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Problem 1

2.1 For the following C statement, write the corresponding RISC-V assembly code. Assume that the C variables f, g, and h, have already been placed in registers x5, x6, and x7 respectively. Use a minimal number of RISC-V assembly instructions.

$f = g + (h - 5);$

sub h, h, 5

add f, g, h

Problem 2

2.2 Write a single C statement that corresponds to the two RISC-V assembly instructions below.

add f, g, h

add f, i, f

$f = i + (g + h)$

Problem 3

2.4 For the RISC-V assembly instructions below, what is the corresponding C statement? Assume that the variables f, g, h, i, and j are assigned to registers x5, x6, x7, x28, and x29, respectively. Assume that the base address of the arrays A and B are in registers x10 and x11, respectively.

*slli x30, x5, 3 // x30 = f*8*

$f = f * 8$

add x30, x10, x30 // x30 = &A[f]

$A = \&A[f]$

*slli x31, x6, 3 // x31 = g*8*

$g = g * 8$

add x31, x11, x31 // x31 = &B[g]

$B = \&B[g]$

ld x5, 0(x30) // f = A[f]

$f = \&A$

addi x12, x30, 8

$C = \&A + 8$

ld x30, 0(x12)

$A = \&C$

add x30, x30, x5

$A = A[f + 8]$

sd x30, 0(x31)

Writes A

Problem 4

2.5 Show how the value 0xabcdef12 would be arranged in memory of a little-endian and a big-endian machine. Assume the data are stored starting at address 0 and that the word size is 4 bytes.

Little-endian: 12efcdab

Big-endian: abcdef12

Problem 5

2.6 Translate 0xabcdef12 into decimal.

0xabcdef12 to binary = 1010 1011 1100 1101 1110 1111 0001 0010

Binary to decimal = 2882400018