German University in Cairo
Faculty of Media Engineering and Technology
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CSEN 602 Operating Systems, Spring 2021
Milestone 2
Due Date:26/6/2021 at 11:59pm

Milestone 2

In this milestone, you are required to extend your milestone 1 code by implementing a scheduler, and a memory.

Scheduling

A scheduler is responsible for scheduling between the processes in the Ready Queue. It ensures that all processes get a chance to execute. A scheduling Algorithm is an algorithm that chooses the process that gets to execute. As mentioned in the lecture, there are many different scheduling algorithms to schedule processes. In this project, you are required to implement the Round Robin algorithm. Round robin is a scheduling algorithm where each process is assigned a fixed time slice. For this project, each process executes 2 instructions in its time slice.

For simplicity you can assume that all processes arrive together in this order, P1, P2, P3.

Memory Management

In milestone 1, your system stored all the created variables in a single data structure and there was no protection offered for each process's data. In this milestone, you are expected to augment your memory system by making the OS manage it and assign a space for each process. The memory is of non-dynamic size. The memory is large enough to hold the un-parsed lines of code, variables and PCB for each of the processes. The memory is divided into memory words, each word can store 1 variable and it's corresponding data. For simplicity, feel free to specify a naming convention for the variable names associated with the lines of code and elements of the PCB. Processes should not access any data outside their allocated memory block.

Feel free to separate the lines of code, variables and PCB within the memory if needed as long as they fall within the same data structure meant to represent the memory.

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Process Control Block

A process control block is a data structure used by computer operating systems to store all the information about a process.In order to schedule your processes, you will need to keep a PCB for every process. The PCB should contain the following information:

1. Process ID (Assume that the ID corresponds to the program number)
2. Process State
3. Program Counter
4. Memory Boundaries

Output

You are required to run the main class, where you schedule the processes. The system will start by reading the program files from the disk and assigning memory locations for each of the aforementioned processes. Once all the processes are loaded in the memory, the OS will start the scheduling process. The scheduler will choose the process to run and do so by checking the processes states from the PCBs stored in the memory, then running the selected process's code from the memory.

Work Distribution

During the evaluation, each team member will be evaluated on the component that they worked on. **However**, the whole team grade will still be affected by any missing part. Each team member must pick and work on one of the three following components:

1. The memory word definition and PCB.
2. The memory allocation and assignment.
3. The Scheduler

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Project Deliverable and Submission

The project should be submitted as ONE zip folder containing the java files. Please make sure to name your folder as follows, Team_number (ex. Team_00). Late submissions will not be accepted. Submission will be through the following link: `https://forms.gle/EWqfwDkVnYk3584p8`.