cs380

Geoff Towell

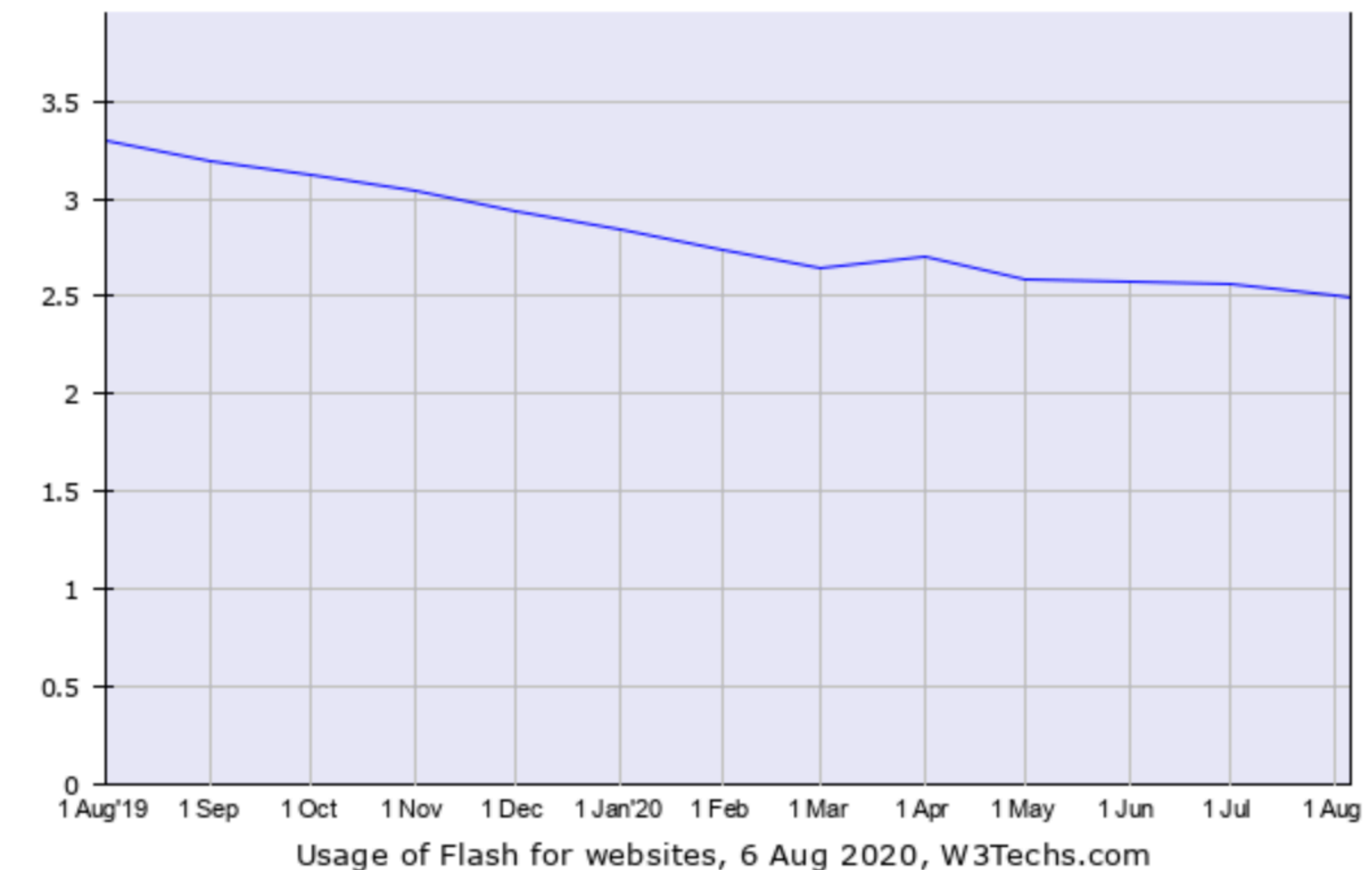
The Course

Topics

- HTML
 - JQuery and JavaScript
 - XML
- PHP and server-side programming
- SQL
- Android Apps

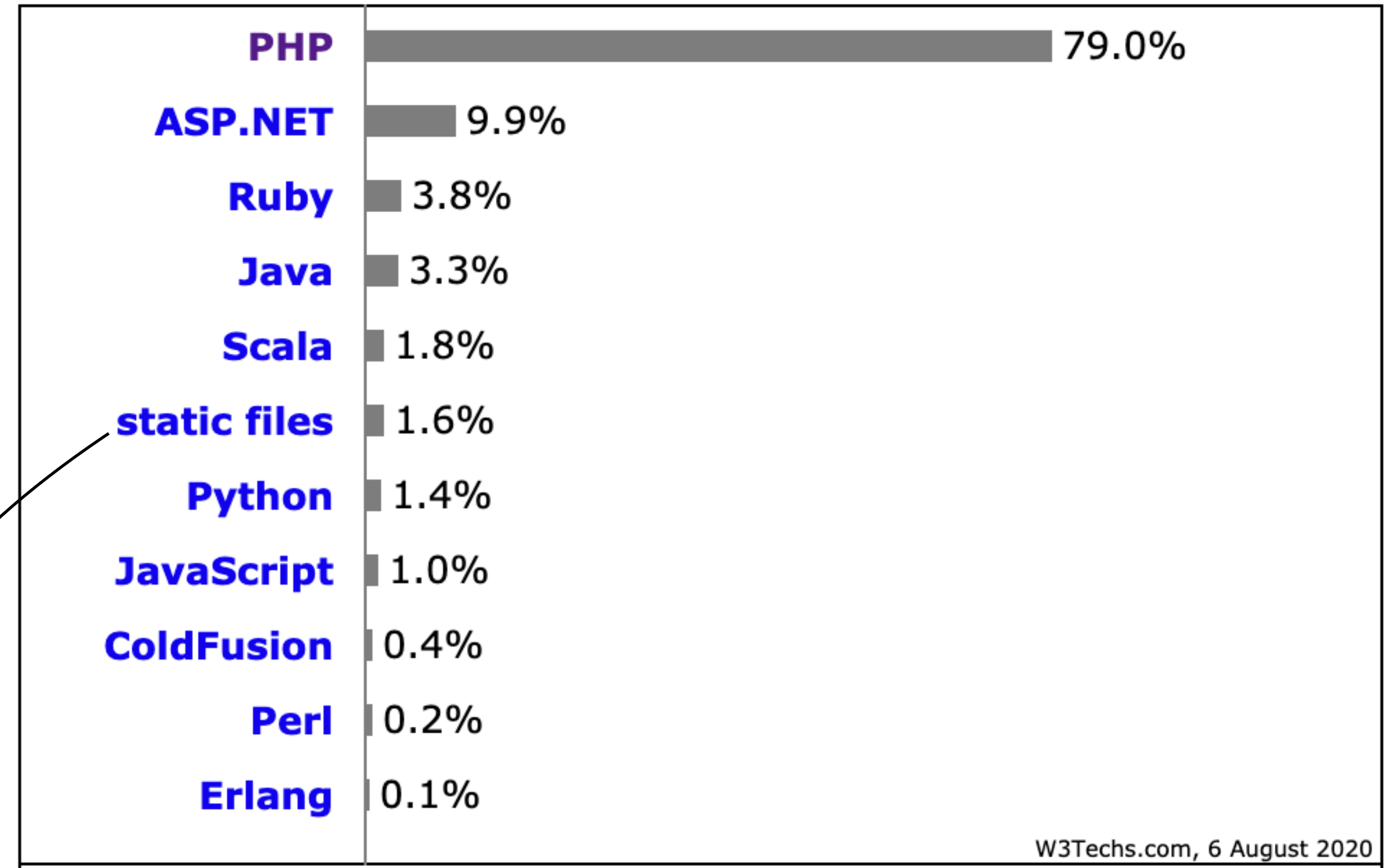
Why these topics

- HTML
 - 90% of web pages
 - Other 10% are XHTML
- JavaScript (which is not java)
 - Allows custom behavior of web pages **after load** on client side
 - 96.5% of sites that have client-side programs use JavaScript
 - 2.5% use flash — (this used to be higher, why?)
 - Java applets
 - Deprecated in Java as of v9 (2017).
 - JQuery — a JavaScript library
 - 97.5% of pages that use Javascript libraries use JQuery (and 76% overall)



Topics

- PHP
 - The dominant server-side programming language
 - Facebook uses it
 - highly customized
 - they are moving away from it



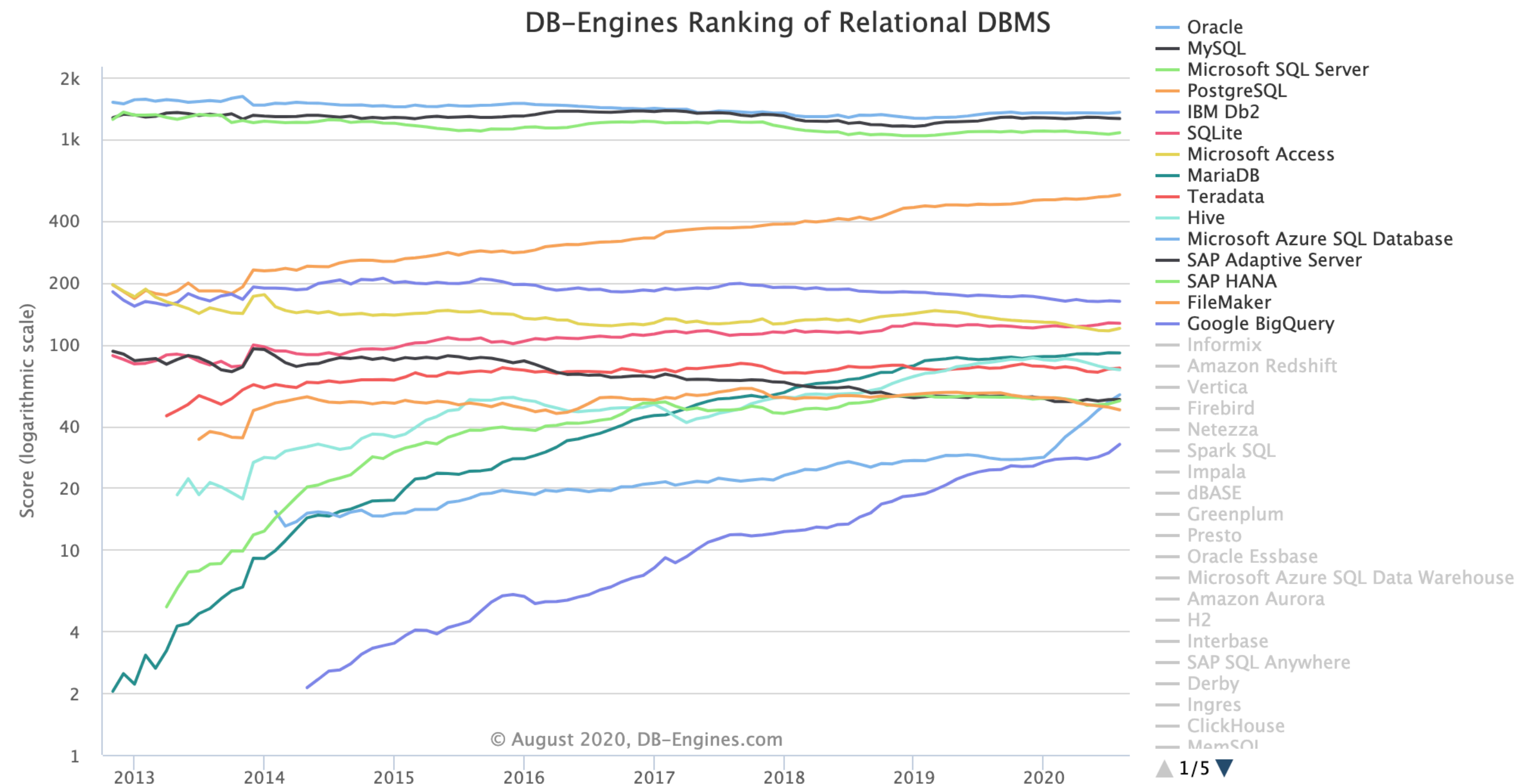
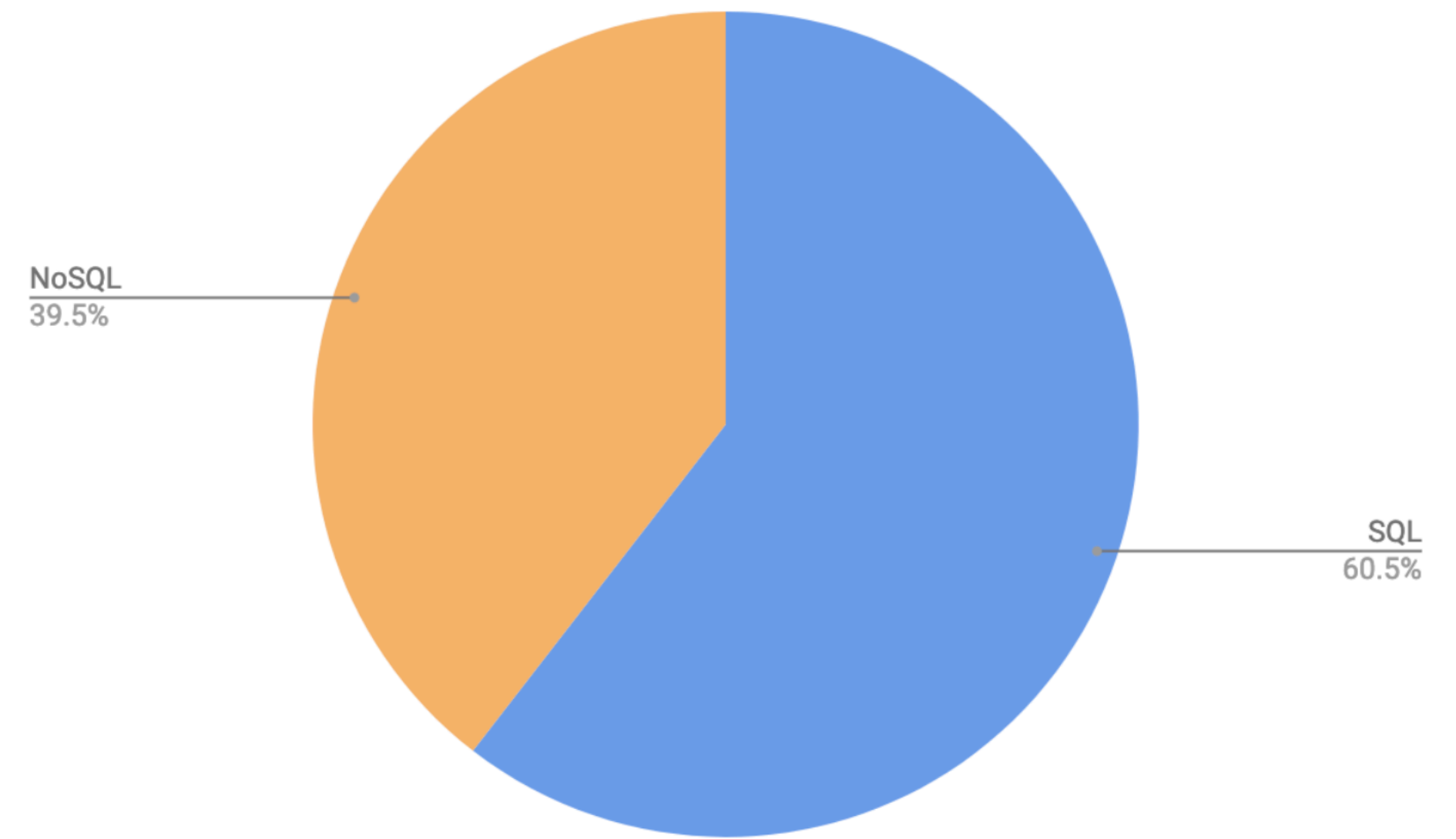
FILE: helloworld.php

```
<html>
<head>
  <title>PHP Test</title>
</head>
<body>
  <?php echo '<p>Hello World</p>'; ?>
</body>
</html>
```

Note that this suggests that only 1.6% of the content you see is just sitting there waiting to be shown

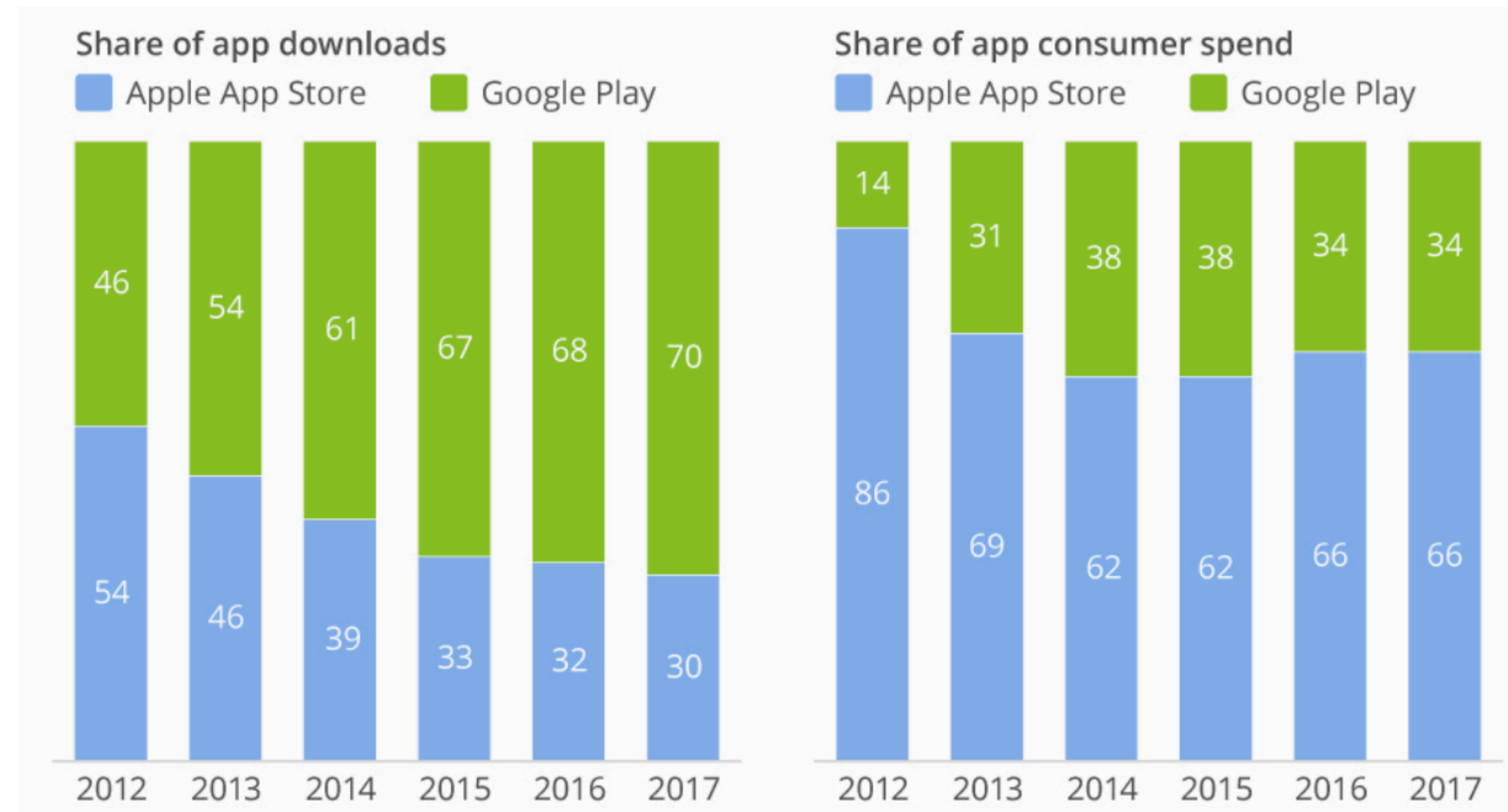
Topics (continued)

- SQL
 - ~~Structured Query Language~~ (sequel! since it was the successor to another data query language)
 - Oracle, MySQL, Postgres, SQL Server, ...
 - Alternative is NoSQL (not only SQL)
 - To use NoSQL need to know SQL
 - MongoDB, Cassandra, ...
 - SQLite
 - On all android devices
- ALL data storage and retrieval in this course will use SQL
 - except, maybe XML



Topics (Still!)

- Android Apps
 - The development tools are available on windows, macOS and Linux.
 - It is a little easier to deploy apps to actual devices
 - Android uses Java and all of you know Java



The Course

Approximate Syllabus

- Sep 10: Intro/html
- Sep 14,17: SQL and databases
- Sep 21,24: Intro to serverside programming / PHP
- Sep 28, Oct 1, 5, 8: HTML and Javascript,
 - JQuery, JSON
- Oct 12,15,19,22: Return to serverside programming
 - cookies
- Oct 26,29, Nov 2, 5, 9 : More on databases and SQL and XML/XPath
- Nov 12, ...: Android Apps

Grading

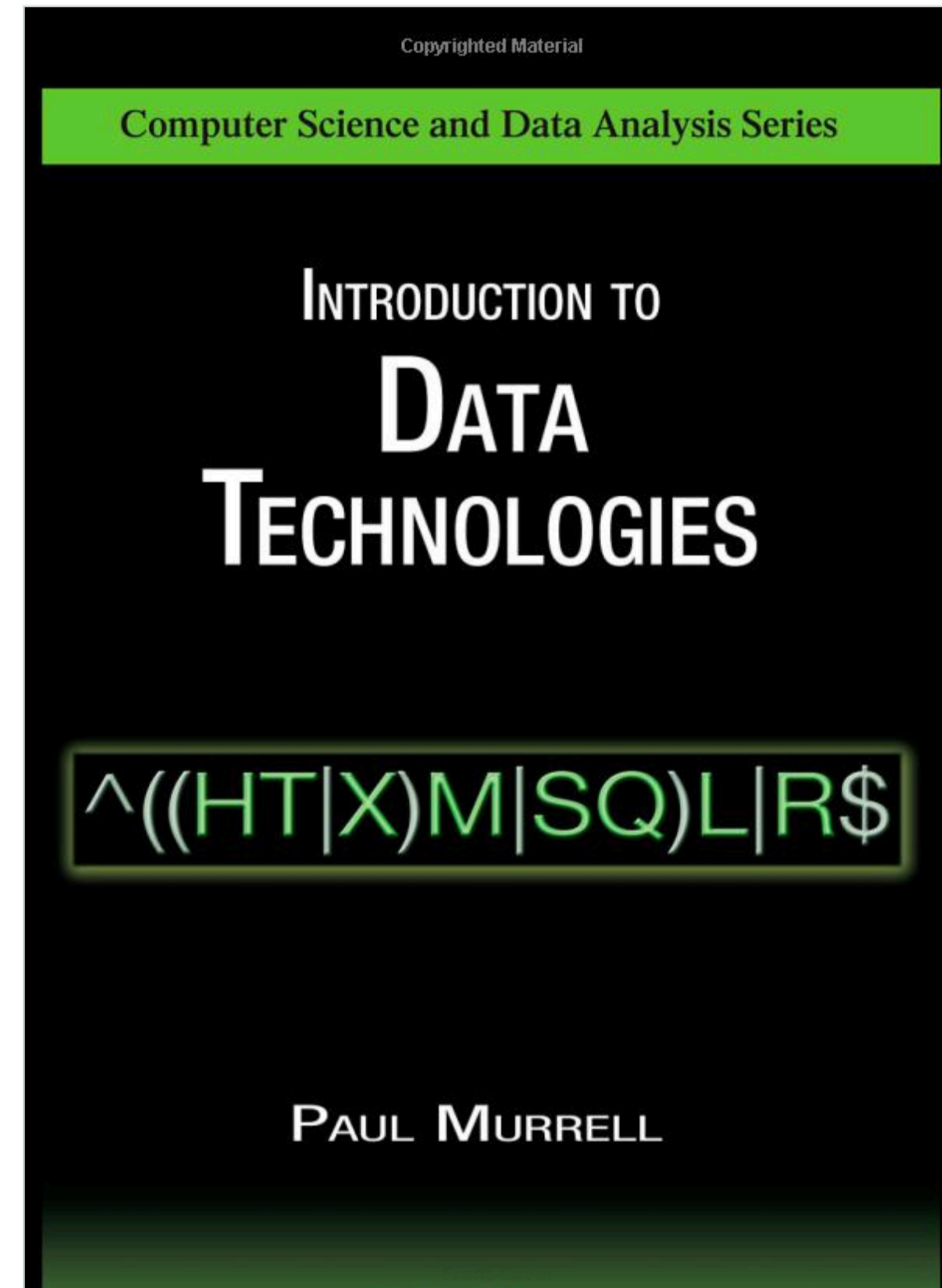
- 3, 1 week individual projects
 - 21%
- 3, 3 week small group projects (groups are 1-3 people)
 - 1 group presentation (10 minutes) on group project 1 or 2
 - Approximately 1/2 of groups will present on project 1, and 1/2 will present on project 2
 - Groups may change after each project, BUT for project 2 groups must be either all presented in P1 or all did not present in P1.
 - 20% each + 4% for presentation
- 2, 3-5 minute presentations to the class on a topic I assign (2 slides max)
 - 8%
- Class participation / Labs
 - 7%
 - Class participation will consist of asking good questions and responding when I ask questions. Responses need not be correct, but they must be rational (or really funny).
 - Constant lateness will annoy me.

Labs

- will “formally” occur immediately after class in the CS department lab rooms.
 - if you prefer to do the labs somewhere/somewhen else that is fine.
- Labs must be submitted by 11:59pm Thursday.
 - Send email to gtowell380@cs.brynmawr.edu
- Labs need not be completed for full credit; rather a credible effort must be made
- Do not spend more than 90 minutes on labs

TextBook

- We will cover only the first 200 pages. No discussion of R. PHP instead
- Use the syllabus to determine what to read.
- I will not expect you to have really mastered the material in the book before lectures. However, I do expect you to come prepared to think, ask questions and opine intelligently.
- This book gives good introductions. We will use other sources for more details



Presentation and Preparation

- Keep them separate!
 - As much as possible
- Consider two java programs: that print the same line of text

```
private static final String RESULT_FORMAT="%5s+%5s+%5s=%-10s\n";
public static void f1(String[] aa) {
    StringBuffer bb = new StringBuffer();
    for (String a3 : aa) {
        bb.append(a3);
    }
    System.out.print(String.format(RESULT_FORMAT,
        aa[0], aa[1], aa[2], bb.toString()));
}
```

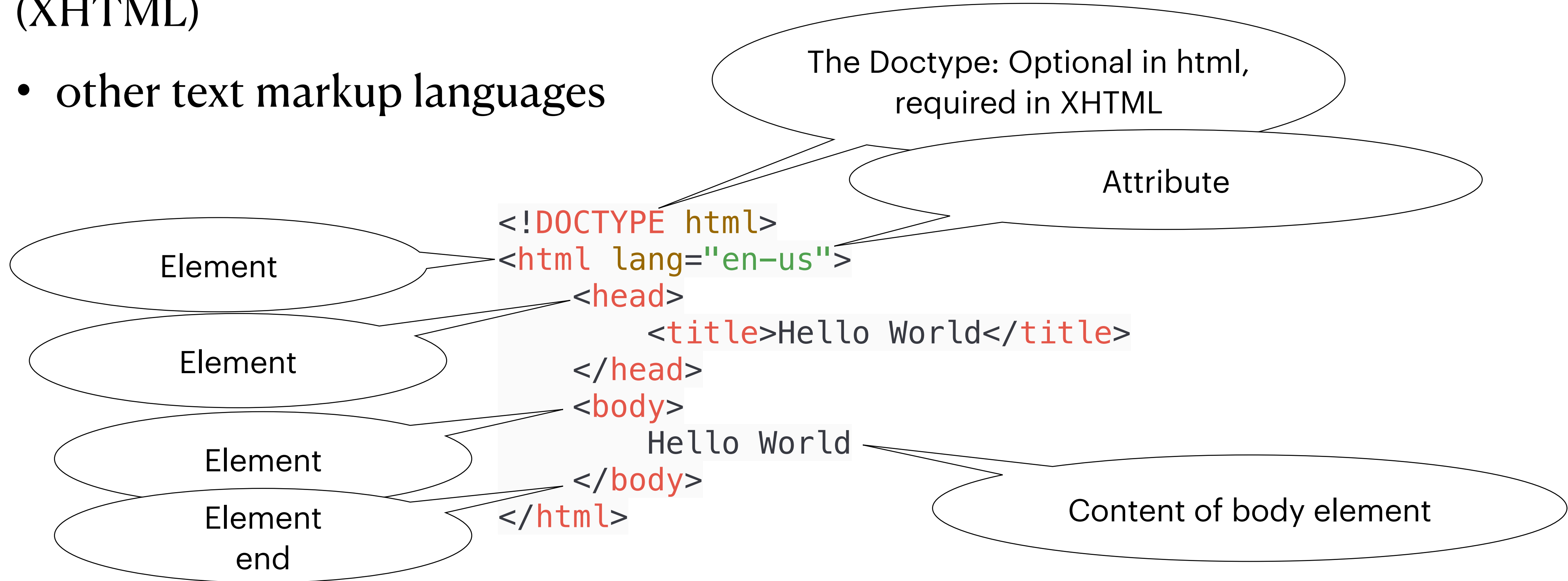
```
public static void f2(String[] aa) {
    StringBuffer bb = new StringBuffer();
    for (String a3 : aa) {
        if (!a3.equals(aa[0]))
            System.out.print("+");
        bb.append(a3);
        for (int i=0; i<5-a3.length(); i++)
            System.out.print(" ");
        System.out.print(a3);
    }
    System.out.print("=" + bb.toString());
    System.out.println();
}
```

Event Driven programs

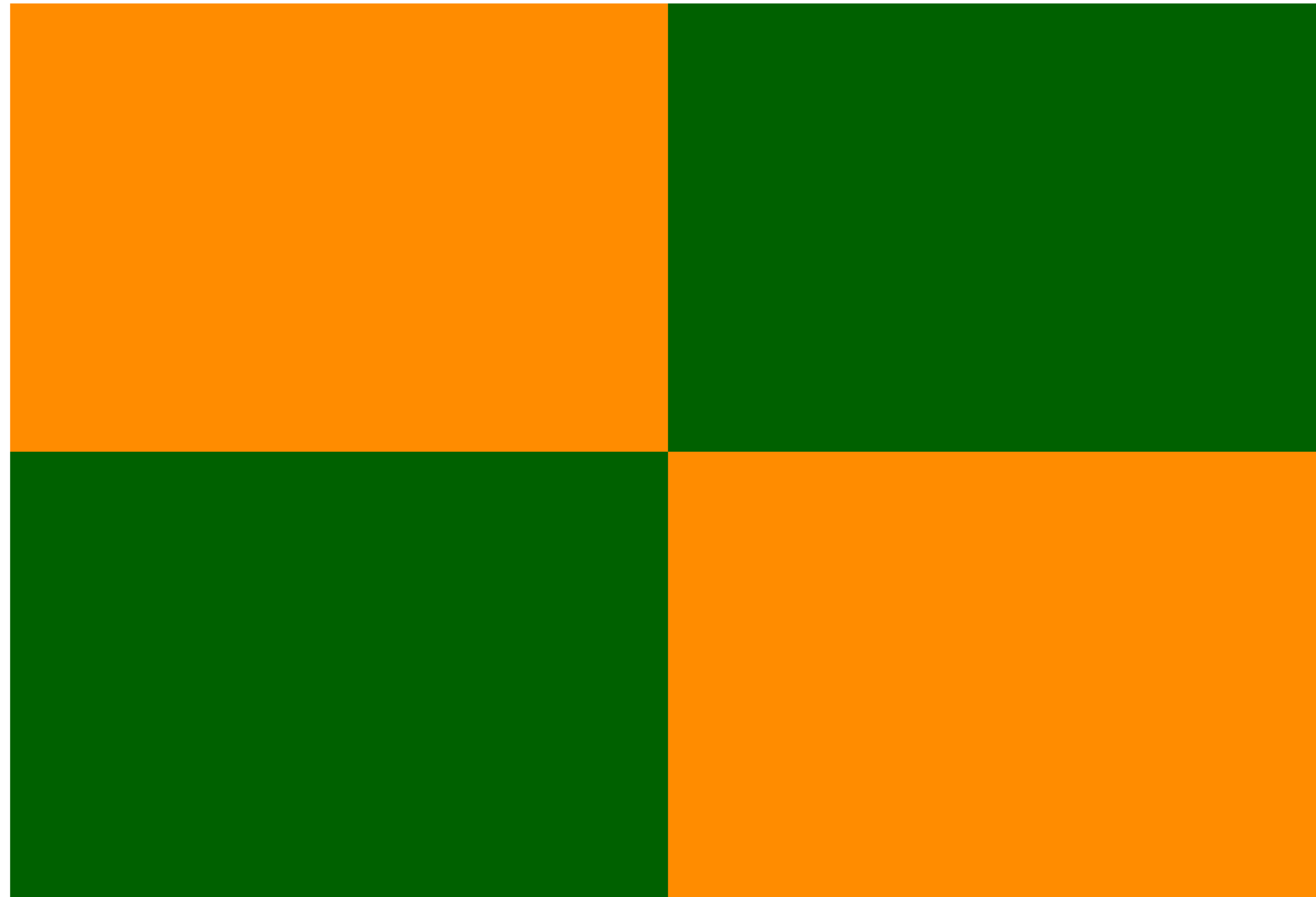
- Many of the programs you will write this semester:
- E-D programs look like:
 - While true:
 - if event e:
 - find all things r registered to handle e
 - apply e to r
- So until event occurs, the program does nothing.
- Types of events
- Event-driven programs and multi-threading

HTML

- Hyper Text Markup Language (XHTML)
- other text markup languages



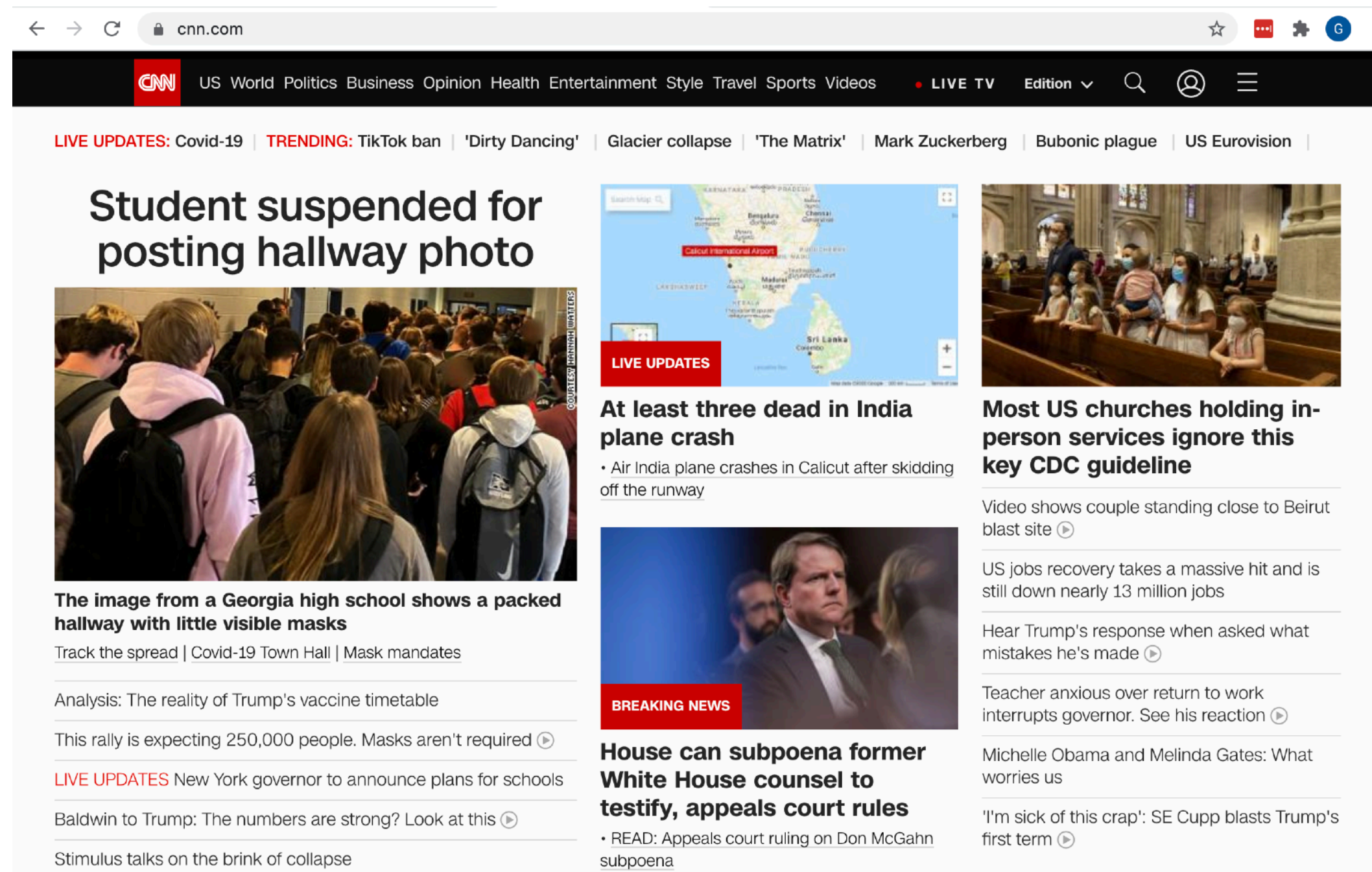
HTML checkerboard



Go through checker1-1e and checker2-2e

Customizing HTML

- Earlier said that only 1.6% of html is “static pages”. Why?
 - Note that the checkerboards are all static in the sense that the html served is always the same, this despite the fact that it changes depending on size of screen



Customizing — How

- Change format of content after it is received on client-side
 - Using javascript and most often, JQuery
- Change what gets sent
 - The trick is “request headers”
 - These are data sent along with the URL that can control the response from the server.

```
:authority: www.cnn.com
:method: GET
:path: /
:scheme: https
accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,image/apng,*/*;q=0.8,application/signed-exchange;v=b3;q=0.9
accept-encoding: gzip, deflate, br
accept-language: en-US,en;q=0.9
cache-control: no-cache
cookie: ug=5cd3fcd30911380a3f92ba0015dc9934; s_fid=009D965D4CFCE24C-1B4F77AC8F8BC89F; s_vi=[CS]v1|2E69FE6A0507C723-6000010D8002380A[CE];
_cb=BGwzTQCNJYyKzJo1; __gads=ID=44121b0177b19614:T=1557396694:S=ALNI_Ma5_oxHAUX7BCh7wqFKKRsvHeXMQ; bfp_sn_rf_8b2087b102c9e3e5ffed1c1478ed8b78=Direct/External; bfp_sn_rt_8b2087b102c9e3e5ffed1c1478ed8b78=1557418006142; bafp=71ceecb1-7274-11e9-9a60-e984e8c6d74b; _v__chartb
...

```

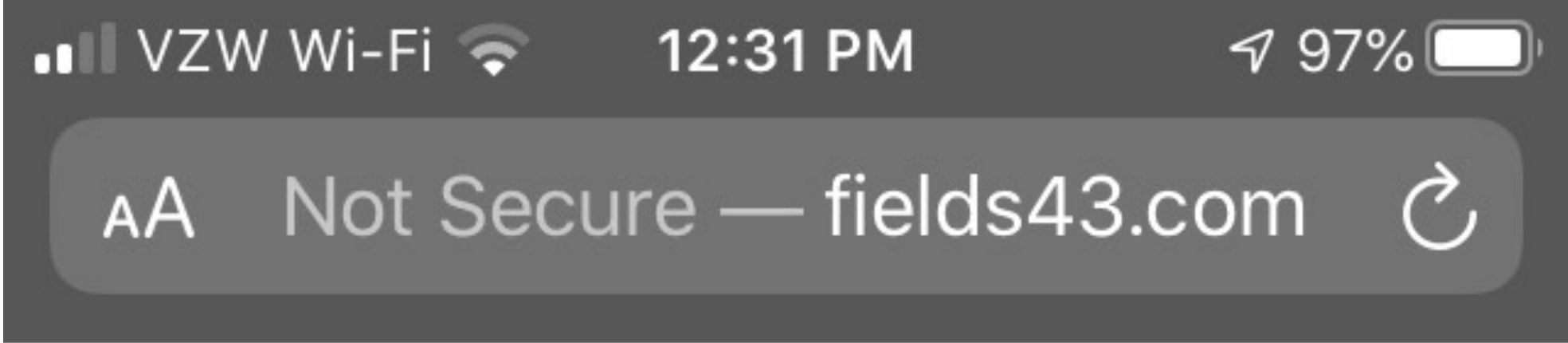
```
596815983280.11011111110111111.BMj5JCA71\sf965iB4mBjLCGLvao.4; ta-octane.id=7d006219-02ca-4c13-8cae-181e8fc89eb6|97363561-eb58-4142-86a4c1f3a0490fb|1596816163996|
pragma: no-cache
sec-fetch-dest: document
sec-fetch-mode: navigate
sec-fetch-site: none
sec-fetch-user: ?1
upgrade-insecure-requests: 1
user-agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_5) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/84.0.4147.105 Safari/537.36
```


Request Headers

Computer: Chrome

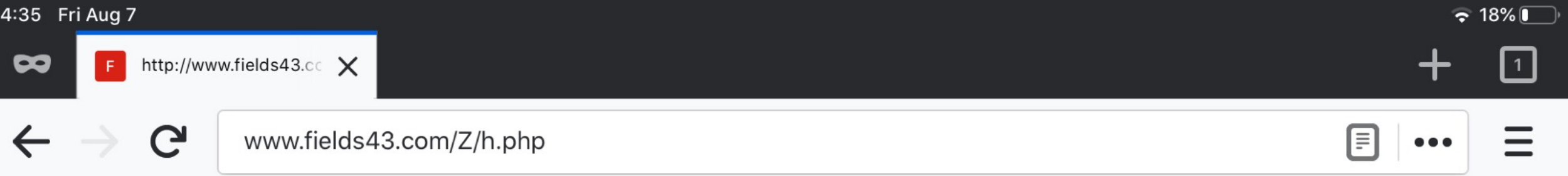
```
Host: www.fields43.com
Connection: keep-alive
Cache-Control: max-age=0
Upgrade-Insecure-Requests: 1
User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_5) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/84.0.4147.105 Safari/537.36
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,image/apng,*/*;q=0.8,application/signed-exchange;v=b3;q=0.9
Accept-Encoding: gzip, deflate
Accept-Language: en-US,en;q=0.9
```

iPhone: safari



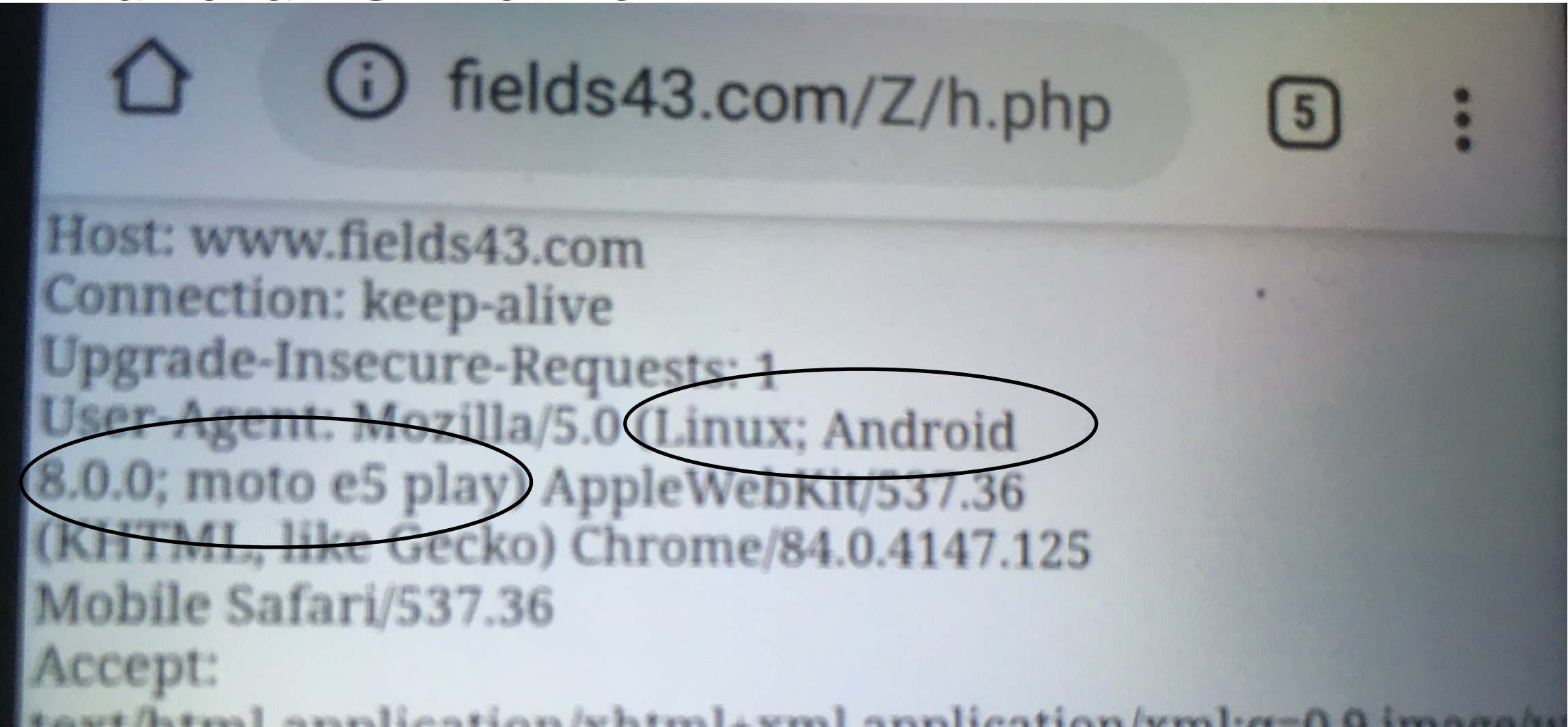
```
Host: www.fields43.com
Upgrade-Insecure-Requests: 1
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
User-Agent: Mozilla/5.0 (iPhone; CPU iPhone OS 13_3 like Mac OS X) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/13.0.4 Mobile/15E148 Safari/604.1
Accept-Language: en-us
Accept-Encoding: gzip, deflate
Connection: keep-alive
```

iPad: Firefox



```
Host: www.fields43.com
Upgrade-Insecure-Requests: 1
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
User-Agent: Mozilla/5.0 (iPad; CPU OS 13_5_1 like Mac OS X) AppleWebKit/605.1.15 (KHTML, like Gecko) FxiOS/13.2b11866 Mobile/15E148 Safari/605.1.15
Accept-Language: en-us
Accept-Encoding: gzip, deflate
Connection: keep-alive
```

Android: Chrome



```
Host: www.fields43.com
Connection: keep-alive
Upgrade-Insecure-Requests: 1
User-Agent: Mozilla/5.0 (Linux; Android 8.0.0; moto e5 play) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/84.0.4147.125 Mobile Safari/537.36
Accept:
```