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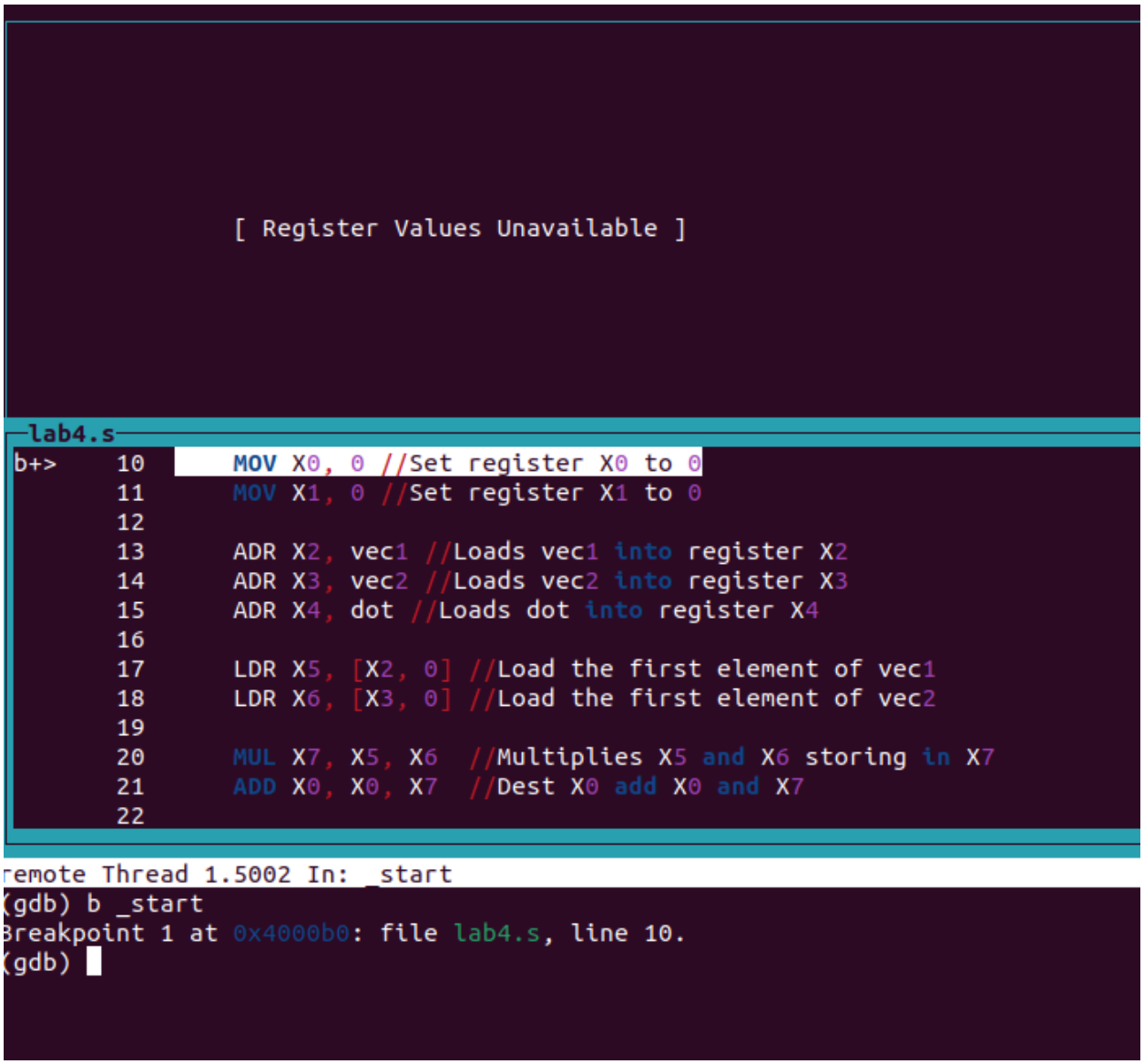
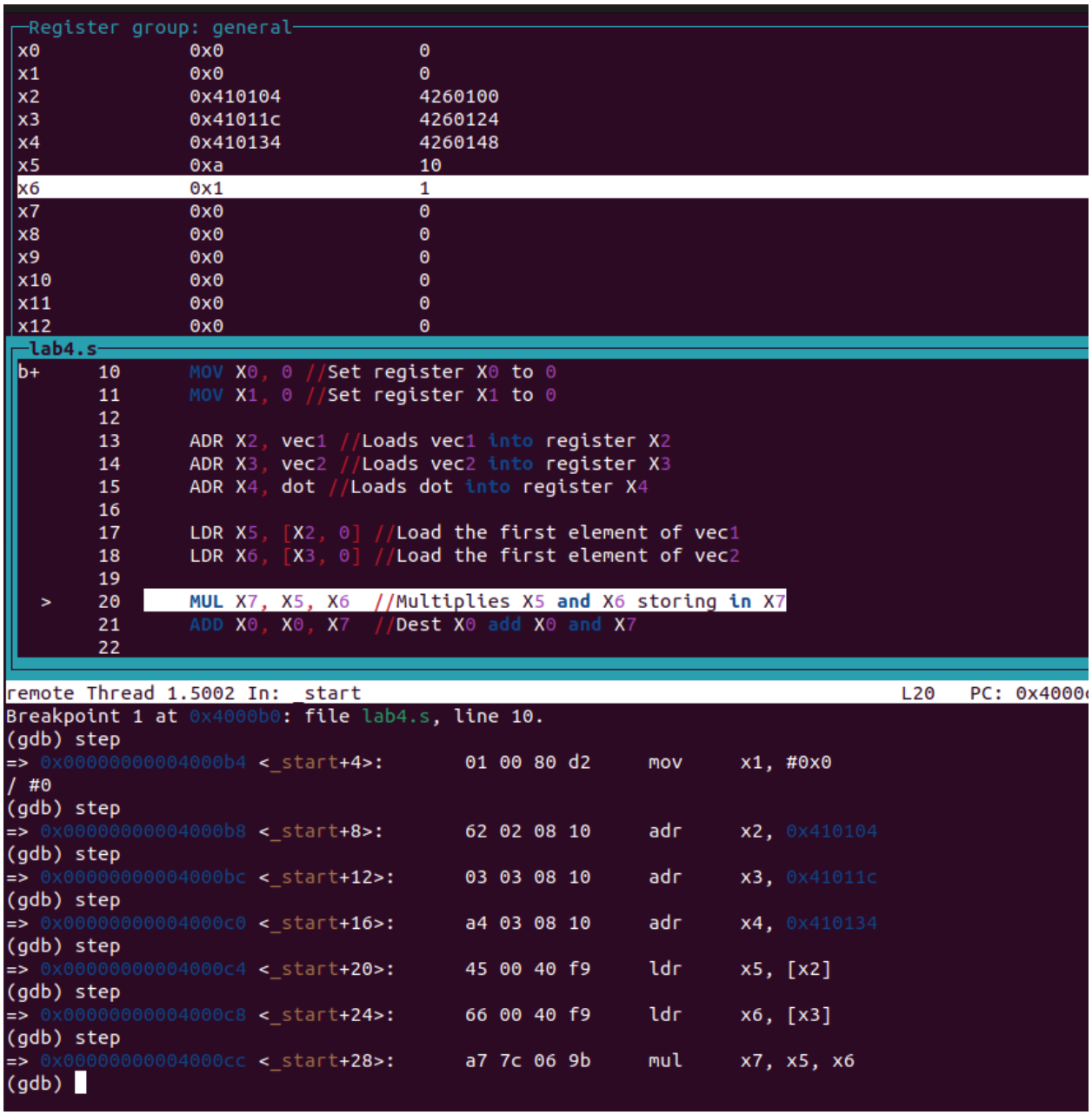
Pledge: "I pledge my honor that I have abided by the Stevens Honor System."

CS 382 Lab 4 Task 2

Start by using the b _start command:



Step through the first 19 lines:
Here we are loading in the first elements of our vectors.



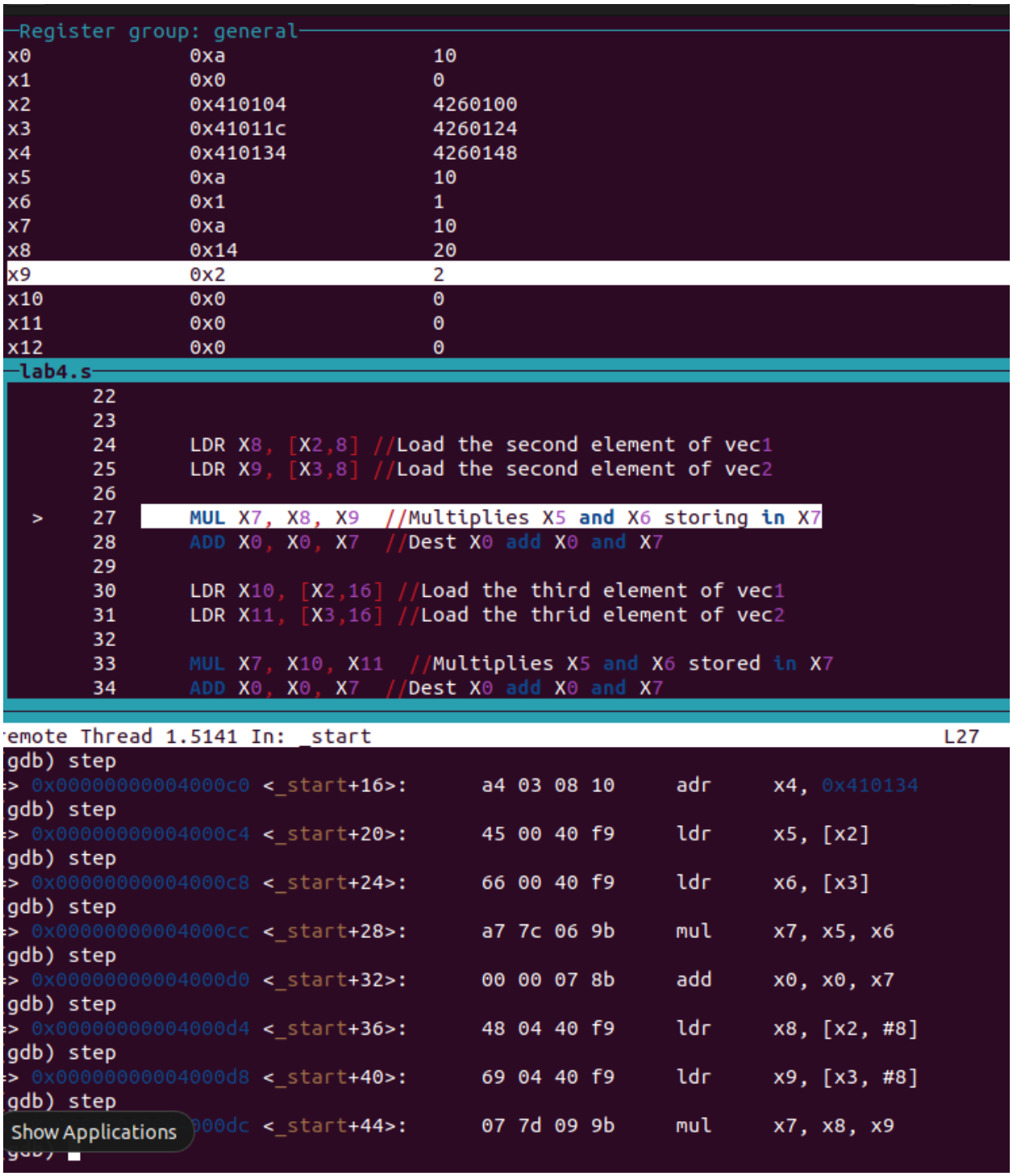
Step through next 2 lines:
Here we store the multiplication and add the product so far

```
Register group: general
x0             0xa                10
x1             0x0                0
x2             0x410104           4260100
x3             0x41011c           4260124
x4             0x410134           4260148
x5             0xa                10
x6             0x1                1
x7             0xa                10
x8             0x0                0
x9             0x0                0
x10            0x0                0
x11            0x0                0
x12            0x0                0
```

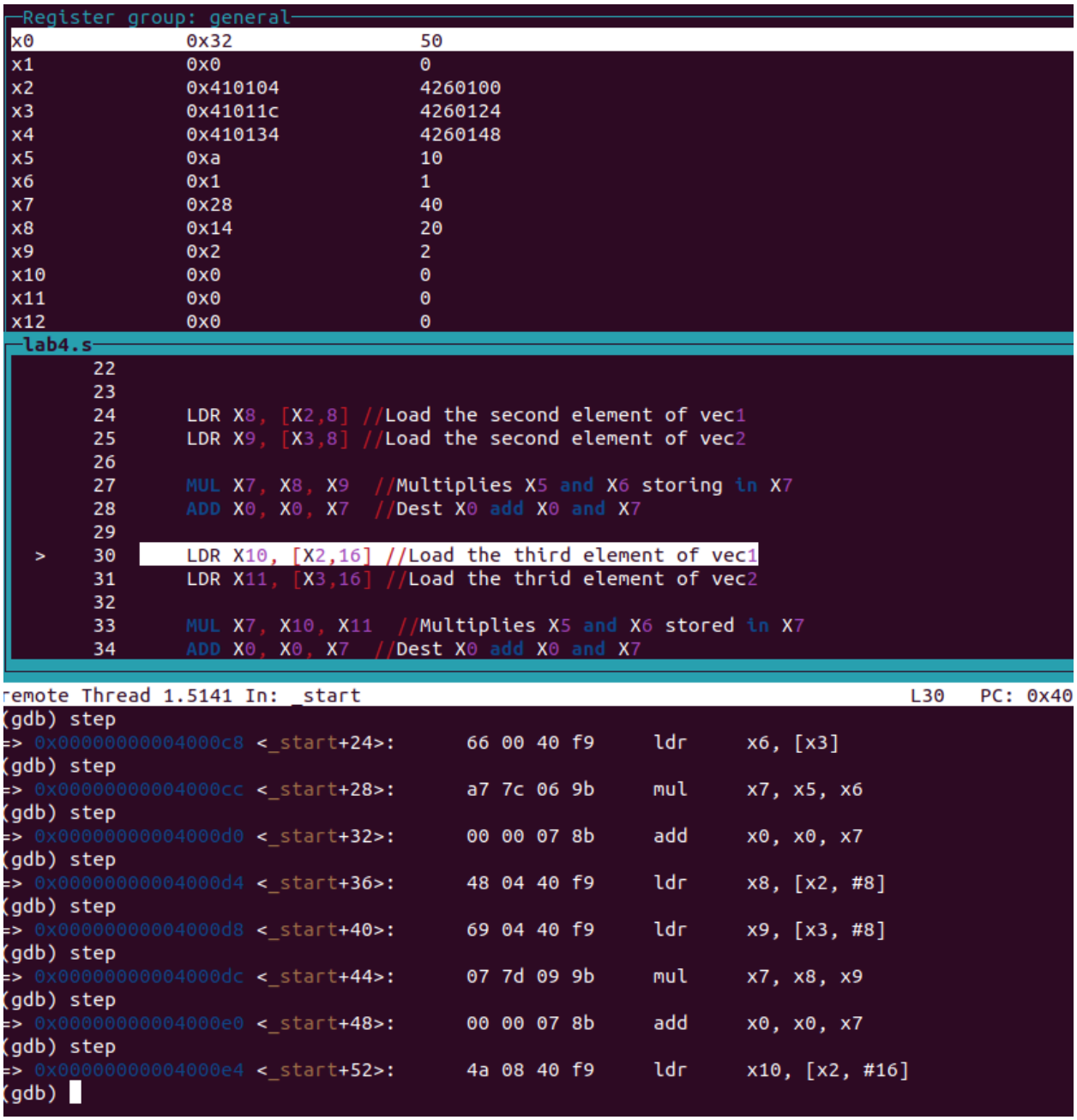
```
lab4.s
      16
      17      LDR X5, [X2, 0] //Load the first element of vec1
      18      LDR X6, [X3, 0] //Load the first element of vec2
      19
      20      MUL X7, X5, X6  //Multiplies X5 and X6 storing in X7
      21      ADD X0, X0, X7  //Dest X0 add X0 and X7
      22
      23
 >    24      LDR X8, [X2,8] //Load the second element of vec1
      25      LDR X9, [X3,8] //Load the second element of vec2
      26
      27      MUL X7, X8, X9  //Multiplies X5 and X6 storing in X7
      28      ADD X0, X0, X7  //Dest X0 add X0 and X7
```

```
emote Thread 1.5141 In: _start                                   L24   PC: 0x40
gdb) step
> 0x00000000004000b8 <_start+8>:       62 02 08 10     adr     x2, 0x410104
gdb) step
> 0x00000000004000bc <_start+12>:      03 03 08 10     adr     x3, 0x41011c
gdb) step
> 0x00000000004000c0 <_start+16>:      a4 03 08 10     adr     x4, 0x410134
gdb) step
> 0x00000000004000c4 <_start+20>:      45 00 40 f9     ldr     x5, [x2]
gdb) step
> 0x00000000004000c8 <_start+24>:      66 00 40 f9     ldr     x6, [x3]
gdb) step
> 0x00000000004000cc <_start+28>:      a7 7c 06 9b     mul     x7, x5, x6
gdb) step
> 0x00000000004000d0 <_start+32>:      00 00 07 8b     add     x0, x0, x7
gdb) step
> 0x00000000004000d4 <_start+36>:      48 04 40 f9     ldr     x8, [x2, #8]
gdb)
```

Step through the next 2 lines:
Here we are loading in the 2nd elements of our vectors.



Step through next 2 lines:
Here we store the multiplication of the second vector and add the product so far



Step through the next 2 lines:
Here we are loading in the 3rd elements of our vectors.

```
Register group: general
x0             0x32                50
x1             0x0                 0
x2             0x410104            4260100
x3             0x41011c            4260124
x4             0x410134            4260148
x5             0xa                 10
x6             0x1                 1
x7             0x28                40
x8             0x14                20
x9             0x2                 2
x10            0x1e                30
x11            0x3                 3
x12            0x0                 0
lab4.s
      28      ADD X0, X0, X7  //Dest X0 add X0 and X7
      29
      30      LDR X10, [X2,16] //Load the third element of vec1
      31      LDR X11, [X3,16] //Load the thrid element of vec2
      32
 >    33      MUL X7, X10, X11  //Multiplies X5 and X6 stored in X7
      34      ADD X0, X0, X7  //Dest X0 add X0 and X7
      35
      36      STR X0, [X4]  //Store the result into X4
      37
      38
      39
      40
emote Thread 1.5141 In: _start                                  L33   PC:
(gdb) step
=> 0x00000000004000d0 <_start+32>:      00 00 07 8b     add     x0, x0, x7
(gdb) step
=> 0x00000000004000d4 <_start+36>:      48 04 40 f9     ldr     x8, [x2, #8]
(gdb) step
=> 0x00000000004000d8 <_start+40>:      69 04 40 f9     ldr     x9, [x3, #8]
(gdb) step
=> 0x00000000004000dc <_start+44>:      07 7d 09 9b     mul     x7, x8, x9
(gdb) step
=> 0x00000000004000e0 <_start+48>:      00 00 07 8b     add     x0, x0, x7
(gdb) step
=> 0x00000000004000e4 <_start+52>:      4a 08 40 f9     ldr     x10, [x2, #16]
(gdb) step
=> 0x00000000004000e8 <_start+56>:      6b 08 40 f9     ldr     x11, [x3, #16]
(gdb) step
=> 0x00000000004000ec <_start+60>:      47 7d 0b 9b     mul     x7, x10, x11
(gdb)
```

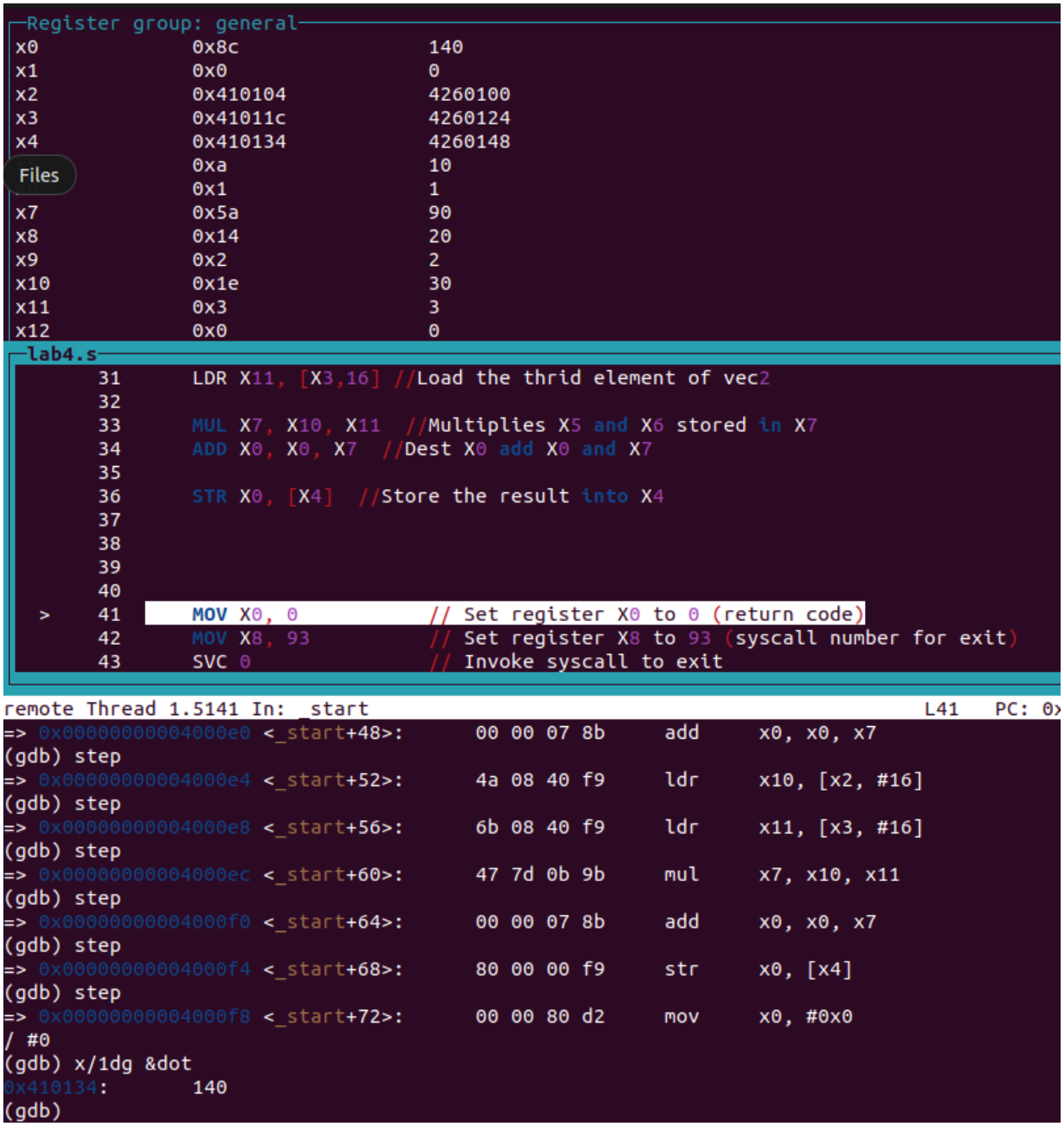
Step through next 2 lines:
Here we store the multiplication of the third vector and add the product so far

```
Register group: general
x0             0x8c                140
x1             0x0                 0
x2             0x410104            4260100
x3             0x41011c            4260124
x4             0x410134            4260148
x5             0xa                 10
x6             0x1                 1
x7             0x5a                90
x8             0x14                20
x9             0x2                 2
x10            0x1e                30
x11            0x3                 3
x12            0x0                 0
```

```
lab4.s
       28      ADD X0, X0, X7  //Dest X0 add X0 and X7
       29
       30      LDR X10, [X2,16] //Load the third element of vec1
       31      LDR X11, [X3,16] //Load the thrid element of vec2
       32
       33      MUL X7, X10, X11  //Multiplies X5 and X6 stored in X7
       34      ADD X0, X0, X7  //Dest X0 add X0 and X7
       35
  >    36      STR X0, [X4]  //Store the result into X4
       37
       38
       39
       40
```

```
remote Thread 1.5141 In: _start                                   L36   PC: 0x4000
(gdb) step
=> 0x00000000004000d8 <_start+40>:      69 04 40 f9     ldr     x9, [x3, #8]
(gdb) step
=> 0x00000000004000dc <_start+44>:      07 7d 09 9b     mul     x7, x8, x9
(gdb) step
=> 0x00000000004000e0 <_start+48>:      00 00 07 8b     add     x0, x0, x7
(gdb) step
=> 0x00000000004000e4 <_start+52>:      4a 08 40 f9     ldr     x10, [x2, #16]
(gdb) step
=> 0x00000000004000e8 <_start+56>:      6b 08 40 f9     ldr     x11, [x3, #16]
(gdb) step
=> 0x00000000004000ec <_start+60>:      47 7d 0b 9b     mul     x7, x10, x11
(gdb) step
=> 0x00000000004000f0 <_start+64>:      00 00 07 8b     add     x0, x0, x7
(gdb) step
=> 0x00000000004000f4 <_start+68>:      80 00 00 f9     str     x0, [x4]
(gdb)
```

Step until line 40:
Use x/1dg &dot: The result of the dot product should be stored here.
We see it prints 140 which is the dot product



Step to end of program:
Ends program

```
Register group: general
x0             0x0                 0
x1             0x0                 0
x2             0x410104            4260100
x3             0x41011c            4260124
x4             0x410134            4260148
x5             0xa                 10
x6             0x1                 1
x7             0x5a                90
x8             0x5d                93
x9             0x2                 2
x10            0x1e                30
x11            0x3                 3
x12            0x0                 0
```

```
lab4.s
      43        SVC 0               // Invoke syscall to exit
      44
      45   .data
      46   vec1: .quad 10, 20, 30
      47   vec2: .quad 1, 2, 3
      48   dot: .quad 0
      49
      50
      51
      52
      53
      54
      55
```

```
exec No process In:                                                    L??
(gdb) step
=> 0x00000000004000f0 <_start+64>:      00 00 07 8b     add     x0, x0, x7
(gdb) step
=> 0x00000000004000f4 <_start+68>:      80 00 00 f9     str     x0, [x4]
(gdb) step
=> 0x00000000004000f8 <_start+72>:      00 00 80 d2     mov     x0, #0x0
/ #0
(gdb) x/1dg &dot
0x410134:       140
(gdb) step
=> 0x00000000004000fc <_start+76>:      a8 0b 80 d2     mov     x8, #0x5d
/ #93
(gdb) step
=> 0x0000000000400100 <_start+80>:      01 00 00 d4     svc     #0x0
(gdb) step
[Inferior 1 (process 1) exited normally]
(gdb)
```