View->Web Layout

1.

You are given the **User** and **SocialNetwork** classes.

The **User** class stores information about username, age and number of friends within a social network.

The **SocialNetwork** class stores a list of members (objects of the User class) and the size of the list.

Add in the initial code the following things:

1. Prevent adding a user with an already existing username by throwing an exception of type **UserAlreadyExistsException**. Handle the exception where necessary.

2. Add a variable for the limit of friends allowed per user (integer). The variable should be valid for all users (objects of the **User** class) and it can be changed through the **setLimit** method. Initially, the variable should have a value of 3.

3. Throw an exception of type **UserNotFoundException** in the friendRequest method if friendRequest or secondUsername are not usernames of users in the social network. Handle the exception where necessary.

4. To prevent an increase in the number of friends of a user (beyond the allowed limit) with an exception of type **FriendsLimitExceededException**. Handle the exception where necessary.

//  
// Created by Stefan Andonov on 13.5.23.  
//  
  
#include<iostream>  
#include<cstring>  
*using namespace* std;  
  
*class* UserAlreadyExistsException {  
*private*:  
 *char* username[50];  
*public*:  
 UserAlreadyExistsException(*char* \*username){  
 strcpy(*this*->username,username);  
 }  
 *void* show\_message(){  
 **cout**<<"User with username "<<username<<" already exists!"<<endl;  
 }  
};  
  
*class* UserNotFoundException {  
*private*:  
 *char* username[50];  
*public*:  
 UserNotFoundException(*char* \*username){  
 strcpy(*this*->username,username);  
 }  
 *void* show\_message(){  
 **cout**<<"User with username "<<username<<" was not found!"<<endl;  
 }  
};  
  
  
  
*class* User {  
*private*:  
 *char* username[50];  
 *int* age;  
 *int* friends;  
 *static int* N\_FRIENDS;  
*public*:  
 User(*char* \*username = "", *int* age = 18) : age(age) {  
 strcpy(*this*->username, username);  
 friends = 0;  
 }  
  
 *friend* ostream &*operator*<<(ostream &os, *const* User &user) {  
 os << "Username: " << user.username << " Age: " << user.age << " # of friends: " << user.friends;  
 *return* os;  
 }  
  
 User &*operator*++() {  
 ++friends;  
 *return* \**this*;  
 }  
  
 *friend class* SocialNetwork;  
  
 *static int* setLimit(*int* n){  
 N\_FRIENDS=n;  
 }  
 *static int* getN(){  
 *return* N\_FRIENDS;  
 }  
  
};  
  
  
  
*int* User::N\_FRIENDS=3;  
  
*class* FriendsLimitExceededException {  
*private*:  
 *char* username[50];  
*public*:  
 FriendsLimitExceededException(*char* \*username){  
 strcpy(*this*->username,username);  
 }  
 *void* show\_message(){  
 **cout**<<"Can't have more than "<<User::getN()<<" friends."<<endl;  
 }  
};  
  
*class* SocialNetwork {  
*private*:  
 User \*users;  
 *int* n;  
*public*:  
 SocialNetwork() {  
 n = 0;  
 users = *new* User[n];  
 }  
  
 SocialNetwork &*operator*+=(User &u) {  
 *if*(n!=0){  
 *for*(*int* **i**=0 ; **i**<n ; **i**++){  
 *if*(strcmp(users[**i**].username,u.username)==0){  
 *throw* UserAlreadyExistsException(u.username);  
 }  
 }  
 }  
 User \***tmp** = *new* User[n + 1];  
 *for* (*int* **i** = 0; **i** < n; **i**++) {  
 **tmp**[**i**] = users[**i**];  
 }  
 **tmp**[n++] = u;  
 *delete*[] users;  
 users = **tmp**;  
 *return* \**this*;  
 }  
  
 *void* friendRequest(*char* \*firstUsername, *char* \*secondUsername) {  
 *int* **flag1**=0;  
 *int* **flag2**=0;  
 *for* (*int* **i** = 0; **i** < n; **i**++) {  
 *if* (strcmp(users[**i**].username, firstUsername) == 0) {  
 **flag1**=1;  
 *for* (*int* **j** = 0; **j** < n; **j**++) {  
 *if* (strcmp(users[**j**].username, secondUsername) == 0) {  
 **flag2**=1;  
 *if*(users[**i**].friends==User::N\_FRIENDS){  
 *throw* FriendsLimitExceededException(users[**i**].username);  
 }  
 *if*(users[**j**].friends==User::N\_FRIENDS){  
 *throw* FriendsLimitExceededException(users[**j**].username);  
 }  
 ++users[**i**];  
 ++users[**j**];  
 *return*;  
 }  
 }  
 }  
 }  
 *if*(**flag1**==0){  
 *throw* UserNotFoundException(firstUsername);  
 }  
 *if*(**flag2**==0){  
 *throw* UserNotFoundException(secondUsername);  
 }  
 }  
  
 *friend* ostream &*operator*<<(ostream &os, *const* SocialNetwork &network) {  
 os << "Users: " << endl;  
 *for* (*int* **i**=0;**i**<network.n;**i**++) {  
 os << network. users[**i**] << endl;  
 }  
 *return* os;  
 }  
};  
  
  
*int* main() {  
 SocialNetwork **sn**;  
 *int* **n**;  
 **cin** >> **n**;  
 *for* (*int* **i**=0;**i**<**n**;**i**++){  
 *char* **username**[50]; *int* **age**;  
 **cin** >> **username** >> **age**;  
 *try* {  
 User **u**(**username**, **age**);  
 **sn** += **u**;  
 }*catch* (UserAlreadyExistsException &**e**){  
 **e**.show\_message();  
 }  
  
  
 }  
  
 **cout** << "Registration of users " << endl;  
 **cout** << **sn** << endl;  
 **cout** << "Friend requests " << endl;  
  
 *int* **friendships**;  
 **cin** >> **friendships**;  
 *for* (*int* **i**=0;**i**<**friendships**;**i**++){  
 *char* **username1**[50], **username2**[50];  
 **cin** >> **username1** >> **username2**;  
 *try* {  
 **sn**.friendRequest(**username1**, **username2**);  
 }*catch* (UserNotFoundException &**e**){  
 **e**.show\_message();  
 }*catch* (FriendsLimitExceededException &**e**){  
 **e**.show\_message();  
 }  
  
  
 }  
  
 **cout** << **sn** << endl;  
  
 **cout** << "CHANGE STATIC VALUE" << endl;  
  
 *int* **maxFriends**;  
 **cin** >> **maxFriends**;  
 **cin** >> **friendships**;  
 User::setLimit(**maxFriends**);  
 *for* (*int* **i**=0;**i**<**friendships**;**i**++){  
 *char* **username1**[50], **username2**[50];  
 **cin** >> **username1** >> **username2**;  
 *try* {  
 **sn**.friendRequest(**username1**, **username2**);  
 }*catch* (UserNotFoundException &**e**){  
 **e**.show\_message();  
 }*catch* (FriendsLimitExceededException &**e**){  
 **e**.show\_message();  
 }  
  
 }  
 **cout** << **sn**;  
 *return* 0;  
}

| **Input** | **Expected** | **Got** |  |
| --- | --- | --- | --- |
|  | 5  stefan.andonov 19  vlatko.spasev 20  marko.petrov 21  dimitar.kitanovski 22  ema.pandilova 18  0  0  0 | Registration of users  Users:  Username: stefan.andonov Age: 19 # of friends: 0  Username: vlatko.spasev Age: 20 # of friends: 0  Username: marko.petrov Age: 21 # of friends: 0  Username: dimitar.kitanovski Age: 22 # of friends: 0  Username: ema.pandilova Age: 18 # of friends: 0  Friend requests  Users:  Username: stefan.andonov Age: 19 # of friends: 0  Username: vlatko.spasev Age: 20 # of friends: 0  Username: marko.petrov Age: 21 # of friends: 0  Username: dimitar.kitanovski Age: 22 # of friends: 0  Username: ema.pandilova Age: 18 # of friends: 0  CHANGE STATIC VALUE  Users:  Username: stefan.andonov Age: 19 # of friends: 0  Username: vlatko.spasev Age: 20 # of friends: 0  Username: marko.petrov Age: 21 # of friends: 0  Username: dimitar.kitanovski Age: 22 # of friends: 0  Username: ema.pandilova Age: 18 # of friends: 0 | Registration of users  Users:  Username: stefan.andonov Age: 19 # of friends: 0  Username: vlatko.spasev Age: 20 # of friends: 0  Username: marko.petrov Age: 21 # of friends: 0  Username: dimitar.kitanovski Age: 22 # of friends: 0  Username: ema.pandilova Age: 18 # of friends: 0  Friend requests  Users:  Username: stefan.andonov Age: 19 # of friends: 0  Username: vlatko.spasev Age: 20 # of friends: 0  Username: marko.petrov Age: 21 # of friends: 0  Username: dimitar.kitanovski Age: 22 # of friends: 0  Username: ema.pandilova Age: 18 # of friends: 0  CHANGE STATIC VALUE  Users:  Username: stefan.andonov Age: 19 # of friends: 0  Username: vlatko.spasev Age: 20 # of friends: 0  Username: marko.petrov Age: 21 # of friends: 0  Username: dimitar.kitanovski Age: 22 # of friends: 0  Username: ema.pandilova Age: 18 # of friends: 0 |  |
|  | 5  stefan.andonov 19  vlatko.spasev 20  marko.petrov 21  stefan.andonov 22  ema.pandilova 18  0  0  0 | User with username stefan.andonov already exists!  Registration of users  Users:  Username: stefan.andonov Age: 19 # of friends: 0  Username: vlatko.spasev Age: 20 # of friends: 0  Username: marko.petrov Age: 21 # of friends: 0  Username: ema.pandilova Age: 18 # of friends: 0  Friend requests  Users:  Username: stefan.andonov Age: 19 # of friends: 0  Username: vlatko.spasev Age: 20 # of friends: 0  Username: marko.petrov Age: 21 # of friends: 0  Username: ema.pandilova Age: 18 # of friends: 0  CHANGE STATIC VALUE  Users:  Username: stefan.andonov Age: 19 # of friends: 0  Username: vlatko.spasev Age: 20 # of friends: 0  Username: marko.petrov Age: 21 # of friends: 0  Username: ema.pandilova Age: 18 # of friends: 0 | User with username stefan.andonov already exists!  Registration of users  Users:  Username: stefan.andonov Age: 19 # of friends: 0  Username: vlatko.spasev Age: 20 # of friends: 0  Username: marko.petrov Age: 21 # of friends: 0  Username: ema.pandilova Age: 18 # of friends: 0  Friend requests  Users:  Username: stefan.andonov Age: 19 # of friends: 0  Username: vlatko.spasev Age: 20 # of friends: 0  Username: marko.petrov Age: 21 # of friends: 0  Username: ema.pandilova Age: 18 # of friends: 0  CHANGE STATIC VALUE  Users:  Username: stefan.andonov Age: 19 # of friends: 0  Username: vlatko.spasev Age: 20 # of friends: 0  Username: marko.petrov Age: 21 # of friends: 0  Username: ema.pandilova Age: 18 # of friends: 0 |  |
|  | 5  stefan.andonov 19  vlatko.spasev 20  marko.petrov 21  dimitar.kitanovski 22  ema.pandilova 18  2  stefan.andonov vlatko.spasev  marko.petrov dimitar.kitanovski  0  0 | Registration of users  Users:  Username: stefan.andonov Age: 19 # of friends: 0  Username: vlatko.spasev Age: 20 # of friends: 0  Username: marko.petrov Age: 21 # of friends: 0  Username: dimitar.kitanovski Age: 22 # of friends: 0  Username: ema.pandilova Age: 18 # of friends: 0  Friend requests  Users:  Username: stefan.andonov Age: 19 # of friends: 1  Username: vlatko.spasev Age: 20 # of friends: 1  Username: marko.petrov Age: 21 # of friends: 1  Username: dimitar.kitanovski Age: 22 # of friends: 1  Username: ema.pandilova Age: 18 # of friends: 0  CHANGE STATIC VALUE  Users:  Username: stefan.andonov Age: 19 # of friends: 1  Username: vlatko.spasev Age: 20 # of friends: 1  Username: marko.petrov Age: 21 # of friends: 1  Username: dimitar.kitanovski Age: 22 # of friends: 1  Username: ema.pandilova Age: 18 # of friends: 0 | Registration of users  Users:  Username: stefan.andonov Age: 19 # of friends: 0  Username: vlatko.spasev Age: 20 # of friends: 0  Username: marko.petrov Age: 21 # of friends: 0  Username: dimitar.kitanovski Age: 22 # of friends: 0  Username: ema.pandilova Age: 18 # of friends: 0  Friend requests  Users:  Username: stefan.andonov Age: 19 # of friends: 1  Username: vlatko.spasev Age: 20 # of friends: 1  Username: marko.petrov Age: 21 # of friends: 1  Username: dimitar.kitanovski Age: 22 # of friends: 1  Username: ema.pandilova Age: 18 # of friends: 0  CHANGE STATIC VALUE  Users:  Username: stefan.andonov Age: 19 # of friends: 1  Username: vlatko.spasev Age: 20 # of friends: 1  Username: marko.petrov Age: 21 # of friends: 1  Username: dimitar.kitanovski Age: 22 # of friends: 1  Username: ema.pandilova Age: 18 # of friends: 0 |  |
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|  | 5  stefan.andonov 19  vlatko.spasev 20  marko.petrov 21  dimitar.kitanovski 22  ema.pandilova 18  5  stefan.andonov vlatko.spasev  marko.petrov dimitar.kitanovski  stefan.andonov marko.petrov  stefan.andonov ema.pandilova  marko.petrov petre.petrev  0  0 | Registration of users  Users:  Username: stefan.andonov Age: 19 # of friends: 0  Username: vlatko.spasev Age: 20 # of friends: 0  Username: marko.petrov Age: 21 # of friends: 0  Username: dimitar.kitanovski Age: 22 # of friends: 0  Username: ema.pandilova Age: 18 # of friends: 0  Friend requests  User with username petre.petrev was not found!  Users:  Username: stefan.andonov Age: 19 # of friends: 3  Username: vlatko.spasev Age: 20 # of friends: 1  Username: marko.petrov Age: 21 # of friends: 2  Username: dimitar.kitanovski Age: 22 # of friends: 1  Username: ema.pandilova Age: 18 # of friends: 1  CHANGE STATIC VALUE  Users:  Username: stefan.andonov Age: 19 # of friends: 3  Username: vlatko.spasev Age: 20 # of friends: 1  Username: marko.petrov Age: 21 # of friends: 2  Username: dimitar.kitanovski Age: 22 # of friends: 1  Username: ema.pandilova Age: 18 # of friends: 1 | Registration of users  Users:  Username: stefan.andonov Age: 19 # of friends: 0  Username: vlatko.spasev Age: 20 # of friends: 0  Username: marko.petrov Age: 21 # of friends: 0  Username: dimitar.kitanovski Age: 22 # of friends: 0  Username: ema.pandilova Age: 18 # of friends: 0  Friend requests  User with username petre.petrev was not found!  Users:  Username: stefan.andonov Age: 19 # of friends: 3  Username: vlatko.spasev Age: 20 # of friends: 1  Username: marko.petrov Age: 21 # of friends: 2  Username: dimitar.kitanovski Age: 22 # of friends: 1  Username: ema.pandilova Age: 18 # of friends: 1  CHANGE STATIC VALUE  Users:  Username: stefan.andonov Age: 19 # of friends: 3  Username: vlatko.spasev Age: 20 # of friends: 1  Username: marko.petrov Age: 21 # of friends: 2  Username: dimitar.kitanovski Age: 22 # of friends: 1  Username: ema.pandilova Age: 18 # of friends: 1 |  |
|  | 5  stefan.andonov 19  vlatko.spasev 20  marko.petrov 21  dimitar.kitanovski 22  ema.pandilova 18  5  stefan.andonov vlatko.spasev  marko.petrov dimitar.kitanovski  riste.ridtovski marko.petrovski  stefan.andonov ema.pandilova  marko.petrov petre.petrev  0  0 | Registration of users  Users:  Username: stefan.andonov Age: 19 # of friends: 0  Username: vlatko.spasev Age: 20 # of friends: 0  Username: marko.petrov Age: 21 # of friends: 0  Username: dimitar.kitanovski Age: 22 # of friends: 0  Username: ema.pandilova Age: 18 # of friends: 0  Friend requests  User with username riste.ridtovski was not found!  User with username petre.petrev was not found!  Users:  Username: stefan.andonov Age: 19 # of friends: 2  Username: vlatko.spasev Age: 20 # of friends: 1  Username: marko.petrov Age: 21 # of friends: 1  Username: dimitar.kitanovski Age: 22 # of friends: 1  Username: ema.pandilova Age: 18 # of friends: 1  CHANGE STATIC VALUE  Users:  Username: stefan.andonov Age: 19 # of friends: 2  Username: vlatko.spasev Age: 20 # of friends: 1  Username: marko.petrov Age: 21 # of friends: 1  Username: dimitar.kitanovski Age: 22 # of friends: 1  Username: ema.pandilova Age: 18 # of friends: 1 | Registration of users  Users:  Username: stefan.andonov Age: 19 # of friends: 0  Username: vlatko.spasev Age: 20 # of friends: 0  Username: marko.petrov Age: 21 # of friends: 0  Username: dimitar.kitanovski Age: 22 # of friends: 0  Username: ema.pandilova Age: 18 # of friends: 0  Friend requests  User with username riste.ridtovski was not found!  User with username petre.petrev was not found!  Users:  Username: stefan.andonov Age: 19 # of friends: 2  Username: vlatko.spasev Age: 20 # of friends: 1  Username: marko.petrov Age: 21 # of friends: 1  Username: dimitar.kitanovski Age: 22 # of friends: 1  Username: ema.pandilova Age: 18 # of friends: 1  CHANGE STATIC VALUE  Users:  Username: stefan.andonov Age: 19 # of friends: 2  Username: vlatko.spasev Age: 20 # of friends: 1  Username: marko.petrov Age: 21 # of friends: 1  Username: dimitar.kitanovski Age: 22 # of friends: 1  Username: ema.pandilova Age: 18 # of friends: 1 |  |
|  | 5  stefan.andonov 19  vlatko.spasev 20  marko.petrov 21  dimitar.kitanovski 22  ema.pandilova 18  8  stefan.andonov vlatko.spasev  marko.petrov dimitar.kitanovski  stefan.andonov marko.petrov  stefan.andonov ema.pandilova  stefan.andonov dimitar.kitanovski  marko.petrov ema.pandilova  dimitar.kitanovski marko.petrov  vlatko.spasev marko.petrov  5  3  marko.petrov ema.pandilova  dimitar.kitanovski marko.petrov  vlatko.spasev marko.petrov | Registration of users  Users:  Username: stefan.andonov Age: 19 # of friends: 0  Username: vlatko.spasev Age: 20 # of friends: 0  Username: marko.petrov Age: 21 # of friends: 0  Username: dimitar.kitanovski Age: 22 # of friends: 0  Username: ema.pandilova Age: 18 # of friends: 0  Friend requests  Can't have more than 3 friends.  Can't have more than 3 friends.  Can't have more than 3 friends.  Users:  Username: stefan.andonov Age: 19 # of friends: 3  Username: vlatko.spasev Age: 20 # of friends: 1  Username: marko.petrov Age: 21 # of friends: 3  Username: dimitar.kitanovski Age: 22 # of friends: 1  Username: ema.pandilova Age: 18 # of friends: 2  CHANGE STATIC VALUE  Can't have more than 5 friends.  Users:  Username: stefan.andonov Age: 19 # of friends: 3  Username: vlatko.spasev Age: 20 # of friends: 1  Username: marko.petrov Age: 21 # of friends: 5  Username: dimitar.kitanovski Age: 22 # of friends: 2  Username: ema.pandilova Age: 18 # of friends: 3 | Registration of users  Users:  Username: stefan.andonov Age: 19 # of friends: 0  Username: vlatko.spasev Age: 20 # of friends: 0  Username: marko.petrov Age: 21 # of friends: 0  Username: dimitar.kitanovski Age: 22 # of friends: 0  Username: ema.pandilova Age: 18 # of friends: 0  Friend requests  Can't have more than 3 friends.  Can't have more than 3 friends.  Can't have more than 3 friends.  Users:  Username: stefan.andonov Age: 19 # of friends: 3  Username: vlatko.spasev Age: 20 # of friends: 1  Username: marko.petrov Age: 21 # of friends: 3  Username: dimitar.kitanovski Age: 22 # of friends: 1  Username: ema.pandilova Age: 18 # of friends: 2  CHANGE STATIC VALUE  Can't have more than 5 friends.  Users:  Username: stefan.andonov Age: 19 # of friends: 3  Username: vlatko.spasev Age: 20 # of friends: 1  Username: marko.petrov Age: 21 # of friends: 5  Username: dimitar.kitanovski Age: 22 # of friends: 2  Username: ema.pandilova Age: 18 # of friends: 3 |  |

2.

Impplement a class Race that contains:

* city name(array of max 40 characters)
* year (int)
* month (int)
* best time in seconds (double)
* length in kilometers (double)

You should also implement the following methods:

* **heaviness**() that returns the heaviness of the race calculated by the following formula:

**(best time in seconds / length in kilometers)**

* **operator<<** for printing the race in the following format:

[City Month.Year Heaviness]

Implement another class **CarRace**which will contain:

* array of best times of practices(dynamically reserved array of decimal numbers)
* number of best times (int)
* number of laps (int)

In this class override the function **heaviness**() so it should return the basic value of the Race and add the average from the best times multiplied by the **CAR\_COEF**, which is initially 0.3 but it can be changed. Additionally if the number of lap sis bigger than 15, the heaviness is greater 10%. For this class you should implement:

* operator += for adding new time from practices in dynamically allocated array of best times. If someone adds time that is less than 10, exception should be thrown from the class InvalidTimeException, that should print "The time is not valid".

#include<iostream>  
#include<cstring>  
*using namespace* std;  
  
*class* InvalidTimeException{  
*public*:  
 InvalidTimeException(){}  
 *void* print(){  
 cout<<"The time is not valid"<<endl;  
 }  
};  
  
*class* Race{  
*protected*:  
 *char* city[40];  
 *int* year;  
 *int* month;  
 *float* bestTime;  
 *float* length;  
*public*:  
 Race(*char* \*city="", *int* year=0, *int* month=0, *float* bestTime=0.0, *float* length=0.0){  
 strcpy(*this*->city,city);  
 *this*->year=year;  
 *this*->month=month;  
 *this*->bestTime=bestTime;  
 *this*->length=length;  
 }  
 *virtual float* heaviness()*const*{  
 *return* bestTime/length;  
 }  
  
 *friend* ostream &*operator*<<(ostream &os, *const* Race &race) {  
 os<<race.city<<" "<<race.month<<"."<<race.year<<" "<<race.heaviness()<<endl;  
 *return* os;  
 }  
  
};  
  
//-----------------------------------------------------------------------------------------//  
  
  
  
  
*class* CarRace:*public* Race{  
*private*:  
 *float* \*bestTimes;  
 *int* numOfBestTimes;  
 *int* numOfLaps;  
 *static float* CAR\_COEF;  
*public*:  
 CarRace(*char* \*city="", *int* year=0, *int* month=0, *float* bestTime=0.0, *float* length=0.0, *float* \*bestTimes= *nullptr*, *int* numOfBestTimes=0, *int* numOfLaps=0)  
 :Race(city,year,month,bestTime,length){  
 *this*->numOfBestTimes=numOfBestTimes;  
 *this*->bestTimes=*new float* [numOfBestTimes];  
 *for*(*int* i=0 ; i<numOfBestTimes ; i++){  
 *this*->bestTimes[i]=bestTimes[i];  
 }  
 *this*->numOfLaps=numOfLaps;  
 }  
  
 *float* heaviness() *const override* {  
 *float* p=Race::heaviness()+average()\*CAR\_COEF;  
 *if*(numOfLaps>15){  
 *return* p\*1.1;  
 }  
 *return* p;  
 }  
 *float* average()*const*{  
 *float* sum=0.0;  
 *for*(*int* i=0 ; i<numOfBestTimes ; i++){  
 sum+=bestTimes[i];  
 }  
 *return* sum/numOfBestTimes;  
 }  
  
 *friend* ostream &*operator*<<(ostream &os, *const* CarRace &race) {  
 os<<race.city<<" "<<race.month<<"."<<race.year<<" "<<race.heaviness()<<endl;  
 *return* os;  
 }  
  
// Account &operator+=(Transaction \*t) {  
// Transaction \*\*tmp = new Transaction \*[count + 1];  
// for (int i = 0; i < count; i++) {  
// tmp[i] = transactions[i];  
// }  
// tmp[count++] = t;  
// delete[] transactions;  
// transactions = tmp;  
// return \*this;  
// }  
  
 CarRace &*operator*+=(*float* time){  
 *if*(time<10){  
 *throw* InvalidTimeException();  
 }  
 *float* \*tmp=*new float* [numOfBestTimes+1];  
 *for*(*int* i=0 ; i<numOfBestTimes ; i++){  
 tmp[i]=bestTimes[i];  
 }  
 tmp[numOfBestTimes++]=time;  
 *delete* [] bestTimes;  
 bestTimes=tmp;  
 *return* \**this*;  
 }  
 ~CarRace(){  
 *delete* [] bestTimes;  
 }  
 *void* setNumberLaps(*int* n){  
 numOfLaps=n;  
 }  
 *static float* setKoeficient(*float* d){  
 CAR\_COEF=d;  
 }  
};  
  
*float* CarRace::CAR\_COEF=0.3;  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
*int* main(){  
 *int* testCase;  
 cin >> testCase;  
 *char* city[50];  
 *int* year;  
 *int* month;  
 *float* bestTime;  
 *float* length;  
 *float* bestTimes[50];  
 *int* n;  
 *int* m;  
 *int* izbor;  
 *int* numberLaps;  
  
 *if* (testCase == 1){  
 cout << "===== Testing the classes ======" << endl;  
 cin >> city;  
 cin >> year;  
 cin >> month;  
 cin >> bestTime;  
 cin>>length;  
 Race t(city, year, month, bestTime, length);  
 cout<<t;  
 cin >> city;  
 cin >> year;  
 cin >> month;  
 cin >> bestTime;  
 cin>>length;  
 cin>>numberLaps;  
 cin>>n;  
 *for* (*int* j = 0; j < n; j++)  
 cin >> bestTimes[j];  
 CarRace mgt(city, year, month, bestTime, length, bestTimes, n, numberLaps);  
 cout << mgt;  
 CarRace mgt2;  
 }  
 *if* (testCase == 2){  
 cout << "===== Testing the operator += ======" << endl;  
 Race \*\*niza;  
 cin >> m;  
 niza = *new* Race \*[m];  
 *for* (*int* i = 0; i<m; i++){  
 cin >> izbor;  
 cin >> city;  
 cin >> year;  
 cin >> month;  
 cin >> bestTime;  
 cin >>length;  
 *if* (izbor == 1){  
 niza[i] = *new* Race(city, year, month, bestTime, length);  
 }  
 *else*{  
 cin>>numberLaps;  
 cin>>n;  
 *for* (*int* j = 0; j < n; j++)  
 cin >> bestTimes[j];  
 niza[i] = *new* CarRace(city, year, month, bestTime, length, bestTimes, n, numberLaps);  
 }  
 }  
 // pecatenje na site Trki  
 cout << "\nList of all races:\n";  
 *for* (*int* i = 0; i < m; i++)  
 cout << \*niza[i];  
  
 // dodavanje novo najdobro vreme za prvata CarRace  
 *float* best;  
 cin >> best;  
 *int* flag = 1;  
 *for* (*int* i = 0; i < m; i++){  
 CarRace\* nn = *dynamic\_cast*<CarRace\*>(niza[i]);  
 *if* (nn != 0){  
 flag = 0;  
 (\*nn) += best;  
 *break*;  
 }  
 }  
  
  
 // pecatenje na site Trki  
 cout << "\nList of all races:\n";  
 *for* (*int* i = 0; i < m; i++)  
 cout << \*niza[i];  
 }  
 *if* (testCase == 3){  
 cout << "===== Testing the exceptions ======" << endl;  
 cin >> city;  
 cin >> year;  
 cin >> month;  
 cin >> bestTime;  
 cin>>length;  
 cin>>numberLaps;  
 CarRace mgt(city, year, month, bestTime, length);  
 mgt.setNumberLaps(numberLaps);  
 *float* vreme1,vreme2;  
 cin>>vreme1>>vreme2;  
 *try*{  
 mgt+=vreme1;  
 mgt+=vreme2;  
 }  
 *catch*(InvalidTimeException e)  
 {  
 e.print();  
 }  
 cout<<mgt;  
 }  
 *if* (testCase == 5){  
 cout << "===== Testing static members ======" << endl;  
 Race \*\*niza;  
 cin >> m;  
 niza = *new* Race \*[m];  
 *for* (*int* i = 0; i<m; i++){  
 cin >> izbor;  
 cin >> city;  
 cin >> year;  
 cin >> month;  
 cin >> bestTime;  
 cin >>length;  
 *if* (izbor == 1){  
 niza[i] = *new* Race(city, year, month, bestTime, length);  
 }  
 *else*{  
 cin>>numberLaps;  
 cin>>n;  
 *for* (*int* j = 0; j < n; j++)  
 cin >> bestTimes[j];  
 niza[i] = *new* CarRace(city, year, month, bestTime, length, bestTimes, n, numberLaps);  
 }  
 }  
 // pecatenje na site Trki  
 cout << "\nList of all races:\n";  
 *for* (*int* i = 0; i < m; i++)  
 cout << \*niza[i];  
  
 CarRace::setKoeficient(0.7);  
 // pecatenje na site Trki  
 cout << "\nList of all races:\n";  
 *for* (*int* i = 0; i < m; i++)  
 cout << \*niza[i];  
 }  
  
  
  
 *return* 0;  
}

| * **Input** | **Expected** | **Got** |  |
| --- | --- | --- | --- |
|  | 1  Paris  2011  5  1986.3  49.6  Jerez  2017  6  41.53  4.429  24  5  49.2  39.11  42.4  54.3  44.4 | ===== Testing the classes ======  Paris 5.2011 40.0464  Jerez 6.2017 25.4556 | ===== Testing the classes ======  Paris 5.2011 40.0464  Jerez 6.2017 25.4556 |  |
|  | 2  5  1  Madrid  2015  1  206.3  34.5  2  Mugello  2019  6  99.7  5.245  20  4  105.2  103.4  99.99  34.2  1  Skopje  2013  8  70.0  1844.5  2  Brno  2017  7  85.824  4.533  24  4  105.2  103.4  99.99  34.2  1  Sofia  2015  9  85.824  4.533  55.55 | ===== Testing the operator += ======  List of all races:  Madrid 1.2015 5.97971  Mugello 6.2019 49.1896  Skopje 8.2013 0.0379507  Brno 7.2017 49.1067  Sofia 9.2015 18.9332  List of all races:  Madrid 1.2015 5.97971  Mugello 6.2019 47.1999  Skopje 8.2013 0.0379507  Brno 7.2017 49.1067  Sofia 9.2015 18.9332 | ===== Testing the operator += ======  List of all races:  Madrid 1.2015 5.97971  Mugello 6.2019 49.1896  Skopje 8.2013 0.0379507  Brno 7.2017 49.1067  Sofia 9.2015 18.9332  List of all races:  Madrid 1.2015 5.97971  Mugello 6.2019 47.1999  Skopje 8.2013 0.0379507  Brno 7.2017 49.1067  Sofia 9.2015 18.9332 |  |
|  | 3  Qatar  2011  3  54.822  5.535  24  33.33  5.5 | ===== Testing the exceptions ======  The time is not valid  Qatar 3.2011 21.894 | ===== Testing the exceptions ======  The time is not valid  Qatar 3.2011 21.894 |  |
|  | 5  5  1  Madrid  2015  1  206.3  34.5  2  Mugello  2019  6  99.7  5.245  20  4  105.2  103.4  99.99  34.2  1  Skopje  2013  8  70.0  1844.5  2  Brno  2017  7  85.824  4.533  24  4  105.2  103.4  99.99  34.2  1  Sofia  2015  9  85.824  4.533  55.55 | ===== Testing static members ======  List of all races:  Madrid 1.2015 5.97971  Mugello 6.2019 49.1896  Skopje 8.2013 0.0379507  Brno 7.2017 49.1067  Sofia 9.2015 18.9332  List of all races:  Madrid 1.2015 5.97971  Mugello 6.2019 86.8965  Skopje 8.2013 0.0379507  Brno 7.2017 86.8136  Sofia 9.2015 18.9332 | ===== Testing static members ======  List of all races:  Madrid 1.2015 5.97971  Mugello 6.2019 49.1896  Skopje 8.2013 0.0379507  Brno 7.2017 49.1067  Sofia 9.2015 18.9332  List of all races:  Madrid 1.2015 5.97971  Mugello 6.2019 86.8965  Skopje 8.2013 0.0379507  Brno 7.2017 86.8136  Sofia 9.2015 18.9332 |  |