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BLG 322E COMPUTER ARCHITECTURE

HOMEWORK 1

RISC 1 Programming, Dealing with Pipeline Hazards

A program will be written in SPARK v8 processor's symbolic language that sorts a one-dimensional array in descending order.

The Bubble sort algorithm is given below.

```
for i=1 to arraysize
        for j=1 to arraysize
                if element#j less than element#j+1
                        swap elements j and j+1
                endif
        endfor
endfor
```

a. Write a program without considering pipeline hazards.
b. Write the program again considering pipeline hazards, and solve pipeline conflicts with rearranging the instructions.

- The array ends with 0.
- Handle pipeline conflicts only by rearranging the instructions. Do not insert NOP instructions.
- You can change the execution logic of the simulator from pipeline processor to non-pipeline processor.
- You can define the array with a .equ segment, e.g.

```
    .equ
1000: .word 44,ee,55,cc,aa,bb,99,11,33,22,00
```

- Compile and test your programs with the Spark v8 simulator, which is uploaded to Ninova.
- Extension of your code files should be .txt.

Submission Date: 12.03.2014, Wednesday, 23:00

Submission Type:

- Program files (*studentID_a*.txt, *studentID_b*.txt) should be submitted through Ninova (http://ninova.itu.edu.tr/).
- Since a report will not be submitted, please add necessary command lines that make your program easily understandable.
- Homework should be done individually. Involving plagiarism may result with negative grade.
- Late submissions will not be considered.