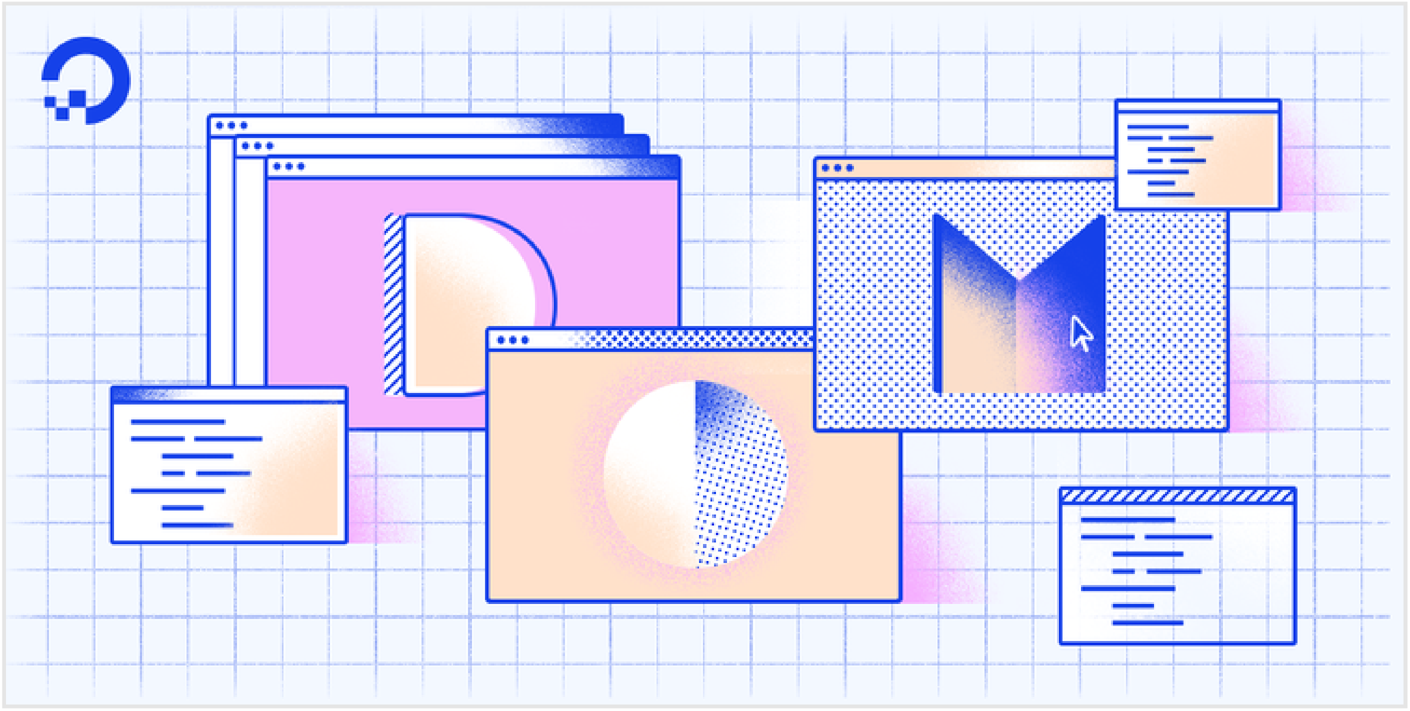

Understanding the DOM Tree and Nodes

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Introduction

The DOM is often referred to as the **DOM tree**, and consists of a tree of objects called **nodes**. In the Introduction to the DOM, we went over what the Document O

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In this tutorial, we will review HTML terminology, which is essential to working with JavaScript and the DOM, and we will learn about the DOM tree, what nodes are, and how to identify the most common node types. Finally, we will move beyond the console and create a JavaScript program to interactively modify the DOM.

HTML Terminology

Understanding HTML and JavaScript terminology is essential to understanding how to work with the DOM. Let's briefly review some HTML terminology.

To begin, let's take a look at this HTML element.

```
<a href="index.html">Home</a>
```

Here we have an anchor element, which is a link to `index.html`.

- `a` is the **tag**
- `href` is the **attribute**
- `index.html` is the **attribute value**
- `Home` is the **text**.

Everything between the opening and closing tag combined make the entire HTML **element**.

We'll be working with the `index.html` from the previous tutorial:

index.html

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

  <head>
    <title>Learning the DOM</title>
  </head>

  <body>
```

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```
</html>
```

The simplest way to access an element with JavaScript is by the `id` attribute. Let's add the link we have above into our `index.html` file with an `id` of `nav`.

index.html

```
...
<body>
  <h1>Document Object Model</h1>
  <a id="nav" href="index.html">Home</a>
</body>
...
```

Load or reload the page in your browser window and look at the DOM to ensure that the code has been updated.

We're going to use the `getElementById()` method to access the entire element. In the console, type the following:

```
> document.getElementById('nav');
```

```
Output
<a id="nav" href="index.html">Home</a>
```

We have retrieved the entire element using `getElementById()`. Now, instead of typing that object and method every time we want to access the `nav` link, we can place the element into a variable to work with it more easily.

```
> let navLink = document.getElementById('nav');
```

The `navLink` variable contains our anchor element. From here, we can easily modify attributes and values. For example, we can change where the link goes by changing the `href` attribute:

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We can also change the text content by reassigning the `textContent` property:

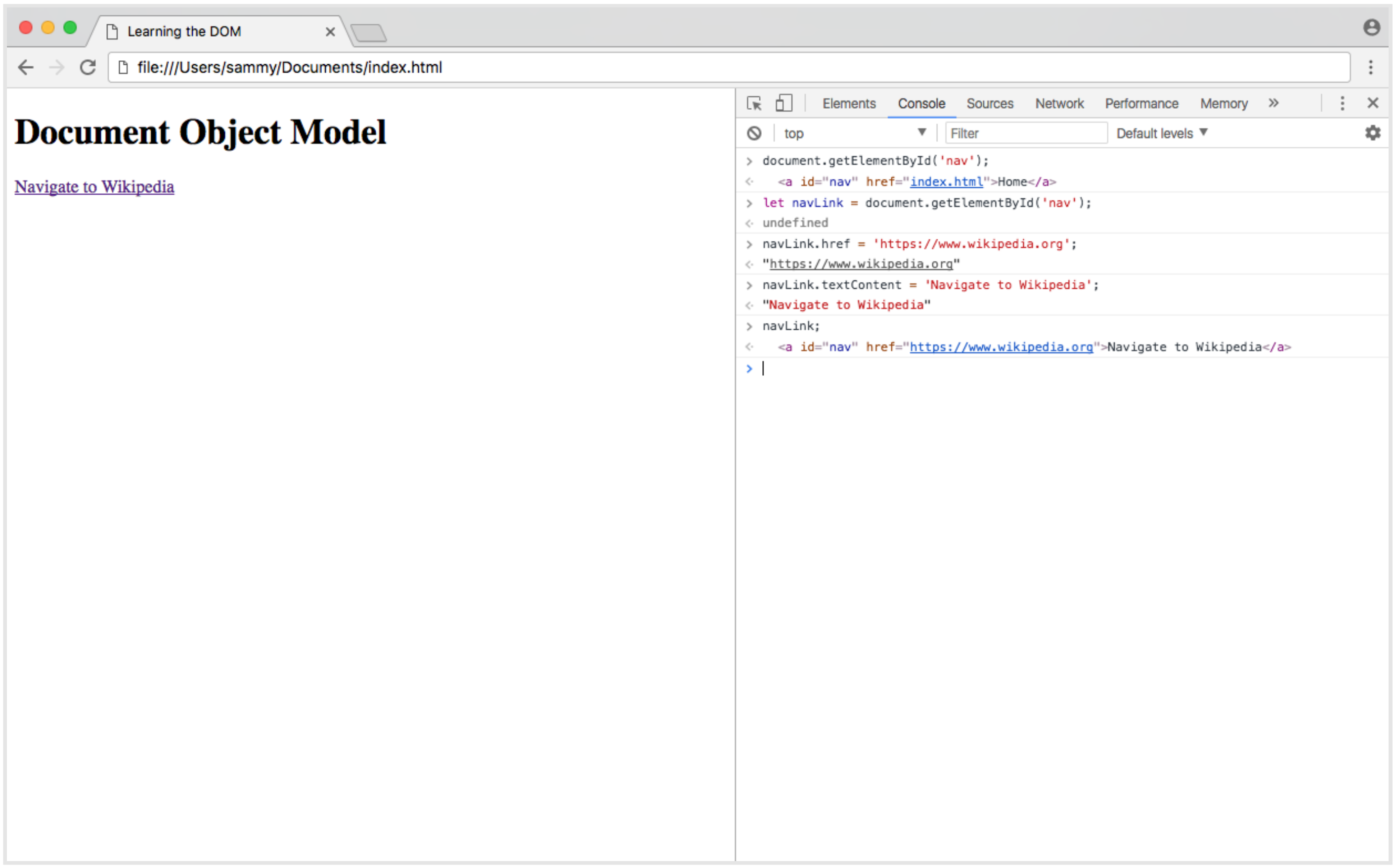
```
> navLink.textContent = 'Navigate to Wikipedia';
```

Now when we view our element, either in the console or by checking the *Elements* tag, we can see how the element has been updated.

```
> navLink;
```

```
Output
<a id="nav" href="https://www.wikipedia.org/">Navigate to Wikipedia</a>
```

This is also reflected on the front-end of the website.



Document Object Model

Navigate to Wikipedia

```
> document.getElementById('nav');
<   <a id="nav" href="index.html">Home</a>
> let navLink = document.getElementById('nav');
< undefined
> navLink.href = 'https://www.wikipedia.org';
< "https://www.wikipedia.org"
> navLink.textContent = 'Navigate to Wikipedia';
< "Navigate to Wikipedia"
> navLink;
<   <a id="nav" href="https://www.wikipedia.org">Navigate to Wikipedia</a>
> |
```

Refreshing the page will revert everything back to their original values.

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element.

The DOM Tree and Nodes

All items in the DOM are defined as **nodes**. There are many types of nodes, but there are three main ones that we work with most often:

- **Element** nodes
- **Text** nodes
- **Comment** nodes

When an HTML element is an item in the DOM, it is referred to as an **element node**. Any lone text outside of an element is a **text node**, and an HTML comment is a **comment node**. In addition to these three node types, the `document` itself is a **document** node, which is the root of all other nodes.

The DOM consists of a **tree** structure of nested nodes, which is often referred to as the **DOM tree**. You may be familiar with an ancestral family tree, which consists of parents, children, and siblings. The nodes in the DOM are also referred to as parents, children, and siblings, depending on their relation to other nodes.

To demonstrate, create a `nodes.html` file. We'll add text, comment, and element nodes.

nodes.html

```
<!DOCTYPE html>
<html>

  <head>
    <title>Learning About Nodes</title>
  </head>

  <body>
    <h1>An element node</h1>
    <!-- a comment node -->
    A text node.
  </body>
```

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The `html` element node is the parent node. `head` and `body` are siblings, children of `html`. `body` contains three child nodes, which are all siblings — the type of node does not change the level at which it is nested.

> **Note:** When working with an HTML-generated DOM, the indentation of the HTML source code will create many empty text nodes, which won't be visible from the DevTools Elements tab. Read about Whitespace in the DOM

Identifying Node Type

Every node in a document has a **node type**, which is accessed through the `nodeType` property. The Mozilla Developer Network has an up-to-date list of all node type constants. Below is a chart of the most common node types that we are working with in this tutorial.

Node Type	Value	Example
`ELEMENT_NODE`	1	The `<body>` element
`TEXT_NODE`	3	Text that is not part of an element
`COMMENT_NODE`	8	`<!-- an HTML comment -->`

In the *Elements* tab of Developer Tools, you may notice that whenever you click on and highlight any line in the DOM the value of `== $0` will appear next to it. This is a very handy way to access the currently active element in Developer Tools by typing `$0`.

In the console of **nodes.html**, click on the first element in the `body`, which is an `h1` element.

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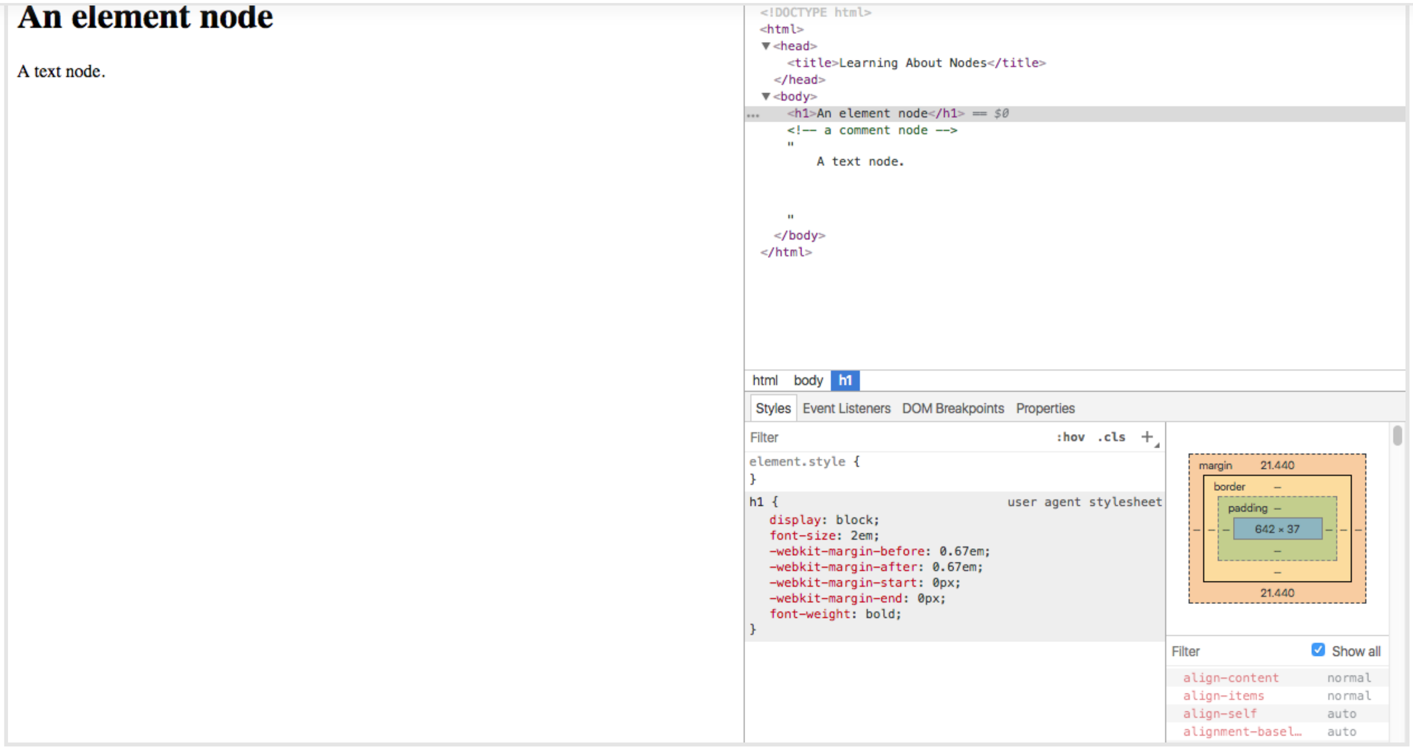

An element node

A text node.

```
<!DOCTYPE html>
<html>
▼<head>
    <title>Learning About Nodes</title>
  </head>
▼<body>
    <h1>An element node</h1> == $0
    <!-- a comment node -->
    "
        A text node.


    "
  </body>
</html>
```

```
element.style {
}
h1 {                                   user agent stylesheet
   display: block;
   font-size: 2em;
   -webkit-margin-before: 0.67em;
   -webkit-margin-after: 0.67em;
   -webkit-margin-start: 0px;
   -webkit-margin-end: 0px;
   font-weight: bold;
}
```

```
align-content       normal
align-items         normal
align-self          auto
alignment-basel...  auto
```

In the console, get the **node type** of the currently selected node with the `nodeType` property.

```
> $0.nodeType;
```

```
Output
1
```

With the `h1` element selected, you would see `1` as the output, which we can see correlates to `ELEMENT_NODE`. Do the same for the text and the comment, and they will output `3` and `8` respectively.

When you know how to access an element, you can see the node type without highlighting the element in the DOM.

```
> document.body.nodeType;
```

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```
Output
```

In addition to `nodeType`, you can also use the `nodeValue` property to get the value of a text or comment node, and `nodeName` to get the tag name of an element.

Modifying the DOM with Events

Up until now, we've only seen how to modify the DOM in the console, which we have seen is temporary; every time the page is refreshed, the changes are lost. In the Introduction to the DOM tutorial, we used the console to update the background color of the body. We can combine what we've learned throughout this tutorial to create an interactive button that does this when clicked.

Let's go back to our `index.html` file and add a `button` element with an `id`. We'll also add a link to a new file in a new `js` directory `js/scripts.js`.

index.html

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

  <head>
    <title>Learning the DOM</title>
  </head>

  <body>
    <h1>Document Object Model</h1>
    <button id="changeBackground">Change Background Color</button>

    <script src="scripts.js"></script>
  </body>

</html>
```

An **event** in JavaScript is an action the user has taken. When the user hovers their mouse over an element, or clicks on an element, or presses a specific key on the keyboard, these are all types of events. In this particular case, we want our button to listen and be ready to perform an action when the user clicks on it. We can do this by adding an **event listener** to our button.

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js/scripts.js

```
let button = document.getElementById('changeBackground');
```

Using the `addEventListener()` method, we will tell the button to listen for a click, and perform a function once clicked.

js/scripts.js

```
...
button.addEventListener('click', () => {
  // action will go here
});
```

Finally, inside of the function, we will write the same code from the previous tutorial to change the background color to `fuchsia`.

js/scripts.js

```
...
document.body.style.backgroundColor = 'fuchsia';
```

Here is our entire script:

js/scripts.js

```
let button = document.getElementById('changeBackground');

button.addEventListener('click', () => {
  document.body.style.backgroundColor = 'fuchsia';
});
```

Once you save this file, refresh `index.html` in the browser. Click the button, and the event will fire.

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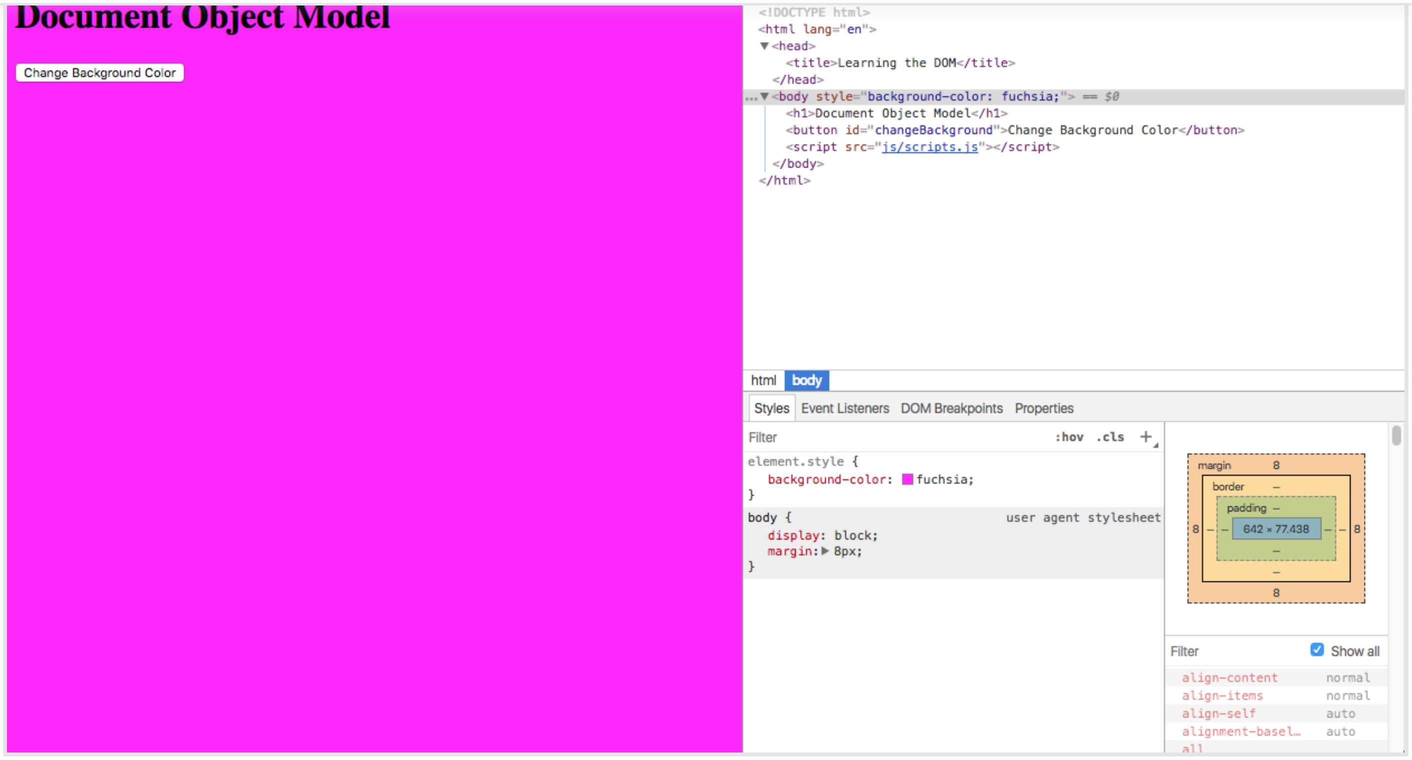

```
<!DOCTYPE html>
<html lang="en">
▼<head>
    <title>Learning the DOM</title>
  </head>
▼<body style="background-color: fuchsia;"> == $0
    <h1>Document Object Model</h1>
    <button id="changeBackground">Change Background Color</button>
    <script src="js/scripts.js"></script>
  </body>
</html>
```

```
element.style {
  background-color: fuchsia;
}
body {                                   user agent stylesheet
  display: block;
  margin:▶ 8px;
}
```

```
align-content          normal
align-items            normal
align-self             auto
alignment-basel…       auto
```

The background color of the page has changed to fuchsia due to the JavaScript event.

Conclusion

In this tutorial, we reviewed terminology that will allow us to understand and modify the DOM. We learned how the DOM is structured as a tree of nodes that will usually be HTML elements, text, or comments, and we created a script that would allow a user to modify a website without having to manually type code into the developer console.

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Understanding the DOM — Document Object Model

The Document Object Model, usually referred to as the DOM, is an essential part of making websites interactive. It is an interface that allows a programming language to manipulate the content, structure, and style of a website. JavaScript is the client-side scripting language that connects to the DOM in an internet browser.

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BKcoder *June 30, 2018*

0 In the code for this tutorial, it will not perform as coded because the file 'script.js' is not the source; the code should reflect src= js/script.js. The tutorial specifically mentions to create a folder 'js' to place the script file; therefore the src='js/script.js' executes, but not src='script.js' Nothing will happen when you click the button because the file can't be found, without reference to the'js' directory folder.

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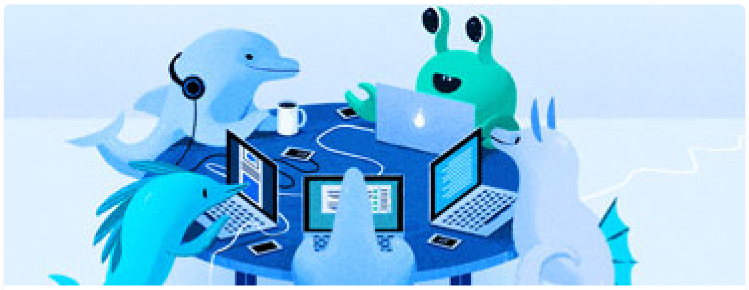

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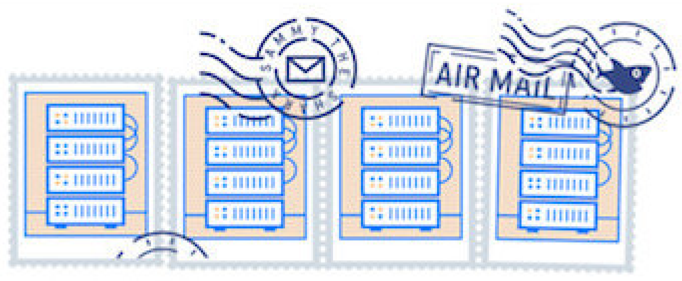

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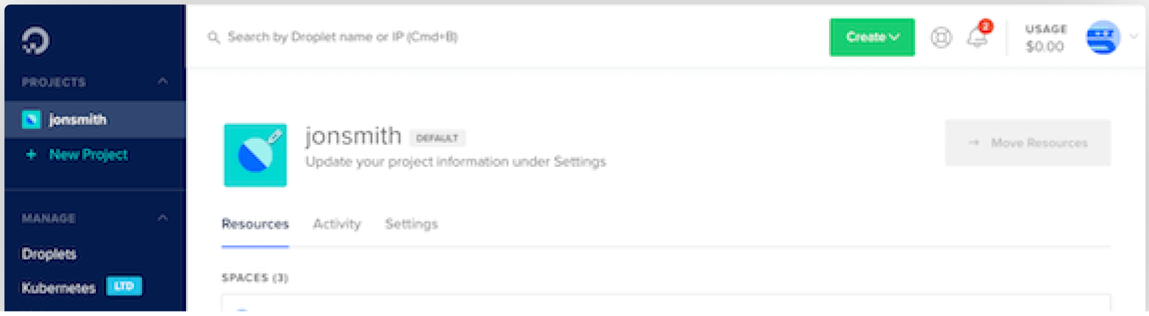

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