Operating System & Keyboard

# What is an Operating System?

An **operating system** (or **OS)** is a set of basic programming instructions to the lowest levels of computer hardware, forming a basic layer of programming **code** on which most other functions of the computer are built. In its lowest form, the operating system takes care of what are known as basic **input/output (I/0)** functions, which let other programs easily talk to the computer hardware. It is essentially the task of the I/0 functions to take requests from the software a user runs (the application software) and translate them into low-level requests that the hardware can understand and carry out. In general, an operating system serves as an interface between application software and hardware

Operating systems perform the following tasks

- Handle input from the **keyboard**

- Handle output to the screen and printer

- Handle communications using a modem

- Control input/output with all bus devices, such as a network interface card

- Control information storage and retrieval using various types of disk drives.

Conclusion

An O.S. provides communication between hardware and software

Software ⟶ Hardware

Hardware ⟶ Software
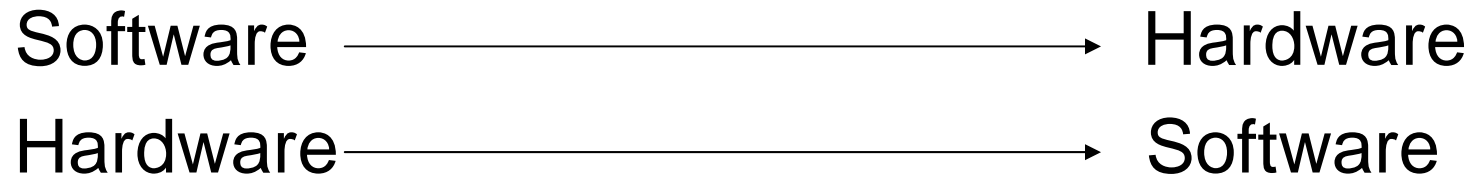
Fundemental of OSs'

Basic O.S. provides only input/output functions. This system is called Basic Input/Output System , or BIOS.Every PC has a bios. Whenever a PC is turned on, the machine wakes up and jumps to a startup program inside the bios. This program initializes the screen and **keyboard**

What is keyboard?

An input device similar to a typewriter, for the entry of text, numbers and punctuation.

What happens when a key is pressed?

When a key is pressed , the keyboard controller sends <u>scancodes</u> to the <u>kernel keyboard driver</u>. Although these codes can be programmed , generally they are fixed codes.

What is a kernel keyboard driver?

The kernel keyboard driver just transmits whatever it receives to the application program when it is in *scancode mode*

What are scancodes?

The codes that are generated when a key is pressed.

ScanCodes

This codes are the first codes that are generated when a key is pressed. There are 3 types of scancodes. But only one of them is used as a default type.

This type is usually produces a value in the range of 0x01 to 0x5f.And the additional codes start form 0x80

When a single key is pressed , it generates a sequence of up to 6 scancodes.

Ex: For the pause key ;

0xe1 0x1d 0x45 0xe1 0x9d 0xc5

The kernel converts this scancodes into a series of keycodes. The range of this keycodes is 1 – 127 and additional key codes start from 128.

Let our scancodes are
0x1e and 0x9e

All ScanCodes are in hexadecimal type.So;

0x1e = 16 * 1 + 14 = 30

0x9e = 16 * 9 + 14 = 158

30 & 158 are the keycodes.

What is a keymap?

A key map is a pre-defined map which equalize the keycodes to characters

Ex:keycode 30 = 'a'

Action!!

We have seen single key press algorithms up to now. But what happens more than one keys are pressed like ctrl+alt+del ?

The keyboard driver supports 8 modifiers for pressing more than one key.Each modifier has an associated weight of power.

Modifier	Power
Shift	1
Alt GR	2
Control	4
Alt	8
ShiftL	16
ShiftR	32
CtrlL	64
CtrlR	128

First Step When A Key is Pressed

Interrupt handlers are small pieces of software that act as translators between the hardware components and the operating system.

When you press a key on your **keyboard**, the signal is sent to the **keyboard interrupt** handler, which tells the CPU what it is and passes it on to the operating system.

BIOS is constantly intercepting signals to and from the hardware.

The communication is established over BIOS

When the operating system is notified that there is data from the keyboard, it checks to see if the keyboard data is a **system level command**.

Ctrl-Alt-Delete on a Windows computer is a good example for system level command, which reboots the system.

Then, the OS passes the keyboard data on to the current application.

An input signal from keyboard can be either a command or a content.

Ex:Alt+f is a command , which opens the File menu in a Windows application

If the signal is not a command , application accepts it as a content.Ex:Typing an URL , performing calculation…

If application does not accept signal , it ignores the information.

References

[1]http://computer.howstuffworks.com/keyboard.htm
keyboard1.htm
keyboard2.htm