

Computer Architecture - CS2323. Autumn 2022

Lab-6 (Matrix Multiplication on RED-V board)

This assignment is a continuation of the previous assignment on matrix multiplication. We will port the code for matrix multiplication implemented on Ripes simulator onto the Freedom Studio tool and then download/execute it on the board. The problem statement remains the same as Lab5.

We are given two 2-D matrices and we need to multiply them to generate a product matrix. Consider that each of the matrix elements is a 32-bit integer. The dimensions of the matrices are also provided, as shown in the data section. Write a RISC-V program to multiply the two matrices. Your program must do the following:

1. First match the dimensions of the matrices to identify whether they can be multiplied. Else, indicate an error by writing to a memory location and exit the program.
2. If the dimensions are compatible, then perform the multiplication and write the sum matrix.

Assume that the matrix elements are signed integers and the result will never overflow the register width.

Following is how the data section is organized (blue are inputs, and red are generated from program):

```
.data
L1: .word 0           #This location indicates the error of the result. It is 0 if no error else 1.
.word D1x D1y        #x and y dimensions of MATRIX-1
.word <VALUES OF THE MATRIX-1 are present here consecutively, in a row-major order>
.word D2x D2y        #x and y dimensions of MATRIX-2
.word <VALUES OF THE MATRIX-2 are present here consecutively, in a row-major order>
.word D3x D3y        #values to be written by the program
.word <VALUES OF THE MATRIX-3 (product matrix) should be written by the program here
consecutively, in a row-major order>
```

main:

```
    la x3, L1
    <YOUR CODE STARTS FROM HERE>
```

Submission instructions:

Submit the assembly code as a file named ROLLNUM1_ROLLNUM2.s (e.g., CSYYBTECHXXXXX_CSYYBTECHZZZZZ.S) in the google classroom. Also mention the names of the team members in comments in the assembly code file. Only one student of the group should submit the assignment.

This assignment must be shown to the TAs in the lab to receive the full credit. There is no partial credit just for submission.

Due to a holiday on 8th Nov., the Tuesday batch students can work on this in the next week (15-Nov). The Wednesday batch students would do this assignment on 9th Nov.

Deadline: 15 Nov 2022 (Tuesday), 10.00 pm

Late submission: No late submission allowed for this assignment.

Note: Submissions are subject to similarity check and hence submit only your own work.