METRO STATE UNIVERSITY

ICS 232 Computer Organization & Architecture
Homework 13 - Chapter 9 - 10 points
Due Date: 8/2/2023

Name:

Note: Please post your homework to ICS232 D2L on or before the due date.

Chapter 9 – Alternative Architectures

Essential Terms and Concepts

3. Describe how register windowing makes procedure call more efficient?
- register windows are divided into partitions, when the CPU moves through procedures, this process overlaps windows and changes the calling functions to the input register modules. The capacity allows work to be done in reduced saving and restoring processes that improves the register environments. It offers greater efficiency.

7. Do all programming problems lend themselves to parallel execution? What is the limiting factor?
- No, many tasks are needed to be answered before the next step can proceed. Limiting factor is the heat in CPU clock speeds.

12. Explain the limitation inherent in a register-register vector processing machine?
- only able to work with one limit at one time

13. Give two reasons for the efficiency of vector processors.
- continuous source of data and can begin prefetching pairs of values
- Machine fetches fewer instructions, less decoding to do

21. What is reentrant code?
- reusable routine that multiply programs can invoke, interrupt, and reinvade simultaneously

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Exercises

1. Why do RISC machines operate on registers?
- provide greater scope for improvement in performance, use special concept that allows registers to be used widely, efficiency as operators and procedure calling, more time and larger resources

4. Suppose a RISC machine uses overlapping register windows with:
   - 10 global registers
   - 6 input parameter registers
   - 10 local registers
   - 6 output parameter registers

How large is each overlapping register window?
6

6. A RISC processor has 152 total registers, with 12 designated as global registers. The 10 register windows each have 6 input registers and 6 output registers. How many local registers are in each register window set? HINT: Remember, due to the circular nature of the windows, the output registers of the last window are shared as the input registers of the first window.

8

9. Recall our discussions from Chapter 8 regarding context switches. These occur when one process stops using the CPU and another process begins. In this sense, register windows could be viewed as a potential weakness of RISC. Explain why this is the case.
- the CPU registers needs to be saved during context switch as they contain current states of the executing processes, saving lots of memory space and its also time consuming
- Restoring register window values is also time consuming

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13. Explain the difference between loosely coupled and tightly coupled architectures.
- loosely coupled system contains distributed memory
- Tightly coupled system has shared memory

21. Why are distributed systems desirable?
- scalability, system can be expanded by adding more machines as needed
- Makes it easy for users to access remote resources and share them in a controlled manner

28. Compare and contrast supervised learning and unsupervised learning with regard to neural networks.
- label training data, supervised relies on labelled input and output training data, unsupervised processed unlabelled/raw data

33. Indicate whether each of the following applies to CISC or RISC by placing either a C (for CISC) or an R (for RISC) in the blank.

__R___ 1. Simple instructions averaging 1 clock cycle to execute
_C____ 2. Single register set
__R___ 3. Complexity is in the compiler
_R____ 4. Highly pipelined
__C___ 5. Any instruction can reference memory
__C___ 6. Instructions are interpreted by the microprogram
__R___ 7. Fixed length, easily decoded instruction format
_C____ 8. Highly specialized, infrequently used instructions
__R___ 9. Use of overlapping register windows
__R___ 10. Relatively few addressing modes

Prepare for Final Exam

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Complete Project 2

Continue working on Your Group Project

Continue working on Homework 14 (Bonus)

Optional Questions:

1. What were your favorite and least favorite parts of the course?

2. In what ways could the course be improved?

3. How many hours a week did you spend outside of class? Do you think this is too much or too little?