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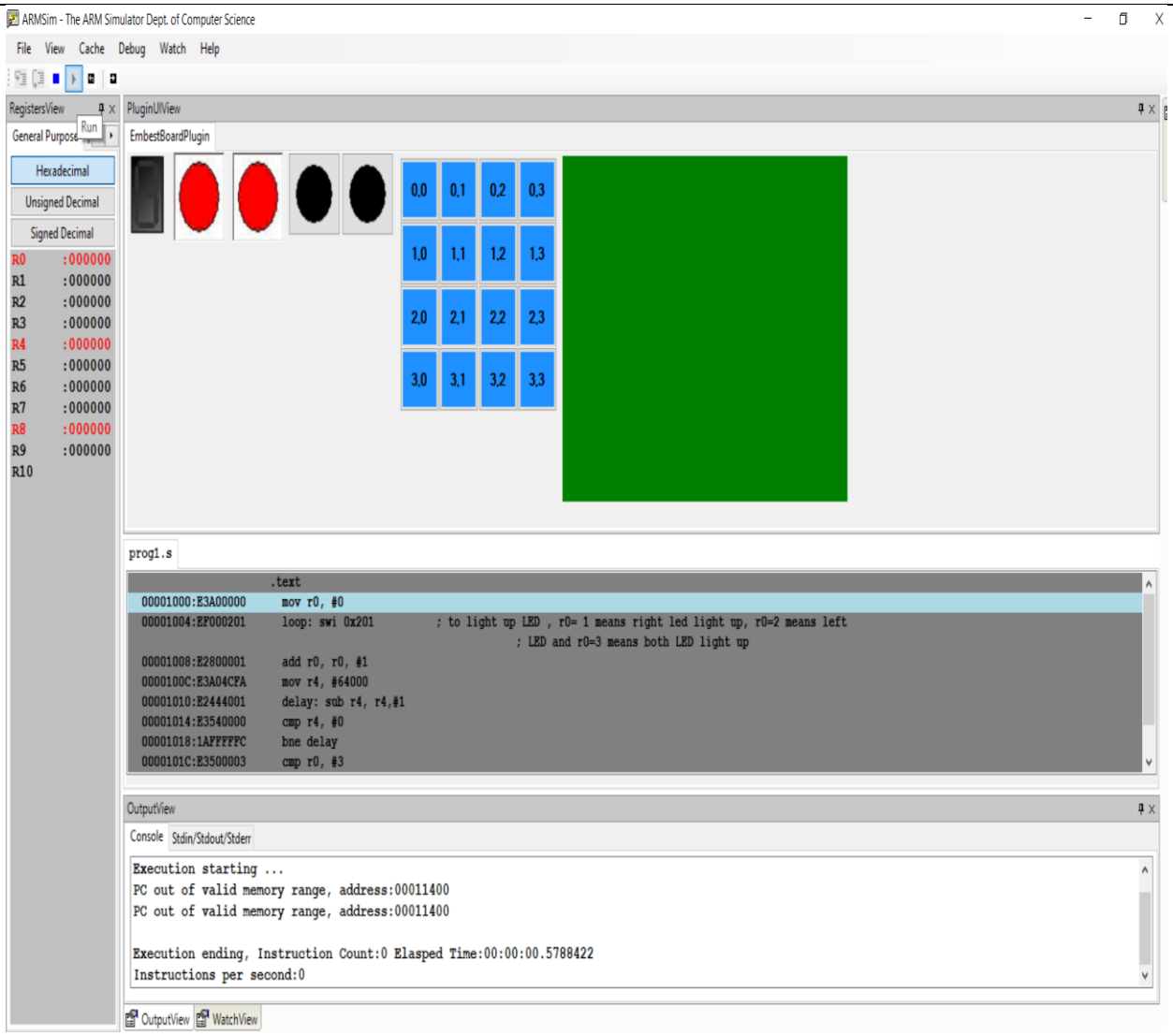
SRN: PES2UG20CS390
SEC:F
DATE:15/03/2022
WEEK:7

PES UNIVERSITY

Department of Computer Science & Engineering
Microprocessor & Computer Architecture - UE20CS252

Sl. No	Programs
Week No.7	1. Demonstration of programs using plug-ins using ARMSIM. a. Set the LED to be light up.

```
.text
 mov r0, #0
 loop: swi 0x201        ; to light up LED , r0= 1 means right led light up, r0=2 means left
                        ; LED and r0=3 means both LED light up
 add r0, r0, #1
 mov r4, #64000
 delay: sub r4, r4,#1
 cmp r4, #0
 bne delay
 cmp r0, #3
 ble loop
 .end
```



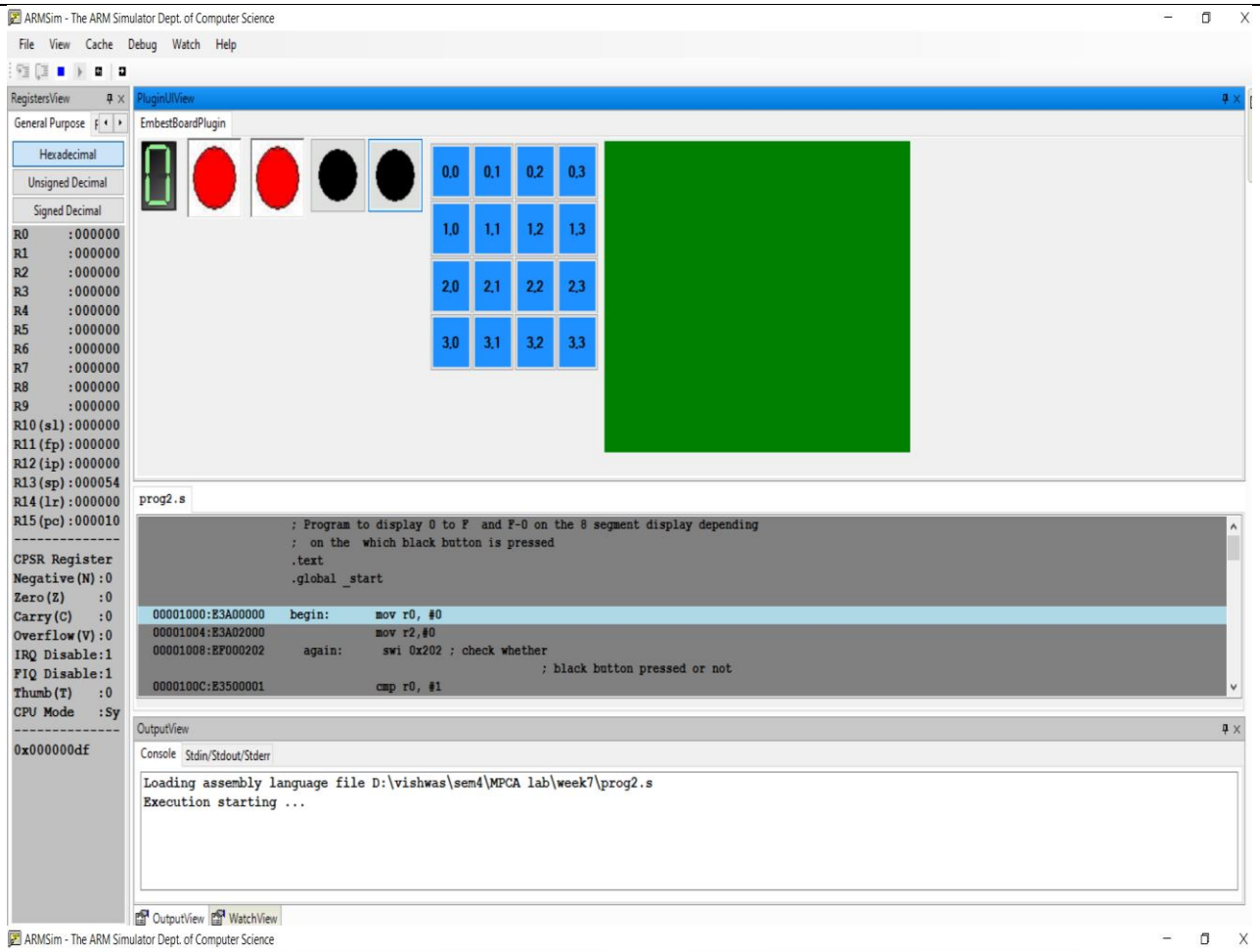
b. Display hexadecimal digits [0-9,A-F] on the 8 segment display.

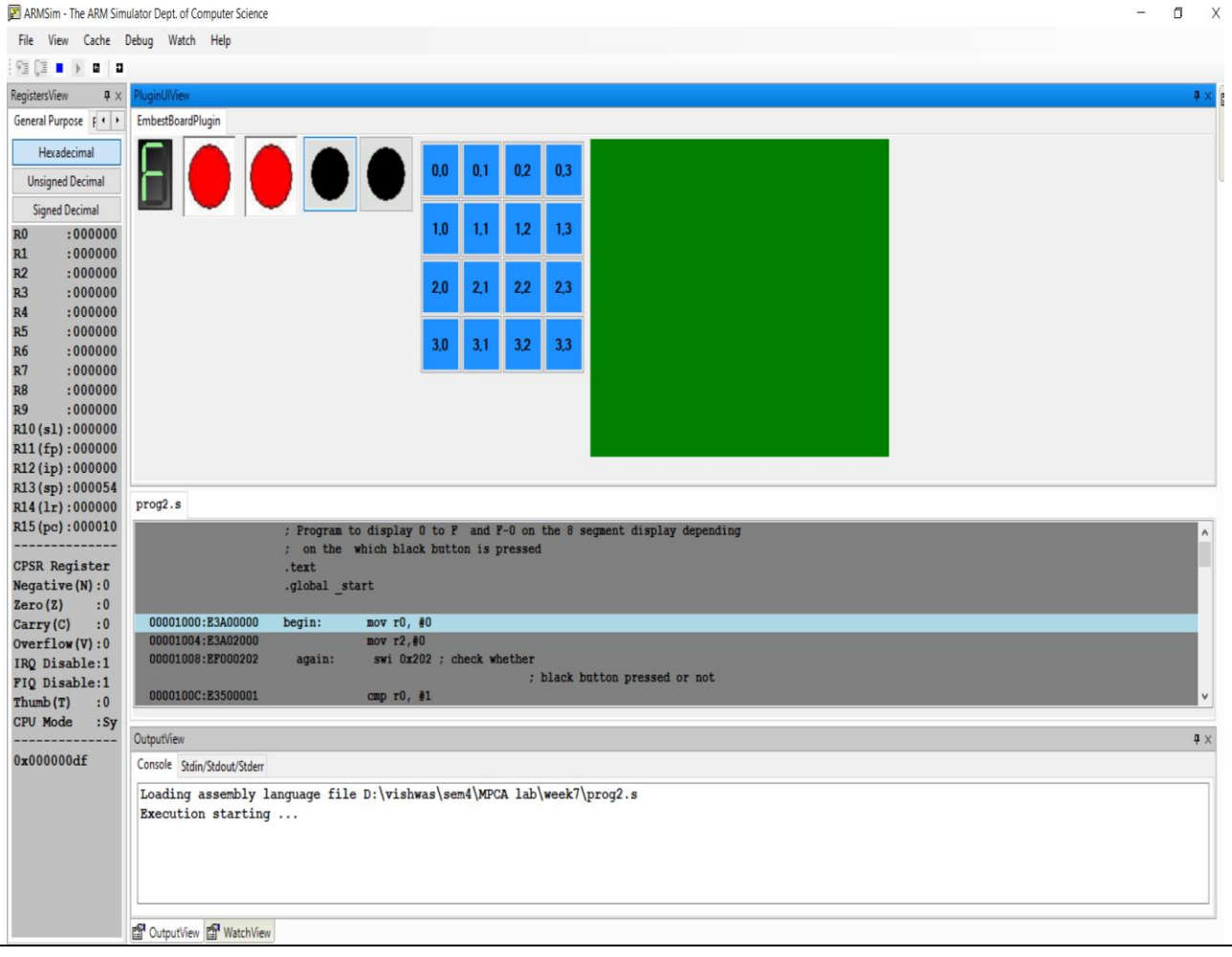
```
; Program to display 0 to F  and F-0 on the 8 segment display depending
;  on the  which black button is pressed
.text
.global _start

begin:              mov r0, #0
            mov r2,#0
 again:     swi 0x202 ; check whether
                       ; black button pressed or not
            cmp r0, #1
            beq loop1
               cmp r0, #2
                  beq loop2
                b again
 loop1:       mov r5,#16
              ldr r1,=zero
back1:                ldrb r0, [r1]
```

```
                swi 0x200   ; Set 8 segment display to light up
                bl delay
                add r1,r1,#1
                sub r5, r5,#1
                cmp r5, #0
                bne back1
                b again
loop2:     mov r5,#16
        ldr r1,=F
back2:          ldrb r0, [r1]
                swi 0x200   ; Set 8 segment display to light up
      bl delay
                sub r1, r1, #1
                sub r5, r5,#1
                cmp r5, #0
                bne back2
                b again
delay:                  mov r4, #64000
loop3:          sub r4, r4, #1
                cmp r4, #0
                bge loop3
                mov pc, lr
                .data

                 zero: .byte  0b11101101
                 one:  .byte  0b01100000
                 two:  .byte  0b01101110
                 three:  .byte  0b11111010
                 four:  .byte  0b00110011----01110011
                 five:  .byte  0b10101011
                 six:  .byte  0b10101111
                 seven: .byte  0b01110000
                 eight: .byte  0b11101111
                 nine: .byte  0b11100011
                 A:  .byte  0b11100111
                 B:  .byte  0b00101111
                 C:  .byte  0b10001101
                 D:  .byte  0b01101110
                 E:  .byte  0b10001111
                 F:  .byte  0b10000111
```


ARMSim - The ARM Simulator Dept. of Computer Science
File View Cache Debug Watch Help
RegistersView
General Purpose
Hexadecimal
Unsigned Decimal
Signed Decimal
R0 :000000
R1 :000000
R2 :000000
R3 :000000
R4 :000000
R5 :000000
R6 :000000
R7 :000000
R8 :000000
R9 :000000
R10(sl):000000
R11(fp):000000
R12(ip):000000
R13(sp):000054
R14(lr):000000
R15(pc):000010
CPSR Register
Negative(N):0
Zero(Z) :0
Carry(C) :0
Overflow(V):0
IRQ Disable:1
FIQ Disable:1
Thumb(T) :0
CPU Mode :Sy
0x000000df
PluginUIView
EmbestBoardPlugin
0,0 0,1 0,2 0,3
1,0 1,1 1,2 1,3
2,0 2,1 2,2 2,3
3,0 3,1 3,2 3,3
prog2.s
; Program to display 0 to F and F-0 on the 8 segment display depending
; on the which black button is pressed
.text
.global _start
00001000:E3A00000 begin: mov r0, #0
00001004:E3A02000 mov r2,#0
00001008:EF000202 again: swi 0x202 ; check whether
; black button pressed or not
0000100C:E3500001 cmp r0, #1
OutputView
Console Stdin/Stdout/Stderr
Loading assembly language file D:\vishwas\sem4\MPCA lab\week7\prog2.s
Execution starting ...
OutputView WatchView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File View Cache Debug Watch Help
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General Purpose
Hexadecimal
Unsigned Decimal
Signed Decimal
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R1 :000000
R2 :000000
R3 :000000
R4 :000000
R5 :000000
R6 :000000
R7 :000000
R8 :000000
R9 :000000
R10(sl):000000
R11(fp):000000
R12(ip):000000
R13(sp):000054
R14(lr):000000
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CPSR Register
Negative(N):0
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CPU Mode :Sy
0x000000df
PluginUIView
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0,0 0,1 0,2 0,3
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3,0 3,1 3,2 3,3
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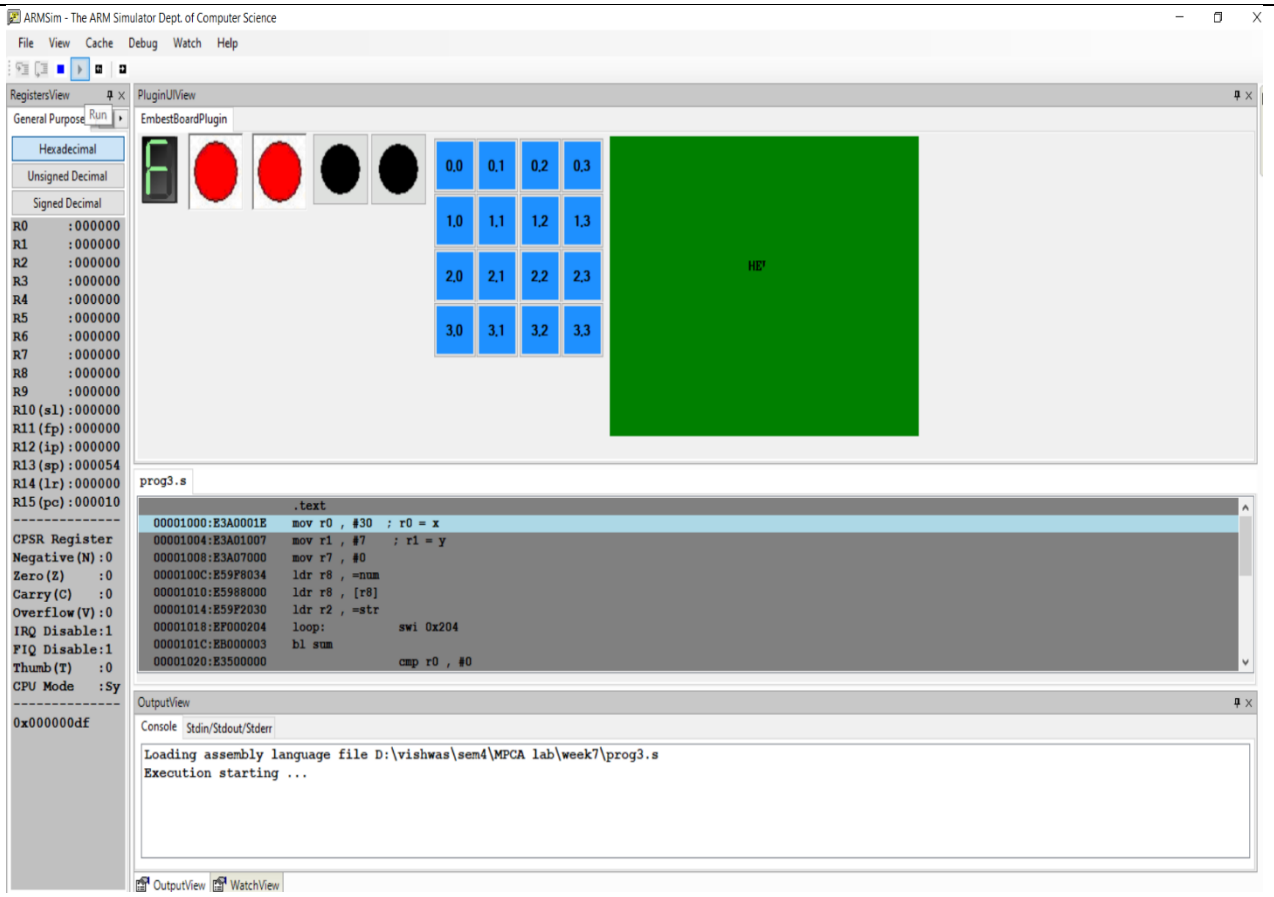
; black button pressed or not
0000100C:E3500001 cmp r0, #1
OutputView
Console Stdin/Stdout/Stderr
Loading assembly language file D:\vishwas\sem4\MPCA lab\week7\prog2.s
Execution starting ...
OutputView WatchView

c. Move a string from LEFT to RIGHT on the LCD display panel.

```
  .text
mov r0 , #30  ; r0 = x
mov r1 , #7    ; r1 = y
mov r7 , #0
ldr r8 , =num
ldr r8 , [r8]
ldr r2 , =str
loop:           swi 0x204
bl sum
                cmp r0 , #0
                 subne r0 , r0 , #1
                swieq 0x11
                 b loop
sum:            cmp r7 , r8
                addne r7 , r7 , #1
                 bne sum
                 swi 0x206   ;Clear one line in the display on                                    the
LCD screen.r0-line no(y)
                 mov r7 , #0
                mov pc , lr

.data
str:   .asciz  "HELLO WORLD"
num:  .word  15000
```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File View Cache Debug Watch Help
RegistersView
General Purpose
Run
Hexadecimal
Unsigned Decimal
Signed Decimal
R0 :000000
R1 :000000
R2 :000000
R3 :000000
R4 :000000
R5 :000000
R6 :000000
R7 :000000
R8 :000000
R9 :000000
R10(sl):000000
R11(fp):000000
R12(ip):000000
R13(sp):000054
R14(lr):000000
R15(pc):000010
CPSR Register
Negative(N):0
Zero(Z) :0
Carry(C) :0
Overflow(V):0
IRQ Disable:1
FIQ Disable:1
Thumb(T) :0
CPU Mode :Sy
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EmbestBoardPlugin
0,0 0,1 0,2 0,3
1,0 1,1 1,2 1,3
2,0 2,1 2,2 2,3
3,0 3,1 3,2 3,3
HE'
prog3.s
.text
00001000:E3A0001E mov r0 , #30 ; r0 = x
00001004:E3A01007 mov r1 , #7 ; r1 = y
00001008:E3A07000 mov r7 , #0
0000100C:E59F8034 ldr r8 , =num
00001010:E5988000 ldr r8 , [r8]
00001014:E59F2030 ldr r2 , =str
00001018:EF000204 loop: swi 0x204
0000101C:EB000003 bl sum
00001020:E3500000 cmp r0 , #0
OutputView
Console Stdin/Stdout/Stderr
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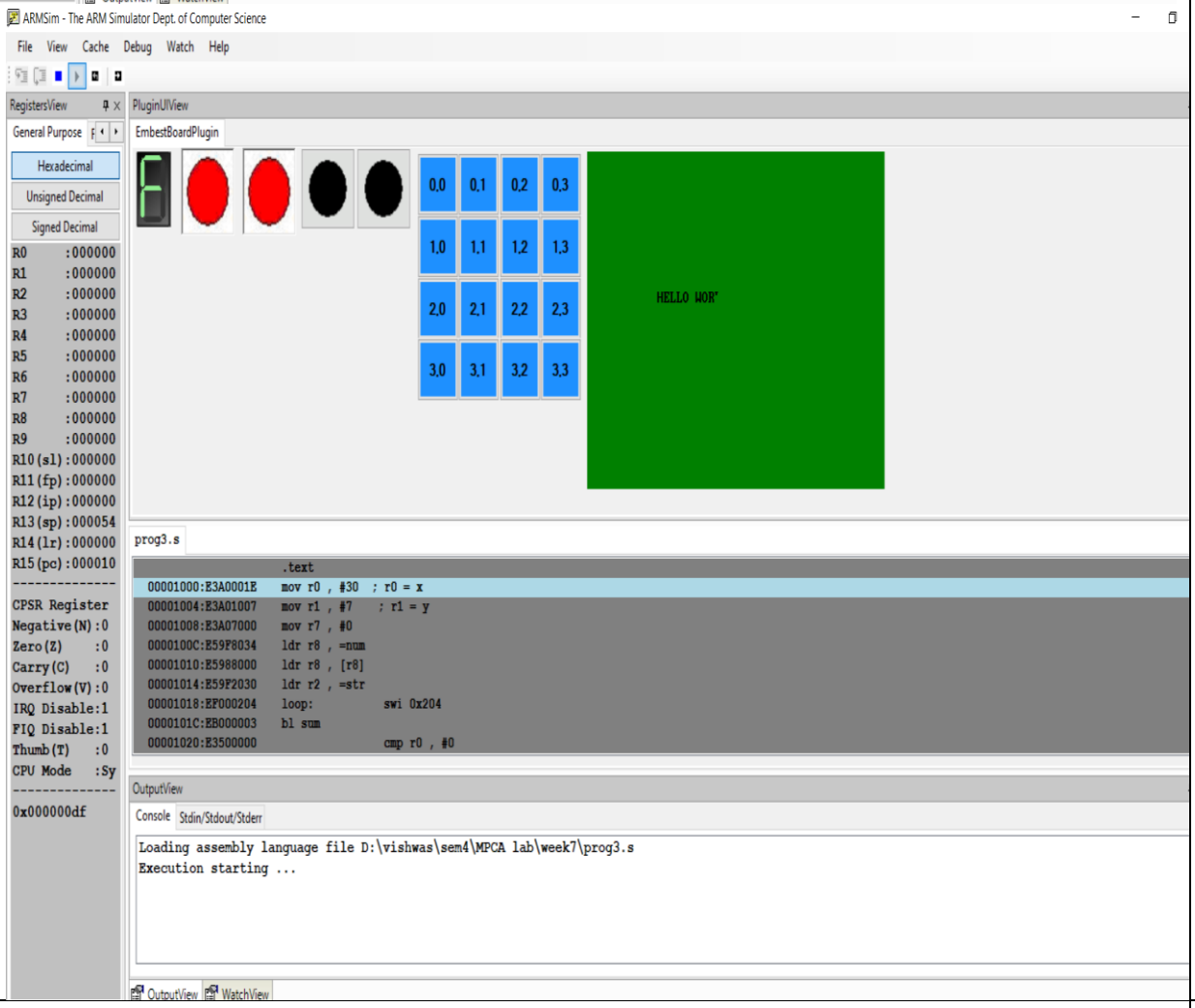
Execution starting ...
OutputView WatchView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Negative(N):0
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IRQ Disable:1
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CPU Mode :Sy
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0,0 0,1 0,2 0,3
1,0 1,1 1,2 1,3
2,0 2,1 2,2 2,3
3,0 3,1 3,2 3,3
HELLO WOR'
prog3.s
.text
00001000:E3A0001E mov r0 , #30 ; r0 = x
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0000100C:E59F8034 ldr r8 , =num
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00001014:E59F2030 ldr r2 , =str
00001018:EF000204 loop: swi 0x204
0000101C:EB000003 bl sum
00001020:E3500000 cmp r0 , #0
OutputView
Console Stdin/Stdout/Stderr
Loading assembly language file D:\vishwas\sem4\MPCA lab\week7\prog3.s
Execution starting ...
OutputView WatchView

Student Exercises:

1. Execute the following programs on ARMSIM – PLUG-INS.

   a. Display hexadecimal digits [0-9,A-F] on the 8 segment display.

```
; Program to display 0 to F  and F-0 on the 8 segment display depending
;  on the  which black button is pressed
.text
.global _start

begin:              mov r0, #0
            mov r2,#0
 again:     swi 0x202 ; check whether
                       ; black button pressed or not
            cmp r0, #1
            beq loop1
               cmp r0, #2
                  beq loop2
               b again
 loop1:        mov r5,#16
               ldr r1,=zero
back1:                 ldrb r0, [r1]
               swi 0x200   ; Set 8 segment display to light up
               bl delay
               add r1,r1,#1
               sub r5, r5,#1
               cmp r5, #0
               bne back1
               b again
loop2:     mov r5,#16
        ldr r1,=F
back2:         ldrb r0, [r1]
               swi 0x200   ; Set 8 segment display to light up
      bl delay
               sub r1, r1, #1
               sub r5, r5,#1
               cmp r5, #0
               bne back2
               b again
delay:                 mov r4, #64000
loop3:         sub r4, r4, #1
```

```
cmp r4, #0
bge loop3
mov pc, lr
.data

zero: .byte  0b11101101
one:  .byte  0b01100000
two:  .byte  0b01101110
three:  .byte  0b11111010
four:  .byte  0b00110011----01110011
five:  .byte  0b10101011
six:  .byte  0b10101111
seven: .byte  0b01110000
eight: .byte  0b11101111
nine: .byte  0b11100011
A:  .byte  0b11100111
B:  .byte  0b00101111
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F:  .byte  0b10000111
```

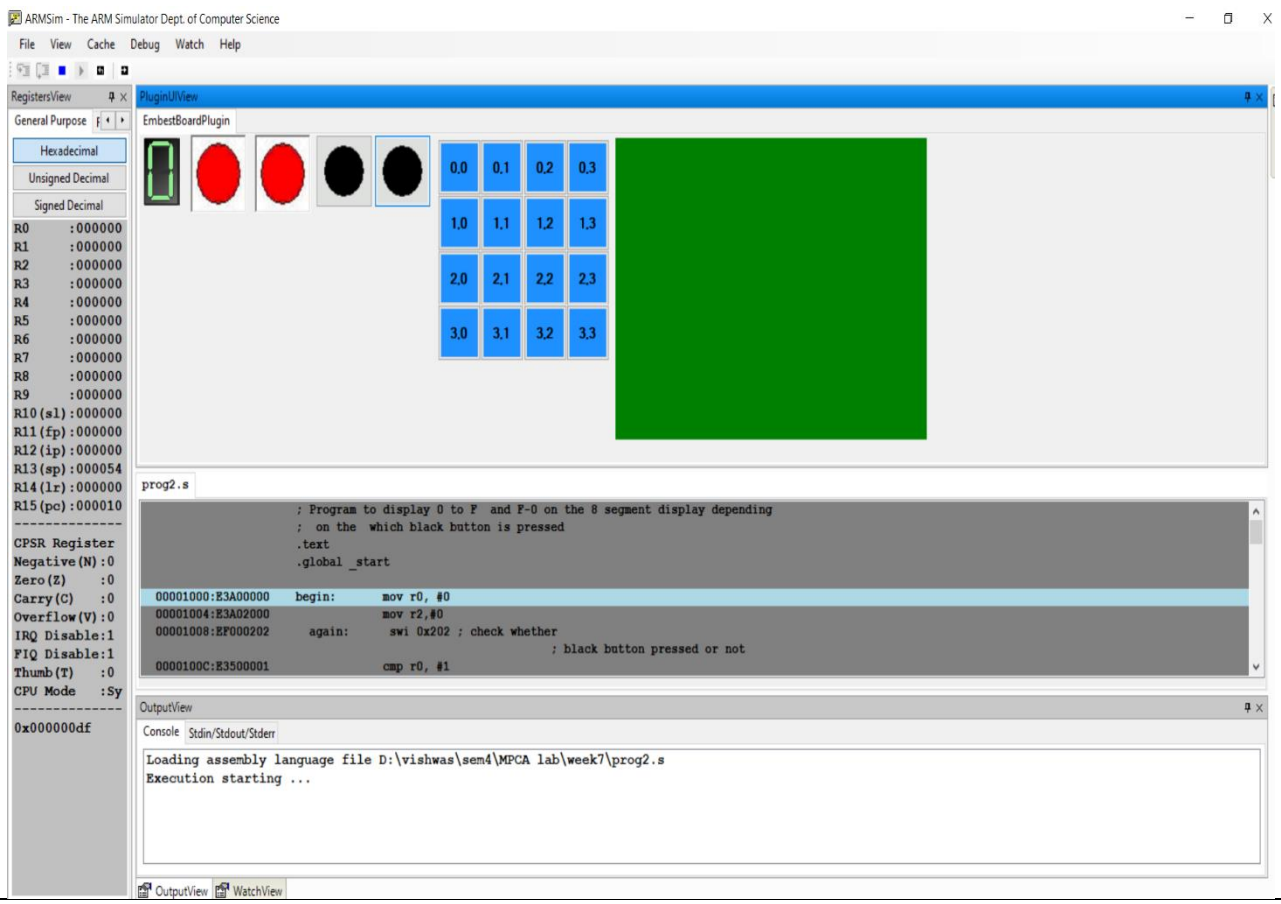

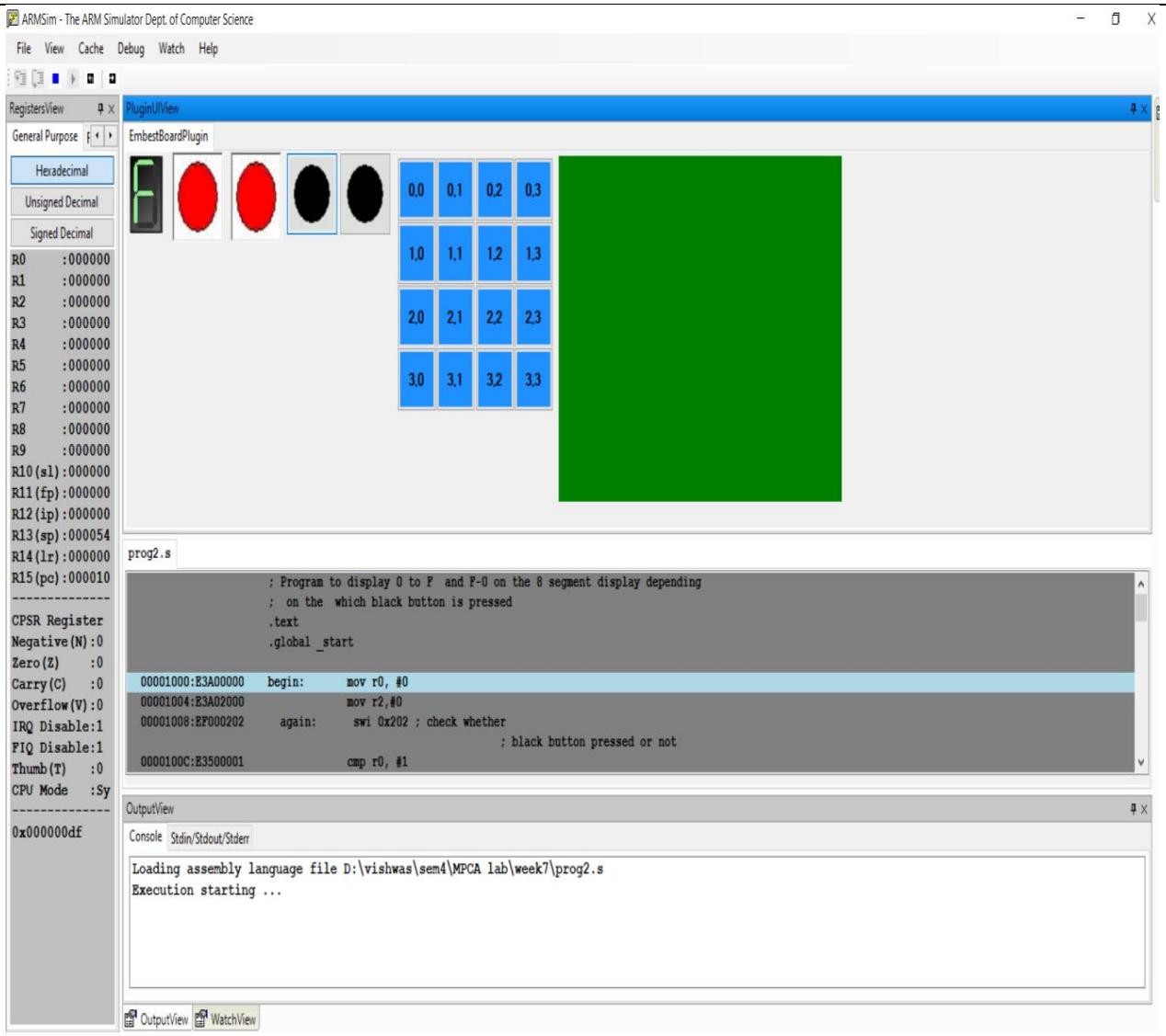

b. Move a string from RIGHT to LEFT on the LCD display panel.

```
        .text
mov r0 , #0  ; r0 = x
mov r1 , #7    ; r1 = y
mov r7 , #0
ldr r8 , =num
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loop:           swi 0x204
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                 addne r0 , r0 , #1
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sum:             cmp r7 , r8
                addne r7 , r7 , #1
                  bne sum
                  swi 0x206   ;Clear one line in the display on                    the
```
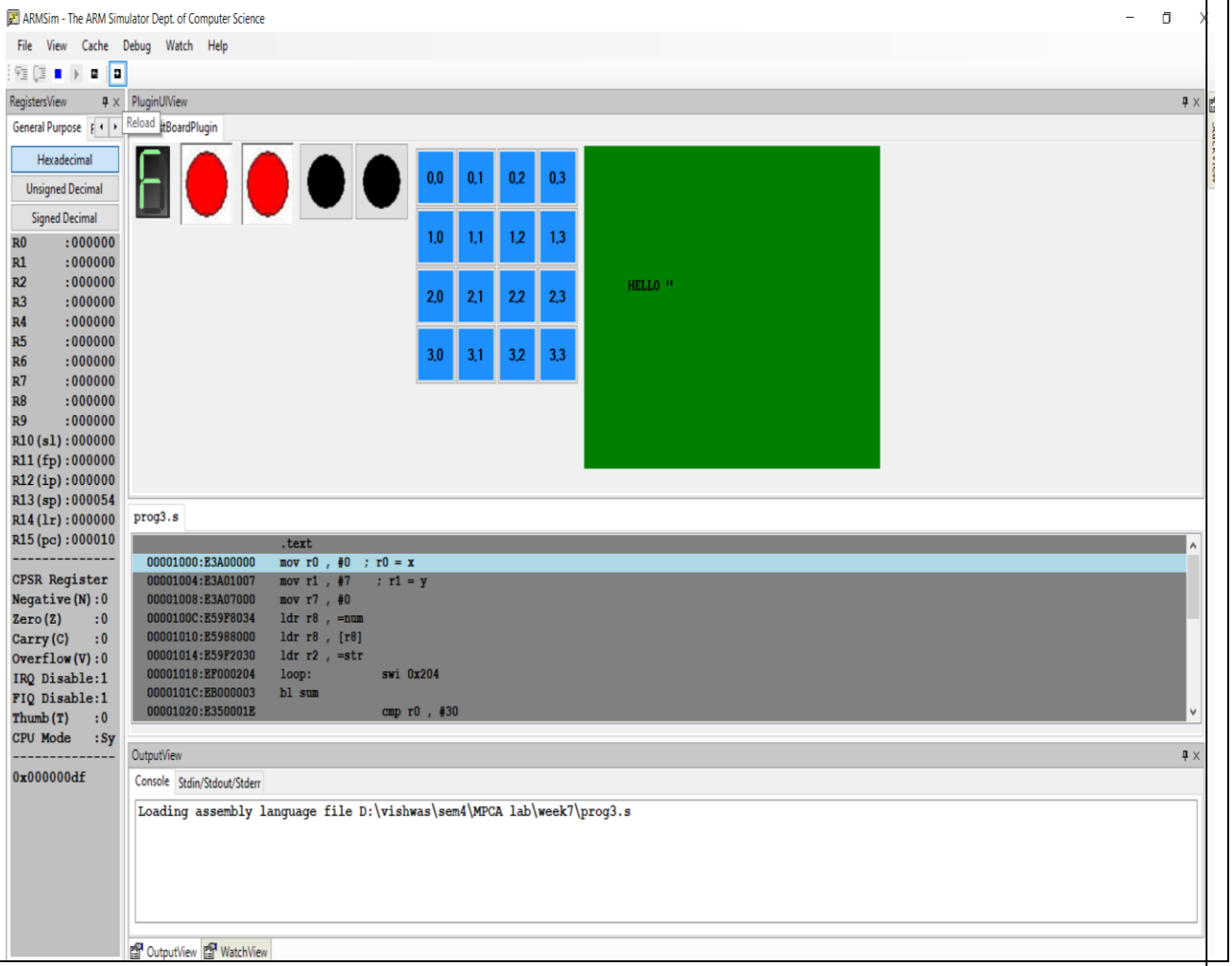
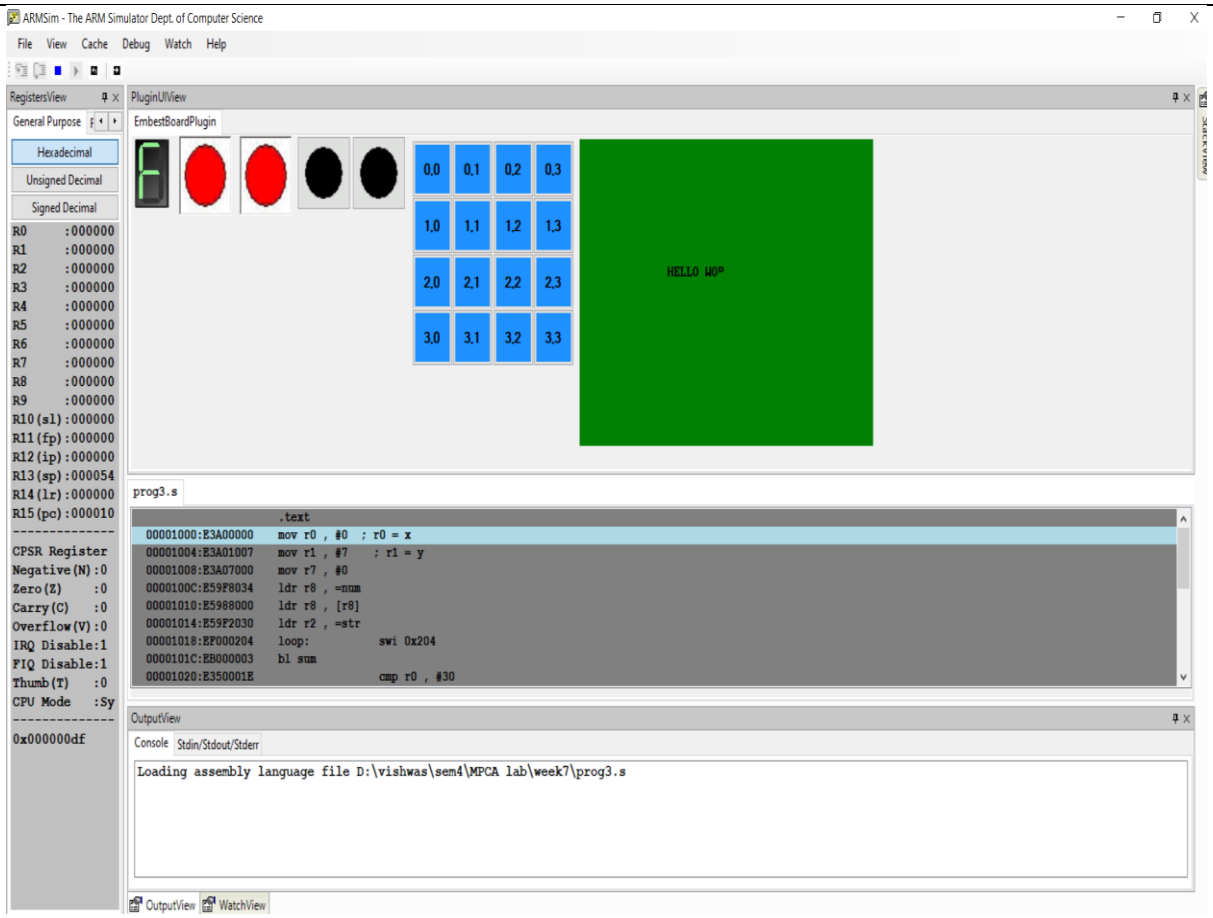

LCD screen.r0-line no(y)

```
mov r7 , #0
mov pc , lr
```

.data

```
str:   .asciz  "HELLO WORLD"
num:  .word  15000
```





MPCA-Laboratory/Assignment/Hands-on/Project