Faculty of Computer & Information Sciences
Ain Shams University
Subject: CSW150
Fundamentals of Structured
Programming

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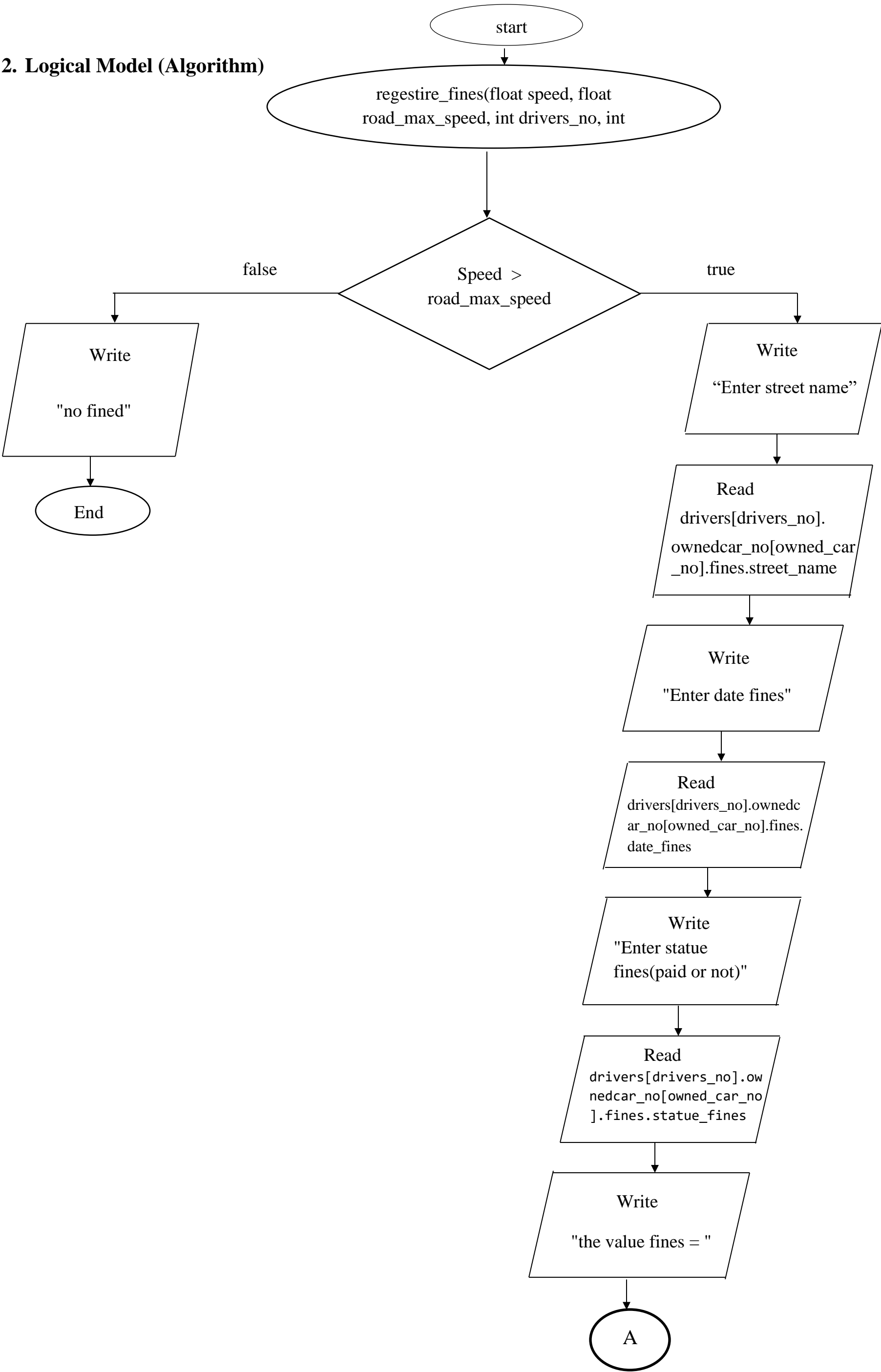
Research Topic Version (D)

Title: Traffic Control System.
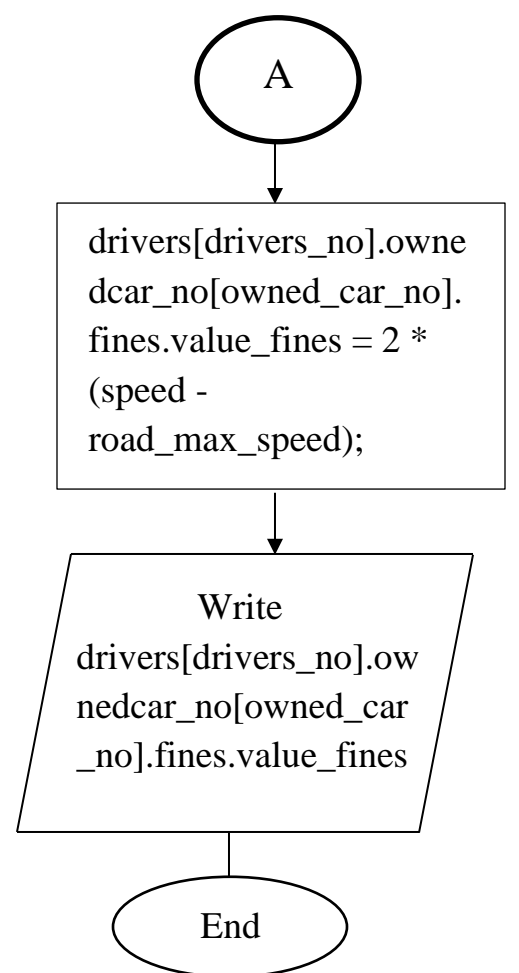
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1. Data Model

- const int ownedcar = 3, constant because it does not change in program, global to see in the whole code as struct and function, use type int because it is short and not need float. use 3 because its maximum owned of car.

- int counter = 1; bool check = false; bool check2 = false; bool check1 = false; bool ok = false; int pay
  (use type int : it short not long or not float , use type Boolean: to check the variable true or false.

  string username, passward, string yourchoose (use type string : to need write word from many character)

  global to Avoid repetition ,to see in whole code, and used in code many times structs and function.

- struct fines_info, struct list_of_ownedcars , struct drivers_info, struct traffic_man

  use type struct to include many different types of data and every data (structure member) has own independent memory that means we can access any member anytime.

- drivers[100], trafficman[100];

  use struct of array to store the same type of data to many variables, size 100 to store many drivers and traffic man.

- Then use functions to make code easier

- string type; string ch; string cont;
  use them local because of used in function main only.

- In sign in when user register ,the code compares the entered information with information in struct if it's valid it continues their tasks else display invalid account.

- Also when the driver pays fined the struct information update the value become zero, the statue become paid and when traffic_man register fines the struct (fines_info) update with date fines , street name ,statue fines , value fines and when driver use function (regestire_new_car) the struct (drivers_info) update with new information entered ,if the new car increase on 3 car it display invalid

2. Logical Model (Algorithm)

start

regestire_fines(float speed, float road_max_speed, int drivers_no, int

Speed > road_max_speed

false

true

Write

"no fined"

End

Write

"Enter street name"

Read

drivers[drivers_no].ownedcar_no[owned_car_no].fines.street_name

Write

"Enter date fines"

Read
drivers[drivers_no].ownedcar_no[owned_car_no].fines.date_fines

Write

"Enter statue fines(paid or not)"

Read
drivers[drivers_no].ownedcar_no[owned_car_no].fines.statue_fines

Write

"the value fines = "

A

```
drivers[drivers_no].owne
dcar_no[owned_car_no].
fines.value_fines = 2 *
(speed -
road_max_speed);
```

Write drivers[drivers_no].ow nedcar_no[owned_car _no].fines.value_fines

End

FUNCTION regestire_fines(float speed, float road_max_speed, int drivers_no, int owned_car_no)

IF speed > road_max_speed THEN

   PRINT "Enter street name"

   READ drivers[drivers_no].ownedcar_no[owned_car_no].fines.street_name;

   PRINT "Enter date fines"

   READ drivers[drivers_no].ownedcar_no[owned_car_no].fines.date_fines

   PRINT   "Enter statue fines(paid or not)"

   READ drivers[drivers_no].ownedcar_no[owned_car_no].fines.statue_fines

   PRINT "the value fines = "

   READ "the value fines = "

   drivers[drivers_no].ownedcar_no[owned_car_no].fines.value_fines = 2 * (speed - road_max_speed);

   PRINT drivers[drivers_no].ownedcar_no[owned_car_no].fines.value_fines

ELSE

   PRINT "no fined"

END IF

END

3. Process Model (Functions)

1. void total_fines (int no ,int driver_no)

   no: number of cars the driver has , driver_no: array number.

   parameter (int no , int driver_no) , don't return thing , the output in the body of the function is total fines, it calculates total fines.

2. void regestire_fines (float speed, float road_max_speed, int drivers_no, int owned_car_no)

   float speed: car speed , road_max_speed: max speed of road , drivers_no: array number , owned_car_no: number car owned.

   Parameter (float speed, float road_max_speed, int drivers_no, int owned_car_no) , don't return thing, not found output, this function calculates the fines value if there.

3. void pay_fines(int driver_no, int no)

   no: number of cars the driver has , driver_no: array number.

   Parameter(int driver_no, int no) , don't return thing ,not found output, this function to pay fines.

4. void regestire_new_car (int driver_no , int no)

   no: number of cars the driver has , driver_no: array number.

   Parameter (int driver_no , int no), don't return thing , not found output, this function, if drivers want to register a new car.

5. void drivers_info()

   don't take thing and don't return thing , it makes sure from information of drivers, then display total fines, paid fines or register the new car.

6. void traffic_man_info()

   don't take thing and don't return thing , it makes sure from information about the traffic man then traffic_man register fines if the car speed exceeds the road maximum speed.

7. void search()

   doesn't take thing and don't return thing, the output in the body of the function is information about the car and information about fines, this function search about car and fines function by plate car or owner name.

8. void sign_up(string type)

   type : to know if he driver or traffic man.

   Parameter (string type) , don't return thing , this function to make an account.

9. void sign_in (string type) type: to know if his driver, traffic man or researcher.

   Parameter (string type), don't return thing, it to sign in and do tasks.

• Why use void in my function?

   Because I do display in the body of the function.

4. Coding Style

1. Use comments (reference[1]) lines (15,22,30,39,45,54,71,86,100,143,146,193,204,217,240,244,247,269,280,314)

2. Good naming (reference[2]) lines (11,12,13,16:20,23:27,31:36,40:43, 46,55, 72,87, 101,194, 152,153,283,247,294,295)

3. Functions (reference[3]) lines (46,72, 55, 87, 101 ,147,194, 245,283)

4. Global variable (reference[4])   lines (5:13)

5. Keep it Simple (reference[5]) show in the code.

6. Include statements must be located at the top of file only. Lines(1:4)

7. 7 The presumed case should be included in the if part and the exception in the other part of an if statement. lines(56/67 , 75/81 , 89/91 , 122/142 , 303/308)

8. Take advantage of white space to improve readability (56/67 , 75/81 , 89/91 , 122/142 , 303/308)

9. We should avoid abbreviations in names. Lines(12, 13, 16:20 , 23:27, 31:37, 40:44, 46, 55, ….)

10. In the top, Declare state constants and types (reference[4])   lines (5)

5. Implementation

[Copy the code from IDE, make sure to choose 'keep the source formatting' when you paste it here]

```cpp
#include <iostream>
#include <string>

using namespace std;
const int ownedcar = 3;
int counter = 1;
bool check = false;
bool check2 = false;
bool check1 = false;
bool ok = false;
int pay;
string yourchoose;
string username, passward;

    // information about fines
struct fines_info {
      int value_fines=0;
      string street_name;
      string date_fines;
      string statue_fines;
};
    //information about owned car
struct list_of_ownedcars {
      string car_plate_no;
      string model;
      fines_info fines;
      int production_year;
};

    //information about driver
struct drivers_info {
      int license_no;
      string driver_name;
      string driver_birthday;
      string driver_passward;
      list_of_ownedcars ownedcar_no[ownedcar];
} drivers[100];

   //information about traffic_man
struct traffic_man {
      string traffic_name;
      string traffic_birthday;
      string traffic_passward;
}trafficman[100];
 //function to calculates total fines
void total_fines(int no ,int driver_no){
      int sum=0;
      for (int i = 1; i <= no; i++) {
            sum += drivers[driver_no].ownedcar_no[i].fines.value_fines;
      }
      cout << "total fines : " << sum << endl;
}

    // function to calculates fines value
```

```cpp
void regestire_fines(float speed, float road_max_speed, int drivers_no, int owned_car_no) {
        if (speed > road_max_speed) {
                cout << "Enter street name" << endl;
                cin >> drivers[drivers_no].ownedcar_no[owned_car_no].fines.street_name;
                cout << "Enter date fines" << endl;
                cin >> drivers[drivers_no].ownedcar_no[owned_car_no].fines.date_fines;
                cout << "Enter statue fines(paid or not)" << endl;
                cin >> drivers[drivers_no].ownedcar_no[owned_car_no].fines.statue_fines;
                cout << "the value fines = ";
                drivers[drivers_no].ownedcar_no[owned_car_no].fines.value_fines = 2 * (speed - road_max_speed);
                cout << drivers[drivers_no].ownedcar_no[owned_car_no].fines.value_fines << endl;
        }
        else
                cout << "no fined";
}

    // function to pay fines
void pay_fines(int driver_no, int no) {
        cout << "you have to pay: " << drivers[driver_no].ownedcar_no[no].fines.value_fines << endl;
        cin >> pay;
        if (drivers[driver_no].ownedcar_no[no].fines.value_fines == pay) {
                drivers[driver_no].ownedcar_no[no].fines.statue_fines = "pay";
                drivers[driver_no].ownedcar_no[no].fines.value_fines = 0;
                cout << "successful" << endl;
        }

        else if (drivers[driver_no].ownedcar_no[no].fines.value_fines > pay) {
                cout << "it is not enough" << endl;
                drivers[driver_no].ownedcar_no[no].fines.statue_fines = "not_pay";
        }
 }
    //function to register new car
void regestire_new_car(int driver_no , int no) {
        no++;
        if (no > 3)
                cout << "it is not available" << endl;
        else {
                cout << "register new car (plate number)" << endl;
                cin >> drivers[driver_no].ownedcar_no[no].car_plate_no;
                cout << "register new car (model)" << endl;
                cin >> drivers[driver_no].ownedcar_no[no].model;
                cout << "register new car (production year)" << endl;
                cin >> drivers[driver_no].ownedcar_no[no].production_year;
        }
    }
    //to display total fines, paid fines or register new car
void drivers_info() {
        int driver_no;
        int no;
        char chick;
        int num;
        int number;
        cout << "Enter your username" << endl; cin.ignore();
        getline(cin, username);
        cout << "Enter your passward" << endl;
        cin >> passward;
        for (int i = 1; i <= 100; i++) {
                if (username == drivers[i].driver_name && passward == drivers[i].driver_passward) {
                        check = true;
                        driver_no = i;
                }
        }
        if (check == true) {
                cout << "if you want show total fines enter(t)" << endl;
                cout << " if you want pay fines enter(p)" << endl;
                cout << " if you want register new car enter(r)" << endl;
                cin >> chick;
                if (chick == 't') {
                        cout << "how many cars you have" << endl;
                        cin >> num;
                        for (int i = 1; i <= num; i++) {
                                cout << "the fine on the car " << i << endl;
                                cout << drivers[driver_no].ownedcar_no[i].fines.value_fines << endl;
                        }
                         total_fines(num, driver_no);
                }
                if (chick == 'p') {
                        cout << "Enter owned car number you want pay to it" << endl;
                        cin >> no;
                        pay_fines(driver_no, no);
                }
                if (chick == 'r') {
                        cout << "Enter how many cars you have"<<endl;
                        cin >> number;
                        regestire_new_car(driver_no, number);
                }
        }
        else
                cout << "invalid account" << endl;  //if username and passward invalid
        check = false;
}
    //to traffic_man register fines if the car speed exceeds the road maximum speed.
void traffic_man_info(){
        int trafficman_no;
        int no;
        string platecar;
        int driver;
```

```cpp
        float speed;
        float road_max_speed;
        cout << "Enter your username" << endl; cin.ignore();
        getline(cin, username);
        cout << "Enter your passward" << endl;
        cin >> passward;
        for (int i = 1; i <= 100; i++) {
                if (username == trafficman[i].traffic_name && passward == trafficman[i].traffic_passward) {
                        check1 = true;
                        trafficman_no = i;
                }
        }
        if (check1 == true) {
                cout << "Enter driver username" << endl; cin.ignore();
                getline(cin, username);
                cout << "Enter owned car number" << endl;
                cin >> no;
                cout << "Enter driver plate car number" << endl;
                cin >> platecar;
                for (int i = 1; i <= 100; i++) {
                        if (username == drivers[i].driver_name && platecar == drivers[i].ownedcar_no[no].car_plate_no) {
                                check2 = true;
                                driver = i;
                        }
                }
                if (check2 == true) {
                        cout << "Enter the speed of car" << endl;
                        cin >> speed;
                        cout << "Enter road_max_speed" << endl;
                        cin >> road_max_speed;

        regestire_fines(speed, road_max_speed, driver, no);
                }
                else
                        cout << "invalid account" << endl;
        }
        else
                cout << "invalid account" << endl;
        check = false;
        check2 = false;
}
    //to search about car and fines by plate car or owner name
   void search() {
        int driver_no;
        int no;
        int num;
        char cho;
        string plate;
        string name;
        cout << "if you want research by plate car enter (1)" << endl;
        cout << "if you want research by car owner name enter (2)" << endl;
        cin >> cho;
        //to research by plate car
        if (cho == '1') {
                cout << "Enter plate car" << endl;
                cin >> plate;
                cout << "Enter number of cars owned" << endl;
                cin >> no;
                for (int i = 1; i <= 100; i++) {
                        if (plate == drivers[i].ownedcar_no[no].car_plate_no) {
                                ok = true;
                                driver_no = i;
                        }
                }
        }
        //to research by owner name
        if (cho == '2') {
                cout << "Enter car owner name" << endl; cin.ignore();
                getline(cin, name);
                cout << "Enter number of cars owned" << endl;
                cin >> no;
                for (int i = 1; i <= 100; i++) {
                        if (name == drivers[i].driver_name) {
                                ok = true;
                                driver_no = i;
                        }
                }
        }
        if (ok == true) {
                cout << "car model : " << drivers[driver_no].ownedcar_no[no].model << endl;
                cout << "car production year : " << drivers[driver_no].ownedcar_no[no].production_year << endl;
                cout << "fines value : " << drivers[driver_no].ownedcar_no[no].fines.value_fines << endl;
                cout << "fines statue : " << drivers[driver_no].ownedcar_no[no].fines.statue_fines << endl;
                cout << "fines date : " << drivers[driver_no].ownedcar_no[no].fines.date_fines << endl;
                cout << "fines street : " << drivers[driver_no].ownedcar_no[no].fines.street_name << endl;

        }
        else
                cout << "invalid account" << endl;  //this account didn't find
        ok = false;
   }

// to make account
void sign_up(string type) {
        int owncarno;
        if (type == "driver") { //register information about drivers and their cars
                cout << "username" << endl; cin.ignore();
```

```cpp
                getline(cin, drivers[counter].driver_name);
                cout << "passward" << endl;
                cin >> drivers[counter].driver_passward;
                cout << "what is your birthday" << endl;
                cin >> drivers[counter].driver_birthday;
                cout << "Enter your license number" << endl;
                cin >> drivers[counter].license_no;
                cout << "how many cars you have?" << endl;
                cin >> owncarno;
                for (int i = 1; i <= owncarno; i++) {
                        cout << "Enter information about car" << i << endl;
                        cout << "Enter your car plate number" << endl;
                        cin >> drivers[counter].ownedcar_no[i].car_plate_no;
                        cout << "Enter your car model" << endl;
                        cin >> drivers[counter].ownedcar_no[i].model;
                        cout << "Enter your car production year" << endl;
                        cin >> drivers[counter].ownedcar_no[i].production_year;
                }
                counter++;
        }
        else if (type == "traffic_man") {  //register information about traffic_man
                cout << "username" << endl; cin.ignore();
                getline(cin, trafficman[counter].traffic_name);
                cout << "passward" << endl;
                cin >> trafficman[counter].traffic_passward;
                cout << "what is your birthday" << endl;
                cin >> trafficman[counter].traffic_birthday;
                counter++;
        }
}

//to sign in and do tasks
void sign_in(string type) {
        char chick;

        if (type == "driver") {
                drivers_info();
        }

        if (type == "traffic_man") {
                traffic_man_info();
        }
        else if (type == "researcher") {
                search();
        }
}
int main() {
        system("COLOR f0");
        string type;
        string ch;
        string cont;
        do {
                cout << "you have account" << endl;
                cin >> ch;
                if (ch == "yes") {
                        cout << "are you driver , traffic_man or researcher??" << endl;
                        cin >> type;
                        sign_in(type);
                }
                else if(ch=="no") {
                        cout << "are you driver or traffic_man??" << endl;
                        cin >> type;
                        sign_up(type);
                }
                cout << "are you want to continue??" << endl;
                cin >> cont;
        } while (cont == "yes");  //ask you if you want to continue  the program

        system("pause");
        return 0;
}
```

6. Testing

```
you have account
no
are you driver or traffic_man??
driver
username
Eslam Omar
passward
Eso789
what is your birthday
10/4/1988
Enter your license number
175984235
how many cars you have?
2
Enter information about car1
Enter your car plate number
SBP789
Enter your car model
mercedes
Enter your car production year
2010
Enter information about car2
Enter your car plate number
ERO159
Enter your car model
kia
Enter your car production year
2015
are you want to continue??
yes
```

```
yes
you have account
no
are you driver or traffic_man??
driver
username
Omar Ahmed
passward
omah123
what is your birthday
5/9/1991
Enter your license number
174569823
how many cars you have?
1
Enter information about car1
Enter your car plate number
WQP457
Enter your car model
kia
Enter your car production year
2005
are you want to continue??
yes
you have account
no
are you driver or traffic_man??
traffic_man
username
Khaled Mohamed
```

```
Khaled Mohamed
passward
khmo158
what is your birthday
22/8/1985
are you want to continue??
yes
you have account
yes
are you driver , traffic_man or researcher??
traffic_man
Enter your username
Khaled mohamed
Enter your passward
khmo158
invalid account
are you want to continue??
yes
you have account
yes
are you driver , traffic_man or researcher??
traffic_man
Enter your username
Khaled Mohamed
Enter your passward
khmo158
Enter driver username
Eslam Omar
Enter owned car number
2
```

```
Enter driver plate car number
ERO159
Enter the speed of car
55
Enter road_max_speed
50
Enter street name
Elmahdy
Enter date fines
5/3/2020
Enter statue fines(paid or not)
not
the value fines = 10
are you want to continue??
yes
you have account
yes
are you driver , traffic_man or researcher??
traffic_man
Enter your username
Khaled Mohamed
Enter your passward
khmo158
Enter driver username
Eslam Omar
Enter owned car number
1
Enter driver plate car number
SBP789
Enter the speed of car
```

```
Enter the speed of car
90
Enter road_max_speed
80
Enter street name
ElMasrawy
Enter date fines
10/5/2020
Enter statue fines(paid or not)
not
the value fines = 20
are you want to continue??
yes
you have account
yes
are you driver , traffic_man or researcher??
driver
Enter your username
Eslam Omar
Enter your passward
Eso789
if you want show total fines enter(t)
 if you want pay fines enter(p)
 if you want register new car enter(r)
t
how many cars you have
2
the fine on the car 1
20
the fine on the car 2
```

```
10
total fines : 30
are you want to continue??
yes
you have account
yes
are you driver , traffic_man or researcher??
driver
Enter your username
Eslam Omar
Enter your passward
Eso789
if you want show total fines enter(t)
 if you want pay fines enter(p)
 if you want register new car enter(r)
Enter owned car number you want pay to it
1
you have to pay: 20
15
it is not enough
are you want to continue??
yes
you have account
yes
are you driver , traffic_man or researcher??
driver
Enter your username
Eslam Omar
Enter your passward
```

Enter your passward
Eso789
if you want show total fines enter(t)
 if you want pay fines enter(p)
 if you want register new car enter(r)
p
Enter owned car number you want pay to it
1
you have to pay: 20
20
successful
are you want to continue??
yes
you have account
yes
are you driver , traffic_man or researcher??
driver
Enter your username
Omar Ahmed
Enter your passward
omah123
if you want show total fines enter(t)
 if you want pay fines enter(p)
 if you want register new car enter(r)
r
Enter how many cars you have
1
register new car (plate number)
GTR595
register new car (model)
mercedes
mercedes
register new car (production year)
2003
are you want to continue??
yes
you have account
yes
are you driver , traffic_man or researcher??
researcher
if you want research by plate car enter (1)
if you want research by car owner name enter (2)
1
Enter plate car
SBP789
Enter number of cars owned
1
car model : mercedes
car production year : 2010
fines value : 0
fines statue : pay
fines date : 10/5/2020
fines street : ElMasrawy
are you want to continue??
yes
you have account
yes
are you driver , traffic_man or researcher??
researcher
if you want research by plate car enter (1)
if you want research by car owner name enter (2)
2
2
car model : mercedes
car production year : 2003
fines value : 0
fines statue :
fines date :
fines street :
are you want to continue??
yes
you have account
yes
are you driver , traffic_man or researcher??
researcher
if you want research by plate car enter (1)
if you want research by car owner name enter (2)
2
Enter car owner name
Eslam Omar
Enter number of cars owned
2
car model : kia
car production year : 2015
fines value : 10
fines statue : not
fines date : 5/3/2020
fines street : Elmahdy
are you want to continue??
no
Press any key to continue . . .

References:

[1] https://www.embedded.com/six-rules-for-writing-clean-code/

datePublished:"2009-06-08"

date I copied : "2020-05-15"

[2] https://bulldogjob.com/articles/469-3-basic-rules-of-clean-code

Date Published:"2017-05-25"

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[3] https://hackernoon.com/how-to-write-clean-code-d557d998bb08

[4] https://www.freecodecamp.org/news/how-to-write-clean-code--c/

Date Published: "2020-01-02",dateModified: "2020-04-30".

Date I copied : "2020-05-15"

[5] https://www.planetgeek.ch/wp-content/uploads/2013/06/Clean-Code-V2.2.pdf

[at least 5 references]

With My Best Regards,

your signature