Cairo University
Faculty of Computers and Artificial Intelligence
Final Research Project
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Course Name: Structured Programming

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TASK#1

```
#include <iostream>

using namespace std;

void DigitalClockIntToStr(int seconds, char time[11])

{    if(seconds<0 || seconds>=86400)

{ time[0]='i';time[1]='n';time[2]='v';time[3]='a';time[4]='l';time[5]='i';

time[6]='d';time[7]='\0';

}

    else{

      int m,h;

      m=seconds/60;

      seconds=seconds%60;

      h=m/60;

      m=m%60;

      if(h>12){

            h=h-12;

        if((h%10)==h) { time[0]='0'; time[1]=char(h+'0');}

        else  {time[1]=char((h%10)+'0'); h=h/10; time[0]=char(h+'0');}

        time[2]=':';

        if((m%10)==m) {time[3]='0'; time[4]=char(m+'0');}

        else {time[4]=char((m%10)+'0'); m=m/10; time[3]=char(m+'0');}

        time[5]=':';

        if((seconds%10)==seconds){ time[6]='0'; time[7]=char(seconds+'0');}

        else {time[7]=char((seconds%10)+'0'); seconds=seconds/10;
time[6]=char(seconds+'0');}

        time[8]='p'; time[9]='m';


      }
```

```
      else if(h==12){
        time[0]='1'; time[1]='2'; time[2]=':'; time[3]='0'; time[4]='0';
        time[5]=':';time[6]='0'; time[7]='0'; time[8]='p'; time[9]='m';
      }
      else {
          if((h%10)==h && h!=0) { time[0]='0'; time[1]=char(h+'0');}
        else  {
      time[1]=char((h%10)+'0'); h=h/10; time[0]=char(h+'0');}
        if(h==0) {time[0]='1'; time[1]='2';}
        time[2]=':';
        if((m%10)==m) {time[3]='0'; time[4]=char(m+'0');}
        else {time[4]=char((m%10)+'0'); m=m/10;          time[3]=char(m+'0');}
        time[5]=':';
        if((seconds%10)==seconds){ time[6]='0'; time[7]=char(seconds+'0');}
        else {time[7]=char((seconds%10)+'0'); seconds=seconds/10;
              time[6]=char(seconds+'0');}
        time[8]='a'; time[9]='m';
      }
    }
}
int main(){
char time[11];
DigitalClockIntToStr(0, time);
cout<<time<<endl;
// The previous line should print on screen: 12:00:00am
}
```

TASK#2

```
#include <iostream>
using namespace std;
int DigitalClockStrToInt(const char time[11])
{
     int e,f,c,d,a,b,k;
     char x,y,r;

    e=time[0]-'0';
    f=time[1]-'0';
    c=time[3]-'0';
    d=time[4]-'0';
    a=time[6]-'0';
    b=time[7]-'0';
    x=time[8]-'0';
    y=time[9]-'0';
    r=time[2],time[5];
    if( time[8]=='a' &&  time[9]=='m')
    {
        if(e==1 && f==2)
        {
            k=(c*10*60)+(d*60)+(a*10)+b;
            return k;

        }
        else
        {k=(e*10*3600)+(f*3600)+(c*10*60)+(d*60)+(a*10)+b;
```

```
            return k;}
  }
    else if(time[8]=='p' && time[9]=='m')
    {
        if(e==1 && f==2)
        {k=(c*10*60)+(d*60)+(a*10)+b+43200;
           return k;}
        else
        { k=(e*10*3600)+(f*3600)+(c*10*60)+(d*60)+(a*10)+b+43200;
           return k;}
    }
}
int main()
{
   cout<< DigitalClockStrToInt("12:00:00am") <<endl;
// The previous line should print on screen: 0
    return 0;
}
```

Code Description

Task A1

At first we use **void** because there is no return to integer or char or string or……etc.

Then we use **if condtion** and say that if seconds less than zero or greater than 86400

It print **invalid** because there is no second with negative or there is no seconds greater than 86400 which equal 24 hours, then we put the word **invalid** seven element , and the size of array is so big[11] and if I run the code it will print carbage ,so we put **'\0'** at end.

But if the seconds greater than zero and less than 86400, so we declare an integer minutes and integer hours, and and we divided the seconds by sixty to get the minutes, and modules seconds by sixty to get the remain and modules minutes by sixty to get the remain.

If the hours more than 12 , so we did hour=hour-12 to get the real hours then we did if condtion and said that if ((hours%10)==hours) so we added '0' at index 0 and add char(hour + '0') at index 1, but if this condtion is false we made that

Hours%10 then we added char((hours %10) +'0') at index 1, and divded hour by 10, then we added char(hour +'0') at index 0.

Then we write ':' to separate between the hours , the minutes and the seconds.

Then we made if condtion ((m%10)==m) to be sure that the minutes contain one digit then we added '0' at index 3, and added char(mint +'0') at index 4.

But if this condtion is false we made that

M%10 then we added char((m %10) +'0') at index 4, and divded mint by 10, then we added char(m +'0') at index 3.

if (seconds%10)==seconds, so we add '0' at index 6 and add char(seconds +'0') at index 7, and if this condtion false ,we added char ((seconds%10)+'0') at index 7, then we divided seconds by 10 ,then we add char(seconds + '0') at index 6.

And at end we put 'p' at index 8 and out 'm' at index 9.

To be 12:00:00pm.

Then we made if condation that said if (hours == 12) it will print 1 at index zero and print 2 at index 1 and it appear 12.

Then we add **':'** to separate between hours and minutes and seconds.

And if (mint % 10) equal mint so we add 0 at index 3 and addchar(mint +'0') at index 4, if this condtion is false , so we add char((mint % 10)+'0') at index 4, then we divided mint by 10 (mint/10)

and add char(mint+48) at index 3 , then we add ‘:” to separate between the hours and minutes and seconds.

And if (seconds%10)==seconds, so we add ‘0’ at index 6 and add char(seconds +’0’) at index 7, and if this condtion false ,we add char ((seconds%10)+’0’) at index 7, then we divided seconds by 10 ,then we add char(seconds + ‘0’) at index 6.

And we added ‘a’ at index 8 an added ‘m’ at index 9 to become ‘am’.

If this condtion is false we add ‘1’ at index 0 , add ‘2’ at index 1, add ‘:’ at index 2, add ‘0’ at index 3, add ‘0’ at index 4, add ‘:’ at index 5, add ‘0’ at index 6, add ‘0’ at index 7, add ‘p’ at index 8 and add ‘m’ at index 9, to become 12:00:00pm.

Then we make another if condtion say that if (hour <12) and make if condtion inside it and says if (hour%10 &&hour !=0) to make sure that the time contain one digit not two , and we added at the fisrt zero then the number of hour at second and we write time[1]=char(hour+’0’) , we add zero because the hours should return to char but if this condtion is false and hour contain two digit , we did {time[1]=char((hour%10)+’0’) if the hour equal 12, so 12%10= 2.

Then we go to the main() to applicate the function to print it at the screen by

```
Char time[11]

DigitalclockintToSter(0,time)

Cout<<time<<endl;
```

And this will print “12:00:00am” on the screen

Task A2

We put integers e,f,c,d,a,b,k, where ‘e’ represent the first number of hours and f represent the second number of hour, and ‘c’ represent the first number of minute and ‘d’ represent the second number of minute ,and ‘a’ represent the first number of seconds and ‘b’ represent the second number of seconds and the ‘k’ represent the seconds which apear on the screen,then we put this integers in a way to change it into char

like “e=time[0]-’0’, so that it will be a char. And time[5] ,time[2] represent the char ‘:’.

Then we make if condtion to make sure that the time is ‘am’ or ‘pm’, so we write if(time[8]=’a’ && time[9]==’m’,then we made if condtion and ask if the hour =12, so we will calculate the number of seconds by this way `k=(c*10*60)+(d*60)+(a*10)+b;` else we will calculate the number of seconds by this way
`k=(e*10*3600)+(f*3600)+(c*10*60)+(d*60)+(a*10)+b;`

And else if the time is ‘pm’ we will calculate the seconds by the same way of ‘am’ but we will add 43200 which equal 12 hours.

Discussing three learning outcomes

There are many styles of writing a code for execution and that's return to the programmer who is responsible for doing his task . We learned how to make a functions , using built in fuctions and how to use the loops.

Functions:

The function help the programmer for controlling his code and organize it , as if a programmer is writing a code of hundred lines the function helps him to divide his code into pieces . As the main role of using a function is to perform a specific task and waiting for calling it .

Ex :

The type of the returning value (here writing the type of the Returned value as int,char,etc. Note that if there is no returning Value we write [void])

function name (here writing the function name with The obligation of Instructions of writing C++ variable)

(formal parameter list) (here writing the parameters and their types by using [,] between each parameter)

After finishing writing a function it can be called in the main() function to execute it's instructions.

Cstirng library:

we learned built in functions in this library that facilitate to us for treating our arrays as:

(strcpy): Which help us to copy the elements of an array in another one.

(strcat): Which help us to add the elements of an array to another one.

Loops:

The loops help us to execute an instruction several time till reaching a specific time that it is committed by the programmer to stop executing the instruction.

Types of loops :

(Do while loop , for loop and while loop) . There must be a counter the count the time executing the instructions inside the

loop and this counter should have a limit to stop otherwise the code will be executed to infinity.