Unit III - Tutorial

Contiguous Memory Allocation

- Consider a swapping system in which memory consists of the following hole sizes in memory order: 10KB, 4KB, 20KB, 18KB, 7KB, 9KB, 12KB, and 15KB.
- Which hole is taken for successive segment requests of (a) 12KB, (b) 10KB, (c) 9KB for

- First Fit?
- Best Fit?
- Worst Fit?
- Next Fit?

Contiguous Memory Allocation

- Given five memory partitions of 100 KB, 500 KB, 200 KB, 300 KB, and 600 KB (in order), how would each of the first-fit, best-fit, and worst-fit algorithms place processes of **212 KB, 417 KB, 112 KB, and 426 KB** (in order)?

- Which algorithm makes the most efficient use of memory?

Paging

- Consider a logical address space of 64 pages of 1024 words each, mapped onto a physical memory of 32 frames.

- How many bits are there in the logical address?
- How many bits are there in the physical address?

Paging

- Assuming a 1-KB page size, what are the page numbers and offsets for the following address references (provided as decimal numbers):

a. 3085
b. 42095
c. 215201
d. 650000
e. 2000001

TLB

- Consider a paging system with the page table stored in memory.
- If a memory reference takes 50 nanoseconds, how long does a paged memory reference take?
- If we add TLBs, and 75 percent of all page-table references are found in the TLBs, what is the effective memory reference time? (Assume that finding a page-table entry in the TLBs takes 2 nanoseconds, if the entry is present.)

Memory Management

Fill in the rest of the table

Virtual Address	Memory Page (Page Size)	Page table entry (bits) (Frame number bits)	Page No # (bits)	Page Offset (bits)	Addressable Physical memory
16	256 B	2	8	8	1 KB
32	1 MB	4			
32	1 KB	8			
64	16 KB	20			
64	8 MB	16			

Segmentation

- Consider the following segment table

Segment No	Base	Limit
0	219	600
1	2300	14
2	90	100
3	1327	580
4	1952	96

What are the physical addresses for the following logical addresses?

a. 0,430
b. 1,10
c. 2,500
d. 3,400
e. 4,112

Page replacement techniques

- Consider the following reference string.

  0 1 3 6 2 4 5 2 5 0 3 1 2 5 4 1 0

- Apply all page replacement algorithms for
  - frames = 3,
  - frames =4 and
  - frames =5.
- List out the number of page faults in each.
- Identify which algorithm works best.

Working-set

- Given the following reference string:

0 1 2 3 0 1 2 3 0 1 2 3 4 5 6 7

- (a) Determine WS(ti) with $\Delta = 3$
- (b) Determine WS(ti) with $\Delta = 4$
- (c) Determine WS(ti) with $\Delta = 9$