2.12 ASSEMBLY PROGRAMMING

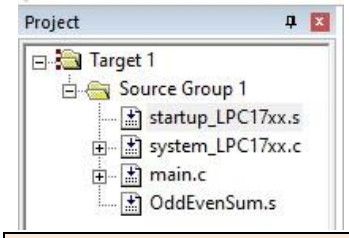
Q) ALP to find sum of even and sum of odd numbers in a given array and store the result in RAM. Assume the numbers to be 8-bit.

Solution:

Files to be included:

system_LPC17xx.c	**system_LPC17xx.c** is a **C source file** that contains the system initialization code for NXP Semiconductors LPC17xx microcontrollers.
system_LPC17xx.s	**system_LPC17xx.s** is an assembly source file that contains low-level system initialization code for NXP Semiconductors' LPC17xx microcontrollers. The file is used in conjunction with the **system_LPC17xx.c** file to provide a complete system initialization routine for LPC17xx-based systems.
main.c	**main.c** is a C source file that is typically the entry point for a C program. It contains the main() function, which is the starting point for the execution of the program.
OddEvenSum.s	**OddEvenSum.s** is an assembly source file that contains the logic to find the sum of even and odd numbers in an array stored in memory.

Project Tree:



main.c

```
#include <LPC17xx.h>

extern void OddEvenSum(void);

int main(void)
{
    SystemInit();
    OddEvenSum();
    while(1);
}
```

OddEvenSum.s

```
 AREA myDATA, DATA, READWRITE  ; Data section
NUM      DCB      1,2,3,4,5,6    ; Numbers
EVENSUM DCB      0              ; Even sum
ODDSUM   DCB      0              ; Odd sum

 AREA myCode, CODE, READONLY   ; Code section
 EXPORT OddEvenSum             ; Export function
ENTRY                          ; Entry point
OddEvenSum
 LDR R0, =NUM    ; Load NUM address
 MOV R1, #0      ; Even sum
 MOV R2, #0      ; Odd sum
 MOV R3, #6      ; Loop count

LOOP
 LDRB R4, [R0], #1  ; Load number
 LSRS R5, R4, #1    ; Check LSB
 BCS ODD            ; If odd

 ADD R1, R1, R4     ; Even sum
 B DEC              ; Continue

 ADD R1, R1, R4     ; Even sum
 B DEC              ; Continue

ODD
 ADD R2, R2, R4     ; Odd sum

DEC
 SUBS R3, R3, #1    ; Decrement counter
 BNE LOOP           ; Loop if not zero

 LDR R0, =EVENSUM   ; Store even sum
 STRB R1, [R0]      ; Store

 LDR R0, =ODDSUM    ; Store odd sum
 STRB R2, [R0]      ; Store

 BX LR              ; Return
 END                ; End of program
```