

## Assignment 2 – Memory Management – Pseudo Virtual Memory

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Specifications:

MAIN MEMORY – 8MB

SWAP FILE SIZE – 16MB

TOTAL PAGES - 2048

TOTAL FILE PAGES - 4096

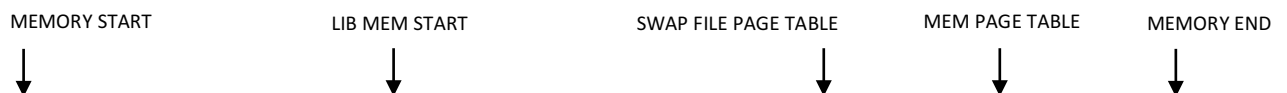
THREAD PAGES - 1024

MEMORY TABLE PAGES - 2

SWAP TABLE PAGES - 8

LIBRARY PAGES - 1014

- Phase A: Direct-Mapped Memory
  - Basic functionality of myallocate / mydeallocate function is to allocate/deallocate request types i.e. THREADREQ / LIBRARYREQ based on preference.



- Phase B: Anonymized Memory
  - The idea to create a contiguous block of memory, after allocating and freeing of memory. Based on the rights to allow / disallow access of address, a signal handler is used to catch the segmentation faults.
  - The memory manager manages memory with a scheduler, based on a switch to protect / not protect context's pages. Thus blocking out unnecessary page requests on location with data.
- Phase C: Swap File
  - In order to give other threads a chance to store a place in the memory, shuffling of memory pages to a swap file.
  - There are occasions with all memory slots are full, there a victim is chosen to swap out of memory and allocate the new request. Based on the which victim is to be chosen below are a few algorithms implemented.
- Also implemented In-memory swapping.
- Page Replacement Algorithm
  - Non-naive victim selection
    - 2nd chance circular
    - Free List
    - LRU
  - FIFO
- If both the memory pages and swap file are occupied then we will return null pointer for the next allocation.
- Benchmarks:
  - Test 1:
    - Purpose: Functionality of page swapping in the swap file

- We are using 2 thread and each tries to allocate 1020 pages. So, swap file must contain some of the pages of at least one of the thread
- Steps:
  - 2 threads are created and a dummy structure is used of size 32bytes
  - Each thread tries to allocate 50000\*32 bytes
  - Each thread then frees the pointer it allocated, indicating it to the main if the value is the same as what it set it to
  - Main, then runs to completion.
- We can run multiple algorithms by changing the cases from 1– 3 based on choice.
  - 1 – Frequency based LRU
  - 2 – FIFO
  - 3 – Free list 2<sup>nd</sup> chance
  - default – Circular 2<sup>nd</sup> chance.