FORT HAYS STATE UNIVERSITY

Forward thinking. World ready.

Front-end development I

1

Introduction to front-end web development

Nicholas Caporusso

Department of Informatics

Robbins College of Business and Entrepreneurship

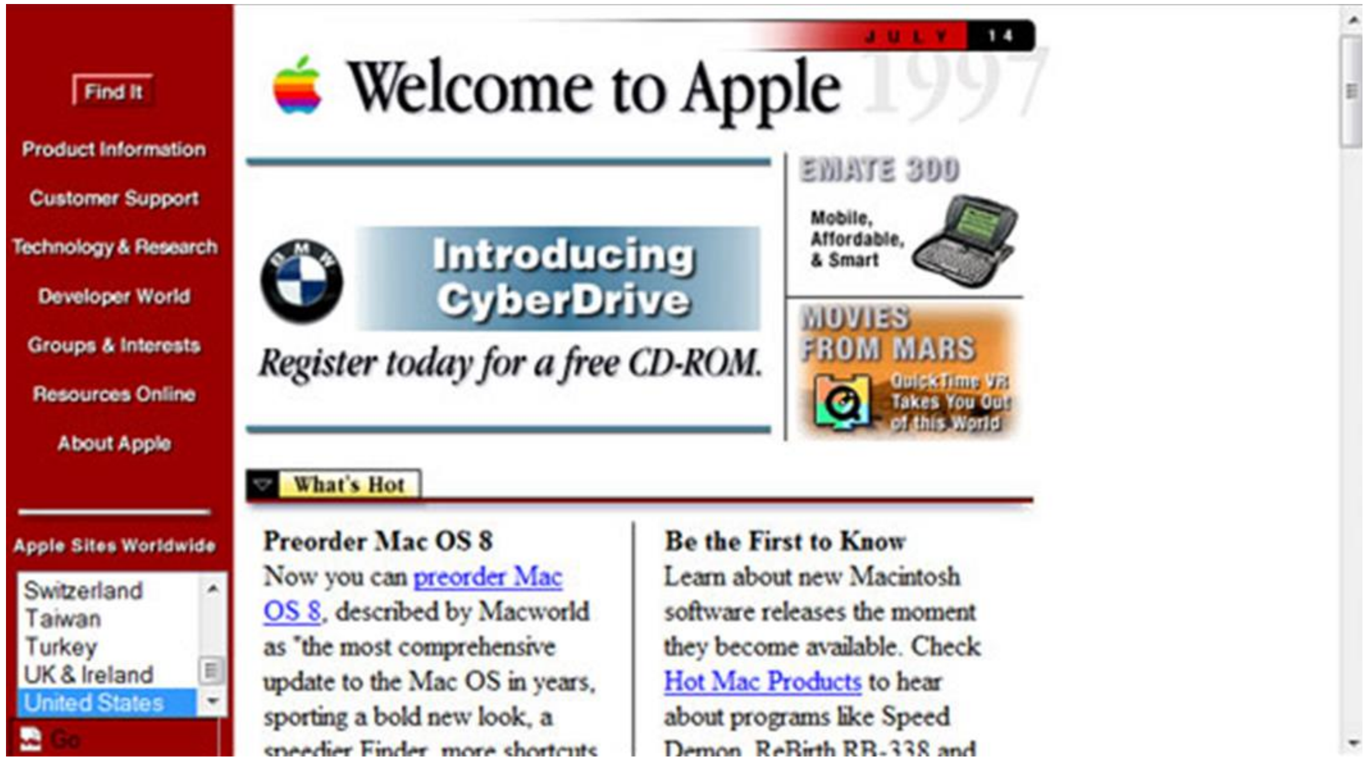
Agenda

1. Web design and development
2. Front-end development
3. Designing web interfaces
4. Inspecting and debugging

FHSU

Web design and development

The web in 1990



Find It
Product Information
Customer Support
Technology & Research
Developer World
Groups & Interests
Resources Online
About Apple

Apple Sites Worldwide

Switzerland
Taiwan
Turkey
UK & Ireland
United States

Go

JULY 14

Welcome to Apple 1997

Introducing CyberDrive

Register today for a free CD-ROM.

EMATE 300

Mobile, Affordable, & Smart

MOVIES FROM MARS

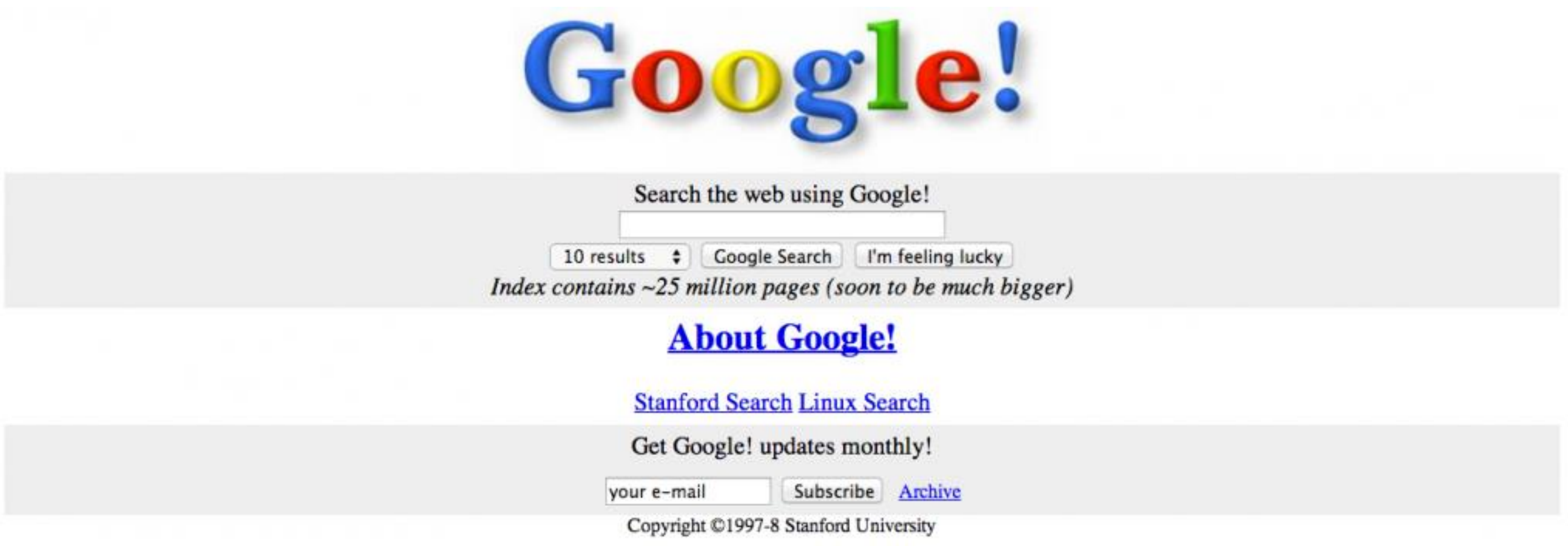
QuickTime VR Takes You Out of this World

What's Hot

Preorder Mac OS 8
Now you can preorder Mac OS 8, described by Macworld as "the most comprehensive update to the Mac OS in years, sporting a bold new look, a speedier Finder, more shortcuts

Be the First to Know
Learn about new Macintosh software releases the moment they become available. Check Hot Mac Products to hear about programs like Speed Demon, ReBirth RB-338 and

Google in 1997



Search the web using Google!

Index contains ~25 million pages (soon to be much bigger)

About Google!

Stanford Search Linux Search

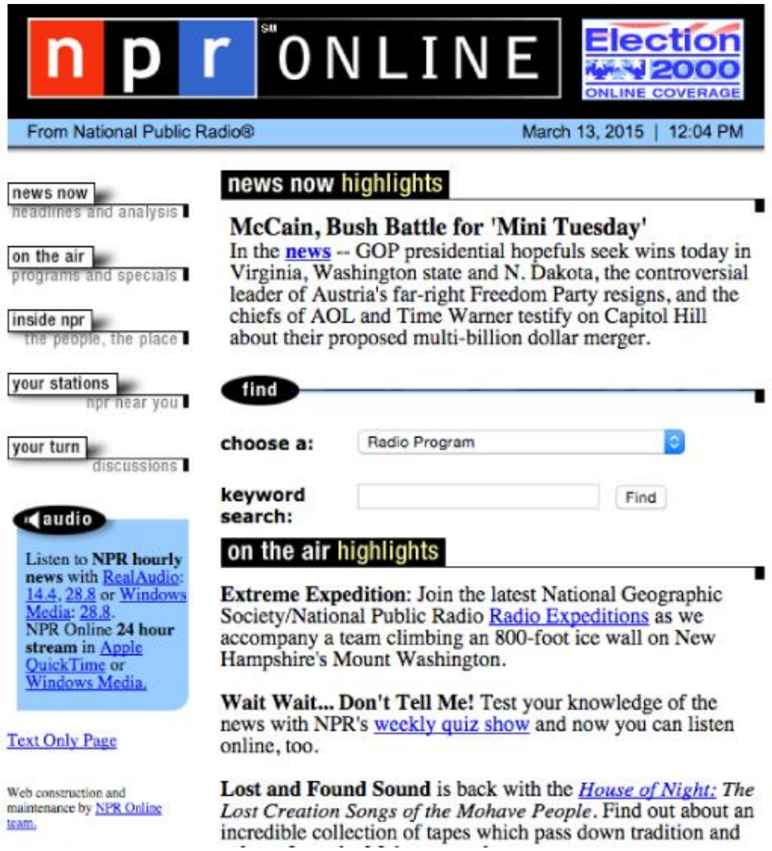
Get Google! updates monthly!

Copyright ©1997-8 Stanford University

FHSU

The web in 1999 (1/2)

- Mostly static pages
- Predominance of text
- No separation between content and appearance



From National Public Radio® March 13, 2015 | 12:04 PM

Listen to **NPR hourly news** with RealAudio: 14.4, 28.8 or Windows Media: 28.8.
NPR Online **24 hour stream** in Apple QuickTime or Windows Media.

Text Only Page

Web construction and maintenance by NPR Online team.

news now highlights

McCain, Bush Battle for 'Mini Tuesday'
In the news -- GOP presidential hopefuls seek wins today in Virginia, Washington state and N. Dakota, the controversial leader of Austria's far-right Freedom Party resigns, and the chiefs of AOL and Time Warner testify on Capitol Hill about their proposed multi-billion dollar merger.

find

choose a: Radio Program

keyword search: Find

on the air highlights

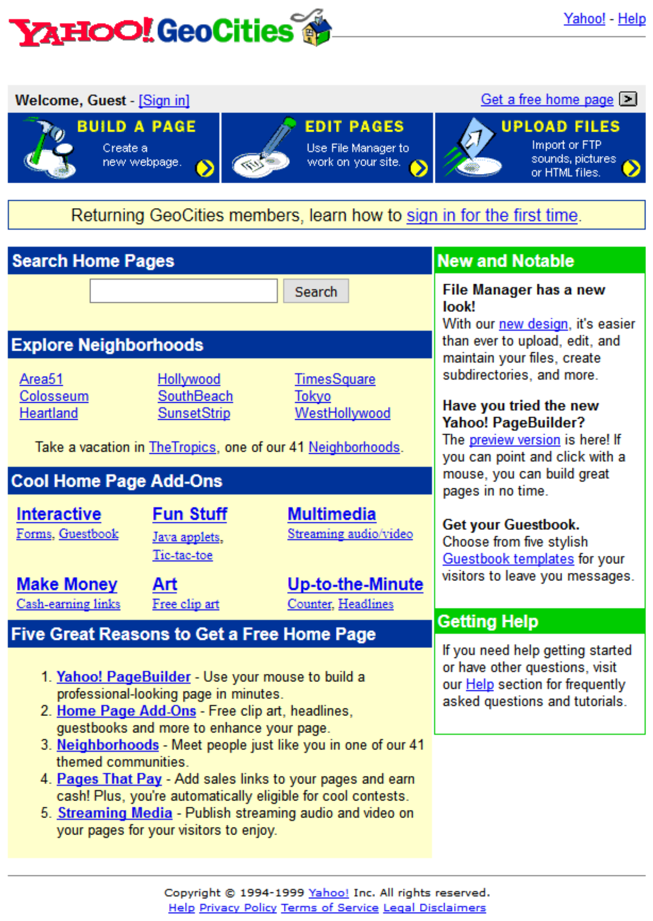
Extreme Expedition: Join the latest National Geographic Society/National Public Radio Radio Expeditions as we accompany a team climbing an 800-foot ice wall on New Hampshire's Mount Washington.

Wait Wait... Don't Tell Me! Test your knowledge of the news with NPR's weekly quiz show and now you can listen online, too.

Lost and Found Sound is back with the *House of Night: The Lost Creation Songs of the Mohave People*. Find out about an incredible collection of tapes which pass down tradition and

The web in 1999 (2/2)

- Portals were the “Yellow pages” of the web
- Sites required manual indexing into web pages



Returning GeoCities members, learn how to sign in for the first time.

Search Home Pages

Explore Neighborhoods

Area51	Hollywood	TimesSquare
Colosseum	SouthBeach	Tokyo
Heartland	SunsetStrip	WestHollywood

Take a vacation in TheTropics, one of our 41 Neighborhoods.

Cool Home Page Add-Ons

Interactive Forms, Guestbook	**Fun Stuff** Java applets, Tic-tac-toe	**Multimedia** Streaming audio/video
Make Money Cash-earning links	**Art** Free clip art	**Up-to-the-Minute** Counter, Headlines

Five Great Reasons to Get a Free Home Page

1. Yahoo! PageBuilder - Use your mouse to build a professional-looking page in minutes.
2. Home Page Add-Ons - Free clip art, headlines, guestbooks and more to enhance your page.
3. Neighborhoods - Meet people just like you in one of our 41 themed communities.
4. Pages That Pay - Add sales links to your pages and earn cash! Plus, you're automatically eligible for cool contests.
5. Streaming Media - Publish streaming audio and video on your pages for your visitors to enjoy.

New and Notable

File Manager has a new look!
With our new design, it's easier than ever to upload, edit, and maintain your files, create subdirectories, and more.

Have you tried the new Yahoo! PageBuilder?
The preview version is here! If you can point and click with a mouse, you can build great pages in no time.

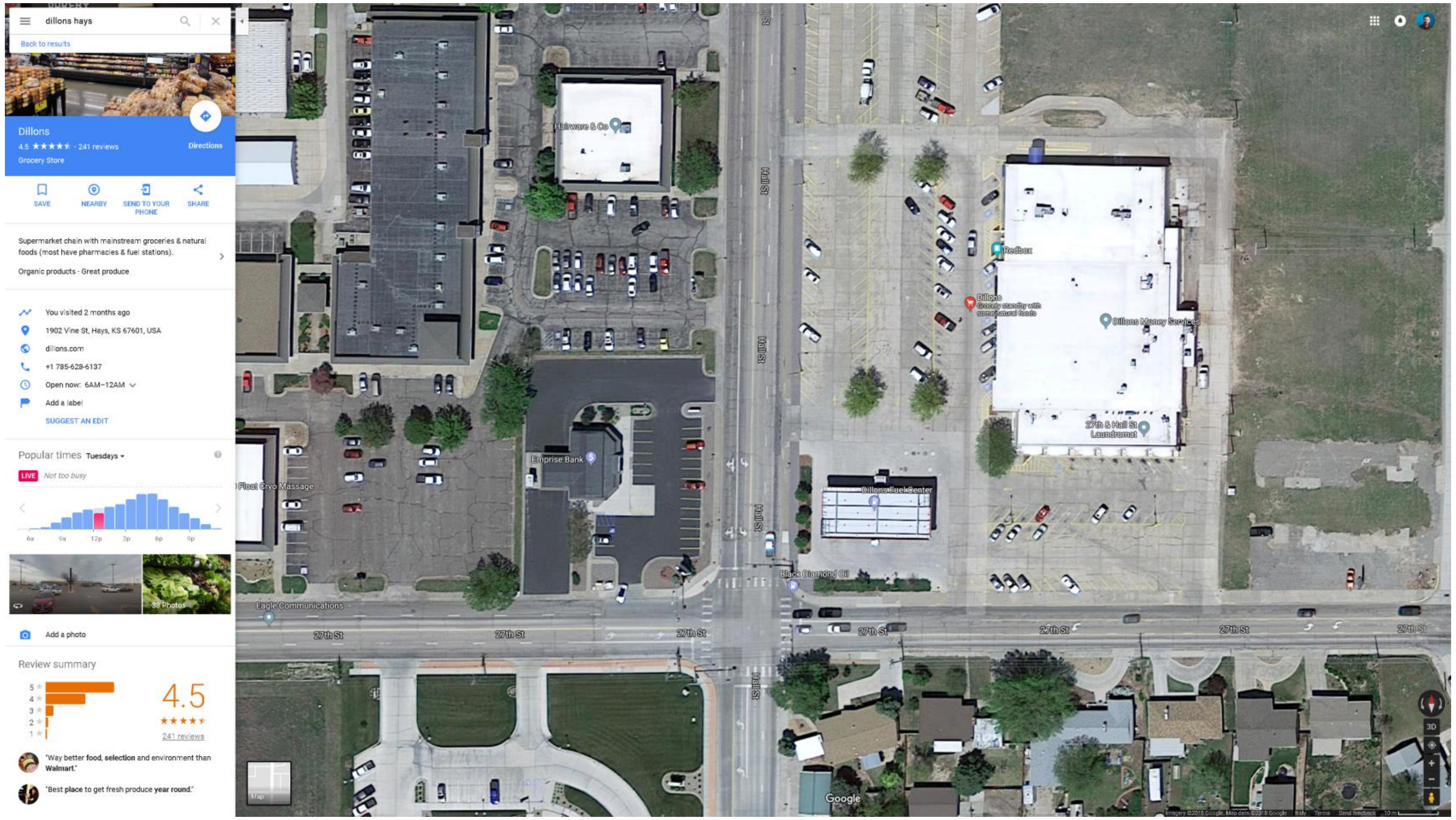
Get your Guestbook.
Choose from five stylish Guestbook templates for your visitors to leave you messages.

Getting Help

If you need help getting started or have other questions, visit our Help section for frequently asked questions and tutorials.

Copyright © 1994-1999 Yahoo! Inc. All rights reserved.
Help Privacy Policy Terms of Service Legal Disclaimers

The web today



dillons hays

Back to results

Dillons

4.5 ★★★★★ · 241 reviews

Grocery Store

Supermarket chain with mainstream groceries & natural foods (most have pharmacies & fuel stations).

Organic products · Great produce

You visited 2 months ago

1902 Vine St, Hays, KS 67601, USA

dillons.com

+1 785-628-6137

Open now: 6AM–12AM

Add a label

Popular times Tuesdays

LIVE *Not too busy*

Add a photo

Review summary

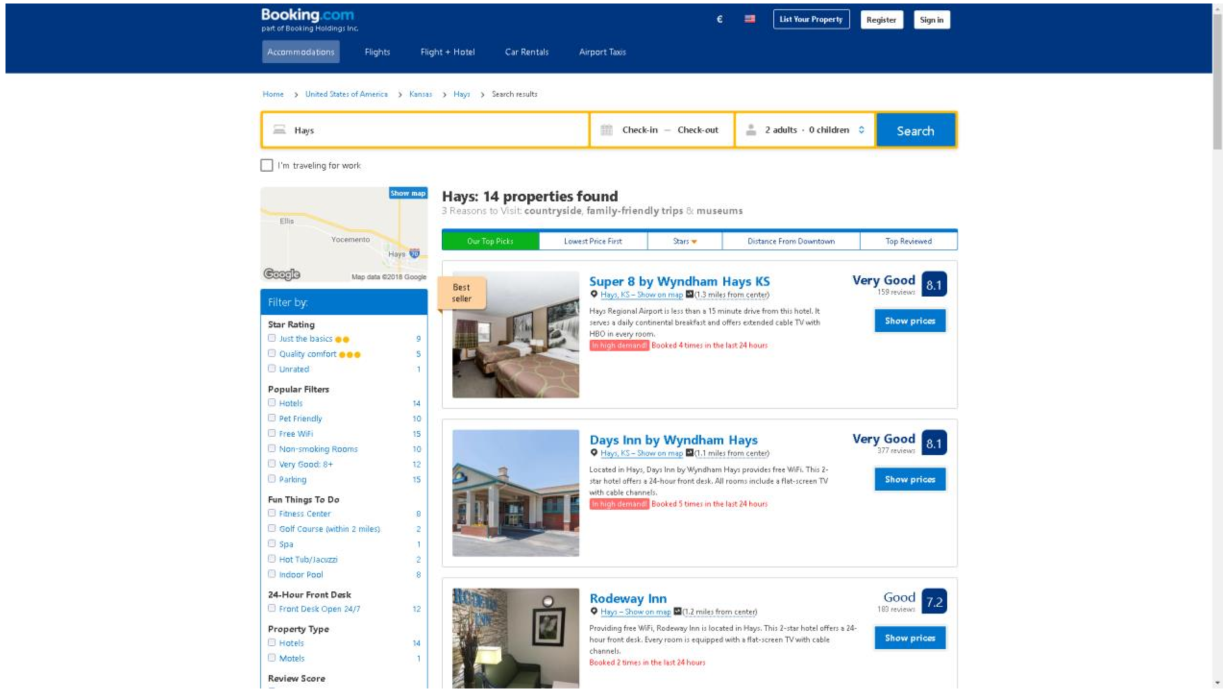
4.5 ★★★★★ 241 reviews

"Way better **food**, **selection** and environment than **Walmart**."

"Best **place** to get fresh produce **year round**."

The web today

- Mostly visual
- Dichotomy between appearance and content
- Interactive web applications



Hays: 14 properties found

3 Reasons to Visit: countryside, family-friendly trips & museums

Star Rating	
Just the basics ●●	9
Quality comfort ●●●	5
Unrated	1
Popular Filters	
Hotels	14
Pet Friendly	10
Free WiFi	15
Non-smoking Rooms	10
Very Good: 8+	12
Parking	15
Fun Things To Do	
Fitness Center	8
Golf Course (within 2 miles)	2
Spa	1
Hot Tub/Jacuzzi	2
Indoor Pool	8
24-Hour Front Desk	
Front Desk Open 24/7	12
Property Type	
Hotels	14
Motels	1
Review Score	

Super 8 by Wyndham Hays KS — Very Good 8.1, 159 reviews
Hays, KS – Show on map (1.3 miles from center)
Hays Regional Airport is less than a 15 minute drive from this hotel. It serves a daily continental breakfast and offers extended cable TV with HBO in every room.
In high demand! Booked 4 times in the last 24 hours

Days Inn by Wyndham Hays — Very Good 8.1, 377 reviews
Hays, KS – Show on map (1.1 miles from center)
Located in Hays, Days Inn by Wyndham Hays provides free WiFi. This 2-star hotel offers a 24-hour front desk. All rooms include a flat-screen TV with cable channels.
In high demand! Booked 5 times in the last 24 hours

Rodeway Inn — Good 7.2, 183 reviews
Hays – Show on map (1.2 miles from center)
Providing free WiFi, Rodeway Inn is located in Hays. This 2-star hotel offers a 24-hour front desk. Every room is equipped with a flat-screen TV with cable channels.
Booked 2 times in the last 24 hours

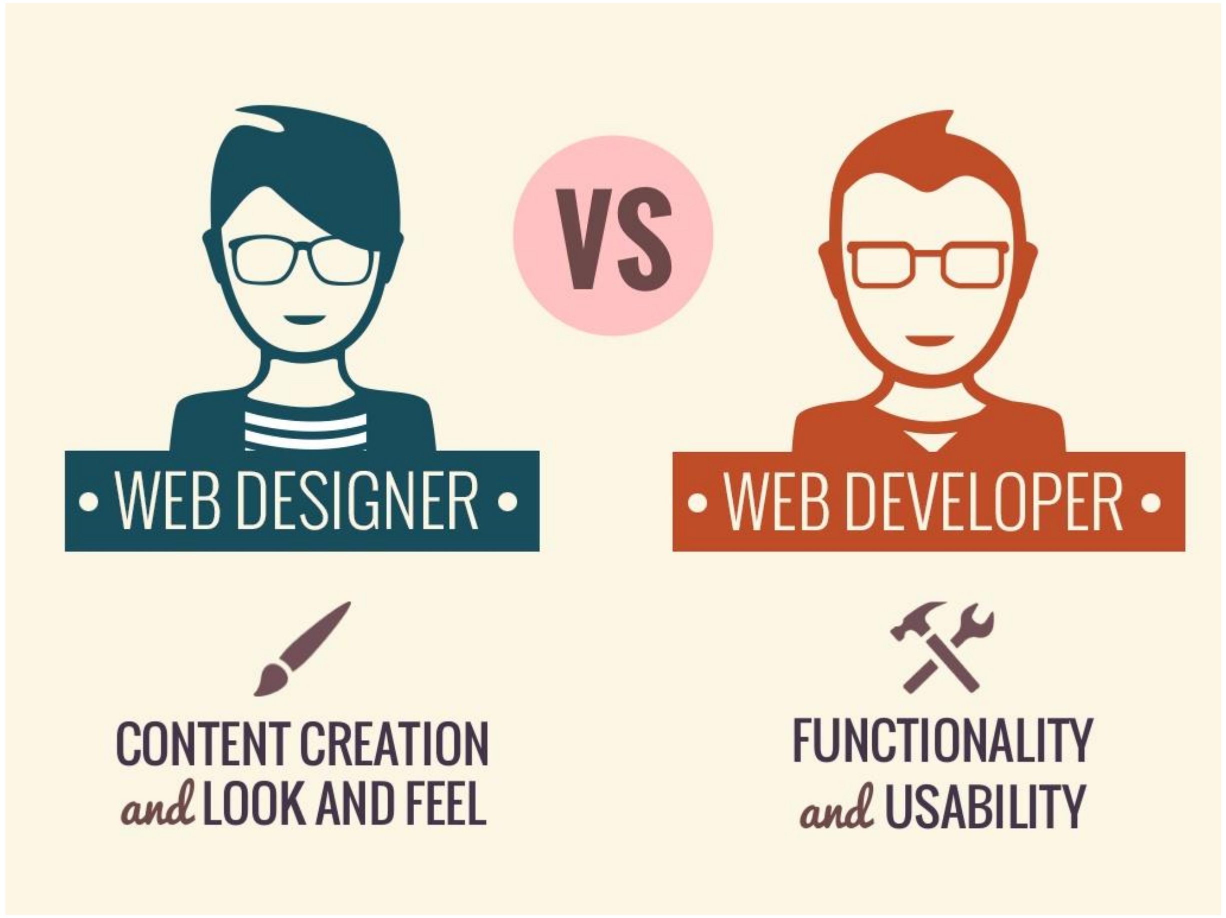
FHSU

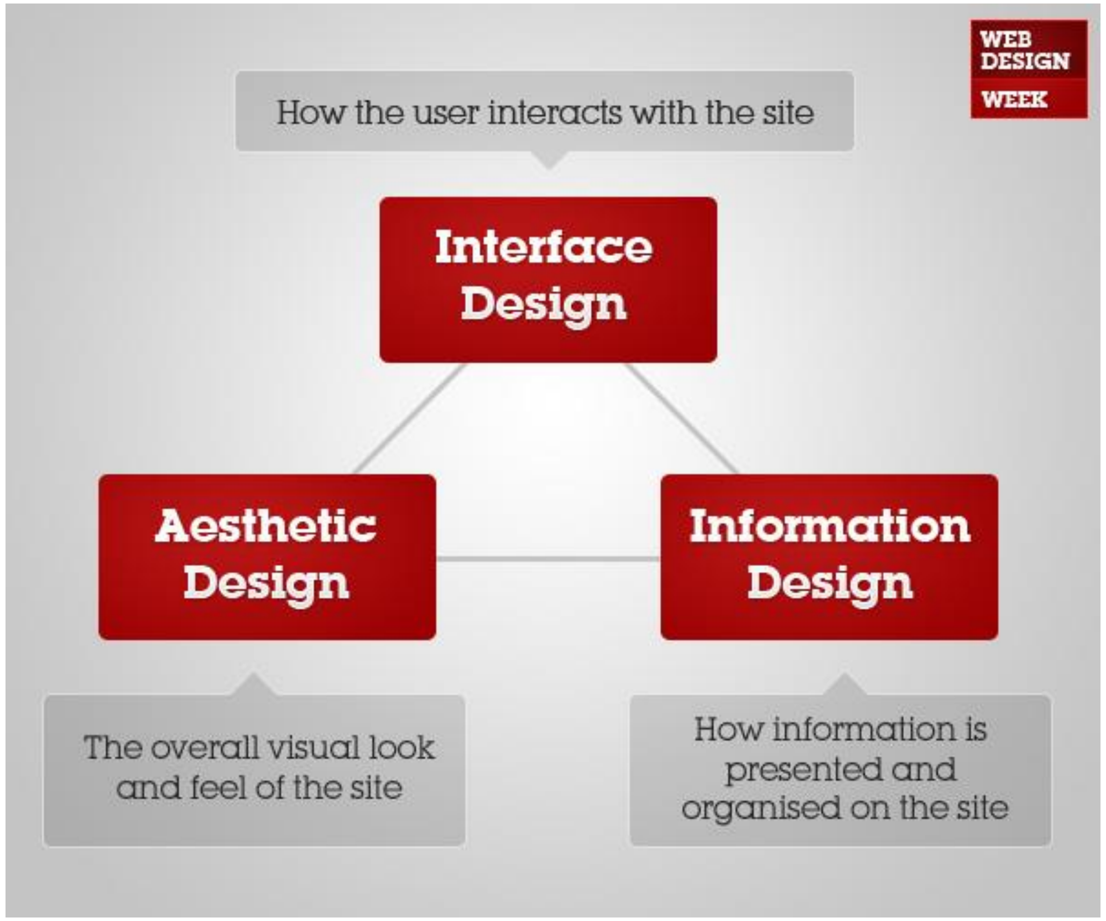
Convergence between web and app design

- This is an amazing time for web developers
- Web technologies and interfaces are being utilized for cross-device app development
- Constant rise of attention to front-end

Front-end development

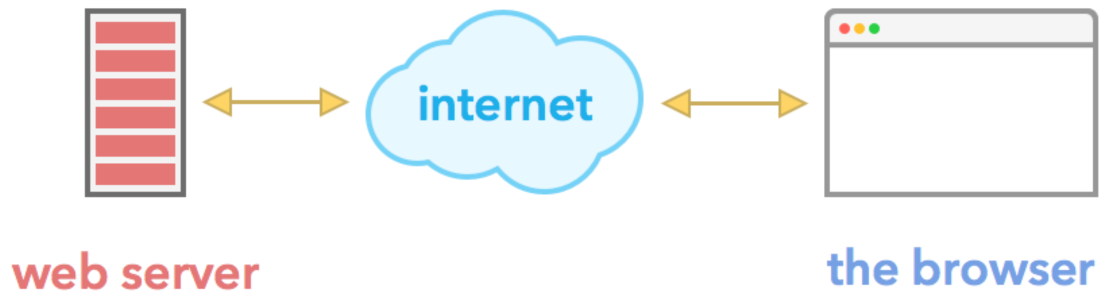
Web design and development


VS
• WEB DESIGNER •
• WEB DEVELOPER •
CONTENT CREATION and LOOK AND FEEL
FUNCTIONALITY and USABILITY


WEB DESIGN WEEK
How the user interacts with the site
Interface Design
Aesthetic Design
Information Design
The overall visual look and feel of the site
How information is presented and organised on the site

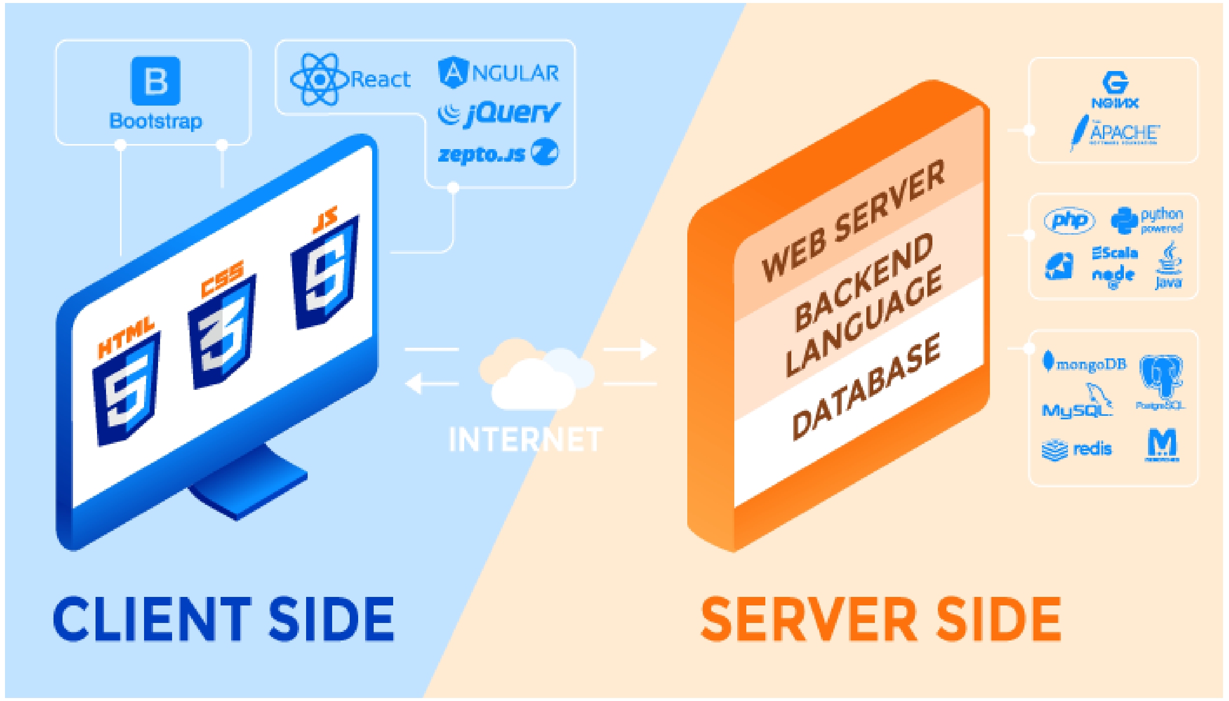
Two components of any web application

- Any website and application has are two sides
  - the server-side: where information is centrally stored, retrieved from, and processed
  - the client-side: users' computers
- Both play a crucial role
  - the server-side focuses on information and processing (the engine)
  - the client-side is what the user sees and interacts with (the user interface)



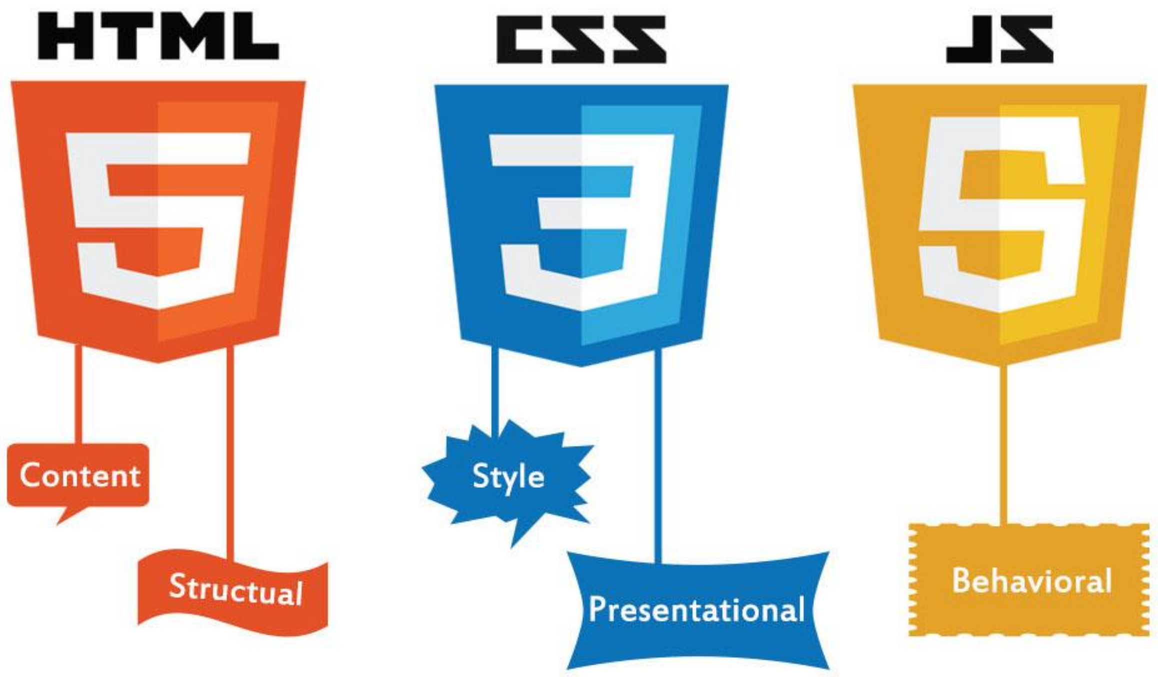
Technologies for client and server side

- As client- and server-side have different roles, they rely on different technology and languages
  - client-side: structure of a website, layout, interface, content, and interaction
  - server-side: centralized information processing (databases), performance optimization
- However, client-side languages are processed at the server-side
- In this course, we will focus on client-side languages



Front-end technology

- The client-side is often referred to as the “front end”, because it is the front-line of interaction
- Front-end technology has some limitations but it is very powerful and fun
  - https://html5demos.com
  - https://experiments.withgoogle.com/collection/chrome



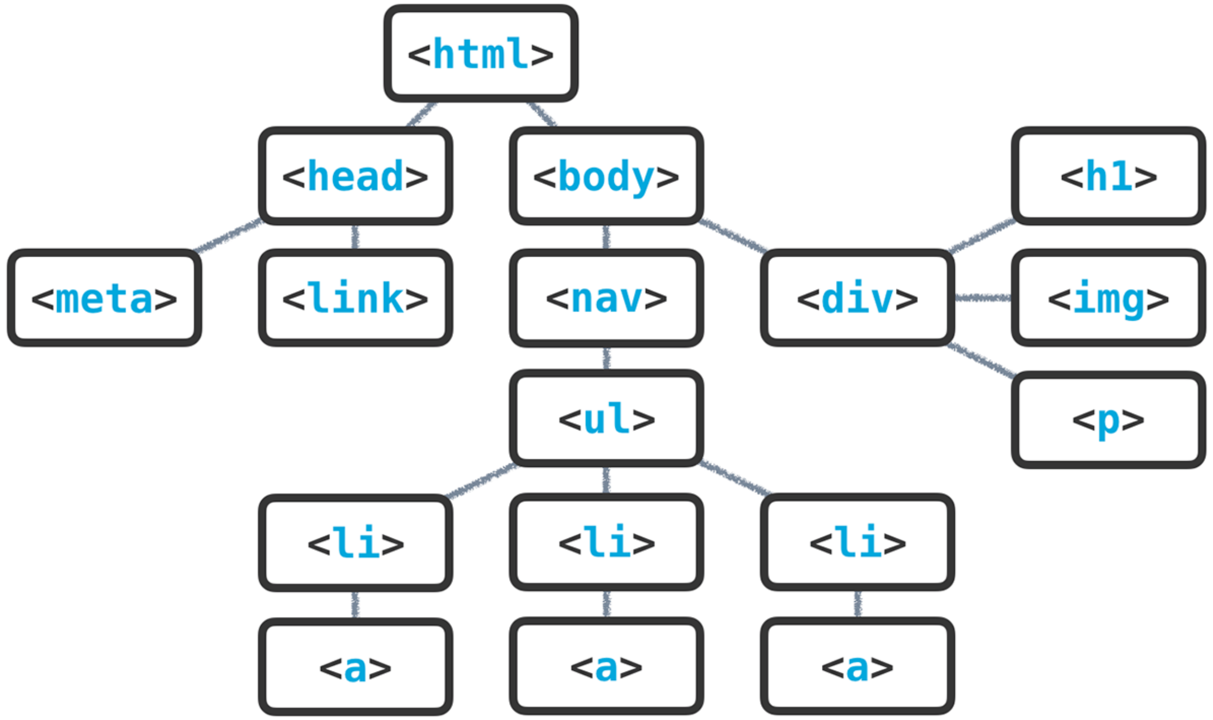
HTML

- Acronym of HyperText Mark-up Language

- Mark-up language
  - not a programming language
  - uses metadata (tags) to annotate content

- The structure and layout of
  - the website (hyperlinks)
  - the page (HTML DOM)
  - information (HTML content tags)

- Webpages are organized into a tree

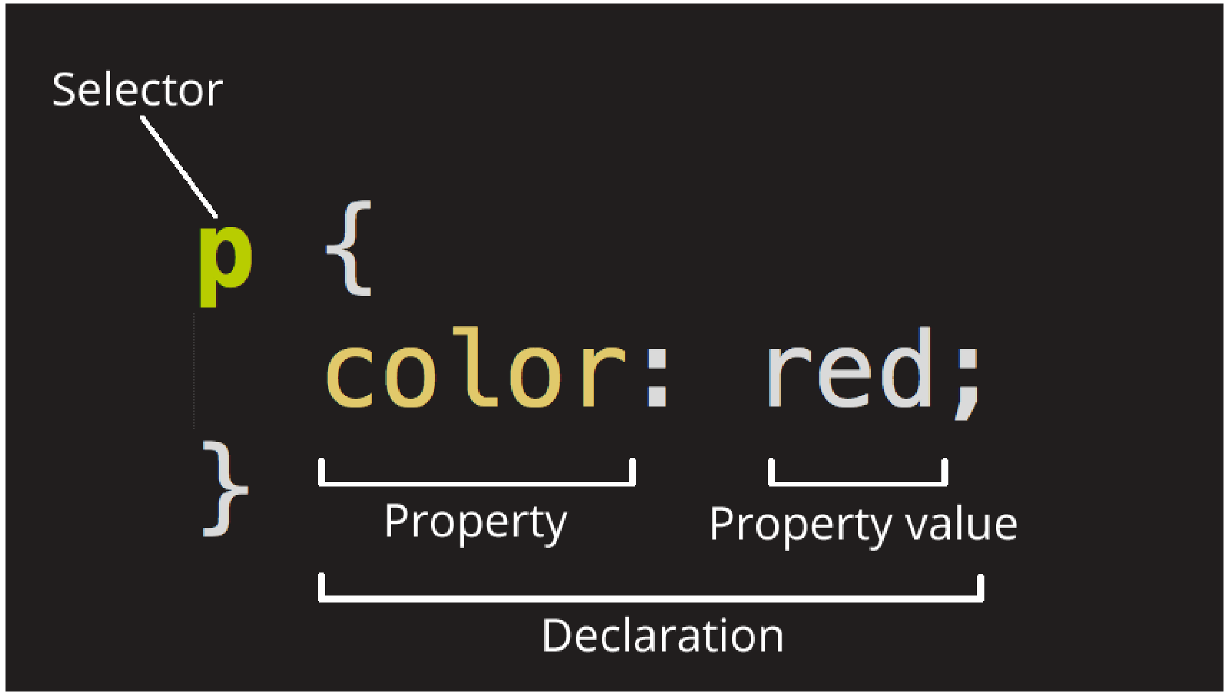


CSS

- Acronym of Cascading Style Sheets
  - multiple styles can be applied and they have a “cascade” effect
  - the top styles are overridden or modified by the styles at the bottom

- CSS modifies the style and appearance of your page
  - color
  - size
  - position
  - the “form” of content

- CSS is an add-on

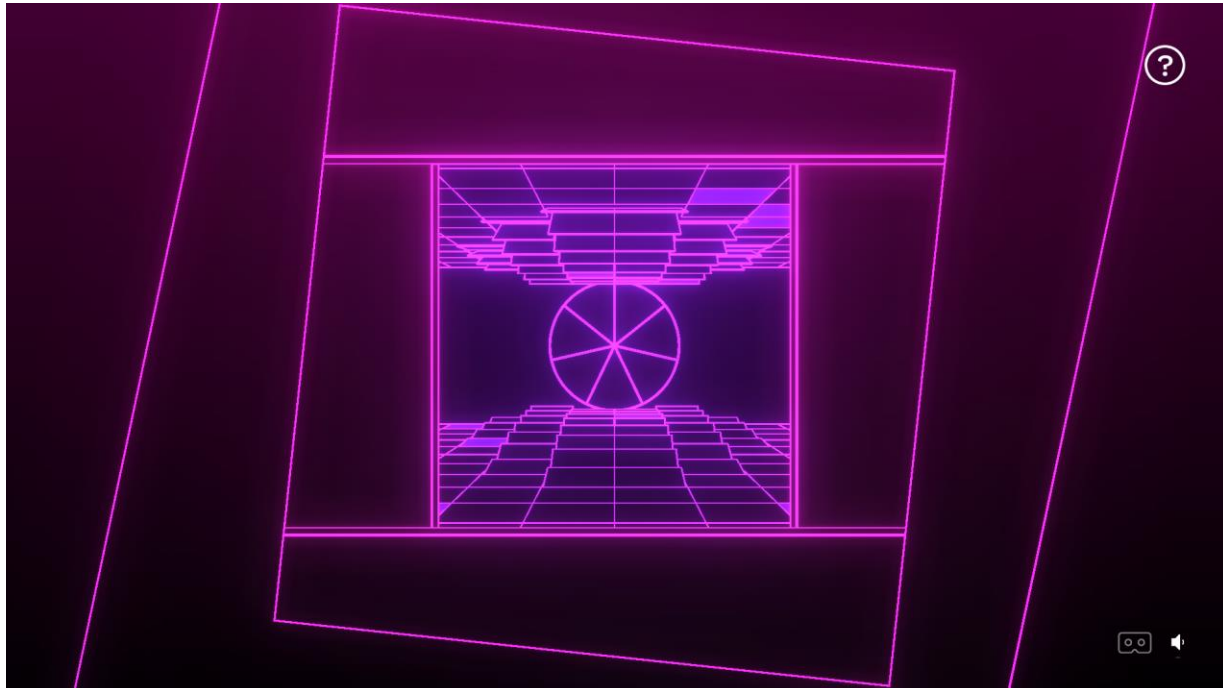


Javascript

- A high-level, interpreted programming language that:
  - adds behavior to the page
  - can capture and respond to events
  - manipulates the DOM
  - can interact with hardware features of the client host (via the browser)

- Javascript is an add-on

- Javascript can take the webpage experience to a new level
  - https://demos.littleworkshop.fr/track

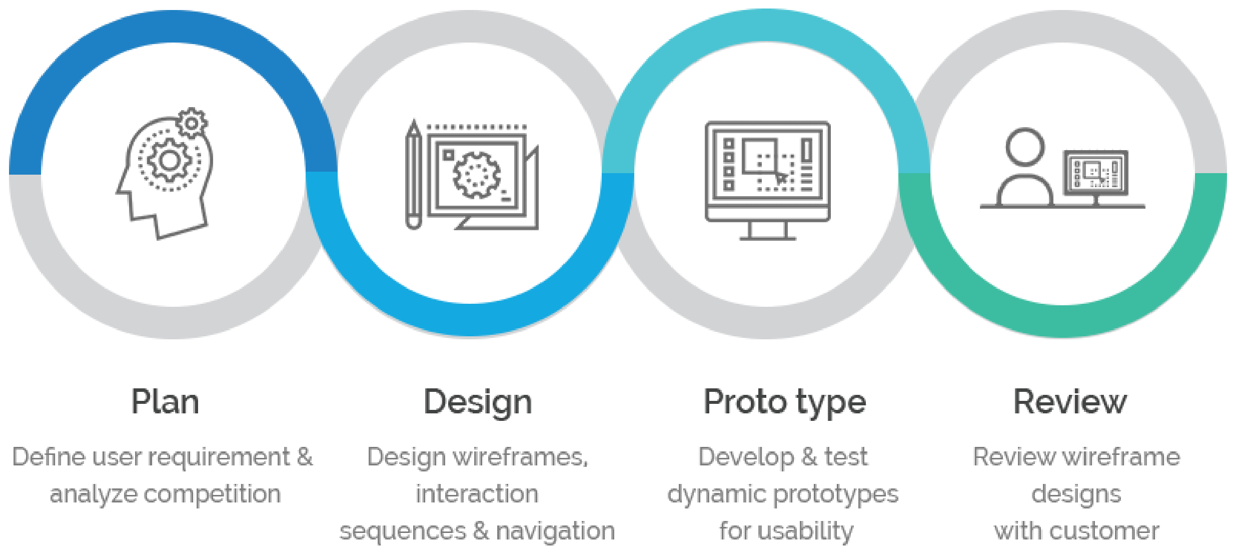


Designing web interfaces

An iterative process

- Designing websites is very similar to any other product design process
  - iterative
  - first step is planning

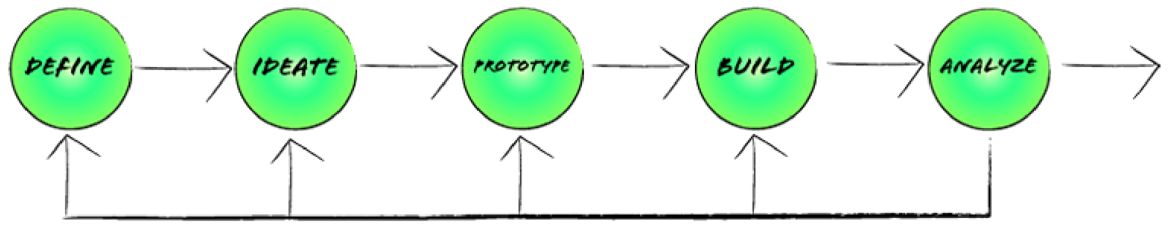
- Technology is just an implementation tool


Plan
Define user requirement & analyze competition
Design
Design wireframes, interaction sequences & navigation
Proto type
Develop & test dynamic prototypes for usability
Review
Review wireframe designs with customer

An additive process

- Web technology enables additive and progressive design and implementation
  - planning the structure of the website
  - designing the layout of the page
  - applying styles
  - implementing interactive behavior

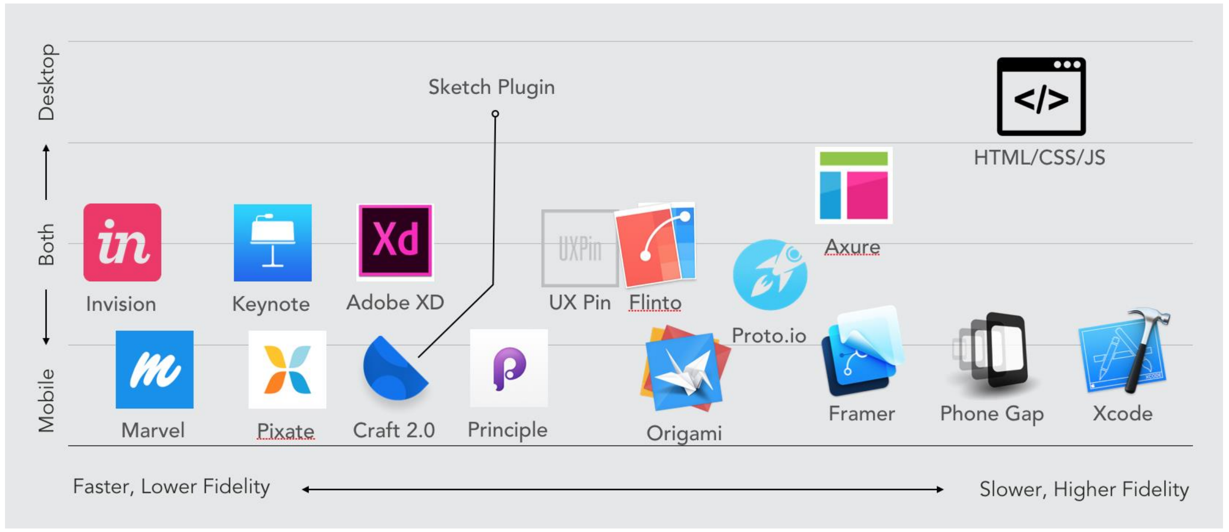
- Typically, but not strictly top-down



Prototyping is essential

- Always start with paper
  - define the structure of what you want to build
  - sketch a layout
  - start implementing the basic building blocks
  - style them with CSS

- Alternatively, you can use prototyping tools



FHSU

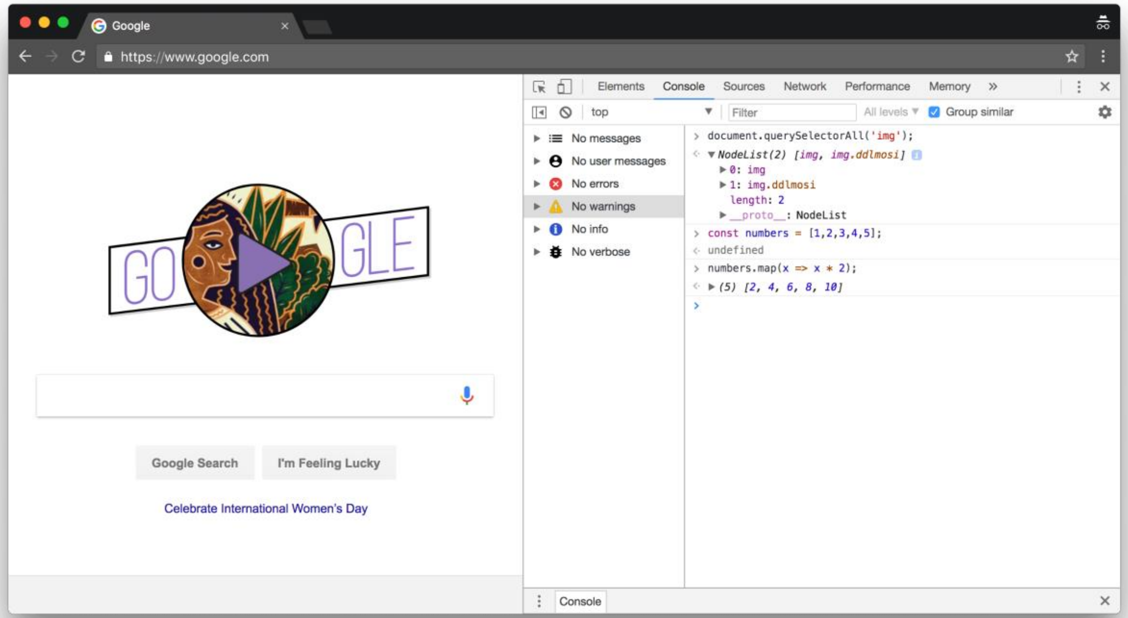
Inspecting and debugging

The Google Chrome developer console

- Chrome DevTools is a set of web developer tools built directly into the Google Chrome browser
  - **Click CTRL+SHIFT+J to open**

- DevTools can help you diagnose problems quickly, which ultimately helps you build better websites, faster

- Learn more
  - https://developers.google.com/web/tools/chrome-devtools/



```
> document.querySelectorAll('img');
<- ▼NodeList(2) [img, img.ddlmosi]
    ▶0: img
    ▶1: img.ddlmosi
     length: 2
    ▶__proto__: NodeList
> const numbers = [1,2,3,4,5];
<- undefined
> numbers.map(x => x * 2);
<- ▶(5) [2, 4, 6, 8, 10]
>
```

Features of Chrome devtools

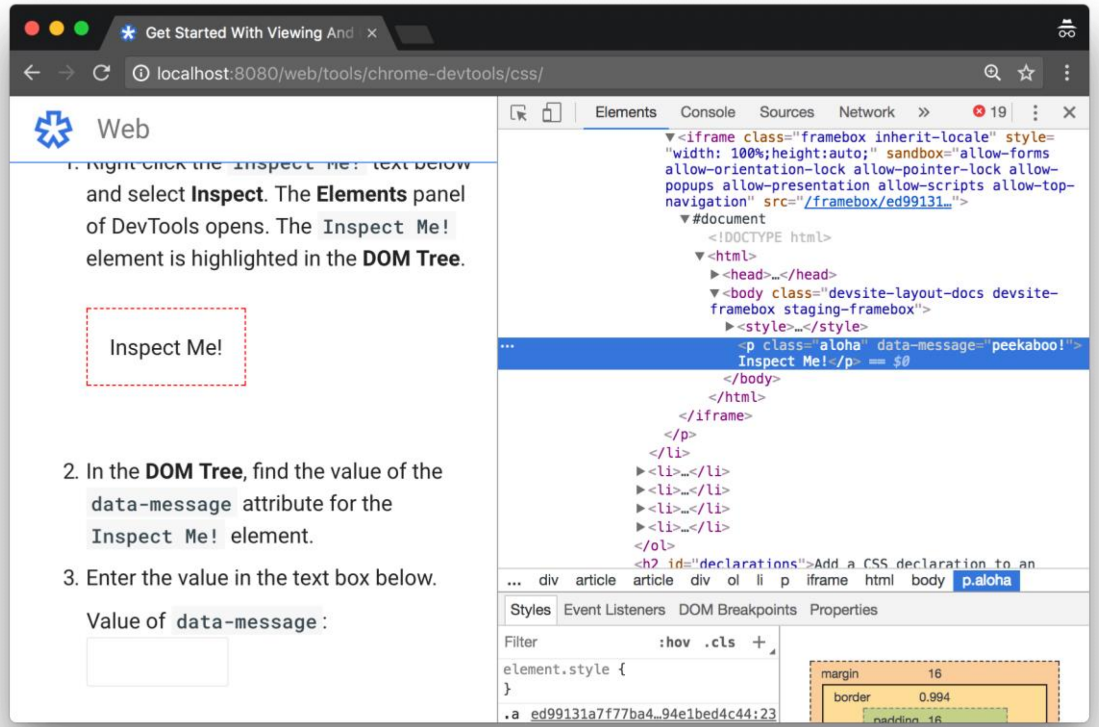
- Google Chrome devtools are great for learning, in addition to debugging:
  - HTML: you can view and change the structure of the page
  - CSS: you can view and modify page styles on the fly
  - Javascript: you can run and debug your code

- Moreover, they enable optimizing website speed
  - the audits panel provides quantitative reports of your site speed, as well as concrete tips on how to improve it

HTML: the elements tab

- The elements tab shows the structure of the HTML page
  - you can interact with and modify any element, and see a live preview
  - this is excellent for understanding the structure of a website, or for applying design changes before actually modifying the HTML markup

- Yuou can oterate on the layout and design of your site by freely manipulating the DOM and CSS


Get Started With Viewing And
localhost:8080/web/tools/chrome-devtools/css/
Web
Elements
Console
Sources
Network
19

and select **Inspect**. The **Elements** panel of DevTools opens. The `Inspect Me!` element is highlighted in the **DOM Tree**.

Inspect Me!

2. In the **DOM Tree**, find the value of the `data-message` attribute for the `Inspect Me!` element.
3. Enter the value in the text box below.

   Value of `data-message`:

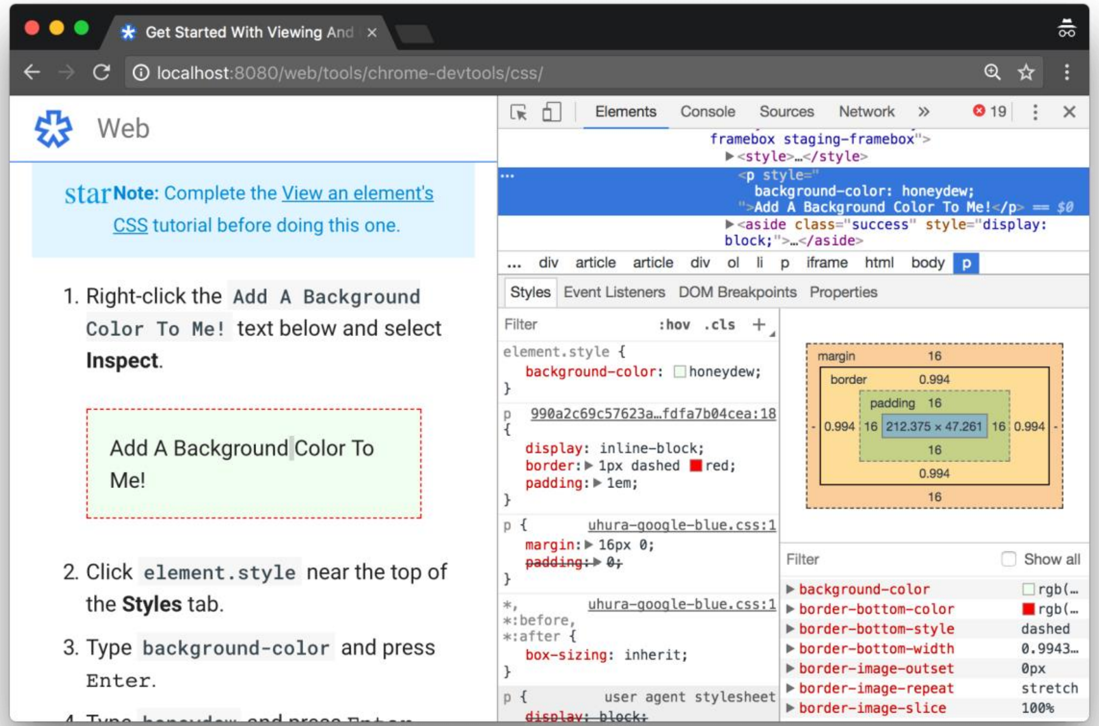
```
▼<iframe class="framebox inherit-locale" style=
"width: 100%;height:auto;" sandbox="allow-forms
allow-orientation-lock allow-pointer-lock allow-
popups allow-presentation allow-scripts allow-top-
navigation" src="/framebox/ed99131…">
  ▼#document
     <!DOCTYPE html>
    ▼<html>
      ▶<head>…</head>
      ▼<body class="devsite-layout-docs devsite-
      framebox staging-framebox">
        ▶<style>…</style>
...       <p class="aloha" data-message="peekaboo!">
          Inspect Me!</p> == $0
        </body>
      </html>
    </iframe>
  </p>
</li>
▶<li>…</li>
▶<li>…</li>
▶<li>…</li>
▶<li>…</li>
</ol>
```

```
element.style {
}
.a ed99131a7f77ba4…94e1bed4c44:23
```

Viewing and changing CSS

- The elements tab also shows all the CSS styles applied to the elements:
  - you can add, modify, disable and remove styles on the fly

- Useful for testing changes to the design before actually coding



star**Note:** Complete the View an element's CSS tutorial before doing this one.

1. Right-click the `Add A Background Color To Me!` text below and select **Inspect**.

   Add A Background Color To Me!

2. Click `element.style` near the top of the Styles tab.
3. Type `background-color` and press `Enter`.

```
framebox staging-framebox">
  ▶<style>…</style>
  <p style="
    background-color: honeydew;
  ">Add A Background Color To Me!</p> == $0
  ▶<aside class="success" style="display:
  block;">…</aside>
```

… div article article div ol li p iframe html body p

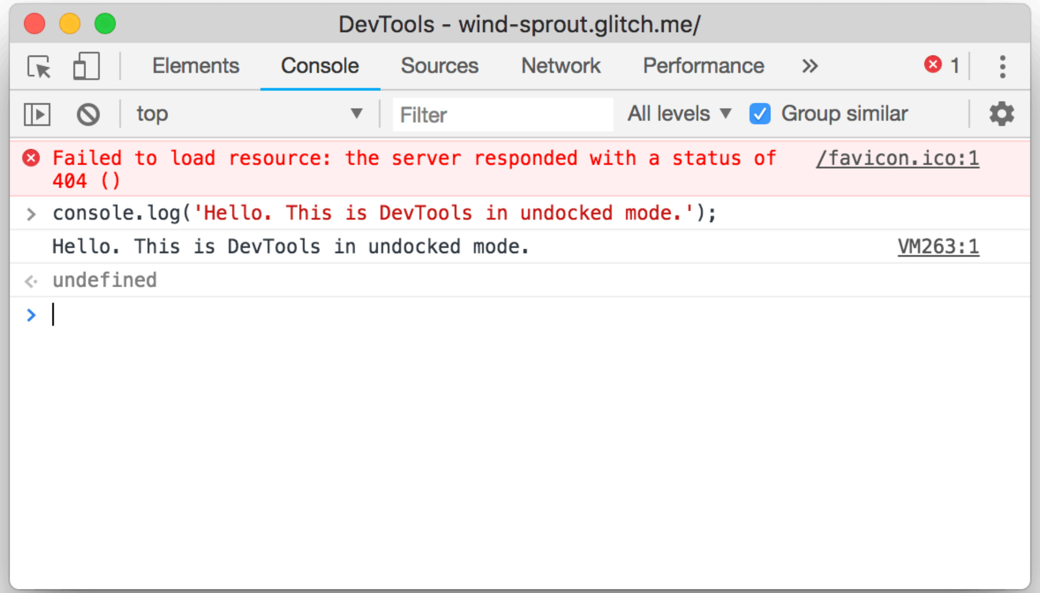
```
element.style {
  background-color: honeydew;
}
p   990a2c69c57623a…fdfa7b04cea:18
{
  display: inline-block;
  border: ▶ 1px dashed red;
  padding: ▶ 1em;
}
p {          uhura-google-blue.css:1
  margin: ▶ 16px 0;
  ~~padding: ▶ 0;~~
}
*,           uhura-google-blue.css:1
*:before,
*:after {
  box-sizing: inherit;
}
p {             user agent stylesheet
  ~~display: block;~~
```

```
▶ background-color        rgb(…
▶ border-bottom-color     rgb(…
▶ border-bottom-style     dashed
▶ border-bottom-width     0.9943…
▶ border-image-outset     0px
▶ border-image-repeat     stretch
▶ border-image-slice      100%
```

Javascript: the console panel

- The console panel logs diagnostic information during development or interact with the JavaScript on the page

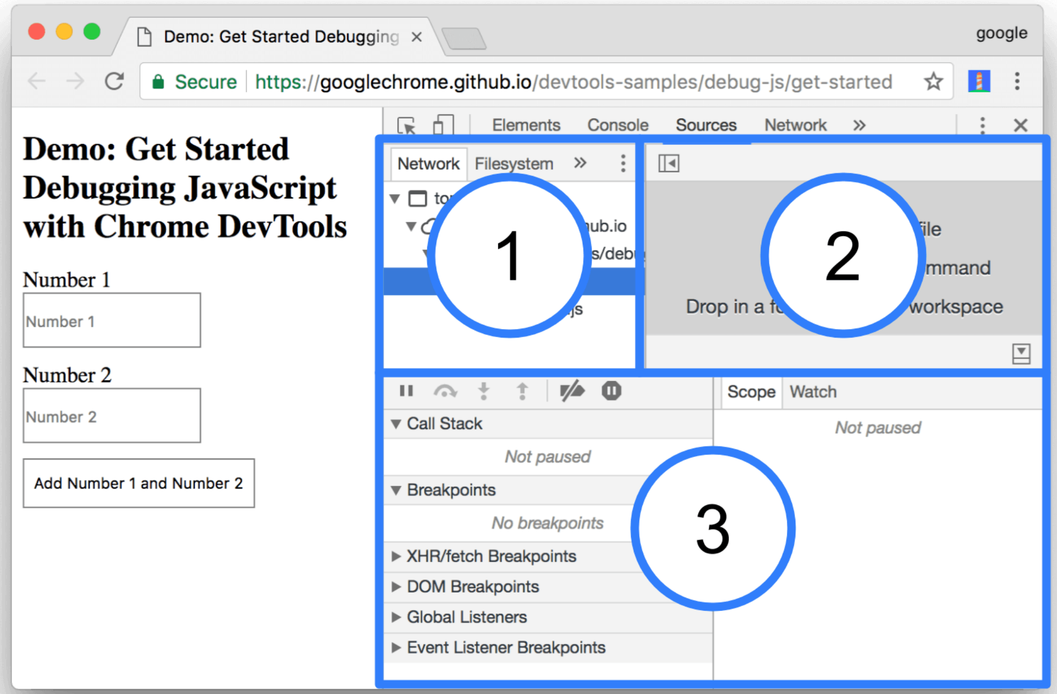
- You can see errors and debug your code



```
Failed to load resource: the server responded with a status of 404 ()    /favicon.ico:1
> console.log('Hello. This is DevTools in undocked mode.');
Hello. This is DevTools in undocked mode.                                VM263:1
< undefined
> |
```

Javascript: the sources panel

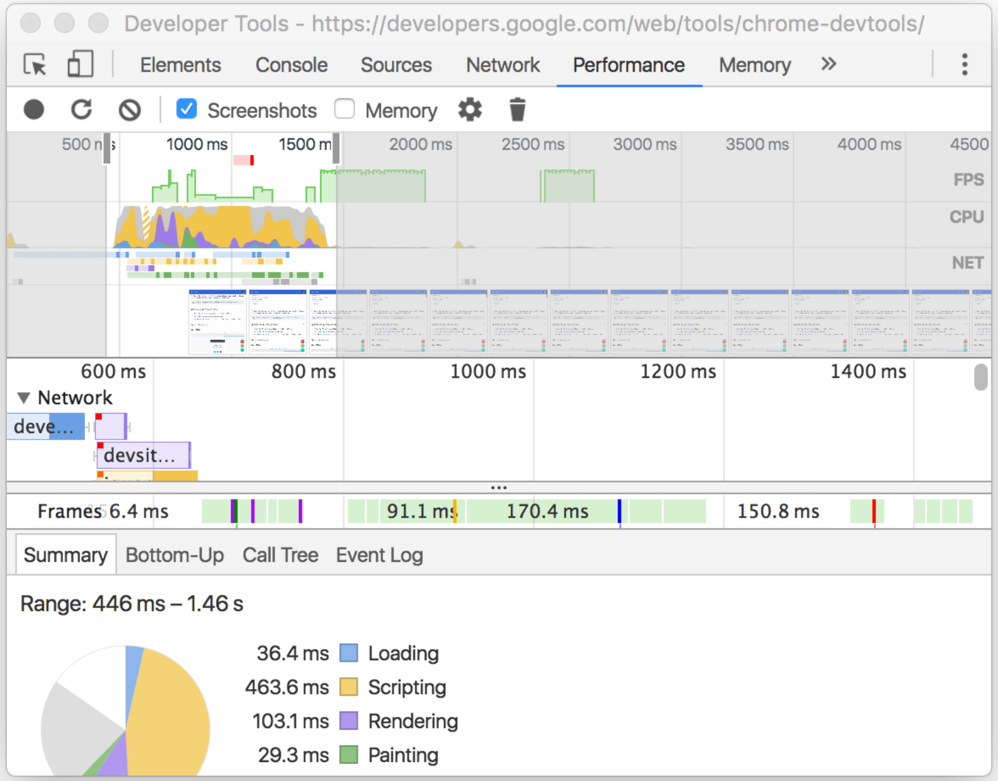
- The 3 parts of the Sources panel UI
  - The File Navigator pane
    - every file that the page requests is listed here
  - The Code Editor pane
    - after selecting a file in the File Navigator pane, the contents of that file are displayed here
  - The JavaScript Debugging pane
    - various tools for inspecting the page's JavaScript. If your DevTools window is wide, this pane is displayed to the right of the Code Editor pane



Demo: Get Started Debugging
google
Secure https://googlechrome.github.io/devtools-samples/debug-js/get-started
Elements
Console
Sources
Network
Network
Filesystem
1
2
3
Demo: Get Started Debugging JavaScript with Chrome DevTools
Number 1
Number 2
Add Number 1 and Number 2
Call Stack
Not paused
Breakpoints
No breakpoints
XHR/fetch Breakpoints
DOM Breakpoints
Global Listeners
Event Listener Breakpoints
Scope
Watch
Not paused

Performance: the audit panel

- Using the audit and performance panel you can improve the runtime performance of your page by recording and exploring the various events that happen during the lifecycle of a site



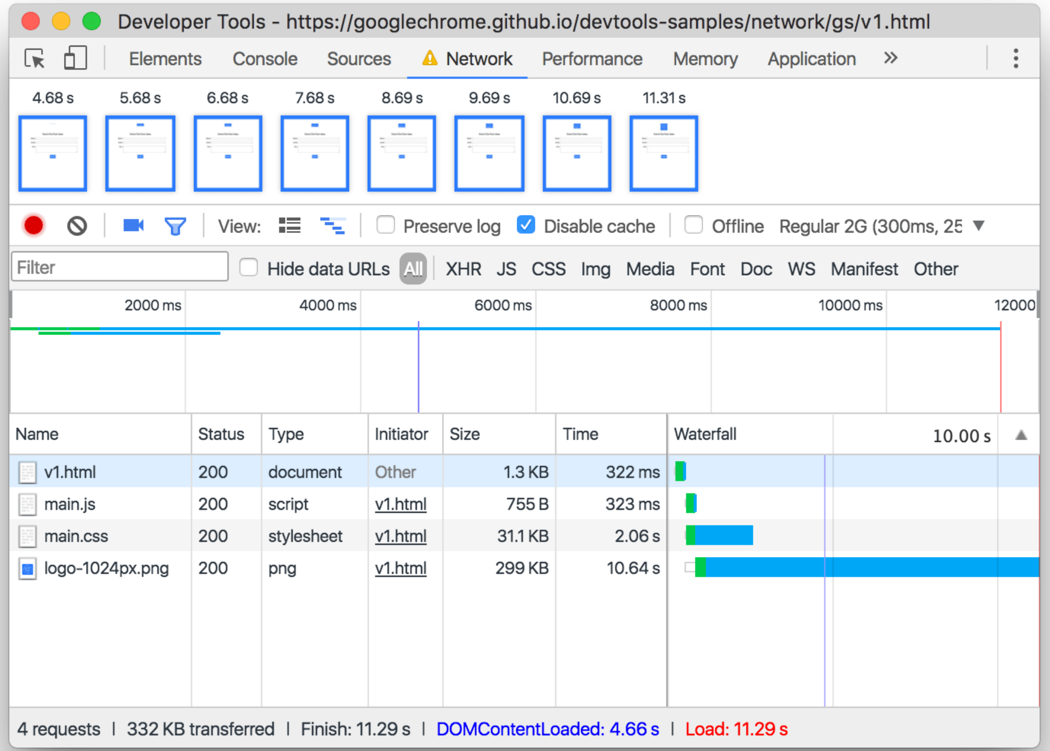
Range: 446 ms – 1.46 s

36.4 ms	🟦	Loading
463.6 ms	🟨	Scripting
103.1 ms	🟪	Rendering
29.3 ms	🟩	Painting

Performance: the network panel

- With the network panel you can optimize page load performance and debug request issues

- This is extremely useful for Ajax code

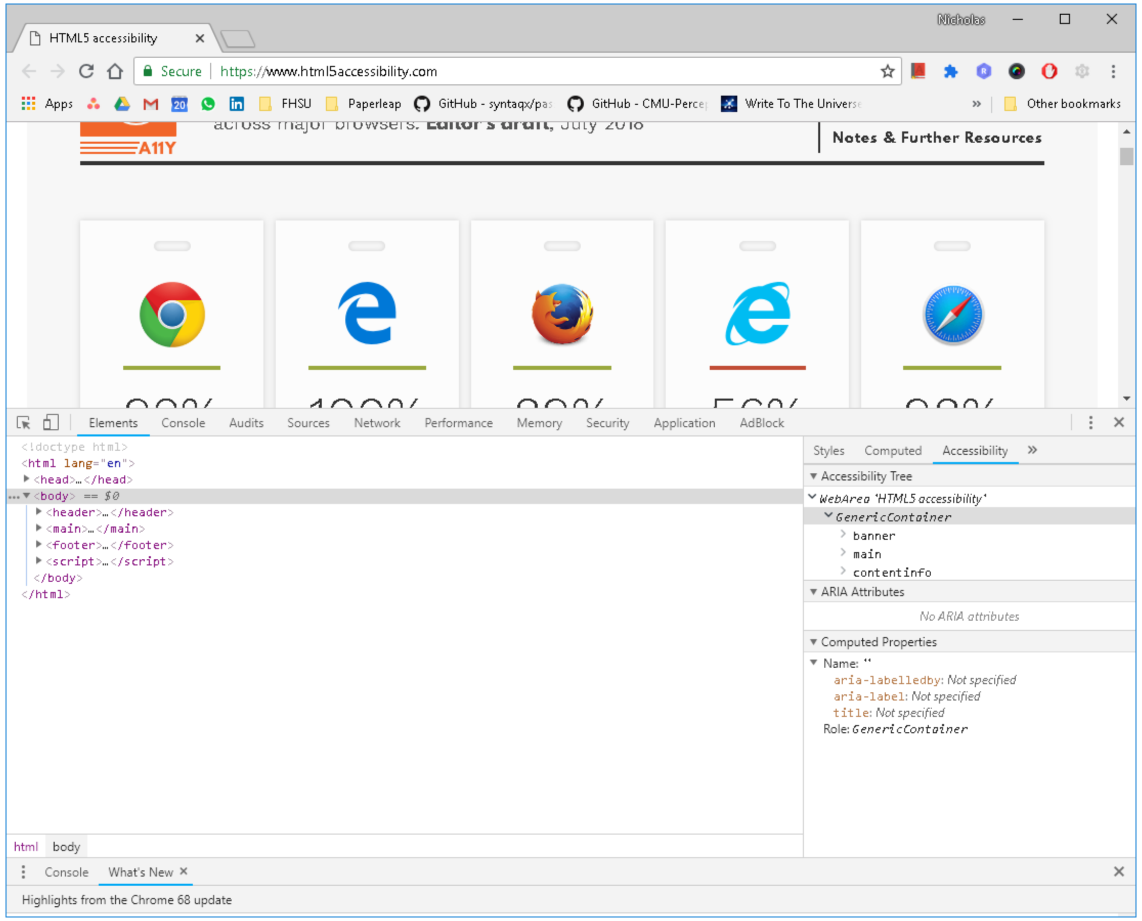


Name	Status	Type	Initiator	Size	Time
v1.html	200	document	Other	1.3 KB	322 ms
main.js	200	script	v1.html	755 B	323 ms
main.css	200	stylesheet	v1.html	31.1 KB	2.06 s
logo-1024px.png	200	png	v1.html	299 KB	10.64 s

4 requests | 332 KB transferred | Finish: 11.29 s | DOMContentLoaded: 4.66 s | Load: 11.29 s

Accessibility

- The accessibility tab in the elements panel helps you navigate items as in a screen reader and check their accessibility readiness


HTML5 accessibility
Secure | https://www.html5accessibility.com
Notes & Further Resources
Elements Console Audits Sources Network Performance Memory Security Application AdBlock
Styles Computed Accessibility
html body
Console What's New

```
<!doctype html>
<html lang="en">
▸ <head>…</head>
▾ <body> == $0
  ▸ <header>…</header>
  ▸ <main>…</main>
  ▸ <footer>…</footer>
  ▸ <script>…</script>
  </body>
</html>
```

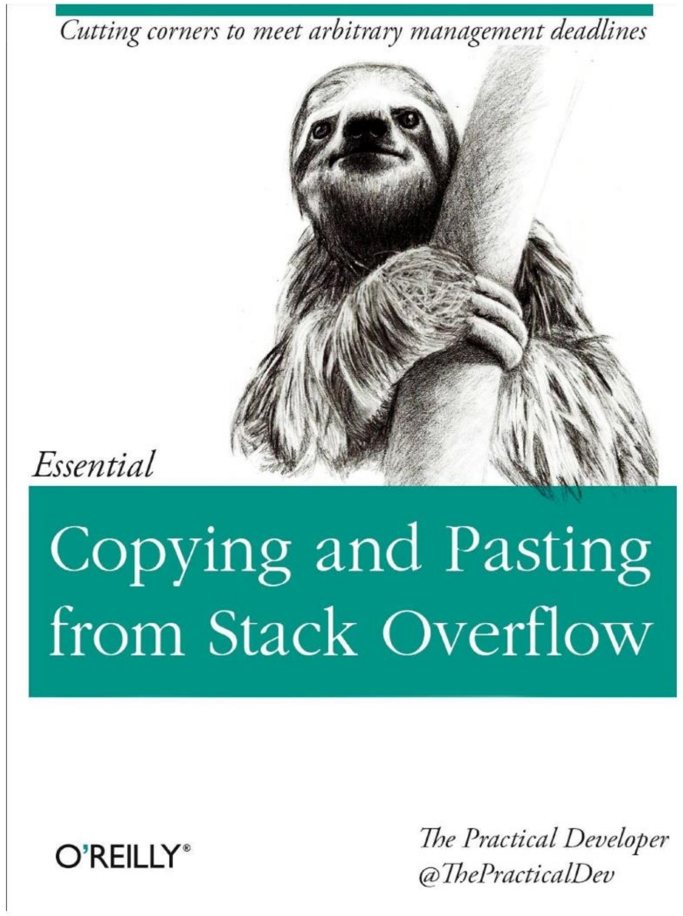
```
▾ Accessibility Tree
˅ WebArea 'HTML5 accessibility'
  ˅ GenericContainer
    › banner
    › main
    › contentinfo
▾ ARIA Attributes
          No ARIA attributes
▾ Computed Properties
▾ Name: ""
    aria-labelledby: Not specified
    aria-label: Not specified
    title: Not specified
  Role: GenericContainer
```

Highlights from the Chrome 68 update

Tools and resources

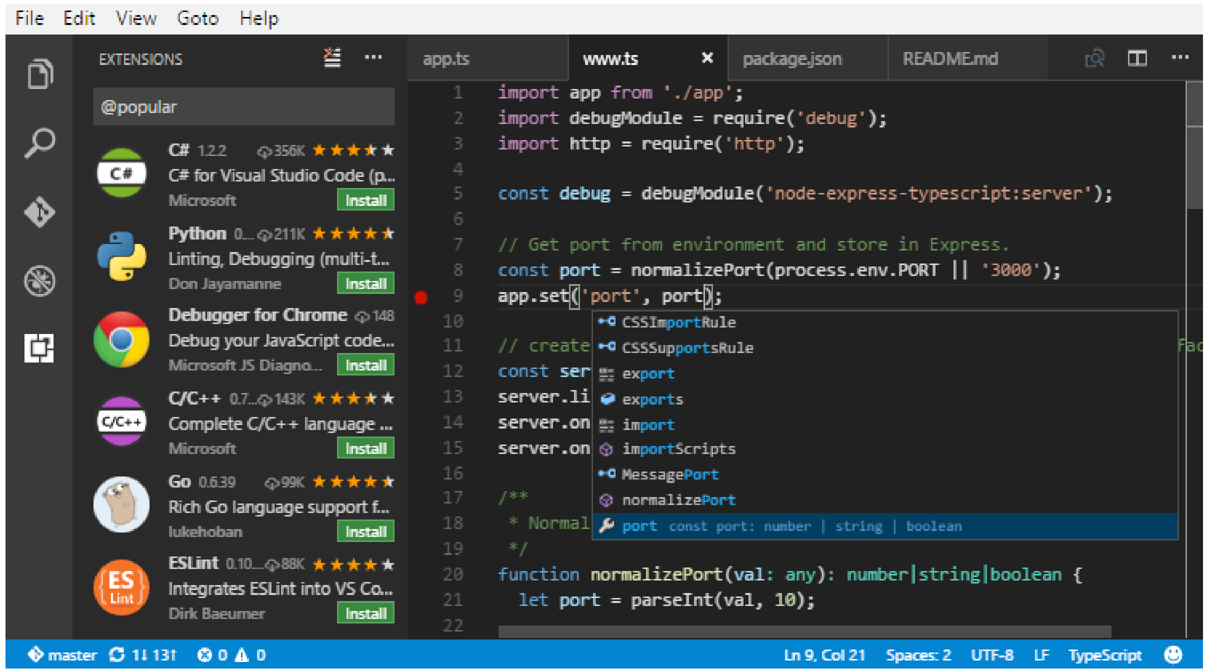
Stackoverflow

- Web development is vast
- It’s hard to have all the answers and to know everything
- In addition to technology tutorials, rely on the wisdom of the crowd
  - https://stackoverflow.com


Cutting corners to meet arbitrary management deadlines
Essential
Copying and Pasting from Stack Overflow
O’REILLY®
The Practical Developer
@ThePracticalDev

Visual Studio code

- There are several tools for creating web projects
  - Integrated Development Environments (Eclipse, Visual Studio)
  - Text editors (Notepad++, Sublime editor)
  - Online playgrounds
- Visual studio code is a hybrid solution
  - https://code.visualstudio.com



C# 1.2.2 356K
C# for Visual Studio Code (p...
Microsoft
Install

Python 0... 211K
Linting, Debugging (multi-t...
Don Jayamanne
Install

Debugger for Chrome 148
Debug your JavaScript code...
Microsoft JS Diagno...
Install

C/C++ 0.7... 143K
Complete C/C++ language ...
Microsoft
Install

Go 0.6.39 99K
Rich Go language support f...
lukehoban
Install

ESLint 0.10... 88K
Integrates ESLint into VS Co...
Dirk Baeumer
Install

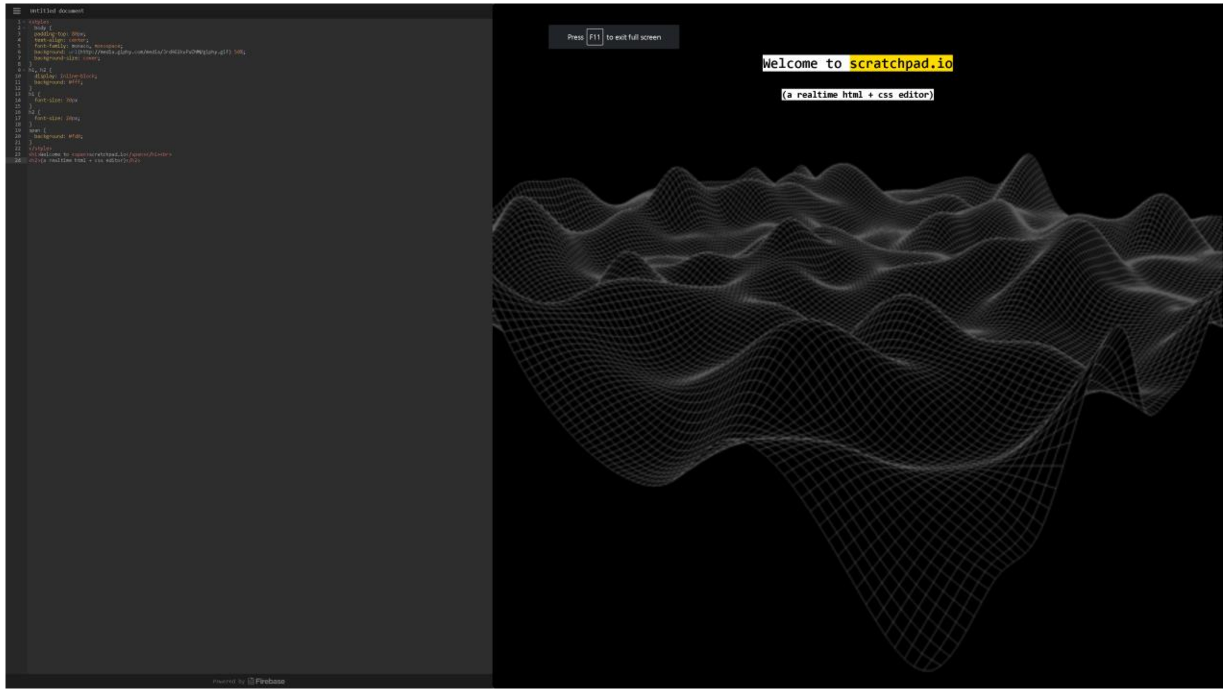
```
import app from './app';
import debugModule = require('debug');
import http = require('http');

const debug = debugModule('node-express-typescript:server');

// Get port from environment and store in Express.
const port = normalizePort(process.env.PORT || '3000');
app.set('port', port);

// create
const ser
server.li
server.on
server.on

/**
 * Normal
 */
function normalizePort(val: any): number|string|boolean {
  let port = parseInt(val, 10);
```

```
CSSImportRule
CSSSupportsRule
export
exports
import
importScripts
MessagePort
normalizePort
port  const port: number | string | boolean
```

master 1↓ 13↑ 0 0 Ln 9, Col 21 Spaces: 2 UTF-8 LF TypeScript

Scratchpad: HTML and CSS editor

- Scratchpad has is a convenient HTML and CSS editor with immediate preview
- Unfortunately, you cannot save your documents
- http://scratchpad.io/



```
<style>
  body {
  padding-top: 80px;
  text-align: center;
  font-family: monaco, monospace;
  background: url(http://media.giphy.com/media/[illegible]/giphy.gif) 50%;
  background-size: cover;
  }
h1, h2 {
  display: inline-block;
  background: #fff;
}
h1 {
  font-size: 30px
}
h2 {
  font-size: 20px;
}
span {
  background: #fd0;
}
</style>
<h1>Welcome to <span>scratchpad.io</span></h1><br>
<h2>(a realtime html + css editor)</h2>
```

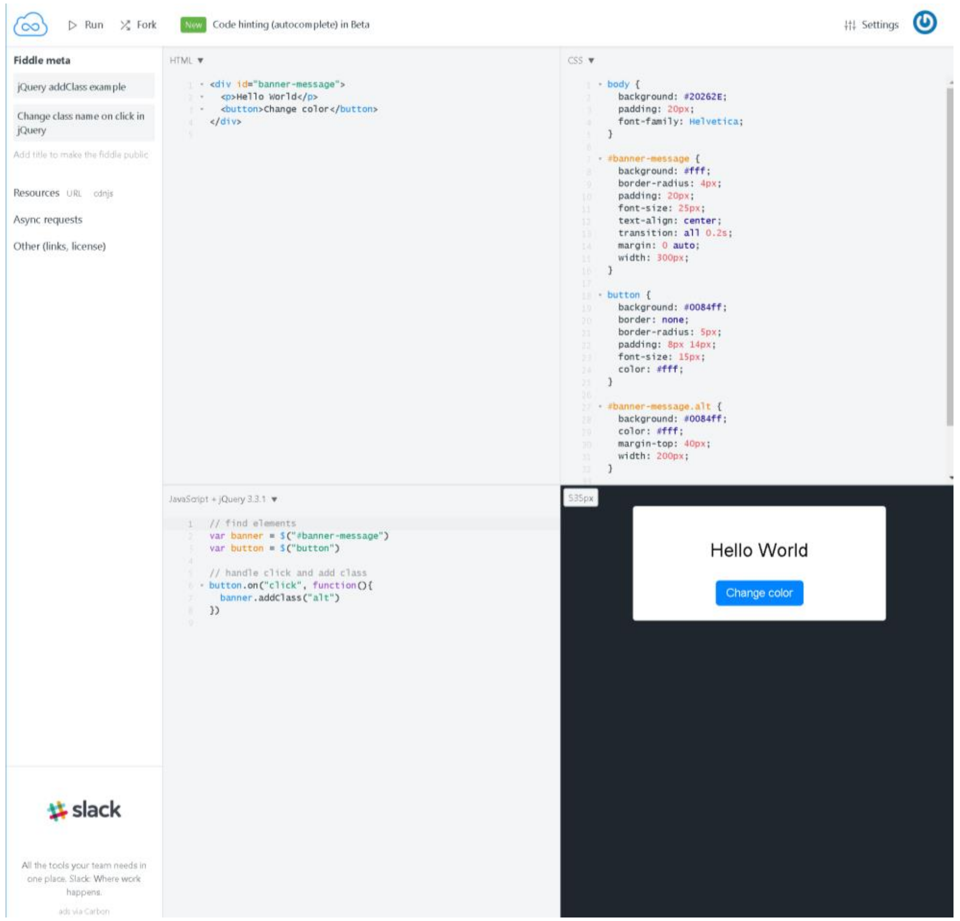
Welcome to scratchpad.io

(a realtime html + css editor)

jsFiddle: an online editor

- jsFiddle is among the most popular online playgrounds for writing HTML, CSS and Javascript code
  - https://jsfiddle.net

- You can import libraries


Run
Fork
New
Code hinting (autocomplete) in Beta
Settings
Fiddle meta
jQuery addClass example
Change class name on click in jQuery
Add title to make the fiddle public
Resources URL cdnjs
Async requests
Other (links, license)
HTML
CSS
JavaScript + jQuery 3.3.1
535px
Hello World
Change color
slack
All the tools your team needs in one place. Slack: Where work happens.
ads via Carbon

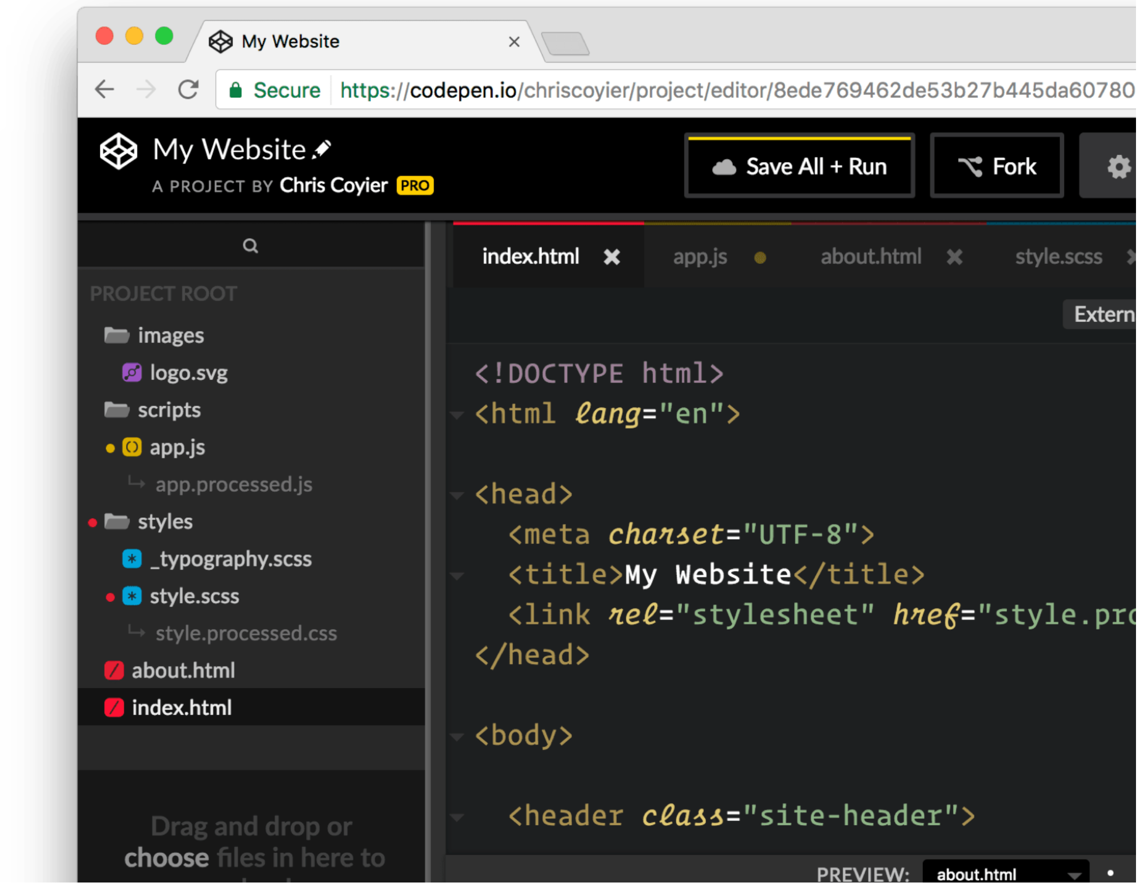
```html
<div id="banner-message">
  <p>Hello World</p>
  <button>Change color</button>
</div>
```

```css
body {
  background: #20262E;
  padding: 20px;
  font-family: Helvetica;
}

#banner-message {
  background: #fff;
  border-radius: 4px;
  padding: 20px;
  font-size: 25px;
  text-align: center;
  transition: all 0.2s;
  margin: 0 auto;
  width: 300px;
}

button {
  background: #0084ff;
  border: none;
  border-radius: 5px;
  padding: 8px 14px;
  font-size: 15px;
  color: #fff;
}

#banner-message.alt {
  background: #0084ff;
  color: #fff;
  margin-top: 40px;
  width: 200px;
}
```

```javascript
// find elements
var banner = $("#banner-message")
var button = $("button")

// handle click and add class
button.on("click", function(){
  banner.addClass("alt")
})
```

Codepen

- Codepen is another code playground
  - https://codepen.io/
- However, it has more advanced features for professional users (e.g., using multiple files)

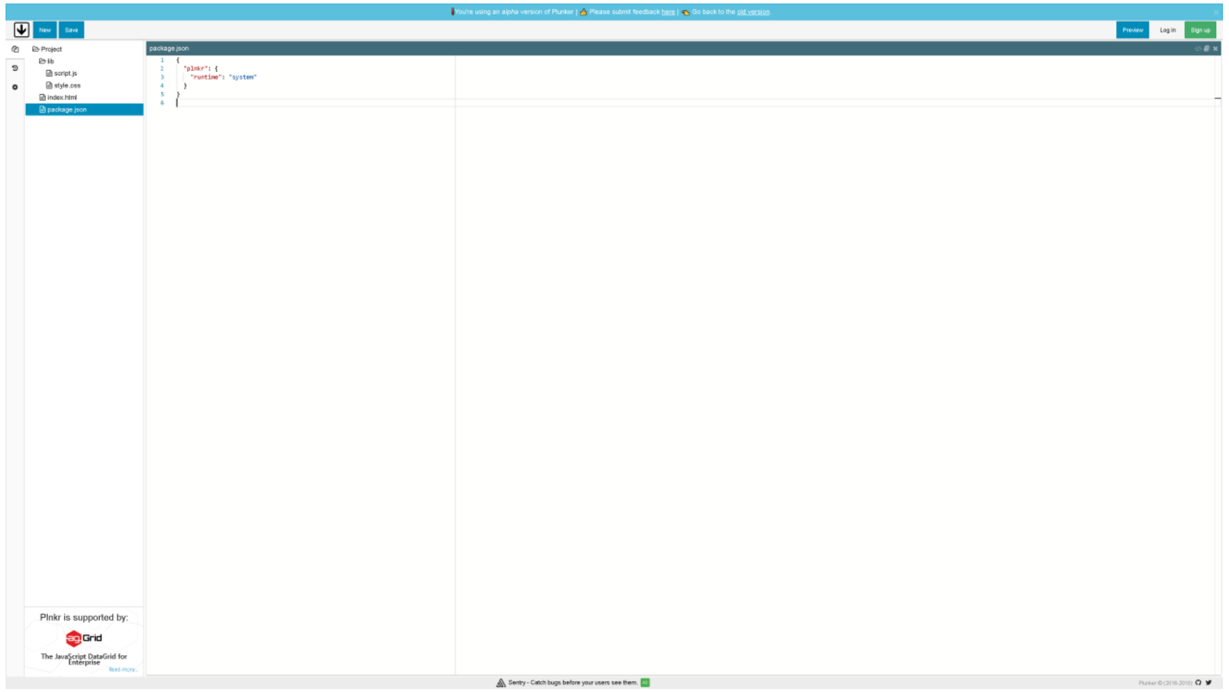


```
<!DOCTYPE html>
<html lang="en">

<head>
  <meta charset="UTF-8">
  <title>My Website</title>
  <link rel="stylesheet" href="style.pro
</head>

<body>

  <header class="site-header">
```

Plunker

- Plunker is a playground that helps you prototype faster
  - https://next.plnkr.co

- The main advantages are:
  - you can use multiple files, and create a full directory structure
  - you can download your project



You're using an *alpha* version of Plunker | Please submit feedback here | Go back to the old version.

package.json

```
{
  "plnkr": {
    "runtime": "system"
  }
}
```

Plnkr is supported by:

ag Grid

The JavaScript DataGrid for Enterprise

Read more...

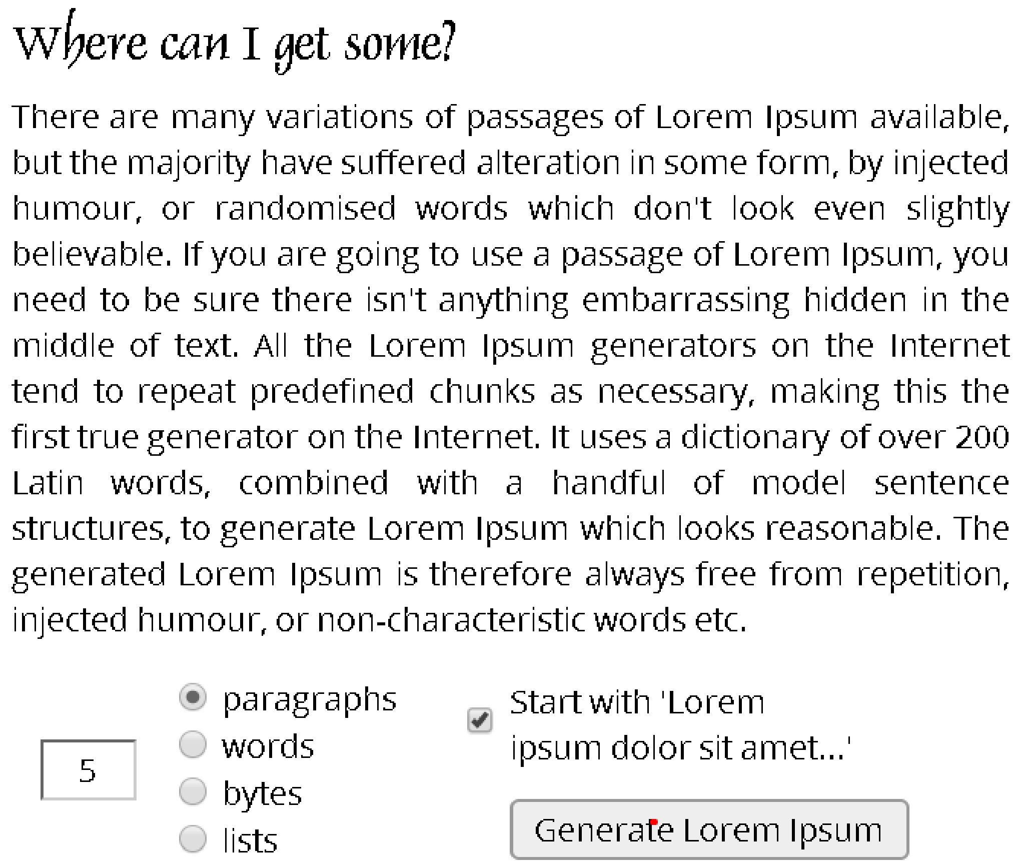
Sentry - Catch bugs before your users see them.

Lipsum generator

- A reader will be distracted by the readable content of a page when looking at its layout

- Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500

- https://www.lipsum.com/



Where can I get some?

There are many variations of passages of Lorem Ipsum available, but the majority have suffered alteration in some form, by injected humour, or randomised words which don't look even slightly believable. If you are going to use a passage of Lorem Ipsum, you need to be sure there isn't anything embarrassing hidden in the middle of text. All the Lorem Ipsum generators on the Internet tend to repeat predefined chunks as necessary, making this the first true generator on the Internet. It uses a dictionary of over 200 Latin words, combined with a handful of model sentence structures, to generate Lorem Ipsum which looks reasonable. The generated Lorem Ipsum is therefore always free from repetition, injected humour, or non-characteristic words etc.

5 [✓ paragraphs] words bytes lists

✓ Start with 'Lorem ipsum dolor sit amet...'

FHSU

Wrap-up

In-class exercise

- Go back in time!
- Select a major website (e.g., Airbnb, Booking, NPR, Pinterest, Tumblr, BBC)
- Redesign it to make it look as if it was 1997:
  - No CSS, no Javascript, no “fancy” items

- How would you proceed? The process matters more than the result