

Developer Tools

CSCI 1720
Intermediate Web

East Tennessee State University
Department of Computing



CSCI 1720
Intermediate Web Design

1

Eliminate (some of) the Guesswork

Browsers have a built-in set of tools that can be used to assist in development

Chrome, Firefox, Opera, IE, others

The amount of information accessible through the tools is extensive

East Tennessee State University
Department of Computing



CSCI 1720
Intermediate Web Design

2

Eliminate (some of) the Guesswork

This lecture uses Google Chrome's developer tools for examples and screenshot

(It's the one I'm most familiar with)

But all have the same functionality

East Tennessee State University
Department of Computing



CSCI 1720
Intermediate Web Design

3

Elements

Looking at the Document Object Model

East Tennessee State University
Department of Computing



CSCI 1720
Intermediate Web Design

4

The DOM

Remember, the browser exists as a hierarchical series of objects

The Developer Tools give us a view of the structure of a given page

...and the styling that is applied to each element

East Tennessee State University
Department of Computing



CSCI 1720
Intermediate Web Design

5

The DOM

<https://csci1720.net/examples/dom/dom.html>

East Tennessee State University
Department of Computing



CSCI 1720
Intermediate Web Design

6

```

1 <doctype html>
2 <html>
3 <head>
4   <meta charset="utf-8">
5 </head>
6 <body>
7
8   <div class="A">
9     <span class="lab">A</span>
10
11     Lorem ipsum dolor sit amet, gravida facilisi orci nulla.
    Erat dolor, sagittis blandit, maecenas quis mi suscipit,
    risus enim tincidunt erat. Eu justo, senectus ut mattis
    laoreet et. Nec ultricies ultricies laculis non asperiores
    urna, nec ut dolor dignissim, sodales purus pretium eget,
    wisi integer molestie arcu platea, urna ut in ipsum
    laoreet. Aenean fusce donec, arcu elit, placerat arcu
    laoreet libero eu vitae.
12
13   </div>
14   <div class="B">
15     <span class="lab">B</span>
16
17     Lorem ipsum dolor sit amet, gravida facilisi orci nulla.
    Erat dolor, sagittis blandit, maecenas quis mi suscipit,
    risus enim tincidunt erat. Eu justo, senectus ut mattis
    laoreet et. Nec ultricies ultricies laculis non asperiores
    urna, nec ut dolor dignissim, sodales purus pretium eget,
    wisi integer molestie arcu platea, urna ut in ipsum
    laoreet. Aenean fusce donec, arcu elit, placerat arcu
    laoreet libero eu vitae.
18
19   </div>
20
21 </body>
22 </html>

```

East Tennessee State
Department of Computing

CSCI 1720
Intermediate Web Design

7

```

1 <doctype html>
2 <html>
3 <head>
4   <meta charset="utf-8">
5 </head>
6 <body>
7   <div class="A">
8     <span class="lab">A</span>
9
10     Lorem ipsum dolor sit amet, gravida facilisi orci
    nulla. Erat dolor, sagittis blandit, maecenas quis mi suscipit,
    risus enim tincidunt erat. Eu justo, senectus ut mattis laoreet
    et. Nec ultricies ultricies laculis non asperiores urna, nec ut
    dolor dignissim, sodales purus pretium eget, wisi integer
    molestie arcu platea, urna ut in ipsum laoreet. Aenean fusce
    donec, arcu elit, placerat arcu laoreet libero eu vitae.
11
12   </div>
13   <div class="B"></div>
14 </body>
15 </html>

```

East Tennessee State
Department of Computing

CSCI 1720
Intermediate Web Design

8

```

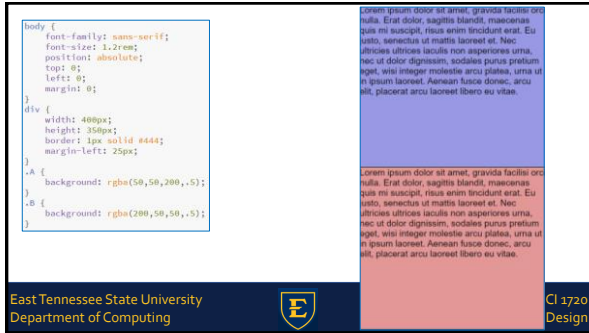
<style>
body {
  font-family: sans-serif;
  font-size: 1.2rem;
  margin: 0;
}
div {
  width: 400px;
  height: 350px;
  border: 1px solid #444;
  margin-left: 25px;
}
.A {
  background: #5050200,.5);
}
.B {
  background: #5050200,.5);
}
.lab {
  position: absolute;
  top: 10px;
  left: 10px;
  font-size: 2em;
}
</style>

```

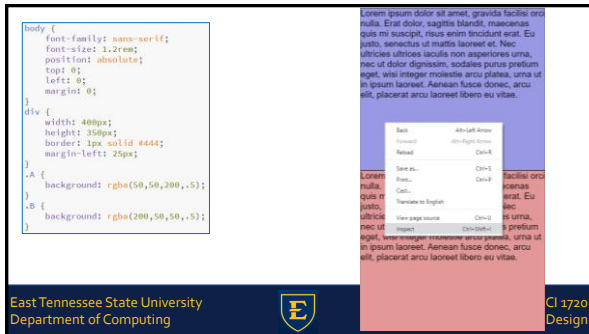
East Tennessee State University
Department of Computing

CSCI 1720
Intermediate Web Design

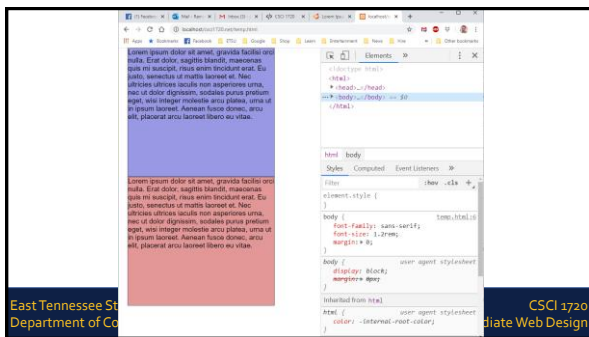
9



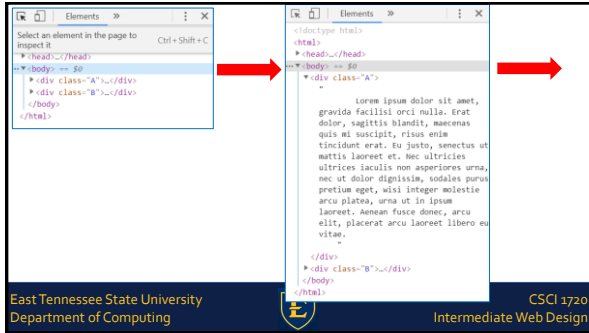
10



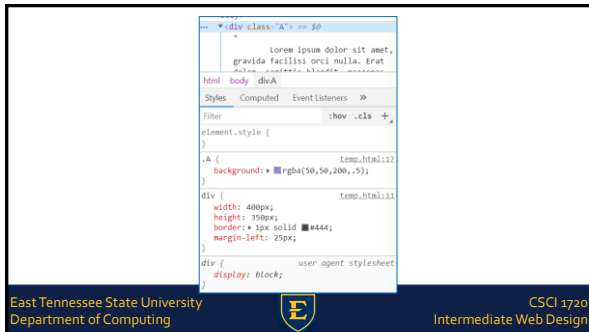
11



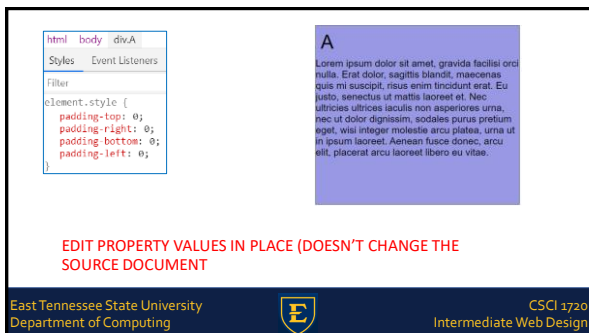
12



13



14



15

html body divA

Styles Event Listeners D

Filter

element.style {

padding-top: 10px;

padding-right: 10px;

padding-bottom: 10px;

padding-left: 20px;

}

A

Lorem ipsum dolor sit amet, gravida facilisi orci nulla. Erat dolor, sagittis blandit, maecenas quis mi suscipit, risus enim tincidunt erat. Eu justo, senectus ut mattis laoreet et. Nec ultricies ultricies laculis non asperiores urna, nec ut dolor dignissim, sodales purus pretium eget, wisi integer molestie arcu platea, urna ut in ipsum laoreet. Aenean fusce donec, arcu elit, placerat arcu laoreet libero eu vitae.

margin

border: 0.994

padding: 10

20 10 10 20

0.994

EDIT PROPERTY VALUES IN PLACE (DOESN'T CHANGE THE SOURCE DOCUMENT)

East Tennessee State University
Department of Computing



CSCI 1720
Intermediate Web Design

16

BUT ... ONCE YOU HAVE THE ELEMENT DISPLAYING THE WAY YOU WANT IT TO, YOU CAN COPY THOSE SETTINGS IN TO THE SOURCE DOCUMENT

html body divA

Styles Event Listeners D

Filter

element.style {

padding-top: 10px;

padding-right: 10px;

padding-bottom: 10px;

padding-left: 20px;

}

html body divA

Styles Event Listeners

Filter

element.style {

padding-top: 10px;

padding-right: 10px;

padding-bottom: 10px;

padding-left: 20px;

}

div {

width: 400px;

height: 350px;

border: 1px solid #444;

margin-left: 25px;

padding-top: 10px;

padding-right: 10px;

padding-bottom: 10px;

padding-left: 20px;

}

East Tennessee State University
Department of Computing



CSCI 1720
Intermediate Web Design

17

A

Lorem ipsum dolor sit amet, gravida facilisi orci nulla. Erat dolor, sagittis blandit, maecenas quis mi suscipit, risus enim tincidunt erat. Eu justo, senectus ut mattis laoreet et. Nec ultricies ultricies laculis non asperiores urna, nec ut dolor dignissim, sodales purus pretium eget, wisi integer molestie arcu platea, urna ut in ipsum laoreet. Aenean fusce donec, arcu elit, placerat arcu laoreet libero eu vitae.

.A {

position: absolute;

top: 0;

left: 0;

background: rgba(50,50,200,.5);

}

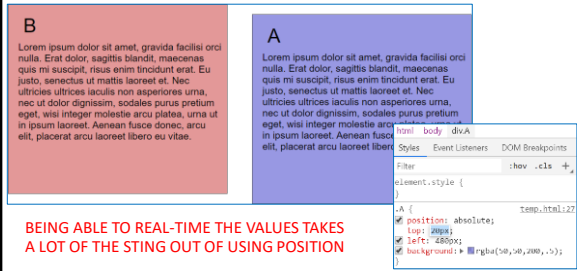
THE POSITION PROPERTY CAN BE A PAIN, BUT IS SOMETIMES NECESSARY

East Tennessee State University
Department of Computing



CSCI 1720
Intermediate Web Design

18



B

Lorem ipsum dolor sit amet, gravida facilisi orci nulla. Erat dolor, sagittis blandi, maecenas quis mi suscipit, risus enim tincidunt erat. Eu justo, senectus ut mattis laoreet et. Nec ultricies ultrices iaculis non asperiores uma, nec ut dolor dignissim, sodales purus pretium eget, wisi integer molestie arcu platea, urna ut in ipsum laoreet. Aenean fuscce donec, arcu elit, placerat arcu laoreet libero eu vitae.

A

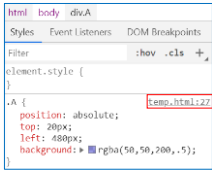
Lorem ipsum dolor sit amet, gravida facilisi orci nulla. Erat dolor, sagittis blandi, maecenas quis mi suscipit, risus enim tincidunt erat. Eu justo, senectus ut mattis laoreet et. Nec ultricies ultrices iaculis non asperiores uma, nec ut dolor dignissim, sodales purus pretium eget, wisi integer molestie arcu platea, urna ut in ipsum laoreet. Aenean fuscce donec, arcu elit, placerat arcu laoreet libero eu vitae.

BEING ABLE TO REAL-TIME THE VALUES TAKES A LOT OF THE STING OUT OF USING POSITION

East Tennessee State University
Department of Computing

CSCI 1720
Intermediate Web Design

19

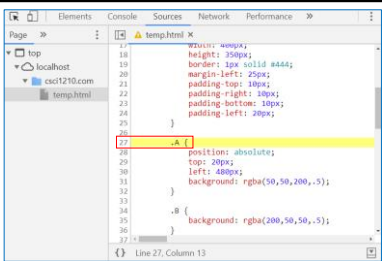


THE DEVELOPER TOOL SHOWS YOU WHERE IN THE SOURCE CODE A GIVEN ELEMENT IS DEFINED (MOST TIMES)

East Tennessee State University
Department of Computing

CSCI 1720
Intermediate Web Design

20



**East Tennessee State University
Department of Computing**

**CSCI 1720
Intermediate Web Design**

21

A

Lorem ipsum dolor sit amet, gravida facilis orci nulla. Erat dolor, sagittis blandit, maecenas quis mi suscipit, risus enim tincidunt erat. Eu justo, senectus ut mattis laoreet et. Nec ultricies ultricies iaculis non asperiores urna, nec ut dolor dignissim, sodales purus pretium eget, wisi integer molestie arcu platea, urna ut in ipsum laoreet. Aenean fusce donec, arcu elit, placerat arcu laoreet libero eu vitae.

YOU CAN ALSO MODIFY COLOR VALUES DYNAMICALLY

background: `rgba(170,50,250,0.7);`

Increment/decrement with mousewheel or up/down keys. Ctrl: ±100, Shift: ±10, Alt: ±0.1

East Tennessee State University
Department of Computing

CSCI 1720
Intermediate Web Design

22

AND ACCESS A COLOR-PICKER



East Tennessee State University
Department of Computing

CSCI 1720
Intermediate Web Design

23



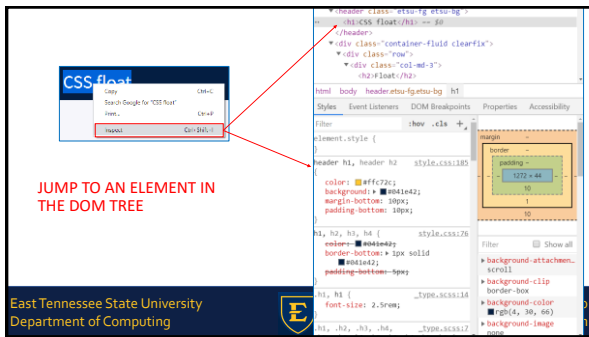
VIEW VALUES FOR RELATED PROPERTIES

```
html body divA
Styles Event Listeners DOM Breakpoints
Filter
element.style {
}
.A {
  position: absolute;
  top: 0;
  left: 0;
  background: rgba(227, 152, 152);
  background-image: initial;
  background-position-x: initial;
  background-position-y: initial;
  background-size: initial;
  background-repeat-x: initial;
  background-repeat-y: initial;
  background-attachment: initial;
  background-origin: initial;
  background-clip: initial;
  background-color: rgba(227, 152, 152);
}
```

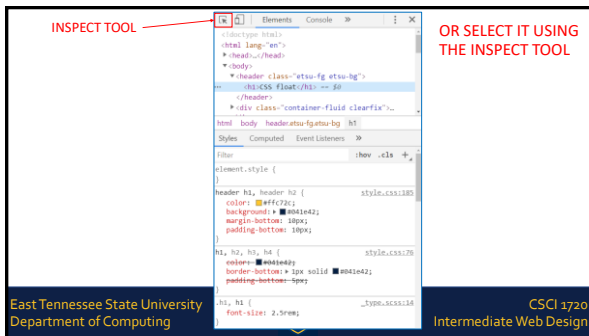
East Tennessee State University
Department of Computing

CSCI 1720
Intermediate Web Design

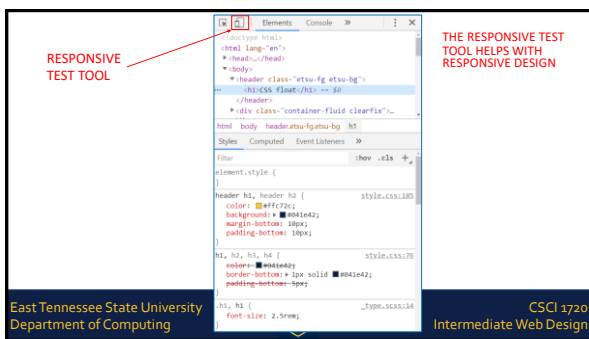
24



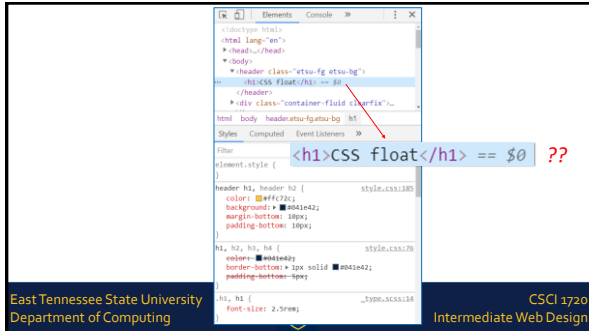
25



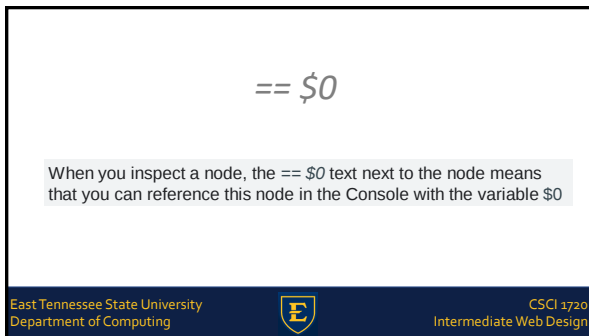
26



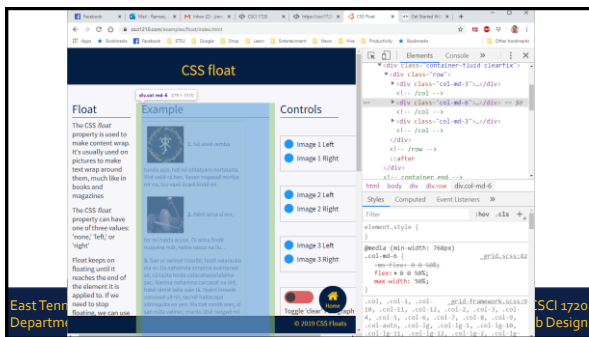
27



28



29



30

YOU CAN THEN EXPAND THE NODE FROM THAT POINT AND INSPECT ITS CHILDREN

East Tennessee State University
Department of Computing

1720
Design

31

IF YOU NEED TO REFER TO THE ELEMENT FREQUENTLY, YOU CAN STORE IT AS A GLOBAL VARIABLE

East Tennessee State University
Department of Computing

CSCI 1720
Intermediate Web Design

32

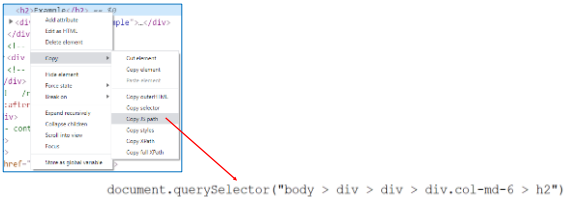
SOMETIMES, THE NODE YOU WANT TO INSPECT IS BURIED DEEP IN THE DOM TREE...

East Tennessee State University
Department of Computing

Intermediate Web Design

33

WHEN YOU'RE DEVELOPING JAVASCRIPT (WE'LL GET INTO THIS LATER), A REAL HANDY FEATURE IS COPYING THE JS PATH...



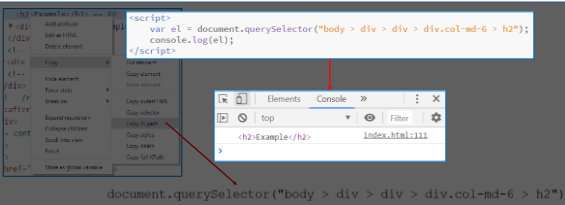
East Tennessee State University
Department of Computing



CSCI 1720
Intermediate Web Design

34

WHEN YOU'RE DEVELOPING JAVASCRIPT (WE'LL GET INTO THIS LATER), A REAL HANDY FEATURE IS COPYING THE JS PATH...



East Tennessee State University
Department of Computing



CSCI 1720
Intermediate Web Design

35

The Console

East Tennessee State University
Department of Computing



CSCI 1720
Intermediate Web Design

36

Console

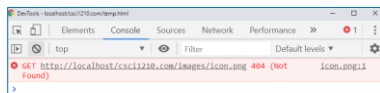
The console displays real-time output from the browser, when there is any

This includes load errors, such as a file that can't be located



37

Console



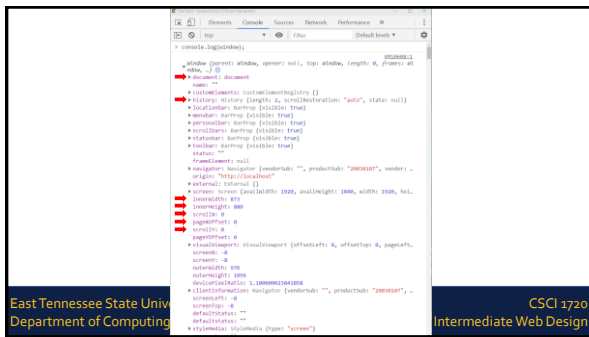
38

Console

We can also enter commands (typically JavaScript) directly into the console



39



East Tennessee State University
Department of Computing

CSCI 1720
Intermediate Web Design

40

Console

The console is of great use

Especially when we're adding/debugging JavaScript/jQuery code

East Tennessee State University
Department of Computing



CSCI 1720
Intermediate Web Design

41

Console

East Tennessee State University
Department of Computing



CSCI 1720
Intermediate Web Design

42

Sources

East Tennessee State University
Department of Computing



CSCI 1720
Intermediate Web Design

43

Sources

We had a quick look at the Sources tab a couple of minutes ago

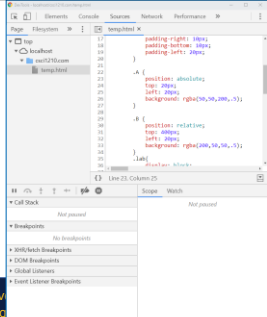
This tab lists all of the source files that the page uses

East Tennessee State University
Department of Computing



CSCI 1720
Intermediate Web Design

44



East Tennessee State University
Department of Computing



CSCI 1720
Intermediate Web Design

45

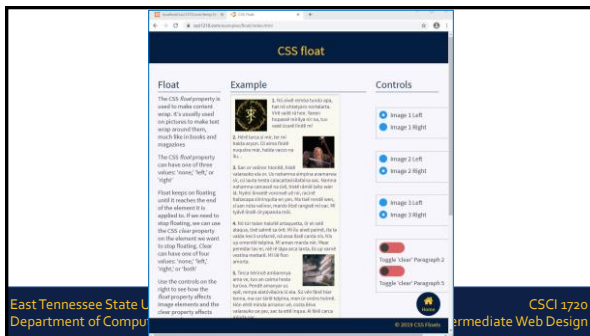
Sources

The temp page we're using is pretty basic

Let's look at the output for a page that's a little more involved



46

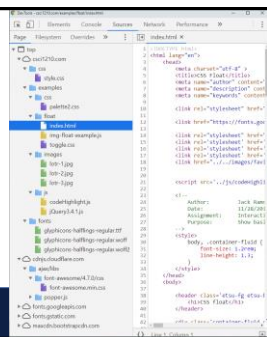


47

As you can see, there are a lot of sources that feed in to this page

This view can help locate errors or external sources that are not working/slowing things down

It is also used for running the JavaScript debugger



48

Network

East Tennessee State University
Department of Computing



CSCI 1720
Intermediate Web Design

49

Network

The Network tab provides a ton of information

By default, it shows the timeline of all the events that take place across the network

East Tennessee State University
Department of Computing



CSCI 1720
Intermediate Web Design

50

Network

In general, use the Network panel when you need to make sure that resources are being downloaded or uploaded as expected. The most common use cases for the Network panel are

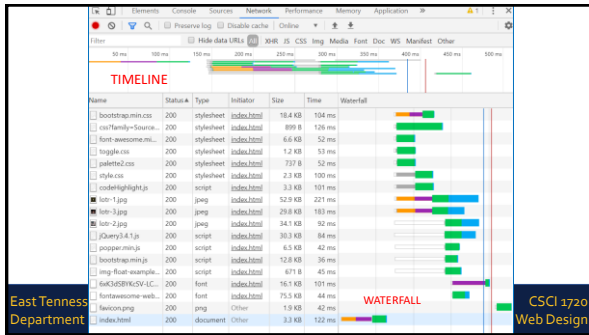
- Making sure that resources are actually being uploaded or downloaded at all
- Inspecting the properties of an individual resource, such as its HTTP headers, content, size, and so on

East Tennessee State University
Department of Computing

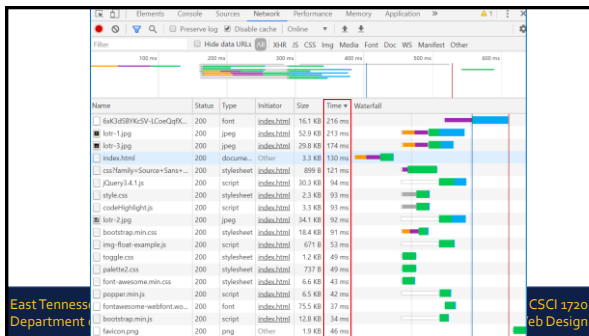


CSCI 1720
Intermediate Web Design

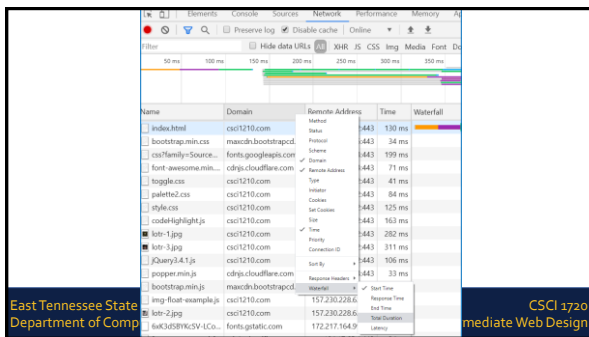
51



52



53



54

55



56



57



YOU CAN INSPECT A SEGMENT OF THE TIMELINE MORE CLOSELY

East Tennessee State University
Department of Computing

WATERFALL

CSCI 1720
Intermediate Web Design

58

...AND FILTER TO SPECIFIC RESOURCES

East Tennessee State University
Department of Computing

WATERFALL

CSCI 1720
Intermediate Web Design

59

PAGE HEADERS

East Tennessee State University
Department of Computing

WATERFALL

CSCI 1720
Intermediate Web Design

60

Audits

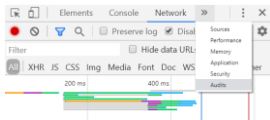
East Tennessee State University
Department of Computing



CSCI 1720
Intermediate Web Design

61

YOU CAN USE AUDITS TO CHECK THE PAGE'S PERFORMANCE AND GET
ADVICE ABOUT HOW TO IMPROVE IT



East Tennessee State University
Department of Computing



CSCI 1720
Intermediate Web Design

62



Audits

Identify and fix common problems that affect your site's performance, accessibility, and user experience.
[Learn more](#)



Device

☒ Mobile

☐ Desktop



Audits

☒ Performance

☒ Progressive Web App

☒ Best practices

☒ Accessibility

☒ SEO



Throttling

☐ Simulated Slow 4G, 4x CPU Slowdown

☒ Applied Slow 4G, 4x CPU Slowdown

☐ No throttling

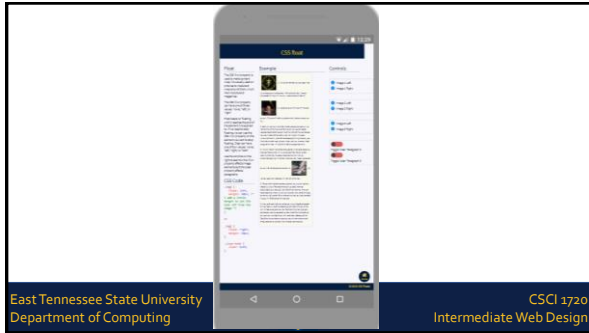
☒ Clear storage

[Run audits](#)

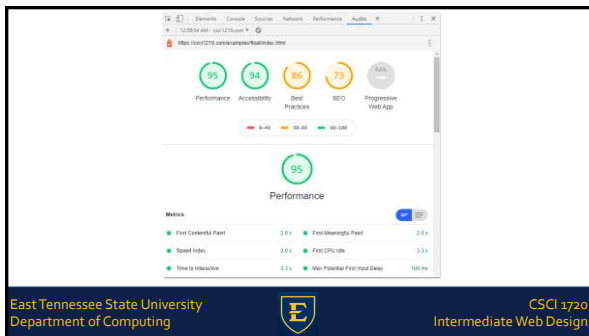
East Tennessee State University
Department of Computing

CSCI 1720
Intermediate Web Design

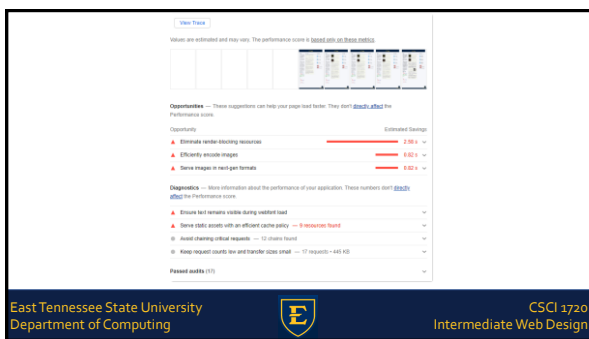
63



64



65



66

Accessibility

These checks highlight opportunities to [improve the accessibility](#) of your web page. Only a subset of accessibility issues can be automatically detected so manual testing is also encouraged.

Contrast — These are opportunities to improve the legibility of your content.

- Background and foreground colors do not have a sufficient contrast ratio

Additional items to manually check (1) — These items address areas which an automated testing tool cannot cover. Learn more in our guide on [conducting an accessibility review](#).

Passed audits (3)

Not applicable (25)

East Tennessee State University
Department of Computing

CSCI 1720
Intermediate Web Design

67

Best Practices

Does not use HTTPS for all of its resources — 10 requests not served via HTTPS

Includes front-end JavaScript libraries with known security vulnerabilities — 1 vulnerability detected

Passed audits (13)

East Tennessee State University
Department of Computing

CSCI 1720
Intermediate Web Design

68

SEO

These checks ensure that your page is optimized for search engine results ranking. There are additional factors Lighthouse does not check that may affect your search ranking. [Learn more](#)

Mobile Friendly — Mobile users may struggle to interact properly, resources don't have to be visible in order to read the content properly. [Learn more](#)

- Does not have a meta title (Lighthouse 1) tag with content of 30-55 characters
- Meta description (Lighthouse 1) tag is empty
- Document doesn't use https:// in alt text
- Text is missing because there's no viewport meta tag optimized for mobile screens
- The length is not sized appropriately
- The layout is not sized appropriately

Additional items to manually check (1) — Run these additional conditions on your site to check additional SEO best practices.

Passed audits (3)

Not applicable (2)

East Tennessee State University
Department of Computing

CSCI 1720
Intermediate Web Design

69

Runtime Settings	
URL	https://api2020.com/compute/rtds/index.html
Fetch time	Jan 18, 2020, 12:58:45 EST
Device	Emulated Nexus 5X
Network throttling	162.5 m HTTP RTT, 1.474 s Kbps down, 475 Kbps up (DevTools)
CPU throttling	50% (DevTools)
User agent (host)	Mozilla/5.0 (Android 10; 10.0; Mobile; rv:68.0) Gecko/68.0 Firefox/68.0 joomla-VM, Inc Chrome/70.0.3548.105 Safari/537.36
User agent (product)	Mozilla/5.0 (Android 10; 10.0; Mobile; rv:68.0) Gecko/68.0 Firefox/68.0 joomla-VM, Inc Chrome/70.0.3548.105 Safari/537.36 Chrome-Lighthouse
CPU/Memory Power	804



70

Sources

<https://developers.google.com/web/tools/chrome-devtools>



71

Copyrights



Presentation prepared by and copyright of John Ramsey,
East Tennessee State University, Department of
Computing . (ramseyjw@etsu.edu)

[illegible]

72