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CSE 3666

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A notebook with writing on it

Description automatically generated1)

A close-up of a notebook

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2)

A screenshot of a computer

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A green text on a white background

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0x12345678 is loaded into s2 using lui and addi, and a copy is made into t0. A loop is then used where it runs for 4 times to perform the correct number of iterations to rearrange the entire hex sequence. Bit shifting is used throughout the code to move the last 8 bits into place after each iteration, and then extract it to add it to s4 by using an and operation with 0xFF. At the end, system call 34 is used to print the hexadecimal number.

3)

1. If s0 is 0xFF00FF00, 146 instructions are going to be executed. The number of executed instructions depends on the number of 1’s in s0, but it does not depend on the location of the 1’s since whenever a 1 is detected in t0, the increment instruction will run. For all other bits that are 0, 2 instructions are going to run in the loop label but will skip the addi instruction. Then, all bits are going to run the skip label regardless of whether it is a 0 or 1. Thus, 4 are guaranteed to run, plus the two addi in the beginning. Then, the number of times s1 will be incremented is based on the number of 1’s. Thus, the equation to find the number of executed instructions is:

Number of instructions = 2 + (4 \* number of bits) + (number of 1’s).

0xFF00FF00 in binary is: 11111111000000001111111100000000­2 and with the equation:

Number of instructions = 2 + (4 \* 32) + 16 which equals 146.

1. A screenshot of a computer

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The number of instructions when s0 is 0xFF00FF00 is 178 instructions. This number can be obtained by the fact that when there is a 0, the loop will run 3 instructions until it reaches the beq instruction, then it will run the two instructions at the skip label. This would then have 0s always running 5 instructions. When t0 is a 1, then all the instructions under the loop label will be run, which will be 4 instructions. Then, the instructions under the skip label will run, which will be 2. Thus, 6 instructions in total will run for 1s. Then, two instructions will run in the beginning. Thus, we can multiply the total number of digits and then add by the total number of 1s in the binary sequence and then a + 2. The equation is then the following for 0xFF00FF00:

Number of instructions = 2 + (5 \* 32) + 16

4) A screenshot of a computer program

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5)

A screenshot of a computer

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