NUST CHIP DESIGN CENTRE

Digital Design Verification

Lab Manual # 15 – Data Transfer, Decision Making, Logical Ops
(Arrays in RISC-V Assembly, Bit Manipulation and Implementation of factorial function)

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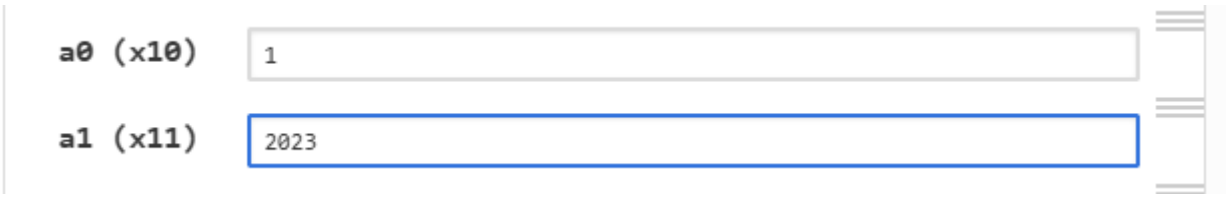
1. Lab Tasks:

Task # 1

```
41 .text
42
43 addi a0 x0 1
44 addi a1 x0 2023
45
46 # This prints out the integer stored in a1
47 ecall
48
49 # This exits the program
50 addi a0 x0 17
51 addi a1 x0 0
52 ecall
```

Output:



Terminal Output:

```
khalilrehman@DESKTOP-NI915SM MINGW64 /d/sp24-lab-starter/lab03 (main)
$ java -jar ../tools/venus.jar ex1_hello.s
2023
Exited with error code 0
```

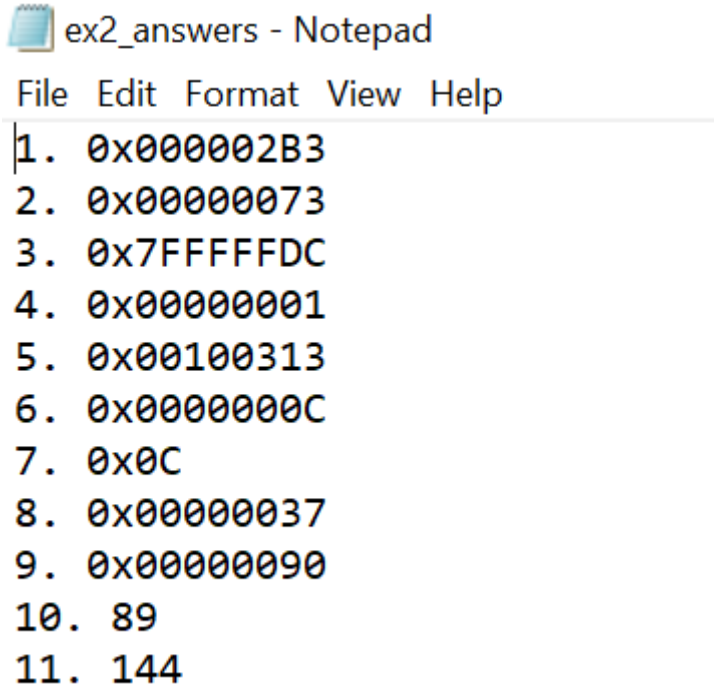
Task # 2

```
.data
n: .word 12

.text
main:
    add t0, x0, x0 # curr_fib = 0
    addi t1, x0, 1 # next_fib = 1
    la t3, n # load the address of the label n
    lw t3, 0(t3) # get the value that is stored at the address denoted by the label n
fib:
    beq t3, x0, finish # exit loop once we have completed n iterations
    add t2, t1, t0 # new_fib = curr_fib + next_fib;
    mv t0, t1 # curr_fib = next_fib;
    mv t1, t2 # next_fib = new_fib;
    addi t3, t3, -1 # decrement counter
    j fib # loop
finish:
    addi a0, x0, 1 # argument to ecall to execute print integer
    addi a1, t0, 0 # argument to ecall, the value to be printed
    ecall # print integer ecall
    addi a0, x0, 10 # argument to ecall to terminate
    ecall # terminate ecall

```

Output:

t0 (x5)	144
t1 (x6)	233
t2 (x7)	233
s0 (x8)	0
s1 (x9)	0
a0 (x10)	10
a1 (x11)	144

Answers:


ex2_answers - Notepad

File Edit Format View Help

1. 0x000002B3
2. 0x00000073
3. 0x7FFFFFDC
4. 0x00000001
5. 0x00100313
6. 0x0000000C
7. 0x0C
8. 0x00000037
9. 0x00000090
10. 89
11. 144