Group #2

10/20/2022

FA-22-CECS2222-22-SJU COMPUTER PROGRAMMING II (FA-22-SJU)

Activity 8.2, Composition II

Descriptive Tables

Private Attributes

Runner	
Member	**Description**
`name`	Holds the name of the runner.
`place`	Has the place the runner arrived in the race.

RunningRace	
Member	**Description**
`event_Name`	String for the event name.
`event_Distance`	Holds the event distance to difference it from others.
`Runner_Count`	Holds the runners count for each race.

Time	
Member	**Description**
`second`	Holds the arrival second.
`minute`	Holds the minute of arrival, being a composition.
`hour`	Holds the hour of arrival.

Protected Attributes

Runner	
Member	**Description**
aTime	Object of class type time to be used as composition for each runner result.

RunningRace	
Member	**Description**
All_Runners	Pointer for dynamic memory that will hold the array of runners with the result of each one.

Public Attributes

Runner	
Member	**Description**
Runner()	Default constructor for the runner class.
Runner(const string)	Parametrized constructor #1.
Runner(const string, const int, const int, const int)	Accepts the parameters of the composed class being Time and call its constructor too.
Runner(const Runner&)	Copy constructor for runner objects.
operator =	Assignment operator.
set_Name	Adjusts runner name.
set_Time	Mutator for class object of time.
set_Place	Adjusts the position/place the runner arrived at.
get_Name	Access for the runner's name.
get_Place	Getter for the place of arrival of the runner.
get_Time	Access for the time object data.
operator ==	Comparison operator for to be used for binary search.
operator !=	Inequality operator.
operator >	Greater than operator.
operator <	Smaller than operator.
operator >>	Insertion operator.

`operator <<`	Output operator.
`~Runner()`	Destructor for runner’s objects occupied memory.

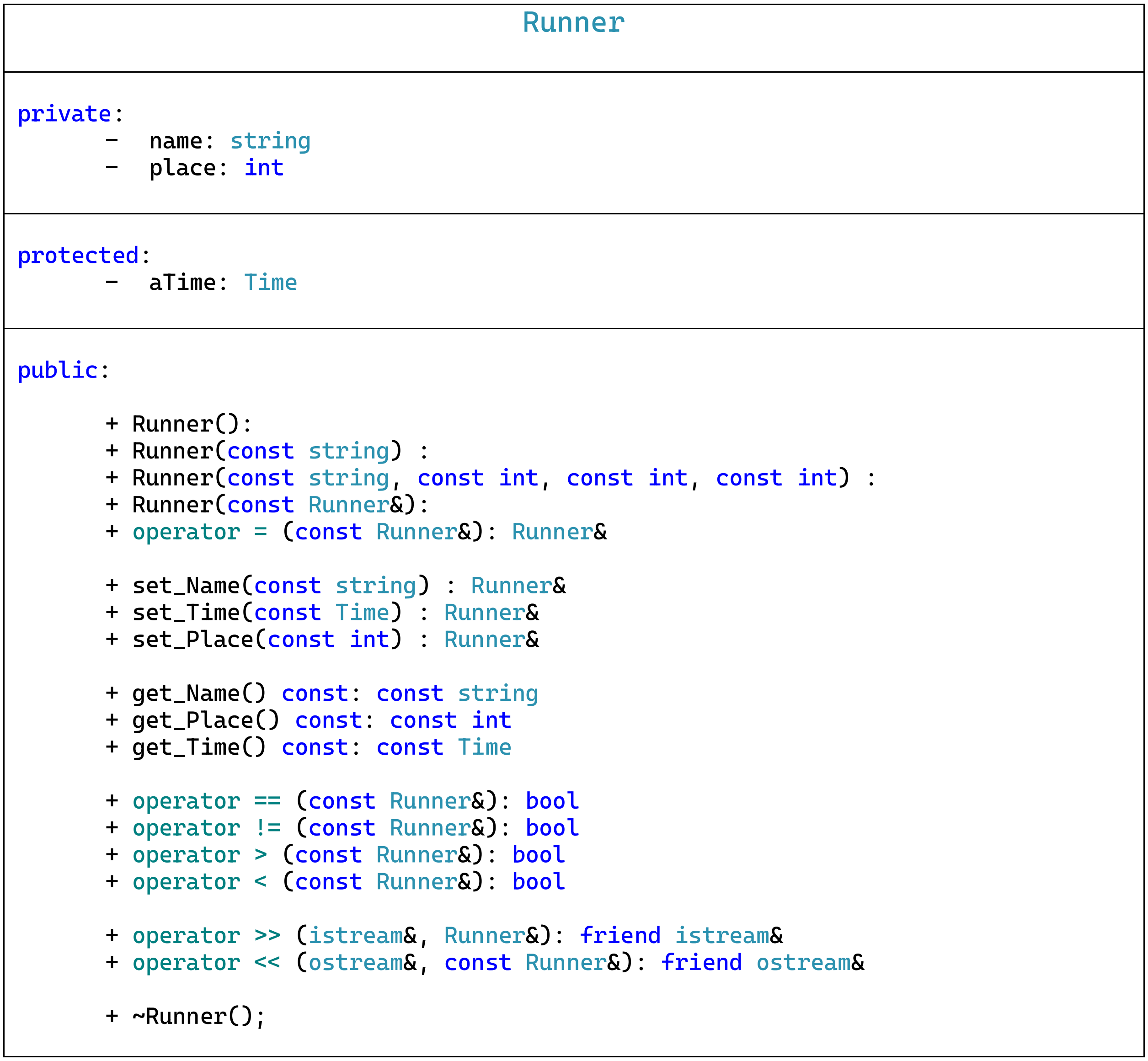
RunningRace	
Member	**Description**
RunningRace()	Default constructor for the race data.
RunningRace(const string, const string, Runner*, const int)	Parametrized constructor that even accepts an array of objects from the runner class.
RunningRace(RunningRace&)	Copy constructor, takes the information of one object and clones it into a new one.
set_EventName	Mutator for the name of the event.
set_AllRunners	Setter for the runner’s dynamic array (can accept multiple runner objects as argument).
set_StudentCount	Mutator/setter for the number of students found in the race.
set_Distance	Adjusts the string that holds the race type/distance.
get_EventName	Access for the name of the event, returns a string constant.
get_AllRunners	Access for the information of all the runners in form of a dynamic memory.
get_RunnerCount	Access for the number of runners of the race.
get_Distance	Gets the string that holds the race type/distance.
sortRunners_ByNames	Sorting algorithm that organizes the runners based on their names to be able to perform binary searches.
PRINT_RUNNERS	Shows the information of every runner without using the operator.
SEARCH_RUNNER	Searches for a runner in the array.
DELETE_RUNNER	Deletes a desired runner and re-sorts the rest of the runners.
binary_Search	Recursive algorithm that searches the name of a desired runner.
ADD_RUNNER	Add a runner to the race, modifies the array of runners.
operator[]	This operator receives a runner as data type, they were used to sort the runners based on their times.
operator[]	This operator allows us to access the data of each runner from the main without having to invoke functions.
operator >>	Insertion operator to be used for the initial information of the whole race.

operator <<	Output operator, prints the results under each race.
~RunningRace()	Destructor for all the information in the running race class.

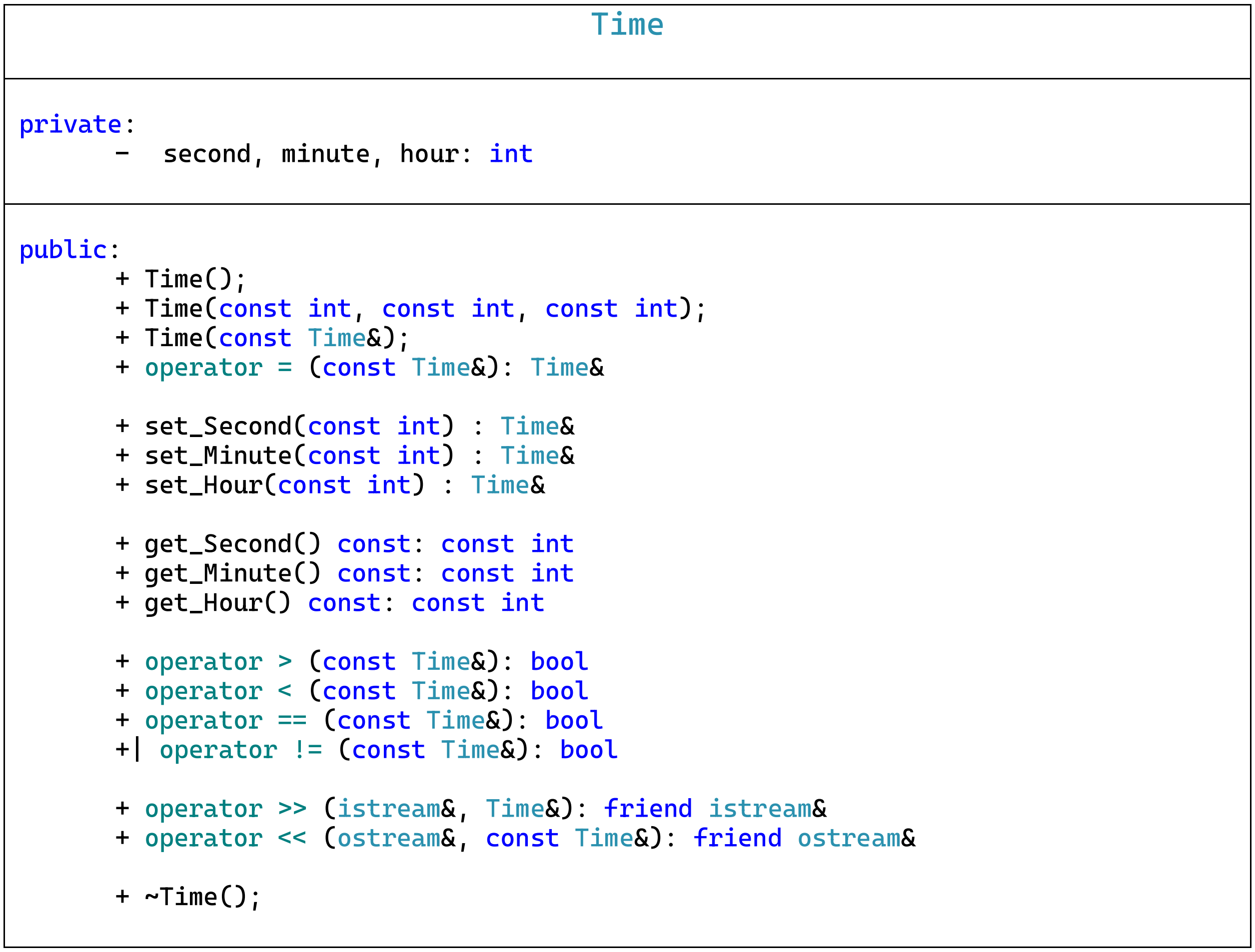
Time	
Member	**Description**
Time()	Default constructor for the time class.
Time(const int, const int, const int)	Parametrized constructor for the information in the class Time.
Time(const Time&)	Copy constructor for the information of the Time class.
operator =	Assignment operator.
set_Second	Mutator for the seconds.
set_Minute	Setter for the minutes.
set_Hour	Adjusts the hour of arrival.
get_Second	Access for the seconds.
get_Minute	Access for the minutes of the runner.
get_Hour	Gets the minute of the runner’s arrival.
operator >	Greater than operator.
operator <	Smaller than operator.
operator ==	Equal to operator.
operator !=	Inequal to operator.
operator >>	Insertion operator for the Time’s attributes.
operator <<	Operator that prints the information of time.
~Time()	Destructor for the time object memory.

Classes UML Diagram (“Unified Modeling Language”)

```
                              RunningRace

private:
      –   event_Name, event_Distance: string
      –   Runner_Count: int

protected:
      –   All_Runners: Runner*

public:
      + RunningRace();
      + RunningRace(const string, const string, Runner*, const int);
      + RunningRace(RunningRace&);

      + set_EventName(const string): RunningRace&
      + set_AllRunners(Runner*): RunningRace&
      + set_StudentCount(const int): RunningRace&
      + set_Distance(const string) : RunningRace&

      + get_EventName() const: const string
      + get_AllRunners() const: Runner*
      + get_RunnerCount() const: const int
      + get_Distance() const: const string

      + sortRunners_ByNames(): void
      + PRINT_RUNNERS(): void
      + SEARCH_RUNNER(): void
      + DELETE_RUNNER(): void
      + binary_Search(bool& found, int& first, int& last, int& middle, int&
position);
      + ADD_RUNNER():void

      + operator[](const int&): Runner&
      + operator[](int) const: Runner

      + operator >> (istream&, RunningRace&): friend istream&
      + operator << (ostream&,  RunningRace&): friend ostream&

      + ~RunningRace();
```



```
                              Runner

private:
      -   name: string
      -   place: int

protected:
      -   aTime: Time

public:

      + Runner():
      + Runner(const string) :
      + Runner(const string, const int, const int, const int) :
      + Runner(const Runner&):
      + operator = (const Runner&): Runner&

      + set_Name(const string) : Runner&
      + set_Time(const Time) : Runner&
      + set_Place(const int) : Runner&

      + get_Name() const: const string
      + get_Place() const: const int
      + get_Time() const: const Time

      + operator == (const Runner&): bool
      + operator != (const Runner&): bool
      + operator > (const Runner&): bool
      + operator < (const Runner&): bool

      + operator >> (istream&, Runner&): friend istream&
      + operator << (ostream&, const Runner&): friend ostream&

      + ~Runner();
```



```
Time

private:
      -  second, minute, hour: int

public:
      + Time();
      + Time(const int, const int, const int);
      + Time(const Time&);
      + operator = (const Time&): Time&

      + set_Second(const int) : Time&
      + set_Minute(const int) : Time&
      + set_Hour(const int) : Time&

      + get_Second() const: const int
      + get_Minute() const: const int
      + get_Hour() const: const int

      + operator > (const Time&): bool
      + operator < (const Time&): bool
      + operator == (const Time&): bool
      +| operator != (const Time&): bool

      + operator >> (istream&, Time&): friend istream&
      + operator << (ostream&, const Time&): friend ostream&

      + ~Time();
```

CRC CARDS

RunningRace	
This class will contain the runner names, times and place he arrived on the race.	Runner

↓

Runner	
Contains three attributes, seconds, minutes, and hours for the runners.	Time

Code

Main.h

```
#pragma once

void sort_RunnersByTime(int Race_Count, RunningRace* All_Races);
```

Runner.h

```cpp
#pragma once
#include "Time.h"

class Runner
{
private:
	string name;
	int place;

protected:
	Time aTime;

public:
	Runner();
	Runner(const string);
	Runner(const string, const int, const int, const int);
	Runner(const Runner&);
	Runner& operator = (const Runner&);

	Runner& set_Name(const string);
	Runner& set_Time(const Time);
	Runner& set_Place(const int);

	const string get_Name() const;
	const int get_Place() const;
	const Time get_Time() const;

	bool operator == (const Runner&);
	bool operator != (const Runner&);
	bool operator > (const Runner&);
	bool operator < (const Runner&);

	friend istream& operator >> (istream&, Runner&);
	friend ostream& operator << (ostream&, const Runner&);

	~Runner();
};
```

RunningRace.h

```
#pragma once
#include "Runner.h"

class RunningRace
{
private:
	string event_Name, event_Distance;
	int Runner_Count;

protected:
	Runner* All_Runners{ nullptr };

public:
	RunningRace();
	RunningRace(const string, const string, Runner*, const int);
	RunningRace(RunningRace&);

	RunningRace& set_EventName(const string);
	RunningRace& set_AllRunners(Runner*);
	RunningRace& set_StudentCount(const int);
	RunningRace& set_Distance(const string);

	const string get_EventName() const;
	Runner* get_AllRunners() const;
	const int get_RunnerCount() const;
	const string get_Distance() const;

	void sortRunners_ByNames();
	void PRINT_RUNNERS();
	void SEARCH_RUNNER();
	void DELETE_RUNNER();
	void binary_Search(bool& found, int& first, int& last, int& middle, int&
position);
	void ADD_RUNNER();

	Runner& operator[](const int&);
	Runner operator[](int) const;

	friend istream& operator >> (istream&, RunningRace&);
	friend ostream& operator << (ostream&,  RunningRace&);

	~RunningRace();
};
```

Time.h

```
#pragma once
#include <iostream>
#include <string>

using std::cin;
using std::cout;
using std::ws;
using std::endl;
using std::out_of_range;
using std::istream;
using std::ostream;
using std::string;

class Time
{
private:
	int second, minute, hour;

public:
	Time();
	Time(const int, const int, const int);
	Time(const Time&);
	Time& operator = (const Time&);

	Time& set_Second(const int);
	Time& set_Minute(const int);
	Time& set_Hour(const int);

	const int get_Second() const;
	const int get_Minute() const;
	const int get_Hour() const;

	bool operator > (const Time&);
	bool operator < (const Time&);
	bool operator == (const Time&);
	bool operator != (const Time&);

	friend istream& operator >> (istream&, Time&);
	friend ostream& operator << (ostream&, const Time&);

	~Time();
};
```

Main.cpp

```
#include "RunningRace.h"
#include "Runner.h"
#include "Main.h"

int main()
{
	cout << "\t- Enter the amount of races --> ";
	int Race_Count{};
	cin >> Race_Count;
	while (cin.fail() || Race_Count < 1)
	{
		cin.clear();
		cin.ignore(256, '\n');
		cout << "\nError, please re-enter a valid amount of races --> ";
		cin >> Race_Count;
	}

	RunningRace* All_Races{ new RunningRace[Race_Count] };
	for (int i{}; i < Race_Count; i++)
	{
		cout << "\nRace #" << (i + 1) << "..." << endl;
		cin >> All_Races[i];
	}
	sort_RunnersByTime(Race_Count, All_Races);

	for (int i{}; i < Race_Count; i++)
	{
		int selection{};
		const int ADD{ 1 }, DELETE{ 2 }, SEARCH{ 3 }, PRINT{ 4 }, PRINT2{ 5 },
EXIT{ 6 };
		do
		{
			cout << "\n\nSelect an operation for race #" << (i + 1) << "..."
				<< "\n\t1) Add a runner"
				<< "\n\t2) Delete a runner"
				<< "\n\t3) Search a runner"
				<< "\n\t4) Print all the runners ordered by their names"
				<< "\n\t5) Print all the runners ordered by their times"
				<< "\n\t6) Exit"
				<< "\nAnswer --> ";

			cin >> selection;

			while (cin.fail() || selection < 1 || selection > 6)
			{
				cin.clear();
				cin.ignore(256, '\n');
				cout << "\nError, please select a valid operation --> ";
				cin >> selection;
			}

			switch (selection)
			{
			case ADD:
				All_Races[i].ADD_RUNNER();
```

```
                break;

            case DELETE:
                All_Races[i].sortRunners_ByNames();
                All_Races[i].DELETE_RUNNER();
                break;

            case SEARCH:
                sort_RunnersByTime(Race_Count, All_Races);
                All_Races[i].sortRunners_ByNames();
                All_Races[i].SEARCH_RUNNER();
                break;

            case PRINT:
                All_Races[i].sortRunners_ByNames();
                All_Races[i].PRINT_RUNNERS();
                break;

            case PRINT2:
                sort_RunnersByTime(Race_Count, All_Races);
                All_Races[i].PRINT_RUNNERS();
                break;

            default:
                cout << "\nFinishing menu for the race...";
            }

        } while (selection != EXIT);
    }

    cout << "\nPrinting whole races stadisctics...";
    for (int i{}; i < Race_Count; i++)
    {
        cout << "\nRace #" << (i + 1) << "..."
            << All_Races[i];
    }

    delete[] All_Races;
    All_Races = nullptr;

    cout << endl << endl;
    return 0;
}

void sort_RunnersByTime(int Race_Count, RunningRace* All_Races) //Using []
operator...
{
    Runner tmp_Runner;
    for (int i{}; i < Race_Count; i++)
    {
        cout << "\nSorting runners by their times..." << endl;
        bool swap{};
        do
        {
            swap = false;

            for (int j{}; j < (All_Races[i].get_RunnerCount() - 1); j++)
            {
                if (All_Races[i][(j + 1)] < All_Races[i][j])
                {
                    swap = true;
                    tmp_Runner = All_Races[i][(j + 1)];
                    All_Races[i][(j + 1)] = All_Races[i][j];
                    All_Races[i][j] = tmp_Runner;
                }
            }
        } while (swap);
    }

    for (int i{}; i < Race_Count; i++)
    {
        for (int j{}; j < All_Races[i].get_RunnerCount(); j++)
        {
            All_Races[i][j].set_Place((j + 1));
        }
    }
}

//Personal Instructions:
//    1. Implement two sorting algorithms one name based from the main and other
time based on the class, per runner. - DONE
//    2. Delete runner, searching by the name. - DONE
//    3. Order from faster time to slower time. - DONE
//    4. Search runner by name and display the results. - DONE
//    5. Print all the runners and their times. - DONE
```

Runner.cpp

```cpp
#include "Runner.h"

Runner::Runner()
{
	name = "";
	place = 0;
	aTime.set_Second(0).set_Minute(0).set_Hour(0);
}

Runner::Runner(const string tmp_Name)
{
	set_Name(tmp_Name);
}

Runner::Runner(const string tmp_Name, const int tmp_Second, const int tmp_Minute, const int tmp_Hour) : aTime(tmp_Second, tmp_Minute, tmp_Hour)
{
	set_Name(tmp_Name);
}

Runner::Runner(const Runner& tmp_Runner)
{
	set_Name(tmp_Runner.get_Name()).set_Time(tmp_Runner.get_Time()).set_Place(tmp_Runner.get_Place());
}

Runner& Runner::operator=(const Runner& tmp_Runner)
{
	this->name = tmp_Runner.get_Name();
	this->aTime = tmp_Runner.get_Time();
	this->place = tmp_Runner.get_Place();
	return *this;
}

Runner& Runner::set_Name(const string tmp_Name)
{
	this->name = tmp_Name;
	return *this;
}

Runner& Runner::set_Time(const Time tmp_Time)
{
	this->aTime = tmp_Time;
	return *this;
}

Runner& Runner::set_Place(const int tmp_Place)
{
	this->place = tmp_Place;
	return *this;
}

const string Runner::get_Name() const
{
	return name;
```

```
}

const int Runner::get_Place() const
{
	return place;
}

const Time Runner::get_Time() const
{
	return aTime;
}

bool Runner::operator==(const Runner& tmp_Runner)
{
	if (get_Name().compare(tmp_Runner.name) == 0)
	{
		return true;
	}
	else
	{
		return false;
	}
}

bool Runner::operator!=(const Runner& tmp_Runner)
{
	if (aTime != tmp_Runner.aTime /*|| get_Name().compare(tmp_Runner.get_Name()) != 0*/)
	{
		return true;
	}
	else
	{
		return false;
	}
}

bool Runner::operator>(const Runner& tmp_Runner)
{
	if (get_Name().compare(tmp_Runner.get_Name()) > 0)
	{
		return true;
	}
	else
	{
		return false;
	}
}

bool Runner::operator<(const Runner& tmp_Runner)
{
	if (aTime < tmp_Runner.aTime /*|| get_Name().compare(tmp_Runner.get_Name()) < 0*/)
	{
		return true;
	}
	else
	{
```

```cpp
        return false;
    }
}

istream& operator>>(istream& input, Runner& tmp_Runner)
{
    cout << "\n\t- Enter the RUNNER NAME --> ";
    getline(input >> ws, tmp_Runner.name);

    input >> tmp_Runner.aTime;

    return input;
}

ostream& operator<<(ostream& output, const Runner& tmp_Runner)
{
    output << "\n\t- The RUNNER NAME is --> " << tmp_Runner.get_Name()
        << "\n\t- The TIME for the distance is --> " << tmp_Runner.aTime
        << "\n\t- Came out in place #" << tmp_Runner.get_Place();

    return output;
}

Runner::~Runner() { /*cout << "\nFreeing runner memory...";*/ };
```

RunningRace.cpp

```cpp
#include "RunningRace.h"

RunningRace::RunningRace()
{
	event_Name = event_Distance = "";
	All_Runners = new Runner;
}

RunningRace::RunningRace(const string tmp_EventName, const string tmp_Distance,
Runner* tmp_AllRunners, const int tmp_StudentCount)
{
	set_EventName(tmp_EventName).set_AllRunners(tmp_AllRunners).set_StudentCount(
tmp_StudentCount).set_Distance(tmp_Distance);
}

RunningRace::RunningRace(RunningRace& tmp_Race)
{
	set_EventName(tmp_Race.get_EventName()).set_AllRunners(tmp_Race.get_AllRunner
s()).set_Distance(tmp_Race.get_Distance());
}

//RunningRace& RunningRace::operator=(RunningRace& tmp_Race)
//{
//	this->event_Name = tmp_Race.get_EventName();
//	this->All_RunnersByNames = tmp_Race.All_RunnersByNames;
//	this->Runner_Count = tmp_Race.get_RunnerCount();
//	return *this;
//}

RunningRace& RunningRace::set_EventName(const string tmp_Name)
{
	this->event_Name = tmp_Name;
	return *this;
}

RunningRace& RunningRace::set_AllRunners(Runner* tmp_AllRunners)
{
	delete[] All_Runners;
	this->All_Runners = tmp_AllRunners;
	tmp_AllRunners = nullptr;
	return *this;
}

RunningRace& RunningRace::set_StudentCount(const int tmp_StudentCount)
{
	this->Runner_Count = tmp_StudentCount;
	return *this;
}

RunningRace& RunningRace::set_Distance(const string tmp_Distance)
{
	this->event_Distance = tmp_Distance;
	return *this;
}
```

```
const string RunningRace::get_EventName() const
{
    return event_Name;
}

Runner* RunningRace::get_AllRunners() const
{
    return All_Runners;
}

const int RunningRace::get_RunnerCount() const
{
    return Runner_Count;
}

const string RunningRace::get_Distance() const
{
    return event_Distance;
}

void RunningRace::sortRunners_ByNames()
{
    cout << "\nSorting runners by their names...";
    bool swap{};
    do
    {
        swap = false;

        for (int i{}; i < (get_RunnerCount() - 1); i++)
        {
            if (All_Runners[i].get_Name() > All_Runners[(i + 1)].get_Name())
            {
                swap = true;
                Runner tmp_Runner(All_Runners[(i + 1)]);
                All_Runners[(i + 1)] = All_Runners[i];
                All_Runners[i] = tmp_Runner;
            }
        }
    } while (swap);
}

void RunningRace::PRINT_RUNNERS()
{
    cout << endl;

    for (int i{}; i < get_RunnerCount(); i++)
    {
        cout << "\nRunner #" << (i + 1) << "..."
            << All_Runners[i];
    }
}

void RunningRace::SEARCH_RUNNER()
{
    if (get_RunnerCount() == 0)
    {
        cout << "\nThere are no runners...";
    }
    else if (get_RunnerCount() == 1)
    {
        cout << "\nThere is only one runner, printing..."
            << All_Runners[0];
    }
    else
    {
        bool found{ false };
        int first{}, middle{}, last{ (get_RunnerCount() - 1) }, position{ -1 };
        binary_Search(found, first, last, middle, position);
        cout << All_Runners[position] << endl;
    }
}

void RunningRace::DELETE_RUNNER()
{
    if (get_RunnerCount() == 0)
    {
        cout << "\nThere are no runners...";
    }
    else if (get_RunnerCount() == 1)
    {
        cout << "\nThere is only one runner, deleting...";
        --Runner_Count;
        delete[] All_Runners;
    }
    else
    {
        bool found{ false };
        int first{}, middle{}, last{ (get_RunnerCount() - 1) }, position{ -1 };
        binary_Search(found, first, last, middle, position);

        Runner* All_Runners2{ new Runner[--Runner_Count] };
        for (int i{}; i < get_RunnerCount(); i++)
        {
            if (i < position)
                All_Runners2[i] = All_Runners[i];
            else if (i == position)
                cout << "\nRunner deleted...";
            else if (i > position)
                All_Runners2[i] = All_Runners[i];
        }

        delete[] All_Runners;
        All_Runners = new Runner[get_RunnerCount()];

        for (int i{}; i < get_RunnerCount(); i++)
        {
            All_Runners[i] = All_Runners2[i];
        }

        delete[] All_Runners2;
        All_Runners2 = nullptr;
    }
}

void RunningRace::binary_Search(bool& found, int& first, int& last, int& middle,
int& position)
```

```
{
    cout << "\n\t- Enter the runner name you want to search --> ";
    string tmp_RunnerToDelete{};
    getline(cin >> ws, tmp_RunnerToDelete);
    Runner tmp_ToCompare;
    tmp_ToCompare.set_Name(tmp_RunnerToDelete);

    while (!found && first <= last)
    {
        middle = ((first + last) / 2);

        if (All_Runners[middle] == tmp_ToCompare)
        {
            cout << "\nFound!";
            found = true;
            position = middle;
        }
        else if (All_Runners[middle] > tmp_ToCompare)
        {
            last = (middle - 1);
        }
        else
        {
            first = (middle + 1);
        }
    }

    if (!found && position == -1)
    {
        cout << "\nNot found, recursion beginning";
        first = 0;
        last = (get_RunnerCount() - 1);
        binary_Search(found, first, last, middle, position);
    }
}

void RunningRace::ADD_RUNNER()
{
    if (get_RunnerCount() < 1)
    {
        cout << "\nThere are no runners, starting array..." << endl;
        cout << "\t- Enter how many runners for the race --> ";
        cin >> Runner_Count;

        while (cin.fail() || get_RunnerCount() < 1)
        {
            cin.clear();
            cin.ignore(256, '\n');
            cout << "\nError, please re-enter a valid amount of runners -->
";

            cin >> Runner_Count;
        }

        All_Runners = new Runner[get_RunnerCount()];

        for (int i{}; i < get_RunnerCount(); i++)
        {
            cout << "\nRunner #" << (i + 1) << "...";
```

```
			cin >> All_Runners[i];
		}
	}
	else
	{
		Runner new_Runner;
		cin >> new_Runner;
		Runner* Old_Runners{ new Runner[get_RunnerCount()] };

		for (int i{}; i < get_RunnerCount(); i++)
		{
			Old_Runners[i] = All_Runners[i];
		}

		delete[] All_Runners;
		All_Runners = new Runner[++Runner_Count];

		for (int i{}; i < get_RunnerCount(); i++)
		{
			if (i < (get_RunnerCount() - 1))
				All_Runners[i] = Old_Runners[i];
			else
				All_Runners[i] = new_Runner;
		}

		delete[] Old_Runners;
		Old_Runners = nullptr;
	}
}

Runner& RunningRace::operator[](const int& i)
{
	if (i < 0 || i >= get_RunnerCount())
	{
		throw out_of_range("Subscript out of range...");
	}
	return All_Runners[i];
}

Runner RunningRace::operator[](int i) const
{
	if (i < 0 || i >= get_RunnerCount())
	{
		throw out_of_range("Subscript out of range...");
	}
	return All_Runners[i];
}

istream& operator>>(istream& input, RunningRace& tmp_Race)
{
	cout << "\t- Enter the event name --> ";
	getline(input >> ws, tmp_Race.event_Name);

	cout << "\t- What is the event distance --> ";
	getline(input >> ws, tmp_Race.event_Distance);

	cout << "\t- Enter how many runners for the race --> ";
	input >> tmp_Race.Runner_Count;
```

```
    while (input.fail() || tmp_Race.get_RunnerCount() < 1)
    {
        input.clear();
        input.ignore(256, '\n');
        cout << "\nError, please re-enter a valid amount of runners --> ";
        input >> tmp_Race.Runner_Count;
    }

    tmp_Race.All_Runners = new Runner[tmp_Race.get_RunnerCount()];

    for (int i{}; i < tmp_Race.get_RunnerCount(); i++)
    {
        cout << "\nRunner #" << (i + 1) << "...";
        input >> tmp_Race.All_Runners[i];
    }

    return input;
}

ostream& operator<<(ostream& output, RunningRace& tmp_Race)
{
    output << "\n\t- The event name is --> " << tmp_Race.get_EventName()
        << "\n\t- The event distance is --> " << tmp_Race.get_Distance();

    cout << "\n\nRace results:";
    for (int i{}; i < tmp_Race.get_RunnerCount(); i++)
    {
        cout << "\nRunner #" << (i + 1) << "...";
        output << tmp_Race.All_Runners[i];
    }

    return output;
}

RunningRace::~RunningRace()
{
    delete[] All_Runners;
    All_Runners = nullptr;
};
```

Time.cpp

```cpp
#include "Time.h"

Time::Time()
{
	second = minute = hour = 0;
}

Time::Time(const int tmp_Second, const int tmp_Minute, const int tmp_Hour)
{
	set_Second(tmp_Second).set_Minute(tmp_Hour).set_Hour(tmp_Hour);
}

Time::Time(const Time& tmp_Time)
{
	set_Second(tmp_Time.get_Second()).set_Minute(tmp_Time.get_Minute()).set_Hour(
tmp_Time.get_Hour());
}

Time& Time::operator=(const Time& tmp_Time)
{
	this->second = tmp_Time.get_Second();
	this->minute = tmp_Time.get_Minute();
	this->hour = tmp_Time.get_Hour();
	return *this;
}

Time& Time::set_Second(const int tmp_Second)
{
	this->second = tmp_Second;
	return *this;
}

Time& Time::set_Minute(const int tmp_Minute)
{
	this->minute = tmp_Minute;
	return *this;
}

Time& Time::set_Hour(const int tmp_Hour)
{
	this->hour = tmp_Hour;
	return *this;
}

const int Time::get_Second() const
{
	return second;
}

const int Time::get_Minute() const
{
	return minute;
}

const int Time::get_Hour() const
```

```
{
	return hour;
}

bool Time::operator>(const Time& tmp_Time)
{
	double hundred{};
	if (get_Second() == 0 || tmp_Time.get_Second() == 0)
	{
		hundred = 100;
	}

	if (get_Hour() * 60 + get_Minute() + 1 / (get_Second() + hundred) > 
tmp_Time.get_Hour() * 60 + tmp_Time.get_Minute() + 1 / (tmp_Time.get_Second() + 
hundred))
	{
		return true;
	}
	else
	{
		return false;
	}
}

bool Time::operator<(const Time& tmp_Time)
{
	double hundred{};
	if (get_Second() == 0 || tmp_Time.get_Second() == 0)
	{
		hundred = 100;
	}

	if (get_Hour() * 60 + get_Minute() + 1 / (get_Second() + hundred) < 
tmp_Time.get_Hour() * 60 + tmp_Time.get_Minute() + 1 / (tmp_Time.get_Second() + 
hundred))
	{
		return true;
	}
	else
	{
		return false;
	}
}

bool Time::operator==(const Time& tmp_Time)
{
	double hundred{};
	if (get_Second() == 0 || tmp_Time.get_Second() == 0)
	{
		hundred = 100;
	}

	if (get_Hour() * 60 + get_Minute() + 1 / (get_Second() + hundred) == 
tmp_Time.get_Hour() * 60 + tmp_Time.get_Minute() + 1 / (tmp_Time.get_Second() + 
hundred))
	{
		return true;
	}
```

```
        else
        {
                return false;
        }
}

bool Time::operator!=(const Time& tmp_Time)
{
        double hundred{};
        if (get_Second() == 0 || tmp_Time.get_Second() == 0)
        {
                hundred = 100;
        }

        if (get_Hour() * 60 + get_Minute() + 1 / (get_Second() + hundred) !=
tmp_Time.get_Hour() * 60 + tmp_Time.get_Minute() + 1 / (tmp_Time.get_Second() +
hundred))
        {
                return true;
        }
        else
        {
                return false;
        }
}

istream& operator>>(istream& input, Time& tmp_Time)
{
        cout << "\t- Enter the seconds, minutes and hours of arrival (Separate them
by a space) --> ";
        input >> tmp_Time.second >> tmp_Time.minute >> tmp_Time.hour;

        while (input.fail() || tmp_Time.get_Second() < 0 || tmp_Time.get_Second() >
59)
        {
                input.clear();
                input.ignore(256, '\n');
                cout << "\nError, please re-enter a valid second --> ";
                input >> tmp_Time.second;
        }

        while (input.fail() || tmp_Time.get_Minute() < 0 || tmp_Time.get_Minute() >
59)
        {
                input.clear();
                input.ignore(256, '\n');
                cout << "\nError, please re-enter a valid minute --> ";
                input >> tmp_Time.minute;
        }

        while (input.fail() || tmp_Time.get_Hour() < 0 || tmp_Time.get_Hour() > 23)
        {
                input.clear();
                input.ignore(256, '\n');
                cout << "\nError, please re-enter a valid hour --> ";
                input >> tmp_Time.hour;
        }
```

```
    return input;
}

ostream& operator<<(ostream& output, const Time& tmp_Time)
{
    if (tmp_Time.hour < 10)
        output << '0';

    output << tmp_Time.hour << ':';

    if (tmp_Time.minute < 10)
        output << '0';

    output << tmp_Time.minute << ':';

    if (tmp_Time.second < 10)
        output << '0';

    output << tmp_Time.second << 's';
    return output;
}

Time::~Time() { /*cout << "\nFreeing Time memory...";*/ };
```

Output.txt

```
      - Enter the amount of races --> 3


Race #1...
      - Enter the event name --> Lola Challenge
      - What is the event distance --> 26.2, Marathon
      - Enter how many runners for the race --> 2


Runner #1...
      - Enter the RUNNER NAME --> Eliud Kipchogue
      - Enter the seconds, minutes and hours of arrival (Separate them by a space) --> 2 3 2


Runner #2...
      - Enter the RUNNER NAME --> Carlos Snow
      - Enter the seconds, minutes and hours of arrival (Separate them by a space) --> 2 23 2


Race #2...
      - Enter the event name --> INEOS CHALLENGE
      - What is the event distance --> 26.2
      - Enter how many runners for the race --> 3


Runner #1...
      - Enter the RUNNER NAME --> Jakob Ingebriksten
      - Enter the seconds, minutes and hours of arrival (Separate them by a space) --> 2 4 2


Runner #2...
      - Enter the RUNNER NAME --> Kenenisa Bekele
      - Enter the seconds, minutes and hours of arrival (Separate them by a space) --> 3 45 2
```

```
Runner #3...

      - Enter the RUNNER NAME --> Paul Chelimo

      - Enter the seconds, minutes and hours of arrival (Separate them by a space) --> 23 10 2


Race #3...

      - Enter the event name --> San Blas

      - What is the event distance --> 13.1, Half Marathon

      - Enter how many runners for the race -->

5


Runner #1...

      - Enter the RUNNER NAME --> Alexander Torres

      - Enter the seconds, minutes and hours of arrival (Separate them by a space) --> 4 12 2


Runner #2...

      - Enter the RUNNER NAME --> Hector Pagan

      - Enter the seconds, minutes and hours of arrival (Separate them by a space) --> 3 4 2


Runner #3...

      - Enter the RUNNER NAME --> Kevin Cubilette

      - Enter the seconds, minutes and hours of arrival (Separate them by a space) --> 2 34 2


Runner #4...

      - Enter the RUNNER NAME --> Juan V. Santiago

      - Enter the seconds, minutes and hours of arrival (Separate them by a space) --> 3 2 3


Runner #5...

      - Enter the RUNNER NAME --> Samuel Valentin

      - Enter the seconds, minutes and hours of arrival (Separate them by a space) --> 54 45 2
```

```
Sorting runners by their times...

Sorting runners by their times...

Sorting runners by their times...


Select an operation for race #1...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 5

Sorting runners by their times...

Sorting runners by their times...

Sorting runners by their times...


Runner #1...
        - The RUNNER NAME is --> Eliud Kipchogue
        - The TIME for the distance is --> 02:03:02s
        - Came out in place #1
Runner #2...
        - The RUNNER NAME is --> Carlos Snow
        - The TIME for the distance is --> 02:23:02s
        - Came out in place #2

Select an operation for race #1...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 4

Sorting runners by their names...

Runner #1...
        - The RUNNER NAME is --> Carlos Snow
        - The TIME for the distance is --> 02:23:02s
        - Came out in place #2
Runner #2...
        - The RUNNER NAME is --> Eliud Kipchogue
        - The TIME for the distance is --> 02:03:02s
        - Came out in place #1

Select an operation for race #1...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 3
```

```
Sorting runners by their times...


Sorting runners by their times...


Sorting runners by their times...


Sorting runners by their names...
        - Enter the runner name you want to search --> ELiud Kipchogue


Not found, recursion beginning
        - Enter the runner name you want to search --> Carlos Snow


Found!
        - The RUNNER NAME is --> Carlos Snow
        - The TIME for the distance is --> 02:23:02s
        - Came out in place #2



Select an operation for race #1...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 4


Sorting runners by their names...
```

```
Runner #1...
        - The RUNNER NAME is --> Carlos Snow
        - The TIME for the distance is --> 02:23:02s
        - Came out in place #2
Runner #2...
        - The RUNNER NAME is --> Eliud Kipchogue
        - The TIME for the distance is --> 02:03:02s
        - Came out in place #1

Select an operation for race #1...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 5

Sorting runners by their times...

Sorting runners by their times...

Sorting runners by their times...


Runner #1...
        - The RUNNER NAME is --> Eliud Kipchogue
        - The TIME for the distance is --> 02:03:02s
        - Came out in place #1
Runner #2...
```

```
        - The RUNNER NAME is --> Carlos Snow
        - The TIME for the distance is --> 02:23:02s
        - Came out in place #2

Select an operation for race #1...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 1

        - Enter the RUNNER NAME --> Madeline
        - Enter the seconds, minutes and hours of arrival (Separate them by a space) --> 2 45 5



Select an operation for race #1...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 3

Sorting runners by their times...

Sorting runners by their times...
Sorting runners by their times...


Sorting runners by their names...
        - Enter the runner name you want to search --> Madeline


Found!
        - The RUNNER NAME is --> Madeline
        - The TIME for the distance is --> 05:45:02s
        - Came out in place #3



Select an operation for race #1...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 1

        - Enter the RUNNER NAME --> Valeria
        - Enter the seconds, minutes and hours of arrival (Separate them by a space) --> 2 34 3



Select an operation for race #1...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 5

Sorting runners by their times...

Sorting runners by their times...

Sorting runners by their times...


Runner #1...
        - The RUNNER NAME is --> Eliud Kipchogue
        - The TIME for the distance is --> 02:03:02s
        - Came out in place #1
Runner #2...
        - The RUNNER NAME is --> Carlos Snow
        - The TIME for the distance is --> 02:23:02s
        - Came out in place #2
Runner #3...
        - The RUNNER NAME is --> Valeria
        - The TIME for the distance is --> 03:34:02s
        - Came out in place #3
Runner #4...
        - The RUNNER NAME is --> Madeline
        - The TIME for the distance is --> 05:45:02s
        - Came out in place #4

Select an operation for race #1...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 4

Sorting runners by their names...

Runner #1...
        - The RUNNER NAME is --> Carlos Snow
        - The TIME for the distance is --> 02:23:02s
        - Came out in place #2
Runner #2...
        - The RUNNER NAME is --> Eliud Kipchogue
        - The TIME for the distance is --> 02:03:02s
        - Came out in place #1
Runner #3...
        - The RUNNER NAME is --> Madeline
        - The TIME for the distance is --> 05:45:02s
        - Came out in place #4
Runner #4...
        - The RUNNER NAME is --> Valeria
        - The TIME for the distance is --> 03:34:02s
        - Came out in place #3

Select an operation for race #1...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 2

Sorting runners by their names...
        - Enter the runner name you want to search --> Carlos Snow

Found!
Runner deleted...

Select an operation for race #1...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 5

Sorting runners by their times...

Sorting runners by their times...

Sorting runners by their times...


Runner #1...
        - The RUNNER NAME is -->
        - The TIME for the distance is --> 00:00:00s
        - Came out in place #1
```

```
Runner #2...
        - The RUNNER NAME is --> Eliud Kipchogue
        - The TIME for the distance is --> 02:03:02s
        - Came out in place #2
Runner #3...
        - The RUNNER NAME is --> Madeline
        - The TIME for the distance is --> 05:45:02s
        - Came out in place #3

Select an operation for race #1...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 4

Sorting runners by their names...

Runner #1...
        - The RUNNER NAME is -->
        - The TIME for the distance is --> 00:00:00s
        - Came out in place #1
Runner #2...
        - The RUNNER NAME is --> Eliud Kipchogue
        - The TIME for the distance is --> 02:03:02s
        - Came out in place #2
Runner #3...
        - The RUNNER NAME is --> Madeline
```

```
    - The TIME for the distance is --> 05:45:02s
    - Came out in place #3

Select an operation for race #1...
    1) Add a runner
    2) Delete a runner
    3) Search a runner
    4) Print all the runners ordered by their names
    5) Print all the runners ordered by their times
    6) Exit
Answer --> 6

Finishing menu for the race...

Select an operation for race #2...
    1) Add a runner
    2) Delete a runner
    3) Search a runner
    4) Print all the runners ordered by their names
    5) Print all the runners ordered by their times
    6) Exit
Answer --> 5

Sorting runners by their times...

Sorting runners by their times...

Sorting runners by their times...
```

```
Runner #1...
        - The RUNNER NAME is --> Jakob Ingebriksten
        - The TIME for the distance is --> 02:04:02s
        - Came out in place #1
Runner #2...
        - The RUNNER NAME is --> Paul Chelimo
        - The TIME for the distance is --> 02:10:23s
        - Came out in place #2
Runner #3...
        - The RUNNER NAME is --> Kenenisa Bekele
        - The TIME for the distance is --> 02:45:03s
        - Came out in place #3

Select an operation for race #2...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 4

Sorting runners by their names...

Runner #1...
        - The RUNNER NAME is --> Jakob Ingebriksten
        - The TIME for the distance is --> 02:04:02s
        - Came out in place #1
Runner #2...
        - The RUNNER NAME is --> Kenenisa Bekele
        - The TIME for the distance is --> 02:45:03s
        - Came out in place #3
Runner #3...
        - The RUNNER NAME is --> Paul Chelimo
        - The TIME for the distance is --> 02:10:23s
        - Came out in place #2

Select an operation for race #2...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 3

Sorting runners by their times...

Sorting runners by their times...

Sorting runners by their times...

Sorting runners by their names...
        - Enter the runner name you want to search --> Paul Chelimo

Found!
        - The RUNNER NAME is --> Paul Chelimo
        - The TIME for the distance is --> 02:10:23s
        - Came out in place #2
```

```
Select an operation for race #2...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 1

        - Enter the RUNNER NAME --> Alodra Negrn
        - Enter the seconds, minutes and hours of arrival (Separate them by a space) --> 2 34 2



Select an operation for race #2...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 5

Sorting runners by their times...

Sorting runners by their times...

Sorting runners by their times...
```

```
Runner #1...
        - The RUNNER NAME is --> Jakob Ingebriksten
        - The TIME for the distance is --> 02:04:02s
        - Came out in place #1
Runner #2...
        - The RUNNER NAME is --> Paul Chelimo
        - The TIME for the distance is --> 02:10:23s
        - Came out in place #2
Runner #3...
        - The RUNNER NAME is --> Alodra Negrn
        - The TIME for the distance is --> 02:34:02s
        - Came out in place #3
Runner #4...
        - The RUNNER NAME is --> Kenenisa Bekele
        - The TIME for the distance is --> 02:45:03s
        - Came out in place #4

Select an operation for race #2...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 4

Sorting runners by their names...

Runner #1...
        - The RUNNER NAME is --> Alodra Negrn
        - The TIME for the distance is --> 02:34:02s
        - Came out in place #3
Runner #2...
        - The RUNNER NAME is --> Jakob Ingebriksten
        - The TIME for the distance is --> 02:04:02s
        - Came out in place #1
Runner #3...
        - The RUNNER NAME is --> Kenenisa Bekele
        - The TIME for the distance is --> 02:45:03s
        - Came out in place #4
Runner #4...
        - The RUNNER NAME is --> Paul Chelimo
        - The TIME for the distance is --> 02:10:23s
        - Came out in place #2

Select an operation for race #2...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 1

        - Enter the RUNNER NAME --> Roberto
        - Enter the seconds, minutes and hours of arrival (Separate them by a space) --> 3 4 24

Error, please re-enter a valid hour --> 5
```

```
Select an operation for race #2...
    1) Add a runner
    2) Delete a runner
    3) Search a runner
    4) Print all the runners ordered by their names
    5) Print all the runners ordered by their times
    6) Exit
Answer --> 7

Error, please select a valid operation --> 5

Sorting runners by their times...

Sorting runners by their times...

Sorting runners by their times...


Runner #1...
    - The RUNNER NAME is --> Jakob Ingebriksten
    - The TIME for the distance is --> 02:04:02s
    - Came out in place #1
Runner #2...
    - The RUNNER NAME is --> Paul Chelimo
    - The TIME for the distance is --> 02:10:23s
    - Came out in place #2
Runner #3...
    - The RUNNER NAME is --> Alodra Negrn
    - The TIME for the distance is --> 02:34:02s
    - Came out in place #3
```

```
Runner #4...
        - The RUNNER NAME is --> Kenenisa Bekele
        - The TIME for the distance is --> 02:45:03s
        - Came out in place #4
Runner #5...
        - The RUNNER NAME is --> Roberto
        - The TIME for the distance is --> 05:04:03s
        - Came out in place #5

Select an operation for race #2...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 4

Sorting runners by their names...

Runner #1...
        - The RUNNER NAME is --> Alodra Negrn
        - The TIME for the distance is --> 02:34:02s
        - Came out in place #3
Runner #2...
        - The RUNNER NAME is --> Jakob Ingebriksten
        - The TIME for the distance is --> 02:04:02s
        - Came out in place #1
Runner #3...
        - The RUNNER NAME is --> Kenenisa Bekele
        - The TIME for the distance is --> 02:45:03s
        - Came out in place #4
Runner #4...
        - The RUNNER NAME is --> Paul Chelimo
        - The TIME for the distance is --> 02:10:23s
        - Came out in place #2
Runner #5...
        - The RUNNER NAME is --> Roberto
        - The TIME for the distance is --> 05:04:03s
        - Came out in place #5

Select an operation for race #2...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> buenas

Error, please select a valid operation --> 1


        - Enter the RUNNER NAME --> Carla
        - Enter the seconds, minutes and hours of arrival (Separate them by a space) --> 4 56 7



Select an operation for race #2...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 5

Sorting runners by their times...

Sorting runners by their times...

Sorting runners by their times...


Runner #1...
        - The RUNNER NAME is --> Jakob Ingebriksten
        - The TIME for the distance is --> 02:04:02s
        - Came out in place #1
Runner #2...
        - The RUNNER NAME is --> Paul Chelimo
        - The TIME for the distance is --> 02:10:23s
        - Came out in place #2
Runner #3...
        - The RUNNER NAME is --> Alodra Negrn
        - The TIME for the distance is --> 02:34:02s
        - Came out in place #3
Runner #4...
        - The RUNNER NAME is --> Kenenisa Bekele
        - The TIME for the distance is --> 02:45:03s
        - Came out in place #4
Runner #5...
        - The RUNNER NAME is --> Roberto
        - The TIME for the distance is --> 05:04:03s
        - Came out in place #5
Runner #6...
        - The RUNNER NAME is --> Carla
        - The TIME for the distance is --> 07:56:04s
        - Came out in place #6

Select an operation for race #2...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 4

Sorting runners by their names...

Runner #1...
        - The RUNNER NAME is --> Alodra Negrn
        - The TIME for the distance is --> 02:34:02s
        - Came out in place #3
Runner #2...
        - The RUNNER NAME is --> Carla
        - The TIME for the distance is --> 07:56:04s
        - Came out in place #6
Runner #3...
        - The RUNNER NAME is --> Jakob Ingebriksten
        - The TIME for the distance is --> 02:04:02s
        - Came out in place #1
```

```
Runner #4...
        - The RUNNER NAME is --> Kenenisa Bekele
        - The TIME for the distance is --> 02:45:03s
        - Came out in place #4
Runner #5...
        - The RUNNER NAME is --> Paul Chelimo
        - The TIME for the distance is --> 02:10:23s
        - Came out in place #2
Runner #6...
        - The RUNNER NAME is --> Roberto
        - The TIME for the distance is --> 05:04:03s
        - Came out in place #5

Select an operation for race #2...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 3

Sorting runners by their times...

Sorting runners by their times...

Sorting runners by their times...

Sorting runners by their names...
        - Enter the runner name you want to search --> Carla
```

```
Found!
        - The RUNNER NAME is --> Carla
        - The TIME for the distance is --> 07:56:04s
        - Came out in place #6



Select an operation for race #2...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 2

Sorting runners by their names...
        - Enter the runner name you want to search --> Carla

Found!
Runner deleted...

Select an operation for race #2...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 5
```

```
Sorting runners by their times...

Sorting runners by their times...

Sorting runners by their times...


Runner #1...
        - The RUNNER NAME is -->
        - The TIME for the distance is --> 00:00:00s
        - Came out in place #1
Runner #2...
        - The RUNNER NAME is --> Jakob Ingebriksten
        - The TIME for the distance is --> 02:04:02s
        - Came out in place #2
Runner #3...
        - The RUNNER NAME is --> Paul Chelimo
        - The TIME for the distance is --> 02:10:23s
        - Came out in place #3
Runner #4...
        - The RUNNER NAME is --> Alodra Negrn
        - The TIME for the distance is --> 02:34:02s
        - Came out in place #4
Runner #5...
        - The RUNNER NAME is --> Kenenisa Bekele
        - The TIME for the distance is --> 02:45:03s
        - Came out in place #5

Select an operation for race #2...
```

```
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 4

Sorting runners by their names...

Runner #1...
        - The RUNNER NAME is -->
        - The TIME for the distance is --> 00:00:00s
        - Came out in place #1
Runner #2...
        - The RUNNER NAME is --> Alodra Negrn
        - The TIME for the distance is --> 02:34:02s
        - Came out in place #4
Runner #3...
        - The RUNNER NAME is --> Jakob Ingebriksten
        - The TIME for the distance is --> 02:04:02s
        - Came out in place #2
Runner #4...
        - The RUNNER NAME is --> Kenenisa Bekele
        - The TIME for the distance is --> 02:45:03s
        - Came out in place #5
Runner #5...
        - The RUNNER NAME is --> Paul Chelimo
        - The TIME for the distance is --> 02:10:23s
        - Came out in place #3
```

```
Select an operation for race #2...

        1) Add a runner

        2) Delete a runner

        3) Search a runner

        4) Print all the runners ordered by their names

        5) Print all the runners ordered by their times

        6) Exit

Answer --> 6


Finishing menu for the race...


Select an operation for race #3...

        1) Add a runner

        2) Delete a runner

        3) Search a runner

        4) Print all the runners ordered by their names

        5) Print all the runners ordered by their times

        6) Exit

Answer --> 5


Sorting runners by their times...


Sorting runners by their times...


Sorting runners by their times...




Runner #1...

        - The RUNNER NAME is --> Hector Pagan
        - The TIME for the distance is --> 02:04:03s
        - Came out in place #1
Runner #2...
        - The RUNNER NAME is --> Alexander Torres
        - The TIME for the distance is --> 02:12:04s
        - Came out in place #2
Runner #3...
        - The RUNNER NAME is --> Kevin Cubilette
        - The TIME for the distance is --> 02:34:02s
        - Came out in place #3
Runner #4...
        - The RUNNER NAME is --> Samuel Valentin
        - The TIME for the distance is --> 02:45:54s
        - Came out in place #4
Runner #5...
        - The RUNNER NAME is --> Juan V. Santiago
        - The TIME for the distance is --> 03:02:03s
        - Came out in place #5

Select an operation for race #3...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 4

Sorting runners by their names...
```

```
Runner #1...
        - The RUNNER NAME is --> Alexander Torres
        - The TIME for the distance is --> 02:12:04s
        - Came out in place #2
Runner #2...
        - The RUNNER NAME is --> Hector Pagan
        - The TIME for the distance is --> 02:04:03s
        - Came out in place #1
Runner #3...
        - The RUNNER NAME is --> Juan V. Santiago
        - The TIME for the distance is --> 03:02:03s
        - Came out in place #5
Runner #4...
        - The RUNNER NAME is --> Kevin Cubilette
        - The TIME for the distance is --> 02:34:02s
        - Came out in place #3
Runner #5...
        - The RUNNER NAME is --> Samuel Valentin
        - The TIME for the distance is --> 02:45:54s
        - Came out in place #4

Select an operation for race #3...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 3
```

```
Sorting runners by their times...


Sorting runners by their times...


Sorting runners by their times...


Sorting runners by their names...
        - Enter the runner name you want to search --> Samuel Valentin


Found!
        - The RUNNER NAME is --> Samuel Valentin
        - The TIME for the distance is --> 02:45:54s
        - Came out in place #4



Select an operation for race #3...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 1


        - Enter the RUNNER NAME --> Ana
        - Enter the seconds, minutes and hours of arrival (Separate them by a space) --> 3 4 6



Select an operation for race #3...
        1) Add a runner
        2) Delete a runner

        3) Search a runner

        4) Print all the runners ordered by their names

        5) Print all the runners ordered by their times

        6) Exit

Answer --> 5


Sorting runners by their times...


Sorting runners by their times...


Sorting runners by their times...



Runner #1...

        - The RUNNER NAME is --> Hector Pagan

        - The TIME for the distance is --> 02:04:03s

        - Came out in place #1

Runner #2...

        - The RUNNER NAME is --> Alexander Torres

        - The TIME for the distance is --> 02:12:04s

        - Came out in place #2

Runner #3...

        - The RUNNER NAME is --> Kevin Cubilette

        - The TIME for the distance is --> 02:34:02s

        - Came out in place #3

Runner #4...

        - The RUNNER NAME is --> Samuel Valentin

        - The TIME for the distance is --> 02:45:54s

        - Came out in place #4
```

```
Runner #5...
        - The RUNNER NAME is --> Juan V. Santiago
        - The TIME for the distance is --> 03:02:03s
        - Came out in place #5
Runner #6...
        - The RUNNER NAME is --> Ana
        - The TIME for the distance is --> 06:04:03s
        - Came out in place #6

Select an operation for race #3...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 4

Sorting runners by their names...

Runner #1...
        - The RUNNER NAME is --> Alexander Torres
        - The TIME for the distance is --> 02:12:04s
        - Came out in place #2
Runner #2...
        - The RUNNER NAME is --> Ana
        - The TIME for the distance is --> 06:04:03s
        - Came out in place #6
Runner #3...
        - The RUNNER NAME is --> Hector Pagan
        - The TIME for the distance is --> 02:04:03s

        - Came out in place #1

Runner #4...

        - The RUNNER NAME is --> Juan V. Santiago

        - The TIME for the distance is --> 03:02:03s

        - Came out in place #5

Runner #5...

        - The RUNNER NAME is --> Kevin Cubilette

        - The TIME for the distance is --> 02:34:02s

        - Came out in place #3

Runner #6...

        - The RUNNER NAME is --> Samuel Valentin

        - The TIME for the distance is --> 02:45:54s

        - Came out in place #4


Select an operation for race #3...

        1) Add a runner

        2) Delete a runner

        3) Search a runner

        4) Print all the runners ordered by their names

        5) Print all the runners ordered by their times

        6) Exit

Answer --> 3


Sorting runners by their times...


Sorting runners by their times...


Sorting runners by their times...
Sorting runners by their names...
        - Enter the runner name you want to search --> El pepe


Not found, recursion beginning
        - Enter the runner name you want to search --> Ana


Found!
        - The RUNNER NAME is --> Ana
        - The TIME for the distance is --> 06:04:03s
        - Came out in place #6



Select an operation for race #3...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 1

        - Enter the RUNNER NAME --> Genesis
        - Enter the seconds, minutes and hours of arrival (Separate them by a space) --> 3 43 2



Select an operation for race #3...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
```

```
    5) Print all the runners ordered by their times
    6) Exit
Answer --> 1

    - Enter the RUNNER NAME --> Francheska
    - Enter the seconds, minutes and hours of arrival (Separate them by a space) --> 3 2 4


Select an operation for race #3...
    1) Add a runner
    2) Delete a runner
    3) Search a runner
    4) Print all the runners ordered by their names
    5) Print all the runners ordered by their times
    6) Exit
Answer --> 1

    - Enter the RUNNER NAME --> Lean
    - Enter the seconds, minutes and hours of arrival (Separate them by a space) --> 3 2 23


Select an operation for race #3...
    1) Add a runner
    2) Delete a runner
    3) Search a runner
    4) Print all the runners ordered by their names
    5) Print all the runners ordered by their times
    6) Exit
Answer --> 1
```

```
        - Enter the RUNNER NAME --> Fernanfloo

        - Enter the seconds, minutes and hours of arrival (Separate them by a space) --> 54 4 3



Select an operation for race #3...

        1) Add a runner

        2) Delete a runner

        3) Search a runner

        4) Print all the runners ordered by their names

        5) Print all the runners ordered by their times

        6) Exit

Answer --> 1


        - Enter the RUNNER NAME --> Kenneth

        - Enter the seconds, minutes and hours of arrival (Separate them by a space) --> 4 23 3



Select an operation for race #3...

        1) Add a runner

        2) Delete a runner

        3) Search a runner

        4) Print all the runners ordered by their names

        5) Print all the runners ordered by their times

        6) Exit

Answer --> 5


Sorting runners by their times...


Sorting runners by their times...
Sorting runners by their times...



Runner #1...
        - The RUNNER NAME is --> Hector Pagan
        - The TIME for the distance is --> 02:04:03s
        - Came out in place #1
Runner #2...
        - The RUNNER NAME is --> Alexander Torres
        - The TIME for the distance is --> 02:12:04s
        - Came out in place #2
Runner #3...
        - The RUNNER NAME is --> Kevin Cubilette
        - The TIME for the distance is --> 02:34:02s
        - Came out in place #3
Runner #4...
        - The RUNNER NAME is --> Genesis
        - The TIME for the distance is --> 02:43:03s
        - Came out in place #4
Runner #5...
        - The RUNNER NAME is --> Samuel Valentin
        - The TIME for the distance is --> 02:45:54s
        - Came out in place #5
Runner #6...
        - The RUNNER NAME is --> Juan V. Santiago
        - The TIME for the distance is --> 03:02:03s
        - Came out in place #6
Runner #7...
        - The RUNNER NAME is --> Fernanfloo
        - The TIME for the distance is --> 03:04:54s
        - Came out in place #7
Runner #8...
        - The RUNNER NAME is --> Kenneth
        - The TIME for the distance is --> 03:23:04s
        - Came out in place #8
Runner #9...
        - The RUNNER NAME is --> Francheska
        - The TIME for the distance is --> 04:02:03s
        - Came out in place #9
Runner #10...
        - The RUNNER NAME is --> Ana
        - The TIME for the distance is --> 06:04:03s
        - Came out in place #10
Runner #11...
        - The RUNNER NAME is --> Lean
        - The TIME for the distance is --> 23:02:03s
        - Came out in place #11

Select an operation for race #3...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 4

Sorting runners by their names...

Runner #1...
```

```
        - The RUNNER NAME is --> Alexander Torres
        - The TIME for the distance is --> 02:12:04s
        - Came out in place #2
Runner #2...
        - The RUNNER NAME is --> Ana
        - The TIME for the distance is --> 06:04:03s
        - Came out in place #10
Runner #3...
        - The RUNNER NAME is --> Fernanfloo
        - The TIME for the distance is --> 03:04:54s
        - Came out in place #7
Runner #4...
        - The RUNNER NAME is --> Francheska
        - The TIME for the distance is --> 04:02:03s
        - Came out in place #9
Runner #5...
        - The RUNNER NAME is --> Genesis
        - The TIME for the distance is --> 02:43:03s
        - Came out in place #4
Runner #6...
        - The RUNNER NAME is --> Hector Pagan
        - The TIME for the distance is --> 02:04:03s
        - Came out in place #1
Runner #7...
        - The RUNNER NAME is --> Juan V. Santiago
        - The TIME for the distance is --> 03:02:03s
        - Came out in place #6
Runner #8...
        - The RUNNER NAME is --> Kenneth
        - The TIME for the distance is --> 03:23:04s
        - Came out in place #8
Runner #9...
        - The RUNNER NAME is --> Kevin Cubilette
        - The TIME for the distance is --> 02:34:02s
        - Came out in place #3
Runner #10...
        - The RUNNER NAME is --> Lean
        - The TIME for the distance is --> 23:02:03s
        - Came out in place #11
Runner #11...
        - The RUNNER NAME is --> Samuel Valentin
        - The TIME for the distance is --> 02:45:54s
        - Came out in place #5

Select an operation for race #3...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 3

Sorting runners by their times...

Sorting runners by their times...

Sorting runners by their times...

Sorting runners by their names...
```

```
      - Enter the runner name you want to search --> Genesis


Found!
      - The RUNNER NAME is --> Genesis
      - The TIME for the distance is --> 02:43:03s
      - Came out in place #4



Select an operation for race #3...
      1) Add a runner
      2) Delete a runner
      3) Search a runner
      4) Print all the runners ordered by their names
      5) Print all the runners ordered by their times
      6) Exit
Answer --> 1

      - Enter the RUNNER NAME --> Claudia Talavera
      - Enter the seconds, minutes and hours of arrival (Separate them by a space) --> 17 5 4



Select an operation for race #3...
      1) Add a runner
      2) Delete a runner
      3) Search a runner
      4) Print all the runners ordered by their names
      5) Print all the runners ordered by their times
      6) Exit
Answer --> 5
```

```
Sorting runners by their times...

Sorting runners by their times...

Sorting runners by their times...


Runner #1...
        - The RUNNER NAME is --> Hector Pagan
        - The TIME for the distance is --> 02:04:03s
        - Came out in place #1
Runner #2...
        - The RUNNER NAME is --> Alexander Torres
        - The TIME for the distance is --> 02:12:04s
        - Came out in place #2
Runner #3...
        - The RUNNER NAME is --> Kevin Cubilette
        - The TIME for the distance is --> 02:34:02s
        - Came out in place #3
Runner #4...
        - The RUNNER NAME is --> Genesis
        - The TIME for the distance is --> 02:43:03s
        - Came out in place #4
Runner #5...
        - The RUNNER NAME is --> Samuel Valentin
        - The TIME for the distance is --> 02:45:54s
        - Came out in place #5
Runner #6...
        - The RUNNER NAME is --> Juan V. Santiago
        - The TIME for the distance is --> 03:02:03s
        - Came out in place #6
Runner #7...
        - The RUNNER NAME is --> Fernanfloo
        - The TIME for the distance is --> 03:04:54s
        - Came out in place #7
Runner #8...
        - The RUNNER NAME is --> Kenneth
        - The TIME for the distance is --> 03:23:04s
        - Came out in place #8
Runner #9...
        - The RUNNER NAME is --> Francheska
        - The TIME for the distance is --> 04:02:03s
        - Came out in place #9
Runner #10...
        - The RUNNER NAME is --> Claudia Talavera
        - The TIME for the distance is --> 04:05:17s
        - Came out in place #10
Runner #11...
        - The RUNNER NAME is --> Ana
        - The TIME for the distance is --> 06:04:03s
        - Came out in place #11
Runner #12...
        - The RUNNER NAME is --> Lean
        - The TIME for the distance is --> 23:02:03s
        - Came out in place #12

Select an operation for race #3...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 4

Sorting runners by their names...


Runner #1...
        - The RUNNER NAME is --> Alexander Torres
        - The TIME for the distance is --> 02:12:04s
        - Came out in place #2
Runner #2...
        - The RUNNER NAME is --> Ana
        - The TIME for the distance is --> 06:04:03s
        - Came out in place #11
Runner #3...
        - The RUNNER NAME is --> Claudia Talavera
        - The TIME for the distance is --> 04:05:17s
        - Came out in place #10
Runner #4...
        - The RUNNER NAME is --> Fernanfloo
        - The TIME for the distance is --> 03:04:54s
        - Came out in place #7
Runner #5...
        - The RUNNER NAME is --> Francheska
        - The TIME for the distance is --> 04:02:03s
        - Came out in place #9
Runner #6...
        - The RUNNER NAME is --> Genesis
        - The TIME for the distance is --> 02:43:03s
        - Came out in place #4
Runner #7...
        - The RUNNER NAME is --> Hector Pagan
        - The TIME for the distance is --> 02:04:03s
        - Came out in place #1
Runner #8...
        - The RUNNER NAME is --> Juan V. Santiago
        - The TIME for the distance is --> 03:02:03s
        - Came out in place #6
Runner #9...
        - The RUNNER NAME is --> Kenneth
        - The TIME for the distance is --> 03:23:04s
        - Came out in place #8
Runner #10...
        - The RUNNER NAME is --> Kevin Cubilette
        - The TIME for the distance is --> 02:34:02s
        - Came out in place #3
Runner #11...
        - The RUNNER NAME is --> Lean
        - The TIME for the distance is --> 23:02:03s
        - Came out in place #12
Runner #12...
        - The RUNNER NAME is --> Samuel Valentin
        - The TIME for the distance is --> 02:45:54s
        - Came out in place #5


Select an operation for race #3...
        1) Add a runner
        2) Delete a runner
        3) Search a runner
        4) Print all the runners ordered by their names
        5) Print all the runners ordered by their times
        6) Exit
Answer --> 5

Sorting runners by their times...

Sorting runners by their times...

Sorting runners by their times...


Runner #1...
        - The RUNNER NAME is --> Hector Pagan
        - The TIME for the distance is --> 02:04:03s
        - Came out in place #1
Runner #2...
        - The RUNNER NAME is --> Alexander Torres
        - The TIME for the distance is --> 02:12:04s
        - Came out in place #2
Runner #3...
        - The RUNNER NAME is --> Kevin Cubilette
        - The TIME for the distance is --> 02:34:02s
        - Came out in place #3
Runner #4...
        - The RUNNER NAME is --> Genesis
        - The TIME for the distance is --> 02:43:03s
        - Came out in place #4
Runner #5...
        - The RUNNER NAME is --> Samuel Valentin
        - The TIME for the distance is --> 02:45:54s
        - Came out in place #5
Runner #6...
        - The RUNNER NAME is --> Juan V. Santiago
        - The TIME for the distance is --> 03:02:03s
        - Came out in place #6
Runner #7...
        - The RUNNER NAME is --> Fernanfloo
        - The TIME for the distance is --> 03:04:54s
        - Came out in place #7
Runner #8...
        - The RUNNER NAME is --> Kenneth
        - The TIME for the distance is --> 03:23:04s
        - Came out in place #8
Runner #9...
        - The RUNNER NAME is --> Francheska
        - The TIME for the distance is --> 04:02:03s
        - Came out in place #9
Runner #10...
        - The RUNNER NAME is --> Claudia Talavera
        - The TIME for the distance is --> 04:05:17s
        - Came out in place #10
Runner #11...
        - The RUNNER NAME is --> Ana
        - The TIME for the distance is --> 06:04:03s
        - Came out in place #11
Runner #12...
        - The RUNNER NAME is --> Lean
        - The TIME for the distance is --> 23:02:03s
        - Came out in place #12
```

```
Select an operation for race #3...
    1) Add a runner
    2) Delete a runner
    3) Search a runner
    4) Print all the runners ordered by their names
    5) Print all the runners ordered by their times
    6) Exit
Answer --> 6

Finishing menu for the race...
Printing whole races stadisctics...
Race #1...
    - The event name is --> Lola Challenge
    - The event distance is --> 26.2, Marathon

Race results:
Runner #1...
    - The RUNNER NAME is -->
    - The TIME for the distance is --> 00:00:00s
    - Came out in place #1
Runner #2...
    - The RUNNER NAME is --> Eliud Kipchogue
    - The TIME for the distance is --> 02:03:02s
    - Came out in place #2
Runner #3...
    - The RUNNER NAME is --> Madeline
    - The TIME for the distance is --> 05:45:02s
    - Came out in place #3
Race #2...
```

```
        - The event name is --> INEOS CHALLENGE
        - The event distance is --> 26.2

Race results:
Runner #1...
        - The RUNNER NAME is -->
        - The TIME for the distance is --> 00:00:00s
        - Came out in place #1
Runner #2...
        - The RUNNER NAME is --> Jakob Ingebriksten
        - The TIME for the distance is --> 02:04:02s
        - Came out in place #2
Runner #3...
        - The RUNNER NAME is --> Paul Chelimo
        - The TIME for the distance is --> 02:10:23s
        - Came out in place #3
Runner #4...
        - The RUNNER NAME is --> Alodra Negrn
        - The TIME for the distance is --> 02:34:02s
        - Came out in place #4
Runner #5...
        - The RUNNER NAME is --> Kenenisa Bekele
        - The TIME for the distance is --> 02:45:03s
        - Came out in place #5
Race #3...
        - The event name is --> San Blas
        - The event distance is --> 13.1, Half Marathon

Race results:
Runner #1...
```

```
        - The RUNNER NAME is --> Hector Pagan
        - The TIME for the distance is --> 02:04:03s
        - Came out in place #1
Runner #2...
        - The RUNNER NAME is --> Alexander Torres
        - The TIME for the distance is --> 02:12:04s
        - Came out in place #2
Runner #3...
        - The RUNNER NAME is --> Kevin Cubilette
        - The TIME for the distance is --> 02:34:02s
        - Came out in place #3
Runner #4...
        - The RUNNER NAME is --> Genesis
        - The TIME for the distance is --> 02:43:03s
        - Came out in place #4
Runner #5...
        - The RUNNER NAME is --> Samuel Valentin
        - The TIME for the distance is --> 02:45:54s
        - Came out in place #5
Runner #6...
        - The RUNNER NAME is --> Juan V. Santiago
        - The TIME for the distance is --> 03:02:03s
        - Came out in place #6
Runner #7...
        - The RUNNER NAME is --> Fernanfloo
        - The TIME for the distance is --> 03:04:54s
        - Came out in place #7
Runner #8...
        - The RUNNER NAME is --> Kenneth
        - The TIME for the distance is --> 03:23:04s
        - Came out in place #8

Runner #9...

        - The RUNNER NAME is --> Francheska

        - The TIME for the distance is --> 04:02:03s

        - Came out in place #9

Runner #10...

        - The RUNNER NAME is --> Claudia Talavera

        - The TIME for the distance is --> 04:05:17s

        - Came out in place #10

Runner #11...

        - The RUNNER NAME is --> Ana

        - The TIME for the distance is --> 06:04:03s

        - Came out in place #11

Runner #12...

        - The RUNNER NAME is --> Lean

        - The TIME for the distance is --> 23:02:03s

        - Came out in place #12



D:\OneDrive\Escritorio\Learning\C++\CECS2222-22 (Compe 2)\All asignments from October 7, 2022 - Solution\x64\Debug\Activity 8.2, Composition.exe (process 14992) exited with code 0.

To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the console when debugging stops.

Press any key to close this window . . .
```