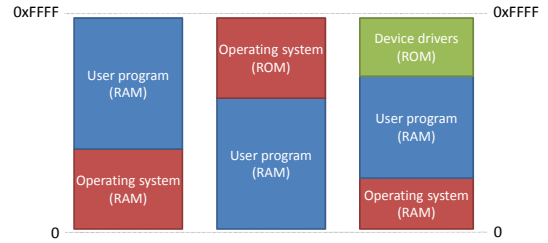


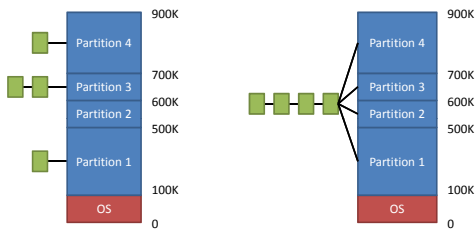
# CS 1550: Memory Management

Jonathan Misurda  
[jmisurda@cs.pitt.edu](mailto:jmisurda@cs.pitt.edu)

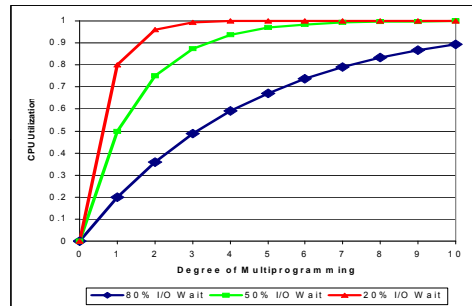
## Exclusive Access



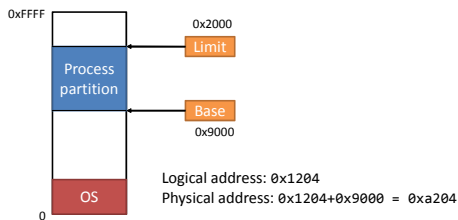
## Fixed Partitions



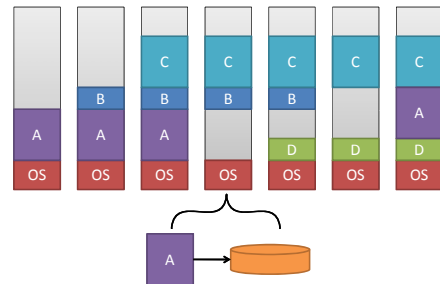
## Degree of Multiprogramming



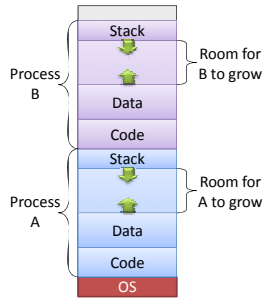
## Relocation and Protection



## Swapping

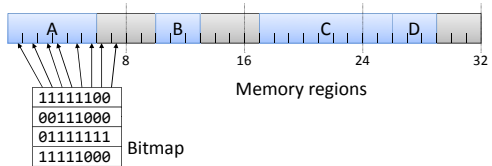


## Room to Grow

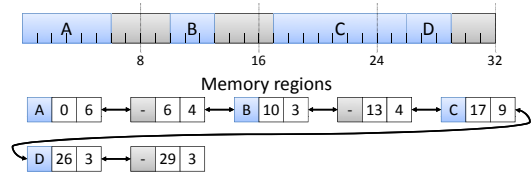


## Allocation Management

## Bitmaps



## Linked Lists



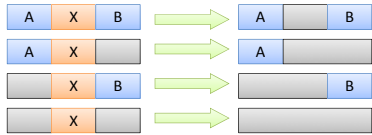
## Allocation Strategies

- First fit
  - Find the first free block, starting from the beginning, that can accommodate the request
- Next fit
  - Find the first free block, starting where the last search left off, that can accommodate the request
- Best fit
  - Find the free block that is closest in size to the request

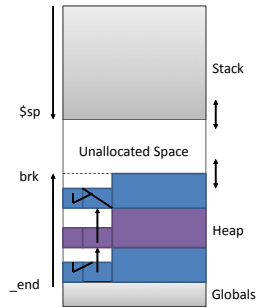
## Allocation Strategies Continued

- Worst fit
  - Find the free block with the most left over after fulfilling the allocation request
- Quick fit
  - Keep several lists of free blocks of common sizes, allocate from the list that nearest matches the request

## Reclaiming Freed Memory



## malloc() and free()



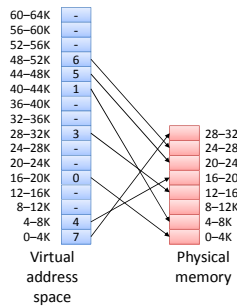
## Overlays

*Hand-written dynamic loading of subsets of a program's code and data.*

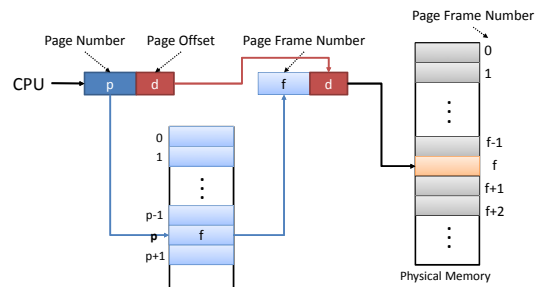
## Virtual Memory

*Attempt to simulate more memory than exists on the system through automatic "overlays"*

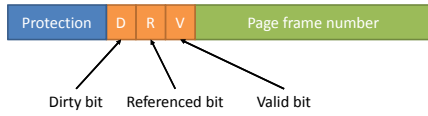
## Page Table



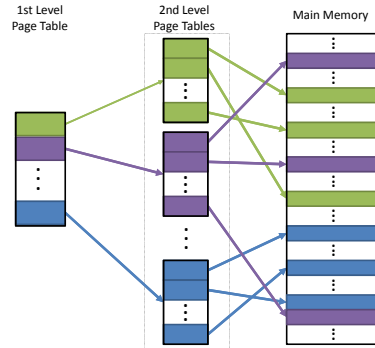
## Translation



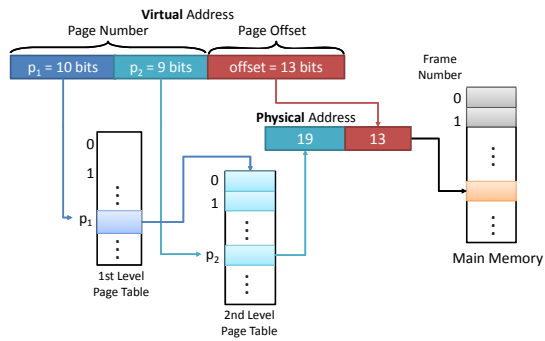
## Page Table Entry



## Multilevel Page Tables



## Two Level Translation



## Translation Lookaside Buffer Cache for Page Table Entries

## Inverted Page Table

*Instead of a PTE per page, make one per frame*

## Inverted Page Table Translation

