Hermes Application Proposal

Zack Deveau
Xandria Richman

1.0 Application Goals

The aim of this application is to demonstrate full working ability of all aspects of the Athena Operating System, built previously for deliverable 1 and completed for deliverable 2, source code submitted online.

To break down functionality further, we wish to demonstrate proper functionality in:
1. FIFO
2. Semaphores
3. Scheduling
4. Device, Periodic, Sporadic processes
5. Memory Management

2.0 Application Introduction

The essence behind Hermes is to simulate a student attending several classes a day, before idling for the night. The student has limited size in their notebooks to take notes in each class, and may only write notes in one notebook at a time. Occasionally, the student will receive texts or email, or Facebook updates during class; however the student is respectful and will wait until after class, when they are idle, to check them. As well, an incoming phone call may cause the student to leave class for a short period of time, in order to ensure minimal disruption to the rest of class. These phone calls will be limited to a short, set period of time as the student does not like missing class time.

2.1 FIFO Representation

FIFO will be represented by the sporadic processes the student performs checking their phone. It could be texting, checking their email, or checking their Facebook feed for updates. These processes will be performed on a first-come first-serve basis; which will better represent the sporadic processes in a real-world sense, as the student would check notifications based on which came in first as some may be time-sensitive.

2.2 Semaphore Representation

When a student is in class, they must select which notebook to take notes in for that class. This will show the effectiveness of semaphores, as a student may only be in one class at one time, writing in one notebook for the class, unless the space runs out in the notebook they were using. This is to keep the student better organized throughout the course of each class, keeping notes from being spread throughout various locations in every notebook.

2.3 Scheduling Representation

The student's class may end early. This will be the student hanging out, or idling, between classes. This shows the CPU idling between periodic processes in the Athena OS, if the periodic process does not take the full time allocation. While the student is idling, they will check to see if any notifications on their phone

arrived during their previous class. If a text notification arrived first, the student will handle checking the text first; as evidenced previously in section 2.1.

2.4 Process Representation

The classes are represented by the periodic processes in the scheduler. The student checking their phone is represented by sporadic processes. The phone calls are represented by a physical button push on the board.

2.5 Memory Management Representation

The notebooks will show memory management of the Athena OS, as there is a limited size to them, which is determined upon purchase, or malloc, of the notebook. As notebooks are filled up, more may need to be purchased. In this case, the application will malloc more space, of random sizes, so the student has new notebooks for more note-taking.

3.0 Scheduler Example

To get a better sense of understanding, we will outline an example schedule for the student's processes, with example processes of each type, below.
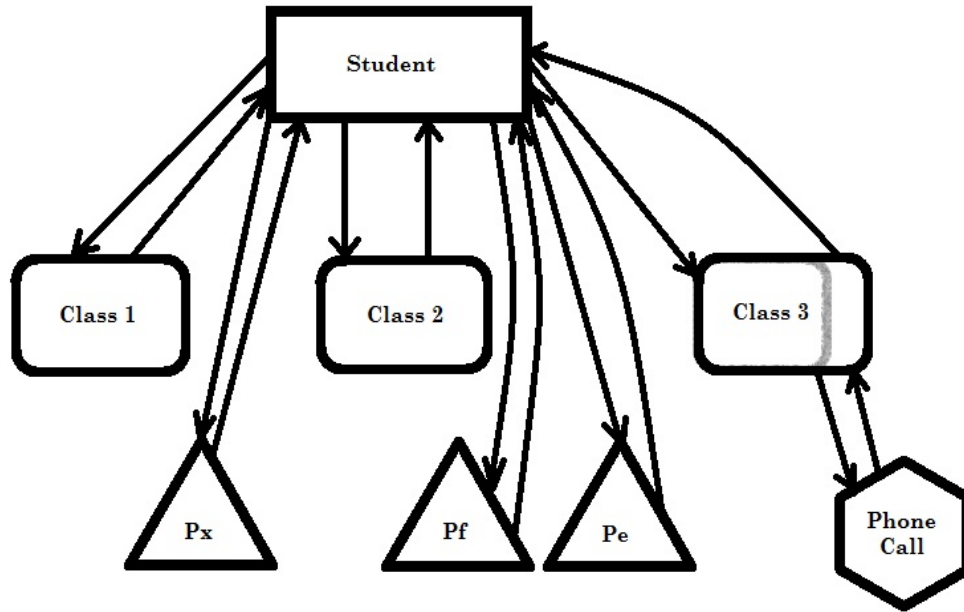
Figure 3.1 Example Scheduler with three classes, one of each notification, and a phone call

As can be seen in Figure 3.1, the example scheduler has three periodic processes, Class 1, Class 2, and Class 3, and a phone notification of each type, one of which arrives during Class 2. Additionally, the student receives a phone call during Class 3, so the context switch between Class 3, the phone call, and the rest of Class 3 is evident.

4.0 Summary

In summary, Hermes will be an application for the Athena OS that will represent a student going about their classes. Classes will be represented by periodic processes, notifications on the student's phone will be represented by sporadic processes, and phone calls will be represented by device processes. In each class, the student will take notes in only one notebook, provided there is enough space in that notebook, else they will switch notebooks part-way through. Notebooks will represent the memory management.