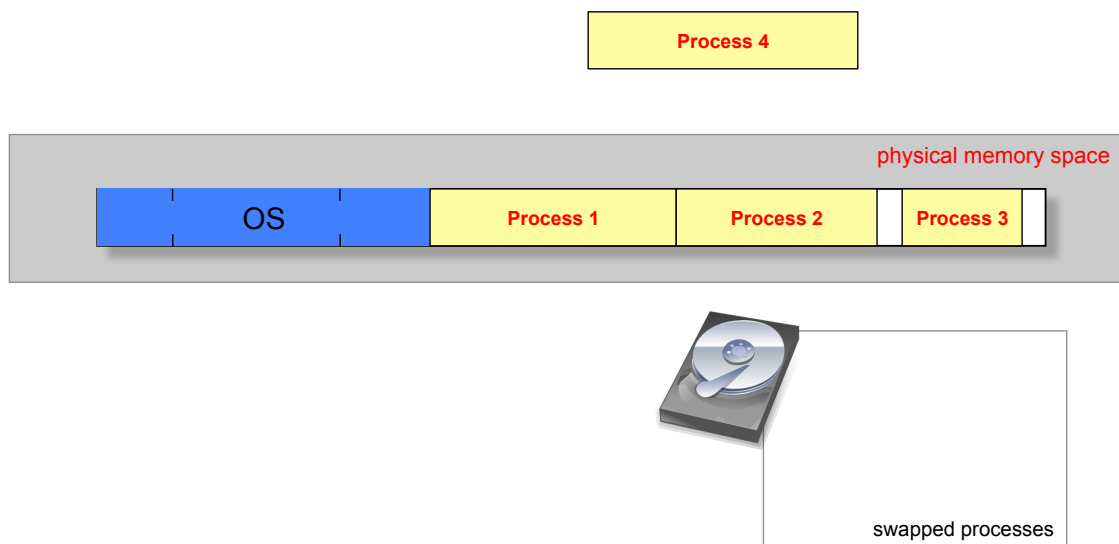


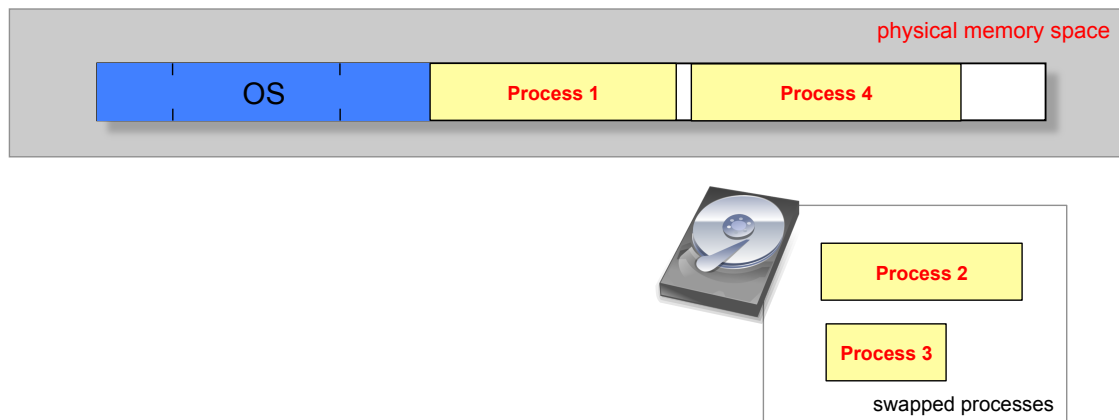
Virtual Memory: Beyond the Physical Memory

- Swapping of Processes to Secondary Storage
- “Partial Swapping” of Process Memory?
- Memory Access Patterns
- Swapping at Page Level?

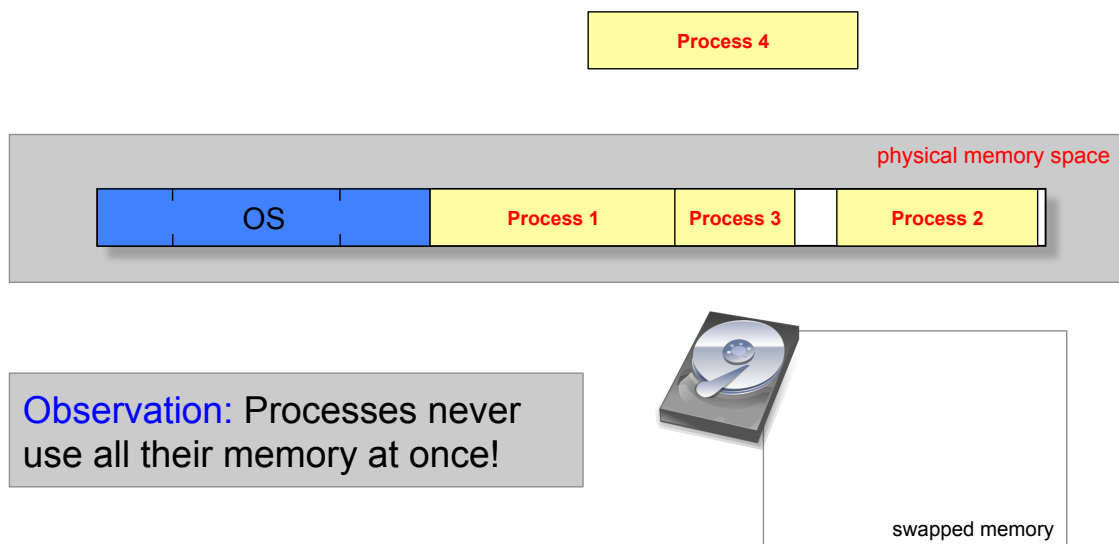
Swapping of Processes



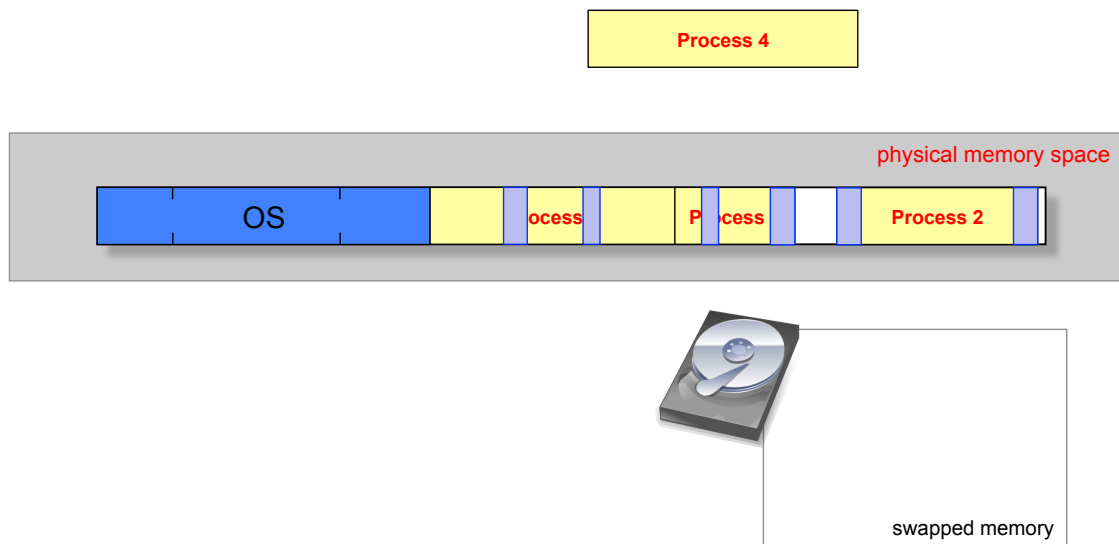
Swapping of Processes



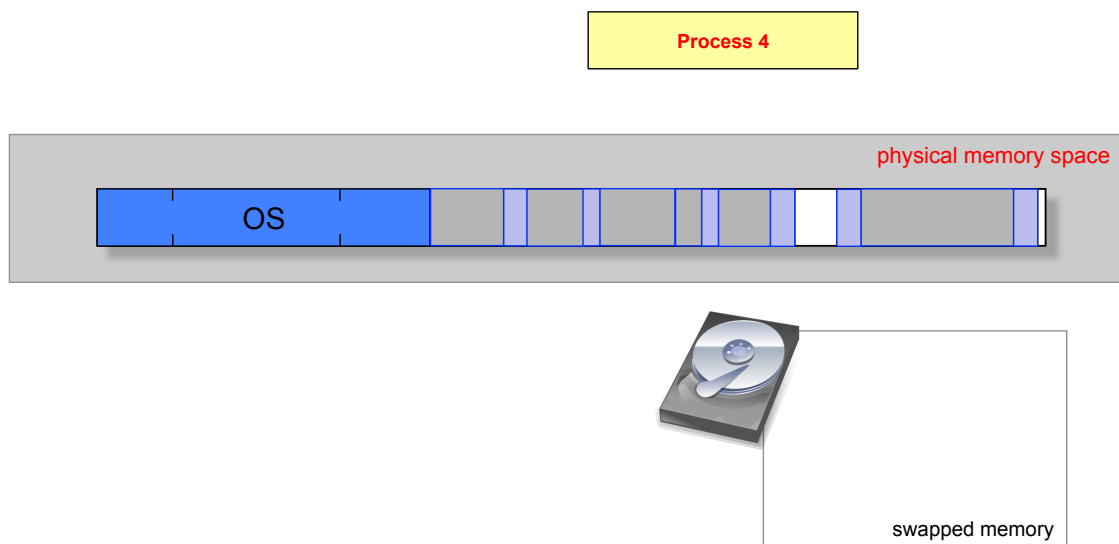
“Partial Swapping” of Process Memory



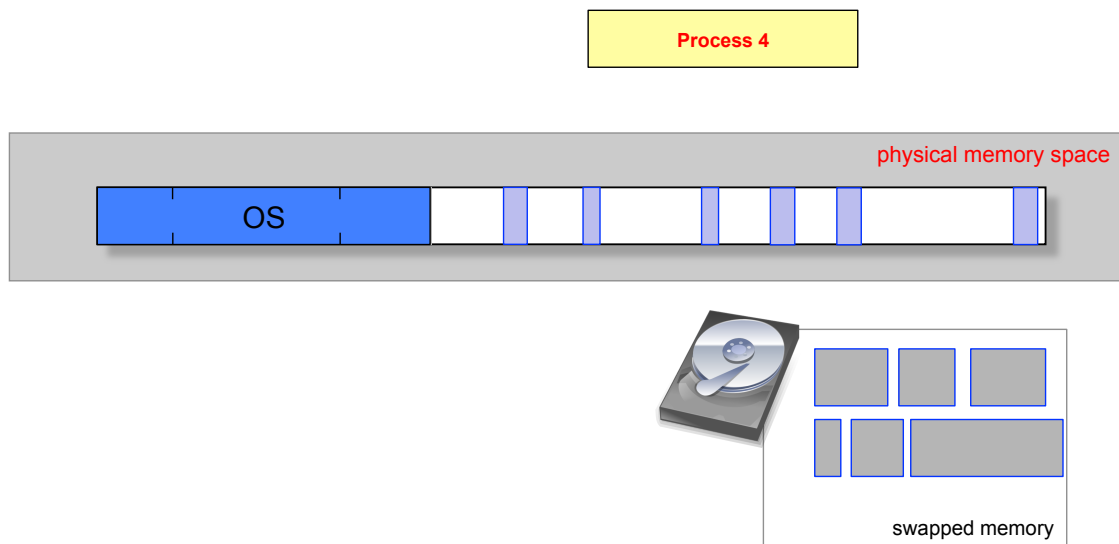
“Partial Swapping” of Process Memory



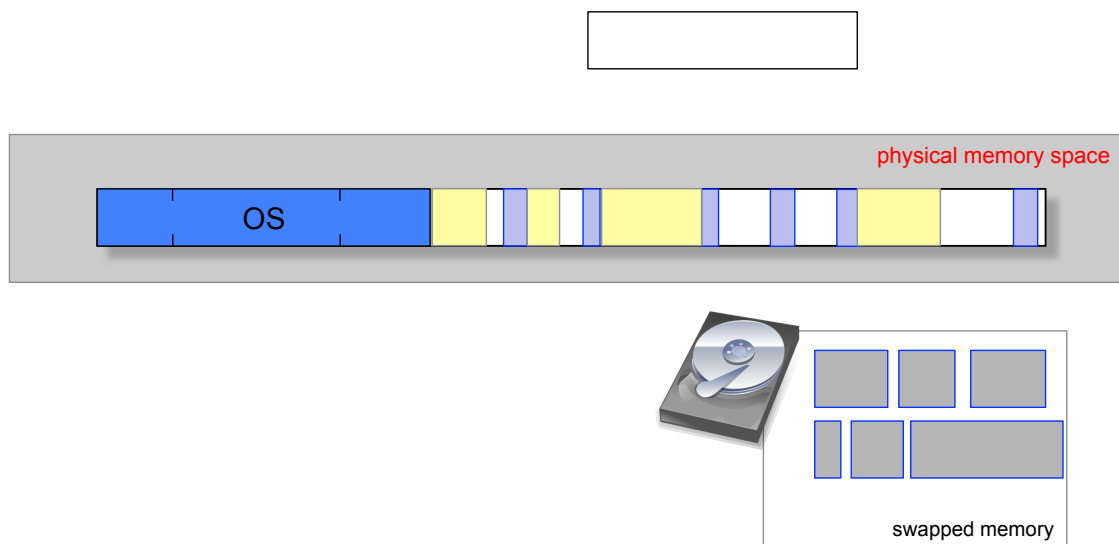
“Partial Swapping” of Process Memory



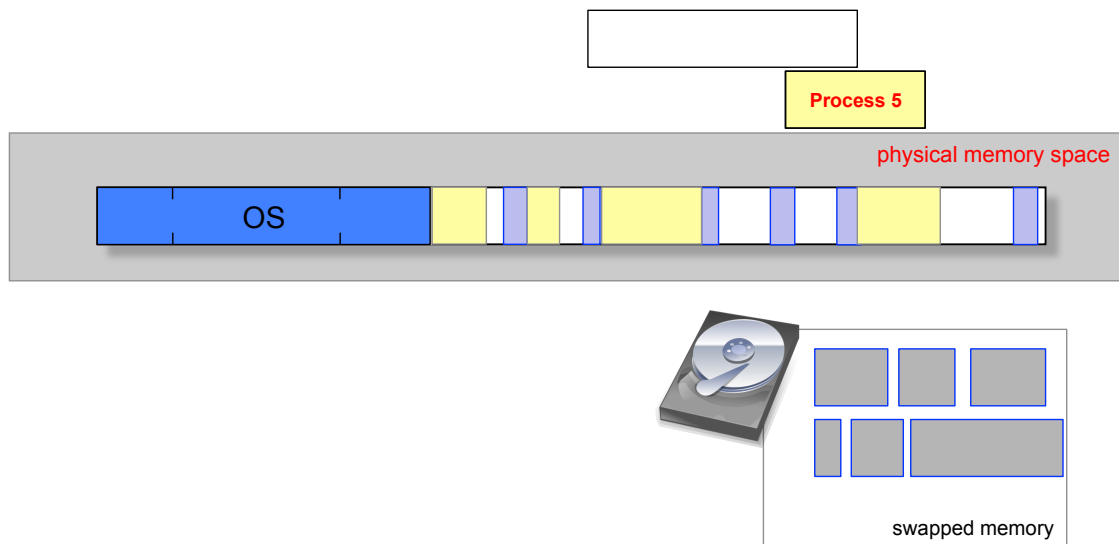
“Partial Swapping” of Process Memory



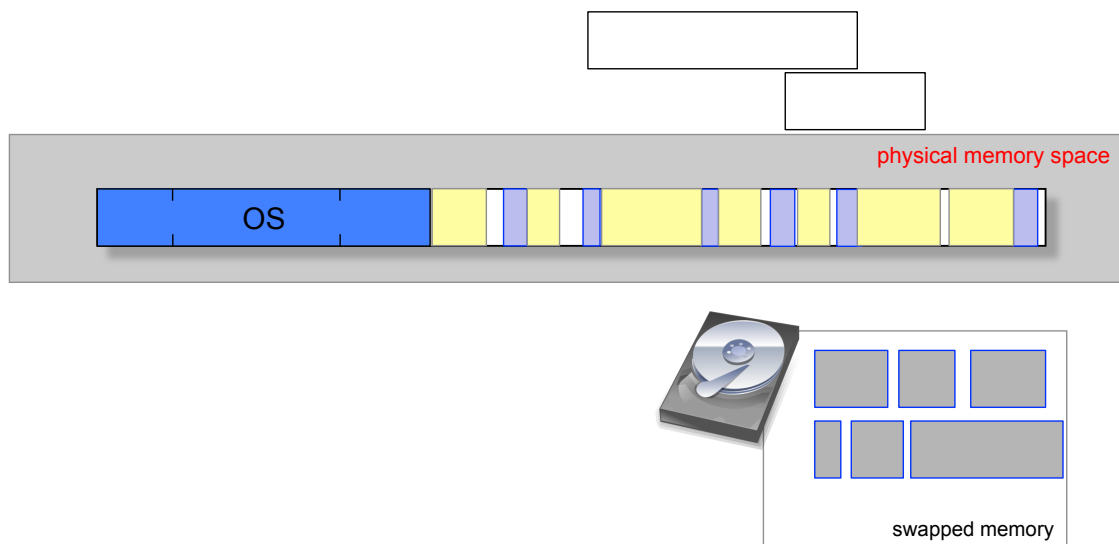
“Partial Swapping” of Process Memory



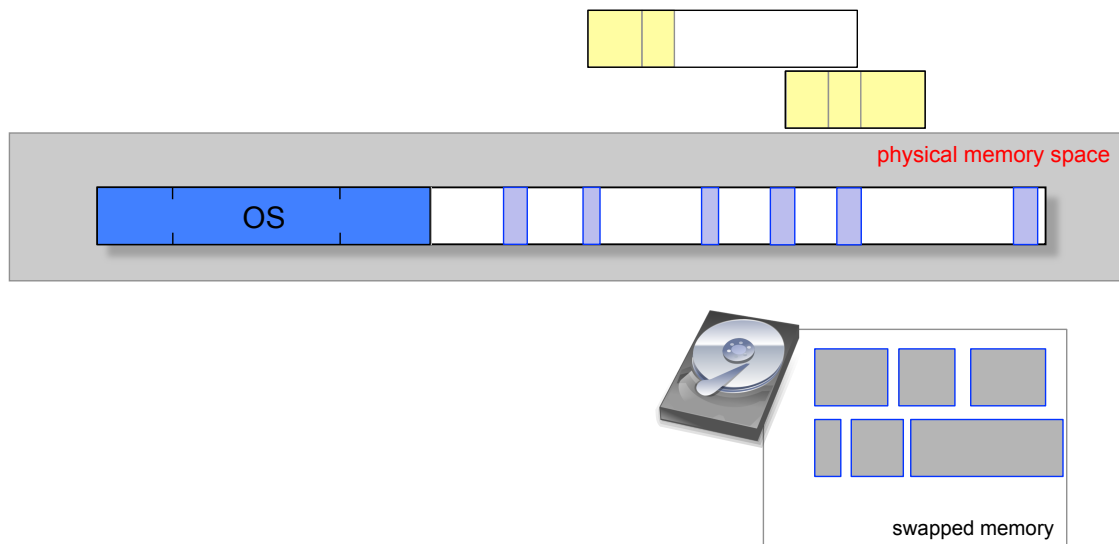
“Partial Swapping” of Process Memory



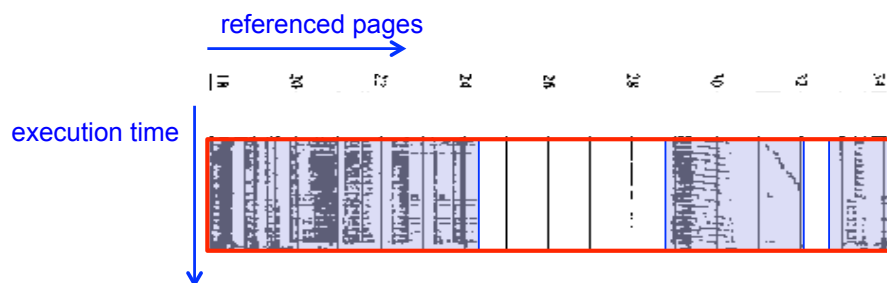
“Partial Swapping” of Process Memory



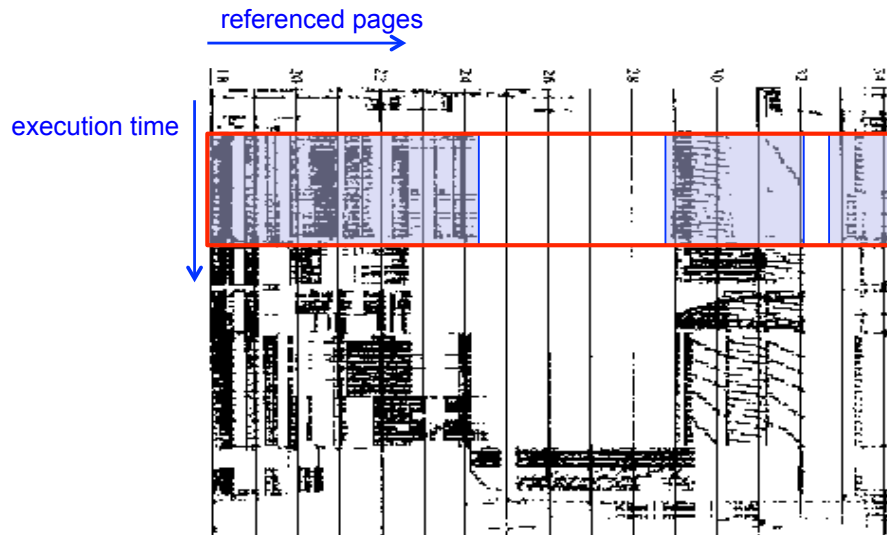
“Partial Swapping” of Process Memory



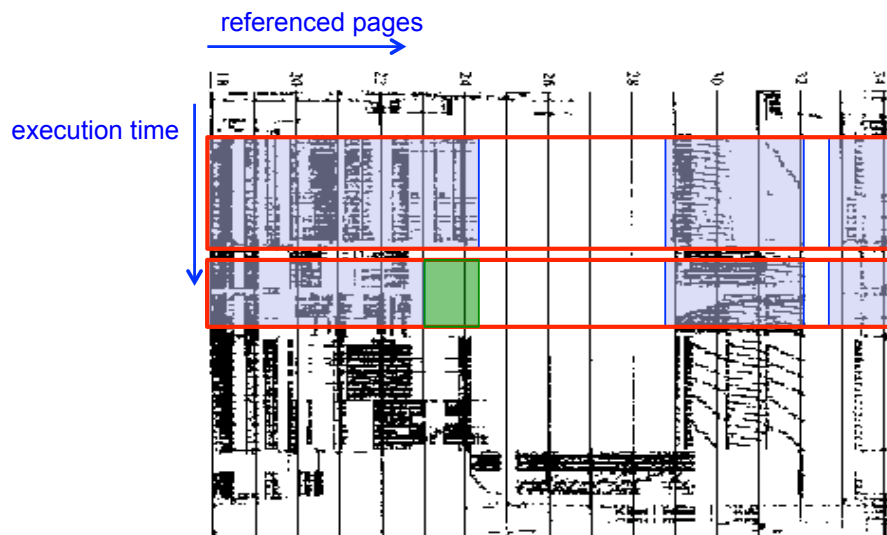
Memory Access Patterns



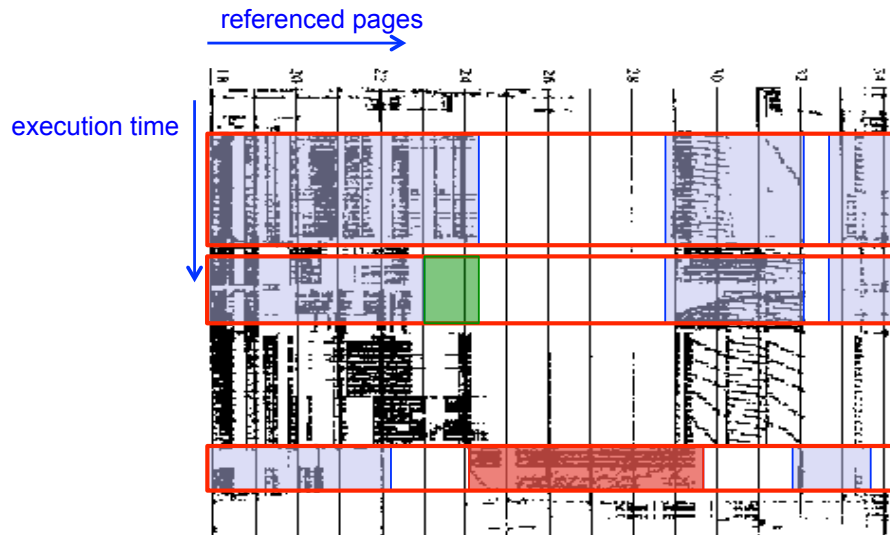
Memory Access Patterns



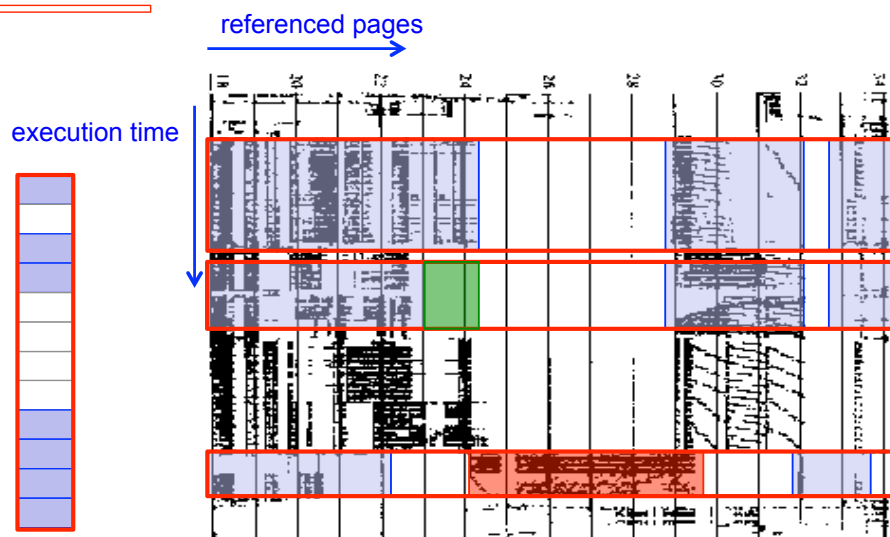
Memory Access Patterns



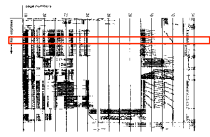
Memory Access Patterns



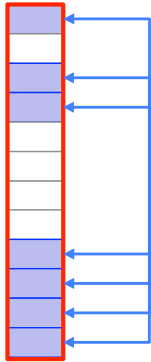
Memory Access Patterns



Page-Level on-Demand Swapping

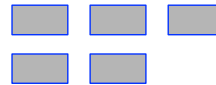


pages of process



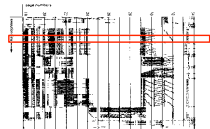
These pages
are stored in
memory

swapping device

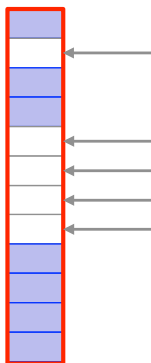


swapped pages

Page-Level on-Demand Swapping



pages of process



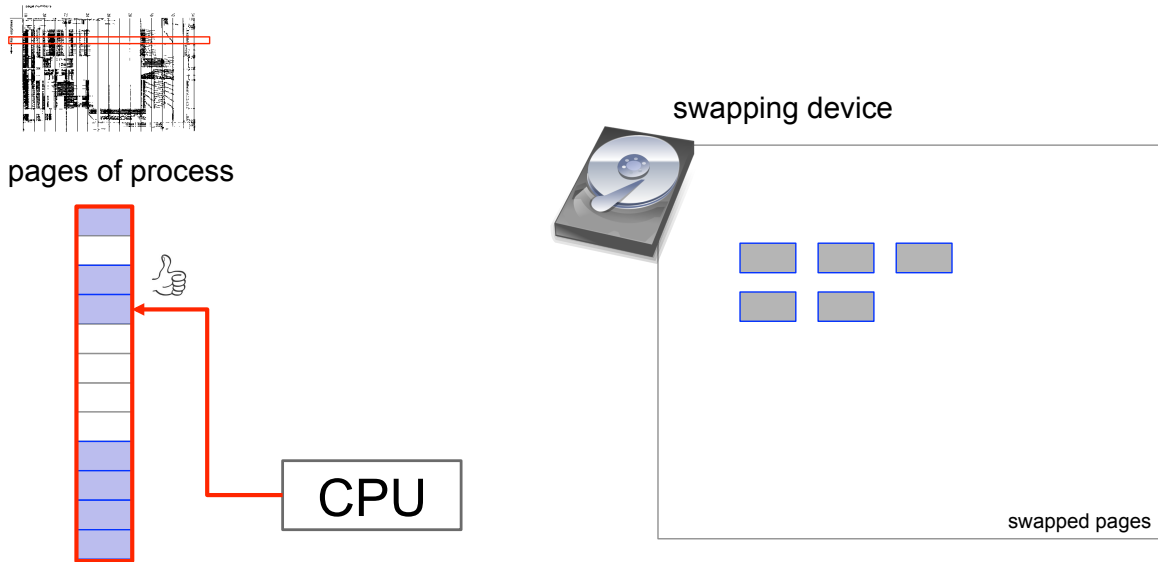
These are
stored on
swapping
device

swapping device

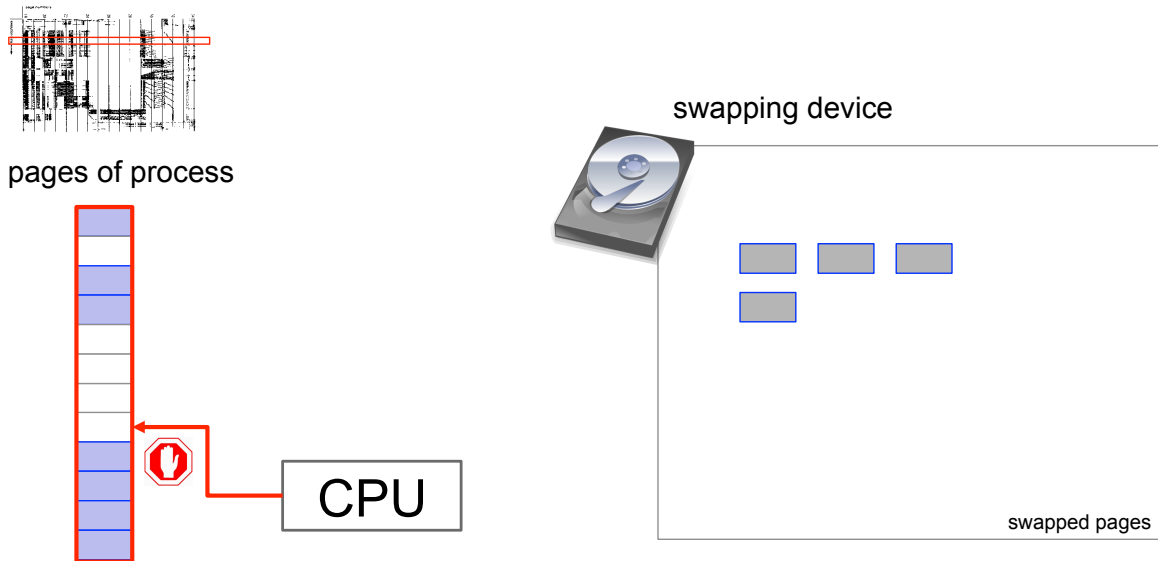


swapped pages

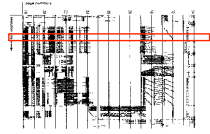
Page-Level on-Demand Swapping



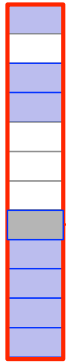
Page-Level on-Demand Swapping



Page-Level on-Demand Swapping

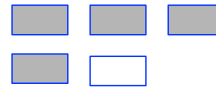


pages of process



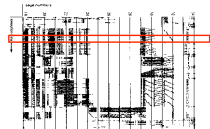
CPU

swapping device

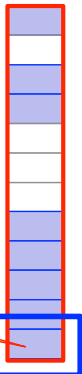


swapped pages

Page-Level on-Demand Swapping



pages of process



ZZZ...

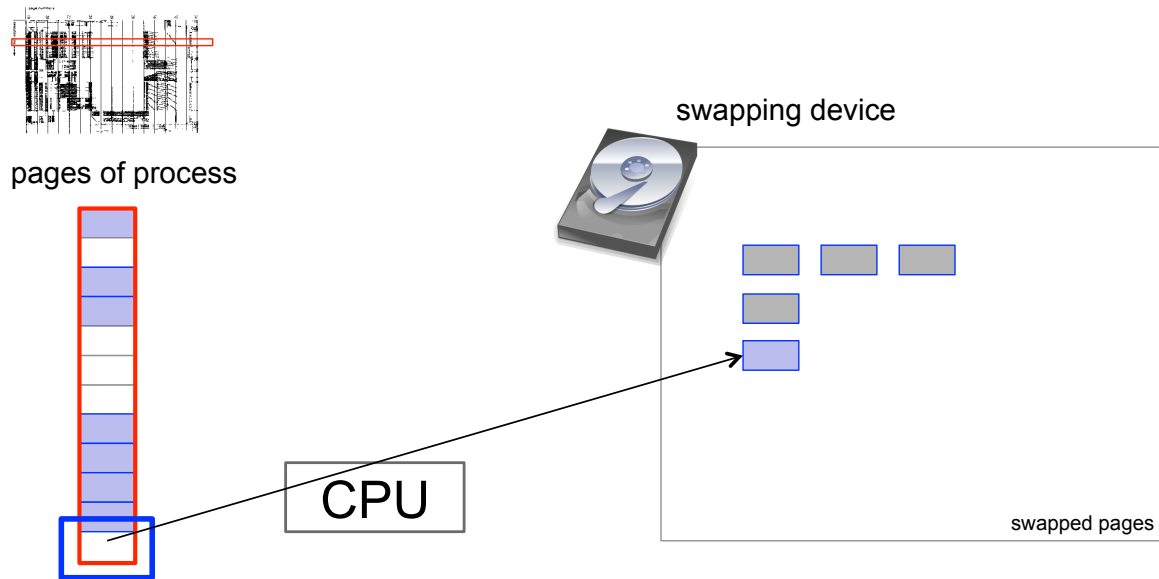
CPU

swapping device



swapped pages

Page-Level on-Demand Swapping



Virtual Memory: Beyond the Physical Memory

- Swapping of Processes to Secondary Storage
- “Partial Swapping” of Process Memory?
- Memory Access Patterns
- Swapping at Page Level?
 - On-demand Paging
 - Virtual Memory