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FACULTY OF ENGINEERING & TECHNOLOGY

BCS-501 Operating System

Lecturer-20

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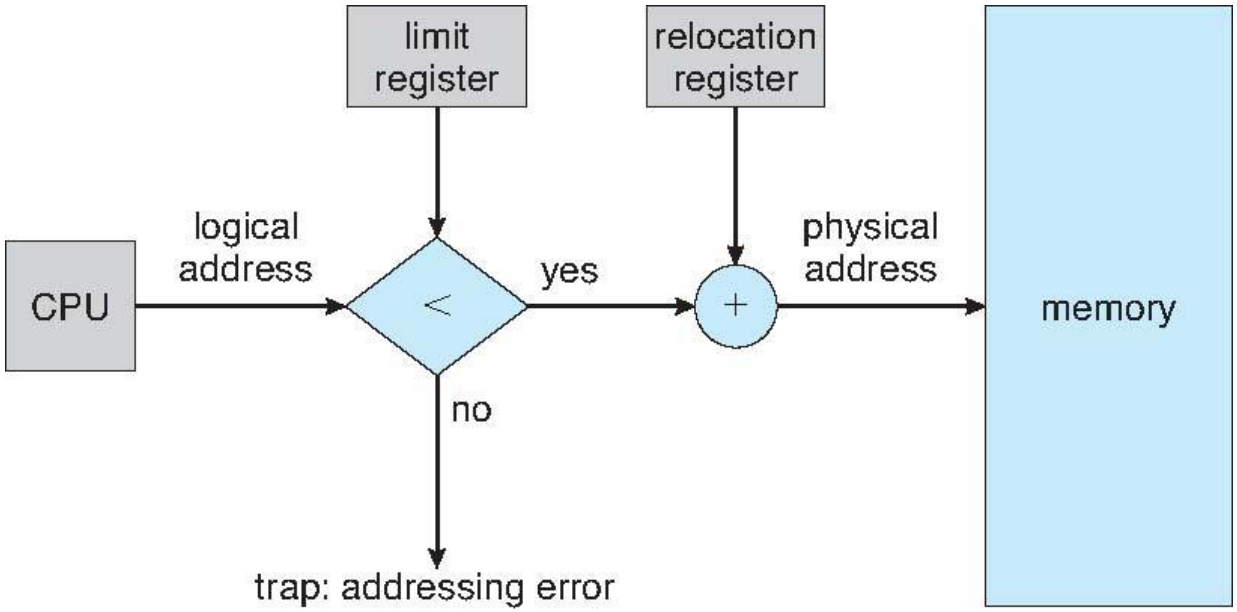
Memory

Contiguous Allocation
Hardware Support for Relocation and Limit Registers
Multiple-partition allocation
Dynamic Storage-Allocation Problem

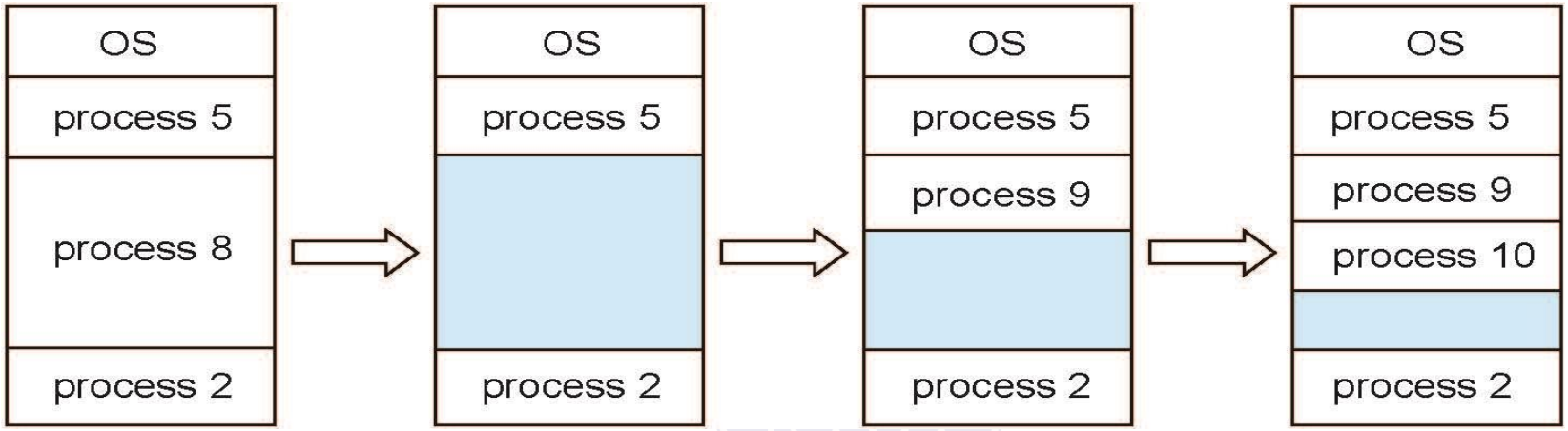
Contiguous Allocation

- Main memory must support both OS and user processes
- Limited resource, must allocate efficiently
- Contiguous allocation is one early method
- Main memory usually into two partitions:
  - Resident operating system, usually held in low memory with interrupt vector
  - User processes then held in high memory
  - Each process contained in single contiguous section of memory
- Relocation registers used to protect user processes from each other, and from changing operating-system code and data
  - Base register contains value of smallest physical address
  - Limit register contains range of logical addresses – each logical address must be less than the limit register
  - MMU maps logical address dynamically
  - Can then allow actions such as kernel code being transient and kernel changing size

Hardware Support for Relocation and Limit Registers



Multiple-partition allocation



- Multiple-partition allocation
  - Degree of multiprogramming limited by number of partitions
  - Variable-partition sizes for efficiency (sized to a given process' needs)
  - Hole – block of available memory; holes of various size are scattered throughout memory
  - When a process arrives, it is allocated memory from a hole large enough to accommodate it
  - Process exiting frees its partition, adjacent free partitions combined
  - Operating system maintains information about:
    a) allocated partitions b) free partitions (hole)

Dynamic Storage-Allocation Problem

How to satisfy a request of size n from a list of free holes

First-fit: Allocate the first hole that is big enough

Best-fit: Allocate the smallest hole that is big enough; must search entire list, unless ordered by size

Produces the smallest leftover hole

Worst-fit: Allocate the largest hole; must also search entire list

Produces the largest leftover hole

MCQ

A process is thrashing if…….
A. it is spending more time paging than executing
B. it is spending less time paging than executing
C. page fault occurs
D. swapping can not take place

Working set model for page replacement is based on the assumption of……
A. modularity
B. locality
C. globalization
D. random access

The operating system is …….
A. in the low memory
B. in the high memory
C. either a or b (depending on the location of interrupt vector)
D. None of these

In contiguous memory allocation ……
A. each process is contained in a single contiguous section of memory
B. all processes are contained in a single contiguous section of memory
C. the memory space is contiguous
D. None of these

The relocation register helps in ……..
A. providing more address space to processes
B. a different address space to processes
C. to protect the address spaces of processes
D. None of these