#### **SOLVED**

**Q.** WAP to simulate 4-digit BCD down counter on the multiplexed seven segment display.

#### **CODE**

```
#include<LPC17xx.h>
unsigned char tohex[10]={0X3F, 0X06, 0X5B, 0X4F, 0X66, 0X6D, 0X7D, 0X07,
0X7F, 0X6F};
long int arr[4]={9,9,9,9};
unsigned int i=0, j=0;
int main()
{
LPC_GPIOO->FIODIR | = 0XFF0;
LPC GPIO1->FIODIR = 0XF << 23;
for(arr[3]=0;; arr[3]--)
{
for(arr[2]=9; arr[2]>=0; arr[2]--)
for(arr[1]=9; arr[1]>=0; arr[1]--)
for(arr[0]=9; arr[0]>=0; arr[0]--)
{
for(i=0; i<4; i++)
{
LPC_GPIO1->FIOPIN=i<<23;
LPC_GPIOO->FIOPIN=tohex[arr[i]]<<4;
```

```
for(j=0; j<1000; j++);
for(j=0; j<1000; j++);
LPC_GPIOO->FIOCLR | =0X00000FF0;
if(arr[3]==0)
arr[3]=10;
OUTPUT
☑ D:\B2_55\LAB7\SOLVED\lab7.uvproj - μVision4
                                                                                                                                                                                          File Edit View Project Flash Debug Peripherals Tools SVCS Window Help
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  🥩 🔛 🛗 🥔 🔠 | 🎇 | Target 1
                                           startup_LPC17xx.s
                                       Source Group 1
      startup_LPC17xx.s
                                        6 int main()
      system_LPC17xx.c
                                       8 LPC_GPIOO->FIODIR|=OXFFO;
9 LPC_GPIO1->FIODIR|=OXF<<23;
10 for(arr[3]=0; ; arr[3]--)
                                       11 {
12 for(arr[2]=9; arr[2]>=0; arr[2]--)
13 for(arr[1]=9; arr[1]>=0; arr[1]--)
14 for(arr[0]=9; arr[0]>=0; arr[0]--)
                                      12 for (arr[2]=9; arr[:

13 for (arr[1]=9; arr[:

14 for (arr[0]=9; arr[:

15 {

16 for (i=0; i<4; i++)

17 {
                                      17 (
18 LPC_GPIO1->FIOPIN=i<<23;
19 LPC_GPIO0->FIOPIN=tohex[arr[i]]<<4;
                                      20 for(j=0; j<1000; j++);

21 }

22 for(j=0; j<1000; j++);

23 LPC_GPIOO->FIOCLR|=0X00000FF0;

24 }

25 if(arr[3]==0);

26 arr[3]=10;

27 }

28 }
                                       20 for(j=0; j<1000; j++);
 Build Output
 Program Size: Code=1668 RO-data=236 RW-data=40 ZI-data=608 FromELF: creating hex file...
".\lab7.axf" - 0 Error(s), 0 Warning(s).
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                                                                                                                                              A Nifty bank +0.70
```

**Q1** Write a C program to display the number "1234" serially in the seven segment display

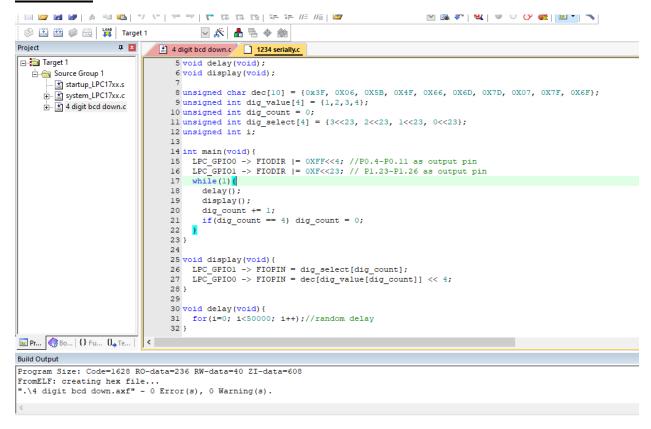
## **CODE**

//To display the number 1234 serially in the seven segment display

```
#include<LPC17xx.h>
#include<stdio.h>
void delay(void);
void display(void);
unsigned char dec[10] = \{0x3F, 0X06, 0X5B, 0X4F, 0X66, 0X6D, 0X7D, 0X07, 0X0
0X7F, 0X6F};
unsigned int dig_value[4] = \{1,2,3,4\};
unsigned int dig_count = 0;
unsigned int dig_select[4] = \{3 << 23, 2 << 23, 1 << 23, 0 << 23\};
unsigned int i;
int main(void){
                        LPC_GPIO0 -> FIODIR |= 0XFF<<4; //P0.4-P0.11 as output pin
                        LPC_GPIO1 -> FIODIR |= 0XF<<23; // P1.23-P1.26 as output pin
                        while(1){
                                                 delay();
                                                 display();
                                                 dig_count += 1;
                                                 if(dig_count == 4) dig_count = 0;
                         }
 }
void display(void){
                        LPC_GPIO1 -> FIOPIN = dig_select[dig_count];
                        LPC_GPIO0 -> FIOPIN = dec[dig_value[dig_count]] << 4;
```

```
}
void delay(void){
    for(i=0; i<50000; i++);//random delay
}</pre>
```

#### **OUTPUT**



**Q2** Write a C program to simulate a 4 digit BCD down counter. Use a timer for delay.

### **CODE**

//To stimulate a 4 digit BCD down counter on the multiplexed seven segment display

```
#include<LPC17xx.h>
#include<stdio.h>
unsigned char dec[10] = \{0x3F, 0X06, 0X5B, 0X4F, 0X66, 0X6D, 0X7D, 0X07, 0X0
0X7F, 0X6F};
long int arr[4] = \{9, 9, 9, 9\};
unsigned int i,j;
void delay(void){
                        for(j=0; j<50000; j++);
 }
int main(void){
                        LPC_GPIO0 -> FIODIR |= 0XFF0; //P0.4-P0.11 as output pin
                        LPC_GPIO1 -> FIODIR |= 0XF<<23; // P1.23-P1.26 as output pin
                                                  while(1){
                                                  for(arr[3]=9; arr[3]>=0; arr[3]--){
                                                                           for(arr[2]=9; arr[2]>=0; arr[2]--){
                                                                                                   for(arr[1]=9; arr[1]>=0; arr[1]--){
                                                                                                                             for(arr[0]=9; arr[0]>=0; arr[0]--){
                                                                                                                                                       for(i=0; i<4; i++)
                                                                                                                                                                               LPC\_GPIO1->FIOPIN = i << 23;
                                                                                                                                                                               LPC_GPIO0->FIOPIN =
dec[arr[i]] << 4;
                                                                                                                                                                               delay();
                                                                                                                                                        }
                                                                                                                                                      delay();
                                                                                                                                                      LPC\_GPIOO->FIOCLR = 0xFFO;
```

```
}
Output
Project
                                4 digit bcd down.c

☐ 🛅 Target 1

                                     7 long int arr[4] = {9, 9, 9, 9};
   🖮 🔄 Source Group 1
                                     8 unsigned int i,j;
      --- 🕍 startup_LPC17xx.s
                                     9 void delay(void) {
                                    10 for(j=0; j<50000; j++);</pre>
      ⊕... 🕍 system_LPC17xx.c
                                    11 }
      🛓 🛣 4 digit bcd down.c
                                    12 int main (void) {
                                    13 LPC_GPIOO -> FIODIR |= 0XFF0; //PO.4-PO.11 as output pin
                                        LPC_GPIO1 -> FIODIR |= 0XF<<23; // P1.23-P1.26 as output pi
                                    14
                                    15
                                           while(1){
                                    16
                                           for(arr[3]=9; arr[3]>=0; arr[3]--){
                                             for(arr[2]=9; arr[2]>=0; arr[2]--){
                                    17
                                    18
                                               for(arr[1]=9; arr[1]>=0; arr[1]--){
                                    19
                                                  for(arr[0]=9; arr[0]>=0; arr[0]--){
                                    20
                                                    for(i=0 ; i<4 ;i++){
                                    21
                                                      LPC GPIO1->FIOPIN = i<<23;
                                                      LPC GPIOO->FIOPIN = dec[arr[i]] << 4;
                                    22
                                    23
                                                      delay();
                                    24
                                    25
                                                    delay();
                                                    LPC_GPIOO->FIOCLR |= 0xFF0;
                                    26
                                    27
                                    28
                                    29
                                    30
                                    31
                                    32 }
                                    33
■ Pr... | 6 Bo... | 6 Fu... | 0 Te... |
Build Output
```

Program Size: Code=1628 RO-data=236 RW-data=40 ZI-data=608 FromELF: creating hex file...
". $\$ 4 digit bcd down.axf" - 0 Error(s), 0 Warning(s).

**Q3** Write a C program for 4 digit BCD up/down counters on seven segment using a switch and timer with a delay of 1-second between each count

#### **Code**

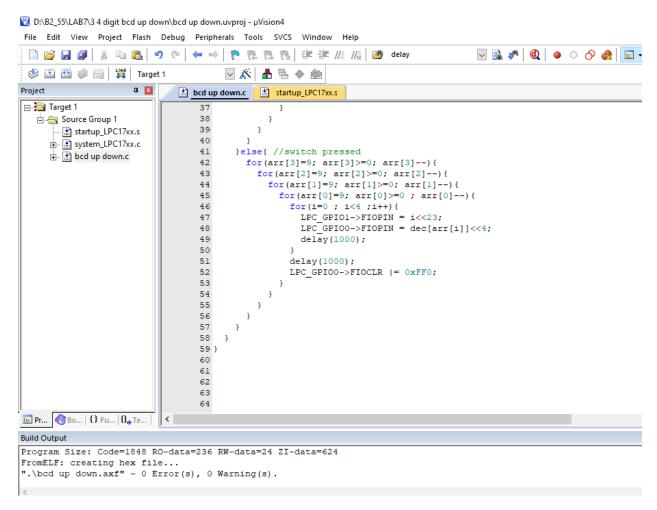
//4 didgit up/down counter on seven segment using a switch and a timer delay of 1 second between each count

```
#include<LPC17xx.h>
#include<stdio.h>
unsigned char dec[10] = \{0x3F, 0X06, 0X5B, 0X4F, 0X66, 0X6D, 0X7D, 0X07, 0X0
0X7F, 0X6F};
long int arr[4] = \{0, 0, 0, 0, 0\};
unsigned int i,j;
void delay(unsigned int milliseconds){
                         LPC_TIM0->CTCR = 0x0;
                         LPC_TIM0->PR=2;
                         LPC_TIM0->TCR = 0x02;
                         LPC_TIM0->TCR = 0x01;
                          while(LPC_TIM0->TC < milliseconds);
                          LPC_TIM0->TCR = 0x00;
 }
int main(void){
                         LPC_GPIO0 -> FIODIR |= 0XFF0; //P0.4-P0.11 as output pin
                         LPC_GPIO1 -> FIODIR |= 0XF<<23; // P1.23-P1.26 as output pin
    LPC_GPIO2 -> FIODIR &= 0xFFFFEFFF; // P2.12 as input pin for switch
```

```
while(1){
if(LPC_GPIO2 -> FIOPIN & 1 << 12){ //switch not pressed
 for(arr[3]=0; arr[3]<10; arr[3]++){
  for(arr[2]=0; arr[2]<10; arr[2]++)
   for(arr[1]=0; arr[1]<10; arr[1]++){
    for(arr[0]=0; arr[0]<10; arr[0]++){
     for(i=0; i<4; i++)
       LPC\_GPIO1->FIOPIN = i << 23;
       LPC_GPIO0->FIOPIN = dec[arr[i]]<<4;
       delay(1000);
     delay(1000);
     LPC\_GPIOO->FIOCLR = 0xFFO;
}else{ //switch pressed
 for(arr[3]=9; arr[3]>=0; arr[3]--){
  for(arr[2]=9; arr[2]>=0; arr[2]--)
   for(arr[1]=9; arr[1]>=0; arr[1]--){
    for(arr[0]=9; arr[0]>=0; arr[0]--)
     for(i=0; i<4;i++)
       LPC\_GPIO1->FIOPIN = i << 23;
       LPC_GPIO0->FIOPIN = dec[arr[i]]<<4;
```

```
delay(1000);
}
delay(1000);
LPC_GPIOO->FIOCLR |= 0xFF0;
}
}
}
}
```

# **OUTPUT**



We see that the 7 segment display is incremented, when we press SW1 button then the counter resets to 0 and starts counting from 0 again

**Q4**Write a program for 4 digit Hexadecimal up/down counters on seven segment using a switch and timer with a delay of 1-second between each count.

#### Code

//4 digit hex up/down counter on seven segment using a switch and a timer delay of 1 second between each count

#include<LPC17xx.h>

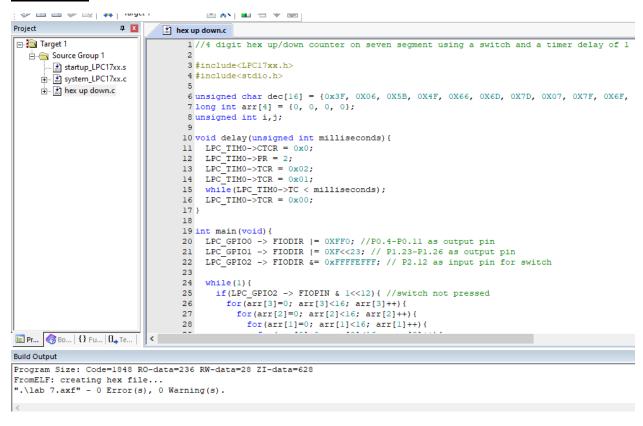
#include<stdio.h>

```
unsigned char dec[16] = \{0x3F, 0X06, 0X5B, 0X4F, 0X66, 0X6D, 0X7D, 0X07, 0X0
0X7F, 0X6F, 0x77, 0x7C, 0X39, 0X5E, 0X79, 0X71};
long int arr[4] = \{0, 0, 0, 0\};
unsigned int i,j;
void delay(unsigned int milliseconds){
                    LPC_TIM0->CTCR = 0x0;
                    LPC_TIM0->PR=2;
                    LPC_TIM0 -> TCR = 0x02;
                    LPC_TIM0->TCR = 0x01;
                     while(LPC_TIM0->TC < milliseconds);
                    LPC TIM0->TCR = 0x00;
 }
int main(void){
                    LPC_GPIO0 -> FIODIR |= 0XFF0; //P0.4-P0.11 as output pin
                    LPC_GPIO1 -> FIODIR |= 0XF<<23; // P1.23-P1.26 as output pin
   LPC_GPIO2 -> FIODIR &= 0xFFFFEFFF; // P2.12 as input pin for switch
                     while(1){
        if(LPC_GPIO2 -> FIOPIN & 1<<12){ //switch not pressed
            for(arr[3]=0; arr[3]<16; arr[3]++){
               for(arr[2]=0; arr[2]<16; arr[2]++){
                    for(arr[1]=0; arr[1]<16; arr[1]++)
                       for(arr[0]=0; arr[0]<16; arr[0]++)
                            for(i=0; i<4; i++)
```

```
LPC\_GPIO1->FIOPIN = i << 23;
      LPC_GPIO0->FIOPIN = dec[arr[i]]<<4;
      delay(1000);
     }
     delay(1000);
     LPC\_GPIOO->FIOCLR = 0xFFO;
}else{
for(arr[3]=15; arr[3]>=0; arr[3]--){
 for(arr[2]=15; arr[2]>=0; arr[2]--){
   for(arr[1]=15; arr[1]>=0; arr[1]--){
    for(arr[0]=15; arr[0]>=0; arr[0]--){
     for(i=0; i<4;i++)
      LPC\_GPIO1->FIOPIN = i << 23;
      LPC_GPIO0->FIOPIN = dec[arr[i]]<<4;
      delay(1000);
     delay(1000);
     LPC\_GPIOO->FIOCLR = 0xFFO;
```

```
}
}
}
```

#### **OUTPUT**



# We can see that it starts incrementing up till 9 and then counts in hexadecimal.