

CS & IT ENGINEERING



OPERATING SYSTEM

Process Concepts

Lecture No. 02



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TOPICS TO BE COVERED

Program Vs Process

Process as an ADT

Process State Transition

Diag.



Program vs Process

int a[10];

int a, b, c; Data Static

Program in Execution:

When Program is loaded from disk to Main Memory

Instance of a Program

(exe)

Instns

Data (operands)

Static

Dynamic

Fixed Size
Known Size

→ Load Time
b/f R.T

→ Varying Size / Fixed Size

→ At run time

Ex: { Load
Store
Add
mul }

b = 1;
c = 2;
a = b + c

a
b c

Compiler
I₁: Load b, #1
I₂: Load c, #2
I₃: Load R₁, b
I₄: Load R₂, c
I₅: Add R₁, R₂
I₆: Store a, R₁

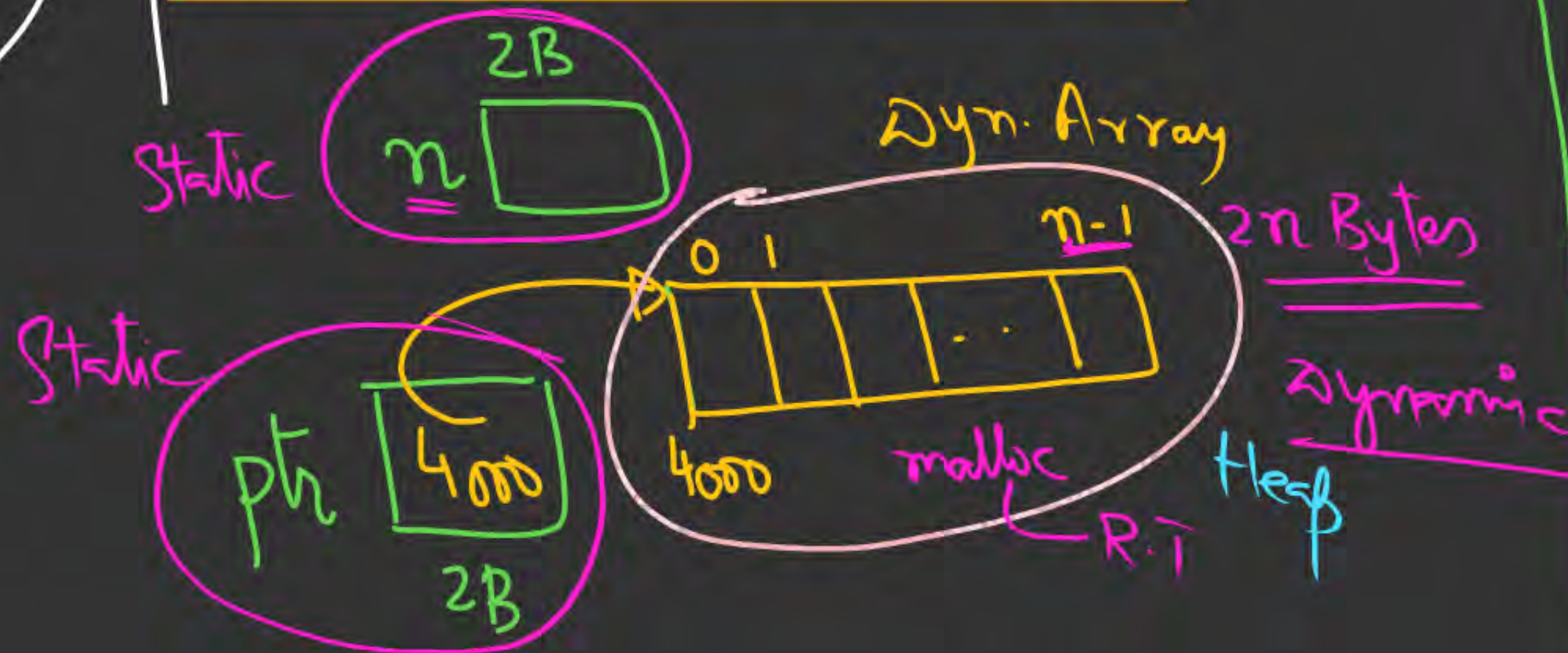
int n, A[n];
scanf("%d", &n);

Concept = Dynamic Array

We can create a dynamic array of size 'n' integers in "C" alternatively

int n, *ptr;
 scanf("%d", &n);
 ptr = (int*) malloc(sizeof(int)*n);

DMA

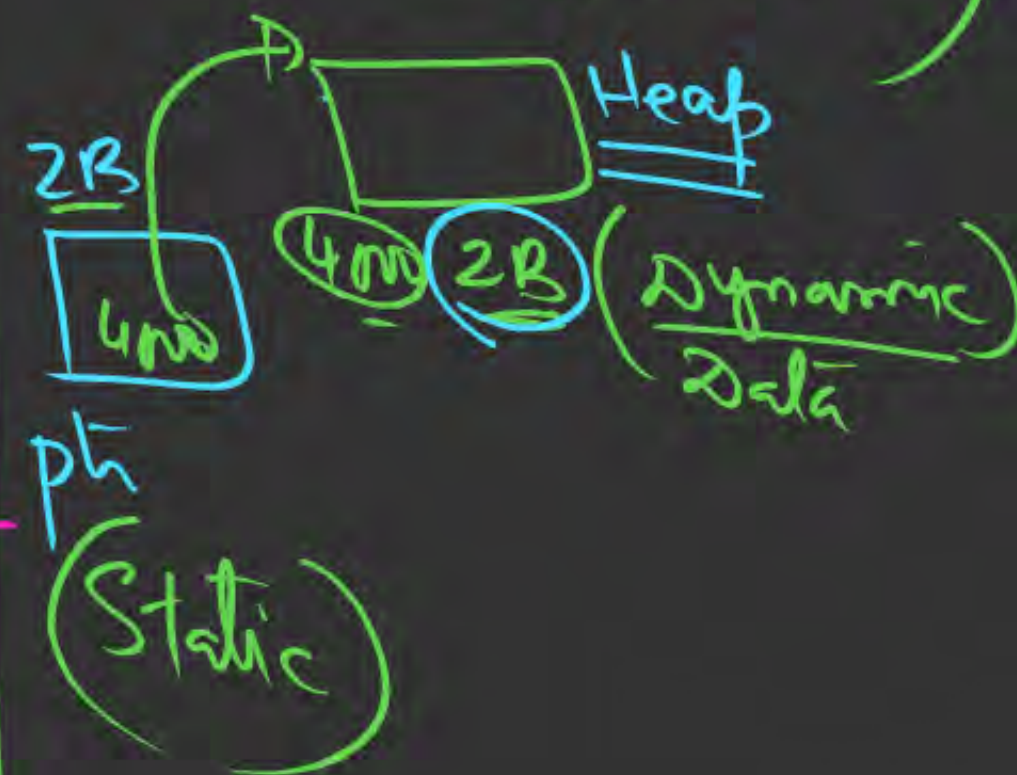


Regular int = 2B

Storage class Static int i

int *ptr;

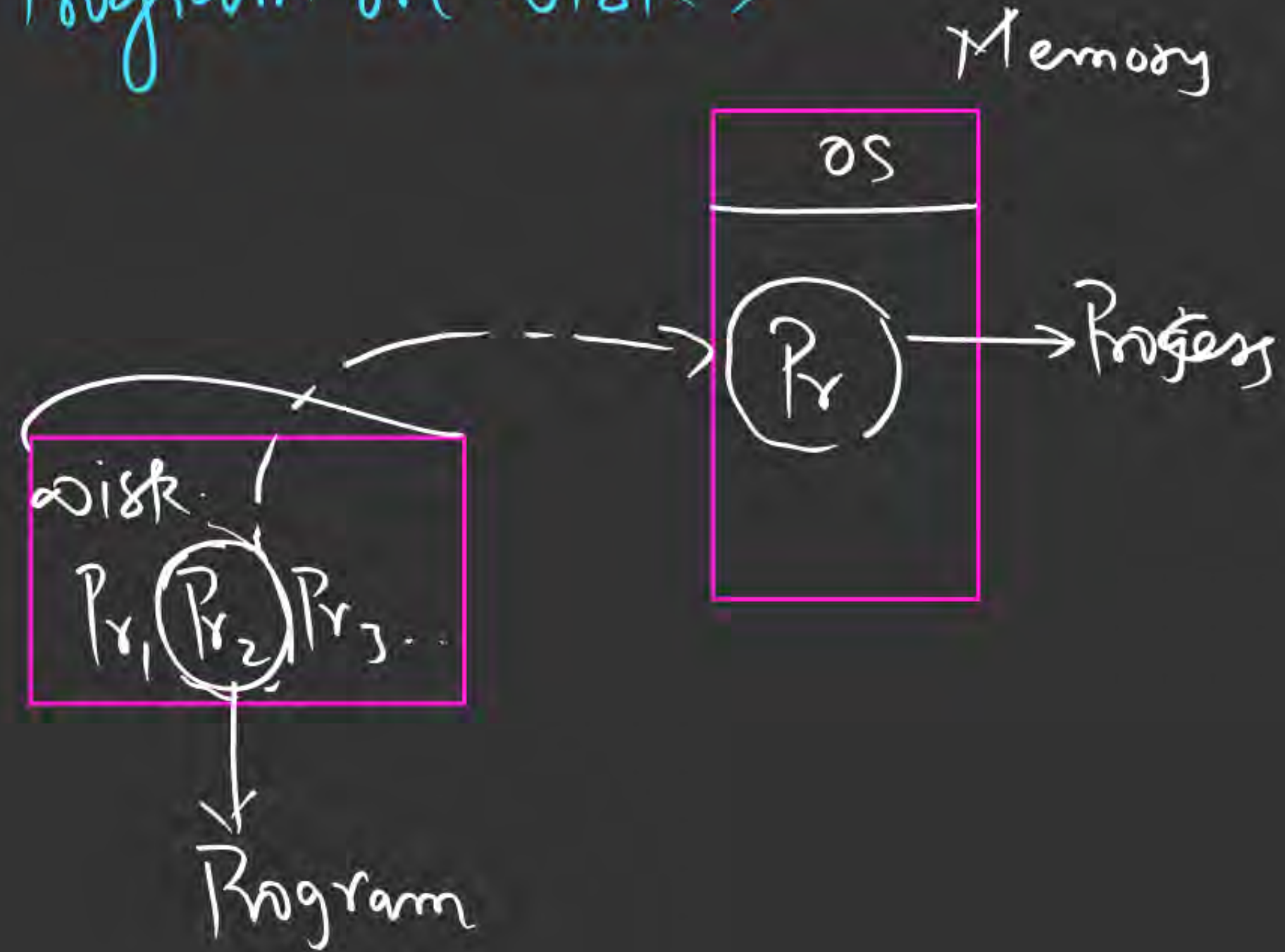
ptr = (int*) malloc(sizeof(int))



Process Defn's → When it is using Resources of Computer,

- Program in (Execution)
- Program when it gets loaded in Memory
- Instance of a Program
- Active entity
- Always in Memory
- Locus of Control of OS
- (Animated Spirit)

Program is passive;
Program on disk;



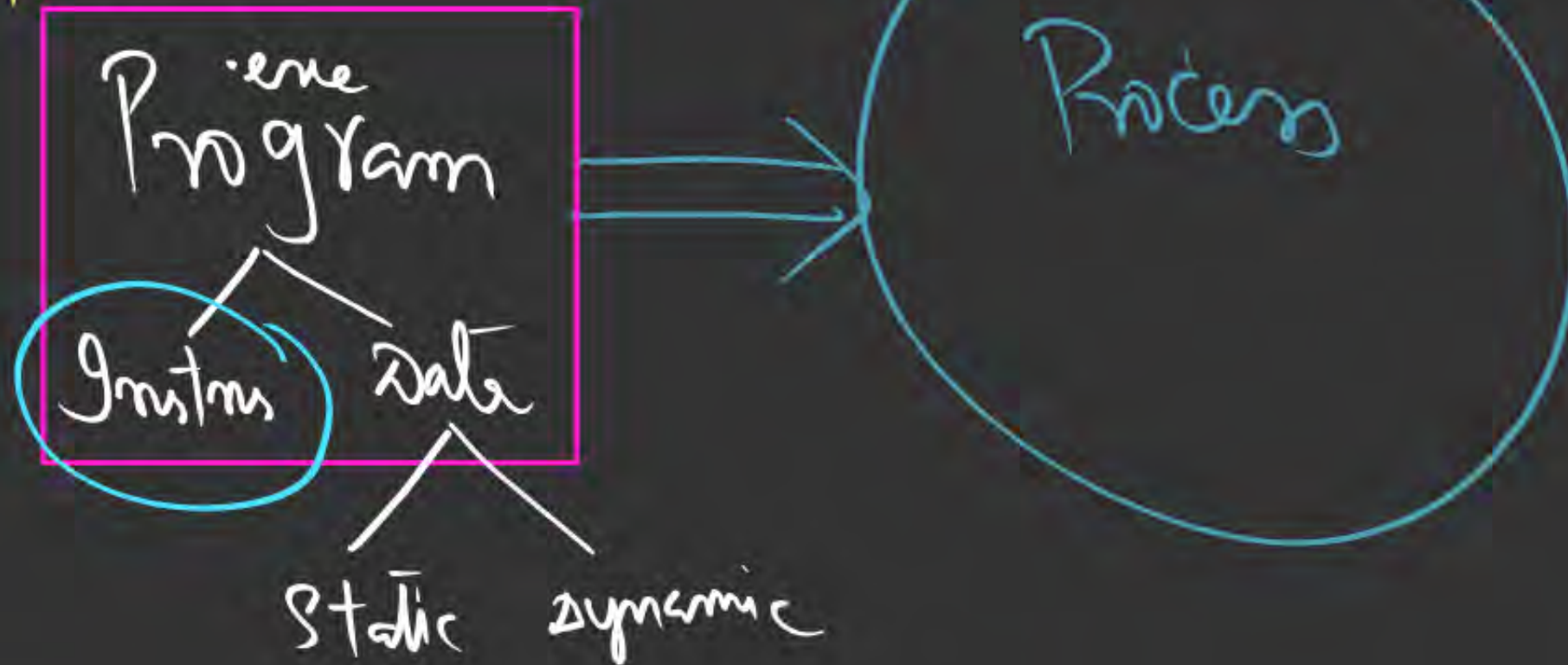
Process from developer's Perspective / Developer's view of Process

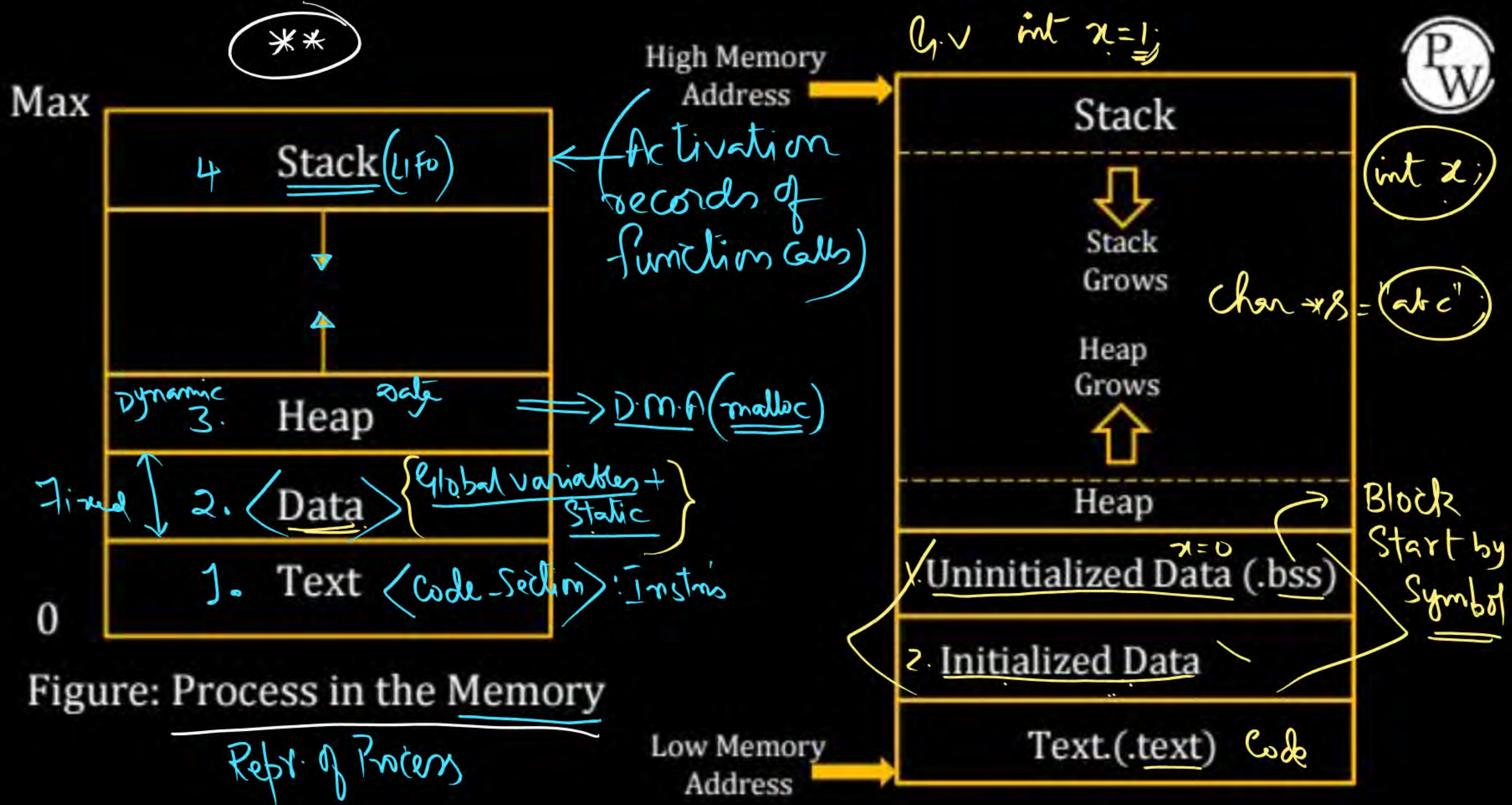
→ Process is an A.D.T: (Data Structure)

(Process Structure in Memory)

↳ Defn; Repr/Impl; operations; Attributes

Repr. of Process in Mem






```

int x; data sec
main() data
{
  static int y;
  int k, x, l;

```

```

  f(k, x);

```

```

  c1: k = x + l;

```

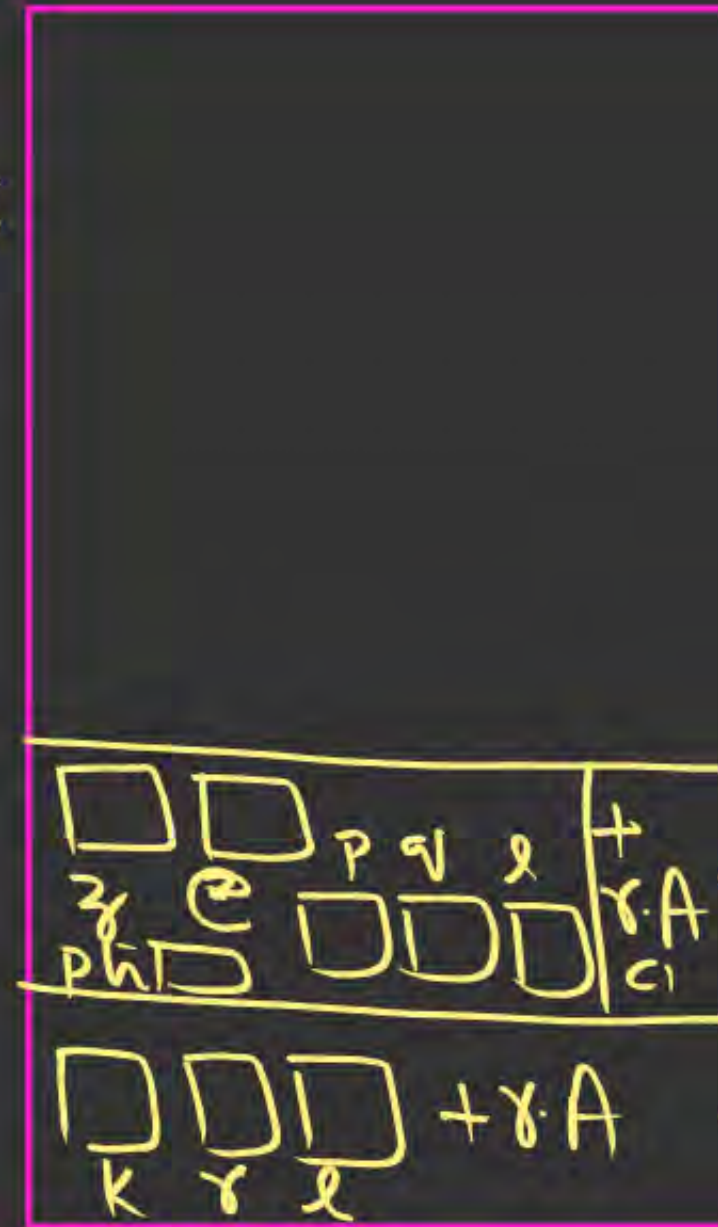
```

      Stack
f(int z, int e)
{
  int p, v, l; Stack *pth;

  pth = () malloc(p);

```

Heap



STACK

System

x.A: return Address

(OS)

Process operations

- 1) create() : Resource Allocation
- 2) Schedule() : The act of selecting Process to run on CPU,
- 3) Execute/Run() : The act of executing instruction from code section,
- 4) Block/Wait : for I/O operation / System Call
- 5) Suspend : Act of moving Process from Mem. to disk;
- 6) Resume : " " " " " " disk to memory;
- 7) Terminate : Act of Resource deallocation;

PC: Program Counter

Process as an entity is associated with several Attributes


(i) Identification: $\langle \underline{Pid}; \underline{PPid}; gid; \dots \rangle$

(ii) CPU related: $\langle \underline{PC}; \underline{Priority}; \underline{State}; \text{Burst time}; \text{General Register Set}; \dots \rangle$

(iii) Memory related: $\langle \underline{Size}; \text{limits}; \dots \rangle$

(iv) File: $\langle \text{list of Files}; \dots \rangle$

(v) Accounting: $\langle \text{resources}; \dots \rangle$



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

PCB

(Id-Card)

P.C.B < Process Control Block >

↳ Contains Attributes of Process;

→ Each process has its own PCB;

→ PCB is Stored in Memory;

