

COMP2300

Tutorial / Laboratory 05 - PeANUt Experiments

Semester 1, 2007

Week 6 (26 March - 30 March)

Note that for this session, there is a submitable laboratory exercise which is due by 10 am Monday 02 April (week 7), which will contribute up to 1% of your assessment (in the Tute/Lab mark).

Preparation Exercises

It is expected that you have looked over your lecture notes of the PeANUt module as well as read the relevant parts of the *Specification of the PeANUt Computer* before doing this session. It is also expected that you have completed the lab exercises of the previous session (at least part 3, **Experimenting with the PeANUt**, and part 5, **Your multiplication program**). You should also look at the [selected answers](#) now up on the web page. It is also expected for you to complete beforehand the following exercises.

Complete the following questions on a separate sheet of paper, with your name and student number clearly written. Please ensure your writing is legible. Hand in to your tutor at the *beginning of your tutorial / laboratory session*.

1. Briefly describe the term *von-Neumann architecture*.
2. Suppose the five 16-bit words starting at byte 1000 of a big-endian machine contain the integers 1, 2, 3, 4, and 5. Further suppose that these five words are transmitted to a little-endian machine as a sequence of bytes in address order and stored at consecutive addresses starting at byte 30000. What are the values of the five 16-bit words now?
3. Write a sequence of PeANUt MLI instructions that would do the same computation as the C statement $x = 3 * y + 1;$. Assume x and y are at memory locations a_0 and a_1 respectively.

Tutorial Exercises

1. Write a sequence of PeANUt MLI instructions that would do the same computation as the C statement $\text{if } (x==0) \ y++;$. Assume x and y are at memory locations a_0 and a_1 respectively.
2. Write a PeANUt program that would read an alphabetic character and output the same character but with its case reversed (that is from upper to lower, or from lower to upper).
3. Is it always possible to rewrite a PeANUt program containing instructions which use indirect mode which is equivalent to one which does not use indirect mode instructions? If not, devise a counterexample. If so, outline a procedure by which a PeANUt instruction using indirect mode might be translated into a sequence of one or more instructions which did not.
4. Analyse the claim that it is always possible to replace a procedure call with the body of a procedure, and therefore that the procedure is necessary.

Laboratory Exercises

Preliminaries

1. In your **comp2300** folder, create a new directory called **lab5**.