Information Technology University, Lahore, Pakistan

BS Computer and Software Engineering

Computer Organization and Assembly Language

Quiz# 2, Spring 2025

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Tuesday Februrary 04, 2025

Name: _____ Roll Number: _____

Maximum Time Allowed: 10 minutes Maximum Marks: 10

Translate the following C code to RISC-V. 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. Assume that the elements of the arrays A and B are 8-byte words:

```
B[4] = A[i] + A[j];
```

Solution: Code is written in blue color, while comments are in Red.

```
// Given f, g, h, i, j are in x5, x6, x7, x28, x29 respectively
// Base addresses of A and B are in x10 and x11 respectively
// Elements of A and B are 8-byte words
// Step 1: Calculate the address of A[i] (A + i * 8)
                    slli x30, x28, 3 // x30 = i * 8 (since each element is 8 bytes)
                    add x30, x10, x30 // x30 = base address of A + offset for A[i]
// Step 2: Load A[i] into a temporary register
                    ld x31, 0(x30) // x31 = A[i]
// Step 3: Calculate the address of A[j] (A + j * 8)
                    slli x30, x29, 3 // x30 = j * 8
                    add x30, x10, x30 // x30 = base address of A + offset for A[j]
// Step 4: Load A[j] into a temporary register
                    ld x5, 0(x30) // x5 = A[j] (using x5 as a temporary register)
// Step 5: add A[i] and A[j]
                    add x31, x31, x5 // x31 = A[i] + A[j]
// Step 6: Store the result in B[4]
                    sd x31, 32(x30) // B[4] = x31 (result of A[i] + A[j])
```