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CS-311-ON
Basic Structures of the JavaScript Programming Language

Language Map for JavaScript

Variable Declaration
Is this language strongly typed or dynamically typed? Provide at least three examples (with different data types or keywords) of how variables are declared in this language.
	It is dynamically typed, meaning that variable types are determined at runtime. Also, a variable can hold values of any type without explicit type declarations.
	
	var age = 25;
	var name = “Levi”;
	var numbers = [1, 2, 3, 4, 5];

Data Types
List all of the data types (and ranges) supported by this language.
	Primitive data types (let age = 25;) (let isMale = true;)
	Object data types represent a collection of key value-pairs – fundamental data structure
	let person = {
	name: "Alice",
	age: 30,
	isStudent: false
	};
	Composite data types such as arrays or functions.
	function add(a, b) {
	return a + b;
	}

Selection Structures
Provide examples of all selection structures supported by this language (if, if else, etc.) ***Don’t just list them, show code samples of how each would look in a real program.***
	if Statement - used for executing a block of code if the specified condition evaluates to true.
	let x = 10;
	
	if (x > 5) {
	console.log("x is greater than 5");
	}
	
	if-else Statement - used for executing one block of code if the condition is true and another block if the condition is false.
	let y = 3;
	if (y > 5) {
	console.log("y is greater than 5");

	} else {
	console.log("y is not greater than 5");
	}
	
	if-else if-else Statement - used for handling multiple conditions in a sequential manner.
	let z = 7;
	if (z > 10) {
	console.log("z is greater than 10");
	} else if (z === 10) {
	console.log("z is equal to 10");
	} else {
	console.log("z is less than 10");
	}
	
	Switch Statement – used for selecting one of many code blocks to be executed
	let day = "Monday";
	switch (day) {
	case "Monday":
	console.log("It's the start of the week.");
	break;
	case "Friday":
	console.log("It's almost the weekend!");
	break;
	default:
	console.log("It's a regular day.");
	}
	
	Ternary/Conditional - used as shorthand to write if-else statement.
	let isRaining = true;
	let weather = isRaining ? "Bring an umbrella" : "Enjoy the sunshine";
	console.log(weather);

Repetition Structures
Provide examples of all repetition structures supported by this language (loops, etc.) ***Don't just list them, show code samples of how each would look in a real program.***
	for Loop – used to iterate a block of code a specific number of times
	for (let i = 0; i < 5; i++) {
	console.log(i);
	}
	
	while Loop – used for iterating a block when a specified condition is true
	let count = 0;

```
while (count < 5) {
   console.log(count);
   count++;
}
```

do-while Loop - similar to a while loop but the block is executed at least once before the condition is checked

```
let number = 1;

do {
   console.log(number);
   number++;
} while (number <= 5);
```

for...in Loop – used for iterating over enumerable prpoperties of an object

```
const person = { name: "Levi", age: 25, job: "Student" };

for (let key in person) {
   console.log(key, person[key]);
}
```

for...of Loop – used for iterating over the values of an iterable object (arrays/strings)

```
const colors = ["red", "green", "blue"];

for (let color of colors) {
   console.log(color);
}
```

ForEach – array method for iterating over the elements of an array

```
const numbers = [1, 2, 3, 4, 5];

numbers.forEach(function(number) {
   console.log(number);
});
```

Map method – array method that creates a new arraty with the results of calling a provided function on every element

```
const numbers = [1, 2, 3, 4, 5];

const squaredNumbers = numbers.map(function(number) {
```

	return number * number; }); console.log(squaredNumbers);

Arrays
If this language supports arrays, provide at least two examples of creating an array with a primitive or String data types (e.g. float, int, String, etc.)
	Primitave/Float:
	let floatArray = [1.5, 2.3, 3.7, 4.1, 5.0];
	
	Array with Strings:
	let stringArray = ["apple", "banana", "orange", "grape", "kiwi"];

Data Structures *If this language provides a standard set of data structures, provide a list of the data structures and their Big-Oh complexity.*	**Arrays** Access: O(1) Search: O(n) Insertion: It depends (O(n) for unshift, O(1) for push) Deletion: It depends (O(n) for shift, O(1) for pop) **Objects (Associative Arrays)** Access: O(1 Search: O(1) Insertion: O(1) Deletion: O(1) **Linked Lists** Access: O(n) Search: O(n) Insertion: O(1) Deletion: O(1) if you have a reference to the node, O(n) otherwise **Sets** Access: N/A (no direct access by index) Search: O(n) (looping through all elements) Insertion: O(1) Deletion: O(1) **Maps** Access: O(1) Search: O(1) Insertion: O(1) Deletion: O(1) **Stacks** Push: O(1) Pop: O(1)

	Peek: O(1) **Queues** Enqueue: O(1) Dequeue: O(1) Peek: O(1) **Hash Tables** Insertion: O(1) Deletion: O(1) Lookup: O(1) on average, but can degrade to O(n) in worst cases

Objects
If this language support object-orientation, provide an example of how you would write a simple object with a default constructor and then how you would instantiate it.
	class Person {
	constructor(name, age) {
	this.name = Levi;
	this.age = 25;
	}
	
	sayHello() {
	console.log(`Hello, my name is ${this.name} and I am ${this.age} years old.`);
	}
	}
	
	let person1 = new Person("John", 52);
	person1.sayHello();

Runtime Environment *What runtime environment does this language compile to? For example, Java compiles to the Java Virtual Machine.* *Do other languages also compile to this runtime?*	JavaScript is primarily an interpreted language, and it is executed in a runtime environment provided by web browsers or server-side environments. The runtime environment for JavaScript in web browsers is commonly referred to as the "JavaScript engine." Examples of popular JavaScript engines include V8 (used in Chrome and Node.js), SpiderMonkey (used in Firefox), and JavaScriptCore (used in Safari). TypeScript, CoffeeScript, Dart, and Elm are a few languages and tools that comple to JavaScript.
Libraries/Frameworks *What are the popular libraries or frameworks used by programmers for this language? List at least three (3) and describe what they are used for..*	**React -** developed and maintained by Facebook, it is a declarative, efficient, and flexible JavaScript library for building user interfaces. React is commonly used for building single-page applications (SPAs) and is often integrated with other libraries or frameworks for state management (e.g., Redux) and routing. Best for building interactive and dynamic user interfaces, especially for complex and data-driven applications. **Vue.js -** Vue.js is a progressive JavaScript framework for building user interfaces. It is designed from the ground up to be incrementally adoptable, meaning developers can use as much or as little of it as needed. Vue.js provides a simple and flexible structure for building reactive components and is known for its ease of integration into existing projects. It's often used for building modern web applications and dynamic user interfaces or creating reactive and dynamic components in web applications, ranging from small widgets to full-fledged SPAs.

Domains *What industries or domains use this programming language? Provide specific examples of companies that use this language and what they use it for.* ***E.g. Company X uses C# for its line of business applications.***	**Google** - utilizes JavaScript extensively for building the user interfaces of its web applications, including Gmail, Google Maps, and Google Docs. Google's JavaScript engine, V8, is also open-source and widely used in other projects. **Facebook** - relies on JavaScript for its web applications, such as the main Facebook platform and Instagram. React, a JavaScript library developed by Facebook, is widely used for building the user interfaces of these applications. **Amazon** - uses JavaScript for building the front-end of its e-commerce platform. The dynamic and interactive features on the website, as well as the user interface components, are implemented using JavaScript.