CS & IT ENGINEERING

Operating Systems

Process Management

Lecture No. 1

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- Program Vs Process
- Process as an ADT
- Process State Diagram

Program vs Process

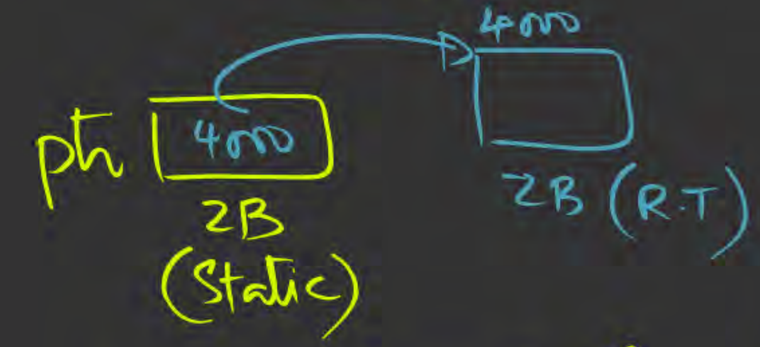
- .exe

- Instructions
  - Code
    - Ex: Load, Move, Store, Add
- Data
  - Static
    - Fixed
      - Known Size
      - → allocation is b/f R.T
  - Dynamic
    - Fixed
      - Variable (Known / unknown)
      - → R.T allocation

Static

```
main()
{
    int a, b, c, *ptr;
}
```

2B




```
ptr = (int *) malloc(sizeof(int));
```

R.T

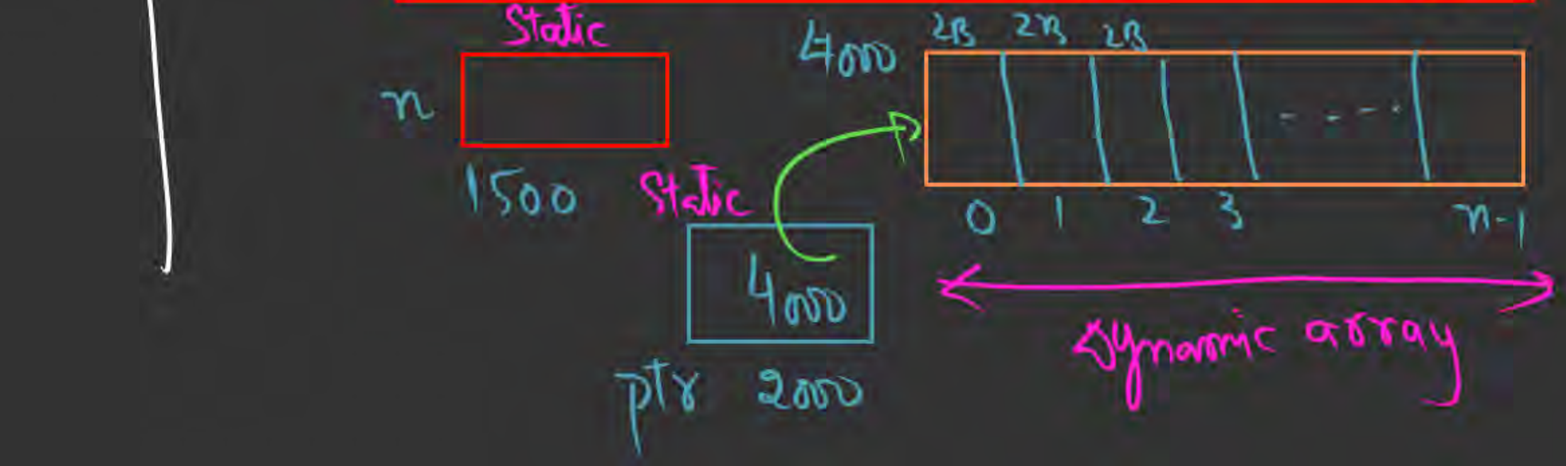
Dynamic Arrays

```
main()
{
    int n, A[n];
    scanf("%d", &n);
    .
    .
}
```

X

Simulate/Emulate the creation of dynamic arrays in C/C++..

```
main()
{
    int n, *ptr;
    ptr = (int *) malloc(n * sizeof(int));
```



Process :

utilizing resources of Computer

Defn :

→ Program in execution

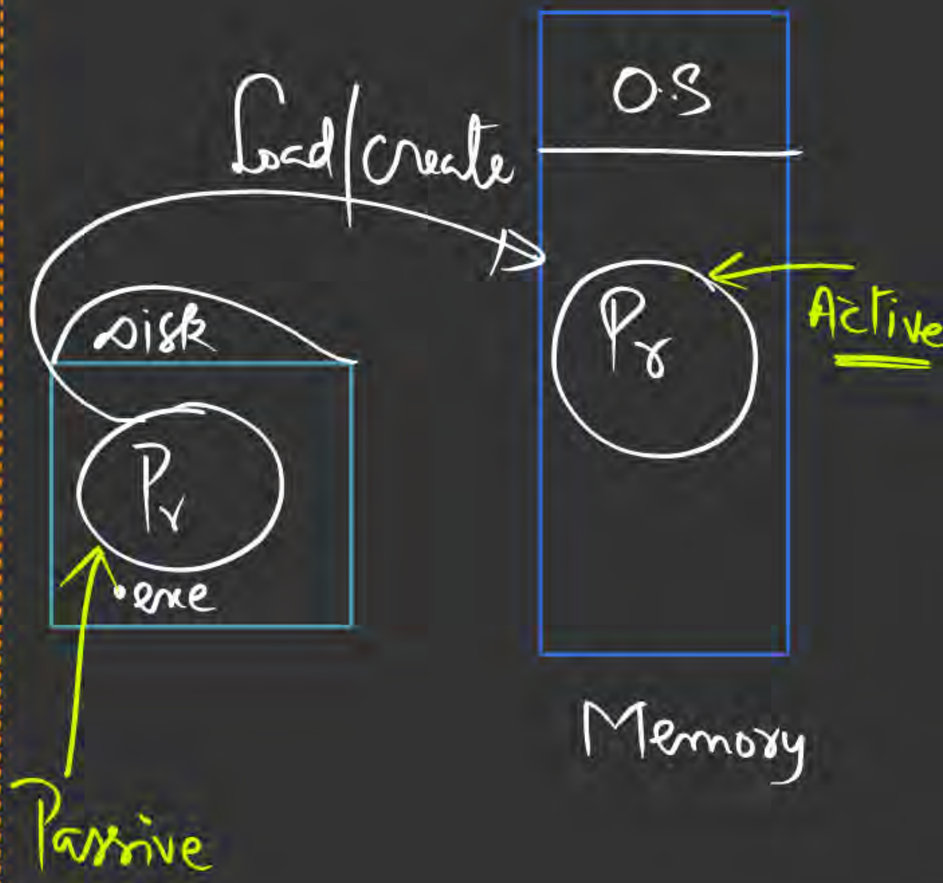
→ Instance of a program

→ Active entity

→ Schedulable/dispatchable unit

→ Locus of Control (of O.S)

→ Animated Spirit



Developer's view of Process

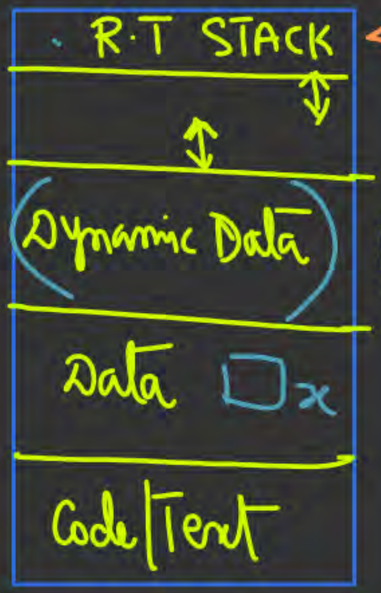
A.D.T ⟨Abstract Data Type⟩

⟨ Defn ; Repr. / Impl. ; Operations ; Attributes ⟩

Charact's

Process Structure / (*) Abstract view of Process (Mem.):

lifetime



malloc

Global var's

⟨Instrns⟩

← Activation record / function call

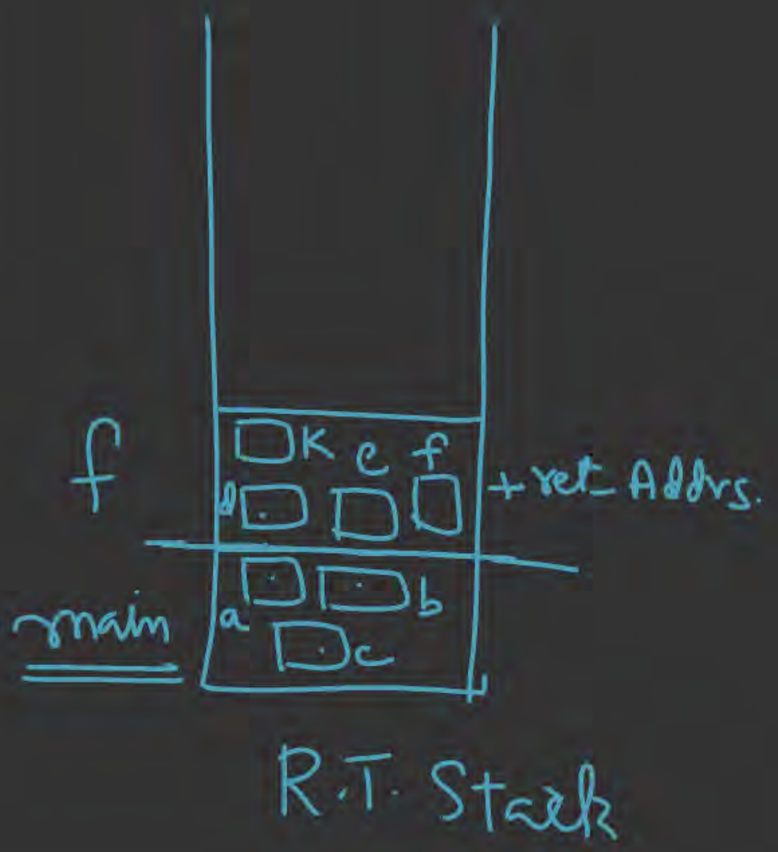
↓

Loc. var's + return Addrs

```
int x;

main()
{
    int a, b, c;
    :
    f(c);
}
```

```
f(int k)
{
    int d, e, f;
    :
}
```



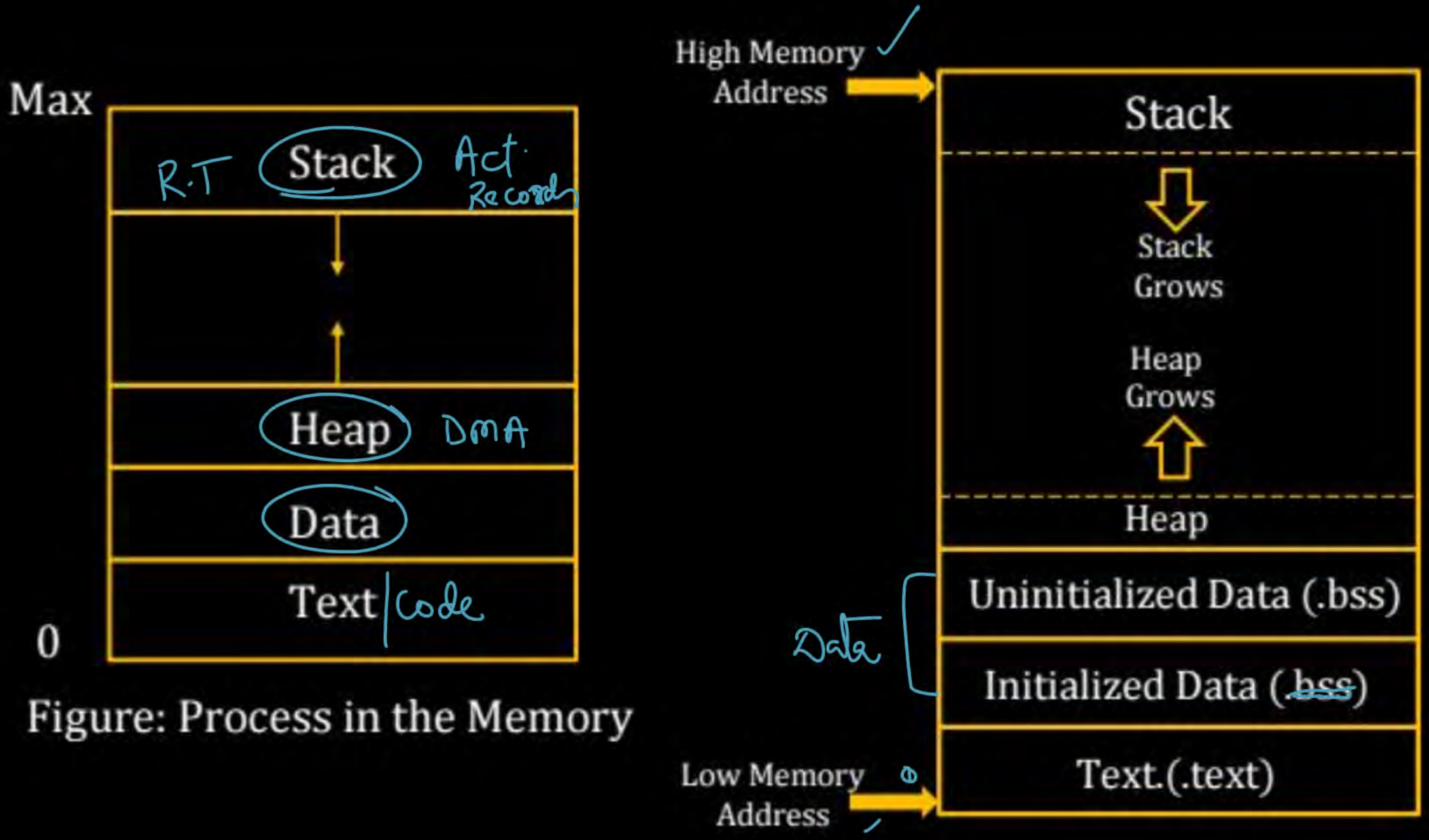


Figure: Process in the Memory

Process operations (O.S) : (functionality)

(i) create(): Resource Allocation

(ii) Schedule(); decision

(iii) Run(): executing Instructions on cpu

(iv) Block(); / wait() Performing I/O operation

(v) Suspend: Pushed out of Memory onto disk;

(vi) Resume: Bring Process back from disk to Memory

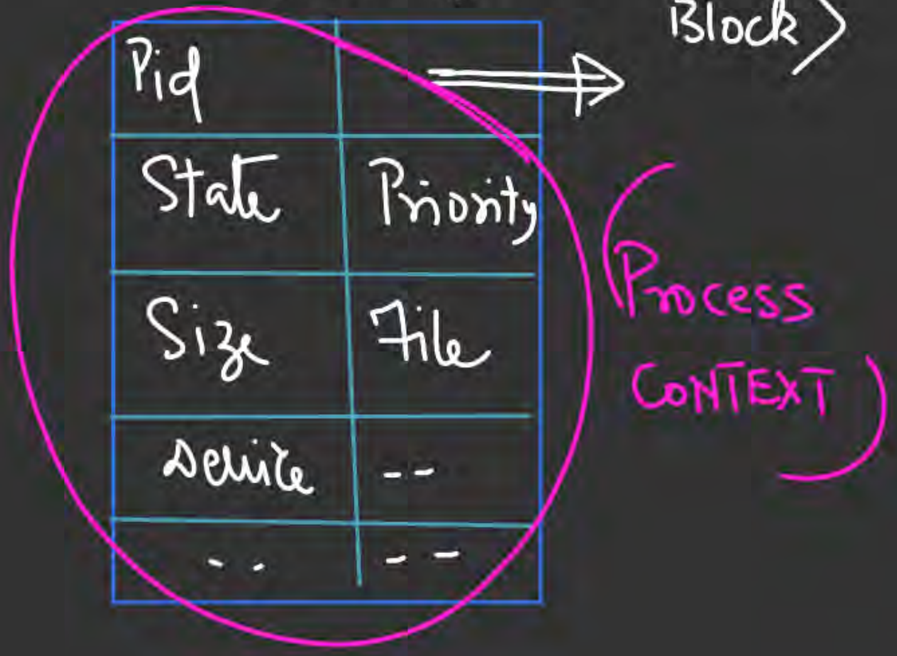
(vii) Terminate: Resource de allocation;

Process Attributes

1) Identification : Proc id ; PPid ; gop-id
2) CPU : PC ; gen-Register ; Process_State ; Priority ; Process_Type ; Burst_time
3) Memory : Size ; Memory limits ; . . .
4) File : list of open files ;
5) Device : " " " services ;
6) Accounting : other resources . .

Process Descriptor

PCB < Proces Control Block >



P.C.B

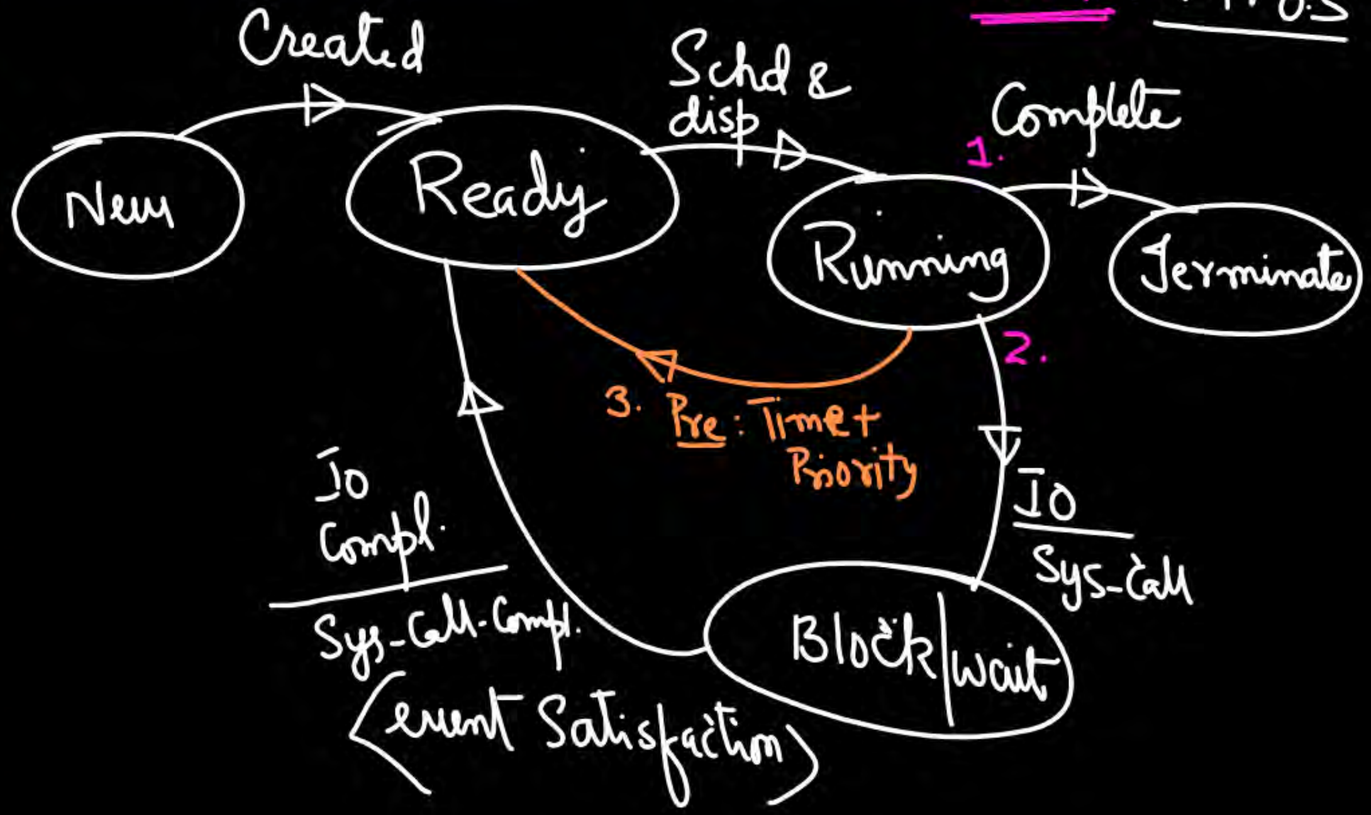
Pointer	Process State
Process number (id)	
Process counter	
Registers	
Memory Limits	
List of open files	
...	

M.Pr < Pr, N.Pr

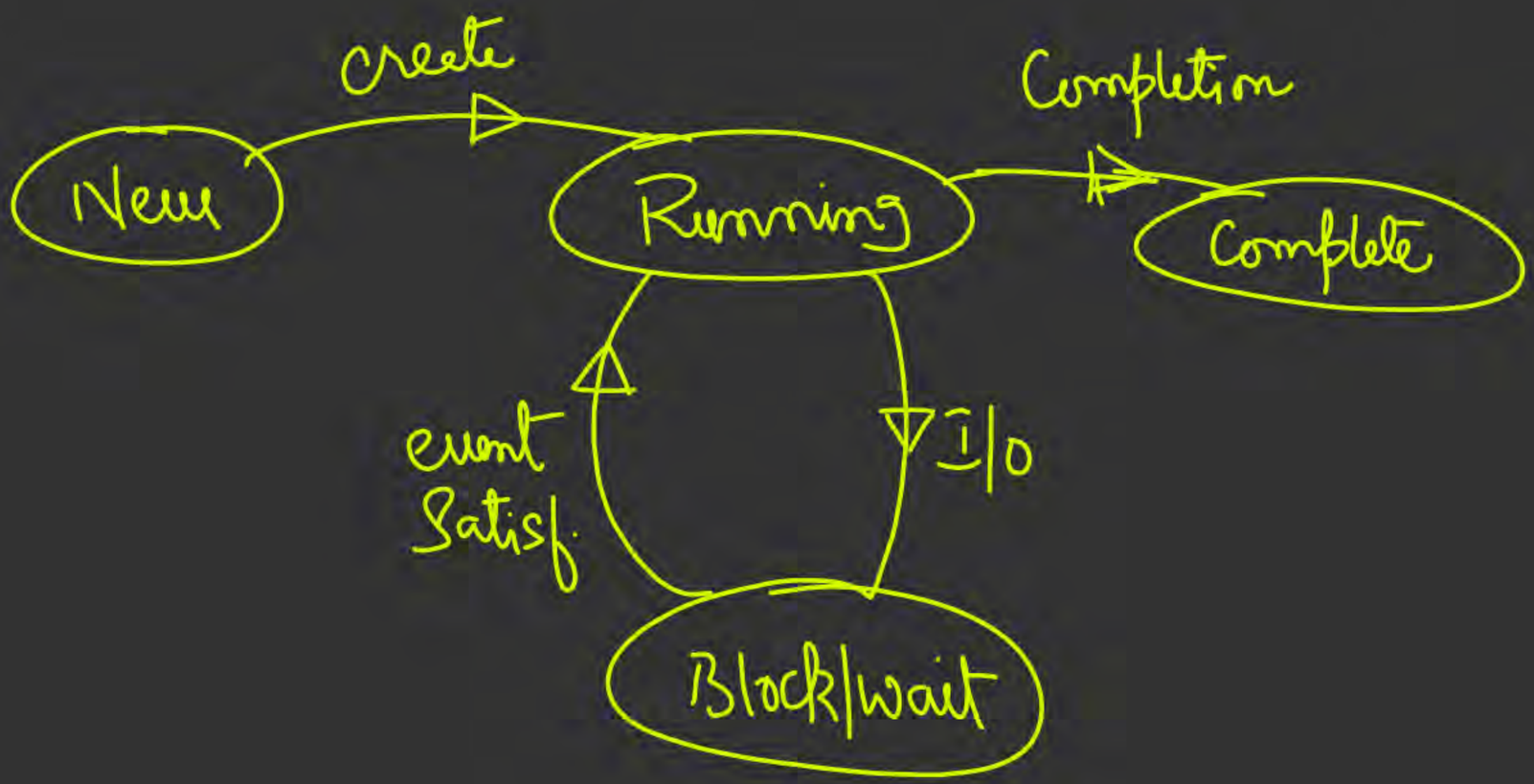
Process States & State - Transition diagram :

<New ; Ready ; Running ; Block ; Terminate>

Non-Pr M.Pr O.S



Uniprogrammed O.S State-Diagram




THANK YOU
GW
SOLDIERS !