

Note on Spring 2000 CDA 4101 Programming Assignment 1

The Problem

There is some confusion over the execution of the example code and its ability or inability to produce the output given in the assignment. The confusion arises over the calculation of the target address for the BEQ instruction. (There is also an implicit assumption in the way the data and instructions are labelled that the addressing is done in terms of words and not bytes.)

It is intended that on a taken branch the target instruction is the LW \$5, 0(\$4). Unfortunately, this interprets the target address computation as $PC + offset \times 4$ (or if written in terms of word addresses as assumed in the assignment $PC + offset$) which is inconsistent with the book.

The book uses $PC + 4 + offset \times 4$ (or if written in terms of word addresses as assumed in the assignment $PC + 1 + offset$) which would evaluate to $PC - 12$ (or $PC - 3$ in word addresses) where PC is the address of the BEQ.

This target is the ADD instruction that follows the LW \$5, 0(\$4) and will not produce the results listed in the assignment.

The Corrections

In order to get the listed output from the listed code you should implement the BEQ by computing the target address via $PC + offset$ for words or $PC + offset \times 4$ for bytes.

However, the preferred solution is to implement the target address computation as $PC + 4 + offset \times 4$ for bytes and $PC + 1 + offset$ for words and replace the instruction BEQ \$6,\$1,-4 with BEQ \$6,\$1,-5. (Again where PC here is taken to be the address of the BEQ.)

Indicate the manner you used to compute the target address of the BEQ in your simulator when you turn it in.

Due Date

Since this confusion, may have caused problems the program can be turned in on **Monday February 14 2000** rather than this Thursday.