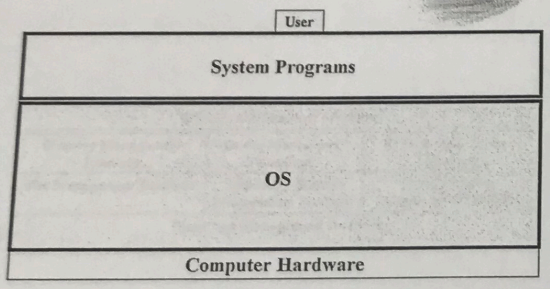
An Introduction to Operating System

Dr. Ray R. Hashemi
Yamacraw Professor of Computer Science
Armstrong Atlantic State University

OS Definition

OS is a collection of programs and data that is in charge of *managing computer resources*, and *supporting virtual characteristics of computer.*

Overall Picture



System Programs

A collection of programs which provide convenience for the user.

System Programs

System programs are categorized as:

1- Program Development Aids
2- System Utilities
3- Application Programs

System Programs

Program Development Aids

- Text Editors
- Debugging Aids
- Macro Processors
- Compilers
- Assemblers
- Loaders/Linkers

System Programs

System Utilities:

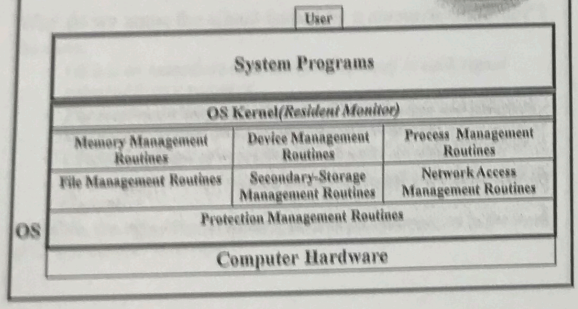
software for implementing popular functions such as Copy, Delete, Sort, Etc.

System Programs

Application Programs

- Word Processor
- Power Point
- Web Browser
- Spread Sheet,
- Plotting and Statistical-Analysis Packages,
- Database Management Systems
- Photo Enhancement Packages
- .
- .
- .

Overall Picture



OS Evolution

1- **Sign-up Scheme**
2- **Hiring Operators**
3- **Batch Processing**
4- **Job Control Language**
5- **Automatic Job Sequencing**

Job Sequencing?

Finishing the engagement of the system from an ended job and starting the engagement of the system with a new job.

Resident Monitor

Resident Monitor

Resident Monitor)

JCL Interpreter	Job Sequencing	Device Drivers	Interrupt and Trap Vectors

Resident Monitor

JCL Interpreter

Interprets the JCL codes.

Job Sequencing

Automates the job sequencing process is done by this component

Resident Monitor

Device Driver

A software module that hides the details of an I/O device from OS.

Device Controller

A hardware module that permits connection of I/O devices to a computer. One controller per kind.

(Mouse device controller, Keyboard device controller, etc.)

Resident Monitor

Interrupt and Trap Vectors

What is an interrupt?

An electric signal issued by a computer resource to get the attention of OS.

When does a resource need to get the attention of OS?

The resource either

a) finished its task or

b) an error encountered

If the computer resource is a software then, the interrupt is called a trap

Resident Monitor

Why do we name the signal issued by a resource "interrupt"?

Because:

- *OS has an immediate reaction (or response) to each signal received from a resource.*
- *The response always manifests itself in execution of a program specifically written as an answer for the interrupt*
- *CPU is in charge of executing this specific program.*
- *CPU is asked to interrupt its current task and start to execute the response.*

Therefore, the signal that eventually caused an interruption in the work of CPU is named "interrupt".

Resident Monitor

Interrupt signal is checked after each machine cycle:

```
...
...
// A machine cycle
While (halt flag not set during execution of a process)
{   IR = (PC);
    PC++;
    //decoding takes place
    execute(IR)
}
```

Resident Monitor

Interrupt may be viewed as follow:

```
IRQ = False //interrupt request is set to false
...
While (halt flag not set during execution)
{   IR = (PC);
    PC++;
    execute(IR)
}
```

Resident Monitor

Interrupt may be viewed as follow:

```
IRQ = False
...
While (halt flag not set during execution)
{   IR = (PC);
    PC++;
    execute(IR)
    If (IRQ)
    {   .
        .
        .
        .
    }
}
```

Resident Monitor

Interrupt may be viewed as follow:

```
IRQ = False
` ` `
While (halt flag not set during execution)
{   IR = (PC);
    PC++;
    execute(IR)
    If (IRQ)
    {   "Context Switching" take place

    }
}
```