TP 0: Structures (records)

1. Declaration of a Structures:

In C++ language, we declare a structure type (record) as follows:

struct **Name_RecordType**
{
*type1 Name*_**Field1**;
*type2 Name*_**Field2**;
. . .
*type*n *Name*_**Fieldn;**
} ;

***Example*:**
We make the declaration of a student type which contains the following data: **name**, **first_name**, and **inscription_date**, knowing that the **inscription_date** is composed of day, month, and year.
So, we must first declare a date type which contains three fields day, month and year; for inscription_date; then the student type:

```
struct date
{
int day;
 int month;
 int year;
} ;
//declare and define the student structured type
 struct student
{
 char name[20];
 char first_name[20];
date inscription_date;
} ;
student E1,E2; //declare two student type variables
```

2. Reading and writing records:

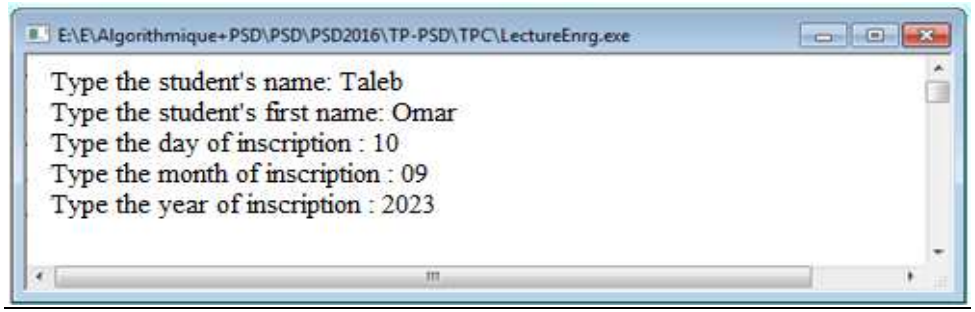
- Here is an example illustrating the essential operations on this type:

```
#include <iostream>
using namespace std;
main  ( )
{
struct date
{
int day;
int month;
int year;
};
struct student
{
char name[20];
char firstname[20];
date inscription_date;
};

student E1,E2; //declare two student type variables

cout<<"\nType the student's name: ";
cin>>E1.name; //read student name

cout<<"\nType the student's first name: ";
cin>>E1.firstname; //read the student's first name

//read the student's registration date

cout<<"\nType the day of inscription : " ;
cin>> E1. inscription_date.day;

cout<<"\nType the month of inscription: " ;
cin>>E1. inscription_date.month;

cout<<"\nType the year of inscription: ";
cin>>E1. inscription_date.year;
```

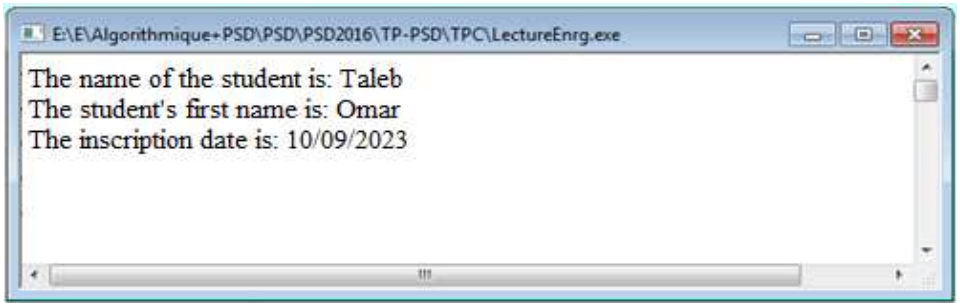
```
system("cls"); //clear the screen

cout<<"\nThe name of the student is: " << E1.name;

cout<<"\nThe student's first name is: "<< E1.first name;

cout<<"\nThe inscription date is: ";
cout<<E1.inscription_date.day<<"/"<<E1.inscription_date.month<<"/"<<E1.
inscription_date.year;

cout<<"\n\nGoodbye. ";

getchar();
return 0;
}
```

- The execution of the previous program is as follows:

First screen:



Second screen:



TP:

The Wilaya of Mila wants to automate the management of its municipalities and entrusts this task to you. For this, a municipality will be identified by: municipality number, name, date of creation (Day, Month and Year), surface area and number of inhabitants.

Write a C++ program allowing the following tasks:

a) Enter **N** municipalities in a vector.
b) Display the municipalities which have a number of inhabitants lower than a **Nbr** number and their creation dates **do not exceed 15 years?**

========== solution (for the teacher) ==========

```
#include <iostream>
using namespace std;
struct date
{
int day;
int month;
int year;
};
struct municipality
{
int Num;
char name[20];
date creation_date;
float surface;
int Nbr_habit;
};

municipality C[50]; //declare an array of 50 communes
int i,n; // the number of municipalities to insert
int Nbr ; // the number of habitats for the research
main ( )

{
cout<<"\nType the number of municipalities to insert: ";
cin>>n; //read the number of municipalities

for (i=1 ;i<=n ;i++) {
cout<<"\nType the municipality number: ";
cin>>C[i].Num; //read the municipality number

cout<<"\nType the name of the municipality: ";
cin>> C[i].name; //read the name of the municipality

//read the date of creation of the municipality
cout<<"\nType the creation day: " ;
cin>> C[i].creation_date.day;

cout<<"\nType the month of creation: " ;
cin>> C[i].creation_date.month;

cost<<"\nType the year of creation: ";
cin>> C[i].creation_date.year;

cout<<"\nType surface: " ;
cin>> C[i].surface;

cout<<"\nType the number of habitat: ";
cin>> C[i].Nbr_habit;
cout<<"\n--------------------";
}

// Display of municipalities which have a number of inhabitants lower than a
//Nbr number and their creation dates do not exceed 15 years
cout<<"\nType the number of habitats to search for: ";
cin>>Nbr; //read the number of habitats

system("cls"); //clear the screen

for (i=1 ;i<=n ;i++) {

if ((C[i].Nbr_habit<Nbr)&& (C[i].date_creation.year>2009)){
cout<<"\n The municipality of: " << C[i].name;
cout<<"\n--------------------";
}
}
getchar();
return 0;
}
```