Project 9: Free Form (4%)

ENEE 447: Operating Systems — Spring 2019
Assigned: Tuesday, Apr 30; **Due:** Sunday, May 12

Purpose

In this project you have the opportunity to go into whatever direction you want. Provide a paper design for whatever subsystem you think would be interesting, or provide an actual implementation of something if you'd prefer. The idea is for you to explore a topic that interests you.

Example Possibilities

The following is a list of examples. You do not have to draw from this list, but this should serve as a guideline for the kinds of things you should consider.

Paper Designs:

- A file system (example options: disk/flash, linear/log-based)
- A distributed file system
- A network stack
- Scheduling heuristic/s for specific metric/s
- Multicore scheduling heuristic/s
- A nonvolatile main memory design
- A hypervisor-based virtual-machine architecture
- Thoughts on hardware support for operating systems
- Extend your Project-6 work and provide a detailed write-up of a proposed design

Implementations for the 447 Kernel:

- A file system
- A network stack
- A multicore implementation
- A multicore/multithread scheduler
- A nonvolatile main memory design
- State dump and hot restart
- Invent one or more new/interesting system calls
- Implement the block-oriented device mechanism (to get at the SD card)

A Note on Paper Designs vs. Implementations

There is a continuum of submission possibilities from an actual working implementation on the one hand, to a purely theoretical paper design on the other. If you submit a working design, it can be dead simple (the code and a one-page description; see below). If you submit a purely theoretical design, it must be detailed (on the order of ten pages, with diagrams). If you submit something in between, such as a

failed attempt at an implementation, or a paper design with example code, then your submission should include all of your code and several pages of documentation.

Implementation Details [Grading]

What I am looking for, in either a concrete working example or a theoretical paper design, is not a "correct" solution to anything (in this field, there are no "correct" solutions, only those that work or fail to work, and then you can measure those that work to determine which ones do better on certain metrics; that is what "design" is all about). I am looking for a detailed description of what you are thinking. Thus, the grading for this will be based on clarity and depth, rather than on "goodness" or "badness" of an idea.

If you are submitting a working implementation, I need just a page or two of what you did, how it works, etc. Diagrams would be very helpful. If you are submitting a paper design, I need depth: motivation, design choices, the data structures and algorithms involved, etc. … and, here, diagrams will be *essential*.

Design It, Draw It, Write It Up

Once you have it finished, show us.