Task_11

Question_1

Do the question_1 from task#9 using vectors instead of array.

Question_2

Create a Vehicle Management System to demonstrate class inheritance, polymorphism, and dynamic memory allocation. This system will manage different types of vehicles, each having specific attributes and behaviors.

Requirements:

1. **Base Class: Vehicle**

   o Attributes: make, model, year

   o Methods:

      ▪ Constructor to initialize the attributes

      ▪ displayInfo() - A virtual function to display vehicle information

2. **Derived Classes: Car and Truck**

   o Car

      ▪ Additional Attributes: numDoors

      ▪ Methods:

         ▪ Constructor to initialize all attributes including those inherited

         ▪ Override displayInfo() to include numDoors

   o Truck

      ▪ Additional Attributes: payloadCapacity

      ▪ Methods:

         ▪ Constructor to initialize all attributes including those inherited

▪ Override displayInfo() to include payloadCapacity

3. **Dynamic Memory Allocation**

   o Use dynamic memory allocation to create instances of Car and Truck at runtime.

   o Store these instances in a Vehicle pointer array to demonstrate polymorphism.

4. **Main Program:**

   o Prompt the user to enter details for a Car or a Truck.

   o Create instances dynamically based on user input.

   o Store these instances in a Vehicle pointer array.

   o Use a loop to call displayInfo() on each stored vehicle to demonstrate polymorphism.

Question_3

Create a Library Management System to demonstrate dynamic memory allocation using std::vector. This system will manage a collection of books, allowing users to add, remove, and display books. Each book has attributes like title, author, and publication year.

Requirements:

1. **Book Class**

   o Attributes: title, author, year

   o Methods:

      ▪ Constructor to initialize the attributes

      ▪ displayInfo() - A method to display book information

2. **Library Class**

   o Attributes: A std::vector of Book objects.

   o Methods:

      ▪ Constructor to initialize the vector

      ▪ addBook() - A method to add a new book to the library

      ▪ removeBook() - A method to remove a book from the library by title

      ▪ displayBooks() - A method to display all books in the library

3. **Main Program**

   o   Provides a menu-driven interface for the user to interact with the library system.

   o   Allows the user to add, remove, and display books.