Review Homework

Due in One Week

This is a review assignment to refresh your memory regarding instruction sets, formats, and memory accesses. While we are reviewing much of this in class, it is useful for you to do this exercise to become more comfortable with the base concepts as we move to advancer topics. Your lecture notes and Appendix A of your textbook are good source of study.

1. Semester Individual Website Assignment:

Start an individual web site to be used for this course. We will use this URL address for peer reviews of all your completed projects.

Once you have setup your website, email it to HUYNH.MANH@UCDENVER.EDU (in the message field) in the following order, and on one line (no end-of-line break):

Last Name one-space comma one-space **First Name** one-space comma one-space **Email** one-space comma one-space **URL**

Last Name , **First Name** , **Email** , **URL**

be sure to enter your name as it appears in the course roster. Do not add any explanation fields, For example:

Alaghband , Gita , Gita.Alaghband@ucdenver.edu, http://cse.ucdenver.edu/~alaghband/

Be sure your URL address works, and use a site that remains valid and you will not change during the semester.

What to submit:

Send your emails to:
HUYNH.MANH@UCDENVER.EDU
Remember for emails to me use "**CSC5593**" in the subject field.

The remaining problems (2 through 4) should be submitted as hard copy in class

2. Consider a load-store type machine with the following specifications:

- 2^{32} x bytes of memory
- 32-bit fixed format instructions
- 32 32-bit general purpose registers (GPR)
- 3-address register-to-register arithmetic instructions
- Single address mode for load/store: base + displacement
- Capable of performing a total of 32 arithmetic operations

For simplicity assume that the machine only performs arithmetic operations plus data transfer operations (i.e. load and store).

A. Write the equivalent machine level language corresponding to a C statement of

C = A + B

B. Give an instruction format for the arithmetic operations. To do this draw a diagram of the instruction format with each field clearly specified.

For each field indicate its size, the reason for selected size, and a description of what purpose the field serves.

C. Give an instruction format for the load/store operations. To do this draw a diagram of the instruction format with each field clearly specified. For each field indicate its size, the reason for selected size, and a description of what purpose the field serves.

3. To see how different ISA decisions will impact the machine design, consider designing an accumulator machine with the following specifications:

- 2^{24} words of memory [words are 32-bit wide]
- Fixed format instructions
- A 32-bit accumulator register (AC)
- An index register X
- Index address mode: address field + X when indexing is indicated in the instruction
- Capable of performing a total of 128 operations

A. Write the equivalent machine level language corresponding to a C statement of

C = A + B

B. Give an instruction format for this computer. To do this draw a diagram of the instruction format with each field clearly specified.

For each field indicate its size, the reason for selected size, and a description of what purpose the field.

3. When designing memory systems, it becomes useful to know the frequency of reads versus writes as well as the frequency of accesses for instructions versus data. Using the average instruction-mix information for MIPS for the program spice (as given below), find the following:

a. The percentage of all memory accesses that are for data (vs. instructions).

b. The percentage of all memory accesses that are reads (vs. writes). Assume that two-thirds of data transfers are loads.

Instruction Class	MIPS Examples	HLL Correspondence	Frequency (spice)
Arithmetic	add, sub, addi	operations in assignment statements	50%

Data transfer	lw, sw	references to data structures	41%
Conditional branch	beq, bne, slt, slti	If statements and loops	8%
Jump	j, jr, jal	procedure calls/returns, case/switch statements	1%

4. Literature Report Assignment:

For this assignment you need to do a literature search on advanced computer architectures topic. Find a peer reviewed publication on a topic of your interest. Read the article and write a one paragraph summary of the objectives, methods, findings of the research.

We will have several of this type of assignments. It is important to distinguish refereed research publications (reviewed by peer researchers) from non-refereed publications (white papers). To get access to refereed publications such as ACM, IEEE, etc, you can login to your library account at UCD. Through your membership you have access to most publications, even inter-loan library.

These exercises will help you identify research topics for your in-depth study research project. It will also help you on finding a project for experimental implementation for your term project.

Periodically, we will discuss your research topics in class to explore common interest.

What to submit:

- Put the submission date of the paper on the top right corner. Don't forget your name!
- Your typed paragraph, written in your own words interpreting the paper, no more than one page, font size 12. A complete reference to the paper, please refer to the Reference Guide, IEEE Style at http://www.ieee.org/documents/ieeecitationref.pdf to be sure you present your reference correctly.
- Give the URL address to the paper if you have it.
- Attach a hard copy of the paper.
- Post all of the above on your course website under "Literature Report" category at the same time as the submission date.