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|  | **Semester: Spring 2020** | | | **Total Marks: 20** |
|  | **CS609: System Programming** | | |  |
|  |  | **Graded** |  | **Due Date: June 11, 2020** |
|  | **Assignment No. 02** | | |  |
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**Instructions:**

Please read the following instructions carefully before submitting assignment. It should be clear that your assignment will not get any credit if:

* The assignment is submitted after due date.
* The submitted assignment does not open or file is corrupt.
* You have not followed steps described in **Detailed Instructions** of the problem statement.
* Assignment is **copied** (partial or full) from any source (websites, forums, students, etc.) Strict action will be taken in this regard.

**Note:** You have to upload only **.doc or .docx file**. Assignment in any other format (extension) will not be acceptedand will be awarded with zero marks.

**Objectives:**

The objective of this assignment is to provide hands-on experience of System Programming concepts including:

How can interrupts be generated What are Interrupts

Interrupt functions writing BIOS data area.

TSR program

Calling interrupt function

**For any assignment related query, contact at** [**CS609@vu.edu.pk**](mailto:CS609@vu.edu.pk)

**Problem Statement:**

1. Write down a program in C which will display any long string on the screen and after passing 5 seconds, if no key is pressed then the string should be changed by replacing all character of ‘y’ on the screen (video text memory)

by ‘z’. For example: String on Screen is : “Hey young man, you have a lovely watch”. It should be changed to “Hez zoung man, zou have a lovelz watch”.

[Hint: Video text memory area starts from location B800:0000. You have to traverse whole text memory area by using for loop, and then use simple if statements, to replace y with z.

**Instructions:**

1. You should include all related header files first of all then declare string array to store string to be displayed and declare interrupt pointer to hold old interrupt i.e



char str1[80]={“ “Hey young man, you have a lovely watch”$”}

void interrupt (\*old)(void);

1. Similarly, give prototype for new functions of i.e void interrupt newfunc();
2. Declare a far pointer i.e \*scr to hold far address =0xB8000000
3. Store current vector values of INT 8 through getvect in old().
4. Set newFunc() fuctions through setvect.
5. In newFunc() function, give logic to wait for 5 seconds i.e t>=90
6. Replace y character to z i.e

for ( int j = 0; j < 4000; j += 2) {

if(\*(scr + j) == 0x79’) // small y ASCII code.

\*(scr + j) = 0x7A;// small z ASCII code.

**Sample Code:**

#include <stdio.h>

#include <BIOS.H>

#include <DOS.H>

int t=0;



char str1[…..Hey young boy you have a lovely watch$”};

void interrupt (\*old)(void);

char far \*……..)0xb8000000; // code to access video text memory area

void interrupt newFunc();

void main( )

{

clrscr();

* Display string on screen by calling int21h. old=getvect(…….);

setvect(0x08,newFunction);

}

void interrupt newFunction( )

{

If (t>=90 )

* write for loop here
* write body of for loop} //if part

(\*old)();

}

**Note: Your assignment file should be a single Word file (.doc or .docx).**

**Solution:**

* include all related header files

#include<stdio.h>

#include<stdlib.h>

#include<DOS.H>

#include<BIOS.H>

#include<conio.h>

* declare interrupt pointer to hold old void interrupt (\*old)(void);

void interrupt (\*oldKey)(void);

* prototype for new functions of newFunc() void interuupt newFunc();

void interrupt (newKey)(void);

//declare a far pointer

char far \*scr = (char \*far) 0xB8000000;

//declare variables

int j, t=0, m=0;

//declare string array

char str1 = [“Hey young boy you have a lovely watch$”};

void main()

{

* Display string on screen by calling int21h. clrscr(); //to clear the screen contents

\_DX = (unsigned int) st1; \_AH = 0x09; geninterrupt(0x21);

* Store current vector values of INT 8 through getvect in old() old = getvect(0x08);

oldKey =getvect(0x09);

* Set newFunc() fuctions through setvect setvect(0x08,newFunc); setvect(0x09,newKey);

getch();

getch();

getch();

getch();

}

void interrupt newFunc()

{

t++;

* wait for 5 seconds

if ((t>=90) && (m==0))

{

for (j=0;j<4000;j++)

{

if(\*(scr + j) == 0x79’) // small y ASCII code.

{

\*(scr + j) = 0x7A;// small z ASCII code.

}

}

t=0;

m=1;

}

(\*old)();

}

* Any key is pressed from the keyboard, the program stop

void interrupt newLKey()

{

if (m==1)

{

m=0;

exit(0);

}

(\*oldKey)();

}