Assignment 2 – Memory Management – Pseudo Virtual Memory

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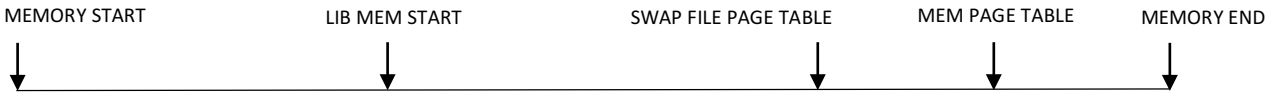
Specifications:

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
- 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 2nd chance
  - default – Circular 2nd chance.