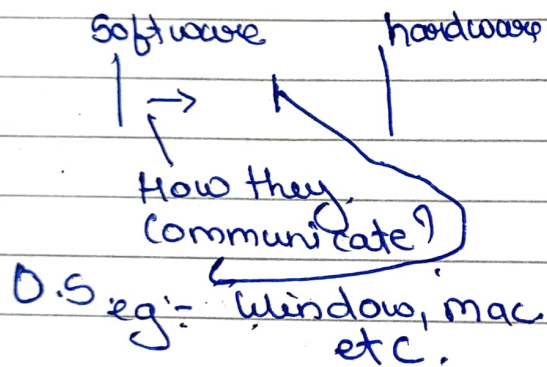1. Introduction to OS. — (8)
2. Process Management. — (9)
3. Memory Management. — (12)
4. File System. — (4)
5. I/O System. — (3)
6. Storage Management and data protection — (2).

⊙ OS and main function.

⊙ OS and main function.

softwore   hardwore

How they
Communicate?

O.S. eg:- Window, mac
etc.

main function.
Device manager ←
User Interface.
Memory, file, Process

⊙ Process and thread.

Process is One app.
In app other function are.
Open which work.
Simontausly is Called.
thread.

⊙ Types of O.S.

1. Batch operating O.S.
⇓.
work One by One.
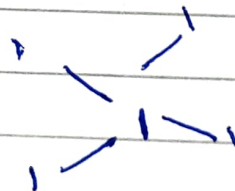
2. Multiprograming O.S.
work Together. ☞

3. Real-Time ⇒ where time is
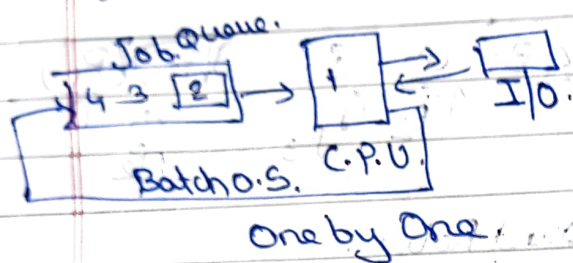strictly eg:- Space Center.

4. Ristributed O.S.
Apple Ecosystem.

5. Embedded O.S.
eg:- elon musk Rocket Cotuh Team.
(IOT).

1.④. Batch O.S.

Job Queue.

4 3 2 → 1 ⇄ I/O.

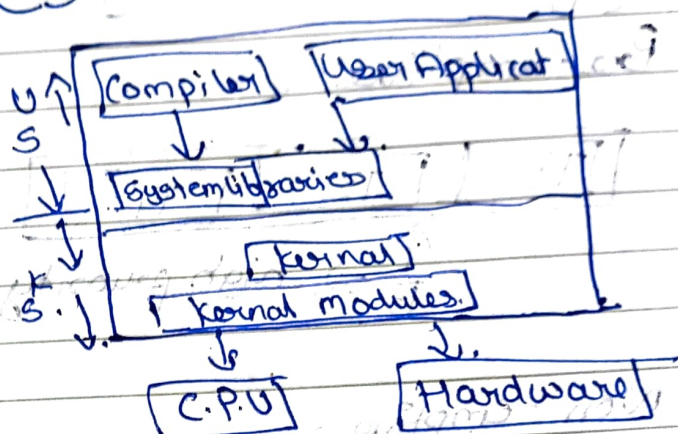Batch O.S.   C.P.U.

One by One.

1.5 Multiprograming and. Multi Tasking.

M.P ⇒. C.P.U Change the T1 and. Go Start with T2 and. again Start T1 meanes Switching between Job.

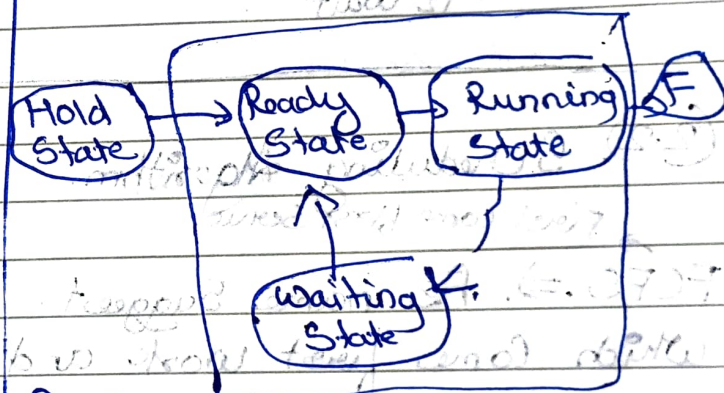M.T ⇒ In Switch Rapadily. between C.P.U and memory is. Small Qutaum that user think. it work together.

Context Switching ⇒. Changes in. One process to another the. time is Called Context. Switching.

1.6). Kernel and user.

U↑
S↑
↓
K↓
S↓

Compiler   User Applicat

↓   ↓

System libraries

Kernal

Kernal modules.

↓

C.P.U   Hardware

1.7) Processes and Thread.

Hold State → Ready State → Running State ⇒ F.

Waiting State

P.C.B and T.C.B are checking and. Show like meter data.

1.8) Normal Call v/s. System call.

Normal call	System call.
Run on. Program Code.	depend on. hardware response.

(2) Process Management

(2.1) Pre-emptive

T_1	T_2	T_1

↑ ⇒ high priority
T_2

Non-emptive

T_1	T_2	
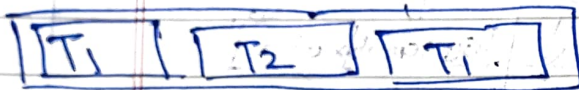
↑ T_2 wait

(2.2) Scheduling Algorithm

→ First come first serve

FCFS ⇒ As name suggest.
which come first work and
no other process in between.

SJF ⇒ Shortest Job First

P	T
1	3
2	2
3	1
4	5

which have shortest time
work fine.

SRTF (Sort Remaining Time First)

| P_1 | P_2 | P_3 | | P_2 | P_1 |

↑ P_2 ↑ P_3 ↑ P_2

Round Robin

If Given Each frame time to
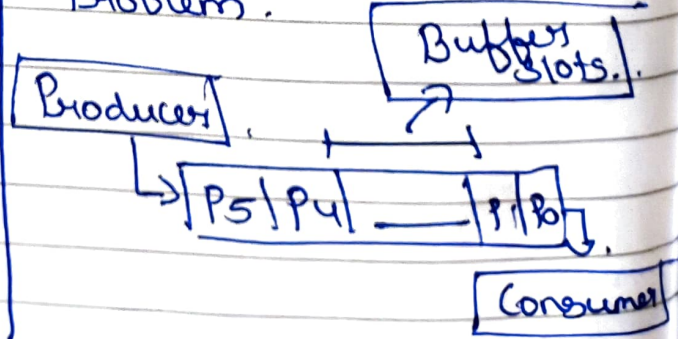every one is called Round
Robin

(2.3) Starving and Aging

Starving :- lower priority
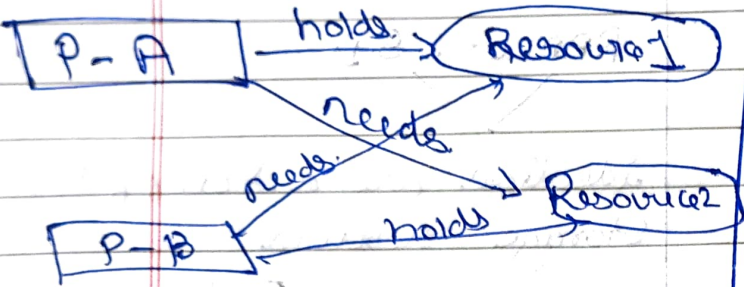task is denied and
high priority task is comming.
it lead to inefficient system.
performace is called Starving.

Aging :- low priority task
move up over time is
called Aging.

(2.4) Producer - Consumer Problem

| Producer |

↳ | P5 | P4 | ___ | P1 | P0 |

Buffer Slots

| Consumer |

2.5 Critical - Section Problem.

```
┌─────┐   holds    ╭──────────╮
│ P-A │ ─────────→ │ Resource 1│
└─────┘ ╲     ╱╲   ╰──────────╯
         ╲   ╱  needs
      needs ╳
         ╱   ╲
┌─────┐ ╱     ╲  ╭──────────╮
│ P-B │────────→ │ Resource 2│
└─────┘  holds   ╰──────────╯
```

Dead Lock.
if A is not hold the other
will not Start and B
is not released A not Start.

Preventing :- Other have to
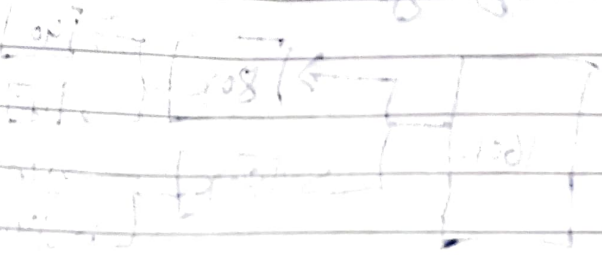wait and One have to.
process and finished.

(2.6) Semaphores.

it is computing Environment
to prevent Race - Condition.

① Binary ② Counting.

(·) Dining philospher Problem.
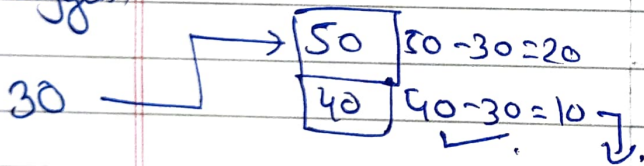
(4) Banker's Algorithm.

Memory Management.

Fragmentation ⇒ it means. waste of memory i.e. Unsed memory is Called. Fragmentation.

First Fit Algorithm.

Where it find first Storage Space. is Called first fit Algorithm.
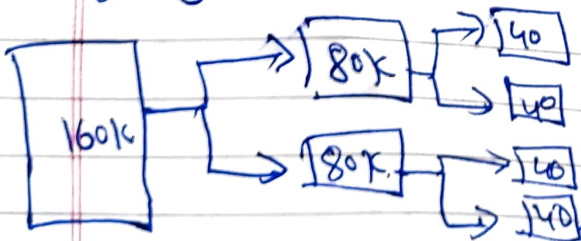
Best-fit Algorithm.

After Substracting which findes. minimum waste of memory is. agains

```
        ┌→ 50   50-30=20
30 ─────┤
        └→ 40   40-30=10
```

(ii) Worst-fit Algorithm.

After Sub Maximum Waste is that. Assigned.

① Buddy System Allocation.


```
160k ──┬→ 80k ──┬→ 40
       │        └→ 40
       └→ 80k. ──┬→ 40
                 └→ 40
```

---

⑥ Virtual Memory.

it is a

```
RAM or S.S.D
     ↓
```

idealized abstraction of the Storage resource.

Virtual   memory   physical
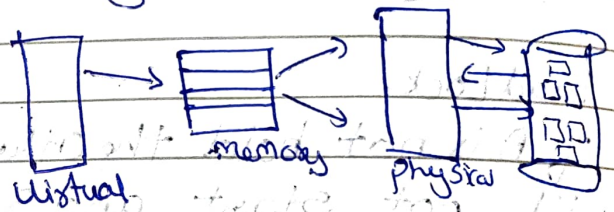
Paging:- Divide memory. into Each Equal bock is Called Paging.

Segmentation:- Divide memory. into Unequal part. according to their requirement.

Logical.   physical.

```
┌──────┐      ┌────────┐      ┌────────┐
│ C.P.U │ ---→ │ Register │ ---→ │ memory │
└──────┘      │   ⊕    │      └────────┘
              └────────┘
```