Introduction to the Document Object Model

You’re About to learn

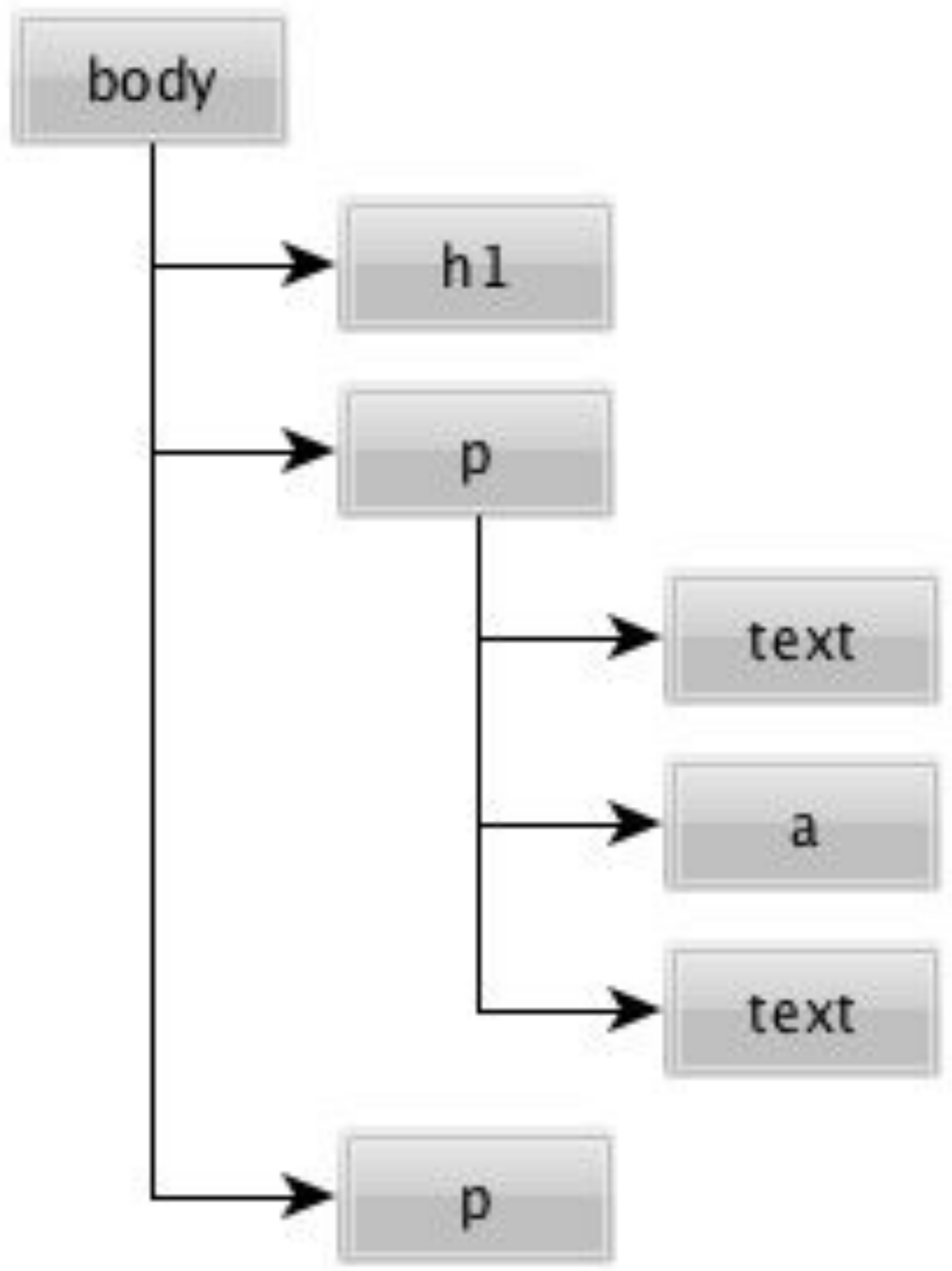
- What is the DOM?
- Why should we care?
- DOM Manipulation
  - Searching the DOM
  - How to traverse the DOM
  - How to change the DOM

What is the DOM?

The Document Object Model is what allows web pages to render, respond to user events and change

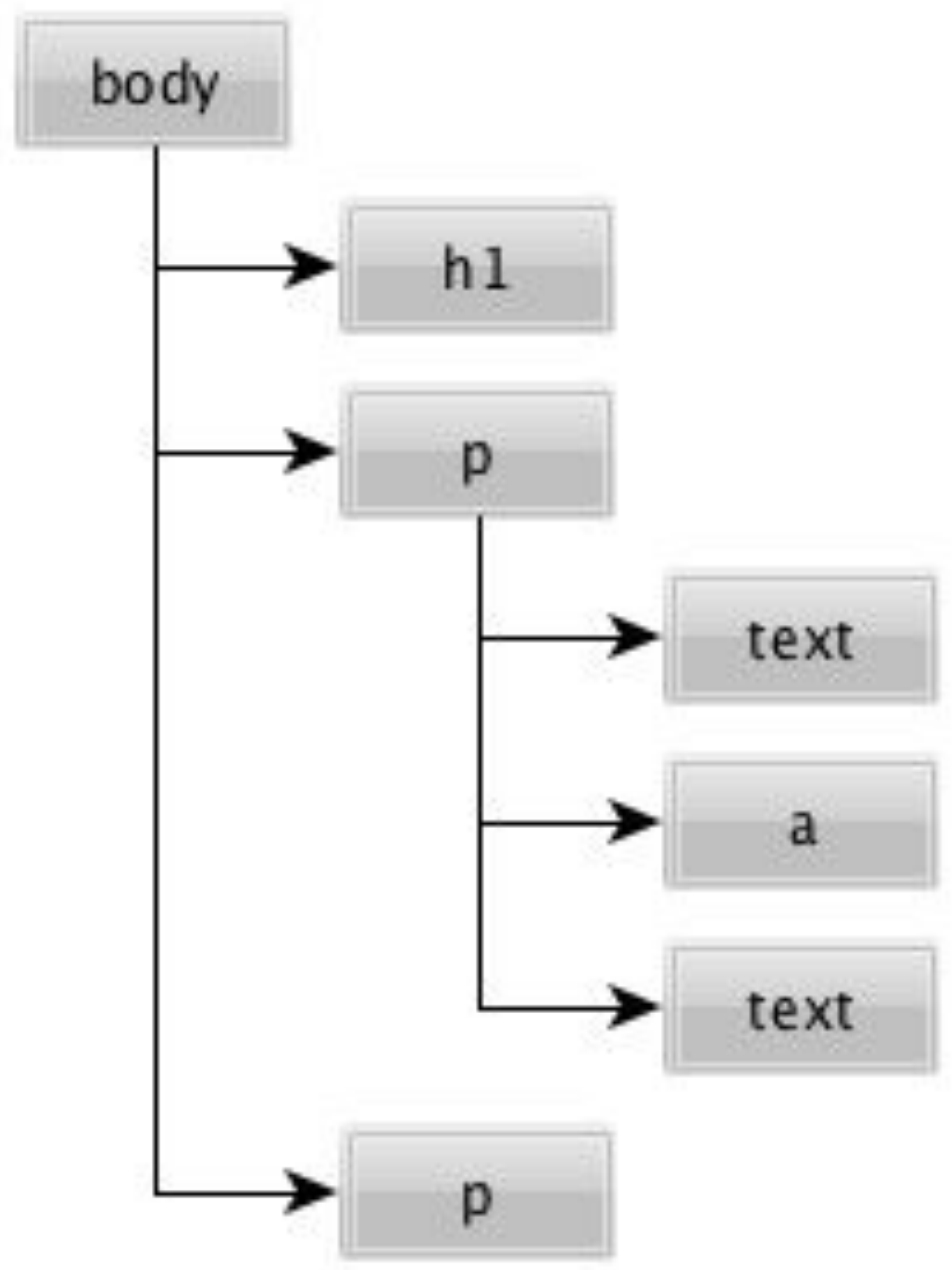
HTML vs DOM

```
<body>

  <h1>Hello</h1>

  <p>

    Check out my

    <a href="/page">Page!</a>

    It's the best page out there
  </p>



  <p>Come back soon!</p>
</body>
```

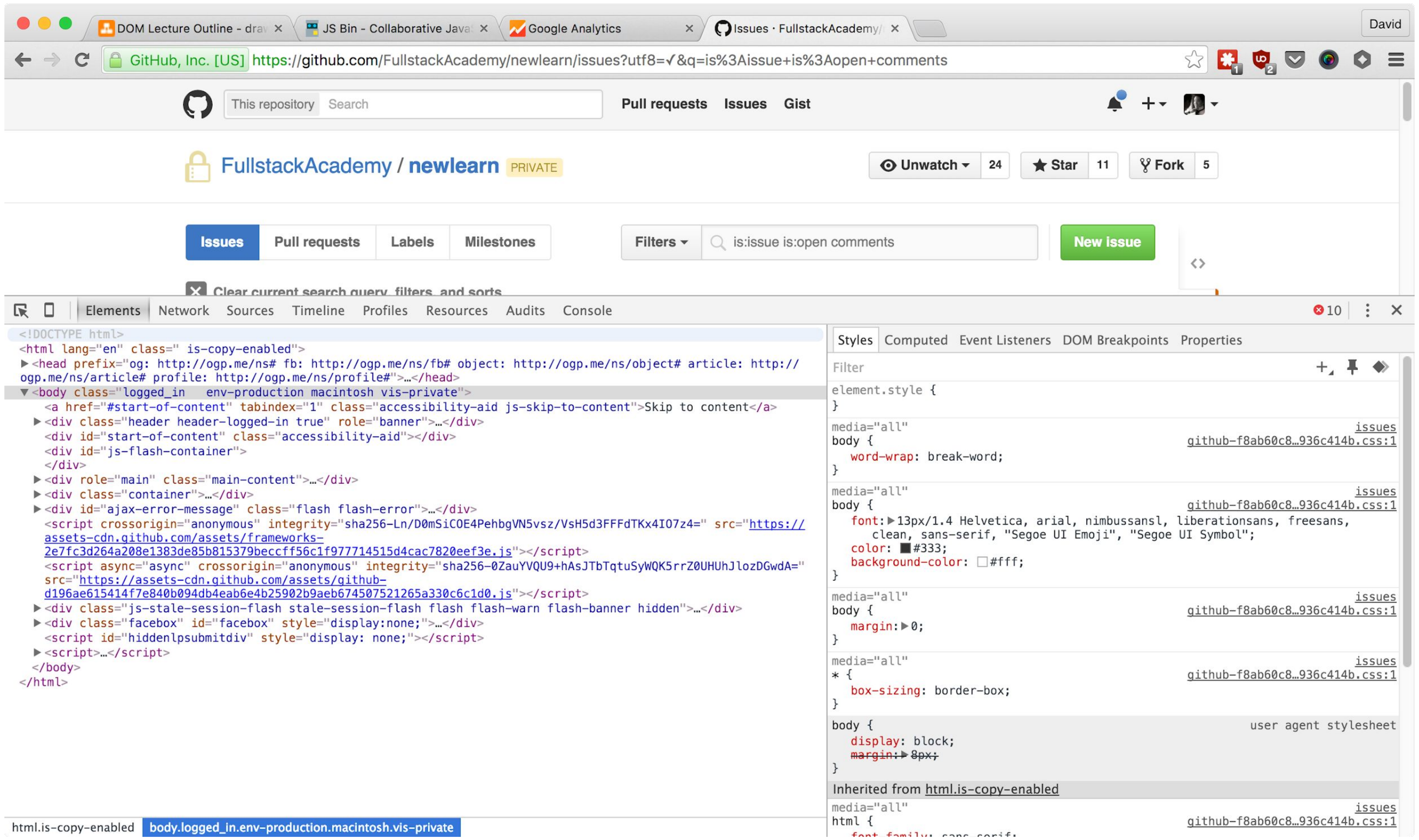


The DOM is a Tree

- Trees are a data structure from computer science
- The main idea here: There is a Node that branches into other Nodes (its children Nodes)
    - Each Node can have 0 to many children Nodes
    - Nodes can have 0 or 1 parent
    - Nodes can have 0 to many Sibling Nodes



Developer Tools



DOM Lecture Outline - draw
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David
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Unwatch 24 Star 11 Fork 5
Issues Pull requests Labels Milestones
Filters is:issue is:open comments
New issue
Clear current search query, filters, and sorts
Elements Network Sources Timeline Profiles Resources Audits Console
10
Styles Computed Event Listeners DOM Breakpoints Properties
Filter
html.is-copy-enabled body.logged_in.env-production.macintosh.vis-private

```
<!DOCTYPE html>
<html lang="en" class=" is-copy-enabled">
▶<head prefix="og: http://ogp.me/ns# fb: http://ogp.me/ns/fb# object: http://ogp.me/ns/object# article: http://
ogp.me/ns/article# profile: http://ogp.me/ns/profile#">…</head>
▼<body class="logged_in   env-production macintosh vis-private">
    <a href="#start-of-content" tabindex="1" class="accessibility-aid js-skip-to-content">Skip to content</a>
  ▶<div class="header header-logged-in true" role="banner">…</div>
    <div id="start-of-content" class="accessibility-aid"></div>
    <div id="js-flash-container">
    </div>
  ▶<div role="main" class="main-content">…</div>
  ▶<div class="container">…</div>
  ▶<div id="ajax-error-message" class="flash flash-error">…</div>
    <script crossorigin="anonymous" integrity="sha256-Ln/D0mSiCOE4PehbgVN5vsz/VsH5d3FFFdTKx4IO7z4=" src="https://
    assets-cdn.github.com/assets/frameworks-
    2e7fc3d264a208e1383de85b815379beccff56c1f977714515d4cac7820eef3e.js"></script>
    <script async="async" crossorigin="anonymous" integrity="sha256-0ZauYVQU9+hAsJTbTqtuSyWQK5rrZ0UHUhJlozDGwdA="
    src="https://assets-cdn.github.com/assets/github-
    d196ae615414f7e840b094db4eab6e4b25902b9aeb674507521265a330c6c1d0.js"></script>
  ▶<div class="js-stale-session-flash stale-session-flash flash flash-warn flash-banner hidden">…</div>
  ▶<div class="facebox" id="facebox" style="display:none;">…</div>
    <script id="hiddenlpsubmitdiv" style="display: none;"></script>
  ▶<script>…</script>
  </body>
</html>
```

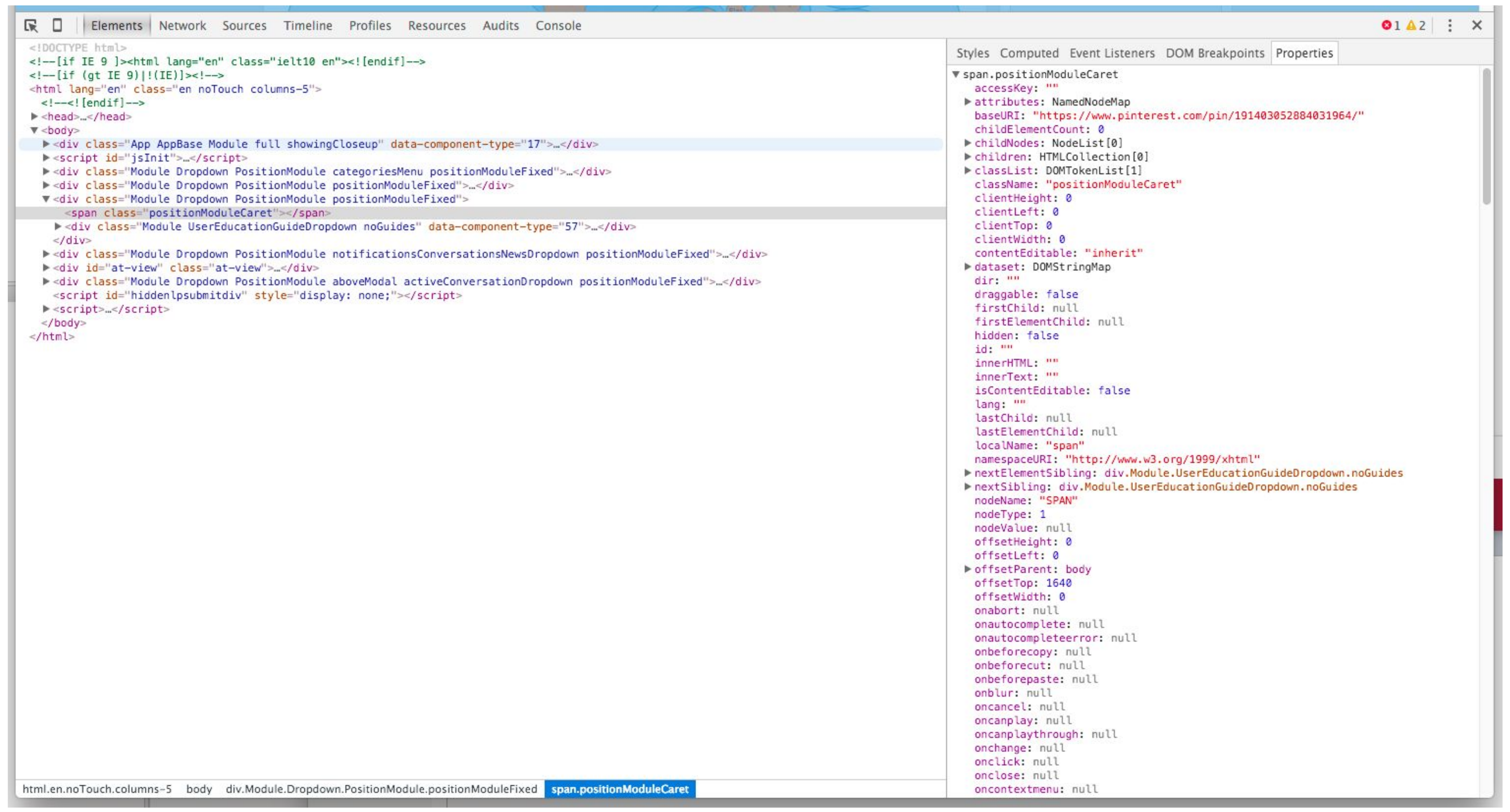
```
element.style {
}
media="all"                                                      issues
body {                                    github-f8ab60c8…936c414b.css:1
   word-wrap: break-word;
}
media="all"                                                      issues
body {                                    github-f8ab60c8…936c414b.css:1
   font:▶13px/1.4 Helvetica, arial, nimbussansl, liberationsans, freesans,
      clean, sans-serif, "Segoe UI Emoji", "Segoe UI Symbol";
   color: ■#333;
   background-color: □#fff;
}
media="all"                                                      issues
body {                                    github-f8ab60c8…936c414b.css:1
   margin:▶0;
}
media="all"                                                      issues
* {                                       github-f8ab60c8…936c414b.css:1
   box-sizing: border-box;
}
body {                                           user agent stylesheet
   display: block;
   ~~margin:▶ 8px;~~
}
Inherited from html.is-copy-enabled
media="all"                                                      issues
html {                                    github-f8ab60c8…936c414b.css:1
```

Why care?

The DOM makes possible to use JavaScript to manipulate the document content and structure

Nodes have lots of Attributes

- Nodes are JavaScript Objects
- Nodes have Attributes that are JavaScript properties
- Attributes define how the Node looks and responds to User activity



```
<!DOCTYPE html>
<!--[if IE 9 ]><html lang="en" class="ielt10 en"><![endif]-->
<!--[if (gt IE 9)|!(IE)]><!-->
<html lang="en" class="en noTouch columns-5">
  <!--<![endif]-->
▶ <head>…</head>
▼ <body>
  ▶ <div class="App AppBase Module full showingCloseup" data-component-type="17">…</div>
  ▶ <script id="jsInit">…</script>
  ▶ <div class="Module Dropdown PositionModule categoriesMenu positionModuleFixed">…</div>
  ▶ <div class="Module Dropdown PositionModule positionModuleFixed">…</div>
  ▼ <div class="Module Dropdown PositionModule positionModuleFixed">
      <span class="positionModuleCaret"></span>
    ▶ <div class="Module UserEducationGuideDropdown noGuides" data-component-type="57">…</div>
    </div>
  ▶ <div class="Module Dropdown PositionModule notificationsConversationsNewsDropdown positionModuleFixed">…</div>
  ▶ <div id="at-view" class="at-view">…</div>
  ▶ <div class="Module Dropdown PositionModule aboveModal activeConversationDropdown positionModuleFixed">…</div>
    <script id="hiddenlpsubmitdiv" style="display: none;"></script>
  ▶ <script>…</script>
  </body>
</html>
```

```
html.en.noTouch.columns-5   body   div.Module.Dropdown.PositionModule.positionModuleFixed   span.positionModuleCaret
```

```
▼ span.positionModuleCaret
    accessKey: ""
  ▶ attributes: NamedNodeMap
    baseURI: "https://www.pinterest.com/pin/191403052884031964/"
    childElementCount: 0
  ▶ childNodes: NodeList[0]
  ▶ children: HTMLCollection[0]
  ▶ classList: DOMTokenList[1]
    className: "positionModuleCaret"
    clientHeight: 0
    clientLeft: 0
    clientTop: 0
    clientWidth: 0
    contentEditable: "inherit"
  ▶ dataset: DOMStringMap
    dir: ""
    draggable: false
    firstChild: null
    firstElementChild: null
    hidden: false
    id: ""
    innerHTML: ""
    innerText: ""
    isContentEditable: false
    lang: ""
    lastChild: null
    lastElementChild: null
    localName: "span"
    namespaceURI: "http://www.w3.org/1999/xhtml"
  ▶ nextElementSibling: div.Module.UserEducationGuideDropdown.noGuides
  ▶ nextSibling: div.Module.UserEducationGuideDropdown.noGuides
    nodeName: "SPAN"
    nodeType: 1
    nodeValue: null
    offsetHeight: 0
    offsetLeft: 0
  ▶ offsetParent: body
    offsetTop: 1640
    offsetWidth: 0
    onabort: null
    onautocomplete: null
    onautocompleteerror: null
    onbeforecopy: null
    onbeforecut: null
    onbeforepaste: null
    onblur: null
    oncancel: null
    oncanplay: null
    oncanplaythrough: null
    onchange: null
    onclick: null
    onclose: null
    oncontextmenu: null
```

ONE NODE

Hundreds of properties!

The *document* Object

- Global reference to the DOM entry point
- Provides methods for:
  - Navigating the DOM
  - Manipulating the DOM
- The ***document*** object is the important connection between the DOM and JavaScript code

Searching the DOM

Searching the DOM

- getElementById (find nodes with a certain ID attribute)
  - `document.getElementById(“will”);`
- getElementsByClassName (find nodes with a certain CLASS ATTRIBUTE)
  - `document.getElementsByClassName(“will”);`
- getElementsByTagName (find nodes with a certain HTML tag)
  - `document.getElementsByTagName(“div”);`
- querySelector, querySelectorAll (search using CSS selectors)
  - `document.querySelector(“#will.will:first-child”);`

Array-Like Objects? Bleh!

- `const realArr = [].prototype.slice.call(arrayLike)`

- `const realArr = Array.from(arrayLike)`

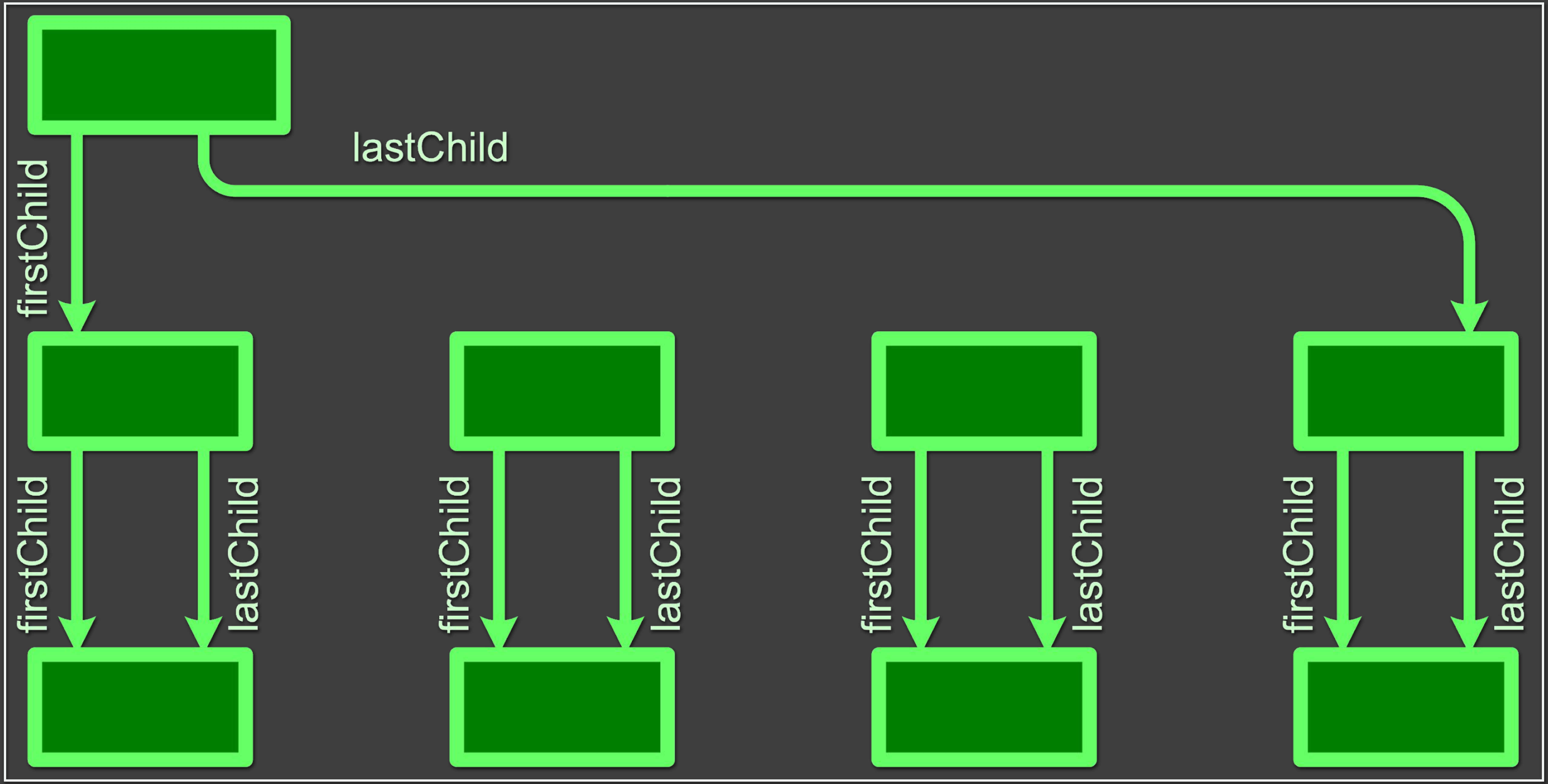
- `const realArr = [...arrayLike]`

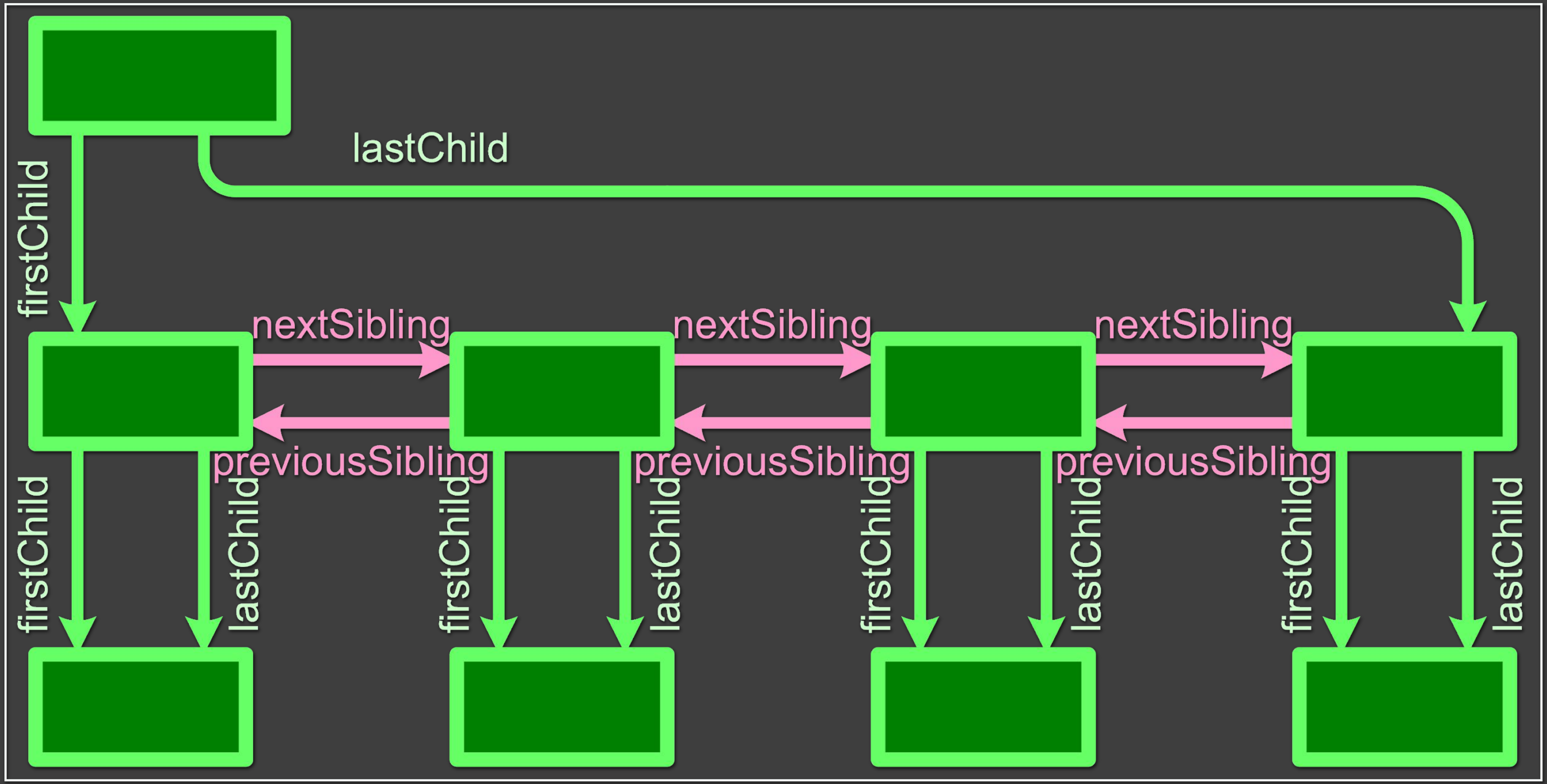
-
```
for (const element of arrayLike) {
    console.log(element);
}
```

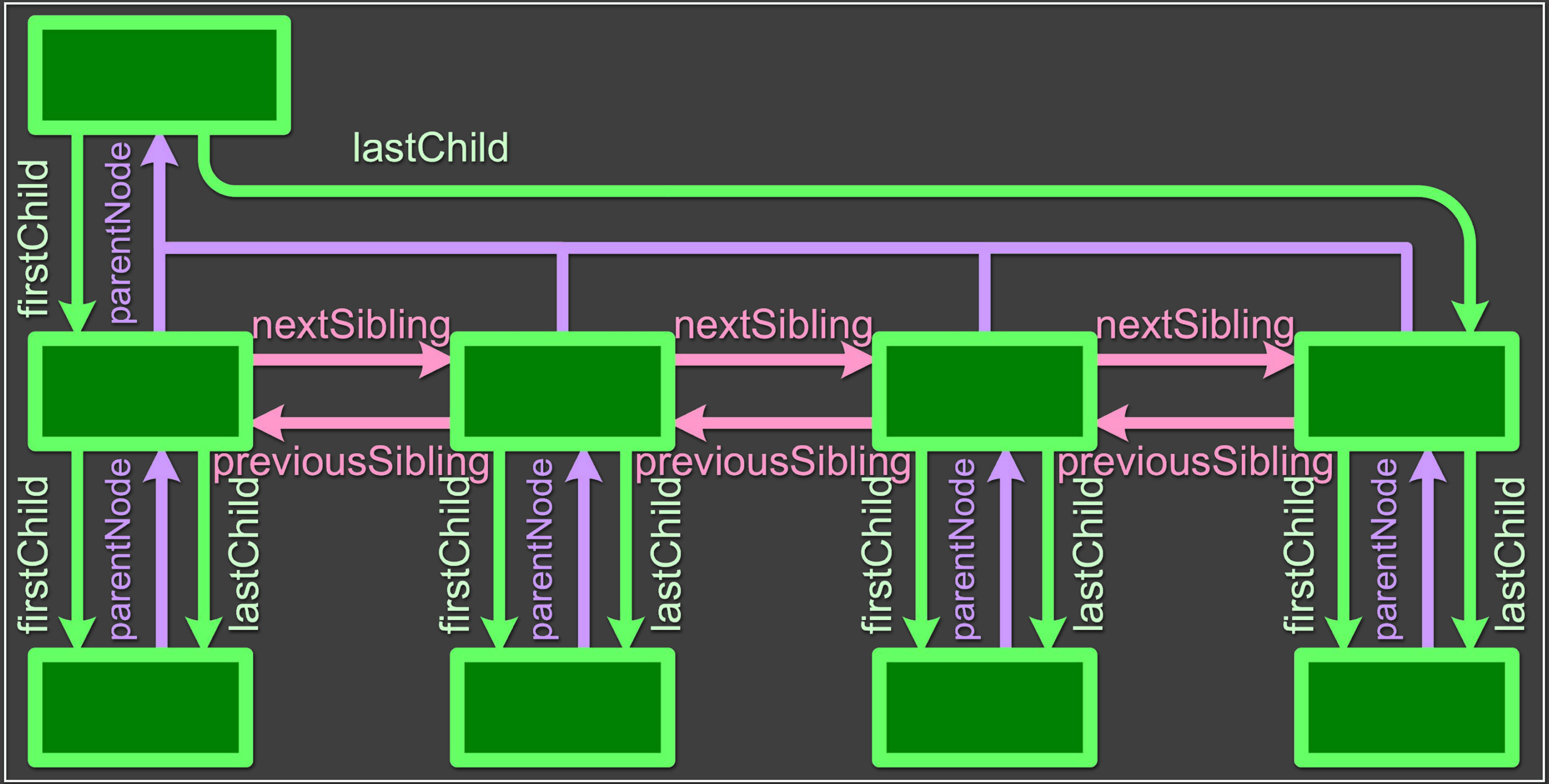
Traversing the DOM

Traversing the DOM

- Tree Structures are easy to navigate:
  - At any point in the DOM you are at a Node
  - No matter where you go, you're still at a Node
    - Child
    - Parent
    - Sibling
  - All Nodes share similar DOM navigation methods


lastChild
firstChild
firstChild
lastChild
firstChild
lastChild
firstChild
lastChild
firstChild
lastChild


lastChild
firstChild
nextSibling
nextSibling
nextSibling
previousSibling
previousSibling
previousSibling
firstChild
lastChild
firstChild
lastChild
firstChild
lastChild
firstChild
lastChild


lastChild
firstChild
parentNode
nextSibling
nextSibling
nextSibling
previousSibling
previousSibling
previousSibling
firstChild
parentNode
lastChild
firstChild
parentNode
lastChild
firstChild
parentNode
lastChild
firstChild
parentNode
lastChild

Traversing the DOM

- Access children
  - `element.children, element.lastChild, element.firstChild`
- Access siblings
  - `element.nextElementSibling, element.previousElementSibling`
- Access parent
  - `element.parentElement`

Changing the DOM

Changing style attributes

```
element.style.backgroundColor = “blue”;
```

CSS		JavaScript
background-color	→	backgroundColor
border-radius	→	borderRadius
font-size	→	fontSize
list-style-type	→	listStyleType
word-spacing	→	wordSpacing
z-index	→	zIndex

CSS
JavaScript
background-color
backgroundColor
border-radius
borderRadius
font-size
fontSize
list-style-type
listStyleType
word-spacing
wordSpacing
z-index
zIndex

Changing CSS Classes

- ***className*** attribute is a string of all of a Node’s classes
- ***classList*** is HTML5 way to modify which classes are on a Node

```
document.getElementById("MyElement").classList.add('class');

document.getElementById("MyElement").classList.remove('class');

if ( document.getElementById("MyElement").classList.contains('class') )

document.getElementById("MyElement").classList.toggle('class');
```

Creating Elements

- Create an element
  - `document.createElement(tagName)`
- Duplicate an existing node
  - `node.cloneNode()`

- Nodes are just free floating, not connected to the document itself, until you ***link*** them to the DOM.

Adding elements to the DOM

- Insert newNode at end of current node
  - `node.appendChild(newNode);`
- Insert newNode at beginning of current node
  - `node.prependChild(newNode);`
- Insert newNode before a certain childNode
  - `node.insertBefore(newNode, sibling);`

Removing Elements

- Removes the oldNode child.
  - `node.removeChild(oldNode);`

- Quick hack:
  - oldNode.parentNode.removeChild(oldNode);