WORKSHEET 3

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Cyber Security and Digital Forensics

Github Link:

https://github.com/Sandhyaaaa1/Cpp_Worksheet

1. **Create a Time class to store hours and minutes. Implement:**
    1. **Overload the + operator to add two Time objects**
    2. **Overload the > operator to compare two Time objects**
    3. **Handle invalid time (>24 hours or >60 minutes) by throwing a custom exception**

```
#include <iostream>

using namespace std;

class Time

{
private:
  int hours;
  int minutes;

public:

  Time(int h = 0, int m = 0)

  {
    hours = h;
    minutes = m;
    validate();
  }
```

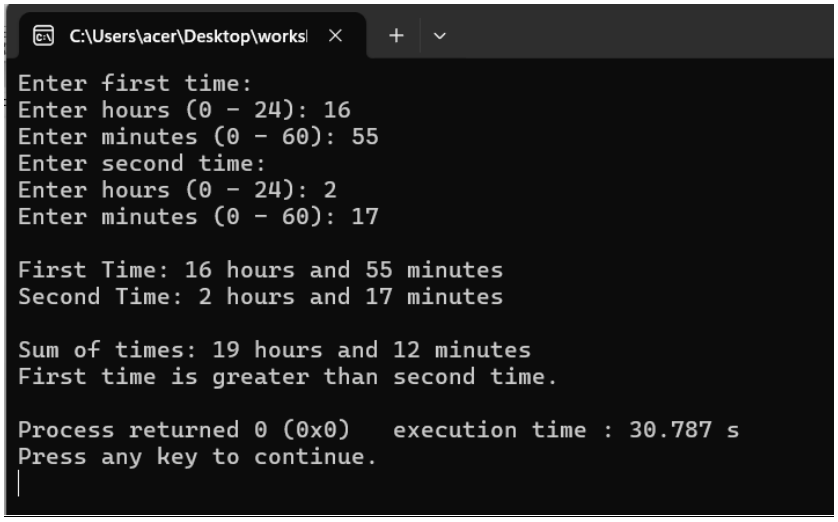
```
void inputTime()

{
   cout << "Enter the time in hours (0 - 24): ";
   cin >> hours;

   cout << "Enter the time in  minutes (0 - 60): ";
   cin >> minutes;
   validate();
}



void displayTime()

{

   cout << hours << " hours and " << minutes << " minutes" << endl;

}



void validate()

{
   if (hours < 0 || hours > 24 || minutes < 0 || minutes >= 60)

      {

         cout << "Error: Invalid time! Hours must be <= 24 and Minutes must be <= 60." << endl;
```

```
        exit(1);
    }
}


Time operator+(Time t)

{
    Time temp;
    temp.minutes = minutes + t.minutes;
    temp.hours = hours + t.hours;

    if (temp.minutes >= 60)

      {

        temp.minutes -= 60;
        temp.hours++;
      }

    return temp;
}

bool operator>(Time t)

{
    if (hours > t.hours)

      {
        return true;
      }
```

```
    else if (hours == t.hours && minutes > t.minutes)

        {
            return true;

        }

    else

        {

            return false;
        }
  }
};

int main()

{
   Time t1, t2, sum;

   cout << "Enter first time:" << endl;
   t1.inputTime();

   cout << "Enter second time:" << endl;
   t2.inputTime();

   cout << "\nFirst Time: ";
   t1.displayTime();

   cout << "Second Time: ";
```

```
    t2.displayTime();

    sum = t1 + t2;
    cout << "\nSum of times: ";

    sum.displayTime();

    if (t1 > t2)

      {

      cout << "First time is greater than second time." << endl;
      }

    else

      {

         cout << "Second time is greater than or equal to first time." << endl;
      }

    return 0;
}
```

OUTPUT:



Task 2: 70 marks

1. **Create a base class Vehicle and two derived classes Car and Bike:**
    1. **Vehicle has registration number and color**
    2. **Car adds number of seats**
    3. **Bike adds engine capacity**
    4. **Each class should have its own method to write its details to a file**
    5. **Include proper inheritance and method overriding**

```
#include <iostream>
#include <fstream>
using namespace std;

class Vehicle {
protected:
   string registrationNumber;
   string color;

public:
```

```
    Vehicle(string regNum = "", string col = "") : registrationNumber(regNum), color(col) {}

    virtual void writeToFile() {
        ofstream outFile("vehicle_details.txt", ios::app);
        if (outFile.is_open()) {
            outFile << "Vehicle Registration Number: " << registrationNumber << endl;
            outFile << "Vehicle Color: " << color << endl;
        } else {
            cout << "Error opening file!" << endl;
        }
        outFile.close();
    }

    virtual void display() {
        cout << "Vehicle Registration Number: " << registrationNumber << endl;
        cout << "Vehicle Color: " << color << endl;
    }

    void inputVehicleDetails() {
        cout << "Enter Vehicle Registration Number: ";
        cin >> registrationNumber;
        cout << "Enter Vehicle Color: ";
        cin >> color;
    }
};

class Car : public Vehicle {
```

```
private:
    int numberOfSeats;

public:

    Car(string regNum = "", string col = "", int seats = 0) : Vehicle(regNum, col), numberOfSeats(seats) {}



    void writeToFile() override {
        ofstream outFile("vehicle_details.txt", ios::app);
        if (outFile.is_open()) {
            outFile << "\n--- Car Details ---" << endl;
            outFile << "Registration Number: " << registrationNumber << endl;
            outFile << "Color: " << color << endl;
            outFile << "Number of Seats: " << numberOfSeats << endl;
        } else {
            cout << "Error opening file!" << endl;
        }
        outFile.close();
    }



    void display() override {
        Vehicle::display();
        cout << "Number of Seats: " << numberOfSeats << endl;
    }



    void inputCarDetails() {
        inputVehicleDetails();
        cout << "Enter Number of Seats: ";
```

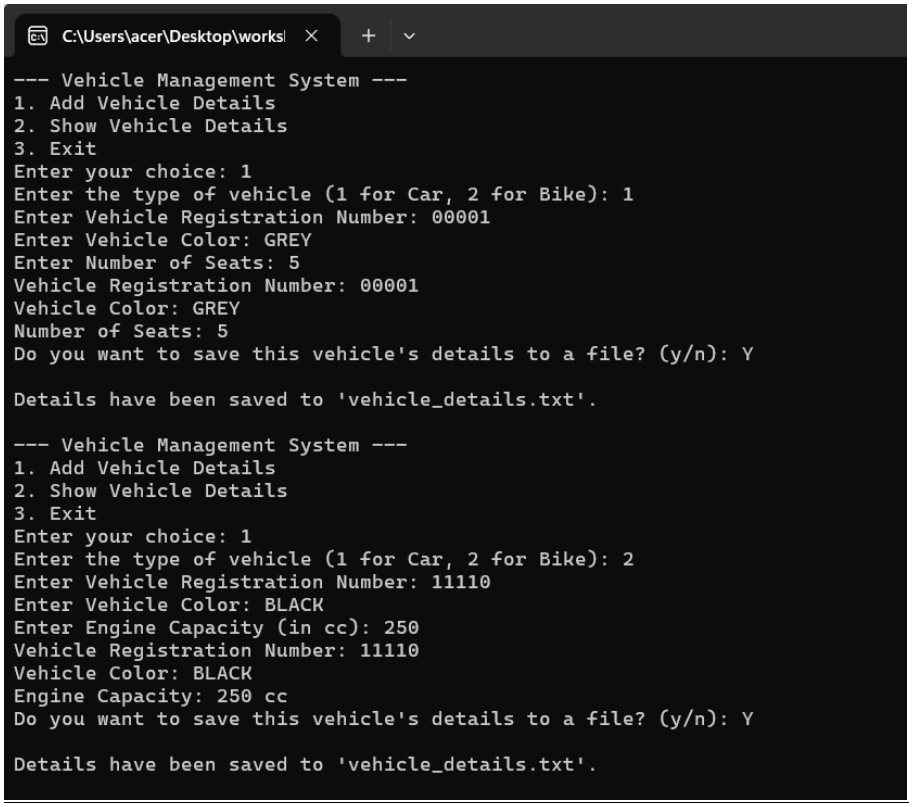
```
        cin >> numberOfSeats;
    }
};


class Bike : public Vehicle {
private:
    int engineCapacity;

public:

    Bike(string regNum = "", string col = "", int capacity = 0) : Vehicle(regNum, col), engineCapacity(capacity)
{}


    void writeToFile() override {
        ofstream outFile("vehicle_details.txt", ios::app);
        if (outFile.is_open()) {
            outFile << "\n--- Bike Details ---" << endl;
            outFile << "Registration Number: " << registrationNumber << endl;
            outFile << "Color: " << color << endl;
            outFile << "Engine Capacity: " << engineCapacity << " cc" << endl;
        } else {
            cout << "Error opening file!" << endl;
        }
        outFile.close();
    }


    void display() override {
        Vehicle::display();
        cout << "Engine Capacity: " << engineCapacity << " cc" << endl;
```

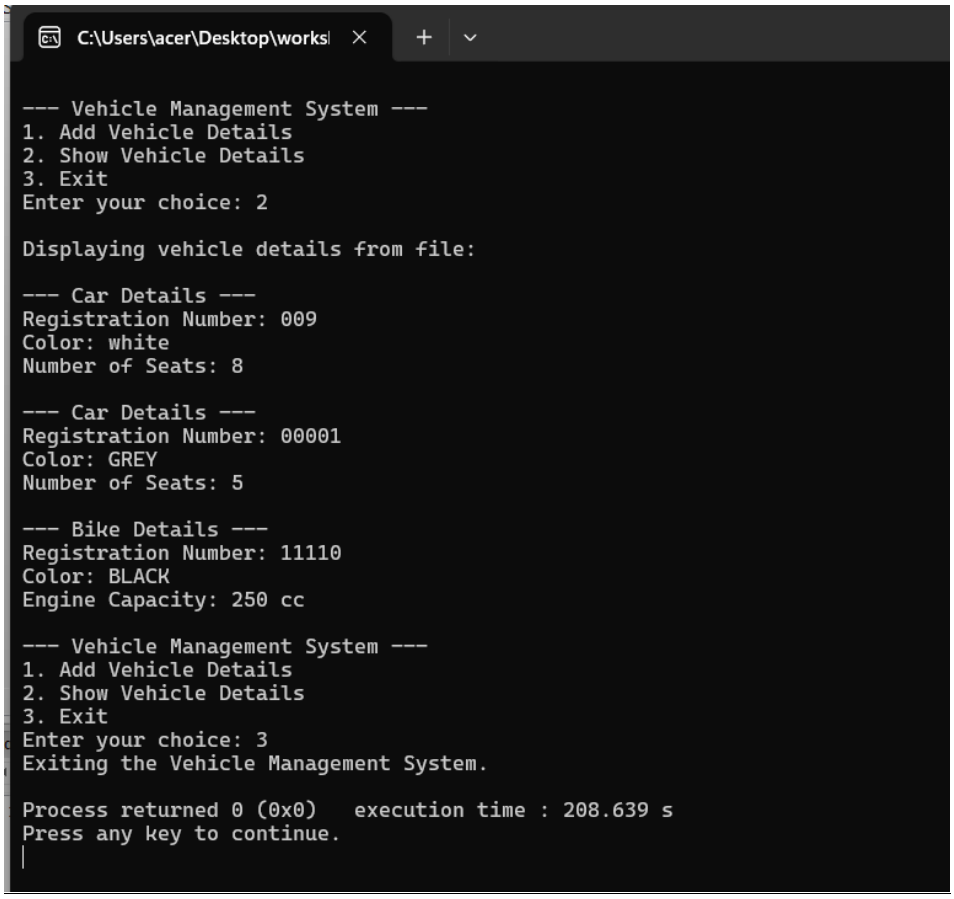
```
    }

    void inputBikeDetails() {
        inputVehicleDetails();
        cout << "Enter Engine Capacity (in cc): ";
        cin >> engineCapacity;
    }
};

void displayVehicleDetailsFromFile() {
    ifstream inFile("vehicle_details.txt");
    if (inFile.is_open()) {
        string line;
        while (getline(inFile, line)) {
            cout << line << endl;
        }
        inFile.close();
    } else {
        cout << "Error opening file!" << endl;
    }
}

int main() {
    int choice;
    char saveOption;

    while (true) {
```

```
cout << "\n--- Vehicle Management System ---\n";
cout << "1. Add Vehicle Details\n";
cout << "2. Show Vehicle Details\n";
cout << "3. Exit\n";
cout << "Enter your choice: ";
cin >> choice;

if (choice == 1) {

  int vehicleType;

  cout << "Enter the type of vehicle (1 for Car, 2 for Bike): ";
  cin >> vehicleType;

  if (vehicleType == 1) {

    Car car;
    car.inputCarDetails();
    car.display();
    cout << "Do you want to save this vehicle's details to a file? (y/n): ";
    cin >> saveOption;
    if (saveOption == 'y' || saveOption == 'Y') {
      car.writeToFile();
      cout << "\nDetails have been saved to 'vehicle_details.txt'." << endl;
    } else {
      cout << "\nVehicle details were not saved." << endl;
    }
  } else if (vehicleType == 2) {

    Bike bike;
    bike.inputBikeDetails();
```

```
            bike.display();
            cout << "Do you want to save this vehicle's details to a file? (y/n): ";
            cin >> saveOption;
            if (saveOption == 'y' || saveOption == 'Y') {
                bike.writeToFile();
                cout << "\nDetails have been saved to 'vehicle_details.txt'." << endl;
            } else {
                cout << "\nVehicle details were not saved." << endl;
            }
        } else {
            cout << "Invalid vehicle type!" << endl;
        }
    } else if (choice == 2) {

        cout << "\nDisplaying vehicle details from file:\n";
        displayVehicleDetailsFromFile();
    } else if (choice == 3) {

        cout << "Exiting the Vehicle Management System." << endl;
        break;
    } else {
        cout << "Your Choice is Invalid! Please try again." << endl;
    }
  }

  return 0;
}
```

OUTPUT:


C:\Users\acer\Desktop\works
--- Vehicle Management System ---
1. Add Vehicle Details
2. Show Vehicle Details
3. Exit
Enter your choice: 1
Enter the type of vehicle (1 for Car, 2 for Bike): 1
Enter Vehicle Registration Number: 00001
Enter Vehicle Color: GREY
Enter Number of Seats: 5
Vehicle Registration Number: 00001
Vehicle Color: GREY
Number of Seats: 5
Do you want to save this vehicle's details to a file? (y/n): Y
Details have been saved to 'vehicle_details.txt'.
--- Vehicle Management System ---
1. Add Vehicle Details
2. Show Vehicle Details
3. Exit
Enter your choice: 1
Enter the type of vehicle (1 for Car, 2 for Bike): 2
Enter Vehicle Registration Number: 11110
Enter Vehicle Color: BLACK
Enter Engine Capacity (in cc): 250
Vehicle Registration Number: 11110
Vehicle Color: BLACK
Engine Capacity: 250 cc
Do you want to save this vehicle's details to a file? (y/n): Y
Details have been saved to 'vehicle_details.txt'.


C:\Users\acer\Desktop\works
--- Vehicle Management System ---
1. Add Vehicle Details
2. Show Vehicle Details
3. Exit
Enter your choice: 2
Displaying vehicle details from file:
--- Car Details ---
Registration Number: 009
Color: white
Number of Seats: 8
--- Car Details ---
Registration Number: 00001
Color: GREY
Number of Seats: 5
--- Bike Details ---
Registration Number: 11110
Color: BLACK
Engine Capacity: 250 cc
--- Vehicle Management System ---
1. Add Vehicle Details
2. Show Vehicle Details
3. Exit
Enter your choice: 3
Exiting the Vehicle Management System.
Process returned 0 (0x0)   execution time : 208.639 s
Press any key to continue.

2. **Create a program that:**
    1. **Reads student records (roll, name, marks) from a text file**
    2. **Throws an exception if marks are not between 0 and 100**
    3. **Allows adding new records with proper validation**
    4. **Saves modified records back to file**

```
#include <iostream>
#include <fstream>
#include <string>
using namespace std;


class Student

{

private:

  string roll;
  string name;
  int marks;

public:


  Student(string r = "", string n = "", int m = 0) : roll(r), name(n), marks(m) {}


  int getMarks() const

  {
```

```
    return marks;

}

void setMarks(int m)

{

    if (m >= 0 && m <= 100)

        {

            marks = m;

        }

    else

        {

            cout << "Error: Marks should be between 0 and 100." << endl;

            marks = -1;

        }

}

void setDetails()

{

    cout << "Enter student roll: ";

    cin >> roll;

    cin.ignore();
```

```
    cout << "Enter student name: ";
    getline(cin, name);

    cout << "Enter student marks (0-100): ";

    int m;
    while (true)

      {
         cin >> m;
      if (m >= 0 && m <= 100)

         {
            setMarks(m);

            break;

         }

      else

         {

         cout << "Error: Marks should be between 0 and 100. Please enter again: ";

         }
    }
}

void displayDetails() const
```

```
{
    cout << "Roll: " << roll << ", Name: " << name << ", Marks: " << marks << endl;
}
void saveToFile() const
{
    ofstream outFile("student_records.txt", ios::app);
    if (outFile.is_open())
      {
          outFile << roll << " " << name << " " << marks << endl;
          outFile.close();
    }
    else
      {
          cout << "Error opening file!" << endl;
      }
}
```

```
    static void readFromFile()

    {
        ifstream inFile("student_records.txt");
        string roll, name;
        int marks;

        if (inFile.is_open())

            {
                while (inFile >> roll >> name >> marks)
                {

                    cout << "Roll: " << roll << ", Name: " << name << ", Marks: " << marks << endl;
                }

                inFile.close();
            }
        else

            {

                cout << "Unable to open file!" << endl;
            }
    }
};

int main()

{
    int choice;
```

```
while (true)

  {

  cout << "\n--- Student Record System ---\n";
  cout << "1. View Student Records\n";
  cout << "2. Add New Student Record\n";
  cout << "3. Exit\n";
  cout << "Enter your choice: ";
  cin >> choice;

  if (choice == 1)

    {

      Student::readFromFile();

    }

  else if (choice == 2)

    {

    Student student;

    student.setDetails();

    if (student.getMarks() >= 0 && student.getMarks() <= 100)

      {
```

```
        student.saveToFile();

        cout << "Record added successfully!" << endl;

    }

    else

      {

        cout << "Failed to add record due to invalid marks." << endl;

        }

}
 else if (choice == 3)

    {

    cout << "Exiting the program!" << endl;
    break;
}

else

    {

    cout << "Invalid choice! Please enter 1, 2, or 3." << endl;

    }
```

```
    }

    return 0;
}
```

OUTPUT: