Part I

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| X | Y | Z | rwe | imm en | imm va | an en | -a/s | lu en | lf | su en | st | st en | ld en | -r/w | msel | Description |
| 2 | - | 3 | 1 | 1 | -1 | 0 | - | 0 | - | 1 | 01 | 0 | 0 | - | 0 | R3 = R2 << 1 |
| 3 | 2 | 3 | 1 | 0 | - | 1 | 0 | 0 | - | 0 | -- | 0 | 0 | - | 0 | R3 = R2 + R3 |
| - | - | 1 | 1 | 1 | 100 | 0 | - | 0 | - | 0 | -- | 0 | 1 | 1 | 1 | R1 = M[100] |
| 1 | - | 1 | 1 | 1 | -2 | 0 | - | 0 | - | 1 | 01 | 0 | 0 | - | 0 | R1 = R1 << 2 |
| 1 | 3 | 1 | 1 | 0 | - | 1 | 0 | 0 | - | 0 | -- | 0 | 0 | - | 0 | R1 = R3 + R1 |

Part II

.data

# This is the start of the original array.

Original: .word 200, 270, 250, 100

.word 205, 230, 105, 235

.word 190, 95, 90, 205

.word 80, 205, 110, 215

# The next statement allocates room for the other array.

# The array takes up 4\*16=64 bytes.

Second: .space 64

.align 2

.globl main

.text

# hard coding at its best

# take two diagonally symmetrical numbers, swap

main: addi $t0, $0, 4 # t0 = 4

addi $t1, $0, 16 # t1 = 16

lw $t2, Original($t0) # t2 = Original(4)

lw $t3, Original($t1) # t3 = Original(16)

sw $t3, Second($t0) # Original(4) = t3

sw $t2, Second($t1) # Original(16) = t2

addi $t0, $0, 8 # t0 = 4

addi $t1, $0, 32 # t1 = 16

lw $t2, Original($t0) # t2 = Original(4)

lw $t3, Original($t1) # t3 = Original(16)

sw $t3, Second($t0) # Original(4) = t3

sw $t2, Second($t1) # Original(16) = t2

addi $t0, $0, 12 # t0 = 4

addi $t1, $0, 48 # t1 = 16

lw $t2, Original($t0) # t2 = Original(4)

lw $t3, Original($t1) # t3 = Original(16)

sw $t3, Second($t0) # Original(4) = t3

sw $t2, Second($t1) # Original(16) = t2

addi $t0, $0, 24 # t0 = 4

addi $t1, $0, 36 # t1 = 16

lw $t2, Original($t0) # t2 = Original(4)

lw $t3, Original($t1) # t3 = Original(16)

sw $t3, Second($t0) # Original(4) = t3

sw $t2, Second($t1) # Original(16) = t2

addi $t0, $0, 28 # t0 = 4

addi $t1, $0, 52 # t1 = 16

lw $t2, Original($t0) # t2 = Original(4)

lw $t3, Original($t1) # t3 = Original(16)

sw $t3, Second($t0) # Original(4) = t3

sw $t2, Second($t1) # Original(16) = t2

addi $t0, $0, 44 # t0 = 4

addi $t1, $0, 56 # t1 = 16

lw $t2, Original($t0) # t2 = Original(4)

lw $t3, Original($t1) # t3 = Original(16)

sw $t3, Second($t0) # Original(4) = t3

sw $t2, Second($t1) # Original(16) = t2

addi $t0, $0, 0 # t0 = 4

addi $t1, $0, 20 # t1 = 16

lw $t2, Original($t0) # t2 = Original(4)

lw $t3, Original($t1) # t3 = Original(16)

sw $t3, Second($t1) # Original(4) = t3

sw $t2, Second($t0) # Original(16) = t2

addi $t0, $0, 40 # t0 = 4

addi $t1, $0, 60 # t1 = 16

lw $t2, Original($t0) # t2 = Original(4)

lw $t3, Original($t1) # t3 = Original(16)

sw $t3, Second($t1) # Original(4) = t3

sw $t2, Second($t0) # Original(16) = t2

Exit: li $v0, 10

syscall