CSC 4035 Computer Systems. An overview of the software required to integrate computer hardware into a functional system. The following topics are covered. Operating systems as resource managers and as virtual machines. System calls, in particular those required for process and file management; interrupt driven systems; concurrency; memory management; file systems and security.
Pre-requisite: Data Structures

Detailed Outline

1. The History of Operating systems,
2. Operating systems as resource managers,
3. Operating systems as virtual machines,
4. The C language,
5. An overview of system calls,
6. The interrupt driven Operating system,
7. The nucleus of an operating system – scheduling, interprocess communication,
8. Memory management, understanding the fork() and exec() system calls
9. File systems – reading and writing to files,
10. Protection and Security,
11. Case studies – journaling file systems.
Assignments

The major assignments would require programming in C. Typical required assignments would include:

1. A “standard” program written in C, for example an RPN calculator;
2. A program that opens and reads one of the proc file system files and reports on it.
3. A C program that uses shared memory,
4. Use of User Mode Linux to write a program that retrieves data from the kernel,
5. Use of User Mode Linux to write a new system call – the aim here is to show how the system calls are integrated into the system.

Books

Students would be asked to buy the following books.

2. IPC in Linux. John Shapely Gray

While this is a long list by comparison with other courses, every one of these is books is one that they should own.
What has changed

First what gets taken out of the old OS course.

- Reduced coverage of IPC. There is an assumption that locking and mutual exclusion are discussed in other courses.
- Dead lock is almost entirely eliminated.
- Device drivers go.
- For memory management: the historical review goes, concentrate on paging and some segment stuff.

What is expanded:

- The coverage of file systems, particularly journaling.
- Security.

What is transferred in from Systems:

- The C language – this is a retrofit from Java.
- System call code examples, thus sigaction can be used to illustrate the way that an interrupt works.
- Basic Un*x literacy as needed.