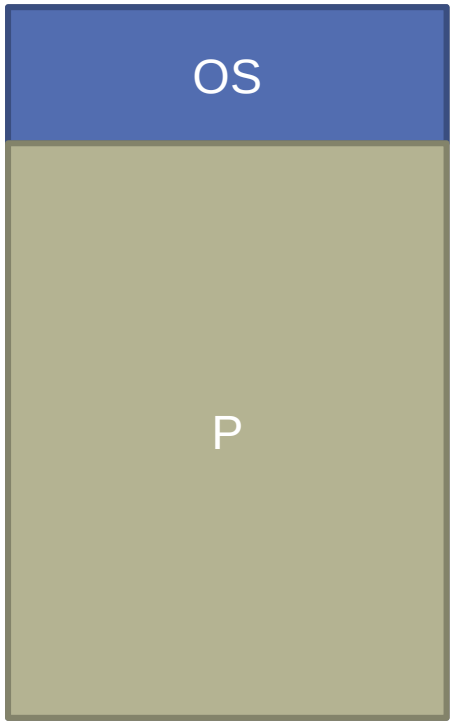
MEMORY MANAGEMENT

Huang Bo
itakejgo@gmail.com

UNIPROGREAMMING

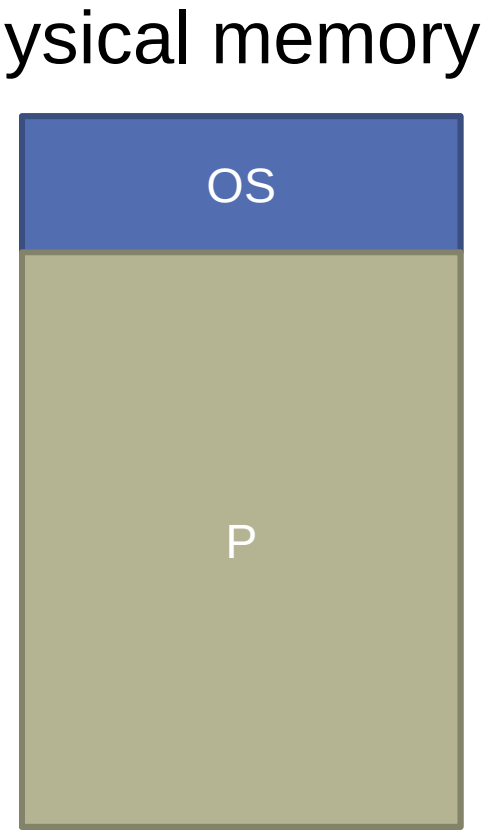
Physical memory



UNIPROGREAMMING

Pros

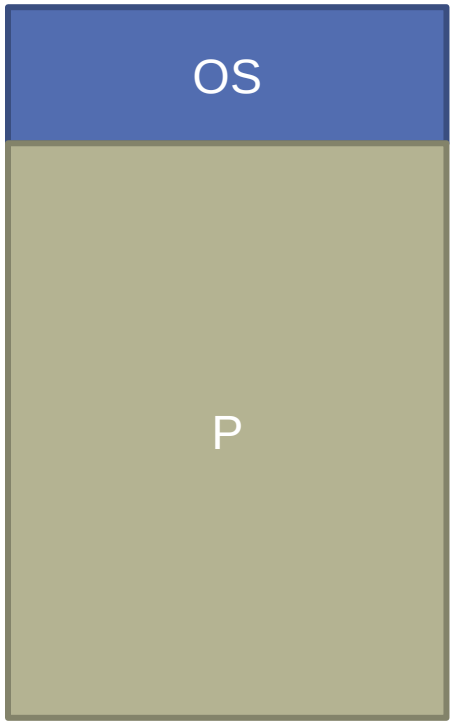
1. No translation & protection
2. App can access larger physical address
3. Simple



UNIPROGREAMMING

Cons

1. Not efficient
2. Not powerful

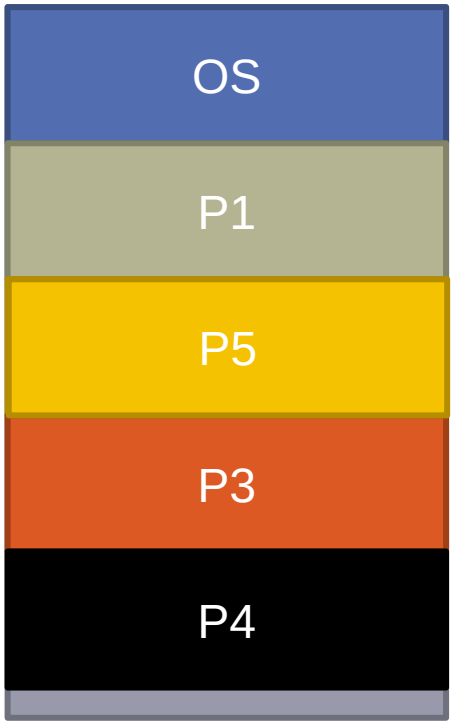


MUITIPROGRAMMING

What if we want to run multiple processes?

Each process has the same memory size

Base &
Bounds



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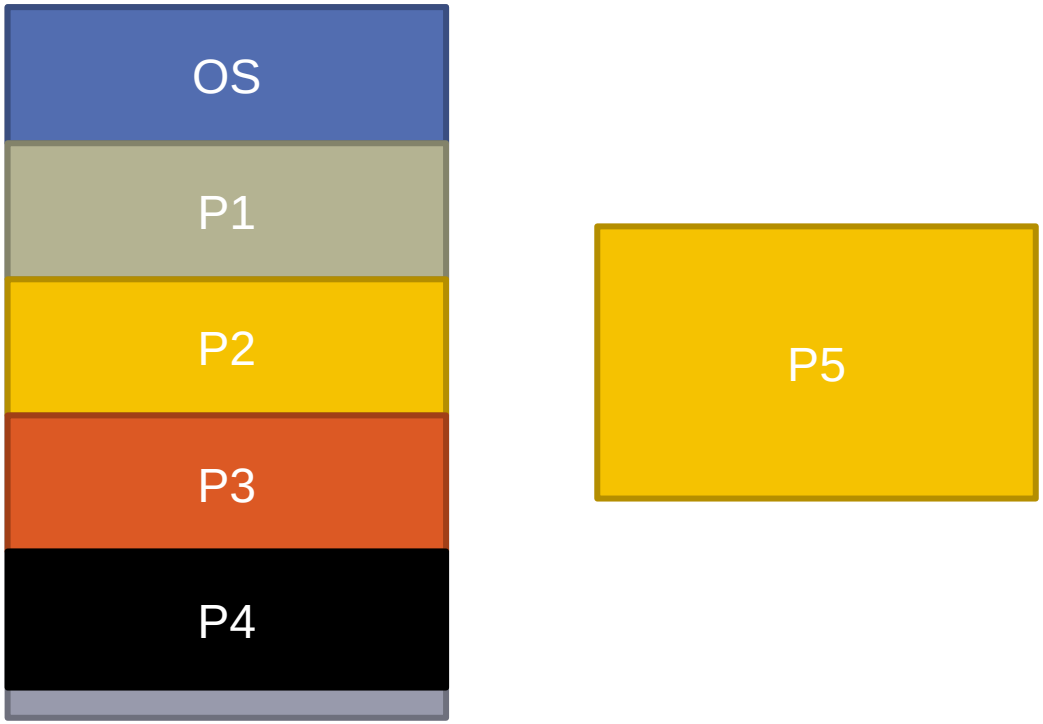
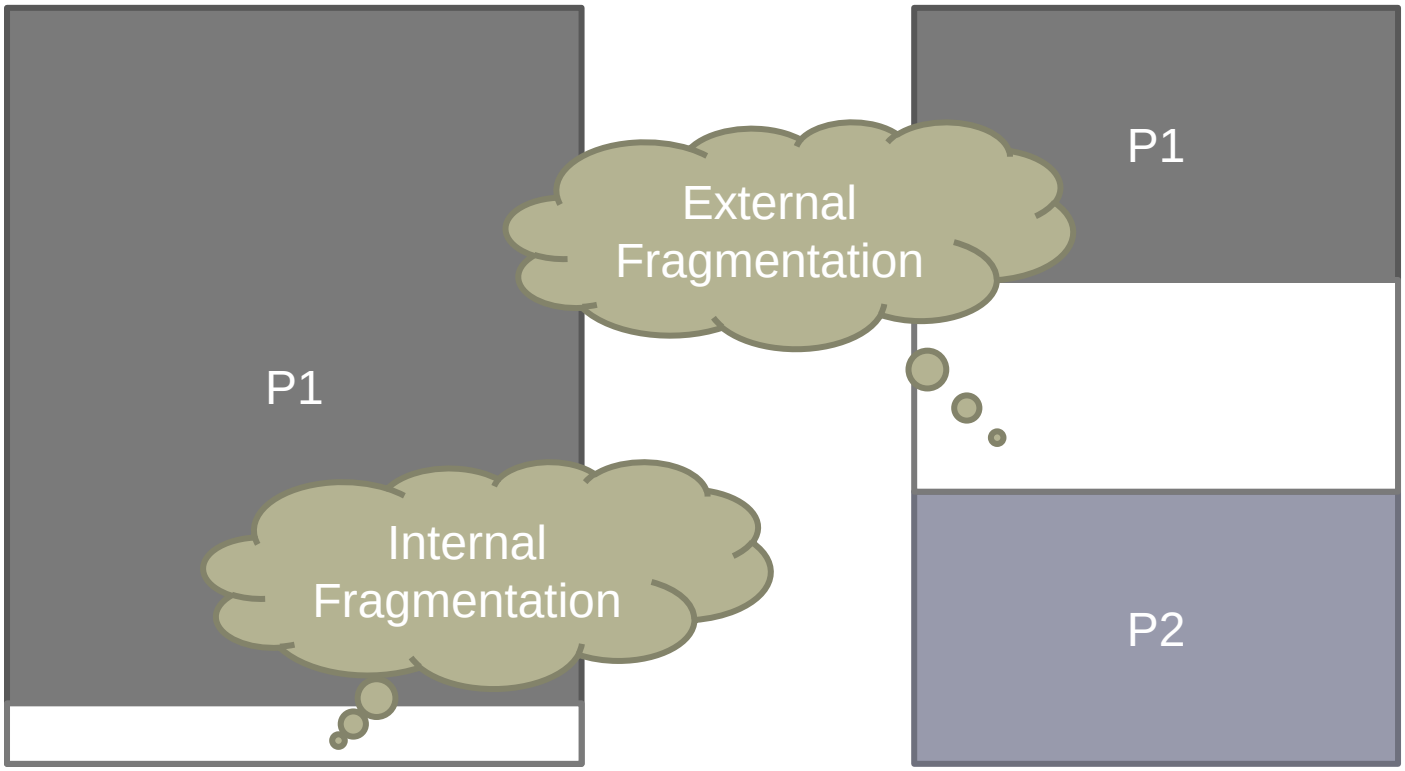
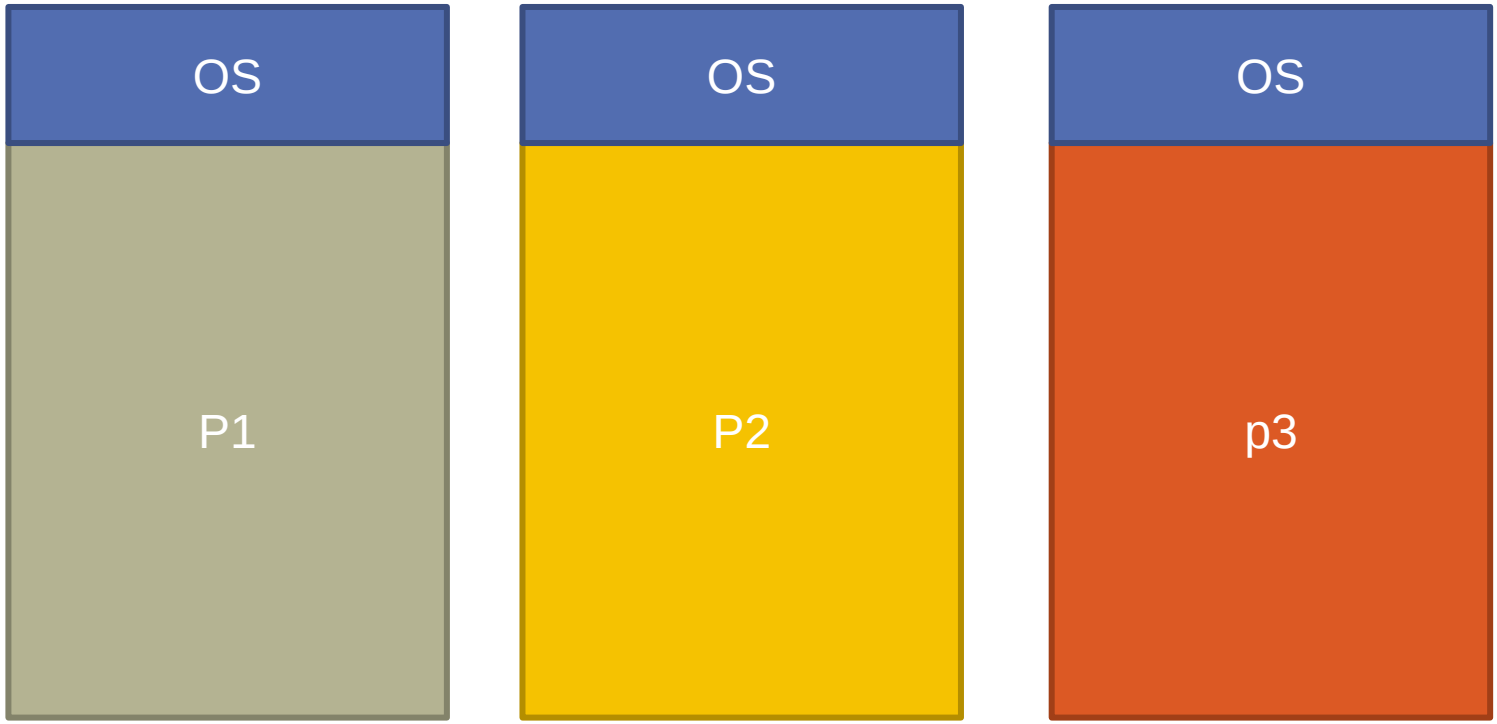


FRAGMENTATION



VIRTUALIZATION



MUITIPROGRAMMING

For Multiprogramming, we need to solve fragmentation problem.

- **There are several algorithms:**
  - First fit
  - Best fit
  - Worst fit

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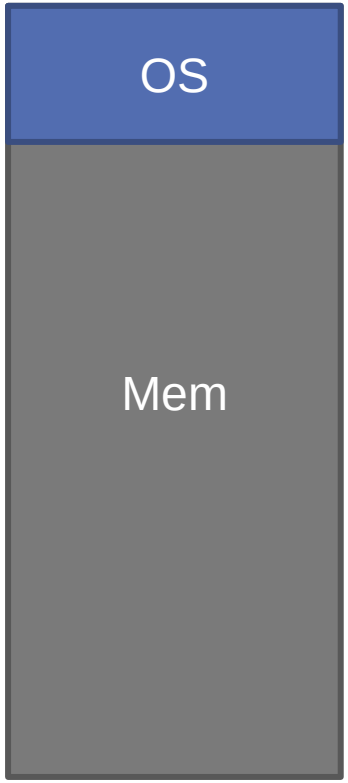
These algorithms can slightly reduce fragmentation.
But they cannot avoid fragmentation.

QUESTION

Q: How to avoid or reduce fragmentation?

SEGMENTATION



QUESTION

Q: How to know which segment is stored in which physical address?

SEGMENTATION

Pros.

1) **Make data more “logical”**
2) **We can do much better on “protection”**
3) **Reduce fragmentation**

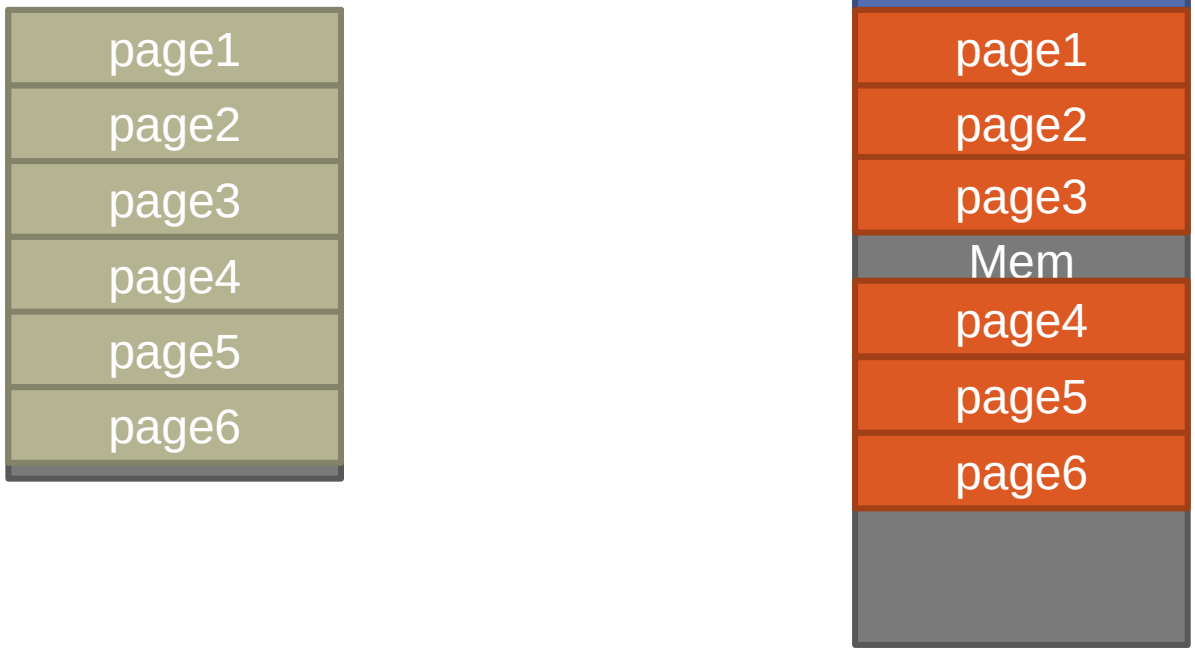
Cons.

1) **Segment size is not fixed**
2) **More Complicated**
3) **May generate “small fragment” which cannot be used**

PAGING

Q: What’s the idea of Paging?

PAGING

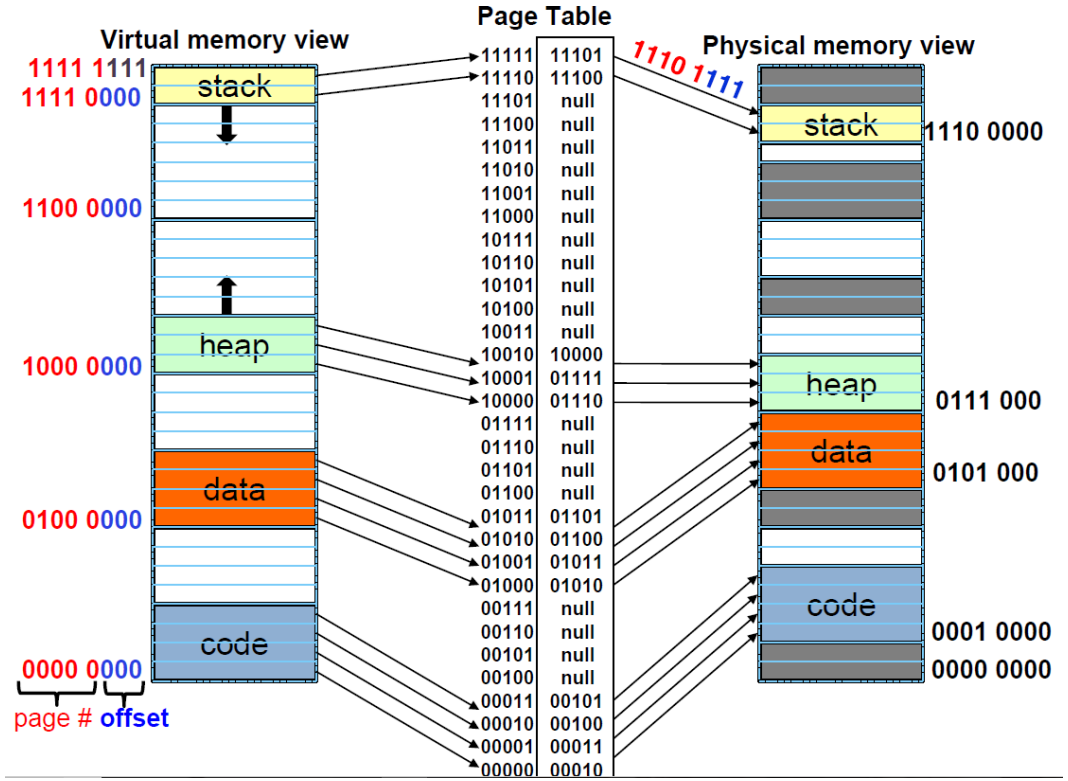

page1
page2
page3
page4
page5
page6
OS
page1
page2
page3
Mem
page4
page5
page6

QUESTION

Q: How to know which page is stored in which physical address?

PAGING

The idea like data base. We need a extra space for “Page Table”, and we also need a “index” to speed up the searching.



PAGING

Q: Pros & Cons?

DEMO

I write a small cpp program for you to practice.

LAB REQUIREMENT

1. Complete the code, so that it can realize basic memory allocation (basic). Please notice, the program may have some bugs, you are also required to fix it.
2. You can try to add segmentation / paging to this program, which will give you **bonus points**.
3. Package should be named as: **OS_lab5_Name_xxxxxxxx** where xxxxxxxx is your student id, Name is your name. This package should contain: your report, your code.
4. Check **blackboard** for ddl.

THANKS