

CMSC 312 Project Part 2 Description 2022

Operating system simulator

Memory management

Memory Management will be implemented by keeping a running total of all processes in main memory by not letting the overall memory size exceed the set limit. **The OS simulator will have a main memory size of 512MB.** This value which is to be compared against the memory requirements of newly arrived processes. If total memory minus used memory is more than the newly arrived job's memory requirement, it may enter the READY state (queue). Otherwise, the process would remain in the NEW queue (if it has been just spawned). Additionally, virtual memory with paging, victim frame selection, and physical-logical address translation must be implemented.

Requirements:

1. Basic contiguous memory and operations on it. Each process must have fixed memory requirements allocated to it that should be randomly assigned during process creation.
2. Non-contiguous allocation of memory via paging with fixed page size and single page containing a single instruction (CALCULATE, I/O, or FORK). Therefore, each process will occupy as many pages as it has instructions. All paging mechanisms, such as page table, must be implemented.
3. Virtual memory extending the main memory. Virtual memory should be of 512MB size. Page replacement mechanism must be implemented.
4. One chosen victim selection algorithm for page replacement.

General rules for the project

- This is an **open-ended project** and the design skills, capability of adapting to specifications where necessary, as well as imagination and creativity of solving the required tasks play a crucial role.
- Project will consist of two mandatory phases / assignments that must be build upon each other consecutively. These two assignments are mandatory for C grade. Third assignment will be to implement functionality for A/B grade
- Project must be fully functional, and the code of project must compile and run.
- Project must be a compound system of modules working together, not a collection of non-integrated parts.

- Project must be done individually, not code sharing or copying / modifying is allowed.
- Students are allowed to discuss and consult theoretical solutions and approaches among themselves.
- Source code must be delivered for grading, as well as an executable version of the project.
- Student is obliged to deliver a .pdf documentation of the project, discussing the implemented solutions, software, and hardware requirements for the project to run, as well as guidelines on how to run the project.