MONASH University

FIT2100 - OPERATING SYSTEMS

WEEK 10 - WORKSHOP 08

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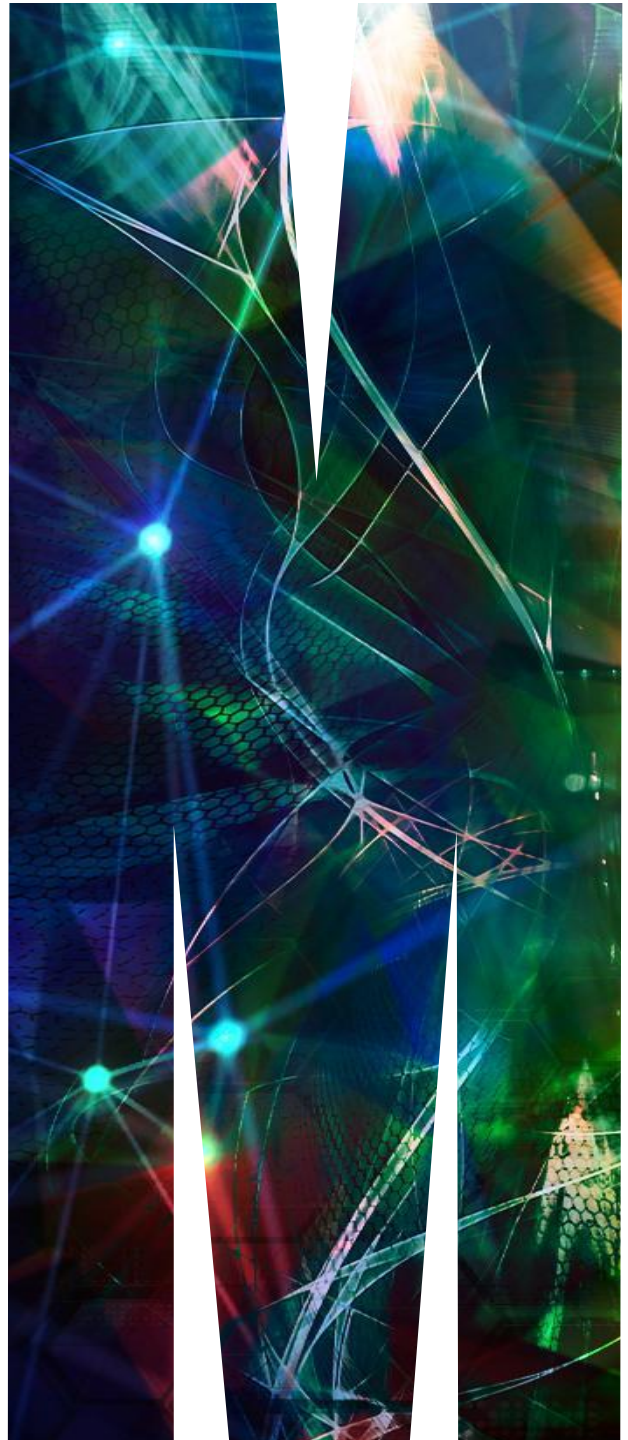

CONTENT

WORKSHOP TOPICS

- Memory Management
    - Virtual Memory
    - Paged Virtual Memory
    - Segmented Virtual Memory

Week 10 Learning Objectives

Virtual Memory and Inter Process Communication (IPC)

- Analyse and evaluate various strategies used by an operating system in managing the system resources and running applications efficiently.
- Analyse and identify parameters that can improve the performance of multi-programming operating systems.
- Apply synchronisation techniques in the development of applications, using operating system services.

RECAP TIME - VIRTUAL MEMORY

MULTIPLE CHOICE / DISCUSSION QUESTIONS (10 mins)

PollEV Time - Engage and Interact

VIRTUAL MEMORY BASICS

VIRTUAL MEMORY TASK (10 MINS)

You are working with a computer system that has a main memory size of 512 MB and a page size of 2 MB. The total virtual memory size is 1 GB. If the Page Table shows that 40% of the pages are currently loaded in main memory, calculate:

a) The total number of pages in the system.
b) The number of pages currently loaded in memory.
c) The number of pages on the disk (swap space).
d) If an application tries to access 300 pages and causes a page fault rate of 10%, how many page faults will occur?

RECAP TIME - PAGED VIRTUAL MEMORY

MULTIPLE CHOICE / DISCUSSION QUESTIONS (10 mins)

PollEV Time - Engage and Interact

PAGE REPLACEMENT ALGORITHMS

FIFO (5 MINS)

You are working on a computer system that has 4 page slots in its main memory. You need to determine the page faults using the FIFO algorithm based on the list of page requests.

List of Page Requests:
1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 6, 7

PAGE	1	2	3	4	5	6	7	8	9	10	11	12
0												
1												
2												
3												
Fault												

PAGE REPLACEMENT ALGORITHMS

SECOND CHANCE (MODIFIED FIFO) (5 MINS)

You are working on a computer system that has 4 page slots in its main memory. You need to determine the page faults using the Modified FIFO algorithm based on the list of page requests.

List of Page Requests:
1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 6, 7

PAGE	1	2	3	4	5	6	7	8	9	10	11	12
0												
1												
2												
3												
Fault												

PAGE REPLACEMENT ALGORITHMS

LRU (5 MINS)

You are working on a computer system that has 4 page slots in its main memory. You need to determine the page faults using the LRU algorithm based on the list of page requests.

List of Page Requests:
1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 6, 7

PAGE	1	2	3	4	5	6	7	8	9	10	11	12
0												
1												
2												
3												
Fault												

PAGE REPLACEMENT ALGORITHMS

NFU (5 MINS)

You are working on a computer system that has 4 page slots in its main memory. You need to determine the page faults using the NFU algorithm based on the list of page requests.

List of Page Requests:
1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 6, 7

PAGE	1	2	3	4	5	6	7	8	9	10	11	12
0												
1												
2												
3												
Fault												

PAGE REPLACEMENT ALGORITHMS

OPTIMAL (5 MINS)

You are working on a computer system that has 4 page slots in its main memory. You need to determine the page faults using the OPTIMAL algorithm based on the list of page requests.

List of Page Requests:
1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 6, 7

PAGE	1	2	3	4	5	6	7	8	9	10	11	12
0												
1												
2												
3												
Fault												

RECAP TIME - SEGMENTED VIRTUAL MEMORY

MULTIPLE CHOICE / DISCUSSION QUESTIONS (10 mins)

PollEV Time - Engage and Interact

SEGMENT PLACEMENT ALGORITHMS

FIRST FIT, NEXT FIT, BEST FIT (15 MINS)

Assume a system that utilizes segmented virtual memory. Given the following free partitions in memory:
400K, 150K, 200K, 700K, and 400K (in this specific order), determine how each of the algorithms listed below would place processes of **256K, 506K, 128K, and 456K** (in this particular order):

(a) First-fit
(b) Next-fit
(c) Best-fit

Which algorithm makes the most efficient use of the memory?

Summary

- Topics covered
  - Memory Management
    - Virtual Memory
    - Paged Virtual Memory
    - Segmented Virtual Memory

- Next week
  - More about IPC and OS security