Dylan Kapustka (dlk190000)

Professor Ozbirn

CS 4348.001 – S21

03/09/2021

Project Summary

**Project Purpose**

The purpose of Project #1: Exploring Multiple Processes and IPC, was to simulate a computer system to further understand how CPU and memory communicate and cooperate. This project also allowed one to better understand the concepts of an operating system and its functionalities. System calls, roles of certain registers (e.g., accumulator), stack processing, and more, were all important parts explored during this extensive project, and served a great purpose of learning.

**Implementation**

For the implementation of this project, I decided to write the program in Java, as I am most comfortable with this language. After reading the project description, I decided upon the implementation of three main classes:  
  
Main.java  
CPU.java  
Memory.java  
  
Main.java creates an instance of a CPU which generates registers PC – program counter, SP – stack pointer, IR – instruction register, AC – accumulator, X, and Y. The Runtime exec method creates processes and streams for communications, and these input and output streams simulate piping. CPU.java processes instructions from the user within a switch case that has a case for each instruction provided. CPU.java also handles a key component of this project which is our timers. The timer, which interrupts the process after the given number of instructions in command line arguments, utilizes the program counter to track the number of instructions. Memory.java stores data at the given addresses and then reports back to the CPU.java. It consists of 2000 entries (0-999 for user program, and 1000-1999 for system code). Memory.java can read and write data, when given an address from the CPU.java.

**Personal Experience**

This project helped expand my understanding of piping and interrupts, and I feel I learned a lot more than I knew before. I would say the hardest part was the interrupt timing as a lot of debugging within CPU.java took place when I was having to deal with interrupts and instruction numbering. Overall, this hefty project was a great learning experience for me, and I feel I have gained a strong project to add to my portfolio, allowing further project discussion for internships and more.