CS311: Lab Report - Assignment 3 - Single Cycle Processor Simulation

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1 Introduction

The assignment 3 is a simulation of a single cycle processor. Every stage of the processor in the pipeline and the Latches corresponding to those stages are written as Java classes. We also implemented Control Unit as a Java Class. As per the definition of Single Cycle processor, the current assignment executes only one instruction per cycle. This is a basic implementation of a processor simulation, but sacrifices time and efficiency. In future assignments we try to improve the performance of our simulation using various techniques learnt in the Computer Architecture theory course

2 Input and Output of the Program

Inputs include:

- path to jar file, `./jars/simulator.jar`.
- path to configuration file, `./src/configuration/config.xml`.
- path to statistics file, `stat.txt`, which stores statistics of the simulation run.
- path to object file, for example `./test_cases/even-odd.out` whose execution is to be simulated.

We run the program for a given object file (e.g. `descending.out`)

3 Results on our files

Object File	Number of Instructions	Number of Cycles	CPI	IPC
`evenorodd.out(input=11)`	7	7	1.0	1.0
`fibonacci.out(n=10)`	77	77	1.0	1.0
`prime.out(n=5)`	9	9	1.0	1.0
`palindrome.out(input='101')`	19	19	1.0	1.0
`descending.out(n=8)`	832	832	1.0	1.0

Table 1: Results observed

4 How to improve the results?

At present the simulation is mimicking a single cycle processor. These results in the above section are clearly showing this. The values of IPC and CPI can be improved by **pipelining** and addressing of the **data and controlflow hazards.** These will be taken care in the upcoming assignments.