CS 273 (Operating Systems), Fall 2020, R. Brown

Homework 5 Due Wednesday, 9-23-20

A. **P-threads**

1. Write a C program `try_pthreads.c` that performs the following operations, using pthreads.
   - Print a message `"I am the MAIN. My pid is` *N*`"`, followed by a newline, where *N* is the process id.
   - Attempt to create a pthread that prints `"I am the PTHREAD. My pid is` *P*`"`, followed by a newline. If this call to create a pthread fails, print an appropriate error message and exit from the program.
   - If the pthread creation succeeds, have `main()` carry out the following:
     1. Print the message `"I am the MAIN, and I successfully launched a pthread."`, followed by a newline.
     2. Perform a join operation on the pthread, in order to pause until that pthread has finished its work. If that join call fails, print an appropriate error message and exit.
   - Print a message `"I am the MAIN, and the pthread has finished."`, followed by a newline.

   Compile and run your program to test it.

   Notes:

   - Use the system call `getpid()` to determine the process id (in both `main()` and the pthread code).
   - Determine the library calls for creating and joining on a thread from the example provided in class (`pthreads.c`). Check about error returns and required header files by looking at a manual page.
   - Use a descriptive name for the function whose computation the pthread will perform. (Note that `Area` is not a good descripton of this computation.)
   - Unlike the example reading, we need only one pthread, not an array of them. So, in this program, use a single `pthread_t` variable, instead of an array of one `pthread_t`.
   - To compile your program, include the flag `-pthreads`, e.g.,

   ```
   % gcc -o try_pthreads -pthread try_pthreads.c
   ```

2. Make multiple test runs of your program `try_pthreads.c` in order to answer the following questions.

   a) Do the `main()` and the pthread share the same process id on our system?

   b) Do the pthread message and the middle message printed by `main()` (about launching the pthread) always appear in the same order? Are they sometimes mixed in any way?

3. Create a git `commit` containing your work on this segment.

   ```
   % git add try_pthreads.c
   % git commit -m "HW5 A3 complete:  try_pthreads.c"
   ```

   Note. If your work on this segment is not yet complete, indicate the status of your work so far in the `commit` message. As you complete more of this work, create additional `commits`, using the `commit` messages to indicate your progress.

B. IPC

p.174 3, 11, 31, 29

C. Submission

To submit by-hand parts, you can use the page `https://www.stolaf.edu/people/rab/os/asgt/hw5+.html`

To submit the electronic portion of this homework:

1. Make sure you are somewhere within your working directory ~`/OS`, and that you have performed all the commits indicated above.
2. Use
   ```
   % git commit --amend
   ```
   to update your most recent commit message to *add* the following:
   ```
   submit HW5: complete
   ```
   Modify that added string if you have any clarifications about this submission (e.g., `submit HW21: parts A-C and D2`). You can use `git commit --amend` again later if you want to indicate an update.
3. Finally, `pull/push` your committed code to stogit.
   ```
   % git pull origin master
   % git push origin master
   ```
   Note: Always pull before you push.

The commands above should submit these files:

Files: `try_pthreads.c`