SOLVED

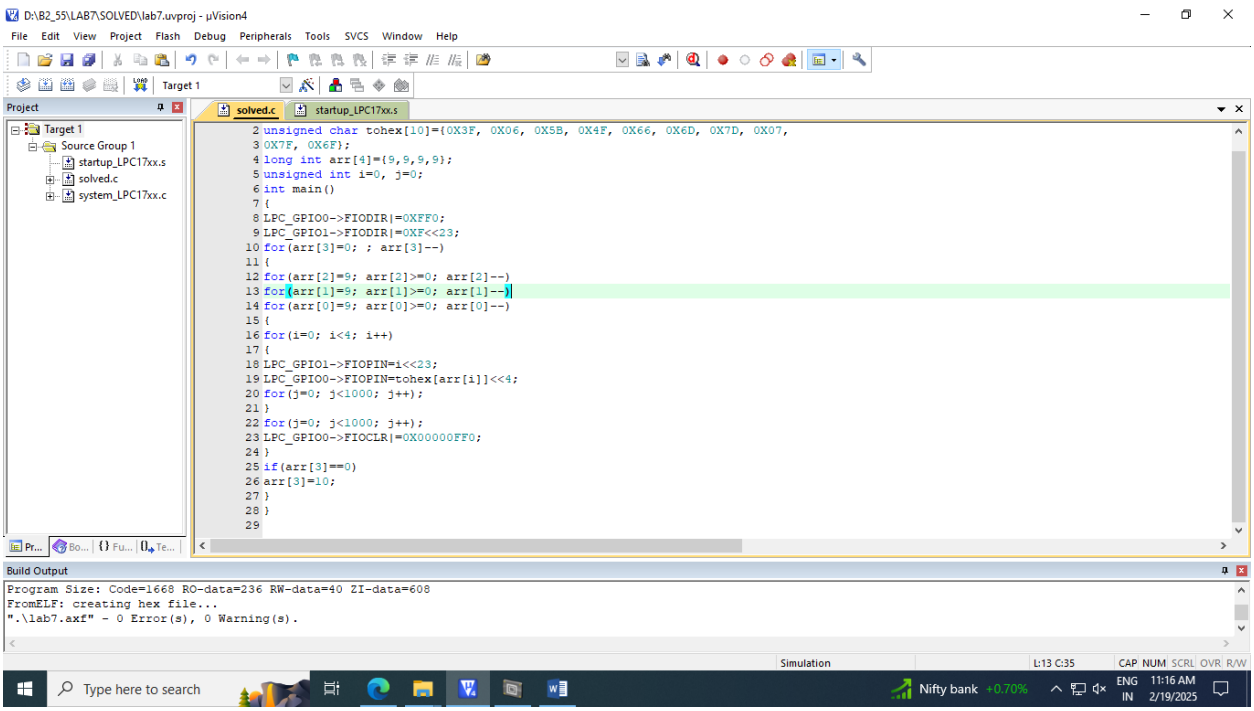
Q. WAP to simulate 4-digit BCD down counter on the multiplexed seven segment display.

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_GPIO0->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_GPIO0->FIOPIN=tohex[arr[i]]<<4;
```

```
for(j=0; j<1000; j++);
}
for(j=0; j<1000; j++);
LPC_GPIO0->FIOCLR|=0X00000FF0;
}
if(arr[3]==0)
arr[3]=10;
}
```

}OUTPUT



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,
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;
```

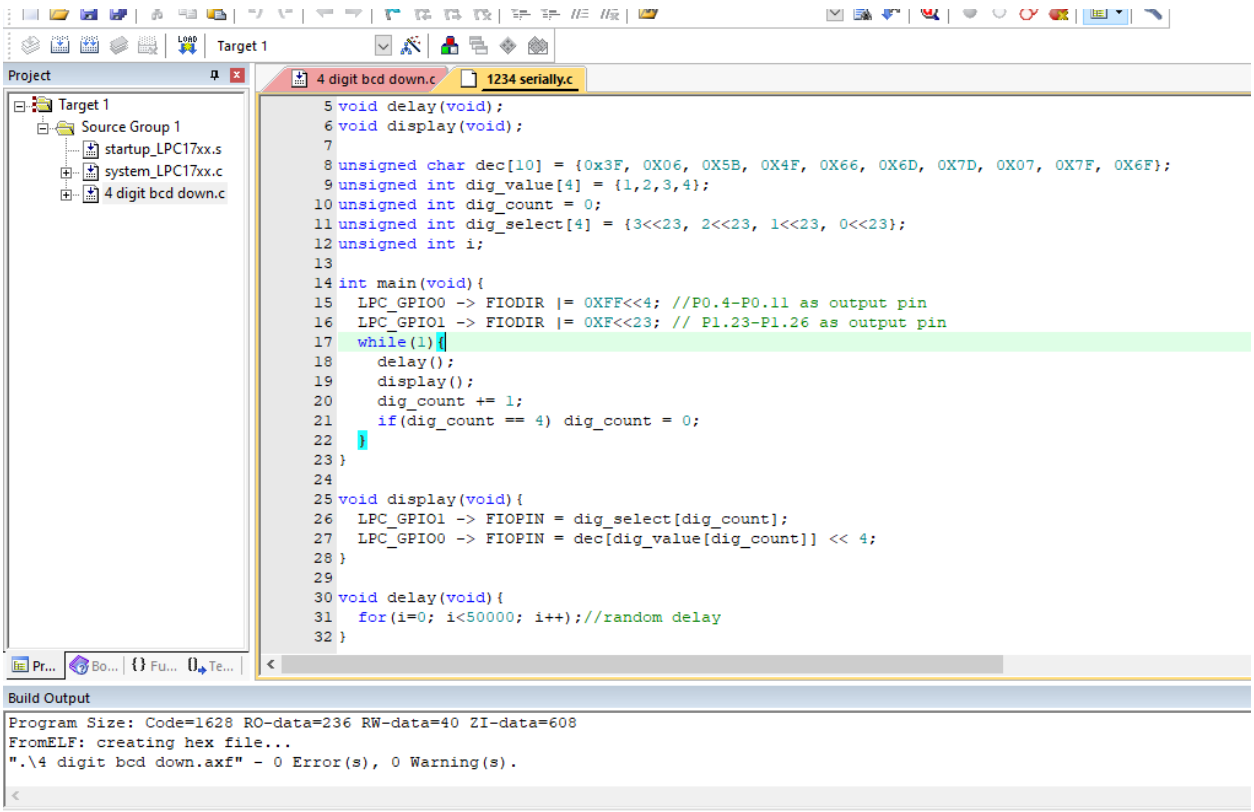
}

void delay(void){

for(i=0; i<50000; i++);//random delay

}

OUTPUT



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

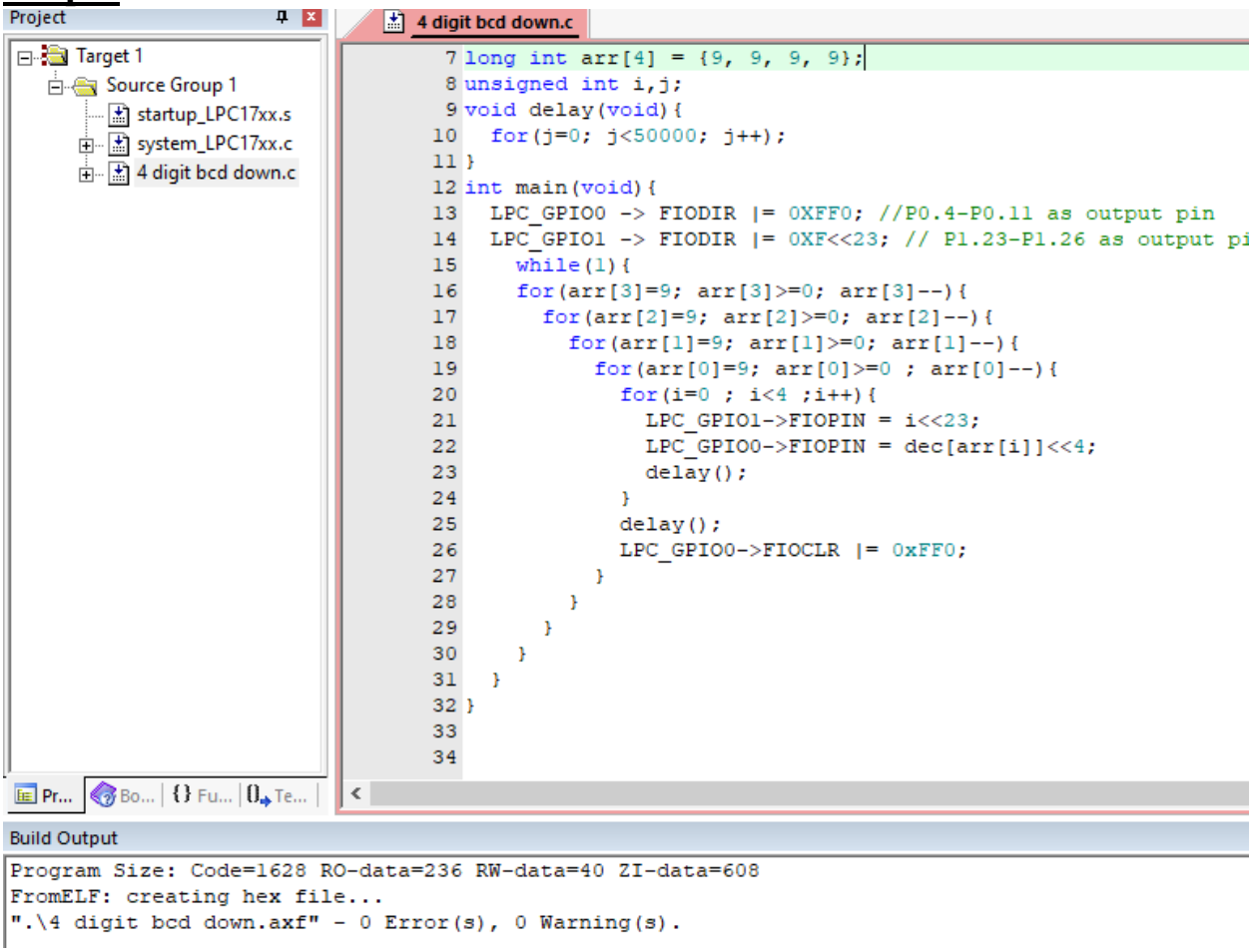
CODE

//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,
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_GPIO0->FIOCLR |= 0xFF0;
```

```
                                    }
                                }
                            }
                        }
                    }
}
```

Output



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

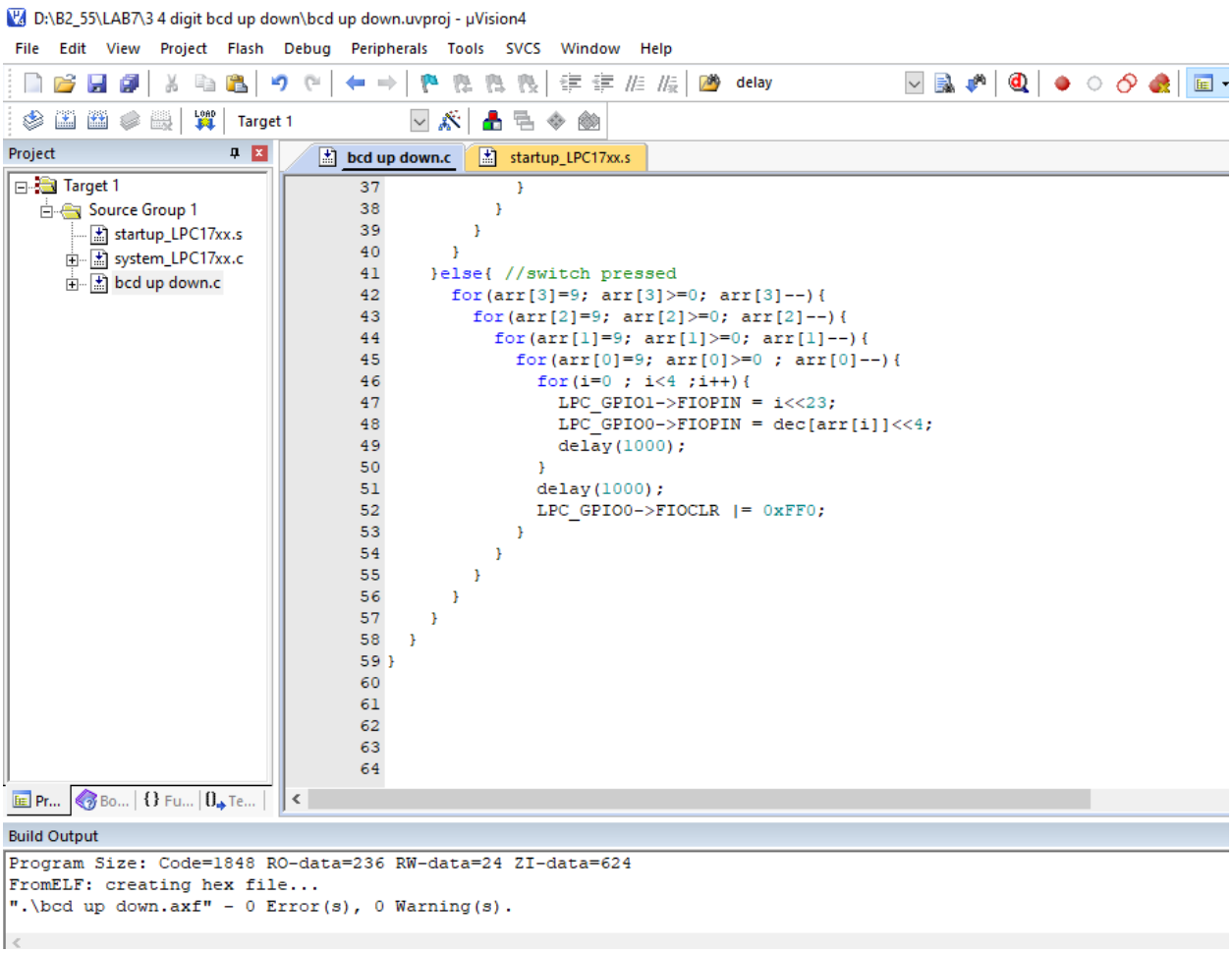
//4 didgit up/down counter on seven segment using a switch and a timer delay of 1 second between each count

```
#include<LPC17xx.h>
#include<stdio.h>

unsigned char dec[10] = {0x3F, 0X06, 0X5B, 0X4F, 0X66, 0X6D, 0X7D, 0X07, 0X7F, 0X6F};
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]<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_GPIO0->FIOCLR |= 0xFF0;
        }
      }
    }
                }
}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_GPIO0->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

Q4Write 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>

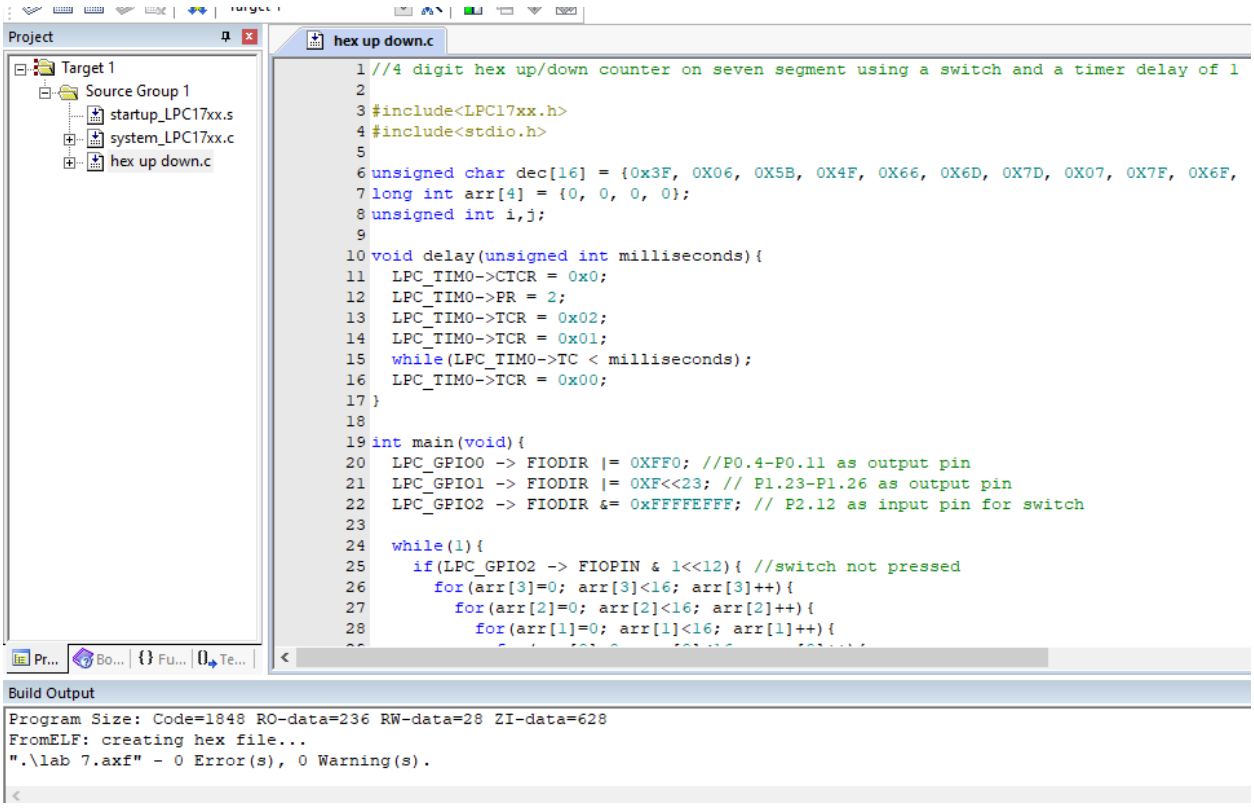
#include<stdio.h>

```
unsigned char dec[16] = {0x3F, 0X06, 0X5B, 0X4F, 0X66, 0X6D, 0X7D, 0X07,
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_GPIO0->FIOCLR |= 0xFF0;
        }
      }
    }
                  }
}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_GPIO0->FIOCLR |= 0xFF0;
        }
      }
    }
```

```
            }
    }
        }
}
```

OUTPUT



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