REPUBLIQUE ALGERIENNE DEMOCRATIQUE ET POPULAIRE
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قسم الإعلام الآلي

Level: 1st year of computer science
Course: ADS1

Typical solution
TD/TP N° : 08

Academic year:2023/2024
Chapter 6 : structures

Exercice 1 : TD/TP

Exercise 1 : TD/TP

- Define a structure to store a complex number (real part, imaginary part).
- Write a program that:
  - Reads a real number (can be negative) and calculates and displays its square root.
  - Reads a complex number, then calculates and displays its modulus (magnitude).
  - Reads 2 complex numbers, then calculates and displays their sum and product.

```c
#include <stdio.h>
#include <stdlib.h>
#include <math.h>

typedef struct {
  float re,im;
} complex;

int main() {
  float x;
  complex a,b,s,p;
  printf("enter a real number \n");
  scanf("%f",&x);
  if (x>=0) {
    a.re=sqrt(x);
    a.im=0;
  } else {
    a.re=0;
    a.im=sqrt(-x);
  }
  printf("the result is %.2f - %.2fi\n", a.re,a.im );
  printf("enter a complex nbr \n");
  scanf("%f%f",&a.re,&a.im);
  printf("the module is %.2f\n", sqrt(a.re*a.re+a.im*a.im) );
  printf("enter first complex nbr \n");
  scanf("%f%f",&a.re,&a.im);
  printf("enter second nbr complex \n");
  scanf("%f%f",&b.re,&b.im);
  s.re=a.re+b.re;
  s.im=a.im+b.im;
  p.re=a.re*b.re - a.im*b.im;
  p.im=a.re*b.im + a.im*b.re;
  printf("the sum is %.2f - %.2fi\n", s.re, s.im );
  printf("the multiplication is %.2f - %.2fi\n", p.re, p.im );
  return 0;
}
```

Exercise 2 : TP

- Define a structure to store the date (day, month, and year).
- Define a structure to store contact information (contact name, contact phone, and contact birthday).

- Write a program that populates an array of "N" contacts. Then, it only displays the contacts that have a Mobilis phone number (phone number starting with 06).

```c
#include <stdio.h>

typedef struct {
  int d,m,y;
} date;

typedef struct {
  char name [20],tel[14];
  date anv;
} contact;

int main() {
  contact C[100];
  int i,n;
  printf("enter number of contacts \n");
  scanf("%d",&n);
  for(i=0; i<n; i++) {
    getchar();
    printf("entrer le contact N: %d\n",i);
    printf("name:");
    gets(C[i].name);
    printf("Tel:");
    gets(C[i].tel);
    printf("date of birth:");
    scanf("%d%d%d",&C[i].anv.d,&C[i].anv.m,&C[i].anv.y);
  }
  printf("here are the contacts who have mobilis\n");
  printf("name \ttel\ tdate of birth \n");
  for(i=0; i<n; i++)
    if(C[i].tel[1]=='6')
      printf("%s\t%s\t%d/%d/%d\n", C[i].name, C[i].tel, C[i].anv.d, C[i].anv.m,
        C[i].anv.y);
  return 0;
}
```

Exercise 3 : TD

- Define a structure to store the time (hour, minute).
- Define a structure to store the TV program of a channel (program name, program time, and duration in minutes).
- Write a program that populates an array of "N" TV programs. Then, it asks the user for a time to display the current program airing at that time

```c
#include <stdio.h>
typedef struct {
  int h,m;
} hour;

typedef struct {
  char name [20];
  hour hr;
  int duration;
} programTV;
```

```c
int main() {
  programTV P[100];
  hour h;
  int i,n;
  printf("enter number of programs \n");
  scanf("%d",&n);
  for(i=0; i<n; i++) {
    getchar();
    printf("enter program N: %d\n",i);
    printf("program name:");
    gets(P[i].name);
    printf("program time:");
    scanf("%d%d",&P[i].hr.h,&P[i].hr.m);
    printf("program duration:");
    scanf("%d",&P[i].duration);
  }
  printf("enter time:\n");
  scanf("%d%d",&h.h,&h.m);
  for(i=0; i<n; i++)
    if((h.h*60+h.m >= P[i].hr.h*60+P[i].hr.m) &&
        (h.h*60+h.m <= P[i].hr.h*60+P[i].hr.m+P[i].duree))
      printf("the program %s begins at %d:%d\n",P[i].nom,P[i].hr.h,P[i].hr.m);
  return 0;
}
```

Exercise 4 : TP

- Define a structure to store the results of the World Cup (names of the two teams and the score).
- Write a program that:
  - Populates an array with the results of the Round of 16 (eighth-finals).
  - Displays the names of the teams that are in the quarter-finals.
  - Saves the results of the Round of 16 in a text file.

```c
#include <stdio.h>
typedef struct {
  char team1[20], team2[20];
  int goals1, goals2;
} matche;
int main() {
  FILE *f;
  matche m8[8];
  int i,n;
  for(i=0; i<2; i++) {
    printf("enter match info N: %d\n",i+1);
    printf("first team name:");
    gets(m8[i]. team1);
    printf("name of second team:");
    gets(m8[i]. team2);
    printf("enter score \n");
    scanf("%d%d",&m8[i].goals1,&m8[i]. goals2);
    getchar();
  }
  printf("here are the teams in the quarter-finals \n",i);
  for(i=0; i<8; i++)
    if (m8[i]. goals1>m8[i]. goals2)
      printf("%d: %s\n",i+1,m8[i].team1);
    else
```

```
      printf("%d: %s\n",i+1,m8[i]. team2);
  f=fopen("d:/myFile.txt","w");
  for(i=0; i<8; i++)
    fprintf(f,"%d: %s\t%d-%d\t%s\n", i+1, m8[i].team1, m8[i].goals1, m8[i].goals2,
        m8[i].team2);
  fclose(f);
  return 0;
}
```

Exercise 5 : TD

- Define a structure to store clothing data in a store (price, type "men or women," and quantity).
- Write a program that:
- Populates an array with the sales data for a day.
- Calculates and displays the total sales for each type of clothing.
- Saves the sales array to a binary file

```
#include <stdio.h>
typedef struct {
  int price, quantity;
  char type;
} clothing;
int main() {
  FILE *f;
  clothing sales [100];
  int i,n,vh,vf;
  printf("enter number of sales \n");
  scanf("%d",&n);
  for(i=0; i<n; i++) {
    printf("enter the sale N: %d\n",i+1);
    printf("price:");
    scanf("%d",& sales [i]. price);
    printf("type:");
    getchar();
    sales [i].type=getchar();
    printf("quantity:");
    scanf("%d",& sales [i]. quantity);
  }
  vh=0;
  vf=0;
  for(i=0; i<n; i++)
    if (sales [i].type=='h')
      vh=vh+ sales [i]. price * sales [i]. quantity;
    else
      vf=vf+ sales [i]. price * sales [i]. quantity;
  printf("total men's clothing sales: %d DA\n",vh);
  printf("total women's clothing sales: %d DA\n",vf);
  f=fopen("d:/myFile.dat","w");
  fwrite(sales,sizeof sales,1,f);
  fclose(f);
  return 0;
}
```