

# CS 2033

# Multimedia & Communications II

LECTURE 3 – HTML AND WEB FORMS

# Websites from scratch!

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- ▶ No more WYSIWYG programs!
- ▶ I'll teach you how to create a website purely using code.
- ▶ What you will need:
  - ▶ Plain text editor like Brackets
  - ▶ Do NOT use Word for this!
  - ▶ Internet browsers...

# Which browsers?

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- ▶ Chrome is the most popular one.
- ▶ Ideally, websites should work on ALL platforms and browsers.



- ▶ Most browsers render code very similar to one another. Sometimes Edge behaves a little differently.

# Website languages

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- ▶ The primary trinity of languages:

- ▶ HTML5
- ▶ CSS3
- ▶ JavaScript



- ▶ Other languages:

- ▶ PHP
- ▶ ASP

- ▶ HTML: Hypertext Markup Language.
- ▶ Consists entirely of tags.
- ▶ Tons of elements, i.e. images, headers, tables, lists, paragraphs
- ▶ Standard language for making static websites.
- ▶ Files usually end in .html or .htm

# Files and folders

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- ▶ The homepage or splash page must be named `index.html` to be loaded first.
- ▶ Other files should be named appropriately and:
  - ▶ All lowercase (fruit.html)
  - ▶ No spaces (myfamily.html)
  - ▶ Not too long (uwo.html)



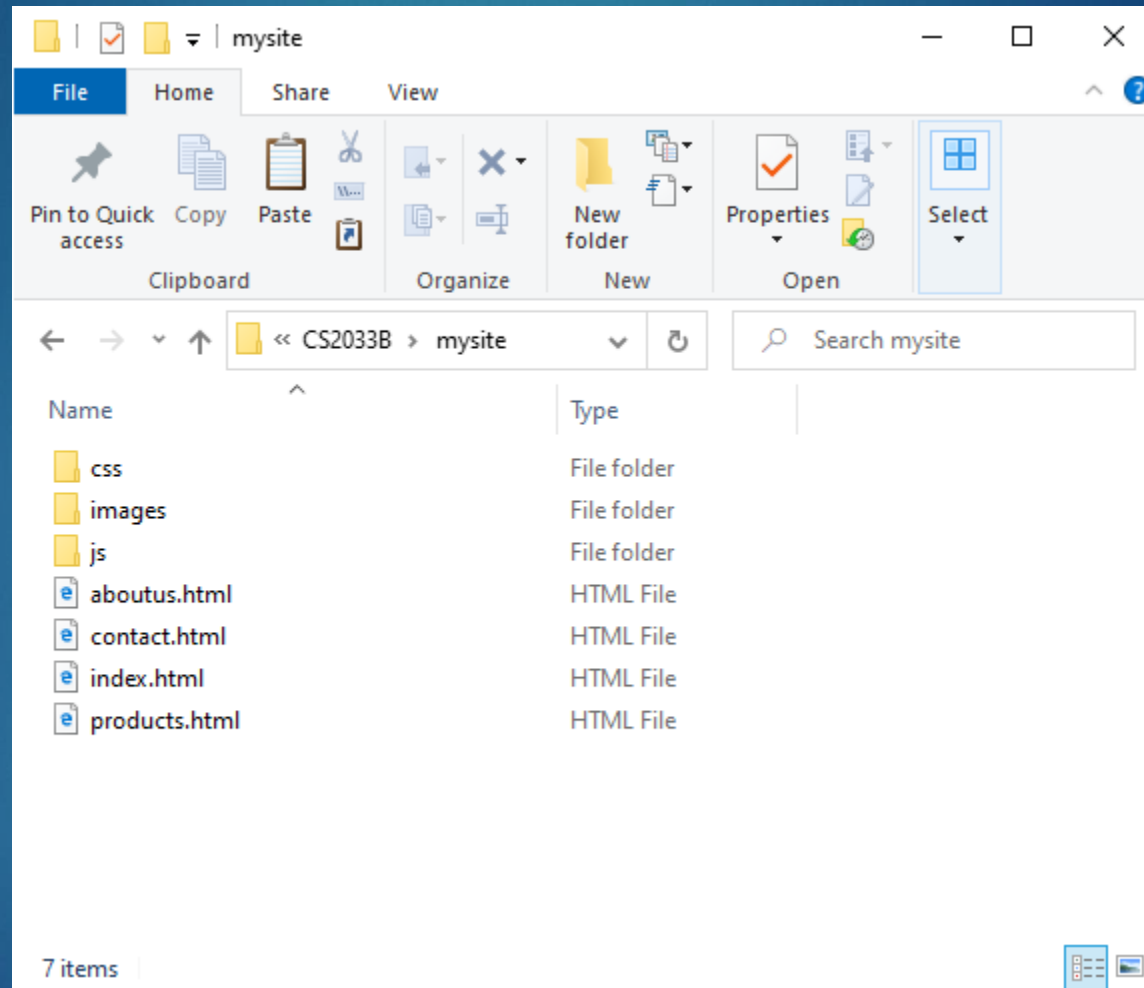
# Files and folders

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- ▶ Folder structure is also important.
- ▶ Have one **root** folder which will contain all the website files.
- ▶ Within that, have a sub-folder for **images**, and sub-folders for **css**, and **js** (once we get there).
- ▶ HTML files should generally stay in root folder, not in sub-folders.

# Files and folders

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# Filepaths

- ▶ Links and images must have the filepaths linked correctly.
- ▶ **Absolute filepaths** point directly to a file using a full path to its location.
- ▶ **Relative filepaths** indicate how to get to the file relative to the HTML file containing that link.

# Filepaths

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- ▶ Use relative paths exclusively!
- ▶ This way, they will work on your computer AND on the server because the relative location does not change.
- ▶ A file's full location path changes when you upload it, so do not use absolute paths!

# Filepaths

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- ▶ `C:/Users/tomsmith/Desktop/website/images/apple.jpg`
  - ▶ Works on Tom Smith's laptop
  - ▶ Does NOT work ANYWHERE else!
- ▶ `images/apple.jpg`
  - ▶ Works on Tom Smith's laptop
  - ▶ Works on server too 😊

# HTML tags

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- ▶ Most tags need to be closed, so that content is surrounded by the opening and closing tags.
  - ▶ i.e. `<p>This is a <b>great</b> paragraph.</p>`
- ▶ Some tags are self-closing.
  - ▶ i.e. `<br />`

# Attributes

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- ▶ HTML tags often have attributes which provide extra information about the content or design of the element.
  - ▶ `<img src='picnic.jpg' width='200' />`
  - ▶ `src` and `width` are two attributes in `img`
  - ▶ You can use either single or double quotations but open and close a string (text) with the same type!

# Doctype

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- ▶ Tells the browser which HTML version is being used.
- ▶ This must be the very first line.
- ▶ `<!doctype html>`
- ▶ Most browsers will assume HTML 5 if not specified but it is best to include this line regardless!



# Head and Body

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- ▶ Main two sections:

- ▶ Head

- ▶ `<head></head>`

- ▶ Meta data, setting title, linking external files, internal CSS or JS, etc.

- ▶ Body

- ▶ `<body></body>`

- ▶ The main part of the website.



# Shell of a website

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```
<!doctype html>  
<html>  
  <head></head>  
  <body></body>  
</html>
```

# Title Property

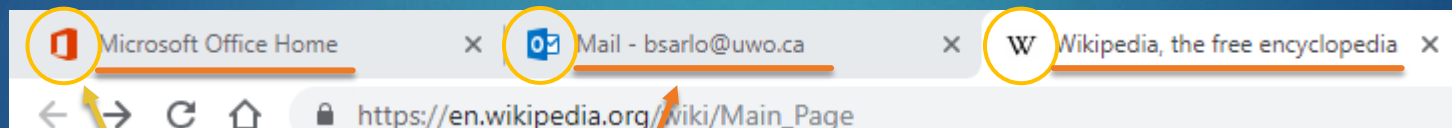
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- ▶ Remember the title property talked about repeatedly in CS1033?
- ▶ This is the text that shows up in the browser tab.
- ▶ `<title>Webpage | Website</title>`
- ▶ This is **meta** data about the page, so it goes in the **head** section.

# Favicon

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- ▶ Have you noticed the little icons beside the title property in a tab?
- ▶ This is called the favicon
- ▶ Small images, usually 16x16 pixels.



Favicon

Title

# Favicon

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- ▶ `<link rel="shortcut icon" href="favicon.ico" type="image/x-icon">`
  - ▶ Notice the image is .ico format.
  - ▶ Some browsers allow .png or .gif formats too.
  - ▶ [www.favicon.cc](http://www.favicon.cc)
- ▶ This is **meta** data about the page, so it goes in the **head** section.

# What else goes in head?

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- ▶ In addition to the title and favicon, the head often directly contains, or has links to, CSS and JavaScript.
  - ▶ We will talk more about that in coming weeks!
- ▶ Sometimes meta tags are used for SEO purposes. This isn't as popular as it used to be.

# Now to the body!

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- ▶ The **body** is typically much larger than the head.
- ▶ This contains content and layout design elements that are displayed in the actual webpage.
- ▶ Some head data (i.e. CSS or JavaScript) can be done in the body as well.



# Common body elements

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- ▶ `<h1>Largest header</h1>`
- ▶ `<h6>Smallest header</h6>`
- ▶ `<p>Paragraph of text</p>`
- ▶ `<a href='index.html'>Link</a>`
- ▶ `<img src='picnic.jpg' />`
- ▶ `<b>Bold text</b>`
- ▶ `<i>Italicized text</i>`



# Common body elements

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- ▶ `<ul>` creates an unordered list.
- ▶ `<ol>` creates an ordered list.
- ▶ `<li>` adds a list item to a `<ul>` or `<ol>`

```
<ul>  
  <li>Apples</li>  
  <li>Grapes</li>  
  <li>Peaches</li>  
</ul>
```

- Apples
- Grapes
- Peaches

```
<ol>  
  <li>Apples</li>  
  <li>Grapes</li>  
  <li>Peaches</li>  
</ol>
```

1. Apples
2. Grapes
3. Peaches

# Common body elements

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- ▶ `<table>` creates a table.
- ▶ `<tr>` creates a row in the table.
- ▶ `<th>` creates a header/title cell.
- ▶ `<td>` creates a data cell.

```
<table border='1'>
  <tr>
    <th>Fruit</th>
    <th>Amount</th>
  </tr><tr>
    <td>Apples</td>
    <td>4</td>
  </tr><tr>
    <td>Peaches</td>
    <td>2</td>
  </tr>
</table>
```

Fruit	Amount
Apples	4
Peaches	2

# Turning the tables

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- ▶ You previously used tables to create the layout of your webpages. They make it easy.
- ▶ However, tables are only supposed to be used for tabular data, not for webpage layouts.
- ▶ In this course, we will move away from table layouts. We will use the HTML elements instead.

# The best HTML element?

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- ▶ One element that hasn't been taught yet is called the **div** (short for division/divider).
- ▶ This is essentially a panel that may contain other divs or different HTML elements, mainly used for creating layouts without a table.
- ▶ When in doubt, use a div!

# The best HTML element?

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- ▶ We will learn about CSS over the next two weeks. Then we can apply styles to our divs to form a layout.
- ▶ For now, our divs won't do very much until we add styles.
- ▶ You can create one anyway!
- ▶ `<div>I'm so excited about my first div!</div>`

# More on layouts

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- ▶ In CS 1033, your websites contained 5 or 6 individual pages.
- ▶ Have you noticed a lot of modern websites have 1 very long page?
- ▶ Look at these sites:
  - ▶ <http://www.thebeet.ca/>
  - ▶ <https://www.mysteryescaperooms.com/>



# More on layouts

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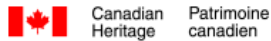
- ▶ Both formats are fine!
- ▶ Individual short page format:
  - ▶ PRO: Keeps content separated.
  - ▶ CON: More files and links.
- ▶ Scrolling long page format:
  - ▶ PRO: One file, everything loads at once, clean on mobiles.
  - ▶ CON: May take longer for users to find the info they need.



# Forms

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## ► What is a form?



### LIABILITY WAIVER FORM

Must be returned within 30 days of receipt

Please complete this form, print it and have it signed and dated, and then submit with your application.

#### Officer to complete

Group:	
Activity:	
Fiscal year:	
File Number:	
Amount approved:	

1. Activity will take place between



Canada Revenue Agency  
Agence du revenu du Canada

### 2019 Personal Tax Credits Return

Protected B when completed  
TD1

Read page 2 before filling out this form. Your employer or payer will use this form to determine the amount of your tax deductions.  
Fill out this form based on the best estimate of your circumstances.

Last name	First name and initial(s)	Date of birth (YYYY/MM/DD)	Employee number
Address		Postal code	For non-residents only – Country of permanent residence
			Social insurance number

**1. Basic personal amount** – Every resident of Canada can claim this amount. If you will have more than one employer or payer at the same time in 2019, see "More than one employer or payer at the same time" on page 2. If you are a non-resident, see "Non-residents" on page 2.

12,069

**2. Canada caregiver amount for infirm children under age 18** – Either parent (but not both), may claim \$2,230 for each infirm child born in 2002 or later, that resides with both parents throughout the year. If the child does not reside with both parents throughout the year, the parent who is entitled to claim the "Amount for an eligible dependant" on line 8 may also claim the Canada caregiver amount for that same child who is under age 18.

**3. Age amount** – If you will be 65 or older on December 31, 2019, and your net income for the year from all sources will be \$37,790 or less, enter \$7,494. If your net income for the year will be between \$37,790 and \$87,750 and you want to calculate a partial claim, get Form TD1-WS, Worksheet for the 2019 Personal Tax Credits Return, and fill in the appropriate section.

# Forms

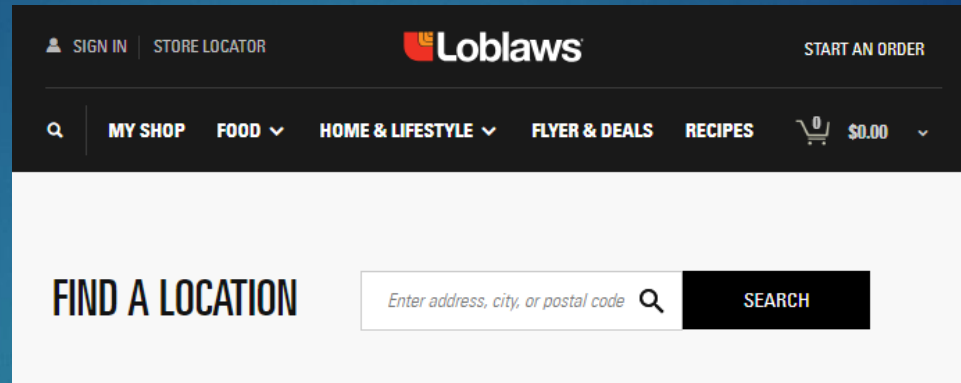
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- ▶ Notice that the forms are asking people to fill in some kind of info.
- ▶ Forms can be used in websites too.
- ▶ Made with `<form>` tag.
- ▶ What kinds of user interaction have we seen so far?
  - ▶ Scrolling with mouse/finger
  - ▶ Clicking links with mouse/finger

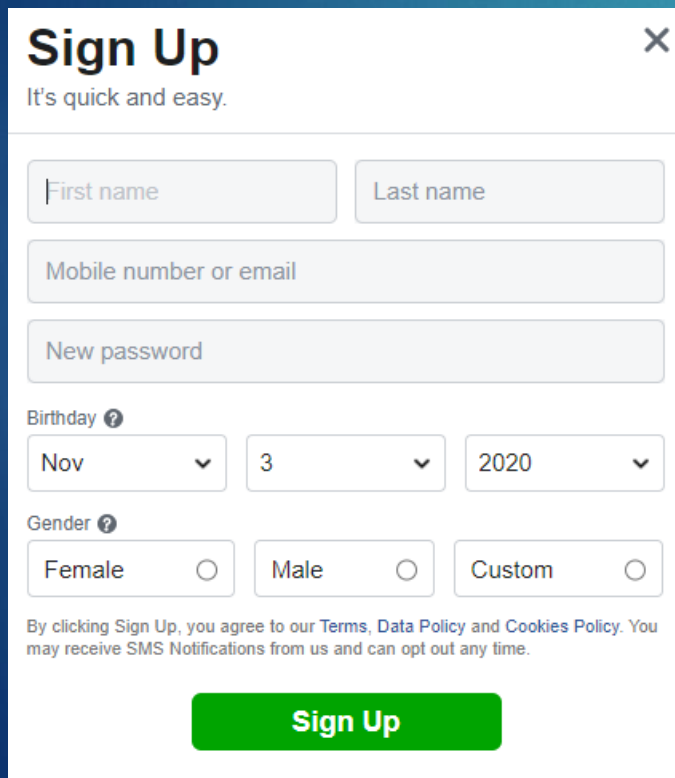
- ▶ Web forms provide a way to receive more kinds of user input.
- ▶ Examples:
  - ▶ Typing their name in a textbox.
  - ▶ Selecting their year of birth from a dropdown menu.
  - ▶ Checking boxes to indicate which foods they like.

# Forms

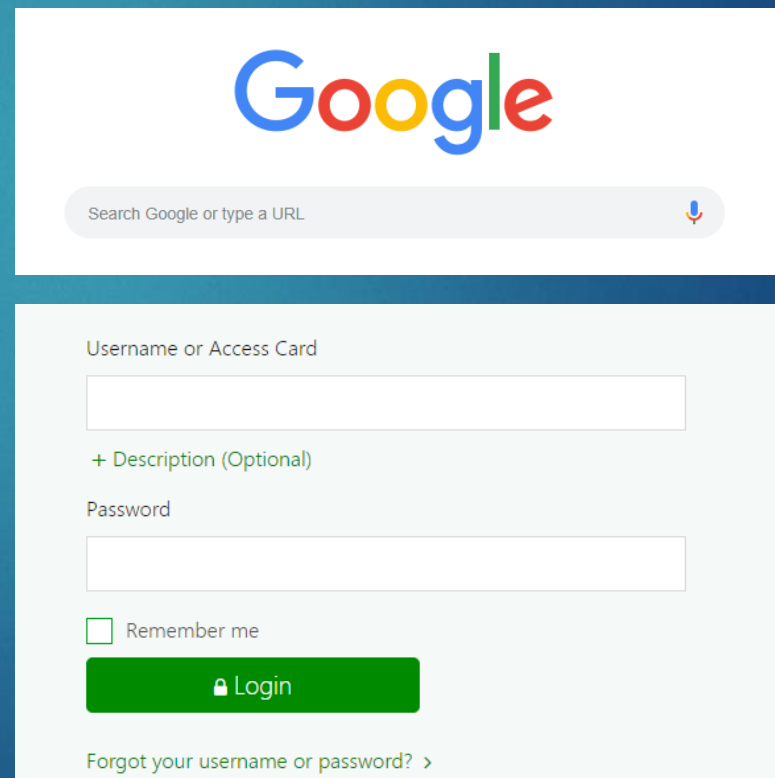
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The screenshot shows the top navigation bar of the Loblaws website. It includes links for 'SIGN IN', 'STORE LOCATOR', and 'START AN ORDER'. Below this is a main menu with categories: 'MY SHOP', 'FOOD', 'HOME & LIFESTYLE', 'FLYER & DEALS', and 'RECIPES'. A shopping cart icon shows a total of '\$0.00'. Below the navigation bar is a 'FIND A LOCATION' section with a search input field labeled 'Enter address, city, or postal code' and a 'SEARCH' button.



The 'Sign Up' form is titled 'Sign Up' with a subtitle 'It's quick and easy.' and a close button. It contains several input fields: 'First name', 'Last name', 'Mobile number or email', and 'New password'. Below these is a 'Birthday' section with dropdown menus for month (Nov), day (3), and year (2020). A 'Gender' section has radio buttons for 'Female', 'Male', and 'Custom'. At the bottom, there is a disclaimer about terms and policies, and a large green 'Sign Up' button.




The top part of the image shows the Google search page with the Google logo and a search bar labeled 'Search Google or type a URL'. Below this is a login form with a 'Username or Access Card' input field, a '+ Description (Optional)' field, and a 'Password' input field. There is a 'Remember me' checkbox and a green 'Login' button. At the bottom, there is a link for 'Forgot your username or password?'.

# Types of user input

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- ▶ Text input:

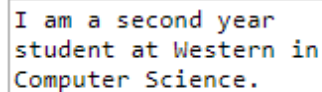
- ▶ Text



London, ON

A single-line text input field with a light gray border and a small cursor at the end of the text.


- ▶ Textarea



I am a second year  
student at Western in  
Computer Science.

A multi-line text area with a light gray border and a small cursor at the bottom right.

- ▶ Password



.....

A single-line password input field with a light gray border and a series of dots representing masked characters.

- ▶ Differentiate text, textarea, and password inputs.

# Types of user input

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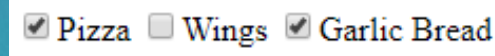
## ► Selection input:

► Radio button



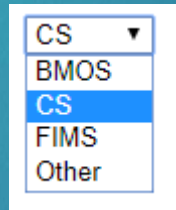
☒ Male ☐ Female ☐ Other

► Checkbox



☒ Pizza ☐ Wings ☒ Garlic Bread

► Select list



CS ▼  
BMOS  
CS  
FIMS  
Other

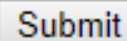
► Differentiate radio buttons, checkboxes, and select list inputs.

# Types of user input

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- ▶ Buttons

- ▶ Submit button

A rectangular button with a light gray background and a thin black border, containing the text "Submit" in a black sans-serif font.

- ▶ Reset button

A rectangular button with a light gray background and a thin black border, containing the text "Reset" in a black sans-serif font.

- ▶ Generic button

A rectangular button with a light gray background and a thin black border, containing the text "Start!" in a black sans-serif font.

- ▶ Differentiate submit, reset, and other generic button inputs.



# Types of user input

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- ▶ Other input:
  - ▶ Hidden
  - ▶ Date chooser
  - ▶ Colour chooser
  - ▶ And several others!

# Types of user input

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- ▶ Most input types are added like:
  - ▶ `<input type="type" />`
    - ▶ i.e. `<input type="text" />`
- ▶ Some have their own tags:
  - ▶ `<textarea></textarea>`
  - ▶ `<select>`
    - `<option>1</option>`
    - `<option>2</option>`
    - `<option>3</option>`
    - `</select>`

# Input attributes

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- ▶ Name
  - ▶ ID for the input which will help when we get to the JavaScript portion.
- ▶ Value
  - ▶ Text displayed on/in the input.
- ▶ Placeholder
  - ▶ Temporary, descriptive text.

# Input attributes

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## ► Tabindex

- Gives an order to the elements for users to "tab" through them.

First Name:	<input type="text"/>	University:	<input type="text"/>
Last Name:	<input type="text"/>	Program:	<input type="text"/>
<input type="button" value="Enter"/>			

OR

First Name:	<input type="text"/>	University:	<input type="text"/>
Last Name:	<input type="text"/>	Program:	<input type="text"/>
<input type="button" value="Enter"/>			

# Labels

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- ▶ Labels are often placed beside or above each of the input fields to indicate the purpose of that field.
- ▶ When you click a label, the associated field becomes **focused**.
- ▶ Focus means the field is activated so that the user can begin typing it in, or for other input types, it may mean selecting a radio button or checkbox.

# Labels

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- ▶ Link a label to an input field using the **for** attribute and referencing the field by its ID attribute.

```
<label for="emailField">Email</label>  
<input type="text" name="email" id="emailField" />
```

Email

- ▶ Clicking a label for a radio button selects that button.

```
<label for="canada">Canada</label>  
<input type="radio" name="country" id="canada" />  
<label for="usa">USA</label>  
<input type="radio" name="country" id="usa" />
```

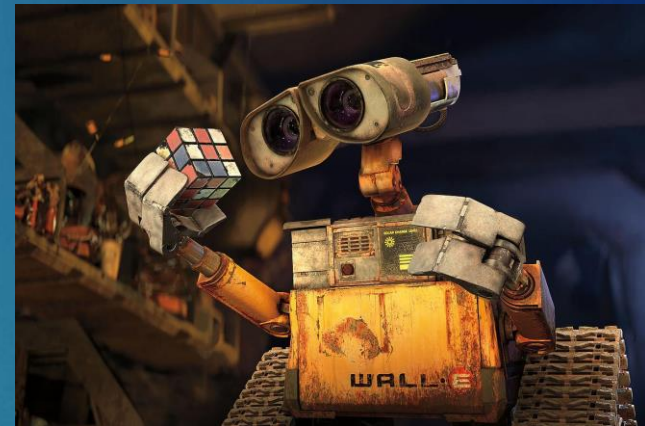
Canada ☒ USA ☐



# Captcha

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- ▶ Prevents bots from automatically filling out your web forms!
- ▶ Include something that only a human can answer.
- ▶ Some sites have a simple math question or ask you to type a word (i.e. the current month)



# Captcha

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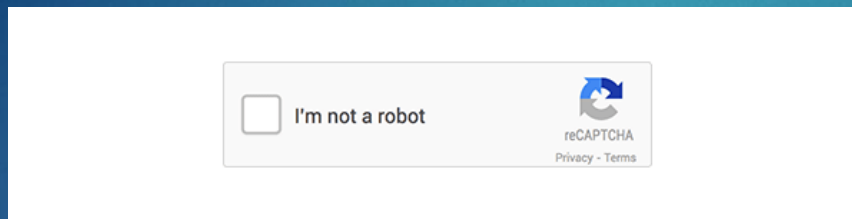
- ▶ Those can be sufficient for low-key websites but bot programmers may catch on to those questions.
- ▶ Bigger sites often have more complex captchas like this:



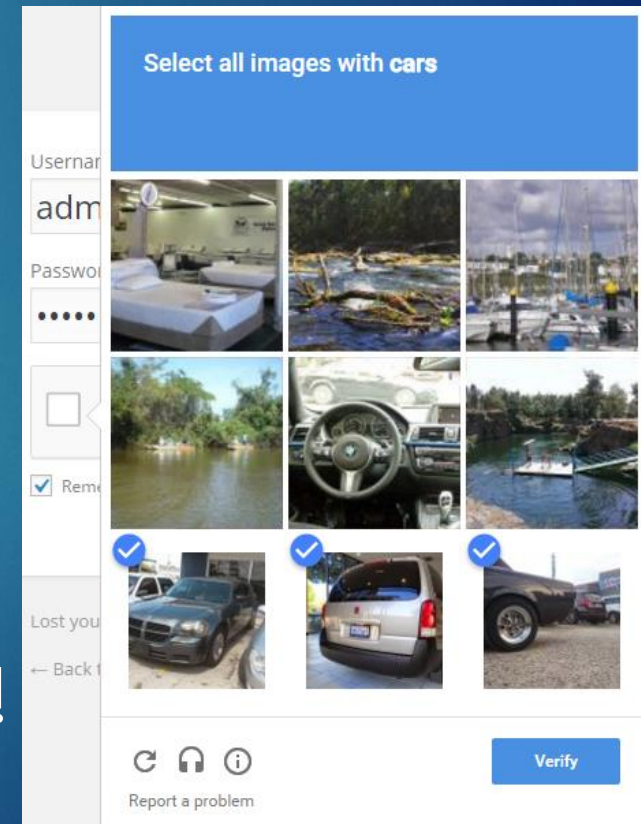
# Captcha

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- ▶ Google's reCaptcha is another popular method.



- ▶ Sometimes it will ask you to select images that contain a certain item.
- ▶ Very hard for bots to get in!



# Form validation

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- ▶ Some fields (inputs) are required while some may be optional.
- ▶ It should be clear to the user which are required. Asterisks (\*) are often used to indicate required fields.
- ▶ Only make inputs required if you really require that info! People usually don't like entering tons of information unless it's necessary.

# Form validation

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## New User Registration \* Required Fields

Users under the age of 16 are not permitted to use this website.

### Step 1. Choose your login information.

Username (4-20 characters)	<input type="text"/>	*
Password (4-20 characters)	<input type="password"/>	*
Re-enter Password	<input type="password"/>	*

### Step 2. PUBLIC Information.

This information visible to everyone

First Name	<input type="text"/>	*
Last Name	<input type="text"/>	*
State or Province	<input type="text"/> ▼ or <input type="text"/>	
Country	<input type="text"/> ▼	

If you do not want your location displayed, please leave it blank out of consideration to users who use this feature to find and trade with gamers in their area.

### Step 3. PRIVATE Information.

This information will subject to our [Privacy Policy](#)

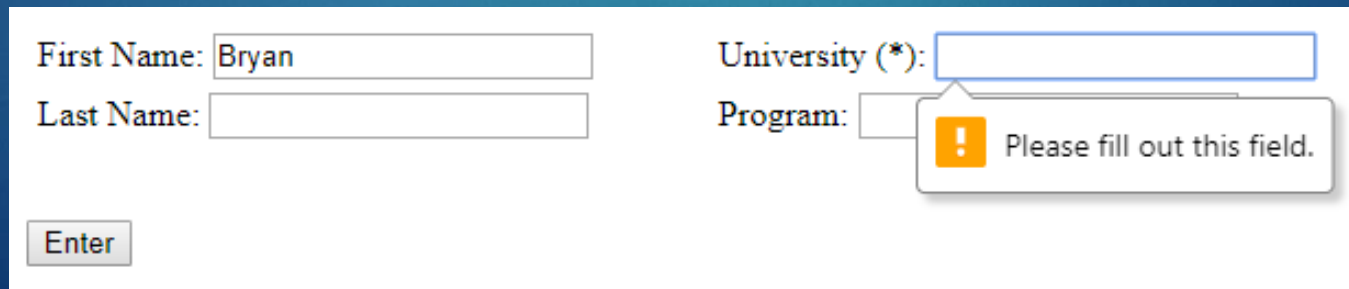
Your Email	<input type="text"/>	*
Date of Birth	<input type="text"/> December ▼ <input type="text"/> 06 ▼ <input type="text"/> 2018 ▼	*



# Form validation

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- ▶ Now the users can see which fields are required, but how do we enforce it?
  - ▶ The **required** attribute.
  - ▶ Look what happens when you push Enter without typing in a university.



A screenshot of a web form with the following fields and labels:

- First Name:
- Last Name:
- University (\*):
- Program:

An "Enter" button is located at the bottom left. A validation message box is displayed over the "Program" field, containing an orange exclamation mark icon and the text "Please fill out this field." The "University" field is empty, and the asterisk (\*) indicates it is a required field.



# Form validation

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- ▶ What else might need to be validated?
- ▶ What happens if the user's input doesn't match what is expected?
  - ▶ i.e. They need to enter a 4-digit PIN but enter 5 numbers. Or 3 numbers.
  - ▶ i.e. They need to enter their name but enter a number.

# Form validation

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- ▶ Text inputs can be given a "maxlength" attribute to limit how many characters can be entered.
- ▶ There's no "minlength" (yet). ☹️
- ▶ There's also no way in HTML to restrict which types of characters are allowed. ☹️
- ▶ Other languages can do this!

# Form validation

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- ▶ Which language to use for this?
  - ▶ Good question! It depends on:
    - ▶ What you need to do with the information.
    - ▶ System (computer or server) specs.
    - ▶ Whether you need the validation or processing done in real-time or on submission.

# Server vs client processing

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- ▶ Form validation and processing, and other functions can be done on the **server side** or the **client side**.
- ▶ Server side work is done on the host machine, while client side work is done on the user's device.
- ▶ PHP is a common server side language. JavaScript is used for client side coding.

# Server vs client processing

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- ▶ How do you know which work should be done on which side?
- ▶ Server side is used for:
  - ▶ Databases / external files.
  - ▶ Processing orders (e-commerce).
  - ▶ Functions involving security.
  - ▶ Anything that the host needs to know about or track.

# Server vs client processing

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- ▶ Client side is used for:
  - ▶ Interactivity / animations.
  - ▶ Non-secure form processing.
  - ▶ Receiving user input in real-time.
  - ▶ Loading or changing elements that appear on a user's device.
- ▶ Can you differentiate the two?



# Server vs client processing

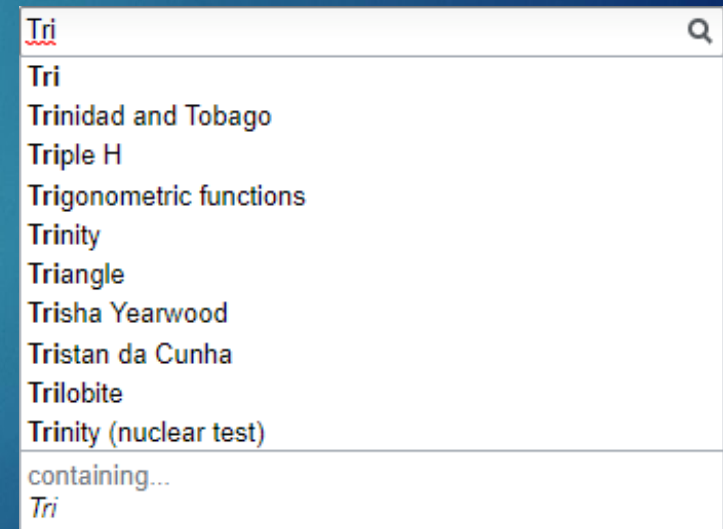
55

- ▶ Websites usually have both types of functionality for different features.
- ▶ What if we want to do server side work but to invoke (start) it based on user interaction? Can we mix client side interactivity and user input with server side work?
- ▶ Yes!

# Server vs client processing

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- ▶ AJAX is a technology that combines JavaScript with PHP or other server side languages.
- ▶ We can run server side code (i.e. find keywords in a database) triggered by user input (i.e. typing on a keyboard).



# Form validation

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- ▶ How should we validate / process our web forms?
- ▶ Do you need to store the form data in a file or database? Are there private data like PINs or passwords?
  - ▶ Server side
- ▶ Do you need it to run in real time?
  - ▶ Client side

# Form validation

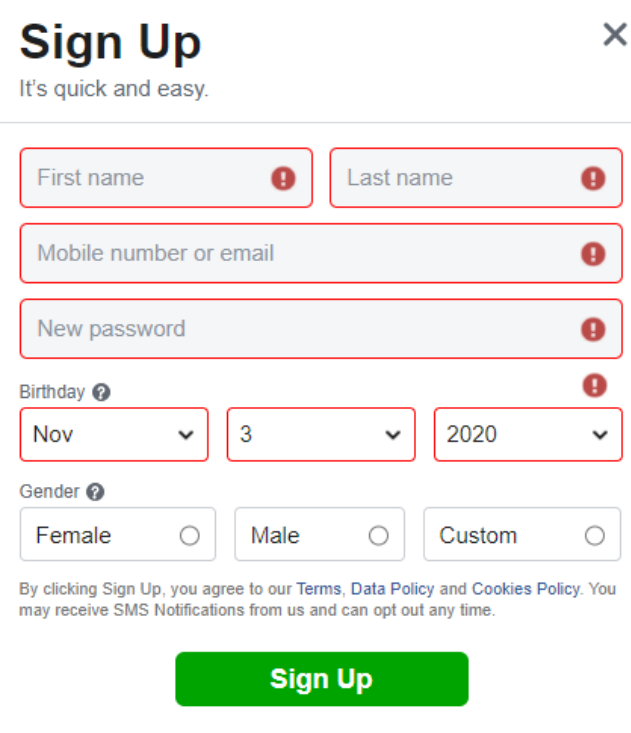
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- ▶ It also may depend on what system you are using.
  - ▶ JavaScript will run on your laptop right now.
  - ▶ PHP won't. ☹ It only runs on servers. You can install virtual server software for free if you want to run PHP locally.
- ▶ We won't do PHP in this course.

# Form validation

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- ▶ Do you think this Facebook signup form is validated with PHP or JavaScript?
- ▶ Hint: I did not click “Sign Up” but only clicked into each of the text boxes.



The image shows a Facebook 'Sign Up' form with a white background and a green 'Sign Up' button. The form is titled 'Sign Up' with a close button (X) in the top right corner. Below the title is the text 'It's quick and easy.' The form contains several input fields, each with a red border and a red exclamation mark icon indicating a validation error. The fields are: 'First name', 'Last name', 'Mobile number or email', 'New password', 'Birthday' (with dropdowns for month, day, and year), and 'Gender' (with radio buttons for Female, Male, and Custom). The 'Sign Up' button is green with white text. At the bottom, there is a small disclaimer: 'By clicking Sign Up, you agree to our Terms, Data Policy and Cookies Policy. You may receive SMS Notifications from us and can opt out any time.'

**Sign Up** X

It's quick and easy.

First name ! Last name !

Mobile number or email !

New password !

Birthday ? !

Nov 3 2020

Gender ?

Female Male Custom

By clicking Sign Up, you agree to our Terms, Data Policy and Cookies Policy. You may receive SMS Notifications from us and can opt out any time.

**Sign Up**