CS 221 Pointers and Arrays Evaluation Assignment

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1.

https://github.com/Id405/cs-221-eval-assignments/blob/main/eval-5/1.s

```
1   .data
2   sep: .asciiz ", "
3
4   .text
5   .globl main
6
7   main:                    # Test code
8       li $a0 1
9       li $s0 10
10  loopmain:
11      jal fib
12      move $s1 $a0
13      move $a0 $v0
14      li $v0 1
15      syscall
16      la $a0 sep
17      li $v0 4
18      syscall
19      move $a0 $s1
20      addi $a0 $a0 1
21      ble $a0 $s0 loopmain
22      li $v0 10
23      syscall
24
25  fib:                    #   # Begin of answer
26      li $t0 0            #   int a = 0;
27      li $t1 1            #   int b = 1;
28      li $v0 0            #   int c = 0;
29      li $t3 1            #   int i = 0;
30  loop:
31      add $v0 $t0 $t1     #   c = a + b;
32      move $t0 $t1        #   a = b;
33      move $t1 $v0        #   b = c;
34      addi $t3 $t3 1      #   i = i + 1;
35      blt $t3 $a0 loop    #   if (int i < n)
36      jr $ra             #      goto loop
```

2.

https://github.com/Id405/cs-221-eval-assignments/blob/main/eval-5/2.s

```
1   .data
2   array:
3       .word    1
4       .word    2
5       .word    3
6       .word    4
7       .word    5
8   sep: .asciiz ", "
9
10  .text
```

```mips
     .globl main

main: # testing stuff :)
     la $a0 array
     li $a1 5
     li $t0 3
     li $t1 5
     li $t2 4

     li $t3 0 # begin problem
     li $s0 0
     li $s1 0
     li $s2 0
     li $s3 0
     ble $t0 $t1 swap
     move $t4 $t1
     move $t1 $t0
     move $t0 $t4
swap:
     ble $t1 $t2 loop
     move $t4 $t1
     move $t1 $t2
     move $t2 $t4
loop:
     mul $t4 $t3 4
     add $t4 $a0 $t4
     lw $t4 ($t4)
     ble $t0 $t4 greater
     addi $s0 $s0 1
     j end
greater:
     blt $t4 $t2 middle
     addi $s3 $s3 1
     j end
middle:
     blt $t4 $t1 lowermiddle
     addi $s1 $s1 1
     j end
lowermiddle:
     addi $s2 $s2 1
end:
     addi $t3 $t3 1
     blt $t3 $a1 loop

     li $v0 1 # then some more testing stuff
     move $a0 $s0
     syscall

     li $v0 4
     la $a0 sep
     syscall

     li $v0 1
     move $a0 $s1
     syscall

     li $v0 4
```

```
68      la $a0 sep
69      syscall
70
71      li $v0 1
72      move $a0 $s2
73      syscall
74
75      li $v0 4
76      la $a0 sep
77      syscall
78
79      li $v0 1
80      move $a0 $s3
81      syscall
82
83      li $v0 10
84      syscall
```

3.

https://github.com/Id405/cs-221-eval-assignments/blob/main/eval-5/3.s

```
1   .data
2   array1:
3       .word   1
4       .word   2
5       .word   3
6       .word   4
7       .word   5
8   array2:
9       .word   6
10      .word   7
11      .word   8
12      .word   9
13      .word   10
14
15  sep: .asciiz ", "
16  nl: .asciiz "\n"
17
18  .text
19  .globl main
20
21  main:
22      la $a0 array1 # testing stuff
23      la $a1 array2
24      la $a2 5
25
26      li $t0 0        # begin problem
27  loop:
28      mul $t1 $t0 4
29      add $t2 $a0 $t1
30      add $t1 $a1 $t1
31      lw $t3 ($t2)
32      lw $t4 ($t1)
33      sw $t3 ($t1)
34      sw $t4 ($t2)
```

```
35      addi $t0 $t0 1
36      blt $t0 $a2 loop
37
38      li $t0 0        # more testing stuff
39  printloop1:
40      mul $t1 $t0 4
41      add $t1 $a0 $t1
42      lw $t1 ($t1)
43      move $t2 $a0
44      li $v0 1
45      move $a0 $t1
46      syscall
47      li $v0 4
48      la $a0 sep
49      syscall
50      move $a0 $t2
51      addi $t0 $t0 1
52      blt $t0 $a2 printloop1
53      li $v0 4
54      la $a0 nl
55      syscall
56      li $t0 0
57  printloop2:
58      mul $t1 $t0 4
59      add $t1 $a1 $t1
60      lw $t1 ($t1)
61      move $t2 $a0
62      li $v0 1
63      move $a0 $t1
64      syscall
65      li $v0 4
66      la $a0 sep
67      syscall
68      move $a0 $t2
69      addi $t0 $t0 1
70      blt $t0 $a2 printloop2
71      li $v0 10
72      syscall
```

4.

https://github.com/Id405/cs-221-eval-assignments/blob/main/eval-5/4.s

```
1   .data
2   node4:
3       .word 0
4       .half 8
5       .align 2
6
7   node3:
8       .word node4
9       .half 6
10      .align 2
11
12  node2:
13      .word node3
```

```
14          .half 10
15          .align 2
16
17    node1:
18          .word node2
19          .half 15
20          .align 2
21
22    .text
23    .globl main
24
25    main:
26          la $a0 node1 # for testing :)
27
28          li $v0 0
29    loop:
30          lw $t1 ($a0)
31          addi $a0 $a0 4
32          lh $t2 ($a0)
33          add $v0 $v0 $t2
34          move $a0 $t1
35          bne $a0 0 loop
36
37            move $a0 $v0
38          li $v0 1 # then some testing stuff :)
39          syscall
40          li $v0 10
41          syscall
```