

Fundamentals of an OS

What is an OS?

A good example can be reference at section 6.5 of [Structured Computer Organization](#).

Fundamentally, an OS provides services:

- File services (open, read, write, close etc.)
- Networking services (open, read, write, close internet socket)
 - Berkeley socket interface
- Multi-tasking services
 - Creating multiple threads
 - Dictating priorities for threads

Interrupt

An interrupt is an asynchronous function call that can interrupt normal flow of a program.

```
// HW and OS work together to invoke this function
// whenever a keyboard key is pressed
// Regardless of where you are at your_program()
// this function can be invoked asynchronously
void interrupt_keyboard(void) {
}

// Thread that never exits
// This calls all the sub-functions synchronously
void your_program(void) {
    while (forever) {
        check_for_brake_pedal();
        actuate_brakes();
    }
}
```

Kernel vs. User Space

```
// OS use "SWI" or "Software Interrupt"
// "Software Interrupt" really means a "Deliberate Interrupt request to the HW"
void deliberate_interrupt(void) {
}

//
void your_program(void) {
    while (forever) {
        int file = open("file.txt");
    }
}

// Psuedo-code for open
// This is what the open function looks like inside the OS
void open(filename) {
    R4 = open_request_number;
    R5 = filename
    SWI
}
```

Virtual Memory

Virtual memory is not purely virtual memory, it is virtual memory addresses that maps to real and physical hardware memory.

POSIX Interface

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