281.785 Advanced Computer Engineering

Assignment 3: CPU Design

Weight: **50%**

Deadline: **Midnight Wednesday, 31 October, 2018**
Late submissions will be penalised by 10% deduction of marks per day up to a maximum of 5 days, after which the submission will not be marked. Requests for extension must be made *before* the due date, and will only be granted under exceptional circumstances.

Instructions:

1) Design a full CPU, using whatever instruction set architecture that you choose.

2) Write a simple program that demonstrates correct operation of your CPU for the following operations:
    a. A conditional branch
    b. An unconditional branch
    c. A function call
    d. Reading data from memory
    e. Writing data to memory
    f. Performing an arithmetic or logic operation

3) Identify the critical path through your design for the various arithmetic and logic operations. Suggest how your design might be improved.

In your report, you should :

1) Present your design

2) List all of the machine instructions, and associated mnemonics

3) Identify the critical propagation path

4) Show evidence of attempts to optimise your design for speed, through careful design.

You may work on this assignment in groups of between two and four people.

Each of you should submit an individual report that demonstrates your own understanding of what your team has done. **Plagiarising any part of your report will be severely penalised.**