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Homework 2 Question 1: Find Min and Max of Array

CIS-655 Advanced computer architecture

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The following program creates an array of 10 integers and finds the minimum and maximum values in the array. The minimum value is stored in register $s0, and the maximum value is stored in register $s1.

The array is [10, 5, 15, 3, 18, 7, 20, 2, 16, 1]. After running the program, register $s0 should have the value 1 stored, representing the minimum, and register $s1 should have the value 20 stored, representing the maximum.

#

# The following program simply creates an array of 10 integers

# and runs a loop to find the minimum and maximum values in

# the array. The minimum value is stored in register $s0 and

# the maximum value is stored in register $s1.

#

.data # Defines variable section of an assembly routine.

array: .word 10, 5, 15, 3, 18, 7, 20, 2, 16, 1 # Define a variable named array as a word

# (integer) array.

.text # Defines the start of the code section for the program.

.globl main

main:

la $t0, array # Move the address of array into register $t0.

addi $t1, $zero, 10 # t1 will have the number of elements inside of it (10) (array length)

lw $s0, 0($t0) # min = array[0]

lw $s1, 0($t0) # max = array[0]

addi $t2, $zero, 1 # t2 represents i which will start at index 1 in the array (not index 0)

loop:

beq $t1, $t2, exit\_loop

sll $t3, $t2, 2 # t3 holds the offset to be applied later to the original address of the array

add $t3, $t3, $t0 # t3 holds the address of array[i]

lw $t4, 0($t3) # t4 holds the value of array[i]

slt $t5, $t4, $s0 # slt = set less than. Set t5 if s0 (min) is less than t4 (array[i])

beq $t5, $zero, do\_not\_set\_min

add $s0, $zero, $t4 # set min = array[i]

do\_not\_set\_min:

slt $t5, $t4, $s1 # set t5 if t4 (array[i]) is less than s1 (max)

bne $t5, $zero, do\_not\_set\_max

add $s1, $zero, $t4 # set max = array[i]

do\_not\_set\_max:

addi $t2, $t2, 1

j loop

exit\_loop:

li $v0, 10 # System Service call to terminate program run.

syscall



