1. In the class, we have discussed how to find the maximum value in an array. You can review this example first then ask the students to write code to find the location of the maximum element in an array with 10 positive elements, assuming the starting address of the array is in $s0. Refreshing the basic concepts of memory access, shift, loop and branch.

# find the index of the maximum element in an array with 10 positive elements

.data

A: .word 34, 67, 10, 45, 90, 11, 3, 67, 19, 100

.text

.globl main

main:

la $s0, A # starting addrerss of A in $s0

li $s1, 10 # number of elements in $s1

li $s2, 0 # i in $s2

li $s3, 0 # max in $s3

li $s4, -1 # index in $s4

Loop: sll $t1, $s2, 2 # $t1 = i \* 4;

add $t1, $t1, $s0 # $t1 = i \* 4 + $s0

lw $t0, 0($t1) # $t0 = A[i]

slt $t2, $t0, $s3 # $t2 = 1 if $t0 < $s3. $t2 = 0 if $t0 >= $s3.

bne $t2, $zero, L1 # if ($t2 == 0), goto L1

ori $s3, $t0, 0 # update max value

ori $s4, $s2, 0 # update max index

L1: addi $s2, $s2, 1 # i = i + 1

bne $s2, $s1, Loop # if (i != $s1), go back to loop

done: li $v0, 10

syscall

1. Ask the students to write code to find the number of times a value appears in an array with n elements where n is 10 in our case.

.data

A: .word 12, 34, 67, 1, 45, 90, 11, 33, 67, 19

.text

.globl main

main:

la $s0, A # base address

li $s1, 10 # n

li $s2, 67 # the value to search

ori $s3, $zero, 0

ori $t0, $zero, 0

findocrloop:

sll $t1, $t0, 2

add $t1, $s0, $t1

lw $t2, 0($t1)

bne $t2, $s2, findocrnoinc

addi $s3, $s3, 1

findocrnoinc:

addi $t0, $t0, 1

bne $t0, $s1, findocrloop

done: li $v0,10

syscall