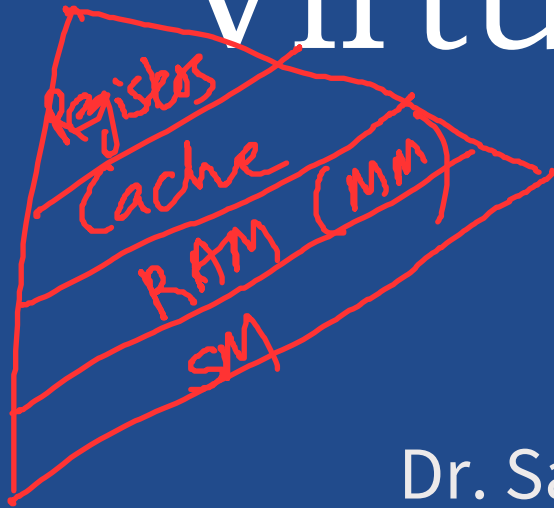
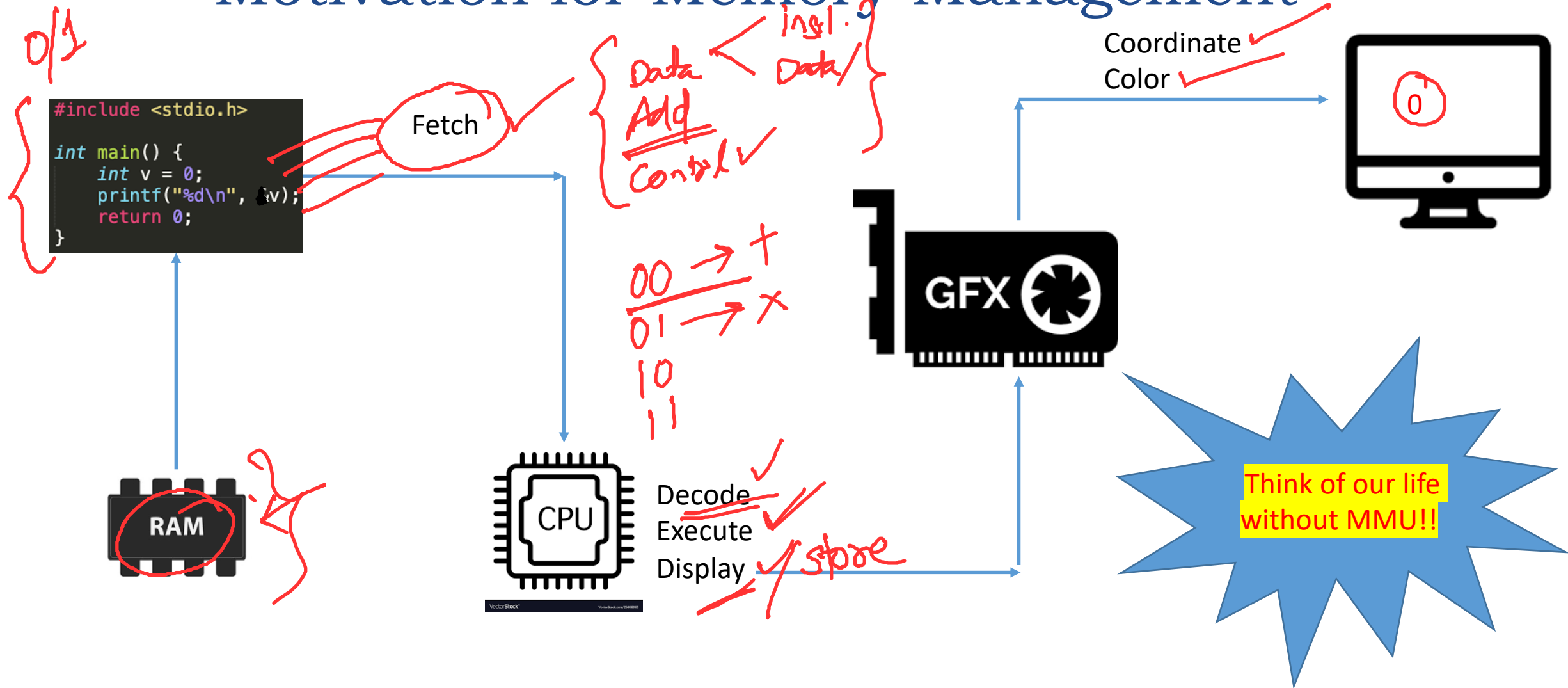


Introduction toⁿ Virtual Memory}



Dr. Sanjeet Kumar Nayak

Motivation for Memory Management



Execution of Program (Process)

- `#include<stdio.h>`

```
int main(){  
char str[]="Hello World\n";  
printf("%s", str);  
}
```



Compile (gcc hello.c)

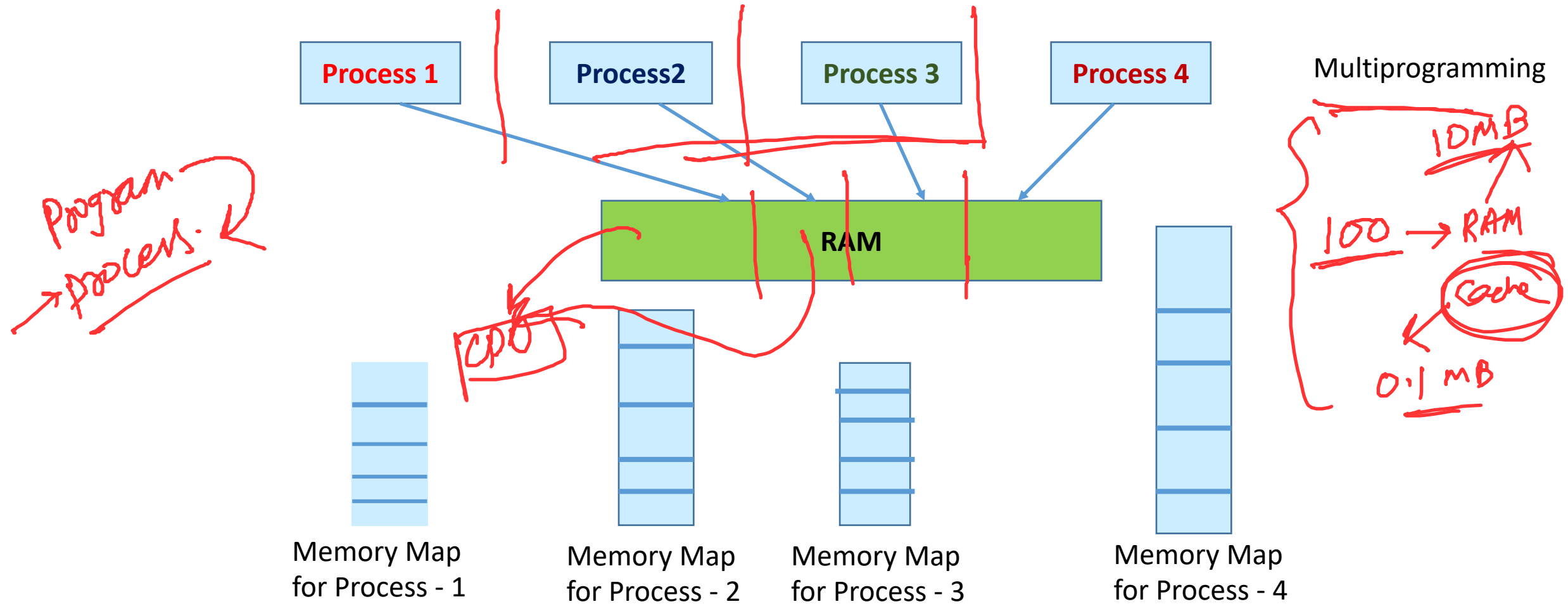
Executable file

Process

- Process


- A program in execution
- Present in the RAM
- Comprises of
 - Executable Instructions
 - Stack
 - Heap
 - State in the OS (in the kernel)

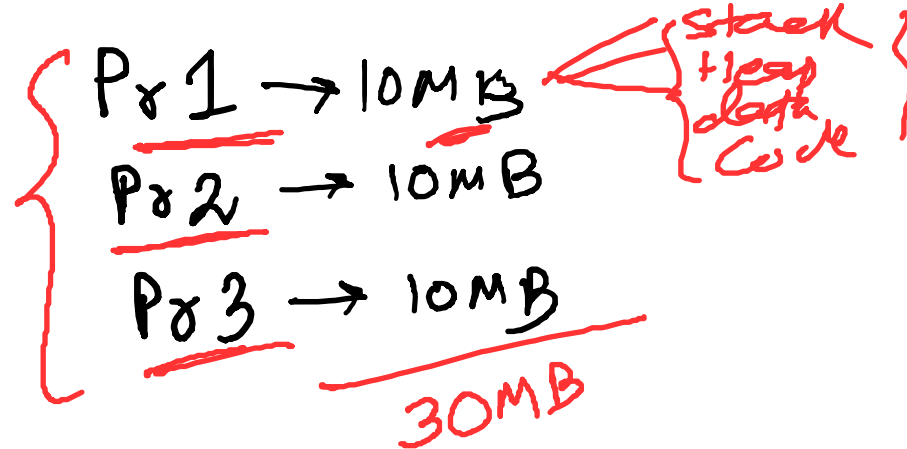
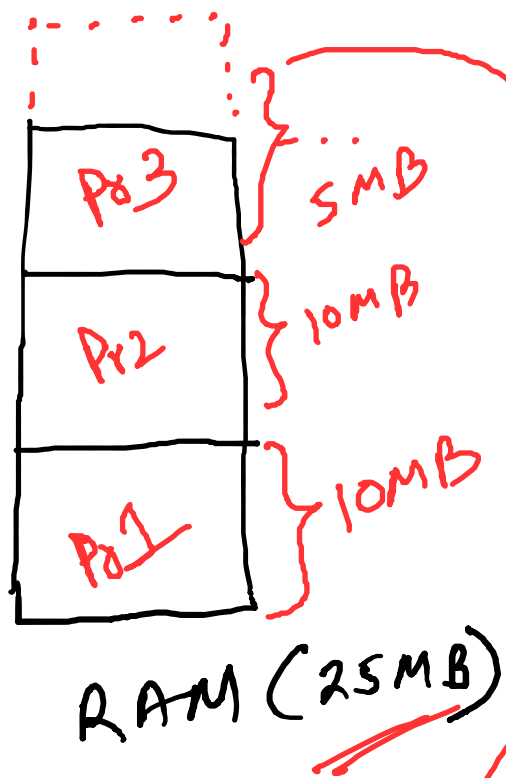
Processes Sharing RAM



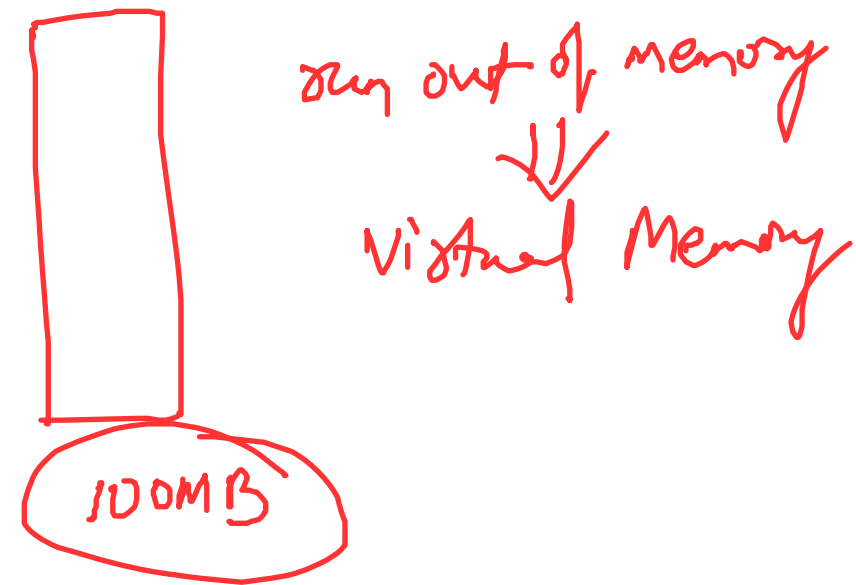
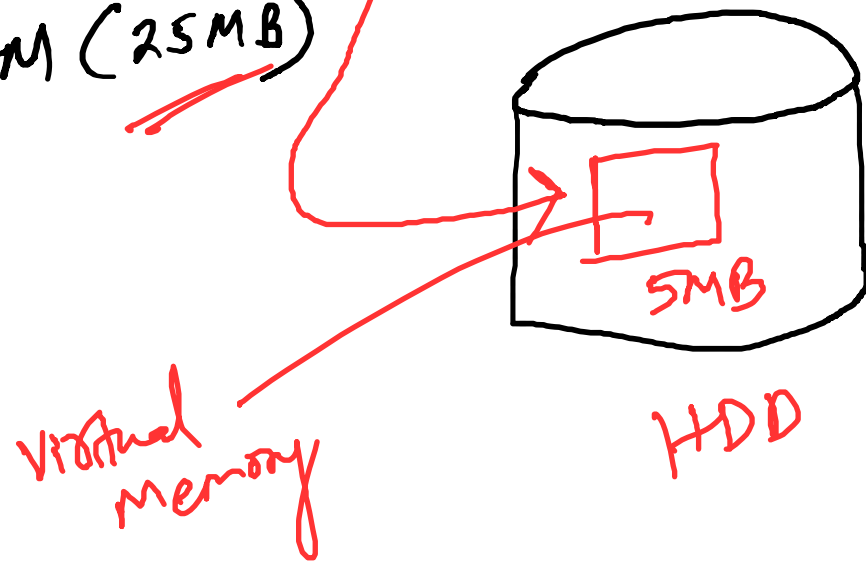
Modern Memory Management Techniques



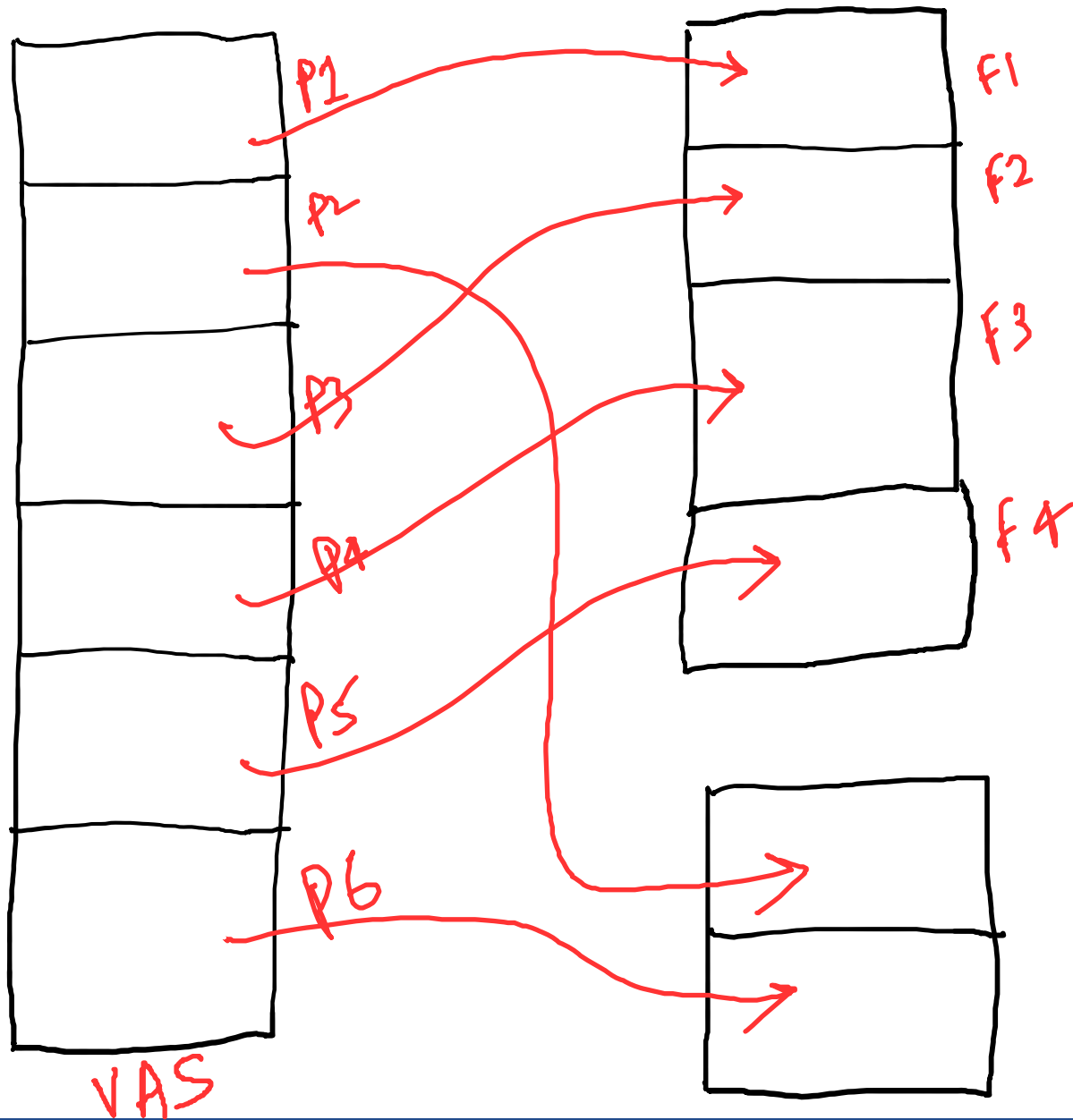
- Virtual Memory 
- Segmentation 



- ① longer arrival time
- ② slower



Page



RAM
PAS

HDD

VAS → Pages

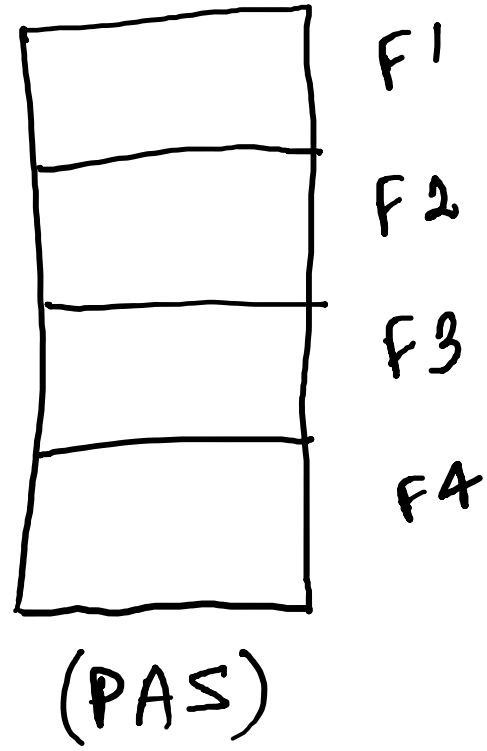
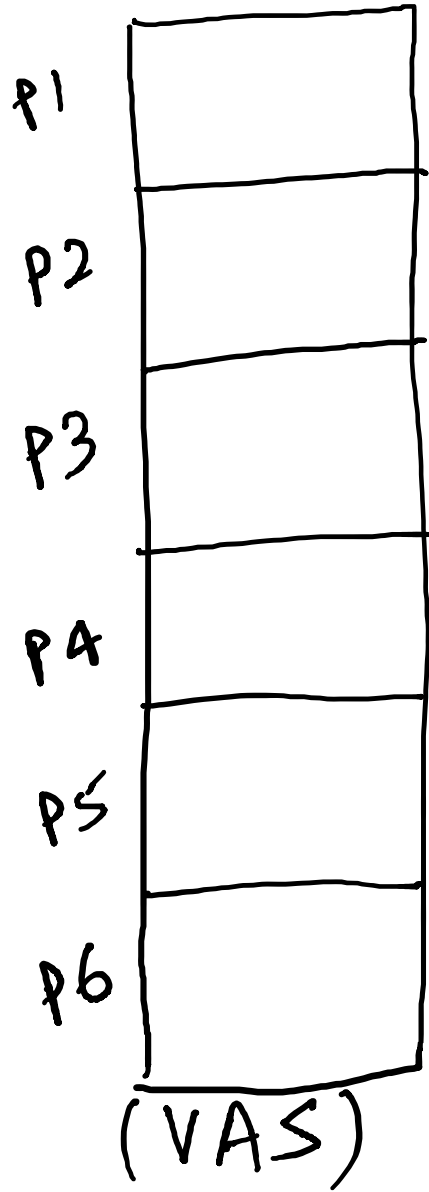
PAS → Page Frames

Size of Page =
Size of frame

Page Table:

P1	→	F1
P2	→	X
P3	→	F2

VM → Paging



24K → 10bit
 → 5bit 15bit



8K -
 4K - (8K - 1)
 0 - (4K - 1)

11 pages - 4bits
 4K → 10bits
 2

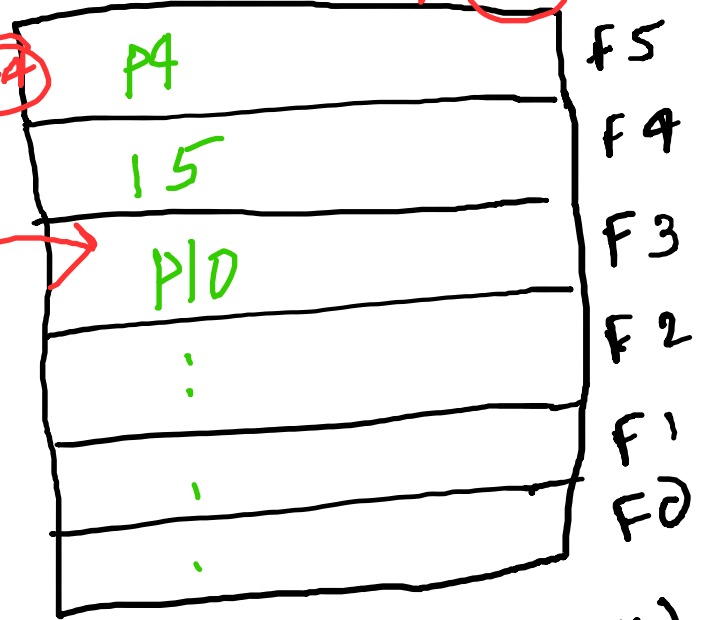
VAS (44K)

CPU → 16 bits

4 → 2 bits
 16 → 4 bits
 17 → 5 bits

44K → 16 bits
 → 2¹⁰
 6

26 :: 32 - 44
 26 = 64



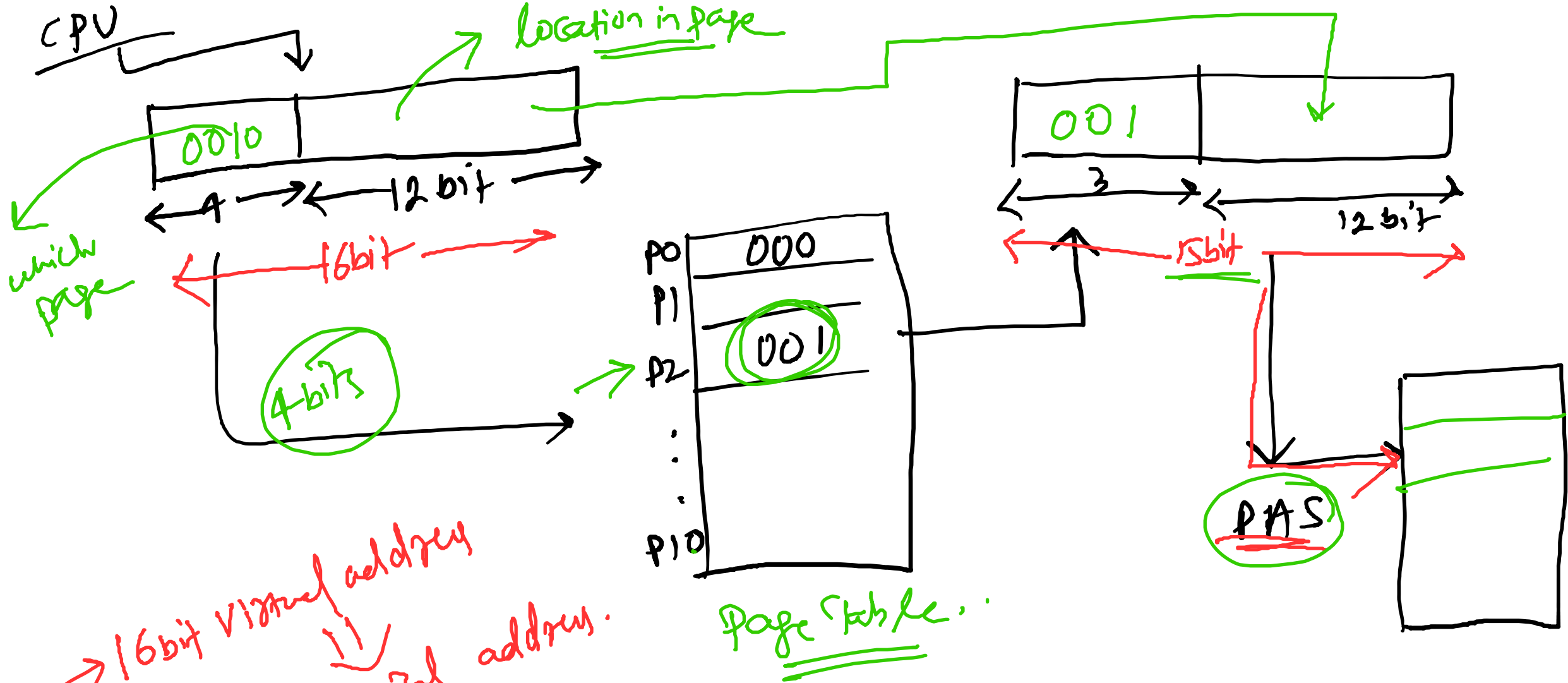
P10 → F3

page table

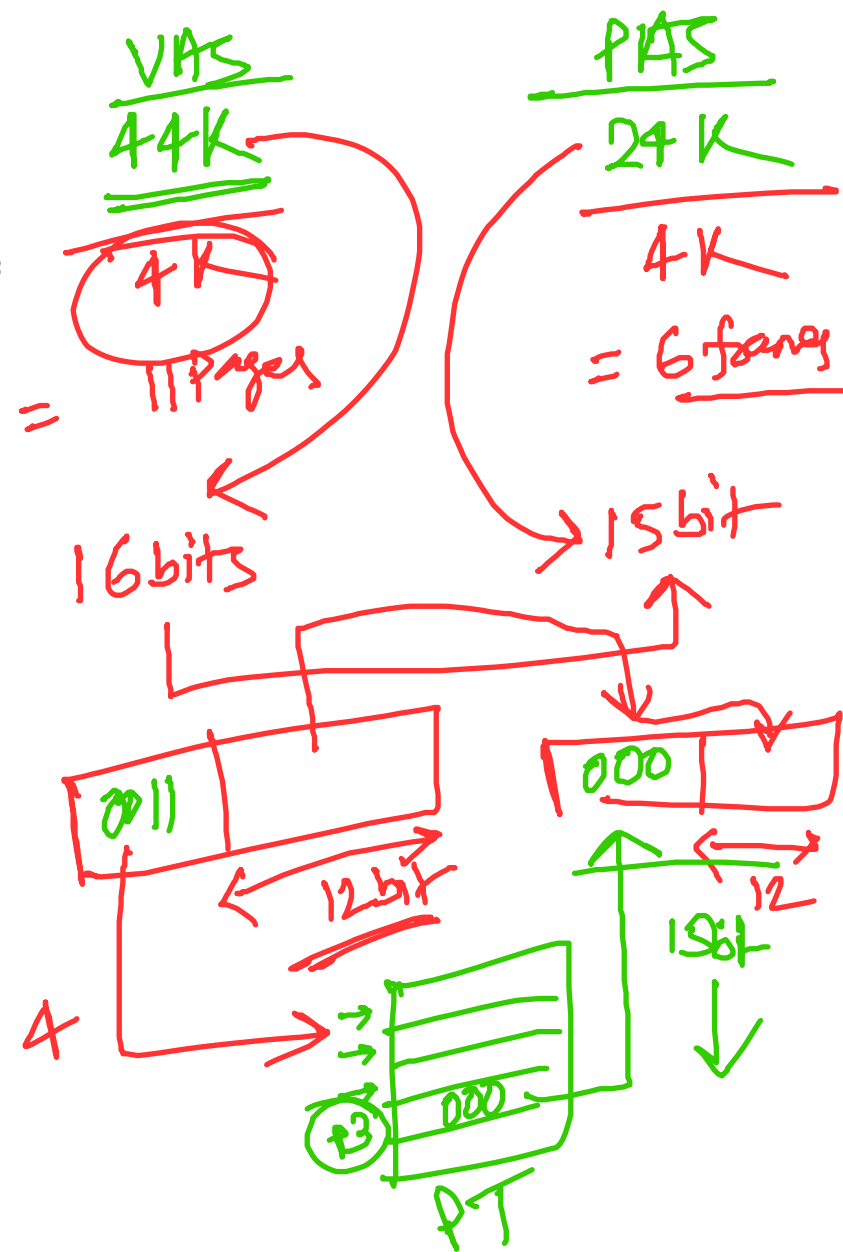
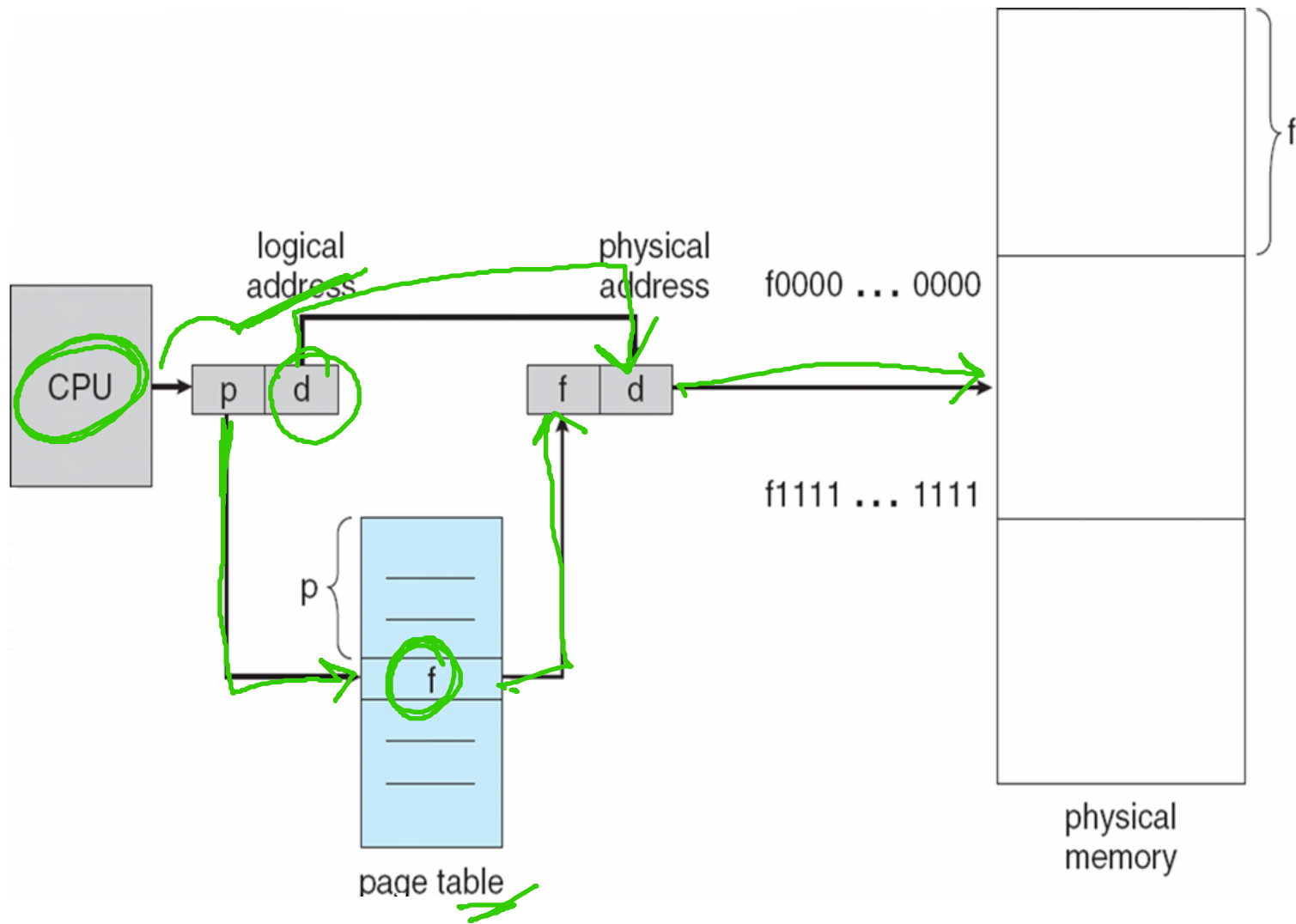
15 bit

PAS (24K)

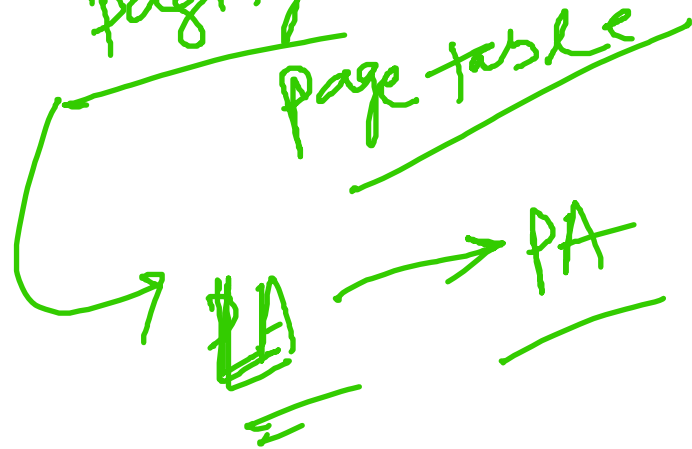
size of page = 4K = size of frame
 $\# \text{ of page} = \frac{44K}{4K} = 11$
 $\# \text{ of frames} = \frac{24K}{4K} = 6$



→ 16bit virtual address
→ 15bit physical address.



need for virtual memory
paging



Thank You

Any Questions?