KS32403/KS31904 Computer Architecture

Instructions:

1. This is an open-book test, you must refer to the lecture notes and text book only. You are not allowed to share the answers with others.
2. To confirm honesty, please turn on your video camera during the test for record.
3. Answer all questions. Write your answer on blank papers, capture and 'private message' it to me within 5 minutes after the test ends.
4. You must upload the same answer script (pdf format) in SMARTV3 within 24 hours after the test ends.
5. This test will cover 10 to 15% of your total mark.

Question 1 (12 marks)

Consider the timing diagram in Figure 1. Assume that there are no memory conflicts and each stage has equal duration. Answer the following questions:

1.1 Redraw the diagram to show how many time units are now needed for eight instructions if using a two-stage pipeline (fetch, execute).

(4 marks)

1.2 Assume a pipeline with four stages: fetch instruction (FI), decode instruction and calculate addresses (DA), fetch operand (FO), and execute (EX). Redraw the diagram for a sequence of eight instructions, in which the fourth instruction is a branch that is taken and in which there are no data dependencies.

(8 marks)

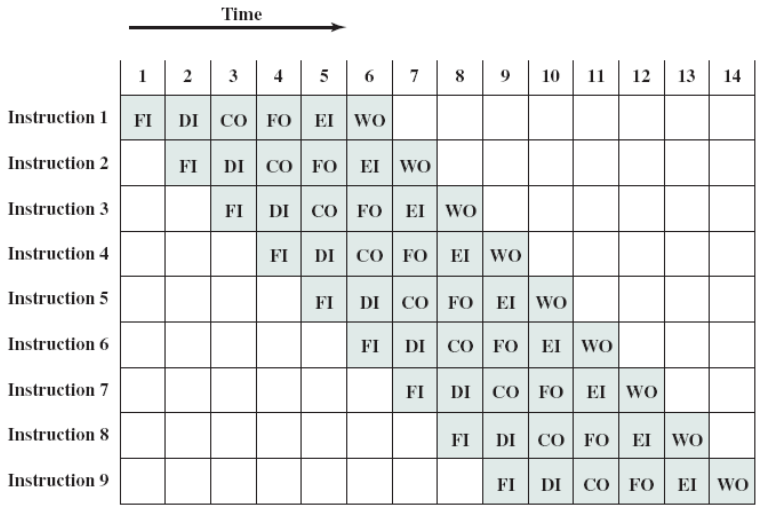

Figure 1

Question 2 (8 marks)

Let A = 01011110 and B = binary representation of your student number digit summation (Ex: BK17161234, total addition of digits = 1+7+1+6+1+2+3+4 = 25_{10} = 00011001_2).

2.1 What would be the value of the Carry, Zero, Overflow, and Sign flags if the last operation performed on a computer with an 8-bit word was A+B?

(4 marks)

2.2 What would be the value of the Carry, Zero, Overflow, and Sign flags if the last operation performed on a computer with an 8-bit word was A-B?

(4 marks)