

Learning Guide Unit 4

Reading Assignment

As you go through the readings and watch the videos, consider the following:

1. Compare paging and segmentation in terms of their memory allocation strategies and how they impact system efficiency.
 2. Explain how virtual memory, demand paging, and page replacement algorithms like FIFO and LRU work together to optimize memory usage in high-demand environments.
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Read:

1. Hailperin, M. (2019). *Operating systems and middleware: Supporting controlled interaction*.

<https://gustavus.edu/academics/departments/mathematics-computer-science-and-statistics/max/os-book/>. Licensed under a Creative Commons Attribution-ShareAlike 3.0 Unported License.

- View the online book.
- Read Chapter 6: Virtual Memory (pp.229 till pp. 283)

A chapter on virtual memory delves into how operating systems manage memory beyond physical limits by using techniques like demand paging. It explores the role of page tables, memory mapping, and how page replacement algorithms like FIFO and LRU are used to handle page faults effectively. The chapter also discusses the performance implications of virtual memory and how it enables multitasking and efficient resource management in modern computing systems.

Additional Readings:

1. Arpaci-Dusseau, R. H., & Arpaci-Dusseau, A. C. (2018). *Operating systems: three easy pieces* (1.01 ed.). Arpaci-Dusseau Books.

<https://pages.cs.wisc.edu/~remzi/OSTEP/>

- View the online book.
- Read Chapter 16: [Segmentation](#) (pp. 1 till pp.11)
- Read Chapter 18: Paging: [Introduction](#) (pp. 1 till pp. 13)
- Read Chapter 19: Paging: [Faster Translations](#) (TLBs) (pp. 1 till pp. 14)
- Read Chapter 20: Paging: [Smaller Tables](#) (pp. 1 till pp. 14)

Segmentation and paging are essential memory management techniques, each offering unique methods for dividing and organizing memory. In the introduction to segmentation and paging, the core principles of these techniques are explained, highlighting their role in efficiently managing system memory. The chapter on paging focuses on the faster translation of addresses, detailing how page tables are used to map virtual to physical addresses. The section on smaller paging tables explores optimizations that reduce the size of page tables, improving memory usage and system performance in large applications.

Watch:

1. DexTutor. (2020, June 16). *Difference between contiguous memory allocation, paging and segmentation* [Video].

- This video explains the key differences between contiguous memory allocation, paging, and segmentation, highlighting how each technique manages memory. It also covers their advantages and challenges in optimizing system performance and resource utilization.

Difference Between Contiguous Memory Allocation, Paging...

2. Computer Science. (2019, March 12). *Segmented, paged and virtual memory* [Video].

- This video is an overview of the paged and segmented memory management systems. It describes how a segmented memory management system employs segments of different sizes, which can result in fragmented free space and prevent large processes from accessing the memory very often.

Segmented, Paged and Virtual Memory

3. Vaishali Tutorials. (2021, March 17). *Demand paging in operating system* [Video].

- This video explains the concept of demand paging in operating systems, where pages are loaded into memory only when needed, reducing unnecessary memory usage.

Demand paging in operating system

4. MIT OpenCourseWare. (2019, July 12). *16.2.2 Basics of Virtual Memory* [Video].

- This video provides a clear overview of virtual memory concepts, explaining how systems use demand paging to extend physical memory. It also introduces key page replacement algorithms like FIFO and LRU, essential for managing memory efficiently.)

16.2.2 Basics of Virtual Memory

