Module 1 :

operating system overview & structures

introduction, operating system operations, Types of operating system, functions of operation system, operating system services, system calls, system programs, operating system structure.

Module - 2 :-

process management and synchronization

process management :- process concepts, process scheduling, operation on process, inter process communication, thread models, implementing threads in user space and kernal.

process synchronization :- critical section problem, petersons problems and solutions, synchronization hardware, semaphores, classic problem of synchronisation.

Module - 3 :-

Dead lock and Memory Management.

Dead lock :- system model, dead lock character -isation, dead lock prevention, dead lock detection and avoidance, recovering Dead lock.

Memory management :- Introduction, swapping, continues memory allocation, tracing, segmentation, virtual Memory management, page replacement, algorithm, trashing, kernal Memory allocation.

Module -4 :-

Mass storage structure and file systems :-

Mass storage structure :- Disk structure, Disk scheduling, raid structure.

File systems :- Files, Directory, file system structure, file system implementation, Directory implementation.

Module- 5 :-

System protection & system security.

System protection :- Goals of protection, principles and domain of protection, access matrix, access control, revocation of access rights.

System security :- Introduction, program threads, System and network threads.

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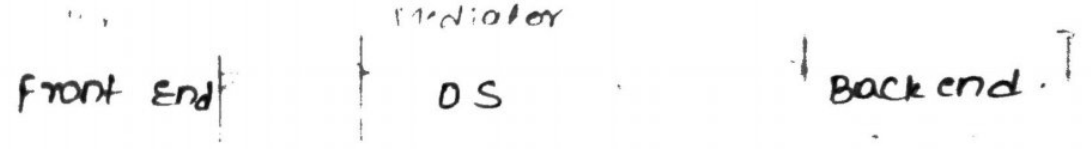
# Operating system overview and structures

## Introduction of operating system :-

* Operating system is a collection of programs and utilities.
* Operating system acts as an interface or a mediator.
* This interface helps to transfer any amount of information from back end to front end.
[Transfers information from user to OS].



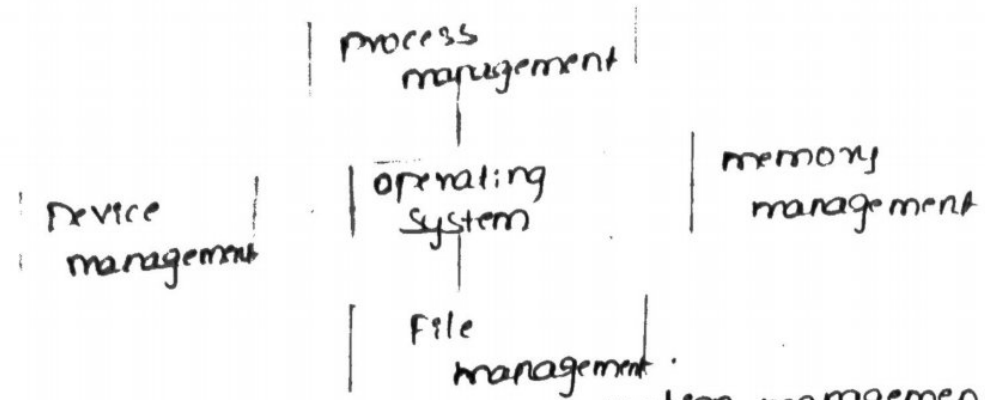

* Front end supports creating of any application program using high level language (C, C++, Java, Python etc).
* Back end or computer system supports Excel, DBMS (SQL Language or PL/SQL)
* OS is used to properly exchanging of any type of application programs from front end to Back end. (or) Backend to front end.

## * OS operations :-

OS operations are mainly divided into 4 types :-

1. Process management.
2. Device management
3. Memory management
4. File management.

Block diagram of OS operation :-




* OS also supported communication management.

management :-

* It is the process of to creating of a data to insertion of data.

1) creation of data.
2) insertion of data
3) updating of data
4) Deleting of data
5) Modifying of data of any application or file.

1. process mangement :-

* It is used to creating of any type of application
* Excuetion of any type of application.
* process management supported different operations to the process (creation using editors, excuetion using processor, checking is possible to with the help of using Debugger).
* Any process need to successfully excuted it requires process scheduling algorithms (FCFS, SRTF STIF, priority, round robbin algorithms)

2. Device Management :-

* It is supported to different types of devices that are :-

i) keyboard

ii) Mouse

iii) Monitor

iv) printer

v) I/o Device.

vi) Memory (main memory or secondary memory).

3. Memory management :-

* Memory management intially maintained Number of pages or frames.

* Each and every page should maintain two variables. They are :-

i) pin count

ii) Dirty.

* These variables are intially setted some values

pin count = 0

Dirty.

* Memory management also supported swapping (or) Buffering process.

* swapping supports two operations :-

i) swap in ii) swap out.

* Buffering is done with the help of buffer manager

* Memory management is also supported page replacement (main memory gets overloaded some of the pages are transfer from main memory to secondary memory).

* Memory using page replacement algorithms such as FIFO, LRU, MRU, LFU, CLAF.

File Management :-

* File is a collection of logical records.
* According to operating system each & every file is technically called process (or) job.
* Any file or processor (or) jobs successfully completed under the processor must and should needed to send from processor to main memory.
* when main memory gets overloaded to transfer some of the process (or) files from main memory to secondary memory with the help of using file management.
* File management supports swapping

i) create
ii) Delete
iii) Modify
iv) Update
v) open
vi) save.

Communication Management :-

* communication Management supported to transfer any Message information one device to another device.
* Different messages transfer from one device to another device.

i) CPU → Main memory
ii) I/O Device → CPU
iii) CPU → I/O device
iv) Main memory → secondary memory
v) I/O device → main memory
vi) Main memory → I/O Device

O.S functions/services :-

* there are different functions. That are :-

i) program creation

ii) program execution

iii) I/o Devices

iv) Error Detection & Correction

v) Resource Allocation

vi) Communication

vii) protection & security.

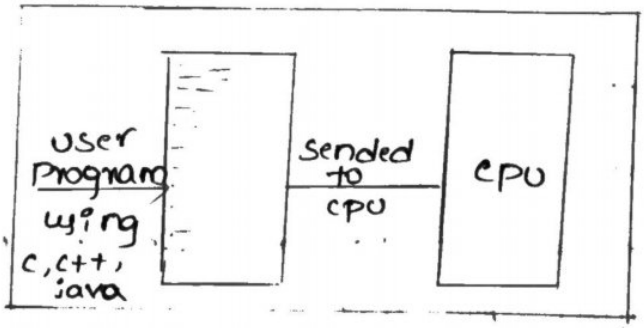
Program creation :-

* Any user coants to create application program, he depends upon two Modes they are Editor and debugging.

* These two modes are provided. implemented with the help of operating system.

* programs are created using high level languages like c, c++, java.

Ex :-




Program Excuetion :-

* Any user successfully completed program/proces/task will be proved from cpu to main memory.

* To properly loading of program information from cpu to main memory using loader;

* Sometimes process/program required input information

* Required information is properly brought from I/O devices to CPU & these corresponding work roles are completed with the help of operating system.

I/O Devices Functions :-

* In general to properly completing of any application or process we require I/O

* Sometimes user programs / applications require input information from I/O Devices to CPU for the purpose of execution.

* output / input information is intially available in I/O devices.

Error Detection correction :-

* Error detection is the process of finding different errors in an application.

* Different errors are main-tained by different applications. They are :-

1. Memory management Error.
2. CPU Error.
3. Power Failure.
4. I/O Errors.

* These Errors are rectified with the help of different Modes. They are :-

1. Page Replacement algorithm / Memory management.
2. Swapping for Memory.
3. Process management / process management routines for CPU
4. Checle points for power failure.
5. I/O routines for I/O devices.

Resource Allocation :-

* Resource allocation means gathering different resources from the network environment.
* Resource allocation maintains different

1. CPU
2. Main memory
3. I/O Devices
4. secondary memory.

communication :-

* communication is the process of exchanging any information from one process to another process.
* It is possible to do using two criteria.

1. single user 2. Multi user.

1) single user :-

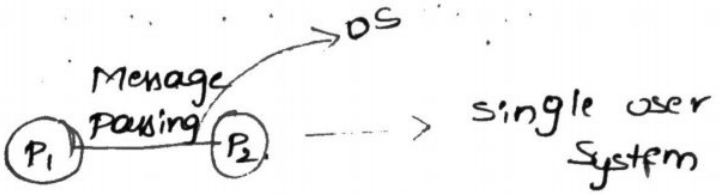
* It is a system used to support successfully completion of $P_1$ and $P_2$ processes under single system.

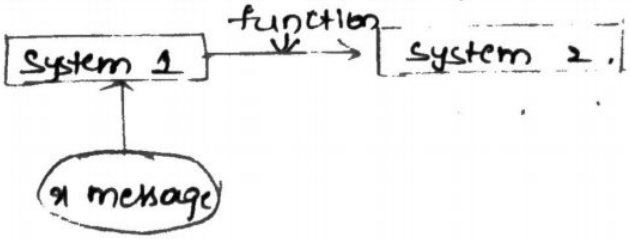
2) Multi user :-

* Multi user system provides 2 different computers. $P_1$ completed under 1st system $P_2$ under another system.

one system into transfers to another system.

Ex :-

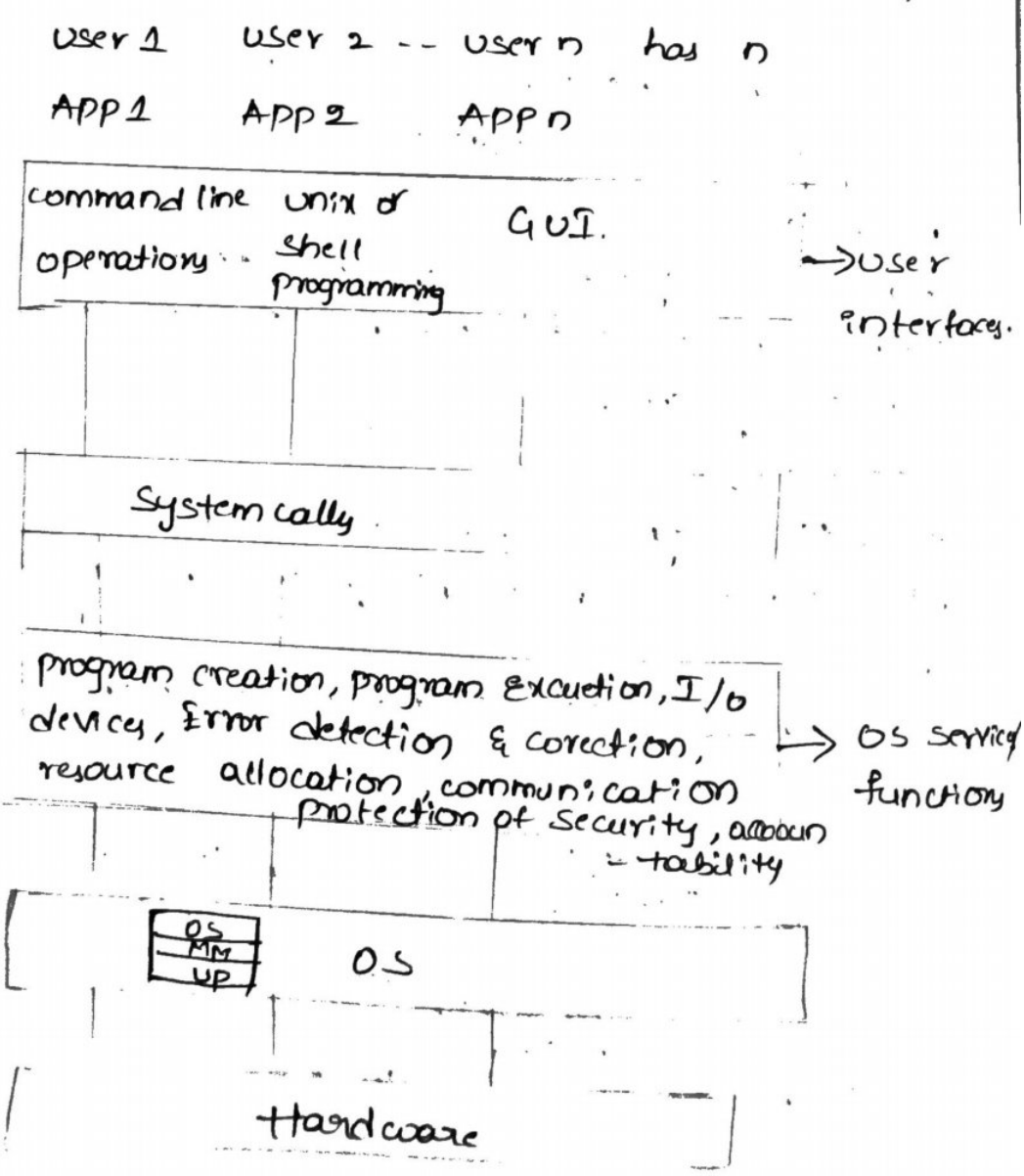


## Protection and Security :-

* protection is the process of properly monitoring of internal functions i.e., different functions of cpu, main memory, I/o devices, secondary memory.
* Security is the process of properly monitoring of external information of os.
* Example : password Mechanism, External communication mode [modems, printers, networkadaptors], authentication.

## OS structure / System structure :-



* user 1, user 2, user 3 - - - can create different application program using different interfaces. they are :-

1. Command line operations :- Disk operating systems provides command line operations to the users.

2. Unix (or) Shell programming :- Unix or shell programming provides batch processing systems.

3. GUI :- GUI provides different icons to the users. These icons are used to create different graphical shapes.

System Calls :-

* System calls acts as interfaces. Interface is used to establish Communication path between process and OS.

* System calls are written using assembly level language. Sometimes they are also written in high level language

* System calls are implemented using two operational modes :-

1. User modes
2. Kernal Mode.

* These two modes are maintained on the same mode.

* This mode provides two integer values 0, 1.

Systems calls are divided into 5 types. They are :-

1. Process management / control management.
2. File management.
3. Device management.
4. Information management.
5. Communication management.

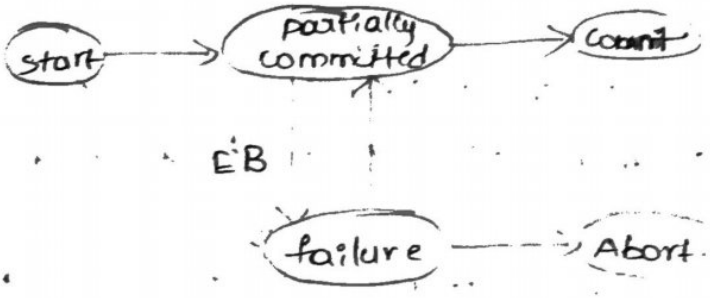
1. Process control :-

* A user can successfully execute a process under cpu / processor.
* process control provides different system calls to the user.

1. End Abort

End :- these calls can support any process to successfully execute.

Abort :- these calls can supports failure process (or) collapsing process.




2. Load, Execute :-

* Load system calls supports a process to properly load the information from cpu to main memory.

3. create, terminate process :-

* create system calls are used to create the process successfully.
* Terminate system calls are used to delete the process from the main memory.

4. set process Attribute :-

* To properly add the available to the process using set process attributes.

5. Get proc
* To properly
process.
6. Allocate
free
7. Memory
8. wait for
9. wait for

2. File manage
* File is a
/attributes.
* File manag
manage an
system cal
1. create a
2. Delete a
3. Open()
4. close()
5. Read, cor
6. Set file
7. Set file

3. Device m
* Device m
memory.
* To prop
1. CPU to
2. I/O to
3. Main
4. CPU

5. Get process Attribute :-

* To properly retrive the attribute from the process.

6. Allocate Memory.

7. Free Memory

8. wait for time

9. wait for event.

2. File management :-

* File is a collection of records. Records means fields /attributes.

* File management is used to properly arrange (or) manage any given files. It provides different system calls to the user.

1. create a file.
2. Delete a file
3. Open()
4. close()
5. Read, write, Reposition.
6. Set file attributes.
7. Get file attributes.

3. Device management :-

* Device management provides I/o devices, processor, memory.

* To properly establish of communication path.

1. CPU to I/o devices
2. I/o to CPU devices.
3. Main memory to CPU.
4. CPU to main memory.

Device management provides different system calls to the users they are

1. Request device
2. Release device
3. Read write Reposition
4. Get device attributes
5. Set device attributes
6. Attach devices
7. Detach devices

4. Information Management :-

* To properly send any type of information into the system.
* Information management provides different system calls to the users :

1. set time Get time
2. Set Date. Get Date.
3. Set System Date. Get System date.
4. Set process files Device attributes.
5. Get process files, Device attributes.

5. Communication management :-

It is the process
* ~~of~~ properly send or establishing a communication path between client and server. It cares about properly sending information from client to server
* Communication management provides different system calls to the users. They are :

1. create, delete connection.
2. Send message
3. Receive message
4. Transfer status information
5. Attach remote files
6. Detach remote files