

Operating system:

Def:

An operating system is a program on which application programs are executed and acts as an communication bridge (interface) between the user and the computer hardware.

Functions in operating system:

1. Security:

It prevents unauthorized access to other users.
Ex: Password.

2. Control over system performance:

Monitors overall system health to help improve performance.

3. Job accounting:

Operating systems keeps track of time and resources used by various tasks and users.

4. Error detecting aids:

Operating system constantly monitors the system to detect the errors and to avoid the malfunctioning of computer system.

5. Coordination b/w the software and users:

Operating system also coordinates and assign interpreters, compilers, assemblers and other software.

6. Memory Management

7. Processor Management

8. Device Management

9. File Management

↓

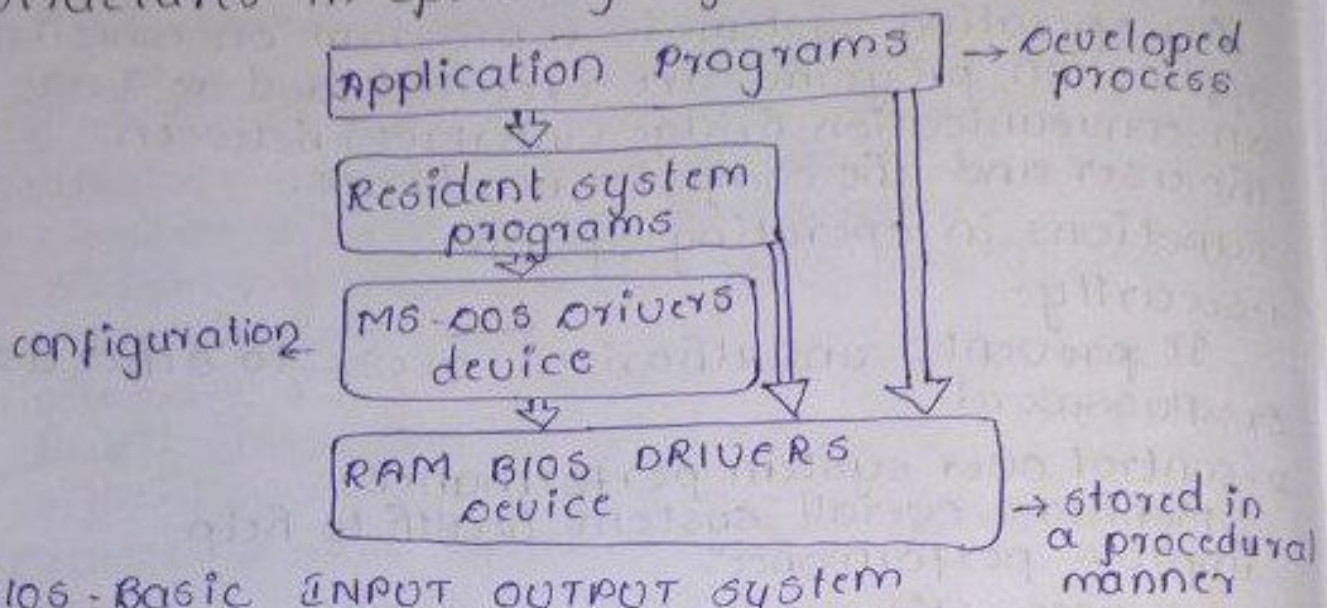
1. Modify
2. update
3. implement
4. delete.

Services:

1. Program Execution
2. Handling input/output operations
3. Manipulation of file systems
4. Error detecting and handling
5. Resource allocation

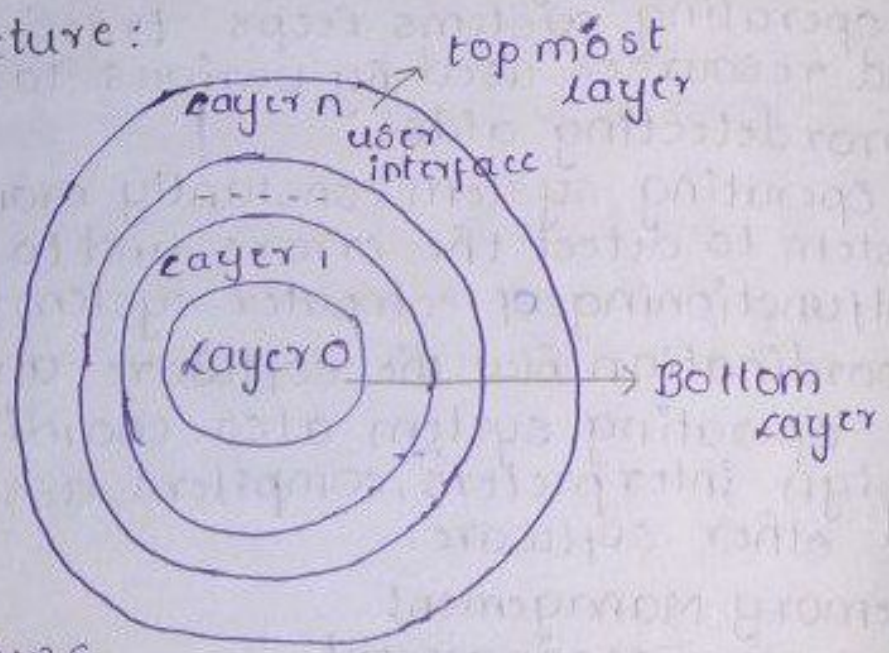
- 6. Accounting
- 7. Information and Resource protection.

Structures in operating systems



BIOS - Basic INPUT OUTPUT system

Layerd Structure:



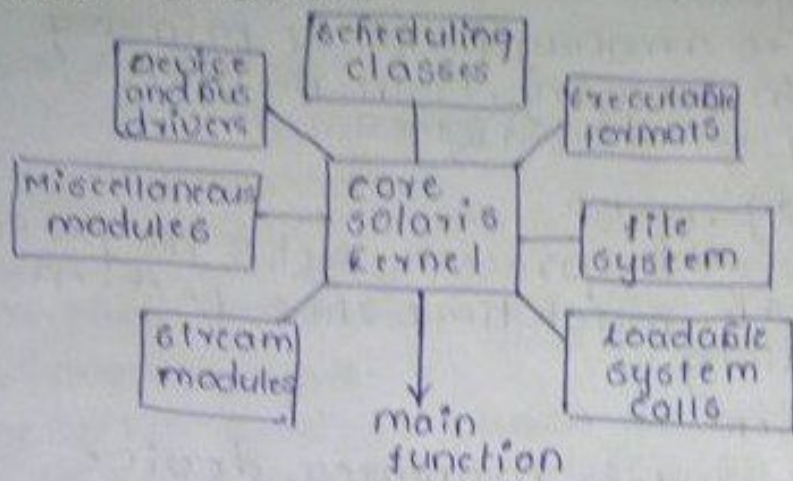
Each layer follows

1. Functionalities
2. Debugging
3. providing input and output

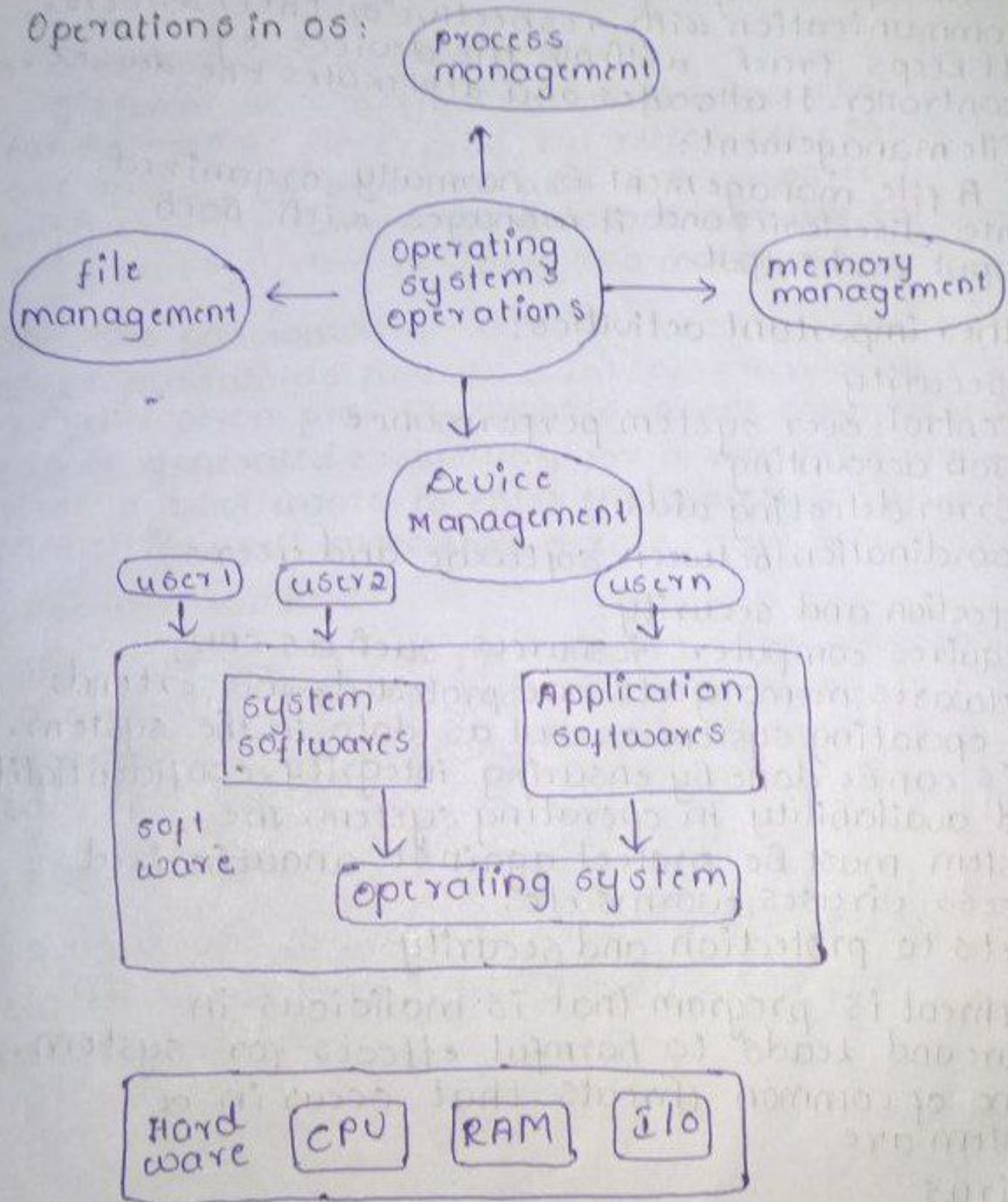
Layer 0 is hardware

Layer n is user interface layer

Modular structures



Operations in OS:



Memory management:

It refers to a management of primary memory or main memory. Main memory is a large array of words or bytes.

Processor management:

OS decides which process gets the processor when and for how much time. This function is process scheduling.

Device management:

An operating system manages device communication with respect to their drivers. It keeps track with all the devices of controller. It allocates and deallocates the device.

File management:

A file management is normally organized into directories and it manages with both input and output.

(Other important activities:

1. Security
2. Control over system performance
3. Job accounting
4. Error detecting aids
5. Coordination between software and users)

Protection and security:

requires computer resources such as CPU, softwares, memory etc are protected. This extends to operating system as well as data in the system. This can be done by ensuring integrity, confidentiality and availability in operating system. The system must be protect against unauthorized access, viruses, worms etc.

Threats to protection and security:

A threat is program that is malicious in nature and leads to harmful effects for system. Some of common threats that occur in a system are

1. Virus
2. Trojan Horse

3. Trap Door

4. Worm

5. Denial of service

Protection and security Methods:

1. Username/Password:

each user distinct username and password combination and they need to enter it correctly before they can access the system.

2. Userkey/usercard:

The users need to punch a card into card slot or use their individual key on key pad to access the system.

3. User Attribute Identification:

Different user attribute identification that can be used as fingerprint, eye retina etc. These are unique for each user and are compared with existing samples in database. The user can only access system if there is a match.

One time password:

These passwords provide a lot of security for authentication process purposes. A one time password can be generated exclusively for a login every time a user wants to enter the system. It cannot be used more than once.

1. Random Numbers:

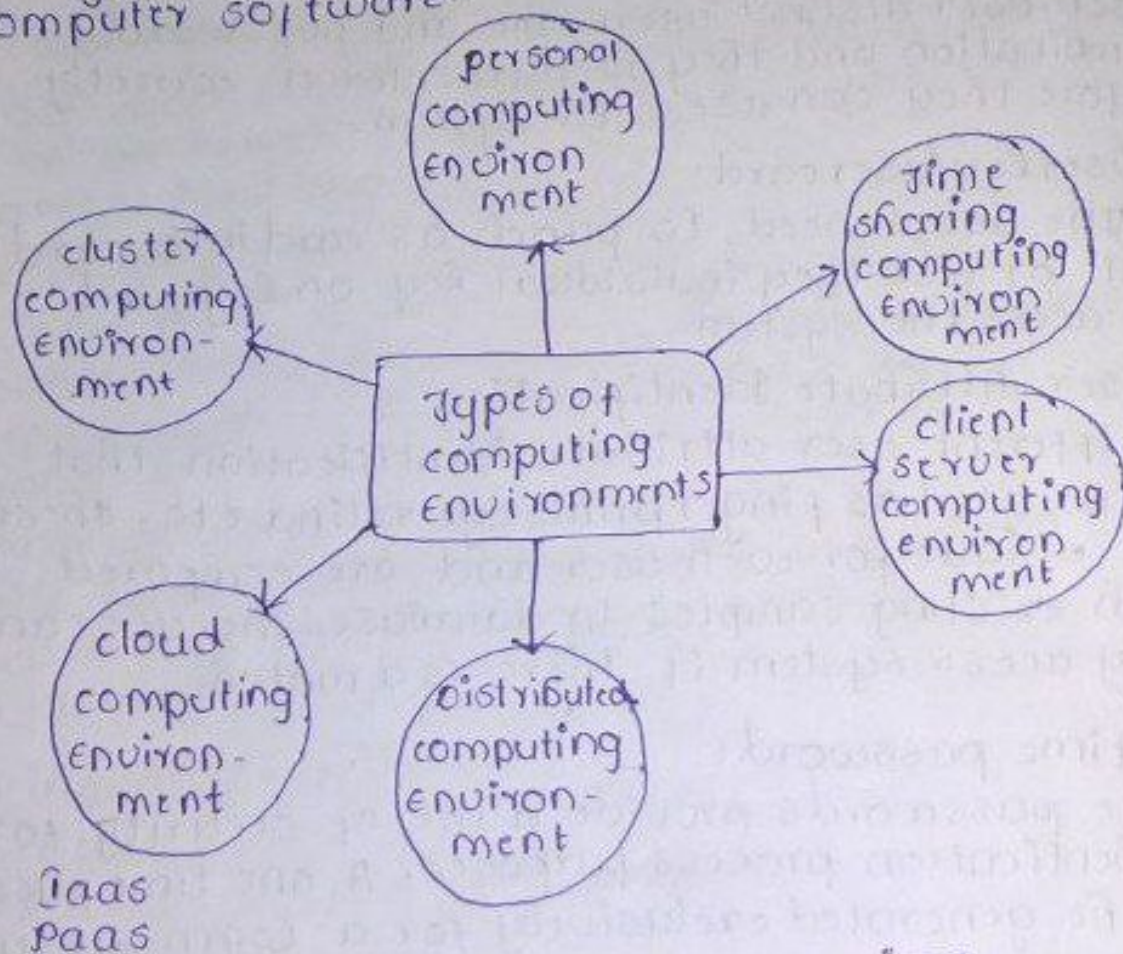
The system can ask for numbers that correspond to alphabets that are pre arranged. This combination can be changed each time a login is required.

2. Secret Key:

A hardware device can create a secret key related to user id for login. This key can change each time.

Computing Environments:

Computing is nothing but a process of completing a task by using this computer technology and it may involve computer hardware (or) computer software.



IaaS - Infrastructure as a service
PaaS - Platform as a service

Open source operating systems:

Open source is a term that originally referred to open source software (OSS). Open source software is code that is designed to be publicly accessible - anyone can see, modify, and distribute the code as they see fit.

What's the difference between free software and open source?

1. These are two terms that get confused with one another in practice, and even get used as equivalents.

2. All free software is open-source, but not all open source software is free.
3. Open source is considered to have more flexible rules than free software, since it allows companies and developers to impose certain usage restrictions and licenses in order to protect the code's integrity.

According to Richard Stallman:

1. There is freedom to execute the code however one wishes and for whatever purpose one wishes.
2. The source code can be known and modified in its entirety.
3. The code can be distributed freely.
4. Modifications to the code can also be freely distributed (with or without cost).

Examples of open source programs

Some widely used programs, platforms and languages which are considered open source are:

1. Linux operating system
2. Android by Google
3. Open office
4. Firefox browser
5. VLC media player
6. Moodle
7. Clam win antivirus
8. WordPress content management system.

Operating system services:

An operating system provides services to both the users and to the programs.

1. It provides programs an environment to execute.

It provides users the services to execute the programs in a convenient manner.

Following are a few common services provided by an operating system.

1. Program Execution
2. I/O operations
3. File system manipulation
4. Communication
5. Error detection
6. Resource Allocation
7. Protection

→ There are different kinds of operating systems: such as windows, Linux and Mac OS

There are also different versions of these operating systems, Ex: windows 7, 8, 10, 11

• Operating systems can be used with different user interfaces (UI):

text user interfaces (TUI) and graphical user interfaces (GUI) as examples.

• Graphical user interfaces have many similarities in different operating systems: such as the start menu, desktop etc.

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text user interfaces (TUI) and graphical user interfaces (GUI) as examples.
3. Graphical user interfaces have many similarities in different operating systems: such as the start menu, desktop etc.

Role of operating system in the computer

An operating system is a set of programs which ensures the interoperability of the hardware and software in your computer.

1. the identification and activation of devices connected to the computer.
2. the installation and use of programs
3. the handling of files.

→ different operating systems are windows, linux, Mac OS.

Windows:

The name of the windows OS comes from the fact that programs are run in "windows": each program has its own window, and you can have several programs open at the same time.

LINUX and UNIX:

Linux is an open source OS, which means that its program code is freely available to software developers.

MAC OS X

Apple's Mac computers have their own operating system, OS X.

ANDROID

Android is an operating system designed for phones and other mobile devices.

USER INTERFACES

A user interface refers to the part of an operating system, program, or device that allows a user to enter and receive information.

Text User Interface

Modern graphical user interfaces have evolved from text based UI's.

Graphical User Interface

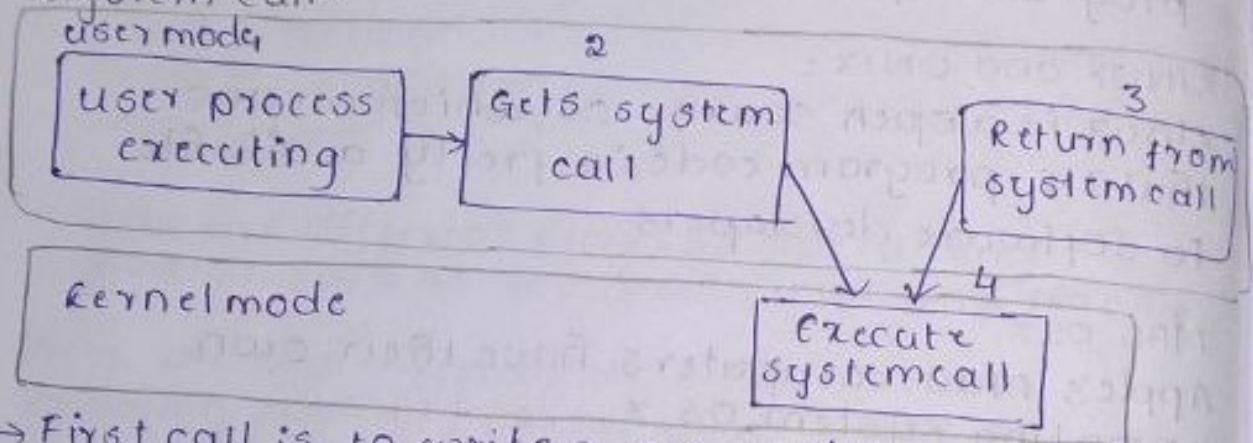
In most operating systems, the primary user interface is graphical

i.e. instead of typing the commands you manipulate various graphical objects with a pointing device.

Most GUIs have the following basic components:

- a start menu with program groups
- a taskbar showing running programs
- a desktop
- various icons and shortcuts.

System call:



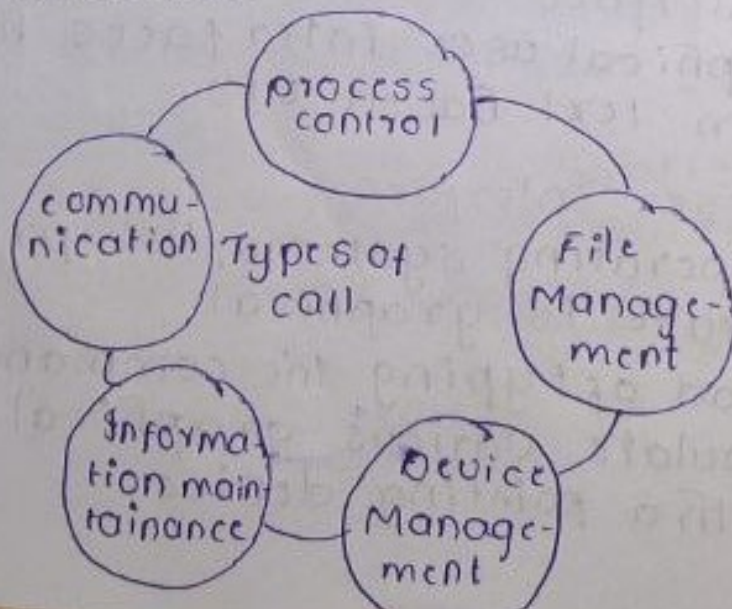
→ First call is to write a prompting message on screen.

→ second, to read from keyboard, the character which define the two files.

Types of system calls:

we have 5 types

1. Process control
2. File Management
3. Device Management
4. Information Maintenance
5. Communication.



Process control:

1. end and abort
2. load execute
3. create process and terminate process
4. wait and signal event
5. Allocate and free memory.

File management:

1. create a file
2. delete a file
3. open and close a file
4. Read, write and reposition
5. Get and set file attributes

Device Management:

1. Request and release
2. logically attach / detach devices
3. Get and set device attributes

Information maintenance:

functions

1. get and set date and time
2. get processes and device attributes

Communication:

functions

1. create, delete, communication connections
2. send, receive message
3. Help OS to transfer status information
4. Attach or detach remote devices