CSE 312 OPERATING SYSTEMS SPRING 2020 HOMEWORK#02

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In each micro kernel I know that how many processess will work so that making a system call by "**INITIALIZE_PROCESS_TABLE**" with the syscall number **19**, I can allocation some memory for process table. Numbers of the process is sent by **R[REG_A3]** registers which is **$a3**.

In each micro kernel there are some rules to add program into the memory (They are explained in the PDF of the homework). Based on these rules I added programs into the memory and process table. "**FORK**" system call is used to do that. The syscall number of this system call is **20**.

After all programs are loaded into the memory and into the process table, I made init wait until all poceses in the process table, terminate their jobs. Starting first execution is maden by "**EXECVE**" syscall. The syscall number of this system call is **23**.

There is a **Round Robin Scheduling** mechanism when a process is interrupted by timer or it finishes its jobs. It means that with an infitine loop, look all processes in the process table with circular way. (When a process is the last item in the process table, its next item is the first item of the process table.) When it finds a ready or not started process (It means that the founded process process can run), I puts its registers and program counter of the last worked process into the process table and let it runs the founded process.

"**EXIT_AND_EXECUTE_NEW_PROCESS**" syscall is called when a program finished it jobs. The syscall number of this system call is **24**. This system call is used int these programs: BinarySearch.s, LinearSearch.s and Collatz.s. In this system call I made a **Round Robin Scheduling** mechanism and run the founded process.

"**RANDOM_INT_GENERATOR**" syscall is used to generate a random number for **SPIMOS_GTU_2.s** and **SPIMOS_GTU_3.s**. It takes an upper bound with **R[REG_A0]** which is **$a0** to generate random number and assign the random number to **R[REG_RES]** which is **$v0**. The syscall number of it is **42**.

Each micro kernel ends with "**PROCESS_EXIT**" with the syscall number **22**.
It deallocates memory that was allocated for process table and ends running of micro kernel.

IMPORTANT POINTS

R[REG_A0] ($a0) is used to determine name of process in each micro kernels.
R[REG_A1] ($a1) is used to determine ID of process in each micro kernels.
R[REG_A3] ($a3) is used to determine number of process in each micro kernels.
R[REG_A0] ($a0) is also used to determine upper bound for random number in **SPIMOS_GTU_2.s** and **SPIMOS_GTU_3.s**.

If you want to run **LinearSearch.s**, **BinarySearch.s** and **Collatz.s** seperatly on to spim, you have to change "**li $v0, 24**" syscall with "**li $v0, 10**" in these files. The reason why I made it different syscall is I do not want to change syscall of spim.