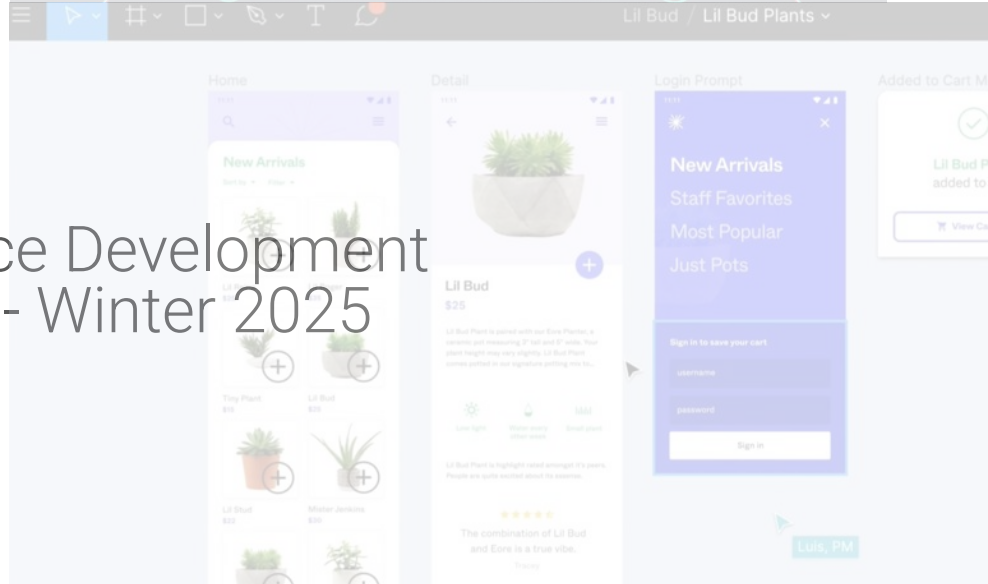
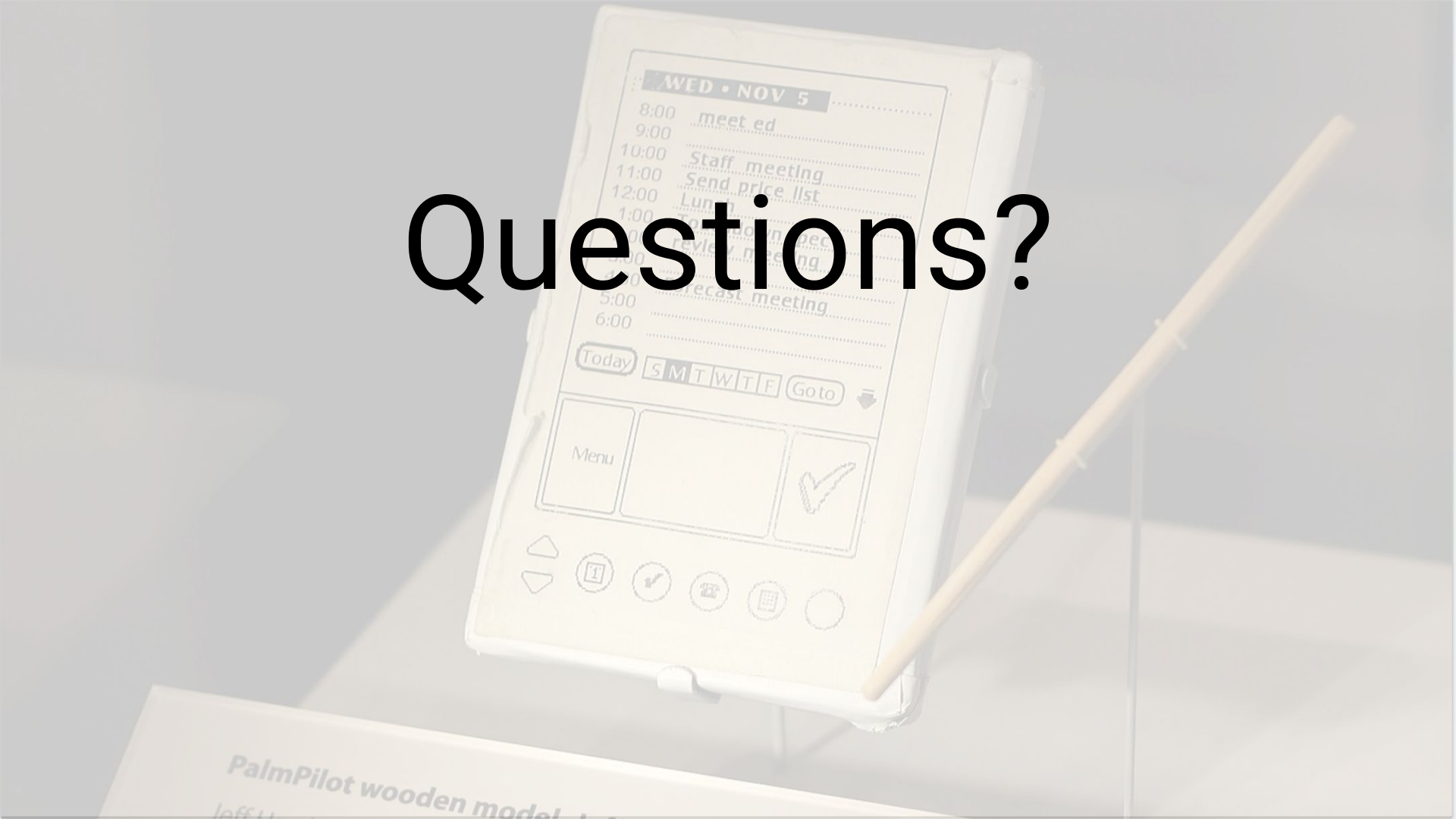
Web Basics, HTML, CSS



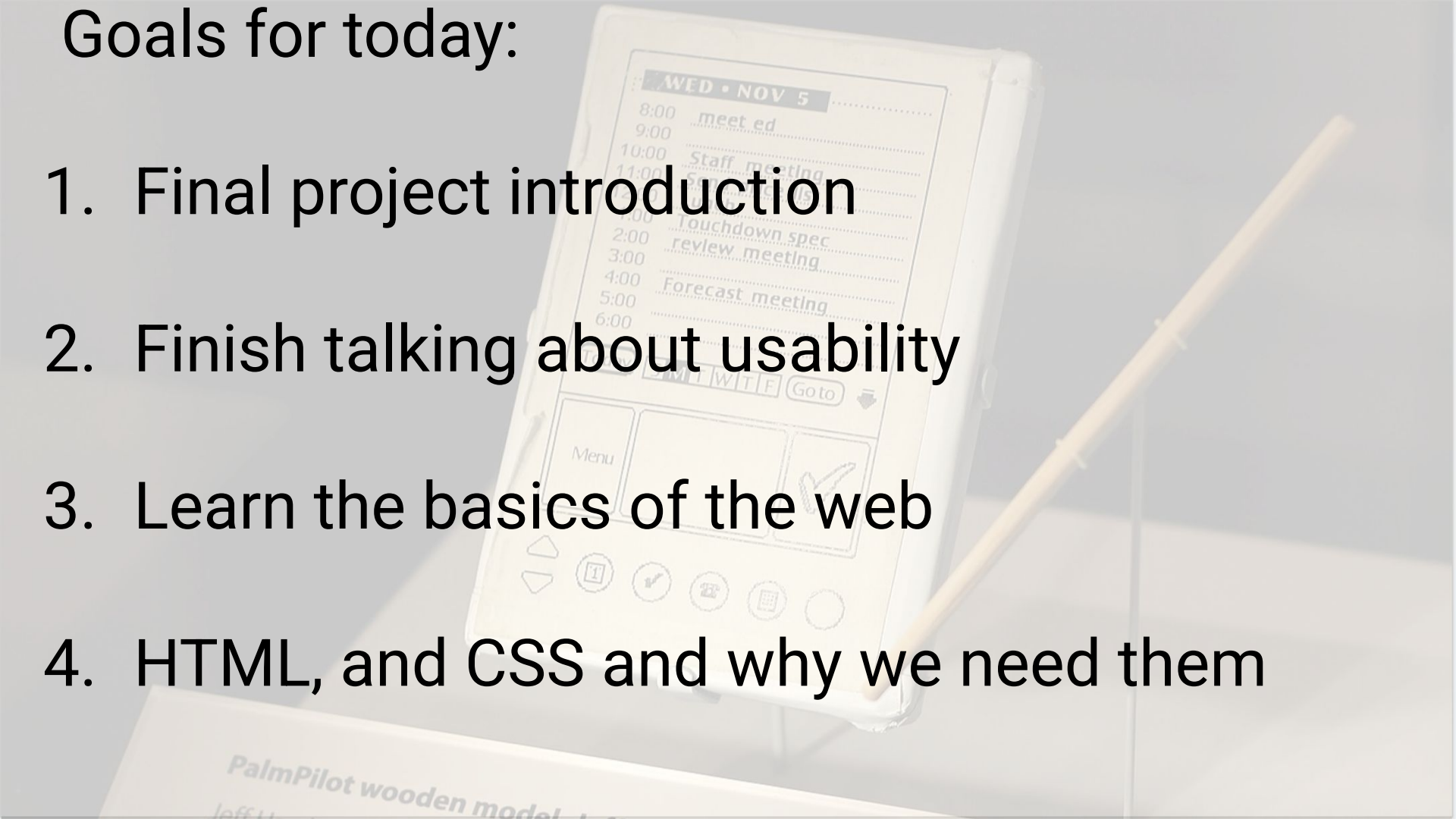
User Interface Development
EECS 493 - Winter 2025


WED • NOV 5
8:00 meet ed
9:00
10:00 Staff meeting
11:00 Send price list
12:00 Lunch
5:00
6:00
Today
S M T W T F
Goto
Menu
PalmPilot wooden model

Questions?

Goals for today:

1. Final project introduction
2. Finish talking about usability
3. Learn the basics of the web
4. HTML, and CSS and why we need them



Final Project Intro

Final Project

- Your team will create your own project theme
  - the stakeholder group should be people you can easily have access to (e.g., other undergraduate students)
- Example project ideas can be found in the project spec document

Milestones

- **Milestone 0:** Team formation (***Feb 2***)
- **Milestone 1:** Need identification (Feb 16)
- **Milestone 2:** Ideation & speed dating
  - *Storyboard Bake-off (Feb 27 before class)*
- **Milestone 3:** Prototype & evaluation (Mar 30)
- **Milestone 4:** Iterate on the prototype & evaluate again
  - *Prototype Bake-off* (April 8 before class)
- **Milestone 5:** Final presentation
  - Video due April 17 before class
  - *Presentation April 17 & April 22*

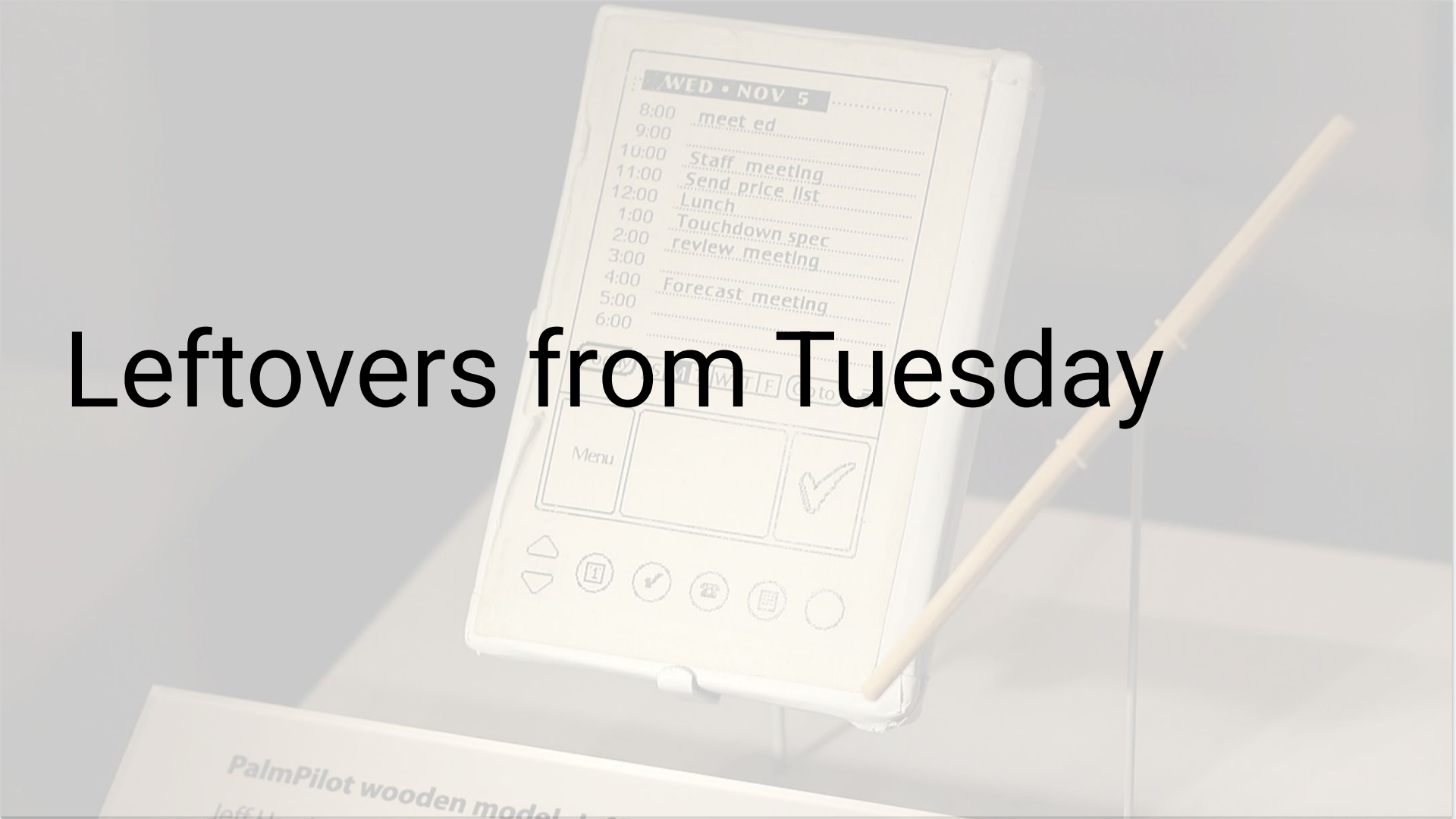
Milestones

- **Milestone 0:** Team formation
  - Team roster (2/2)
    - Teams of 4 (pick your own, or we pick for you)
    - Piazza team finding post
    - Decide the project theme
      - just the problem space, not the solution

Start finding your teammates!!

- More details about the final project:

bit.ly/4hdE3sg



Leftovers from Tuesday

Summary from Tuesday

- UI design must fit human abilities
  - Perceptual, cognitive, and motor capabilities
- Design is solving the two gulfs matching the representations we can use and expectations of the users
- Frequently used UI design concepts (affordances, signifiers, metaphors, and learned associations)
- Principles to guide design and UI properties we aim to improve. (Efficiency, understandability, discoverability and learnability)

Interface Design Properties

- Usability
  - Efficiency
  - Understandability
  - Discoverability
  - Learnability

UI Properties - Efficiency

Can you get the job done quickly + well?

Example: Predictive text helps people type more efficiently

UI Properties - Efficiency

Can you get the job done quickly + well?

Example: The dock helps people easily access the frequently-used apps

UI Properties - Understandability

Do you understand what is happening?

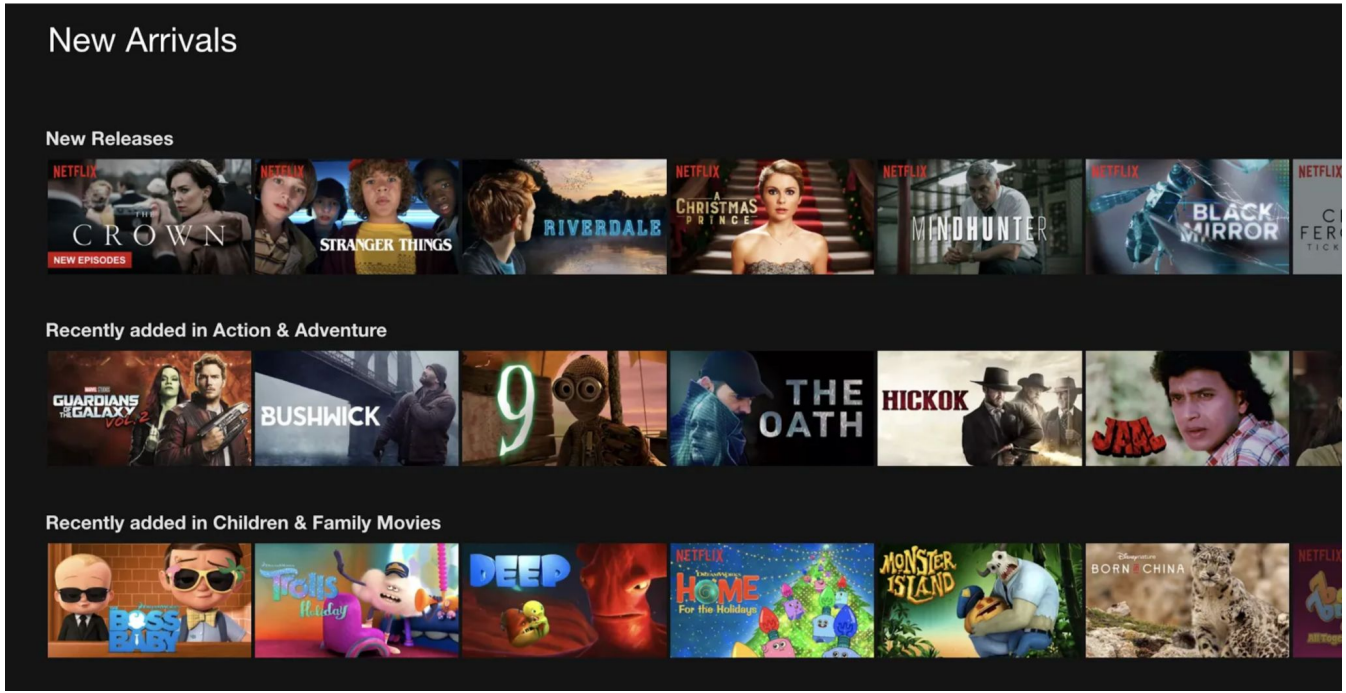
Example: The Nest interface shows the current and goal temperature.

UI Properties - Understandability

Use metaphors and learned associations to enhance understandability.

UI Properties - Understandability

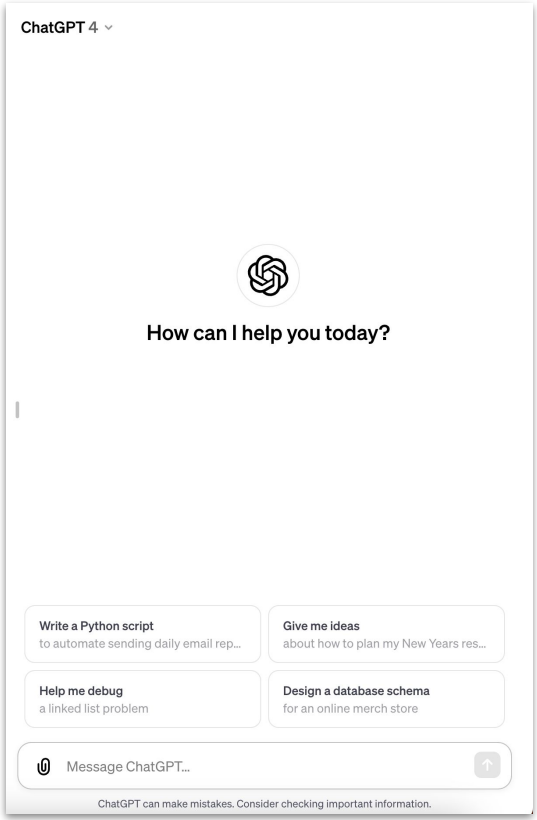
Grouping of content can enhance understandability.



UI Properties - Discoverability

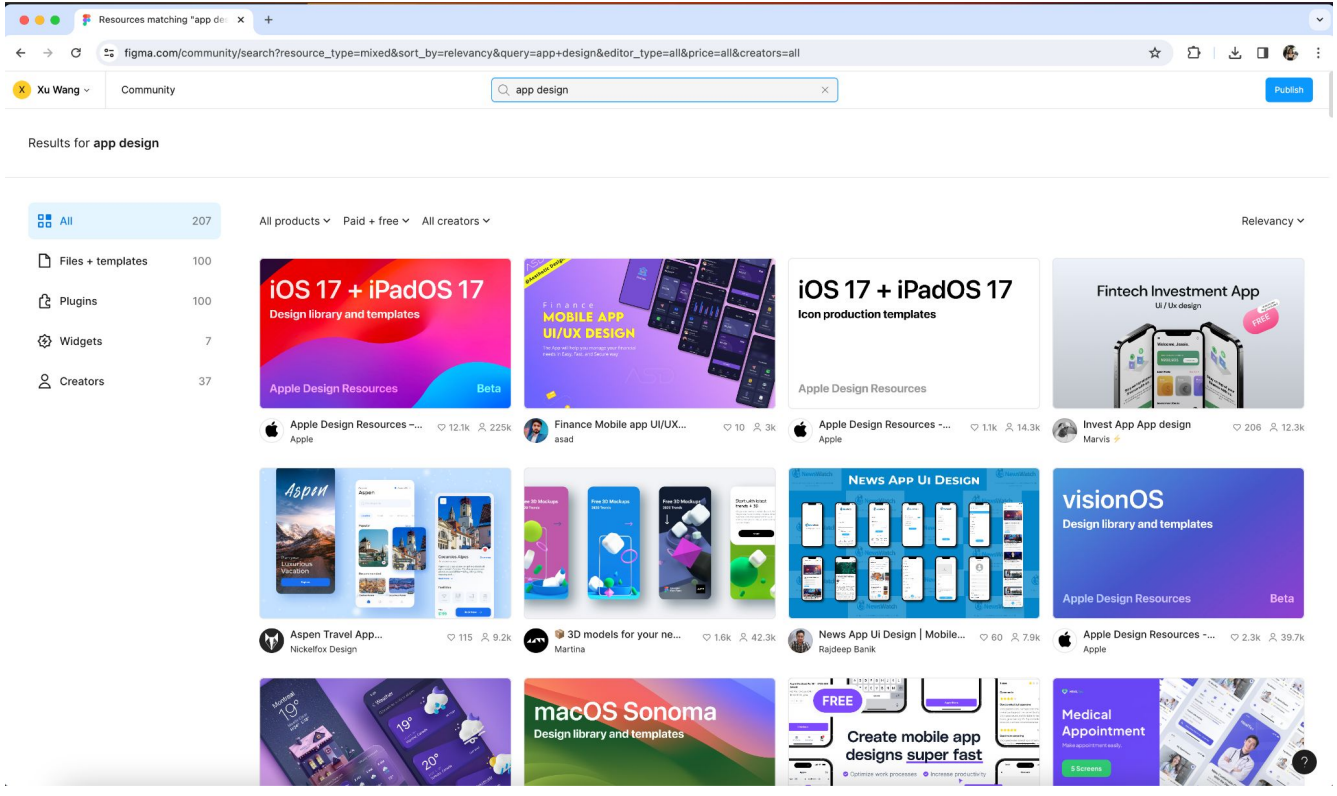
- Can you find new/existing UI features/tools?
- Tied to learnability

Example: ChatGPT gives some inspirations for people to try cool functionalities.



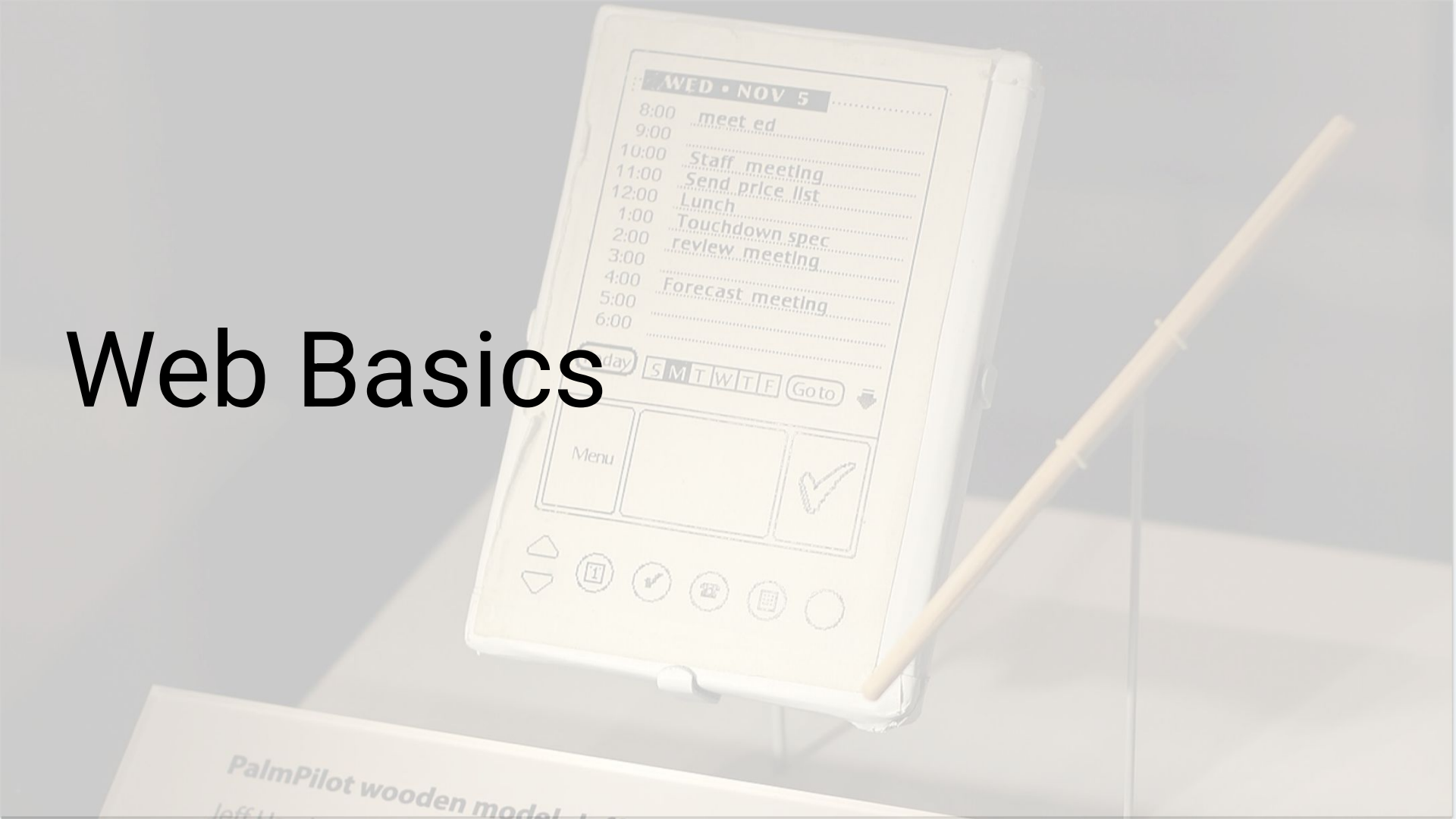
UI Properties - Learnability

Can you get better at using the interface?



The Figma community gives a lot of examples

Web Basics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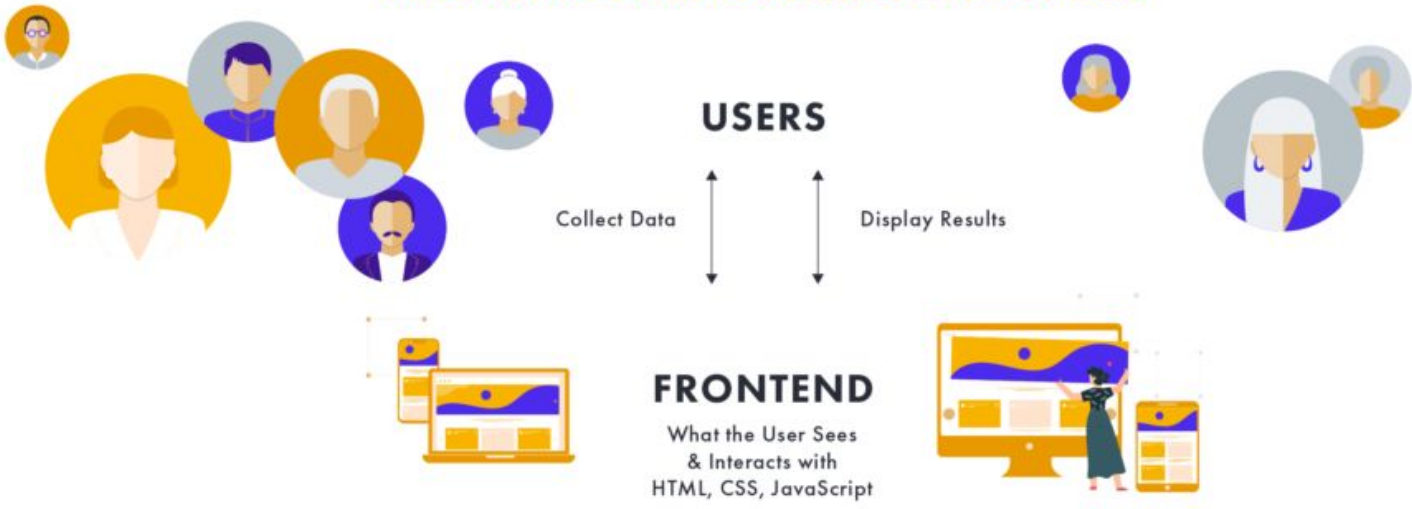
Three pillars of EECS 493

- **User-centered research and design methods**
  - Interviews and observations
  - Methods to analyze qualitative data
  - Storyboarding
  - User-testing
- **Prototyping**
  - Low-fidelity wireframes
  - High-fidelity prototyping: Figma
  - Prototyping with AI (wizard-of-oz)
- **Web-programming**
  - HTML/CSS/Javascript
  - jQuery
  - MVC framework
  - Vue framework

Difference of UI vs. other software

- Many other software focus on procedures:
  - Calculate X, retrieve Y from a database, etc.
  - The system decides when to move to a new state, execute a function, etc.
  - Goal: as fast as possible, as little resource as possible
- UI software:
  - Users need to provide input, e.g., type text, push button, navigate a menu, etc.
  - More critical goal: ***User Agency and Control!***

WEB APPLICATION ARCHITECTURE



https://www.evertop.pl/en/frontend-vs-backend/

Frontend

- **What the user sees and interacts with**
  - HTML: content/structure
  - CSS: style/layout
  - Javascript: interactivity
- Why keeping them separated?
  - Easier design and software engineering
  - Allow real-time manipulations on the browser

Amazon.com. Spend less. Smil

amazon.com/ref=nav_logo

Incognito

amazon Hello Select your address All Hello, Sign in Account & Lists Returns & Orders 0 Cart

All Best Sellers Prime Customer Service New Releases Today's Deals Pharmacy Books Fashion Registry Toys & Games Kindle Books Gift Cards Amazon Home Sell Computers Automotive Coupons

4+ star men's fall fashion

See more

Customers' Most-Loved

Women's

Men's

Beauty

Home

4+ star fashion, beauty & more

Back to School fashion

Clothing

Uniforms

Shoes

Backpacks

Shop smart picks

Sign in for the best experience

Sign in securely

Sponsored

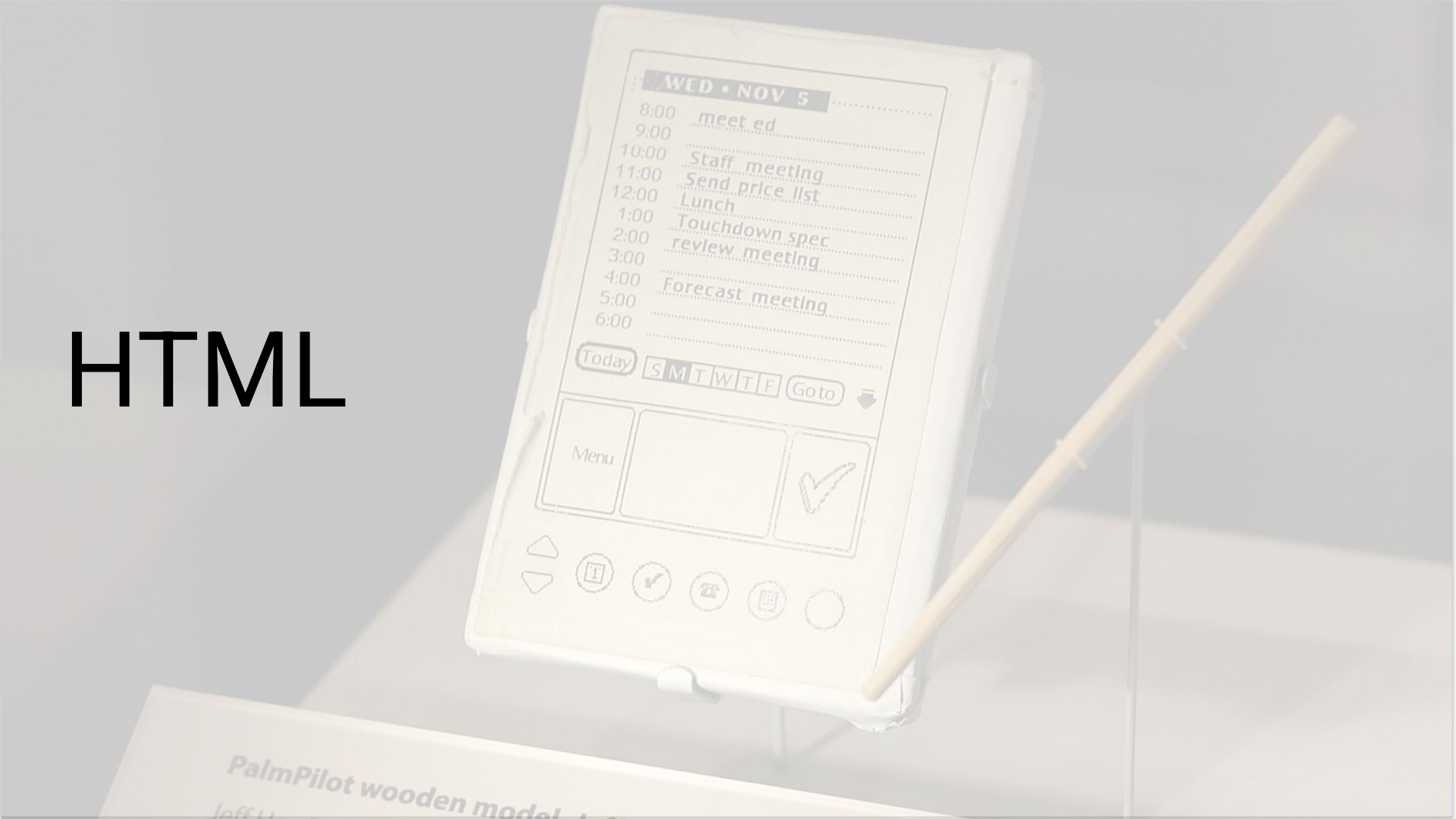
Off to College for her

Off to College fashion

Stock up for college

Get lost in a new release

HTML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HTML Primer

- HTML in 5 Minutes
  - https://youtu.be/salY_Sm6mv4


HTML
in 5 mins

HTML Primer

- HTML: Hypertext Markup Language
- HTML is a markup language
  - Technically is not a programming language
  - …because it’s not an executable script: you cannot write conditionals or generally act on data with it

HTML Primer: Containers

- **<html>**: html document specifier
- **<head>**: document meta-data container
- **<body>**: the top-most content element in the document.
- ** **: generic container widget
- ****: container for inline markup
- ** / **: ordered/unordered lists
  - **<li>**: list item

HTML Primer: Simple Widgets

- **<button>**: button
- **<img>**: display image
- **<a>**: anchor tag that creates hyperlink
- **<input>**: types include…
  - checkbox, color, date, datetime, file, month, number, password, radio, range, search, tel, text, time, url, …
- **<textarea>**: resizable area with multiple lines of editable text

HTML Primer: Other Stuff

- **
**: line break
- **<hr>**: line break with separator
- **<p>**: paragraph container (pre-styled div)
- **<h1> - <hN>**: headers (pre-styled div)
- List of html tags: https://www.w3schools.com/tags/

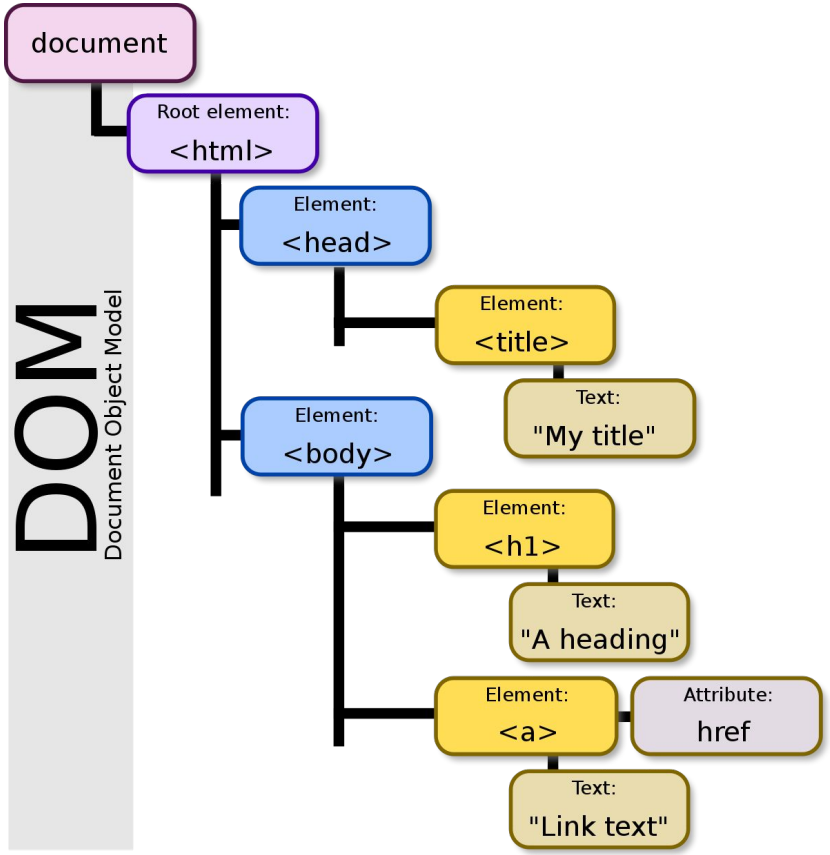
Resource: http://www.w3schools.com/html/html_intro.asp
Resource: http://www.w3schools.com/tags/default.asp

Browser as the Interpreter

- DEMO: simple HTML file + Browser as the Interpreter + Chrome Developer Tools

Document Object Model (DOM)

- Object that stores the hierarchy and relationships in our HTML page
- All elements in a page inherit from the document object



Example of a DOM Tree

```
<!DOCTYPE html>
<html>
  <head>
    <meta name="viewport" content="width=device-width,initial-scale=1" />
    <link href="style.css" rel="stylesheet" />
    <title>Critical Path</title>
  </head>
  <body>
    <p>Hello <span>web performance</span> students!</p>
    <div><img src="awesome-photo.jpg" /></div>
  </body>
</html>
```

https://web.dev/articles/critical-rendering-path/constructing-the-object-model

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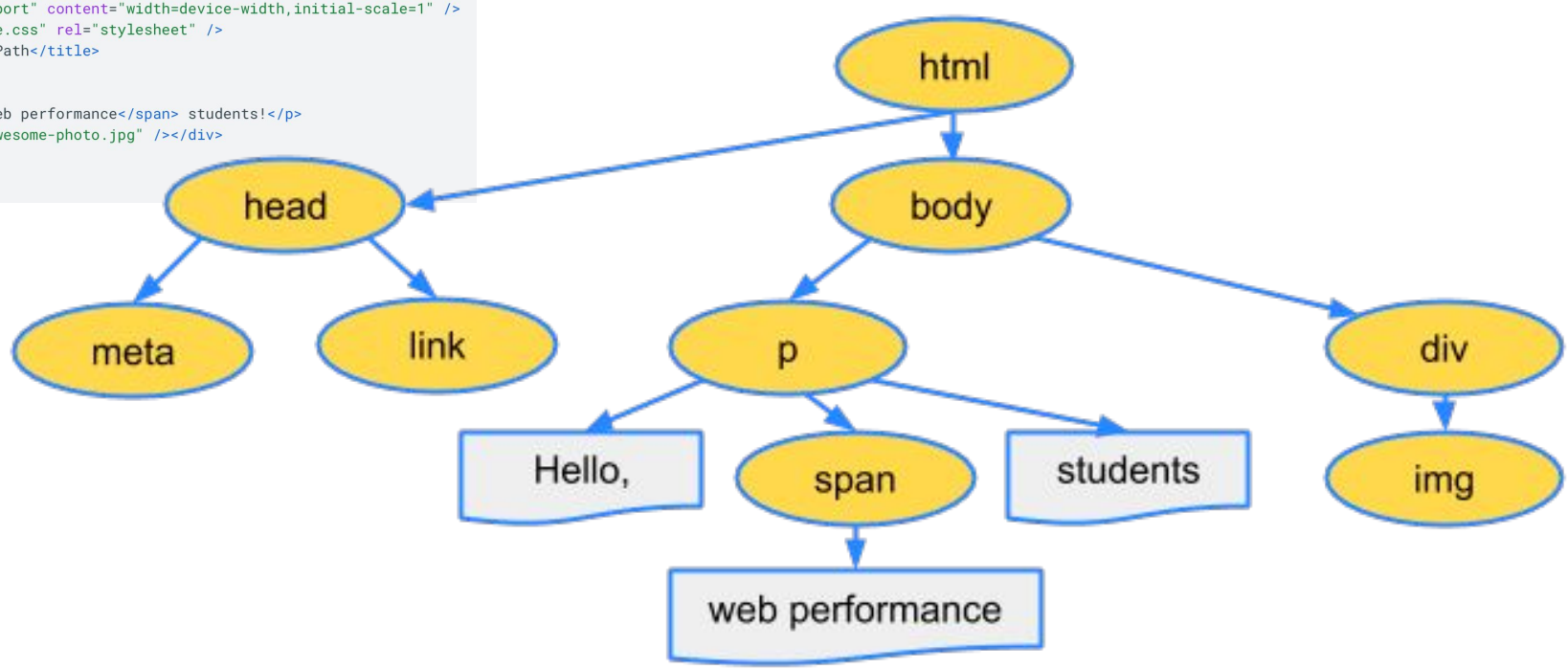


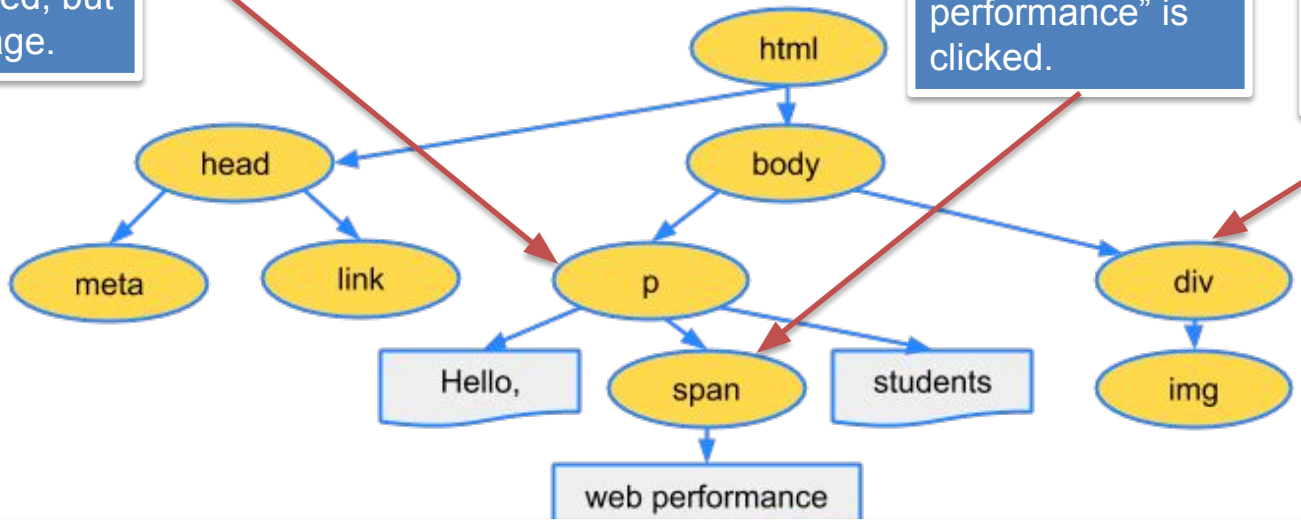
https://web.dev/articles/critical-rendering-path/constructing-the-object-model

Inheritance flows through DOM tree

If you handle clicks here, the handler (“C”) responds if any text is clicked, but not the image.

If you handle clicks here, the handler (“B”) only responds if “web performance” is clicked.

If you handle clicks here, the handler (“A”) only triggers when the image is clicked.



It’s completely okay to have all three click handlers doing different things.
Which handler fires when you click on “web performance”? When you click on “students”?

Survey 1

www.yellkey.com/pressure

Discuss with your peer

Which of the following is the most true? *

- ◯ The HTML that we write in an editor is the DOM
- ◯ When we click "View Source," what we see is the DOM
- ◯ We can see the DOM through the Development Tools or an Inspector

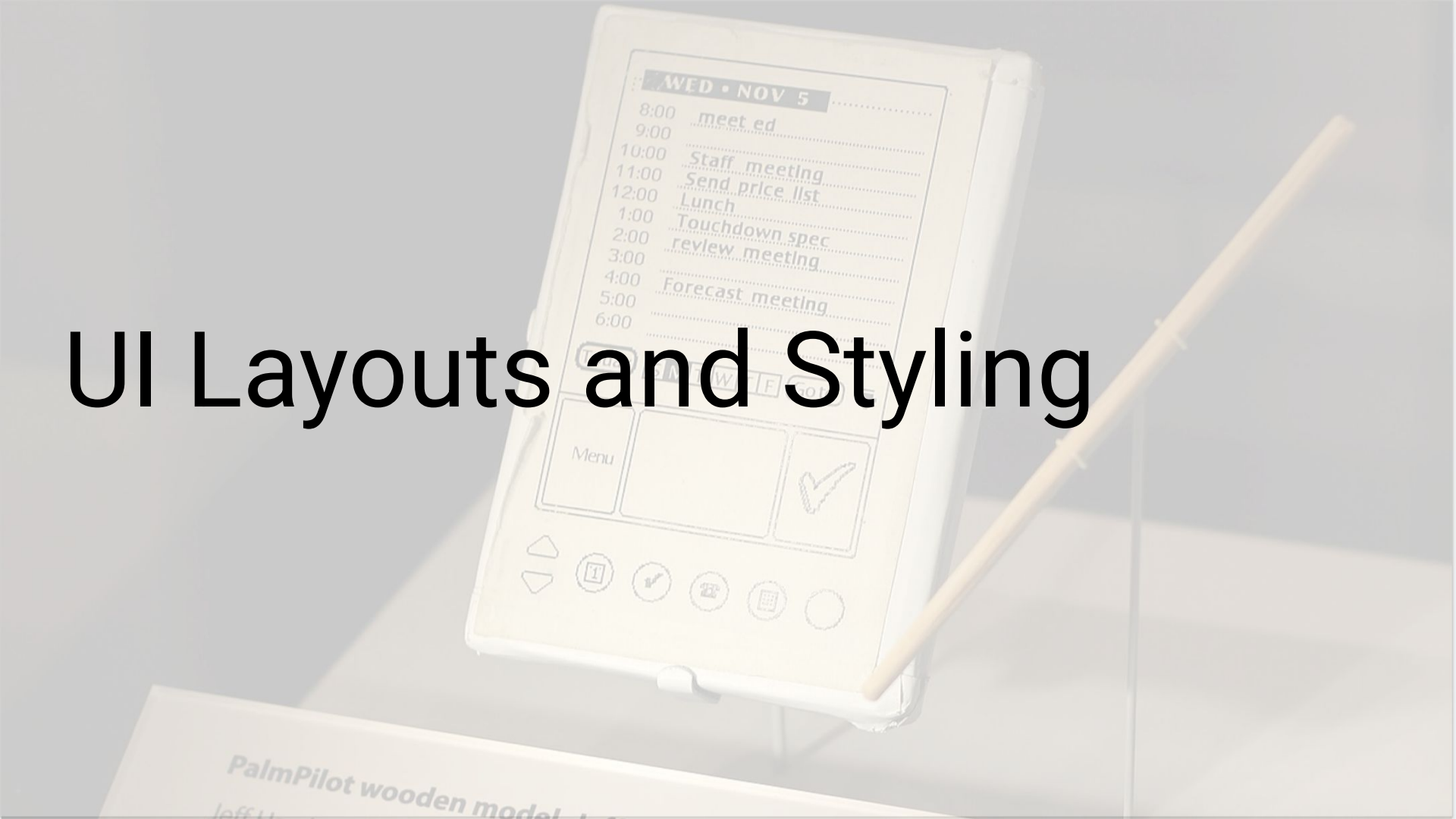
HTML is a programming language like Java *

- ◯ True
- ◯ False

For a web app, HTML mostly handles *

- ◯ Content/Structure
- ◯ Style/Layout
- ◯ Interactivity

UI Layouts and Styling

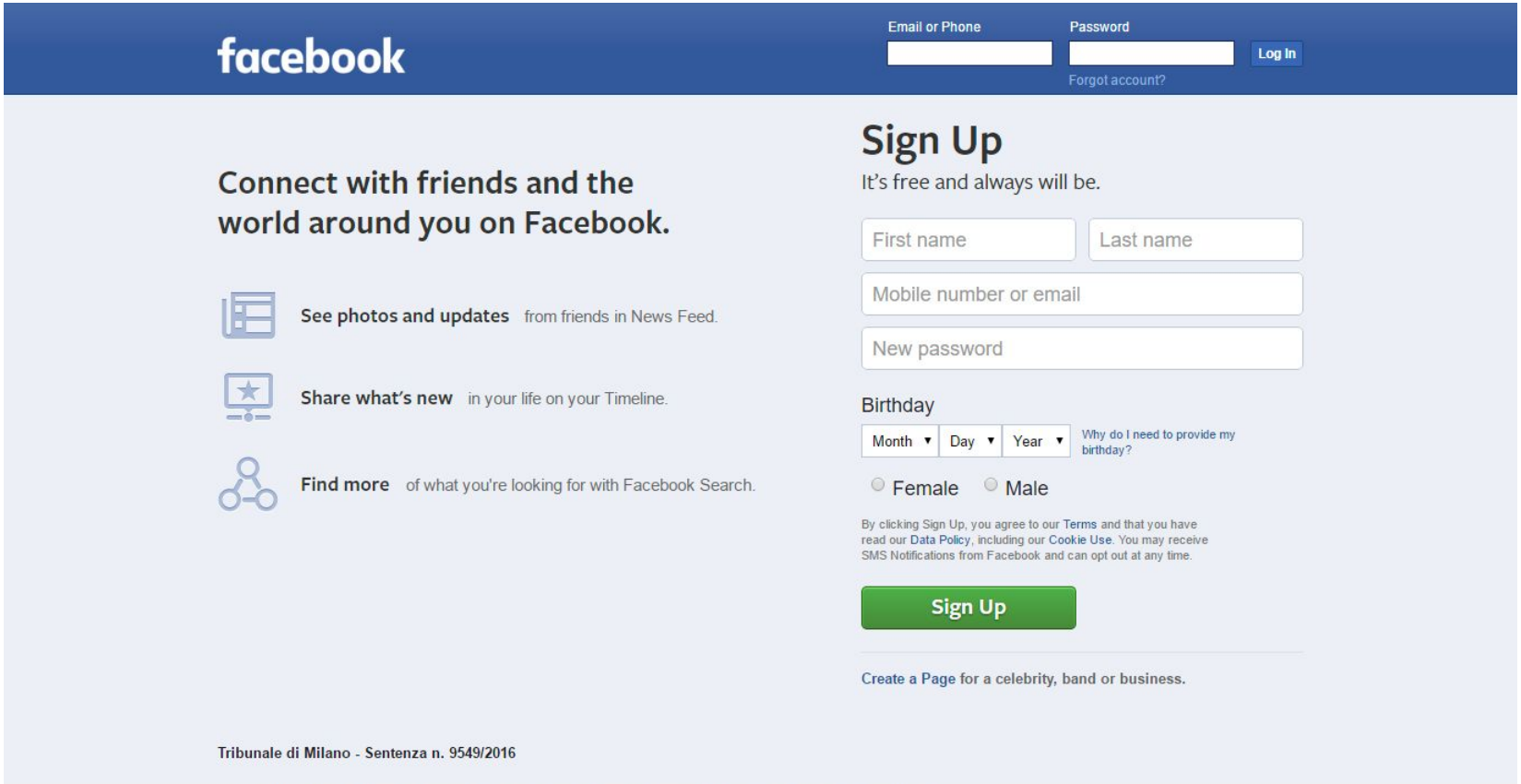


Video on Evolution of Web Design

- History of web technologies
  - https://youtu.be/XYTwYmOjqQs


Google!
BETA
1990
Google
2019

A (GUI) world without layout



Facebook

Email or Phone Password

Log In

Forgot account?

Connect with friends and the world around you on Facebook.

See photos and updates from friends in News Feed.

Share what's new in your life on your Timeline.

Find more of what you're looking for with Facebook Search.

Sign Up

It's free and always will be.
An error occurred. Please try again.
First name

Using your real name makes it easier for friends to recognize you. No special characters are allowed.
Last name

Using your real name makes it easier for friends to recognize you. No special characters are allowed.
Mobile number or email

You'll use this number or email when you log in and if you ever need to reset your password.
Re-enter email

Enter your email again.
Mobile Number

Enter your mobile number.
New password

To create a strong password, enter at least 6 characters, letters, numbers and punctuation marks.
Birthday

Month ▾ Day ▾ Year ▾ Why do I need to provide my birthday?

Female Male

By clicking Sign Up, you agree to our Terms and that you have read our Data Policy, including our Cookie Use. You may receive SMS Notifications from Facebook and can opt out at any time.

Sign Up

Security Check

This field is required.
Can't read the words below? Try different words or an audio captcha.
Please enter the words or numbers you hear.
Try different words or back to text.
Loading...
Enter the text you see above.

Why am I seeing this?

Layouts and Styling are critical!

- Without layout, we risk inefficient interactions with our UIs
- Usability of our systems depend on these.

Source: https://www.interaction-design.org/literature/article/design-failures

Problem Definition

- How do we put things where we want them and make them look the way we intend?

Styles vs. Layouts distinction

- Styles:
  - Specify widget appearances
- Layouts:
  - Specify spatial positioning (2D + layers)
  - Set of rules that govern the behaviors of what’s shown where, in a UI of a given app

Styles

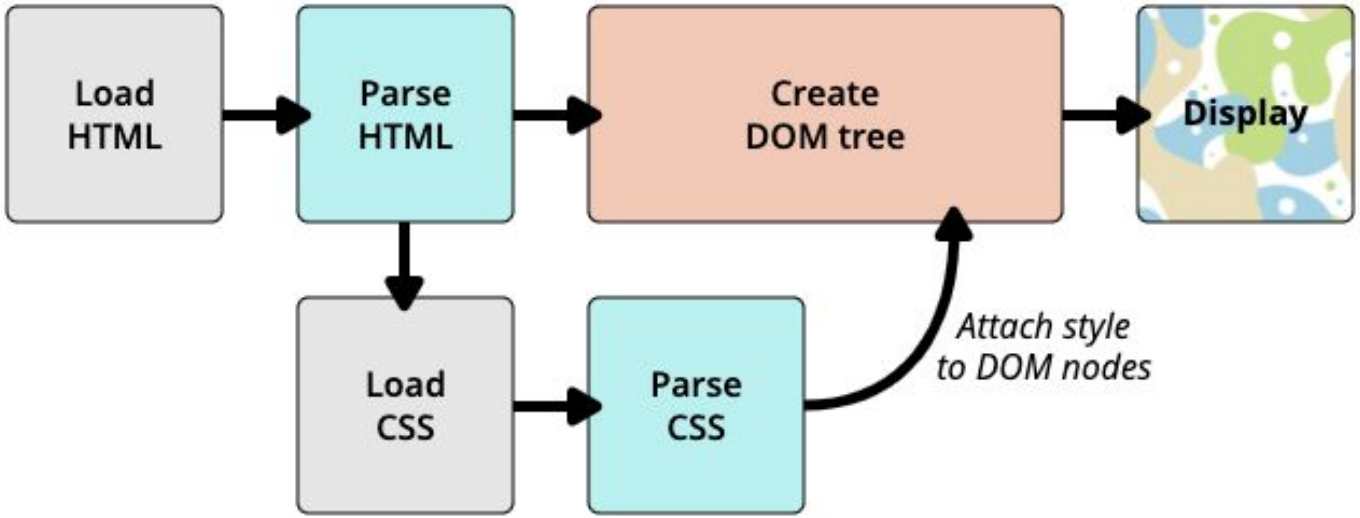
- Setting/defining the widget attributes, e.g.,
  - Color
  - Size
  - Text style
  - Shape
  - Borders
  - etc.

Layouts

- Layouts: where things are?
  - How would you define this?
  - How about different window sizes - responsive design
- Display properties:
  - flexbox, grid, float etc.
- Positioning of elements
  - absolute, relative, fixed, etc.

CSS: Cascading Style Sheets

- a language to describe the presentation of a document



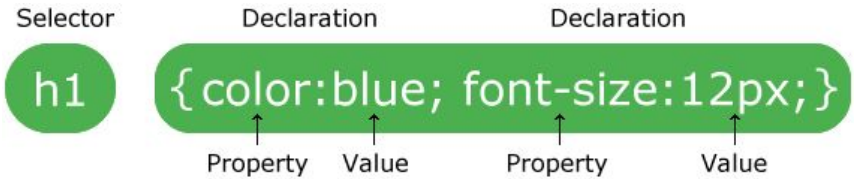
CSS Primer

- CSS in 5 Minutes
  - https://youtu.be/Z4pCqK-V_Wo


CSS
IN 5 MINS

CSS: Syntax

General form:




```
body {
    padding-left: 11em;
    font-family: Georgia, "Times New Roman”,
            Times, serif;
    color: purple;
    background-color: #d8da3d;
}
```

Translation: Anything in the <body>, paint in purple with a mustard background color, pick from a selection of fonts, and add some space to the left.

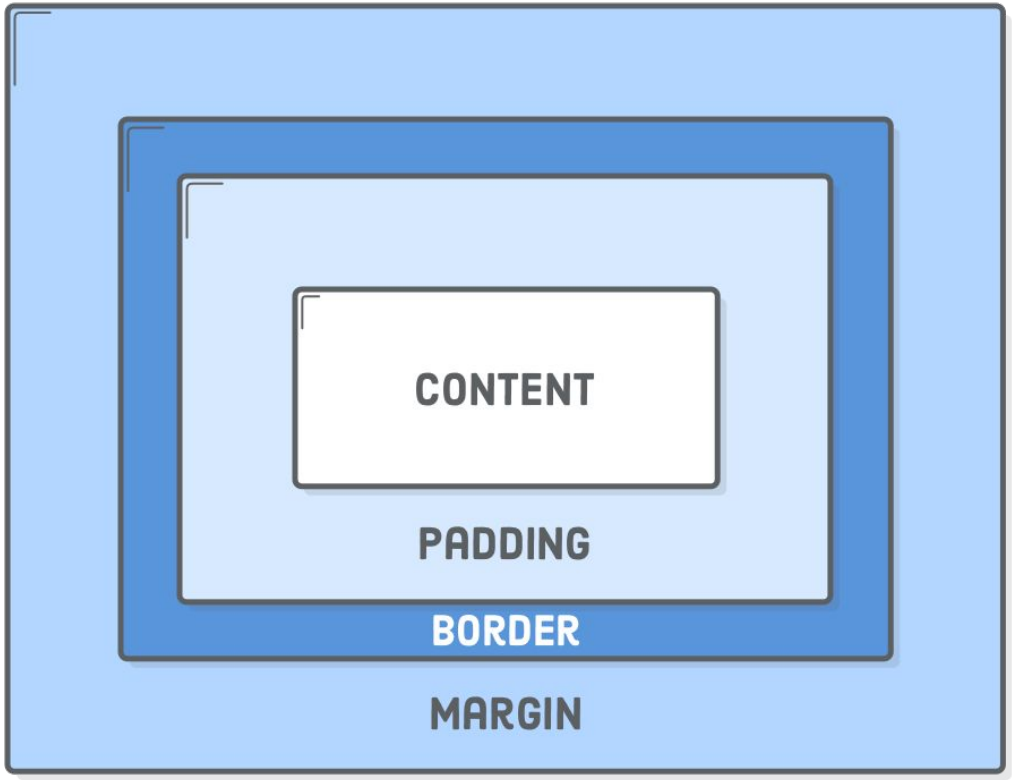
https://www.w3schools.com/css/css_syntax.asp

Best practice to include CSS

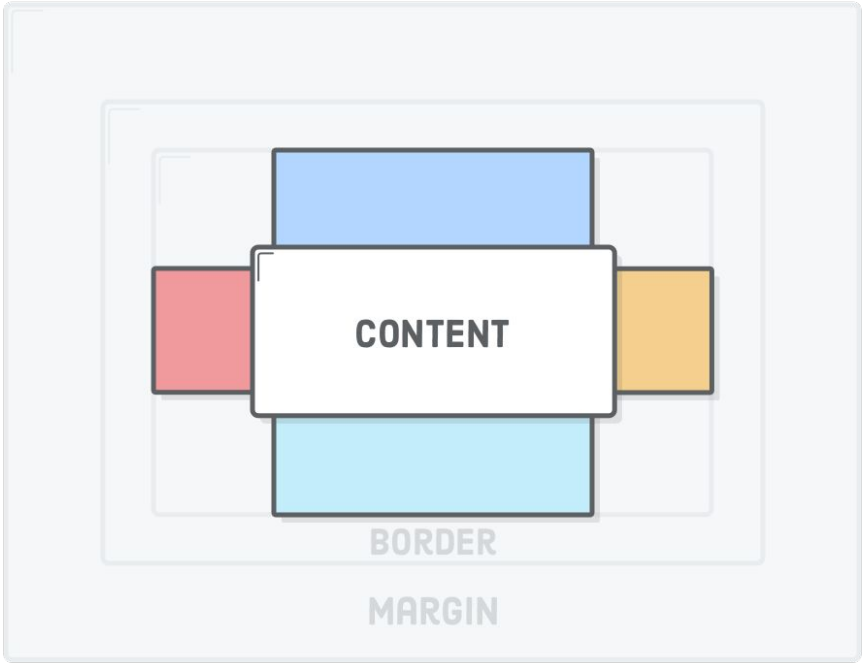
- **Inline**
  - <P style="font-size: 12pt; color: fuchsia;">Aren't style sheets wonderful?</P>
- **Style tags**

  <HEAD>
  <STYLE type="text/css">
  H1 {border-width: 1; border: solid; text-align: center;}
  </STYLE>
  </HEAD>
- **Separate style sheets (preferred)**
  - <LINK rel="alternate stylesheet" title="compact" href="small-base.css" type="text/css">

CSS Box Model

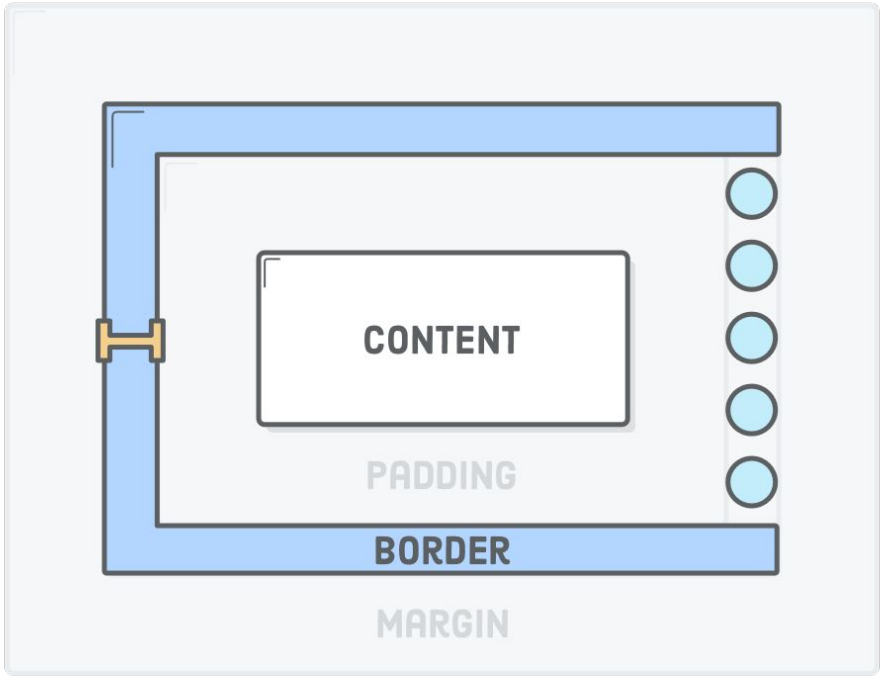


CSS Box Model - padding



PADDING : TOP RIGHT BOTTOM LEFT

CSS Box Model - border



CSS Selectors

- Elements are selected with their HTML name
  - p { … }
- IDs are selected with a “#”
  - #myElementID { … }
- Classes are selected with a “.”
  - .makeThisGreen { … }
- Combination lets you do interesting things with elements
  - Can create complex selectors
  - Can select nested elements only
  - Lots more combos!

CSS Selectors - OOP!

- Class structure of selectors
  -
  - Valid references in CSS:
    - #myID {…}
    - .classA {…}
    - .classB {…}
  - A comma means multiple entities
  - If we wrap this in
    - Access with: .metadiv .classA
      - Descendant selector
    - **The "space" matters here!**
      - .metadiv.classA is not the same – it describes an element with BOTH types aclass and metadiv (in a single element)

Survey 2

www.yellkey.com/worry

Discuss with your peer

Web responsive design are a result of (choose the best answer): *

- ◯ Needing to create new applications to increase use
- ◯ Needing to make web pages run faster
- ◯ Wanting to reduce programming costs
- ◯ Wanting reliability and consistency of content among form factors

Given the code below, what is the font size of the text “My Website Title”? (Note that em is a unit that describes font size relative to the parent element’s font size. For example, a size of 3em means that the font would be three times the size of the font in the parent element.) *

```
<html>

<head>
    <style>
        body {
            font-size: 6px;
        }
        .header {
            font-size: 50px;
        }
    </style>
</head>

<body>
    <div class="header">
        <h1 id="page-title">
            My Website Title
        </h1>
    </div>
</body>

</html>
```

- ◯ 6px, because we set all of the text within the body to be 6px.
- ◯ 100px, because default text size for the h1 element is 2em (meaning 2 times the font size of the parent element), and 2 times 50px is 100px.
- ◯ 12px, because the default text size for the h1 element is 2em (meaning 2 times the font size of the parent element), and 2 times 6 px is 12 px.
- ◯ 50px, because we set all of the text within the header to be 50px.

Discuss with your peer

What would this CSS selector select? p, #helloWorld { ... } *

- ◯ All <p> tags and element w/ID "helloWorld"
- ◯ An element w/ID "helloWorld" that's within a <p> tag
- ◯ All <p> tags that are named with ID "helloWorld"

What would this CSS selector select? p #helloWorld { ... } *

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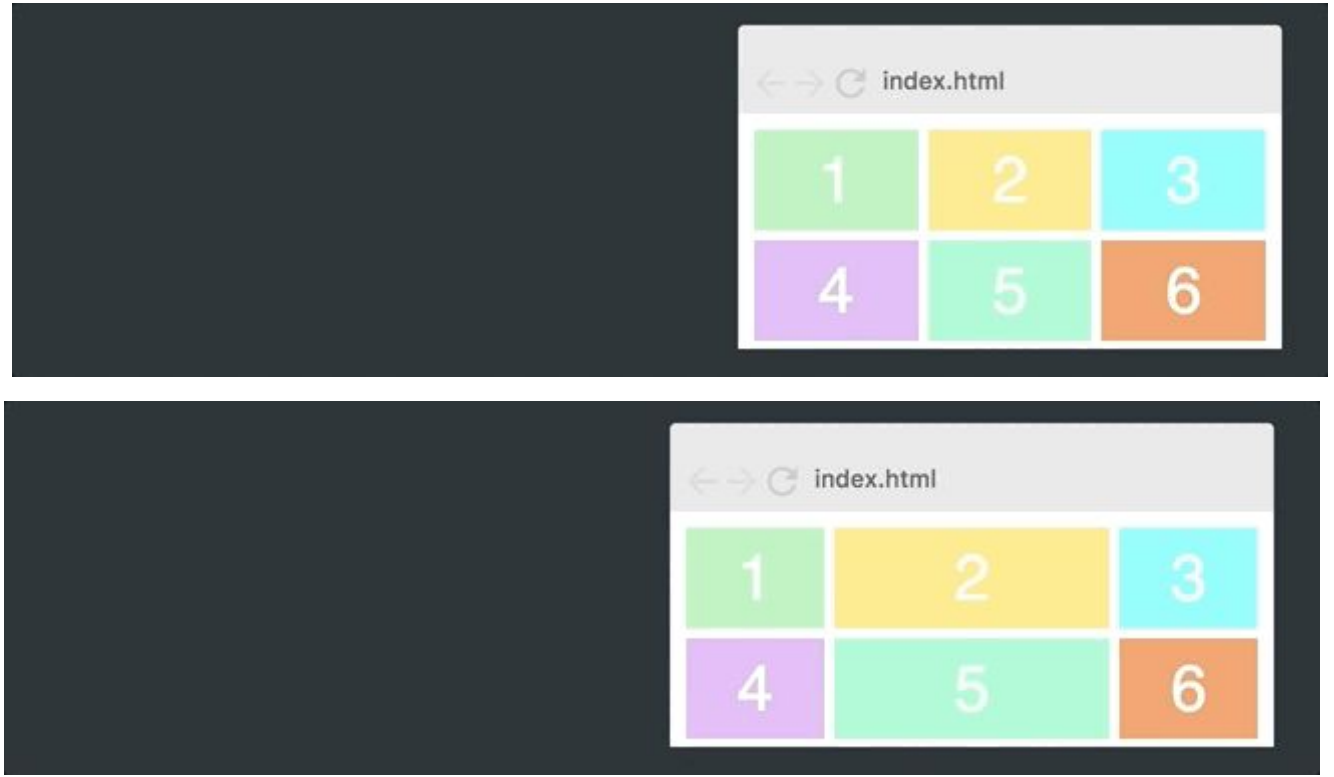
Containers



CSS Flexbox

- CSS Flexbox in 100 seconds
  - https://youtu.be/K74l26pE4YA

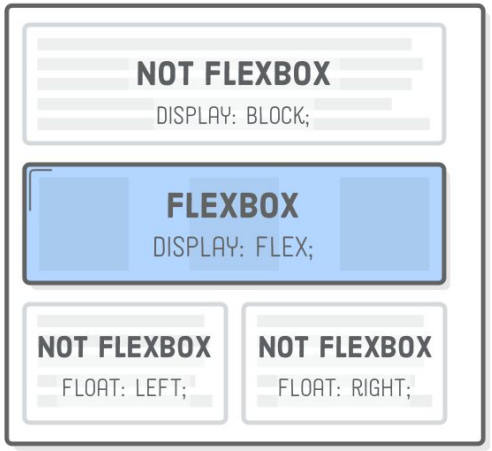
100 seconds of CSS

FLEXBOX

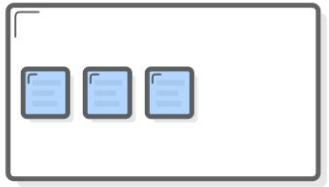
LAYOUT

Flexbox

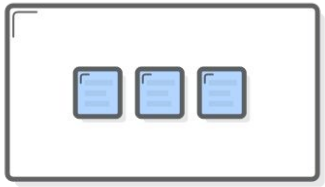
```
.menu-container {
    /* ... */
    display: flex;
}
```



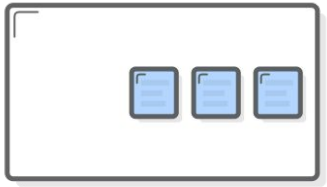

```
.menu {
    border: 1px solid #fff;
    width: 900px;
    display: flex;
    justify-content: center;
}
```



FLEX-START



CENTER



FLEX-END

Can also justify content *within* containers easily!

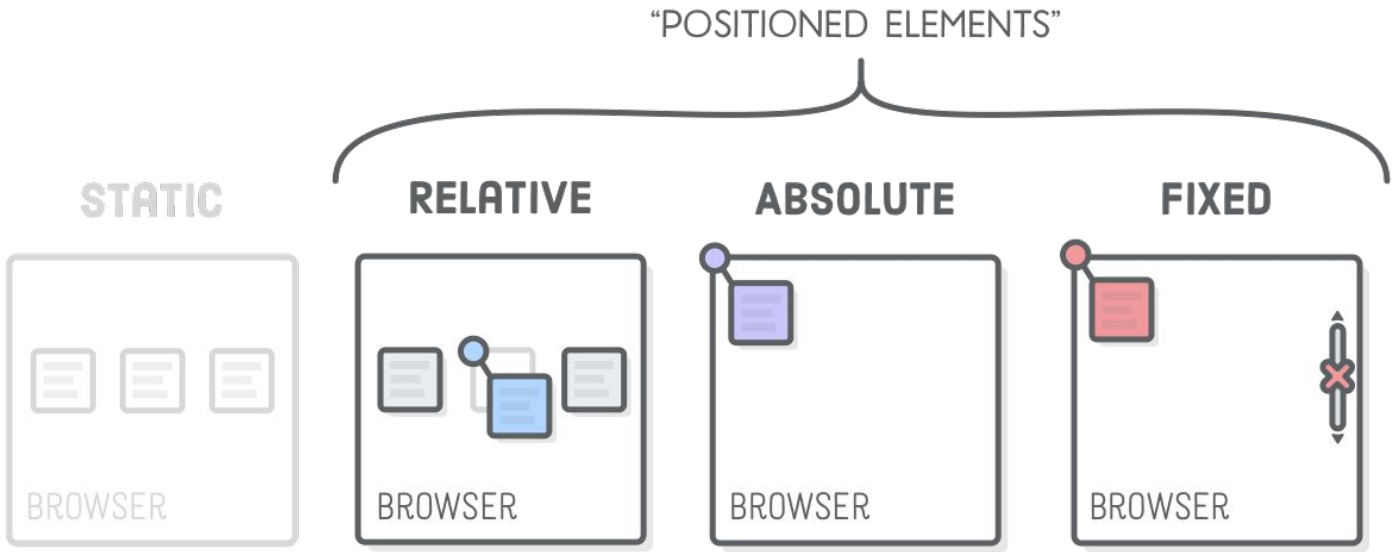
SPACE-AROUND

SPACE-BETWEEN

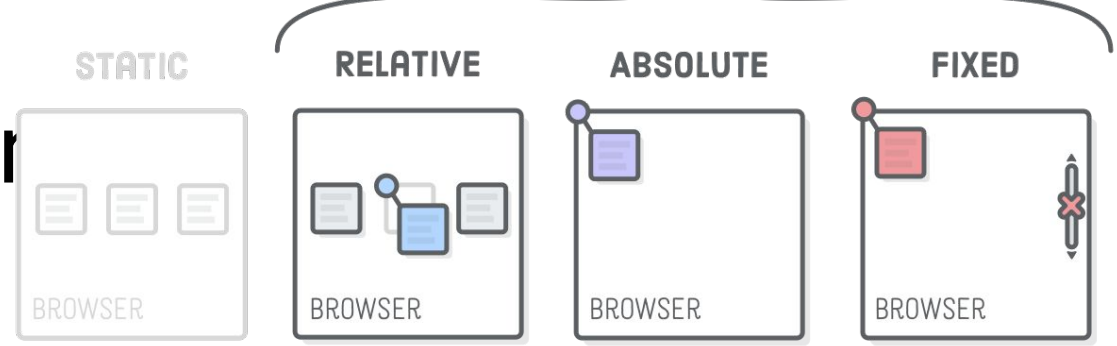
https://internetingishard.netlify.app/html-and-css/flexbox/index.html

Layout Positioning

- Static
- Relative
- Absolute
- Fixed
- Sticky



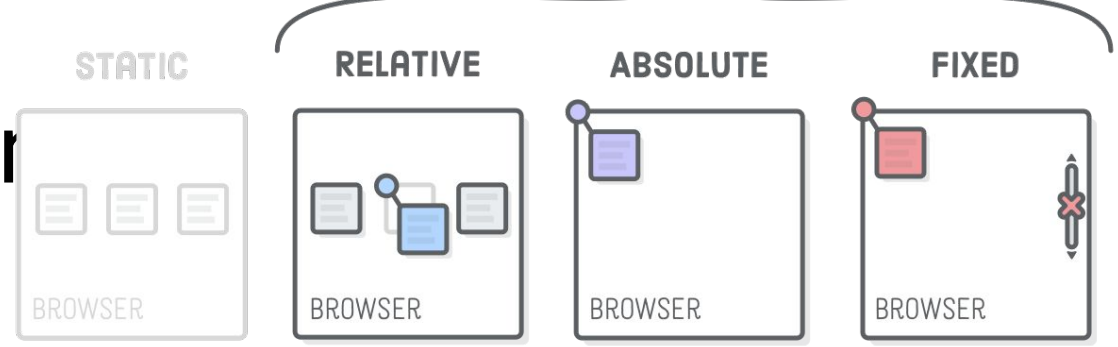
Layout Positionir



- Static
  - **Nature:** This is the default positioning for any HTML element.
  - **Behavior:** Elements are positioned in the normal document flow. They appear in the order they are written in the HTML.
  - **Use Cases:** Ideal for standard web page layouts where elements follow a sequential order.

https://www.w3schools.com/css/tryit.asp?filename=trycss_position_static

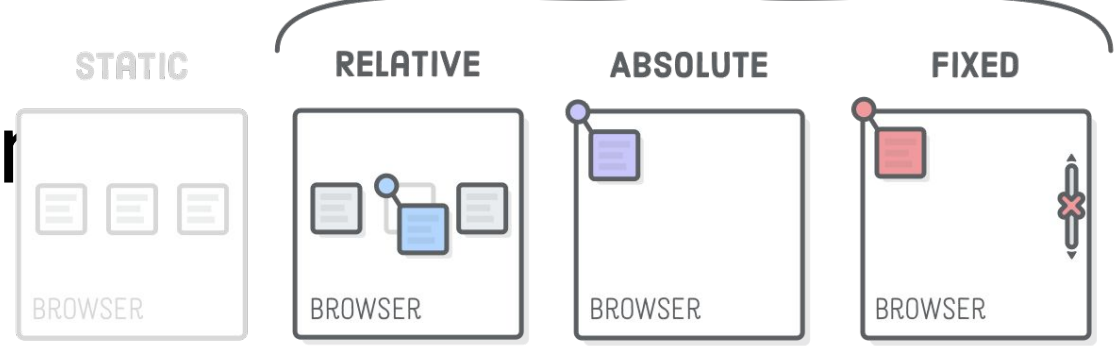
Layout Positionir



- Relative
  - **Nature:** Positions an element relative to its normal position.
  - **Behavior:** You can move the element up, down, left, or right, but it still occupies its original space in the document flow. Other elements don't adjust to fill the space the element would have occupied.
  - **Use Cases:** Useful when you need to adjust the position of an element slightly without affecting the layout of surrounding elements.

https://www.w3schools.com/css/tryit.asp?filename=trycss_position_relative

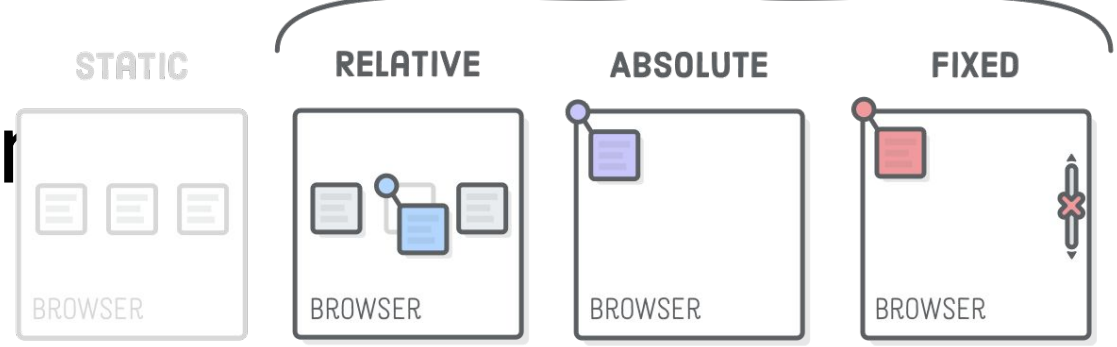
Layout Positionir



- Absolute
  - **Nature:** Positions an element in relation to its nearest positioned ancestor (other than static).
  - **Behavior:** The element is removed from the normal document flow, meaning it doesn't affect the position of other elements, and they don't affect it. It can be positioned anywhere within its container.
  - **Use Cases:** Ideal for creating a layout where elements overlay one another or for positioning elements precisely within a container.

https://www.w3schools.com/css/tryit.asp?filename=trycss_position_absolute

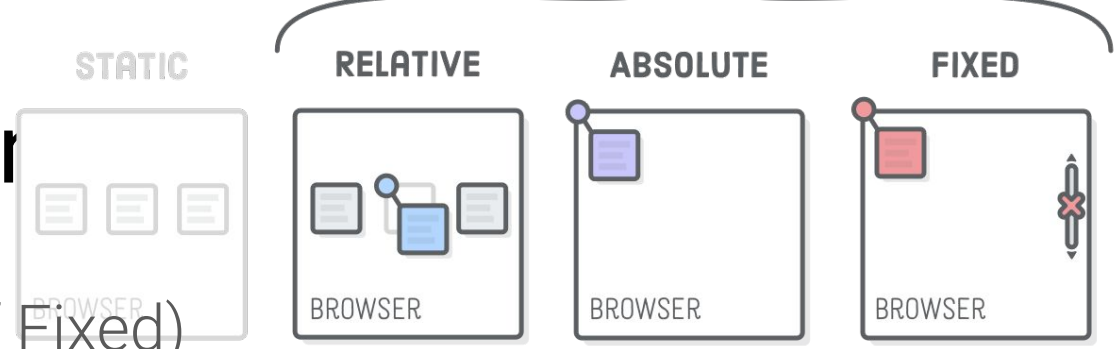
Layout Positionir



- Fixed
  - **Nature:** Positions an element in relation to the browser window or viewport.
  - **Behavior:** The element stays in the same place even when the page is scrolled. Like absolute positioning, it's removed from the document flow.
  - **Use Cases:** Perfect for creating navigation bars or anything that should stay visible regardless of scrolling.

https://www.w3schools.com/css/tryit.asp?filename=trycss_position_fixed

Layout Positionir

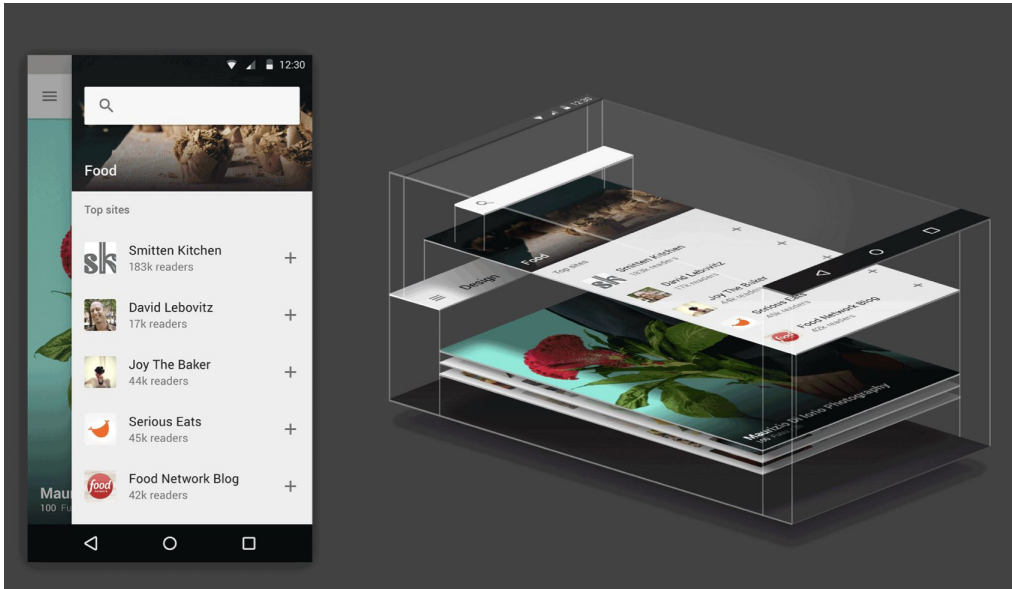


- Sticky (special case of Fixed)
  - **Nature:** A combination of relative, and fixed, based on scroll position
  - **Behavior:** It's part of the normal document flow until a defined point, then it acts like a fixed element.
  - **Use Cases:** Table headers, call-to-action buttons, scroll to top buttons

https://www.w3schools.com/css/tryit.asp?filename=trycss_position_sticky

Layers (z-index)

- Layers let some content appear ‘above’ others
- Z-index: default 0, larger goes on top, can be negative



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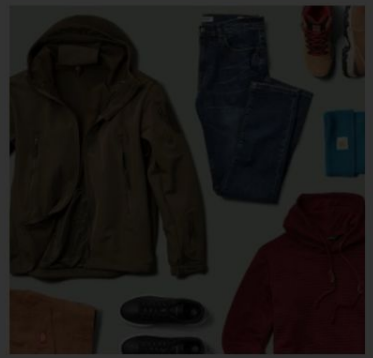

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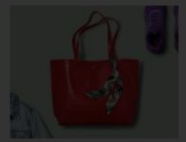
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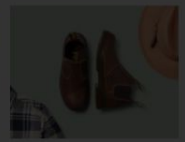
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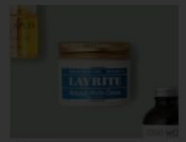
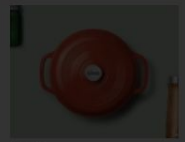

Beauty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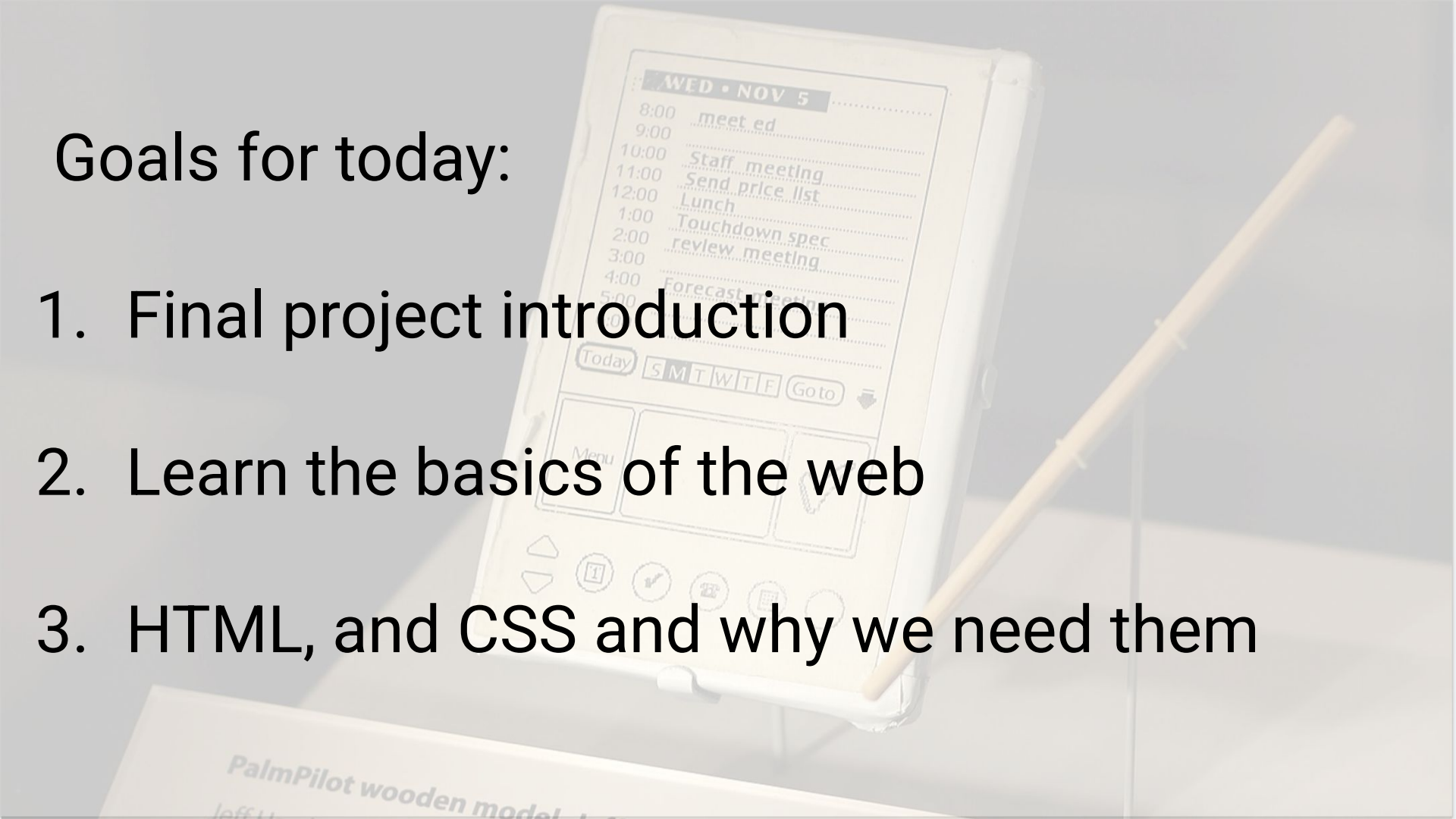

Goals for today:

1. Final project introduction
2. Learn the basics of the web
3. HTML, and CSS and why we need them