CSC369 Week 5 Notes

Hyungmo Gu

September 11, 2020

1 Memory Management

- Physical Memory vs Virtual Memory [1]

    - Physical Memory

        * Is RAM :)!!
        * Is the first memory used when computer requires memory such as loading application or OS

    - Virtual Memory

        * Is stored on hard drive
        * Is used when RAM is filled
        * Is slower than RAM

    Refernces:

    1) Tech Walla: What Is the Difference Between Virtual Memory & Physical Memory?, link

- Memory Management

    - Is the process of controlling and coordinating computer memory
    - Assings portions known as **blocks** to various programs [1]

    Refernces:

    1) Guru 99: Memory Management in OS: Contiguous, Swapping, Fragmentation & Physical Memory?, link

- Fixed Partitioning

- Is the oldest and simplest technique to put more than one processes in the main memory. [1]

- Divides memory into regions with fixed boundaries.
    * Can be of equal size
    * Or unequal size

- Advantages: [1]
    * Is easy to implement
    * Requires lesser indirect computational power

- Disadvantages: [1]
    * Creates a gap if process is smaller than partition (**Internal Fragmentation**)
    * Programmer must deal with programs larger than partition

../images//week_5_notes_1_1.png

Refernces:

1) Chegg Study: Fixed Partitions, link

- Dynamic Partitioning

  - Allevates problems caused by fixed partitioning [1]
  - A partition of exact the right size is created for a process
  - OS may move processes around to create larger chunks of space
    * I.e. moving process 3 right beneath process 1
    * Is called **compaction**
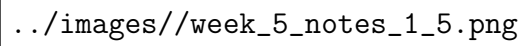   * Processes <u>must</u> be **relocatable**

../images//week_5_notes_1_2.png

  - Advantages [1]
    * No **internal fragmentation**
      · There will be no unused space left in the partition

../images//week_5_notes_1_3.png

    ∗ No restriction on degree of multiprogramming [1]
- · More proccesses in memory due to absence of internal fragmentation
- · Processes can be loaded until RAM is empty

    ∗ No limitation on the size of process
- · Process size not limited to the size of partition

– Disadvantages

    ∗ As processes come and go 'holes' are created
- · Is called **external fragmentation**
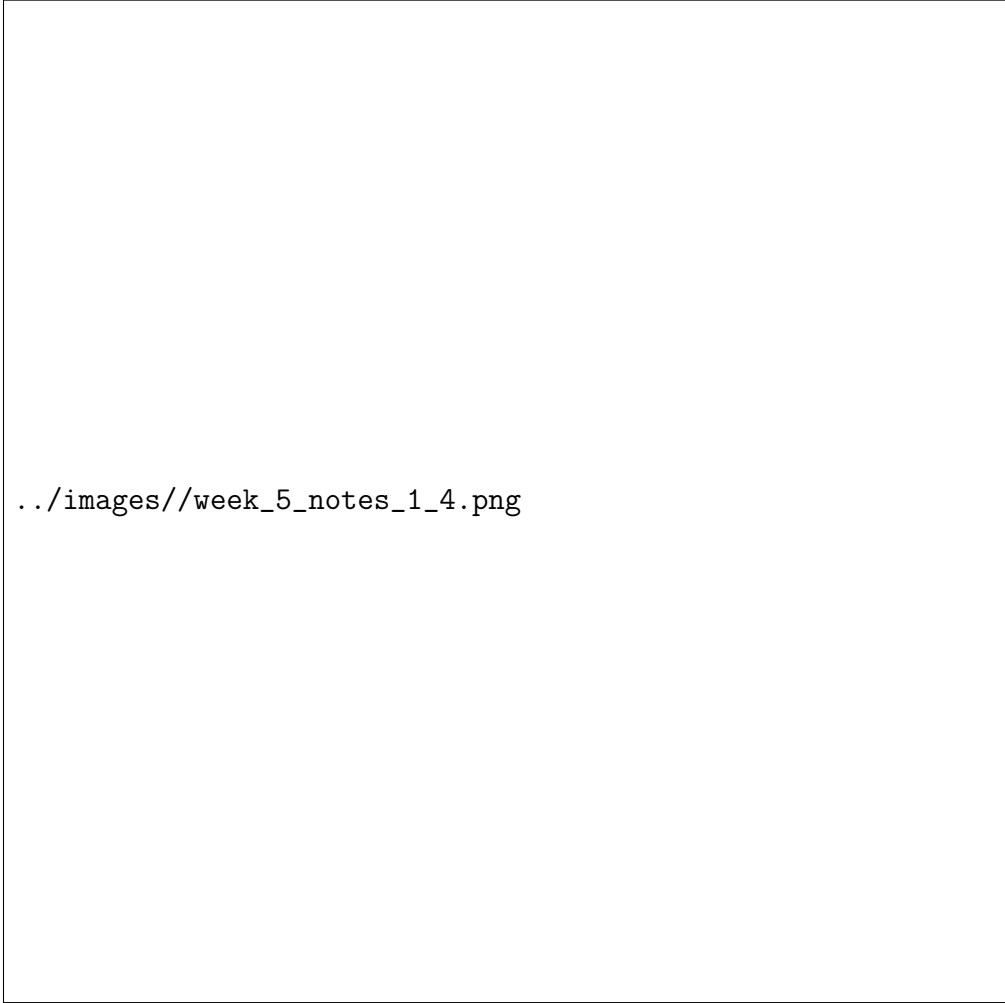
../images//week_5_notes_1_5.png

../images//week_5_notes_1_6.png

Refernces:

1) GeeksForGeeks: Variable (or dynamic) Partitioning in Operating System, link

- Paging
  - Solves **internal fragmentation** and **external fragmentation**
  - Stores and retrieves data from **secondary storage** for use in **main memory** [1]
    * Secondary storage → Hard Drive
    * Main memory → RAM
  - Is an important part of **virtual memory** management in modern OS [1]
  - Partitions memory into equal, fixed-size chunks
    * Are called **page frames** or **frames**
  - Divide processes' memory into chunks of the same size
    * These are called **pages**

../images//week_5_notes_1_4.png

Figure 1: Oh moe.. :)

Refernces:

1) Wikipedia: Paging, link
2) JavaTPoint: Paging with Example, link

- Translation Lookaside Buffer (TLBS)
  - Is a memory cache that is used to reduce the time taken to access a user memory location [1]
  - Stores the recent translations of virtual memory to physical memory [1]
  - Resides in between the different levels of multi-level cache, i.e. L1, L2, L3 cache [1]

Refernces:

1) Wikipedia: Translation Lookaside Buffer, link