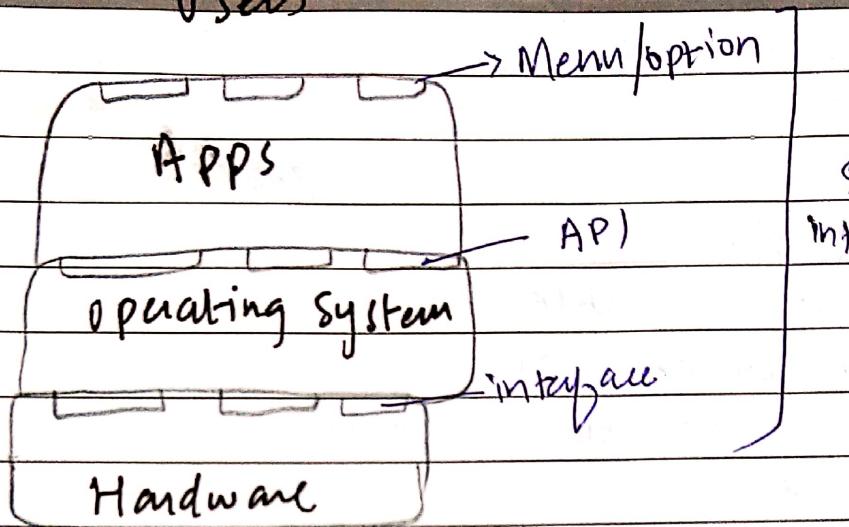


Operating System.

Date: _____



API (Application Programming interface) → set of functions that allows application to access data & interact with external software components, operation systems or microservices.

- To simplify, an API delivers a user response to a system & send the system's response back to user.

User Interface (UI) → describes the way in which humans interact with a machine.

- makes the exchange b/w user & machine possible. without it, viral form of communication ceases to exist.

→ prevalent types of user interface
→ command line → Menu-driven → Graphical user.

→ Touchscreen GUI

2.1

- user type appropriate instructions into the command line.
- computer is commanded to first go to the required ^{Date:} file or directory. From there, a whole host of commands becomes available.

Menu driven

- provides with a range of commands or options in the form of a list or menu displayed in full-screen, pop-up, pull-down.
- e.g. → ATM

GUI

- user interact with these interfaces using mouse, track pad or other peripheral to point by click on graphics or icons.

Hardware interface

↳ Plugs, sockets, cable by electric signals travelling through them.

Software Interface

(programming interface) → languages, codes by messages that programs use to communicate with each other by to the hardware.

Firmware

↳ piece of software that's stored on hardware device in order to make it run properly.

→ added at time of manufacturing

→ used to run user programs on the device & can be thought of as the software that allows hardware to run.

The core of computer(s)

Date: _____

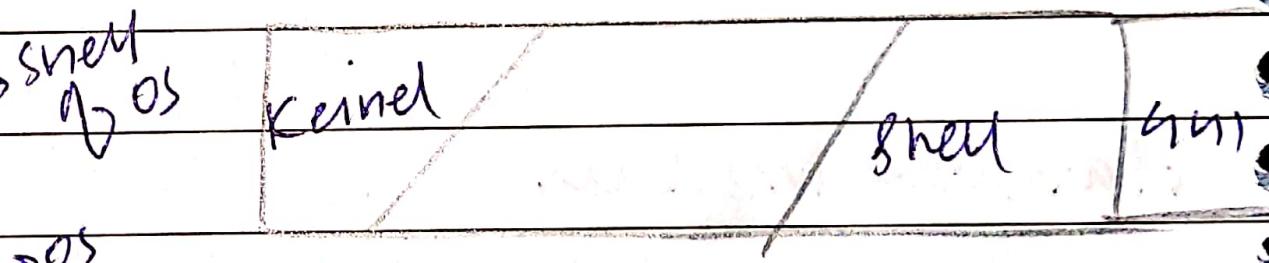
ndows is to act.

tion by actual data processing

b/w user application by

mes / program segments /
with hardware devices.

computer, Kernel comes to
of memory.



Network OS (NoS)

↳ windows 2010

↳ OS with capability to network on internet.

Date: _____

↳ we've to be networked all the time.

→ modern OS.

Distributive OS

→ system which runs on multiple machines.

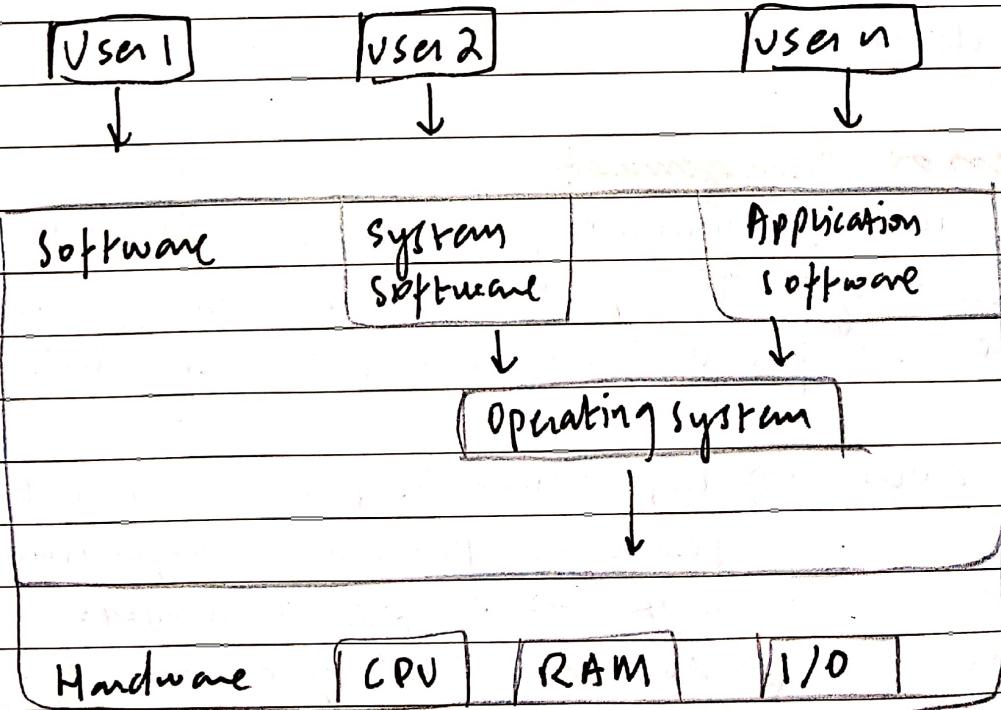
real time OS (RTOS)

→ in control system industry.

~~OS~~ → interface b/w comp user & hardware.

→ controls the execution of all kinds of programs.

- a software which performs all basic tasks.



→ Primary purpose of OS → make efficient use of computer hardware

→ OS runs on comp hardware & serve as platform for other software to run on.

Functions of a typical OS

- Memory Management (RAM)

Date: _____

- refers to management of Primary Memory or Main memory.
- Main memory is a large array of words or bytes where each word or byte has its own address.
- main memory provides a fast storage that can be accessed directly by CPU. For a program to be executed, it must be in the main memory. OS does following activities for memory management.

- keeps track of primary memory i.e. what part is in use & what not.
- In multi programming, OS decides which process will get memory when & how much.
- Allocates the memory when a process requests it to do so.

Processor Management

- In multiprogramming environment, OS decides which process gets the processor when & for how much time. → function called → process scheduling.

- OS does → keeps track of processor & status of processes. Program responsible for this task → traffic controller.
- allocates the processor to a process.

Device management

- OS manages device communication via their respective drivers. Does the following activities.

- keeps tracks of all devices. Program responsible for this task → I/O controller.

Date: _____

↳ decides which process gets the device when & for how much time.

- allocates the device in the efficient way.

File management

→ file system is normally organised into directories for easy navigation by users. These directories may contain files in other directions.

OS → keeps track of info, location user, status etc. validating facilities mount a file system.

- decides who gets the resources
- allocates the resources.

Security

- by means of password & similar other techniques
- prevents unauthorized access to programs & data.

Storage management

Networking

Devices command interpretation

32-bit vs 64-bit

word size → characteristic given to computer architecture.

↳ denotes no. of bits that a CPU can process at one time.

→ modern processors 32 & 64 bits

→ when referring to word size, one is also describing the size of address space on that computer.

- Computer said to be 32-bit also usually allows
 32 bit memory addresses
- Date: _____
 9+ word
 It's 32-bit,
 2^{32}
 memory
 location.
- a byte addressable 32-bit computer can address $2^{32} = 4GB$ of memory.
 - Allows 1 mem
 - CPU register stores memory addresses which is how the processor accesses data from RAM.
 - ↳ one bit in the register can reference an individual byte in memory, so a 32 bit system can address a max of 4 GB of RAM.
 - 32-bit programs can run on a 64-bit system but not vice versa.
 - ↳ 64-bit applications include 64-bit instructions that'll not be recognised by a 32-bit processor.
 - 64 over 32
 - multitasking - we can easily switch b/w various applications without any windows hanging problems.
 - In 64-bit → if we lose memory, we'd lose a lot.

Linux over windows . why?

- free (open source)
- secure
- fast / robust
- handles interrupt preemptively.

- DBMS stores data.
- Hierachial db's used on mainframe comp.

DATA BASES

Date: _____

- organisation & collection of data generally stored & accessed electronically from a computer system.

- there's a need to organise data so that it's retrievable
- ensure info is complete
- ensure info is accurate, current.
- ensure no redundancy in info (no duplicate)

↓
all this necessitates
the need for databases.

- databases are pieces of software to manage data.
↓
data base management system.

↓
2 types

↓
relational
(RDBMS)

- like excel sheets

- data is arranged
in tables.

↓
(rows by columns)

↓
non-relational

RDBMS

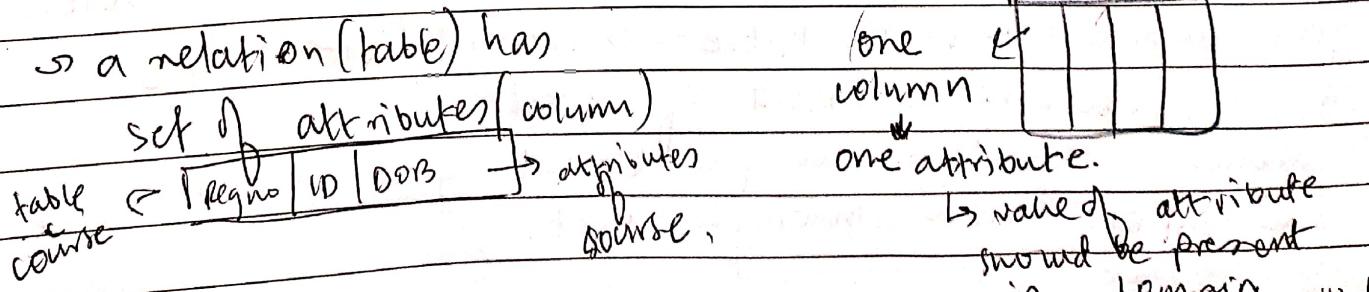
- for eg. we've info for a student (name, add., DOB, CNIC,
reg no)

↳ written in a table.

- one whole row of the table → record / table tuple
- a table can have thousand of records
- whenever there's a unique element, you can search
the whole row through that.

Date: _____

- data elements which can uniquely determine these records → CANDIDATE KEYS
- One candidate key selected among rest by database developers → primary key
 - ↳ something(s) that's in database developers' control.
 - ↳ something that they can change.
- Primary key → has to be unique in under developer's control
 - like (reg.no, ERP ID)
 - will a particular person's record.
 - can make changes in other elements present in the record by searching through primary key.
- data base will have multiple tables/entities.
- e.g. if a student has courses so there'd be another table for that.
- Primary key from first table (e.g. student) will become foreign key (e.g. in course table).
↳ replicated/pinned in other table.



column → one set of values
key → constraints
row → one whole set of attributes

entry → piece of data

Date: _____

- 3 types of links that can be made among entities
 - ↳ one to one
 - ↳ one to many
 - ↳ many to one
- (like one course can have multiple teachers or one teacher can have multiple courses).

- once the tables are made
 - ↳ Normalisation (make further tables)
- there are usually 5 levels of normalisation but mostly went up to 2-3 (BCNF)

Data warehouse

- electronic storage of large amount of info by a business or organisation. (data warehousing)
- ↳ perform queries by analysis by often contain large amounts of historical data.

Relational databases

- MS Access, Oracle, Amazon RDS, DB2

Structured query lang → programming lang that's (SQL) typically used in relational database.

Data def lang

- ↳ performs all operation in defining structures of relation (structure of rel, def rel)

→ does operation to organize & refine info in relational data bases.

Data managnt lang

- ↳ performs changes in values

of relation (insert, move, delete, modify)