OS Assignment 3
README
2021395, 2022083

MeMS is a simple memory management system implemented in C. It allows for dynamic memory allocation and deallocation using the mmap and munmap functions. This system maintains a doubly linked list of memory chunks, enabling the splitting and merging of memory as needed.

The **sys/mman.h** and **unistd.h** libraries are used for memory mapping and other system calls.

mems_init()

- The mems_init function is responsible for initializing the MeMS system.
- It uses the mmap function to allocate memory for the initial node in the linked list.
- If the memory allocation fails, it prints an error message and exits the program.

mems_finish()

- The mems_finish function is used to deallocate all the memory used by the MeMS system.
- It traverses the linked list and uses the munmap function to deallocate memory for each node.
- If any deallocation operation fails, it prints an error message and exits the program.

mems_malloc(size_t size)

- The mems_malloc function is responsible for allocating memory for the user based on the requested size.
- It traverses the linked list to find a suitable chunk of memory to allocate.
- If no suitable chunk is found, it requests a new chunk from the operating system using mmap.
- It also splits the memory chunk if it is larger than the requested size.

mems_free(void *v_ptr)

- The mems_free function is used to free the memory at the specified virtual address.
- It marks the corresponding node as a hole and attempts to merge adjacent holes if possible to avoid memory fragmentation.

mems_print_stats()

- The mems_print_stats function prints statistics about the MeMS system.
- It prints information about the main chain length, sub-chain lengths, pages used, and unused space.
- It traverses the linked list and calculates the statistics accordingly.

mems_get(void *v_ptr)

- The mems_get function is used to find the physical address corresponding to the virtual address provided.
- It traverses the linked list and searches for the node with the specified virtual address.
- If the address is found, it returns the corresponding physical address; otherwise, it prints an error message.

main()

- The main function is used for testing and demonstrating the functionalities of the MeMS system.
- It initializes the MeMS system, allocates and frees memory, assigns values to memory, prints statistics, and finishes the MeMS system.

OUTPUT: