

Assignment 4: Concept of Programming

Introduction

This assignment is designed to test your understanding of Objects in JavaScript. You will have to write code snippets to solve various problems using these concepts. You will also have to explain your logic and output for each code snippet.

Instructions

- Write your code in a text editor like Notepad or Visual Studio Code.
- Save your file with a .js extension (for example, assignment1.js).
- You can use a web browser such as Chrome or Firefox to run your code. Open the browser's developer tools (Ctrl+Shift+I) and go to the console tab. Then drag and drop your file into the browser window or use the File > Open File option to select your file. You should see the output of your code in the console.
- Alternatively, you can use an online tool such as <https://replit.com/languages/javascript> to write and run your code.
- You have to complete this assignment individually.
- You have to submit your assignment as a single PDF file that contains your code snippets, explanations, and outputs.
- You have to use proper indentation, comments, and naming conventions for your code snippets.
- You have to cite any sources that you use for reference or inspiration.
- You have to follow the marking scheme given below for each question.

Questions

Question 1: Build a class Employee which contains details about the employee and compile and run its instance.

Write a class that represents an employee with properties such as name, id, salary, and department. Then create an instance of the class and display its details.

Question 2: Build a class which has references to other classes. Instantiate these reference variables and invoke instance methods

Write a class that represents a book with properties such as title, author, price, and publisher. Then write another class that represents a library with properties such as name and books (an array of book objects). Then create instances of both classes and display their details.

Appendix

Objects in JavaScript

Introduction

An object is a variable that can hold many different values. It acts as the container of a set of related values. For example:

```
const person = {  
  firstName: "John",  
  lastName: "Doe",  
  age: 50,  
  eyeColor: "blue"  
};
```

Here, person is an object that stores values such as strings and numbers.

You can create an object using two ways:

1. Using an object literal

The easiest way to create an object is by using an object literal {}. For example:

```
const person = {  
  firstName: "John",  
  lastName: "Doe",  
  age: 50,  
  eyeColor: "blue"  
};
```

Here, an object person is defined. Each member of an object is a key: value pair separated by commas and enclosed in curly braces {}.

2. Using the new keyword

You can also create an object using JavaScript's new keyword.

```
const person = new Object();  
person.firstName = "John";  
person.lastName = "Doe";  
person.age = 50;  
person.eyeColor = "blue";
```

In both of the above examples, we have created an object having four properties.

Note: It is recommended to use object literal to create an object.

You can access the value of a property by using its key.

1. Using dot notation

Here's the syntax of the dot notation.

`objectName.key`

For example:

```
const person = {
  firstName: "John",
  lastName: "Doe",
  age: 50,
  eyeColor: "blue"
};

// accessing property
console.log(person.firstName); // John
```

2. Using bracket notation

Here is the syntax of the bracket notation.

`objectName["propertyName"]`

For example:

```
const person = {
  firstName: "John",
  lastName: "Doe",
  age: 50,
  eyeColor: "blue"
};

// accessing property
console.log(person["firstName"]); // John
```

Objects can also have methods. Methods are actions that can be performed on objects. Methods are stored in properties as function definitions.

For example:

```
const person = {
  firstName: "John",
  lastName: "Doe",
  id: 5566,
  fullName: function() {
    return this.firstName + " " + this.lastName;
  }
};
```

Here, a function is used as a value for the `fullName` key. That's why we need to use `person.fullName()` instead of `person.fullName` to call the function inside the object. In the above example, `this` refers to the `person` object. I.E. `this.firstName` means the `firstName` property of `this`. I.E. `this.firstName` means the `firstName` property of `person`.

Hints

Question 1:

For example:

```
// define class
class Employee {
  // constructor
  constructor(name, id, salary, department) {
    this.name = name;
    this.id = id;
    this.salary = salary;
    this.department = department;
  }

  // method
  display() {
    console.log(`Name: ${this.name}`);
    console.log(`ID: ${this.id}`);
    console.log(`Salary: ${this.salary}`);
    console.log(`Department: ${this.department}`);
  }
}

// create instance
let emp1 = new Employee("Alice", 101, 5000, "IT");

// display details
emp1.display();
```

Question 2:

For example:

```
// define book class
class Book {
  // constructor
  constructor(title, author, price, publisher) {
    this.title = title;
    this.author = author;
    this.price = price;
    this.publisher = publisher;
  }

  // method
  display() {
    console.log(`Title: ${this.title}`);
  }
}
```

```

        console.log(`Author: ${this.author}`);
        console.log(`Price: ${this.price}`);
        console.log(`Publisher: ${this.publisher}`);
    }
}

// define library class
class Library {
    // constructor
    constructor(name, books) {
        this.name = name;
        this.books = books;
    }

    // method
    display() {
        console.log(`Library Name: ${this.name}`);
        console.log(`Books:`);
        for (let book of this.books) {
            book.display();
            console.log();
        }
    }
}

// create book instances
let book1 = new Book("The Alchemist", "Paulo Coelho", 10, "HarperCollins");
let book2 = new Book("The Catcher in the Rye", "J.D. Salinger", 15, "Little, Brown and Company");
let book3 = new Book("Harry Potter and the Philosopher's Stone", "J.K. Rowling", 20, "Bloomsbury");

// create library instance
let library = new Library("My Library", [book1, book2, book3]);

// display library details
library.display();

```

End of Assignment

I hope this assignment helps you learn about objects in JavaScript. If you have any questions or feedback, please let me know. 😊