UI Programming

Let’s enter into the Web world

UI Design Principles

- Make User Interface consistent
- Allow users to navigate easily
- Provide informative feedback
- Design dialog to yield closure
- Prevent error as much as possible
- Allow users to reverse their actions easily
- Minimize memory load
- Clarity
- Familiarity

Role of UI Developer

A UI developer’s role is to translate creative software design concepts and ideas into reality using frontend technologies.

UI Developer Skills

In depth knowledge of user interface development tech stack and frameworks

- HTML
- CSS
- JavaScript
- Angular
- ReactJS
- Typescript
- AJAX etc

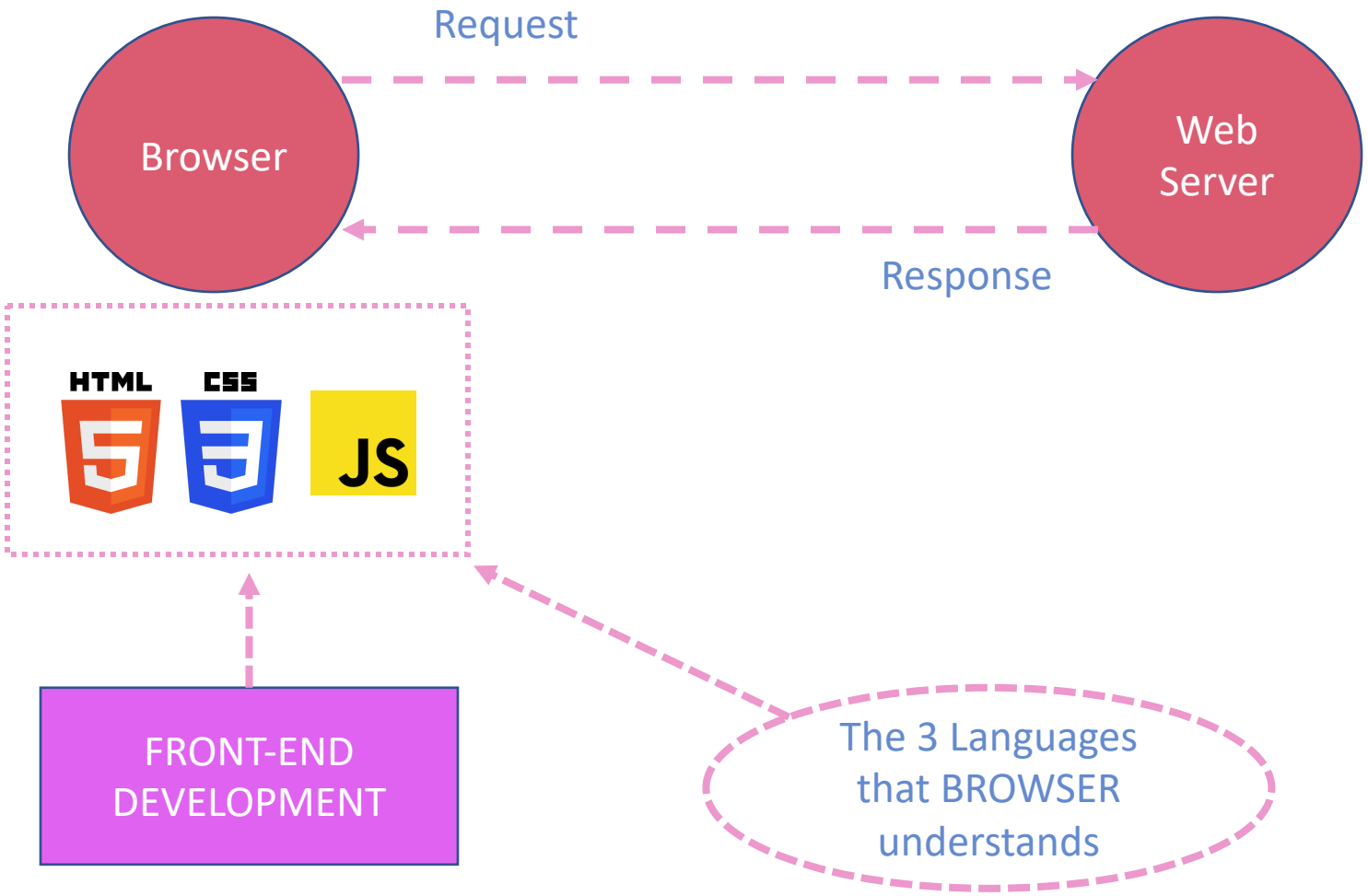
A level of design and business understanding so as to not compromise on business goals and design intents

UX Designer vs UI Developer

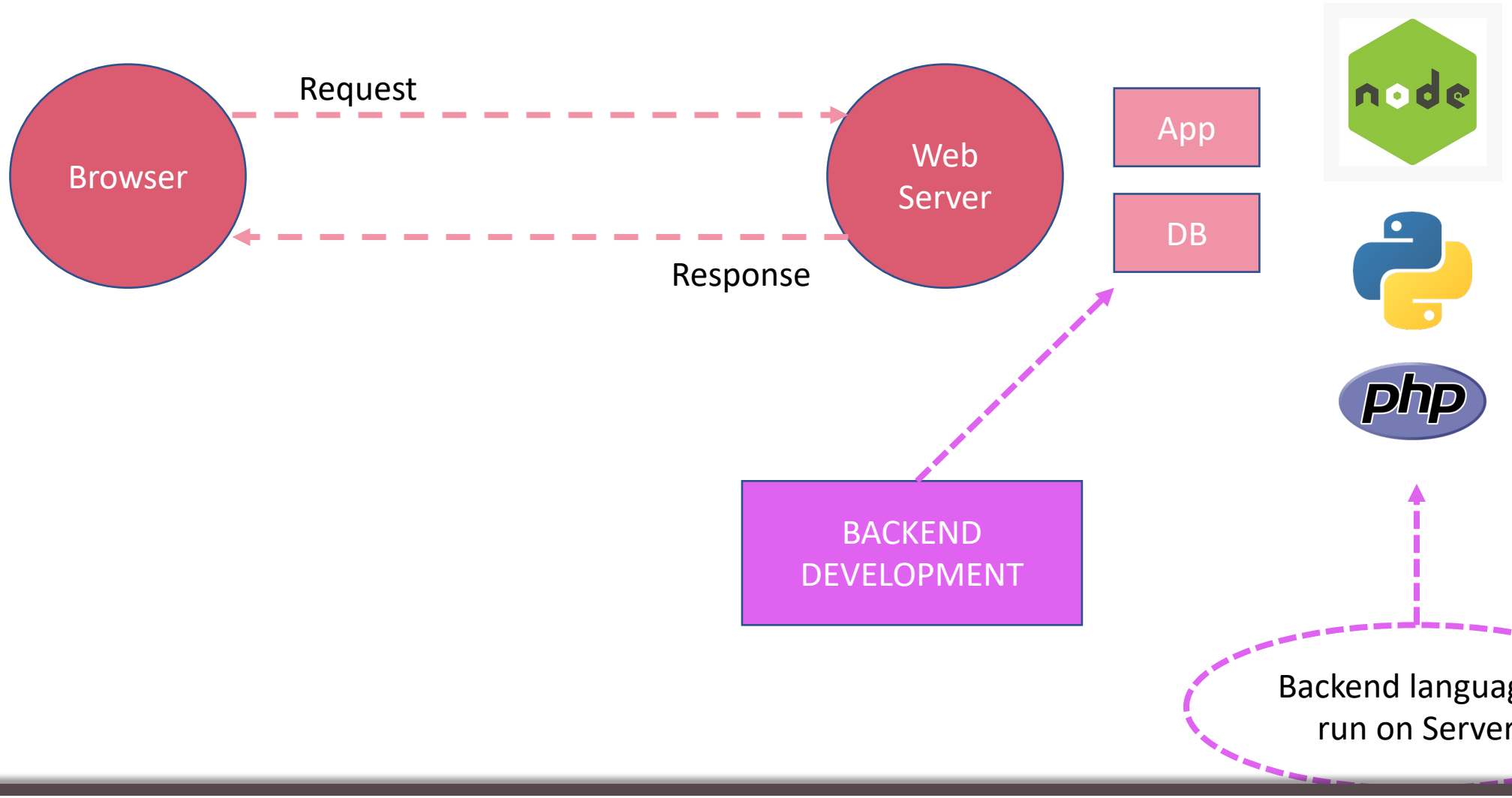
Create user stories, persona and storyboards
Determine information architecture and create sitemaps
Create prototypes and wireframes
Conduct usability testing

Frontend Technologies

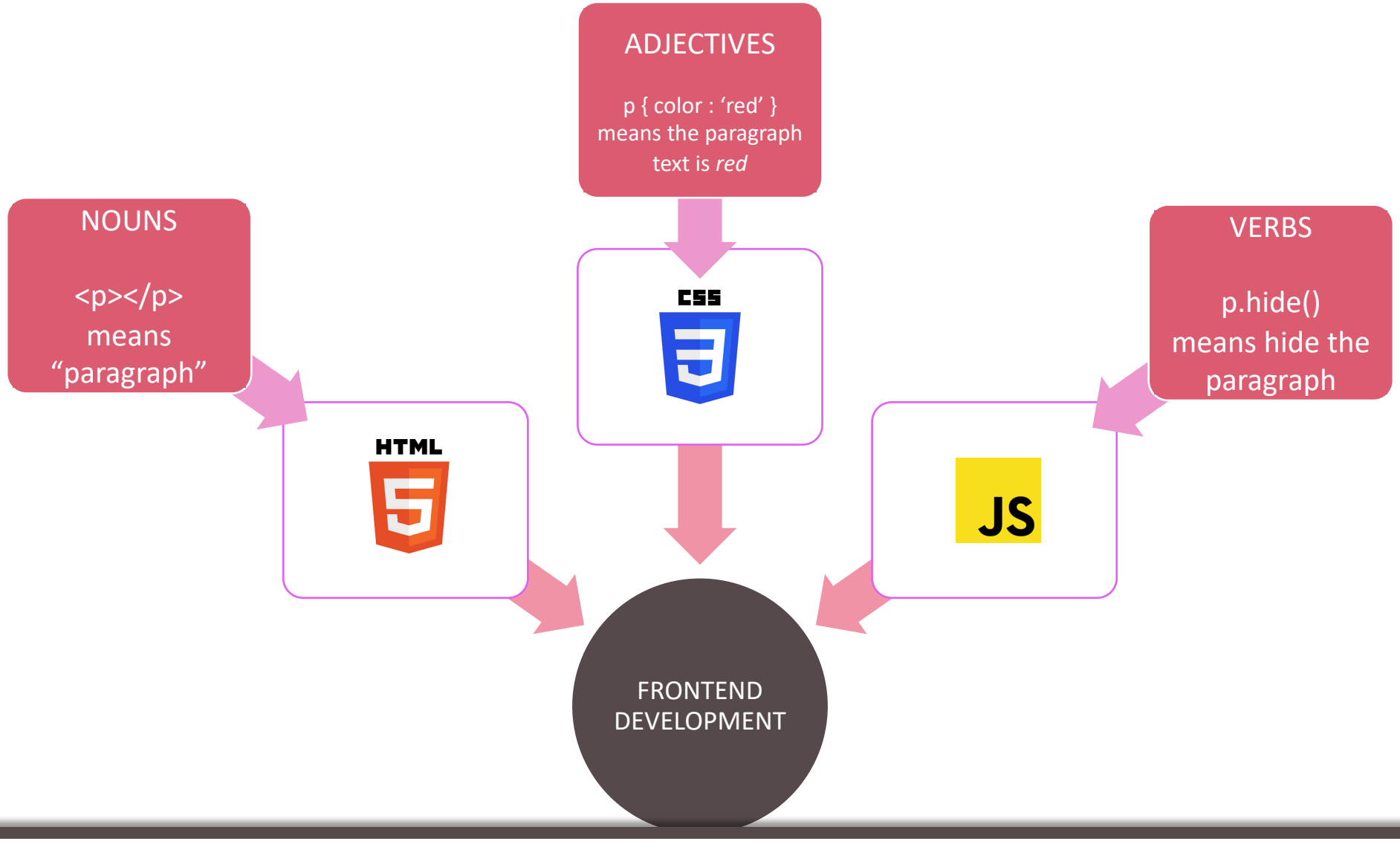
FRONTEND DEVELOPMENT



BACKEND DEVELOPMENT



THE 3 LANGUAGES OF FRONTEND



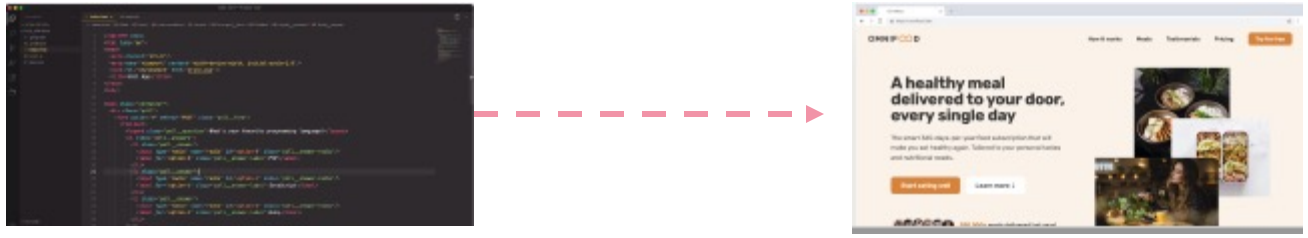
INTRODUCTION TO HTML

HyperText Markup Language

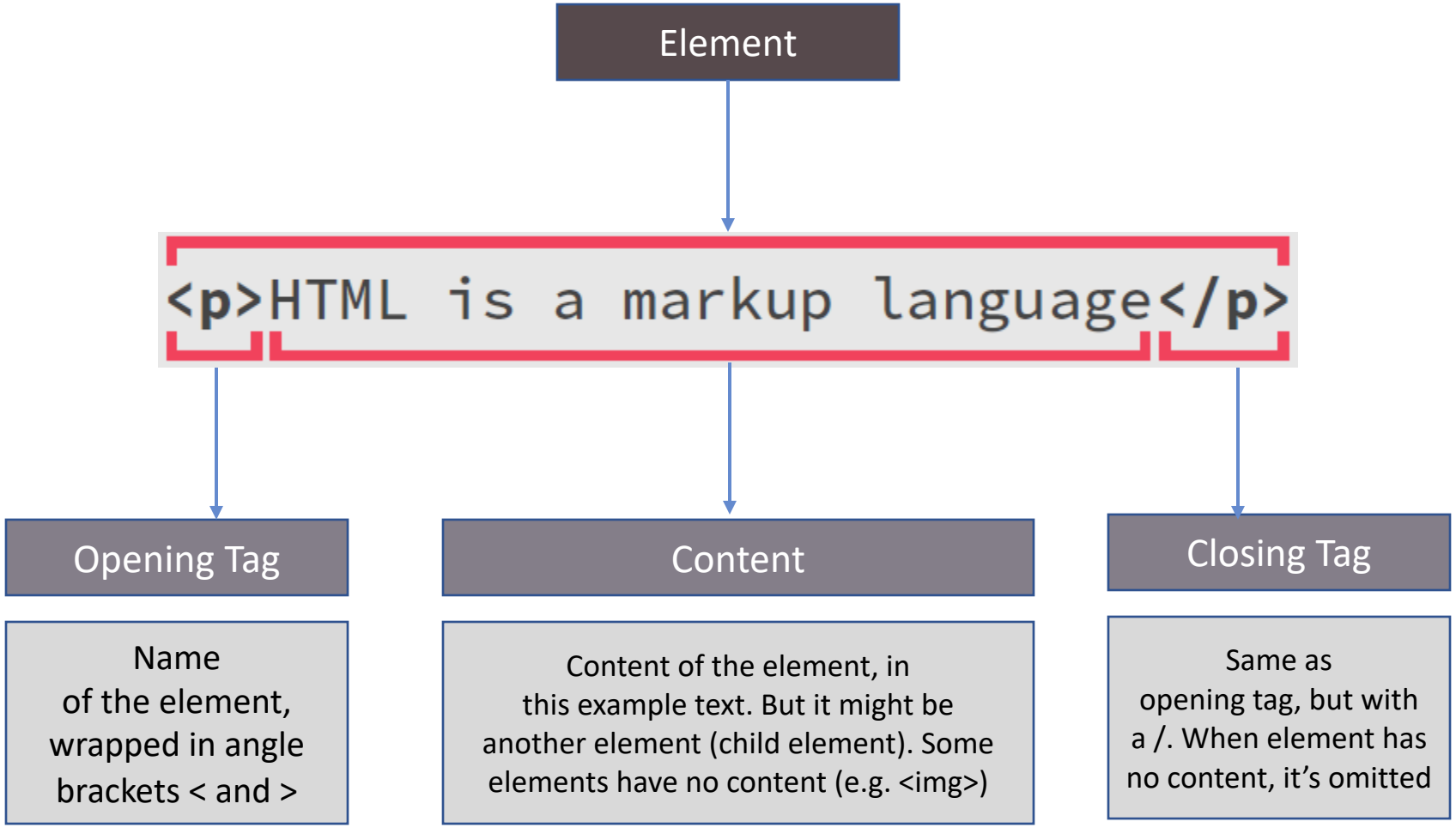
HTML is a markup language that web developers use to structure and describe the content of a webpage (not a programming language)

HTML consists of elements that describe different types of content: paragraphs, links, headings, images, video, etc.

Web browsers understand HTML and render HTML code as websites



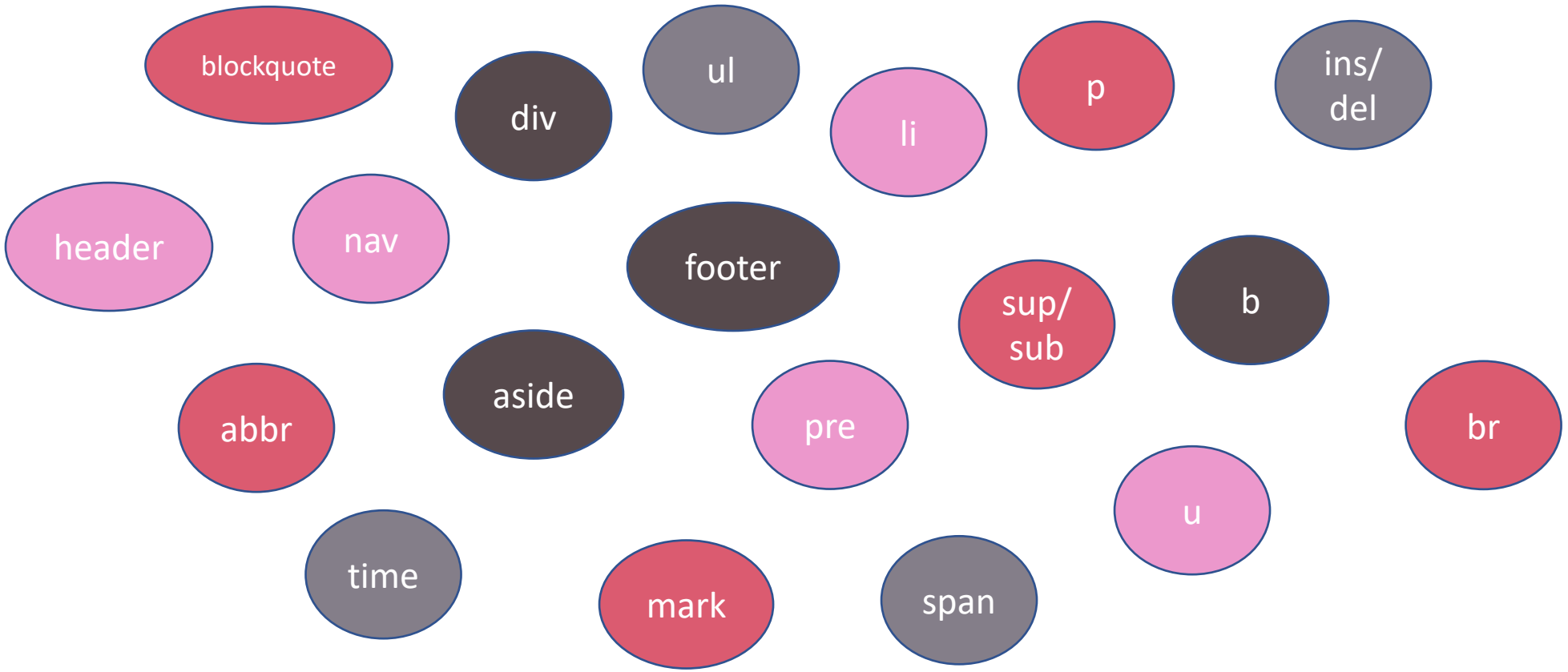
ANATOMY OF AN HTML ELEMENT



HTML Elements

title	specifies the label that appears in the browser window's *title bar*.
meta	Provide information about the web page.
style	Writing internal stylesheet for your page.
script	Adding actions to your app by including JavaScript.
body	Includes various other elements to display data on webpage

Elements To Watch For…



CSS

Let’s make it better looking

INTRODUCTION TO CSS

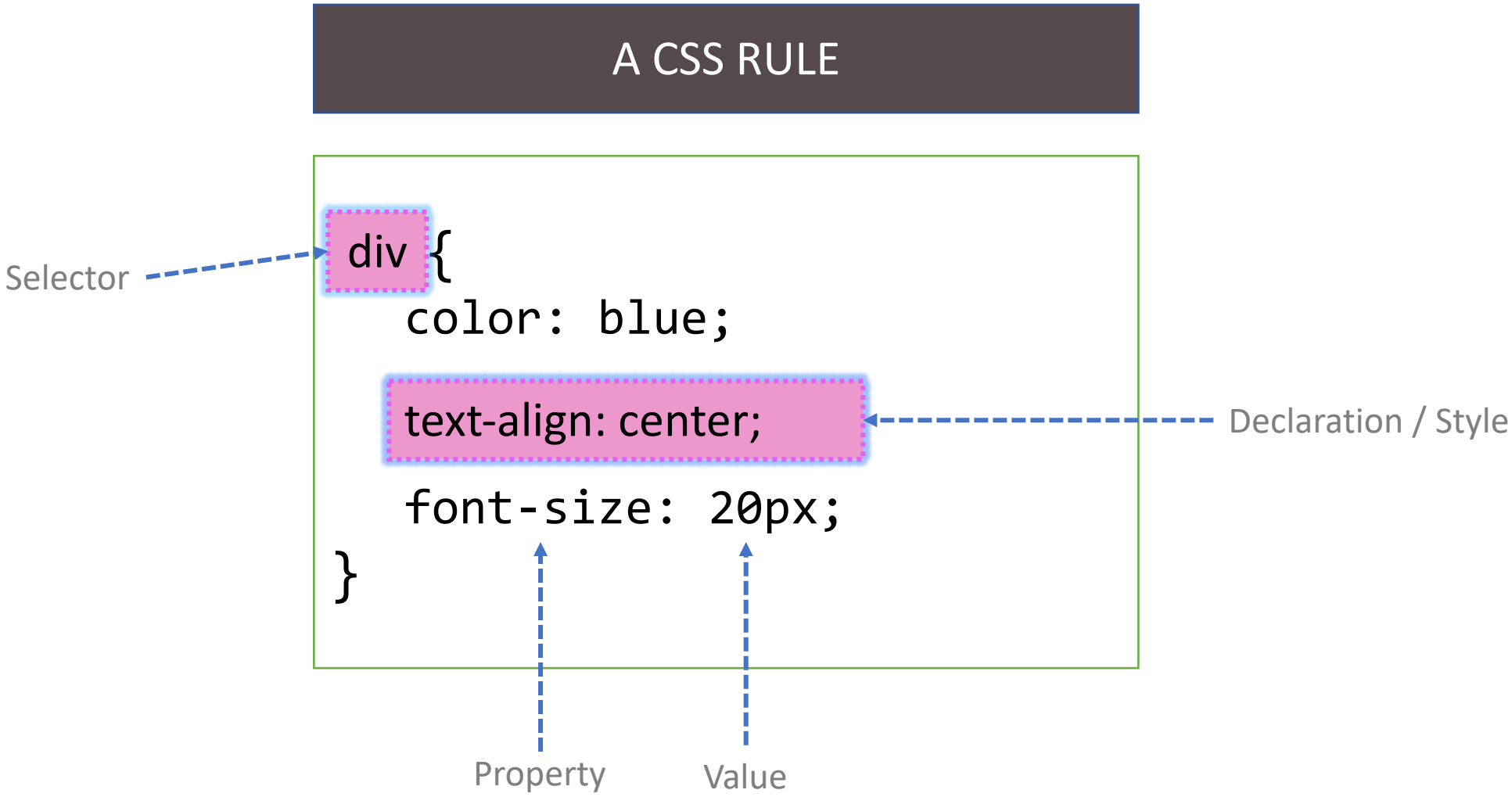
Cascading Style Sheets

CSS describes the visual style and presentation of the content written in HTML

CSS consists of countless properties that developers use to format the content: properties about font, text, spacing, layout, etc.

Web browsers understand HTML and render HTML code as websites

HOW WE SELECT AND STYLE ELEMENTS



CSS SELECTORS

Selector Type	Syntax	Description	Example
Universal	*	Selects all elements	* will match all the elements
Type	elementName	Selects all elements that have the given node name	input will match any <input> element.
Class	.classname	Selects all elements that have the given class attribute	.index will match any element that has a class of "index"
ID	#id	Selects an element based on the value of its id attribute	#toc will match the element that has the ID "toc"
Attribute	[attr]	Selects all elements that have the given attribute	[autoplay] will match all elements that have the autoplay attribute

MORE CSS SELECTORS

Selector Type	Syntax	Description	Example
Grouping Selector List	,	The , selector is a grouping method that selects all the matching nodes	div, span will match both and elements
Descendant combinator	“ “	The " " (space) combinator selects nodes that are descendants of the first element	div span will match all elements that are inside a element
Child combinator	>	The > combinator selects nodes that are direct children of the first element	ul > li will match all elements that are nested directly inside a element.
General sibling combinator	~	The ~ combinator selects siblings. This means that the second element follows the first (though not necessarily immediately), and both share the same parent	p ~ span will match all elements that follow a <p>, immediately or not.
Adjacent sibling combinator	+	The + combinator matches the second element only if it immediately follows the first element	h2 + p will match all <p> elements that immediately follow an <h2> element

MORE CSS SELECTORS

Selector Type	Syntax	Description	Example
Pseudo classes	:	The : pseudo allow the selection of elements based on state information that is not contained in the document tree	a:visited will match all <a> elements that have been visited by the user
Pseudo elements	::	The :: pseudo represent entities that are not included in HTML	p::first-line will match the first line of all <p> elements

WHAT IS RESPONSIVE DESIGN?

Design technique to make a webpage adjust its layout and visual style to **any possible screen size** (window or viewport size)

In practice, this means that responsive design makes websites usable on all devices, such as **desktop computers, tablets, and mobile phones**.

It's a set of practices, **not a separate technology**. It's all just CSS!

RESPONSIVE DESIGN INGREDIENTS

FLUID LAYOUTS

To allow webpage to adapt to the current viewport width (or even height)

Use **%** (or vh / vw) unit instead of px for elements that should adapt to viewport (usually layout)

Use **max-width** instead of width

RESPONSIVE UNITS

Use **rem** unit instead of px for most lengths to make it easy to scale the entire layout down (or up) automatically

Helpful trick: setting 1rem to 10px for easy calculations

FLEXIBLE IMAGES

By default, images don't scale automatically as we change the viewport, so we need to fix that

Always use % for image dimensions, together with the **max-width** property

Use max-width instead of width

MEDIA QUERIES

Bring responsive sites to life!

To change CSS styles on certain viewport widths (called breakpoints)

Use media queries and select breakpoints

DESKTOP-FIRST VS. MOBILE-FIRST DEVELOPMENT

DESKTOP-FIRST

- Start writing CSS for the desktop: large screen
- Then, media queries shrink design to smaller screens.

MOBILE-FIRST

- Start writing CSS for mobile devices: small screen
- Then, media queries expand design to a large screen
- Forces us to reduce websites and apps to the absolute essentials.

JAVASCRIPT

THE SCRIPTING LANGUAGE FOR WEB PROGRAMMING

WHAT IS JAVASCRIPT?

JAVASCRIPT IS A *HIGH-LEVEL*, *OBJECT-ORIENTED*, *MULTI-PARADIGM PROGRAMMING LANGUAGE.*

We don’t have to worry about complex stuff like memory management

We can use different styles of programming

Based on objects, for storing most kinds of data

Instruct computer to do things

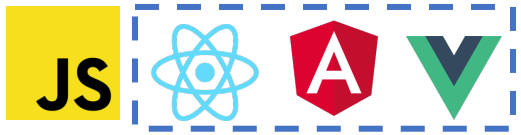
JAVASCRIPT FEATURES

HIGH-LEVEL	PROTOTYPE-BASED OBJECT-ORIENTED	MULTI-PARADIGM
INTERPRETED OR JUST-IN-TIME COMPILED	DYNAMIC	SINGLE-THREADED
NON-BLOCKING EVENT LOOP	FIRST-CLASS FUNCTIONS	GARBAGE-COLLECTED

THERE IS NOTHING YOU CAN'T DO WITH JAVASCRIPT

FRONT-END APPS

Dynamic effects and web applications in the browser



100% based on JavaScript.
They might go away,
but JavaScript won't!

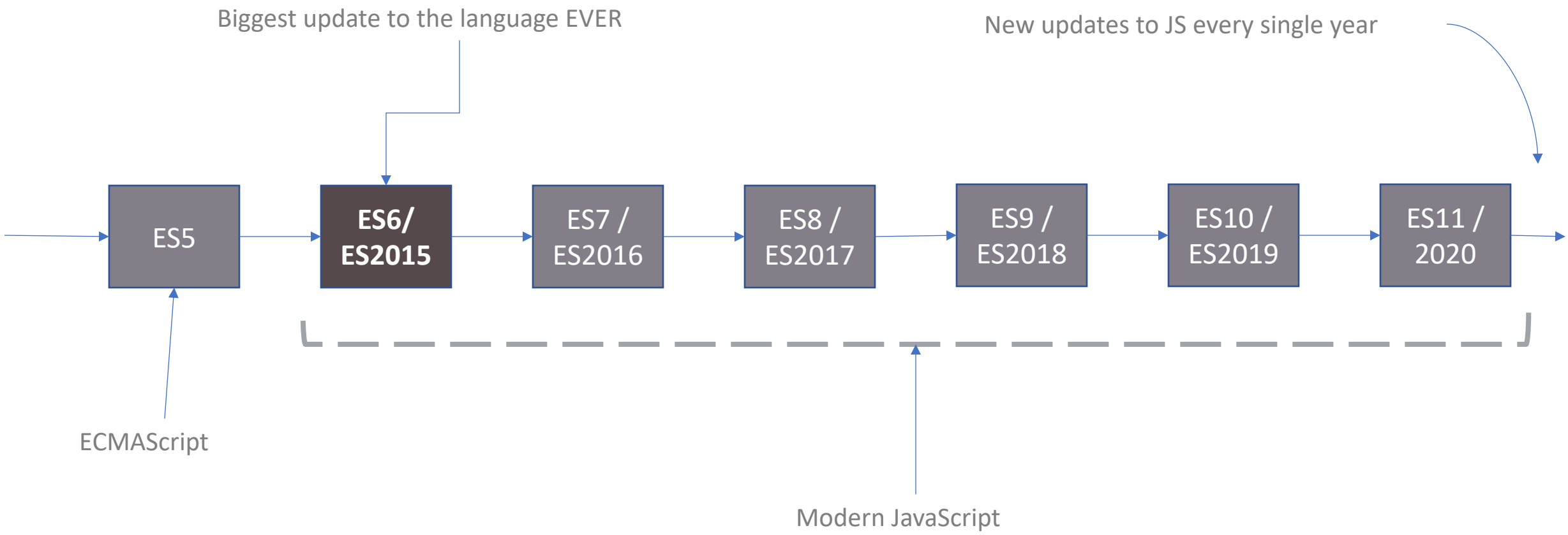
BACK-END APPS

Web applications on web servers

Native mobile applications

Native desktop applications

JAVASCRIPT RELEASES...



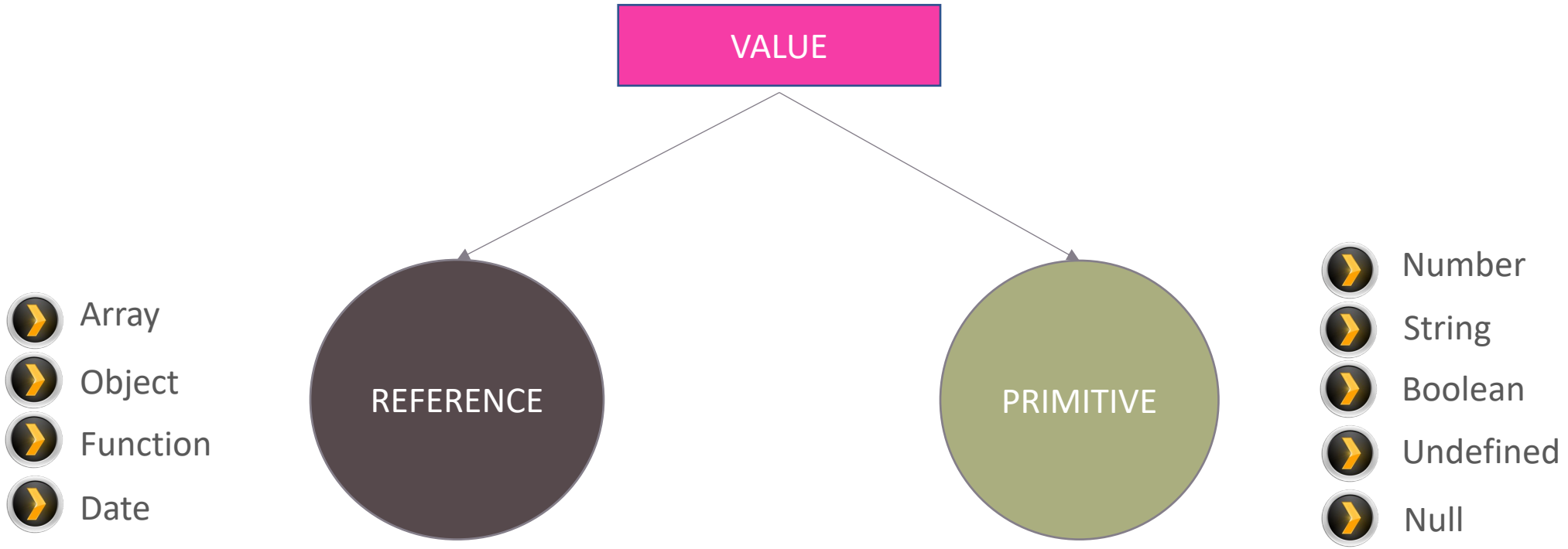
A BRIEF HISTORY OF JAVASCRIPT

1995	Brendan Eich creates the very first version of JavaScript in just 10 days. It was called Mocha.
1996	Mocha changes to LiveScript and then to JavaScript, in order to attract Java developers.
	Microsoft launches IE, copying JavaScript from Netscape and calling it JScript;
1997	With a need to standardize the language, ECMA releases ECMAScript 1 (ES1), the first official standard for JavaScript (ECMAScript is the standard, JavaScript the language in practice)
2009	ES5 (ECMAScript 5) is released with lots of great new features
2015	ES6/ES2015 (ECMAScript 2015) was released: the biggest update to the language ever!
	ECMAScript changes to an annual release cycle in order to ship less features per update
2016 onwards	Release of ES2016 / ES2017 / ES2018 / ES2019 / ES2020 / ES2021 / … / ES2089

DATA TYPES

LET’S GIVE IT A TYPE

OBJECTS AND PRIMITIVES



DATA STRUCTURE

STORING DATA IN OBJECT AND ARRAY

OBJECTS & ARRAYS

Objects represented by Flower Brackets – { }

- The Object type represents one of JavaScript's data types
- It is used to store various keyed collections and more complex entities
- Objects can be created using the Object() constructor or the object initializer / literal syntax

Arrays represented by Square Bracket - [ ]

- The Array object, as with arrays in other programming languages, enables storing a collection of multiple items under a single variable name, and has members for performing common array operations

WORKING WITH ARRAY

A COLLECTION OF MULTIPLE ITEMS UNDER A SINGLE VARIABLE NAME

ARRAY IN JAVASCRIPT

The Array object, as with arrays in other programming languages, enables storing a collection of multiple items under a single variable name, and has members for performing common array operations.

JavaScript arrays are resizable and can contain a mix of different data types

JavaScript arrays are not associative arrays and so, array elements cannot be accessed using strings as indexes

JavaScript arrays are zero-indexed

JavaScript array-copy operations create shallow copies

WHICH ARRAY METHOD TO USE?

I WANT …

TO MUTATE ORIGINAL ARRAY

- Add methods -
  - push()
  - unshift()
- Remove methods -
  - Pop()
  - shift()
  - Splice()
- Others -
  - Reverse()
  - Sort()
  - Fill()

A NEW ARRAY

- Computed from original-
  - Map()
- Filtered using condition-
  - Filter()
- Portion of original -
  - Slice()
- Adding original to other-
  - Concat()

AN ARRAY INDEX

- Based on value-
  - indexOf()
- Based on test condition
  - findIndex()
- An array element -
  - Find()

WHICH ARRAY METHOD TO USE?

I WANT …

KNOW IF ARRAY INCLUDES

- Based on value -
  - Includes()
- Based on test condition -
  - some()
  - every()
- Based on separator string-
  - Join()

TO TRANSFORM TO VALUE

- Based on accumulator
  - reduce()
- Based on callback-
  - forEach()

FUNCTIONS

FIRST CLASS CITIZENS IN JAVASCRIPT

FUNCTIONS

Function declaration
Function that can be used before it's declared

Function expression
Essentially a function value stored in a variable

Arrow function
Great for a quick one-line functions. (more later...)

```
function calcAge(birthYear) {
  return 2037 - birthYear;
}

const calcAge = function (birthYear) {
  return 2037 - birthYear;
};

const calcAge = birthYear ⇒ 2037 - birthYear;
```

Three different ways of writing functions, but they all work in a similar way -
Receive input data, transform data, and then output data.

FIRST-CLASS AND HIGHER-ORDER FUNCTIONS

FIRST-CLASS FUNCTIONS

JavaScript treats functions as first-class citizens.

This means that functions are simply values

Functions are just another “type” of object

Store functions in variables or properties

Pass functions as arguments to OTHER functions

Return functions FROM functions

HIGHER-ORDER FUNCTIONS

A function that receives another function as an argument, that returns a new function, or both

This is only possible because of first-class functions

Function that receives another function

Function that returns new function

DOM AND EVENTS

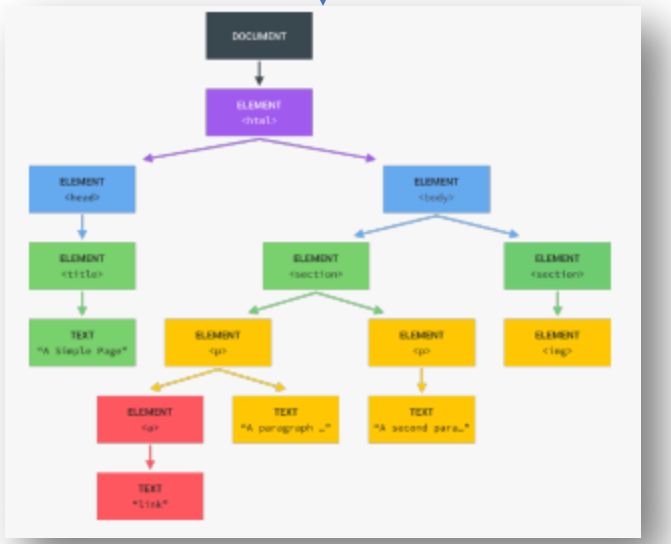
JAVASCRIPT IN THE BROWSER

WHAT IS THE DOM?

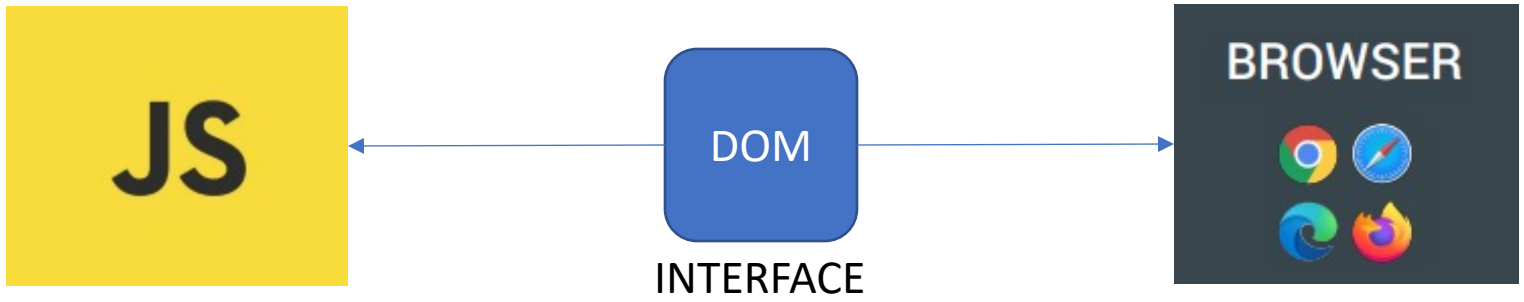
DOCUMENT OBJECT MODEL: STRUCTURED REPRESENTATION OF HTML DOCUMENTS. ALLOWS JAVASCRIPT TO ACCESS HTML ELEMENTS AND STYLES TO MANIPULATE THEM

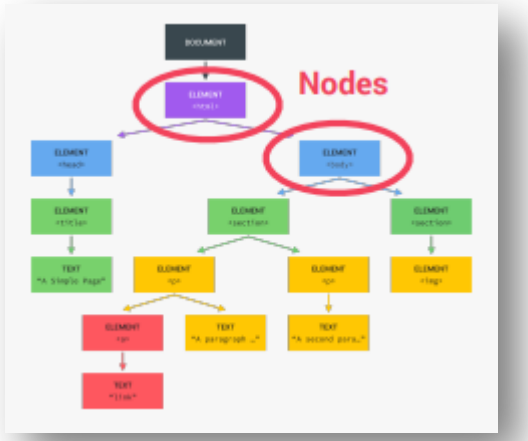
Change text, HTML attributes, and even CSS styles

Tree structure, generated by browser on HTML load



DOM IN DETAIL





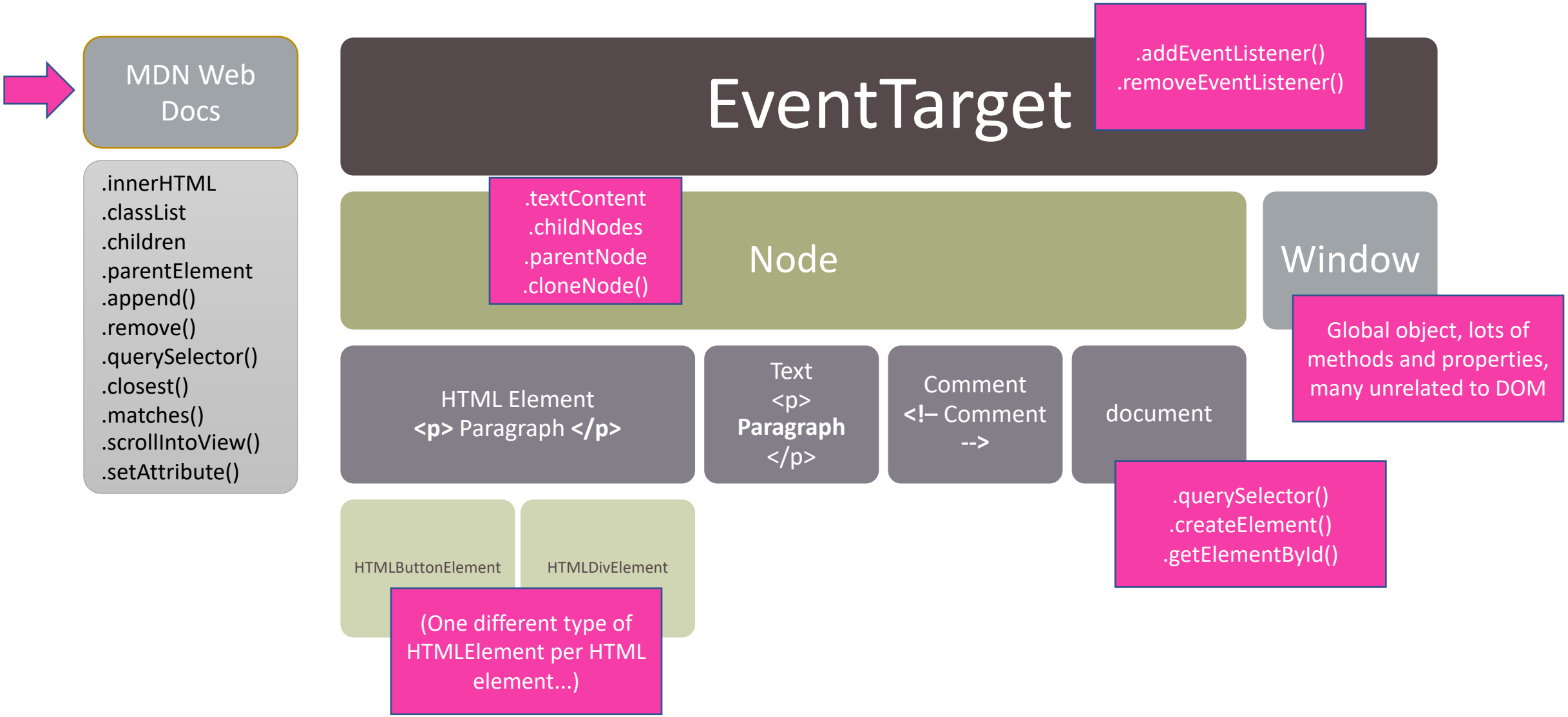
Allows us to make JavaScript interact with the browser

We can write JavaScript to create, modify and delete HTML elements set styles, classes and attributes; and listen and respond to events

DOM tree is generated from an HTML document, which we can then interact with

DOM is a very complex API that contains lots of methods and properties to interact with the DOM tree

HOW THE DOM API IS ORGANIZED BEHIND THE SCENES



JAVASCRIPT NEW FEATURES

ES6 AND MORE

ES6 & MORE – NEW FEATURES

ARROW FUNCTION	DESTRUCTURING	REST / SPREAD
TEMPLATE LITERALS	BLOCK SCOPING	MAP/SET
CLASSES	DEFAULT PARAMETERS	PROMISE API