Ayush Goyal

190905522 CSE D 62

ES Lab End Semester Examination

1. **The checksum of a set of numbers is the sum of all the elements of the set, ignoring the carry. Write and execute an ARM assembly language program to calculate the checksum of a set of numbers, available in the code memory as LIST, which is initialized with 0x28, 0x55, 0x26, 0x70, 0x45, 0x30, 0x62 and 0x85. The size of the set whose checksum is to be calculated is defined by the variable LENGTH. You are supposed to find the checksum by adding all the numbers up to LENGTH from the first element in the LIST, ignoring the carry. Store the checksum in the variable CHECKSUM.**

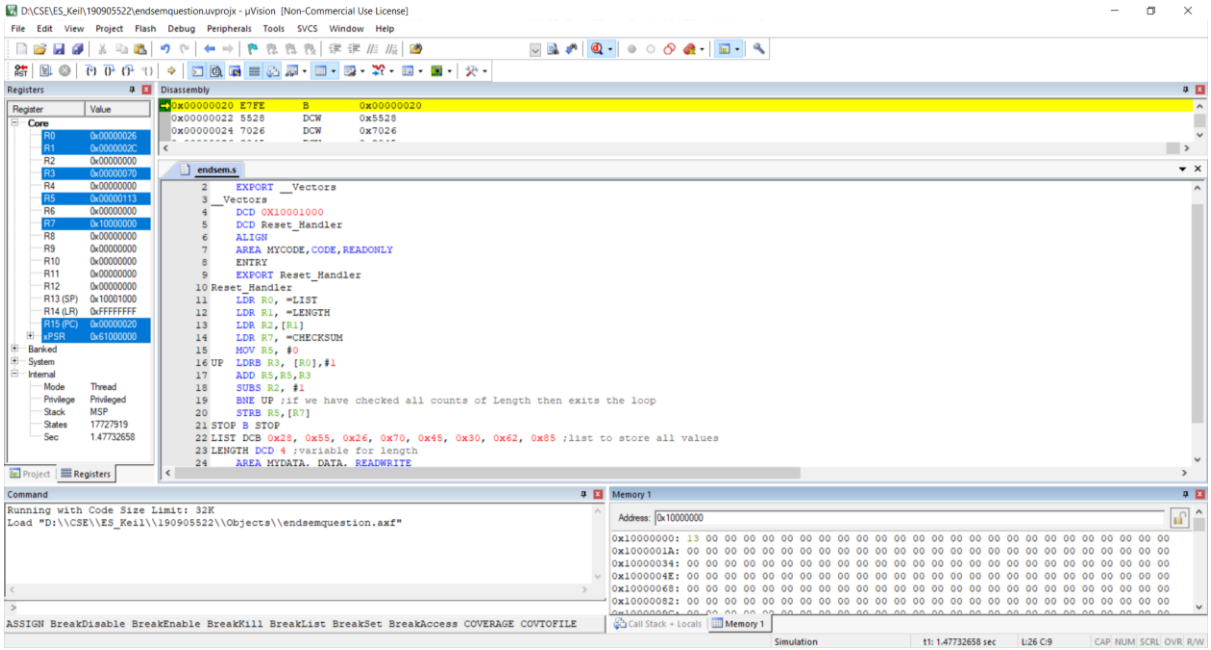
CODE:

```
        AREA RESET,DATA,READONLY
        EXPORT __Vectors
__Vectors
        DCD 0X10001000
        DCD Reset_Handler
        ALIGN
        AREA MYCODE,CODE,READONLY
        ENTRY
        EXPORT Reset_Handler
Reset_Handler
        LDR R0, =LIST
        LDR R1, =LENGTH
        LDR R2,[R1]
        LDR R7, =CHECKSUM
        MOV R5, #0
UP      LDRB R3, [R0],#1
        ADD R5,R5,R3
        SUBS R2, #1
        BNE UP ;if we have checked all counts of Length then exits the loop
```

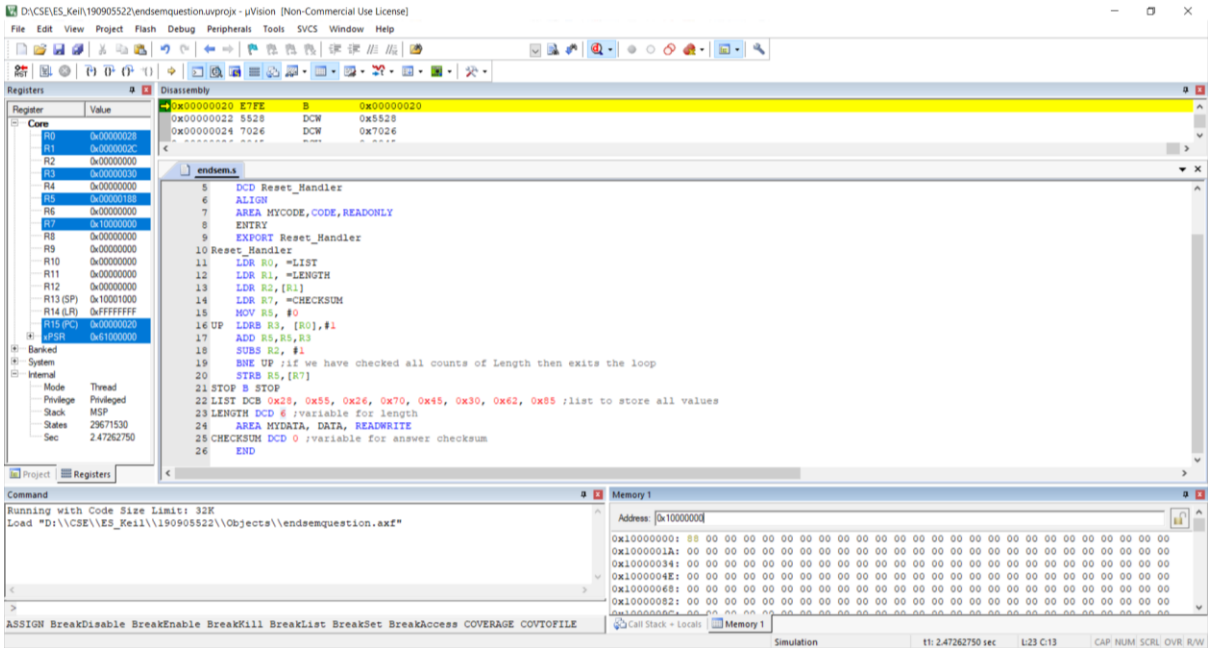
```
        STRB R5,[R7]
STOP B STOP
LIST DCB 0x28, 0x55, 0x26, 0x70, 0x45, 0x30, 0x62, 0x85 ;list to store all values
LENGTH DCD 4 ;variable for length
        AREA MYDATA, DATA, READWRITE
CHECKSUM DCD 0 ;variable for answer checksum
        END
```

OUTPUT:

The following screenshot is the output for when the value of the variable LENGTH is equal to 4. The answer is stored in variable CHECKSUM which is at memory location 0x10000000 and it is shown in the memory window shown below. The answer is as shown = 0x13 since we ignore the carry.



The following screenshot is the output for when the value of the variable LENGTH is equal to 6. The answer is stored in variable CHECKSUM which is at memory location 0x10000000 and it is shown in the memory window shown below. The answer is as shown = 0x88 since we ignore the carry. Otherwise, would've been 0x188.


D:\CSE\ES_Keil\190905522\endsemquestion.uvprojx - µVision [Non-Commercial Use License]
File Edit View Project Flash Debug Peripherals Tools SVCS Window Help
Registers
Register Value
Core
R0 0x00000028
R1 0x0000002C
R2 0x00000000
R3 0x00000030
R4 0x00000000
R5 0x00000188
R6 0x00000000
R7 0x10000000
R8 0x00000000
R9 0x00000000
R10 0x00000000
R11 0x00000000
R12 0x00000000
R13 (SP) 0x10001000
R14 (LR) 0xFFFFFFFF
R15 (PC) 0x00000020
xPSR 0x61000000
Banked
System
Internal
Mode Thread
Privilege Privileged
Stack MSP
States 29671530
Sec 2.47262750
Project Registers
Disassembly
0x00000020 E7FE B 0x00000020
0x00000022 5528 DCW 0x5528
0x00000024 7026 DCW 0x7026
endsem.s
5 DCD Reset_Handler
6 ALIGN
7 AREA MYCODE,CODE,READONLY
8 ENTRY
9 EXPORT Reset_Handler
10 Reset_Handler
11 LDR R0, =LIST
12 LDR R1, =LENGTH
13 LDR R2,[R1]
14 LDR R7, =CHECKSUM
15 MOV R5, #0
16 UP LDRB R3, [R0],#1
17 ADD R5,R5,R3
18 SUBS R2, #1
19 BNE UP ;if we have checked all counts of Length then exits the loop
20 STRB R5,[R7]
21 STOP B STOP
22 LIST DCB 0x28, 0x55, 0x26, 0x70, 0x45, 0x30, 0x62, 0x85 ;list to store all values
23 LENGTH DCD 8 ;variable for length
24 AREA MYDATA, DATA, READWRITE
25 CHECKSUM DCD 0 ;variable for answer checksum
26 END
Command
Running with Code Size Limit: 32K
Load "D:\\CSE\\ES_Keil\\190905522\\Objects\\endsemquestion.axf"
ASSIGN BreakDisable BreakEnable BreakKill BreakList BreakSet BreakAccess COVERAGE COVTOFILE
Memory 1
Address: 0x10000000
0x10000000: 88 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x1000001A: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x10000034: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x1000004E: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x10000068: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x10000082: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Call Stack + Locals Memory 1
Simulation t1: 2.47262750 sec L:23 C:13 CAP NUM SCRL OVR R/W

THE END