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Input/Output Research

# I/O Software Layers

## Interrupt Handlers

Interrupts are certain events that stop current programs to execute other tasks. There are three types of interruptions: Software, Hardware, and Exceptions. All are sent from specific hardware or processes running on the operating system. In Linux, the kernel needs to handle all three. Hardware interruptions occur when devices need to interact with the CPU, software interruptions allow processes to communicate with each other, and exceptions occur when the CPU executes a command that leads to failure. An example of this could be and abort type exception where the physical piece of RAM hardware is damaged or if the config is incorrect.

## Device Drivers

A device program is a type of program without a user interface. Its main purpose is to manage components and allow them to function correctly with a computer. Some examples of this are device drivers that allow connections from hard drives, USBs, and network-attached storage devices.

## Device Independent I/O Software

Though some input/output software is specific to a certain device, other parts are device independent. The difference between drivers and device-independent software is system dependent because functions that could be done in a device-independent way could be completed in the drivers. Functions that are usually done in device-independent software are interfaces for device drivers, buffering, error reporting, allocation of dedicated devices, and device-independent block size.

## User Space I/O Software

Most of the software for the I/O is located in the operating system but a small chunk consists of libraries linked together via user programs and those running outside of the kernel. System calls are an example of those made by a library procedure. Another point is the spooling system which involves dealing with dedicated input output devices in a multiprogramming system.

# Hardware Interrupt Handler

A screenshot of a computer

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(excuse the arrow lines)

Anytime an interrupt is raised it may be either an I/O interrupt or a system interrupt. From there, the current state composed of registrars and the program counter is then stored to conserve the state of the process. Then, the interrupt and its handler is identified through a vector table in the processor. This control then shifts to the interrupt handler which is a function located in kernel space. Specific tasks are then performed by the Interrupt Service Routine (ISR). Then, the status from the previous session is retrieved to build on the process from that point. Lastly, the control is then shifted back to other processes that were pending and the normal process continues.

# Keyboard and Mouse I/O Devices

## Keyboard

The keyboard is one of the most widely used input devices for entering data into a computer. Numeric keys are used to enter numerical data, typing keys are A-Z, control keys are used for the pointer and screen, special keys include shift, caps lock, enter, tab, etc, and function keys are F1-F12.

## Mouse

The mouse is the most common pointing device. Since the computer is dependent on you (the user) to move the mouse, it is an input device. Usually, the left mouse button is used to select or move items, and the right click button is used to display extra menus.

## Diagram

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