/home/protik/Desktop/Computer-Architecture-Homeworks/vector_multiplication.asm - MARS 4.5

File Edit Run Settings Tools Help

Run speed at max (no interaction)

Edit Execute

vector_multiplication.asm

```
1  .data
2
3  vector_a:   .word 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32
4  vector_b:   .word 32, 31, 30, 29, 28, 27, 26, 25, 24, 23, 22, 21, 20, 19, 18, 17, 16, 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1
5  n:          .word 32
6
7  .text
8
9  main:
10     # Load the address of vector_a, vector_b, and n into registers
11     la $s0, vector_a
12     la $s1, vector_b
13     lw $t0, n
14
15     # Initialize variables for dot product and loop counter
16     li $t1, 0    # Dot product sum
17     li $t2, 0    # Loop counter
18     li $t3, 0    # Offset value
19
20 outer_loop:
21     # Load elements a[i] and b[i]
22     lw $s2, 0($s0)  # Load a[i] into $s2
23     lw $s3, 0($s1)  # Load b[i] into $s3
24     li $s4, 0       # multiplication (sum) accumulator
25
26 multiply_loop:
27     # implement multiplication using add
28     beq $s3, 0, end_multiply_loop          # stop the loop whenever s3 = 0
29
30     add $s4, $s4, $s2                      # we continue adding s2 to itself
31     subi $s3, $s3, 1                       # continue subtracting 1 from s3
32
33     j multiply_loop
34
35 end_multiply_loop:
36     # update dot product sum
37     add $t1, $t1, $s4
38
39     # Update loop counter and pointers
40     addi $t2, $t2, 1    # Increment loop counter
41     addi $s0, $s0, 4    # Move to the next element in vector a
```

Line: 5 Column: 21 Show Line Numbers

Mars Messages Run I/O

```
814
-- program is finished running --

5984
-- program is finished running --
```

Clear

Registers Coproc 1 Coproc 0

Name	Number	Value
$zero	0	0x00000000
$at	1	0x00000000
$v0	2	0x0000000a
$v1	3	0x00000000
$a0	4	0x00001760
$a1	5	0x00000000
$a2	6	0x00000000
$a3	7	0x00000000
$t0	8	0x00000020
$t1	9	0x00001760
$t2	10	0x00000020
$t3	11	0x00000000
$t4	12	0x00000000
$t5	13	0x00000000
$t6	14	0x00000000
$t7	15	0x00000000
$s0	16	0x10010080
$s1	17	0x10010100
$s2	18	0x00000020
$s3	19	0x00000000
$s4	20	0x00000020
$s5	21	0x00000000
$s6	22	0x00000000
$s7	23	0x00000000
$t8	24	0x00000000
$t9	25	0x00000000
$k0	26	0x00000000
$k1	27	0x00000000
$gp	28	0x10008000
$sp	29	0x7fffeffc
$fp	30	0x00000000
$ra	31	0x00000000
pc		0x00400070
hi		0x00000000
lo		0x00000000