Intro to Web Workshop

MITRE STEM Outreach

Approved for Public Release; Distribution Unlimited. Public Release Case Number 20-1095

MITRE | SOLVING PROBLEMS
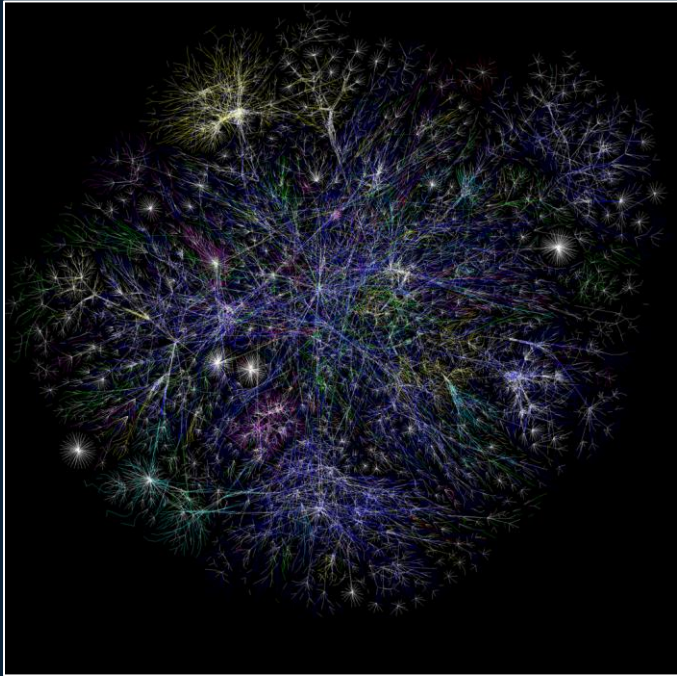FOR A SAFER WORLD™

MITRE

SOLVING PROBLEMS
FOR A SAFER WORLD™

OUR VISION

pioneering for
a better future

MITRE

The Internet

An **Inter**connected **Net**work of computers that links devices all over the world.

Opte Project

MITRE

The World Wide Web

An information system that exists on the Internet.

On the **Web**, content is published by **servers**, and typically accessed with a **browser**.

This workshop focuses on three fundamental Web technologies

HTML

Think **content**

CSS

Think **style**

JavaScript

Think **behavior**

MITRE

This workshop focuses on three fundamental Web technologies

HTML

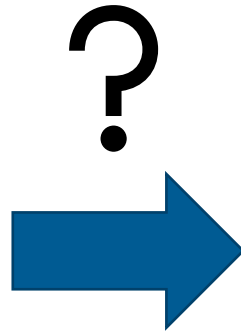Think **content**

CSS

Think **style**

JavaScript

Think **behavior**

You're writing a document about cats to share with your friends. How will you structure it? What kinds of content might you include?

- **Title**
- **Headers**
- **Paragraphs**
- **Lists**
- **Tables**
- **Images**
- **References**

?

→

Cats

Cat Types

Cats can vary in many ways, including personality and color.

Personality types:
1. Shy
2. Aggressive
3. Playful

Colors	
Black	White

Learn more: wikipedia.org/wiki/Cat

MITRE

Markup languages allow you to describe document content in a format that computers can understand

Angle brackets (< >) denote tags, which define HTML elements

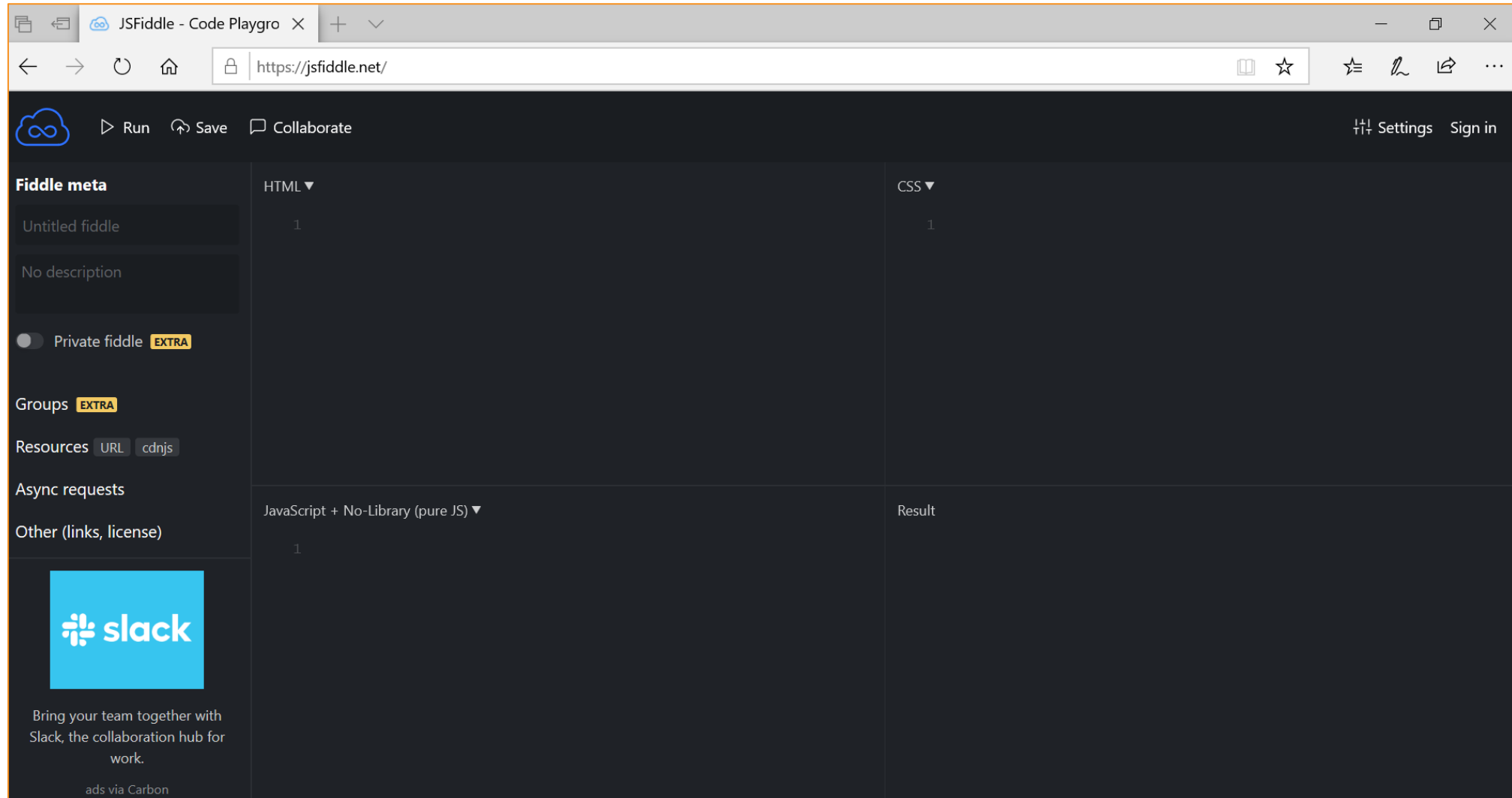Content is placed between the start and end tags

`<h1>Cat Types</h1>`

Content type is specified with the element name

Backslash (/) denotes end tag, which closes the element

MITRE

Let's write an HTML document!

Go to [JSFiddle.net](https://jsfiddle.net/), a code playground for HTML, CSS, and JavaScript

Type the example in the HTML box and then click "Run"

```
<h1>Cat Types</h1>
```

- **What do you see in the result box?**

- **Can you change the content?**

- **Can you add a second element?**

MITRE

Add a paragraph element `<p>`

`<p>Cats vary in many ways, including personality and color.</p>`

- **How does the result compare with what you typed?**

- **What happens if the line is longer than the width of the result box?**

- **What happens if you add extra spaces or returns?**

- **How would you type multiple paragraphs?**

MITRE

Elements can be nested – for example, the ordered list `<ol>` and list item `<li>`

```
<p>Personality types:</p>
<ol>
  <li>Shy</li>
  <li>Aggressive</li>
  <li>Playful</li>
</ol>
```

- **Can you add or remove items from the list?**

- **Can you modify the code to create an unordered list `<ul>`?**

MITRE

Tags often contain attributes that provide additional information about the element

```
<a href="https://en.wikipedia.org/wiki/Cat">Cats</a>
```

Specify the destination of a hyperlink `<a>` with `href`

Specify the source of an image `<img>` with `src`

Note that `<img>` has no end tag

```
<img src="https://picsum.photos/200">
```

- **Can you modify the attributes…**
  To change the hyperlink destination?
  To show a different picture?

MITRE

Experiment with your own document
Hint: You can find more information at developer.mozilla.org/docs/Web/HTML

```html
<h1>Cat Types</h1>
<p>Cats vary in many ways, including personality and
color.</p>
<p>Personality types:</p>
<ol>
  <li>Shy</li>
  <li>Aggressive</li>
  <li>Playful</li>
</ol>
<img src="https://upload.wikimedia.org/wikipedia/common
s/thumb/0/0b/Cat_poster_1.jpg/320px-Cat_poster_1.jpg">
<p>Learn more:
  <a href="https://en.wikipedia.org/wiki/Cat">
      wikipedia.org/wiki/Cat
  </a>
</p>
```


Cat Types

Cats vary in many ways, including personality and color.

Personality types:

1. Shy
2. Aggressive
3. Playful

Learn more: wikipedia.org/wiki/Cat

MITRE

Quiz: What is the purpose of markup languages?

This workshop focuses on three fundamental Web technologies

HTML

Think **content**

CSS

Think **style**

JavaScript

Think **behavior**

MITRE

Look again at your HTML document. Does it feel like something's missing? What aspects of the document's design would you like to change?

- **Alignment**

- **Margins**

- **Borders**

- **Fonts**

- **Colors**

- **Sizes**

- **Background**

Cat Types

Cats vary in many ways, including personality and color.

Personality types:

1. Shy
2. Aggressive
3. Playful

Learn more: wikipedia.org/wiki/Cat

MITRE

Stylesheet languages allow you to describe document styles and specify how the content is presented

Selector specifies the elements to style

Rules are declared in the form `property: value;`

```
h1 {
    text-align: center;
}
```

Style rules are enclosed in curly braces ({ })

MITRE

Let's write some CSS styles!

Go back to JSFiddle.net, type the example in the CSS box, and click "Run"

```
h1 {
    text-align: center;
}
```

- **What happened to your <h1> element?**

- **Is the style rule applied to all <h1> elements or just the first one?**

- **Can you right-align the text?**

The ‹body› element encloses all the content on the page

```css
body {
    margin: auto;
    padding: 20px;
    width: 400px;
    font-family: Arial, Helvetica, sans-serif;
}
```

- **Add each of these rules one at a time.
  What do they do?**

MITRE

Colors are specified with predefined names or with red-green-blue values (0-255)

```css
img {
    border: 1px solid black;
}
```

- **What does the border property do?
  Can you change the width, style, and color of the border?**

```css
html {
    background-color: rgb(222, 222, 222);
}
```

- **What is the `<html>` element?
  What happens when you change the numbers in `rgb(#, #, #)`?**

You can set the class attribute of HTML elements and use a class selector (.) to apply a ruleset to them

```
                              .underline {
<p class="underline">             text-decoration: underline;
                              }
```

- **Can you set the same class for different elements?**

```
                              .hoverable:hover {
<p class="hoverable">             font-weight: bold;
                              }
```

Pseudo-class selectors apply a ruleset when the element is in the specified state

- **What happens when you hover the mouse over an element with the hoverable class?**

MITRE

Experiment with your own styles

Hint: You can find more information at developer.mozilla.org/docs/Web/CSS

```html
<html><body>
  <h1>Cat Types</h1>
  <p>Cats vary in many ways, including
     personality and color.</p>
  <p class="underline">Personality types:</p>
  <ol>
    <li class="hoverable">Shy</li>
    <li class="hoverable">Aggressive</li>
    <li class="hoverable">Playful</li>
  </ol>
  <img src="https://upload.wikimedia.org/wikiped
ia/commons/thumb/0/0b/Cat_poster_1.jpg/320px-
Cat_poster_1.jpg">
  <p class="hoverable">Learn more:
    <a href="https://en.wikipedia.org/wiki/Cat">
      wikipedia.org/wiki/Cat
    </a>
  </p>
</body></html>
```

```css
html {
  background-color: rgb(222, 222, 222);
}
body {
  margin: auto;
  padding: 20px;
  width: 400px;
  font-family: Arial, Helvetica, sans-serif;
  background-color: white;
}
h1 { text-align: center; }
img {
  display: block;
  margin: auto;
  padding: 5px;
  border: 1px solid black;
}
.underline { text-decoration: underline; }
.hoverable:hover { font-weight: bold; }
```

MITRE

Quiz: What is the purpose of stylesheet languages?

This workshop focuses on three fundamental Web technologies

HTML

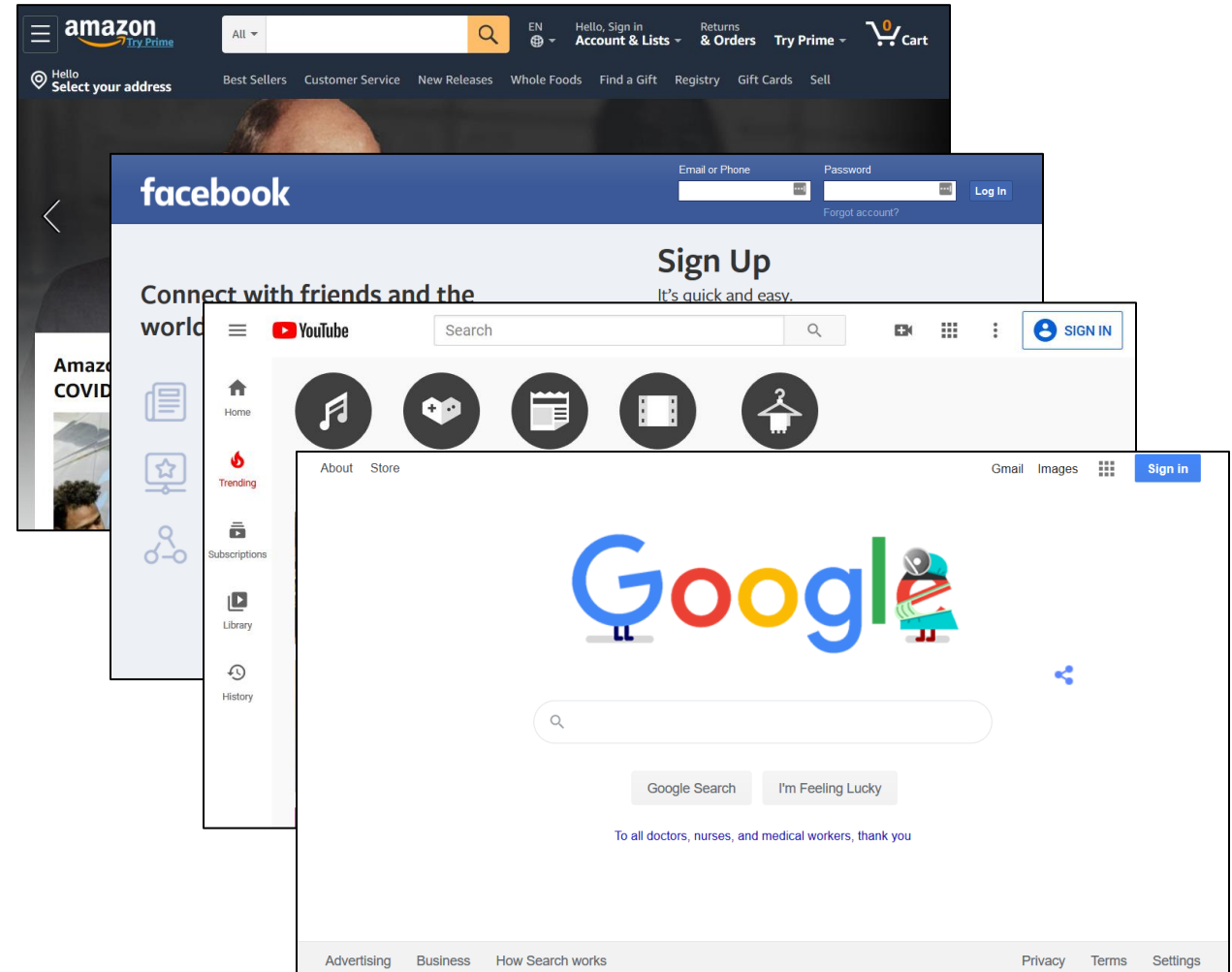Think **content**

CSS

Think **style**

JavaScript

Think **behavior**

Think about the websites you visit often. How do you interact with them? How does the content change as you use the page?

- **Text input**

- **Clickable buttons**

- **Navigation tabs**

- **Collapsible menus**

- **Tooltips**

- **Generated content**

- **Animations**

MITRE

Programming languages allow you to specify a set of instructions for a computer to follow

Functions define a recipe of instructions

Pieces of text (strings) are enclosed in quotes (' or ")

alert is a built-in function that displays a message

```
function hello() {
  alert('Hello, world!');
}
hello();
```

Functions can be called to execute their instructions

MITRE

MITRE

Let's write some JavaScript code!

Once again, return to JSFiddle.net and try the example

```
function hello() {
    alert('Hello, world!');
}
hello();
```

- **What happens when you run the code?**

- **Can you change the message that is displayed?**

MITRE

JavaScript can be used to manipulate content on the page

const defines a new variable that cannot be reassigned

document object contains methods to select elements on the page

```
const heading = document.querySelector('h1');
heading.textContent = 'Heading was modified';
```

The text content of an element can be changed

- **Can you modify other elements on the page?**

MITRE

Event listeners execute instructions when an action takes place

```html
<button id="helloButton">Say hello!</button>
```

HTML elements can be identified with the `id` attribute

```javascript
const button = document.getElementById('helloButton');
button.addEventListener('click', hello);
```

- **Can you add the button element to your page?**

- **What happens when you click it?**
  Hint: Make sure you still have the `hello` function defined!

MITRE

Combine multiple techniques to enable user interaction

```javascript
function printWelcome() {
  let name = prompt('Enter your name');
  let welcomeMessage = document.createElement('p');
  welcomeMessage.textContent = 'Welcome, ' + name + '!';
  document.body.appendChild(welcomeMessage);
}
const button = document.getElementById('helloButton');
button.addEventListener('click', printWelcome);
```

- **What does this code do?**

Experiment with your own code
Hint: You can find more information at developer.mozilla.org/ocs/Web/JavaScript

```html
<body>
  <p id="welcome">Welcome</p>
  ...
</body>
```

```css
#welcome {
  text-align: right;
  font-size: x-small;
}
```

```javascript
function welcome() {
  const welcomeMessage = document.querySelector('#welcome');
  let name = prompt('Enter your name');
  if (name) {
    welcomeMessage.textContent = 'Welcome, ' + name + '!';
  }
}
welcome();
```

MITRE

Quiz: What is the purpose of programming languages?

This workshop focuses on three fundamental Web technologies

HTML

Think **content**

CSS

Think **style**

JavaScript

Think **behavior**

Congratulations! You have now learned the basics of the Web.

Bonus Content

Using GitHub to host your webpage

[GitHub.com](https://github.com) is a website that saves code in a way that makes it easy to track changes

"Git is a free and open source distributed version control system designed to handle everything from small to very large projects with speed and efficiency."

– [Git website](https://git-scm.com)
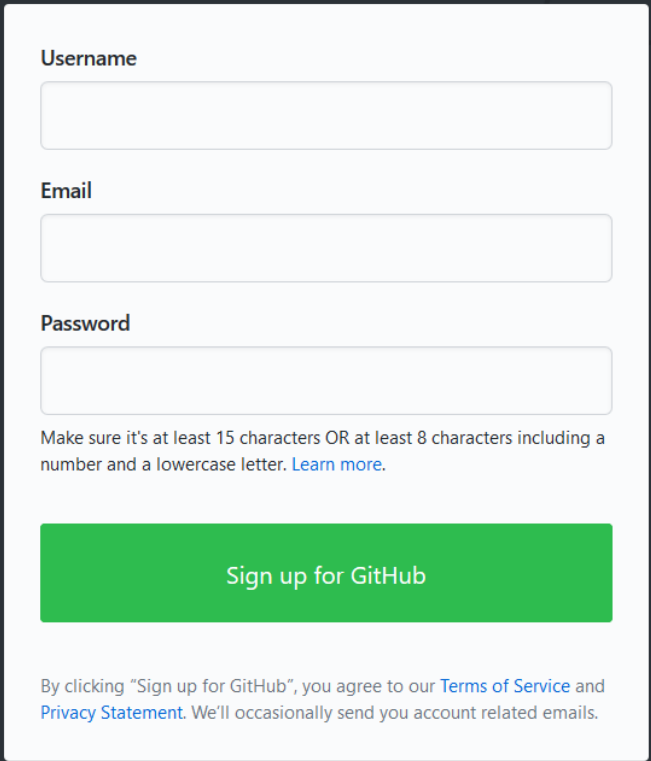
You can store code repositories version-controlled with Git on GitHub.

If your repository contains a static webpage, GitHub will host it for free on GitHub Pages.

MITRE

Create a GitHub account and verify your email address

- **Go to GitHub.com**

- **Enter your username, email, and password**
  - ✓ Username must be unique
  - ✓ Email must be accessible
  - ✓ Remember your password

- **Select free plan** (uncheck "send me updates")

- **Verify email address**
  - ✓ Log in to your email account
  - ✓ Open the message from GitHub and click the link
  - ✓ Remember to log out when you're done

Username

Email

Password

Make sure it's at least 15 characters OR at least 8 characters including a number and a lowercase letter. Learn more.

Sign up for GitHub

By clicking "Sign up for GitHub", you agree to our Terms of Service and Privacy Statement. We'll occasionally send you account related emails.

MITRE

Create a GitHub repository and enable GitHub Pages

- **Log in to GitHub at GitHub.com/login**

- **Click the green "New" button on the left**

- **Enter a repository name and description**

- **Click "Create repository"**

- **Click the "Settings" tab near the top**

- **Scroll down to the "GitHub Pages" section**

- **Under "Source", change "None" to "master branch"**

MITRE

Add your HTML content to the repository and view the result

- **Click "creating a new file"**

- **Name your file "index.html"**

- **Using the template on this slide, copy your HTML content into the editor**

- **Scroll down and click "Commit new file"**

- **Click the "Settings" tab near the top**

- **Scroll down to the "GitHub Pages" section and find the URL where your site is published**

- **Open the link in a new tab**

Quick setup — if you've done this kind of thing before

Set up in Desktop   or   HTTPS   SSH   https://github.com/rhpreston/website-demo.git

Get started by creating a new file or uploading an existing file. We recommend every reposit

```html
<!DOCTYPE html>
<html>
<head>
  <title>[ENTER TITLE]</title>
  <link href="styles.css" rel="stylesheet">
  <script src="script.js" defer></script>
</head>
<body>
  [ENTER CONTENT]
</body>
</html>
```
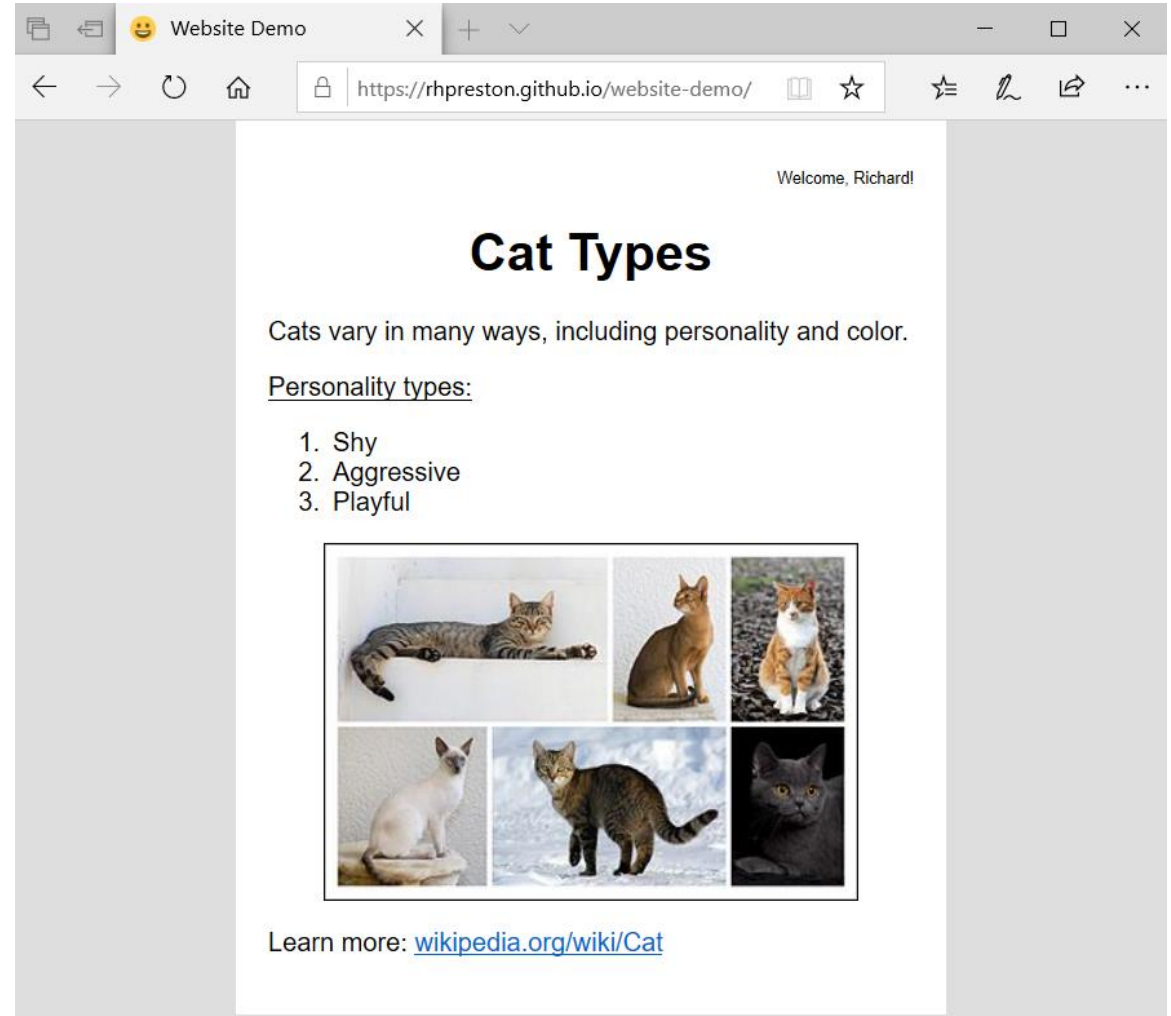
MITRE

Add your CSS styles and JavaScript code

- **Scroll to the top and ensure you are on the "Code" tab**

- **Click the gray "Create new file" button**

- **Name the file "styles.css", copy your CSS code into the editor, and commit the file**

- **Repeat for "script.js" and your JavaScript code**

- **Wait 30 seconds**

- **Refresh your github.io site to verify the result**

- **If something isn't working, press F12 to open the developer tools and try to investigate the problem**
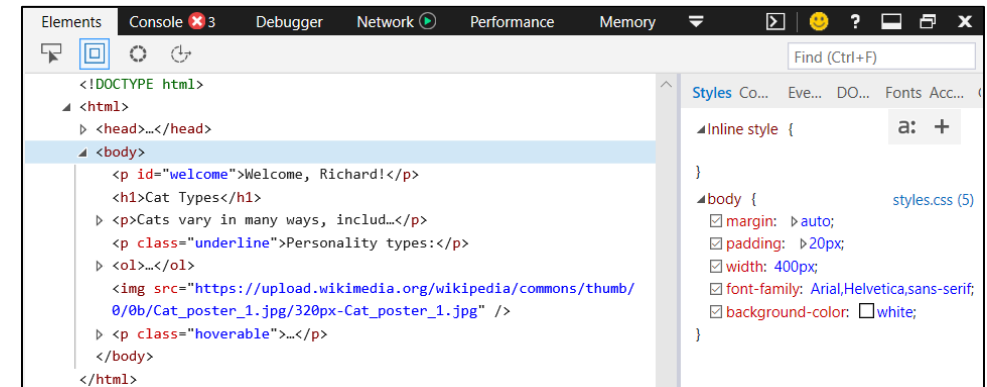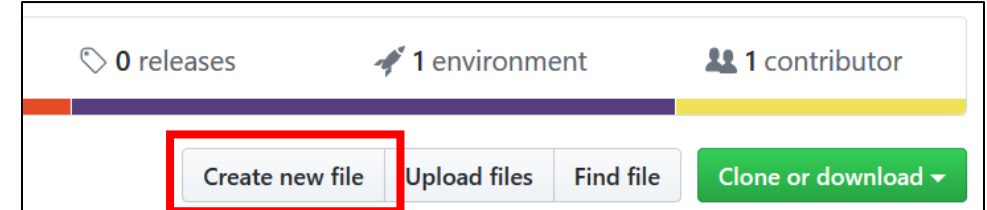
MITRE

Example

github.com/rhpreston/website-demo

rhpreston.github.io/website-demo

MITRE

Slides by Richard Preston

rhpreston@mitre.org

🐦 @MITREcorp

in linkedin.com/company/mitre

MITRE | SOLVING PROBLEMS
FOR A SAFER WORLD™