

CS120 WEB PROGRAMMING & ENGINEERING

SUMMER 2025



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COURSE INTRO

- <https://cs120.secretcheese.com>
- Wide range of material - intensive, hands-on approach.
- This is a survey class - there is not time to cover each topic in its entirety.
 - Further exploration on your own is always encouraged but not required.
- Canvas for assignments, slides, resources, and documents
- Piazza for Q&A, announcements

How to get an A/A+

- Time management
- Do the work
- Do extra credit when available
- Ask for help/ attend OH

Getting Help

- Don't hesitate to ask for help if you need it
- I am normally available after class - other times on request
- *An OH session may end after 20 minutes if no one shows up. Post in Piazza if you need to arrive late.*
- Additional office hours may be available on request. Post requests to instructors in Piazza.



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A LITTLE ABOUT MYSELF

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ASSIGNMENT POLICIES (SUMMARY)

See the online syllabus for all class policies.

- Late assignments
 - Up to 24 hours late, -5 pts
 - Up to 72 hours late, -15pts
 - Extensions to avoid a late penalty may be granted *if you have a hardship*. Request an extension *in advance* by email or in piazza and indicate how much time you need (24 or 48 hours) and why you need the extension.
- Deliverables
 - The deliverable checklist sheet **MUST** accompany every assignment.
 - Your code is required to be submitted with *every* assignment (Only submit code you wrote)
 - You may submit the files or copy paste into a document. *You may not submit a link to code online.*
 - Code must be readable *and* selectable (no screen shots)

- Assignment Guidelines
 - Test before and after submitting
 - Assignments **MUST** work for credit
- Code styling and comments
 - There is no style guide for this course. However, it is expected that you use a consistent coding style appropriate to each language.
 - A comment should appear at the top of each file, ahead of each function, and inline *as needed*.



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STRUCTURE OF THE COURSE

- Three Units - Each unit includes:
 - 2 - 4 topics
 - Problem sets
 - Project
- Each week you are expected to do the following:
 - Attend the class session
 - Watch any additional recorded material (identified in canvas)
 - Read online material (identified in canvas)
 - Complete the assigned problem set
 - Complete any prep tasks specified for that week - this may include setting up an account for an online tool.
 - Review the previous week's material and participate in the review at the beginning of the class session.

Projects

Each unit includes a larger, free-form project. You should work on these in addition to the weekly problem sets.

- Unit 1: Wedding/Cover Band website
- Unit 2: Interactive Web App - client side only
- Unit 3: E-Commerce website
- Final Project: Transactional Web app



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WEB BASICS

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WEB PROGRAMMING – WHERE IS IT USED?

Responsive/Mobile-friendly Website
Web App
Mobile App
CMS tools (for example, Canvas, Salesforce)



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WEB TECHNOLOGIES TO BE COVERED

Executed on the user's system (client side)

- HTML
- CSS
- Javascript
- JQuery

Executed at the web server (server side)

- PHP
- Node.js

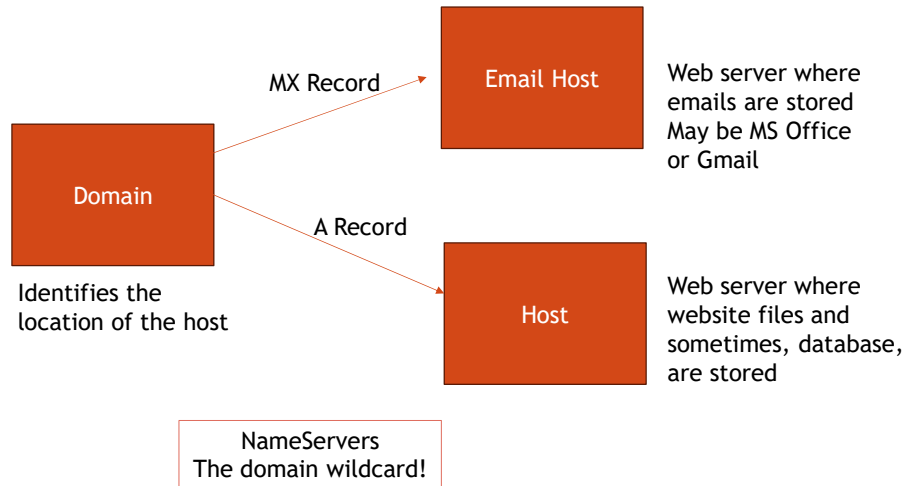
Other

- JSON
- AJAX
- SQL Database
- NoSQL Database



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GETTING A SITE ONLINE



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ANATOMY OF A URL

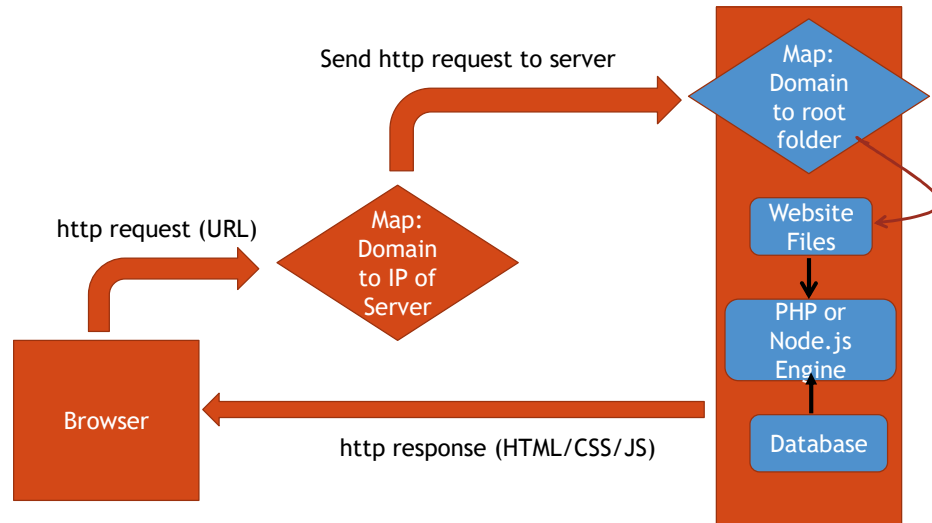
- URL = Universal Resource Locator

[HTTPS://HELP.FEEDME.COM/SNACKS.PHP?FLAVOR=SALTY](https://help.feedme.com/snacks.php?flavor=salty)

- Protocol
- Domain (TLD + domain name)
- Subfolder/subdomain
- File (default file)
- Query string

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What happens when you enter a URL into the browser? (the big picture)



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GETTING A DOMAIN

- Choosing a TLD: <https://data.iana.org/TLD/tlds-alpha-by-domain.txt>
- Playing with the country code: https://icannwiki.org/Country_code_top-level_domain
- Find a name: bustaname.com
- Ensure that it is available: whois.com

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ADD-ON DOMAINS VS SUBDOMAINS

- A **subdomain** is created by adding an "A" record to the domain with the subdomain prefix. You will need access to the site DNS to create a subdomain.
 - Most domain registrars do not charge for subdomains
 - This is a good way to have extra "sites" associated with the same domain. Some use cases:
 - staging.mysite.com
 - m.mysite.com
 - support.mysite.com
 - app.mysite.com
- An **add-on domain** is an extra domain that points to the same IP address.
 - This is set up at the host (usually in c-panel)
 - Some hosts do not support add-on domains.



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CONTEST: CHOOSE A DOMAIN NAME

Work in a group to do the following:

1. Create a domain name for a non-profit working to save/heal the oceans
2. Make sure your name does not already exist
3. There will be voting (next week in class)
 - First place: 15 points e/c plus bragging rights!
 - Second place: 10 points e/c
4. Email your group's entry to me at lisa.diorio@tufts.edu

Deadline is Wednesday May 28 at noon



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THE IP ADDRESS

Domain name ~ human friendly ⇔ IP address ~ computer friendly

- 32 bits (4 sets of numbers, 1 - 255)
 - Ex: 81.138.15.252
- Every endpoint attached to the WWW has an IP Address
 - whatismyipaddress.com/
- Every domain must be registered.
 - Internet Corporation for Assigned Names and Numbers (ICANN)
- There is a mapping from the domain to the IP address of the hosting.
 - Stored in a database of DNS Records. DNS = Domain Name System
- DNS records
 - Change the "A" record of a domain's DNS records to "point" the domain to the IP address of the server
 - Change the "MX" record for a domain to point to the email provider
- Caching can occur at several points: Browser, OS, Router, ISP
- See: <https://www.sistrix.com/ask-sistrix/seo-basics/what-is-a-dns-record-and-what-is-it-used-for>

whatismyipaddress.com
whatsmydns.net
whoishostingthis.com



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BACK AT THE SERVER ...

- There is a mapping at the web server from a domain name to the folder where the corresponding files are located
- When the last part of the URL indicates it is a file - then that file is served
 - If not, it may be a subfolder, "view", or "route".
- When the url ends after the domain, the file served will be the default for that server.
 - Usually, index.html, index.php, default.php)
- When the file to be served cannot be located, it's a 404 error - "file not found"
- Client-side code files (html, css, js) are passed directly back to the client
- Server-side code files (node.js, php, aspx, etc) => execute at the server and the result is passed back to the client
- Query string data is passed to the server-side code



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IS THAT IT?

- Not quite ... Now it's the browser's turn
- The browser will
 - display content formatted via **HTML** markup
 - interpret Javascript or other **Client Side** code
- The browser may
 - request other resources from the server - images, include files
 - access the server asynchronously



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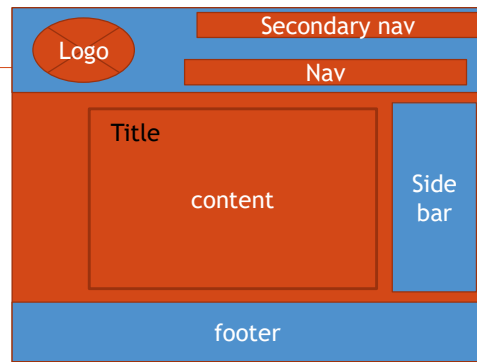


HTML
HYPERTEXT-MARKUP LANGUAGE

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ANATOMY OF A WEB PAGE

- Fixed page elements
 - Appear in the same place on every page
 - Important for usability and branding
- Content
 - The information for the page
 - Headings: signify importance to search engines and make the site scannable
- Sidebars
 - Augment the information on the page
 - Usually down the left or right side
- Header
 - Fixed element at top of page
 - Often contains logo and navigation



- Footer
 - Fixed element at bottom of page
 - May contain contact, copyright, lesser important nav, social icons
- Favicon and Title
 - Visible in browser tab

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WHAT IS HTML?

- A web page is a file containing content and HTML (and/or other web programming code)
- HTML is a markup language that describes what each piece of content is which helps:
 - The browser understand how to display it (sometimes with the addition of CSS)
 - Search engine bots to understand what is significant on the page
- HTML elements consist primarily of
 - Headings
 - Text
 - Images
 - Hyperlinks

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HTML QUICKSTART

Skeletal HTML Page

```
<html>
<head>
  <title>Cool Page Here</title>
</head>
<body>
  <h1>Hello World!</h1>
  This is my cool hello world page
</body>
</html>
```

Enter into any HTML or plain text editor

Naming the File

- Extension is .html
- Name the file index.html or default.html if it is the “home” page
 - Recall the rule for when the URL points to a folder and not a file: The default page will be selected automatically if no file is specified in the URL
- Any other file name can be used, but it will need to be specified in the URL.
 - <http://mysite.com/help.html>



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VIEWING THE PAGE IN A BROWSER

Option 1: View the page locally

- Open a browser and put the full path to the file in the url bar (the protocol is [file://](#))
- **Or easier,** drag/drop the file from file explorer into the browser
- This is for LOCAL VIEWING ONLY

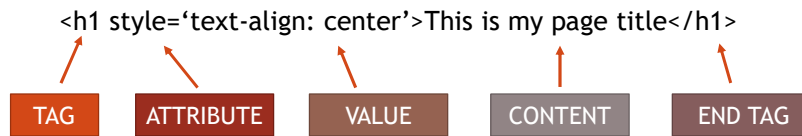
Option 2: View the page on the web

- Upload the file to a server on the web - note the web address
- Open a browser and enter the web address
- Include the file name at the end of the url if needed.



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HTML COMMANDS



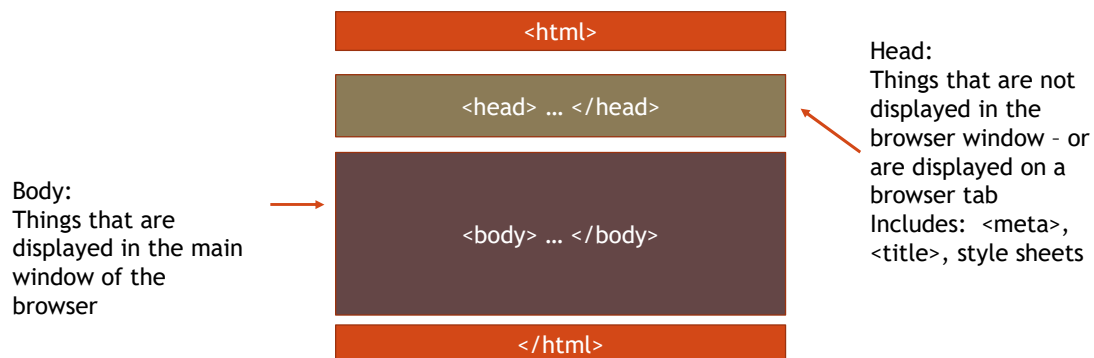
- Tags that contain content are **container tags**
 - <h1> My Title </h1>
- Add a slash to a non-container tag to let it also serve as an end tag (best practice)
 -

- **Entities** Start with & and end with ;
- Common entities:
 -
 - ©
 - ®



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STRUCTURE OF HTML PAGE



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BASIC HTML TAGS

- HTML ignores whitespace. You have to insert it explicitly.
 - Paragraph `<p>` (double line break)
 - Break `
` (single line break - not a container tag)
 - Div `<div>` (single line break - a container tag)
 - Non-breaking space ` ` (a space)
- Headings `<h1>`, `<h2>`, ... `<h6>`
- Horizontal rule `<hr>` (not a container tag)



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TEXT FORMATTING

- `` bold (also ``)
- `` italic (also `<i>`)
- `<SUP>`, `<SUB>` superscript, subscript
- Tags can be nested

```
<strong>text1</strong>
```

text1 is bold

```
<strong>text1<em>text2</em>
text3</strong>text4
```

text1 will be bold

text2 will be bold and italic

text3 will be bold

text 4 will be normal



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HTML LISTS

- Unordered (bulleted) ``
- Ordered (numbered) ``
- List item ``
- Attributes
 - Start
 - Type
- You can create an indent level by creating another list inside of an ``
- Styling to shut off bullets
`<ul style="list-style-type: none">`



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IMAGES

- ``
- `img` is *not* a container tag
- It will auto-size but may reduce performance
- Attributes
 - `alt`, `title`
 - `height`, `width`
 - `align`
- Formats: `jpg`, `png`, `WebP`
- Tradeoff - quality of image vs load time
- Finding images
 - `unsplash.com`
 - Stock photos
 - Creative commons
 - Be mindful of attribution
- File size reduction: `birme.net`



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HYPERLINKS <a>

- Link `text to be linked`
- # link links to an id on the page with the specified name.
ex: `<div id="abc">` ``
``
- Use a full URL (including the protocol) for external sites
- Relative paths:
 - If a file in same folder as web page: `file.xxx`
 - If file is in child folder of web page: `folder_name/file.xxx`
- Best practice to open links for an external site in a new window or tab:
 - Use: `target="_blank"`
``



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EMAIL, PHONE & FILE LINKS

- Email link
``
- Phone link
``
- Download a file - set href to the file name
 - full URL or relative path to the file must be specified



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HTML TABLES

- Main tag is `<table>`
 - Border attribute to have a border
- Tables are made of rows: `<tr>`
- Rows are made of elements (table data) `<td>`
- “Header” rows are bold and centered `<th>`
- Rows are auto sized to the tallest item in the row
- Columns are auto sized to the widest element in the column
- Use ` ` for an empty cell

| Effect | Description | Results or Outcomes | Other Interesting Facts |
|--------|-------------|---------------------|-------------------------|
| | | | |
| | | | |
| | | | |



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META TAGS

- Metadata is “data about the data”
- `<meta ... />`
 - Name =
 - Description Keywords
 - Author Viewport
 - Content =
 - Should be relevant to the name
- HTML Redirect
`<meta http-equiv="refresh" content="5;URL=https://www.newsite.com/" />`



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