CSE306: Spring 2019

OSP2: An Operating System Project

Project 1 – Thread Management

Out: February 21
Due: March 12

What to do. Implement the *Threads* module of OSP2.

The project files are found on Blackboard in the Assignments section. Details of what you are supposed to do are in the OSP2 manual, Chapter 4. The only additional requirement is that the dispatcher should schedule threads using the following strategy:

- Threads are scheduled according to their priority. Threads with the same priority are to be scheduled according to the time they were inserted in the ready queue.
- The priority is calculated by the following expression (higher value means higher priority):

$$\frac{\textit{total time the thread was waiting in the ready queue}}{1+\textit{total CPU time all the threads in the same task have used so far}}$$

- When a thread is dispatched, it is given a CPU time slice of 100 time units. If the thread is still running at the end of its time slice, it is preempted and put back into the ready queue.
- If an interrupt occurs before the current thread finished 90% of its time slice and the thread does not get blocked on some event (i.e., the thread is in the ready queue and not some other queue), that thread has the highest priority when the dispatcher is invoked next.
- You must devise an organization for the ready queue by which scheduling will **not** require scanning the entire queue in order to find the highest priority thread. (This is not obvious due to the denominator in the priority formula.) You are not required to make the scan of the ready queue optimal—just make it faster than linear.

Note: to implement this strategy, threads must remember the total CPU/wait time they used so far. There also must be an account of the total CPU time of all the threads in each task.

Your objective in this project is to get your implementation to run under OSP2 without errors and warnings with the parameter file in the `Misc` subdirectory.

Important note on the Git repository. You **must** use Git to maintain your project files **and** you must make frequent commits to your repository. The Git repository must be in *Github classroom*. Follow this link to create a repository in this course's classroom:

`https://classroom.github.com/a/UWCei-s2`

After a few clicks you will get a repository named `cse306-project-1-`*YourGuthubId*. The repository will automatically become private and you must **not** attempt to share it.

We will be checking your repository and your commit logs to make sure that substantial activity has been taking place over a period of time. If there are less than 3 **nontrivial** commits, significant penalty will be applied.

We recommend that you read a brief Git tutorial to learn the concepts, but avoid using command line tools to work with the repository, to save yoursel from costly mistakes. Pick a nice graphical tool like GitKraken, SmartGit, TortoiseGit, or SourceTree (GitKraken and SmartGit work on all platforms, are commercial, but free for academic use; TortoiseGit is Windows only; SourceTree is Windows+Mac). Otherwise, chances are that you will make mistakes that will waste your time and may affect your grade. (Messing up your git repository is not an excuse.)

Your code must be well-structured, documented, properly indented, and there must be **no compilation warnings or errors**. These factors will be taken into account in grading.

How to submit. Zip-up your main branch and submit the zip file via **Blackboard**. Github has a button for generating such zip files: *Clone or download>Download ZIP*. Normally, the zip file will have a top folder with a name like `cse306-project-1-`*YourGuthubId*`-master`, but if not then make sure that your submitted zip file has a top folder with such a name (-master is dispensable, but the rest is not). Do not forget to include your **name** and **student Id** in the program source-files. Submission is electronic only.

This project is to be done **individually**. Each source file must include the following pledge:

> **I pledge my honor that all parts of this project were done by me individually, without collaboration with anyone, and without consulting any external sources that could help with similar projects.**

The author name, the Id, and the pledge **must** be as specified to avoid penalty.

GOOD LUCK!