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

Homework 3   Due Monday, 9-7-20

> **Note:** For each homework assignment including this one, create a subdirectory in your `stogit` working directory for your electronic work on that assignment, and submit that subdirectory electronically using `stogit` as you complete your work. For this assignment, use the subdirectory name ∼/OS/hw3, except as noted. See Homework 2 for more details.
>
> If some or all of a homework assignment is presented as a lab, use a subdirectory ∼/OS/lab*N* for that portion instead. For example, create a subdirectory ∼/OS/lab2 for the lab portion of this assignment.
>
> **Use the exact subdirectory and file names specified in each assignment**, so you can receive credit for your work for portions graded automatically.

A. **C programming and system calls**

1. Write and test a short program `lseek.c` that uses the `lseek()` system call. For example, your program could:

   - open a pre-existing file for reading;

   - read some bytes from the file descriptor returned by the `open` system call, and output the bytes that were read;

   - use `lseek()` to reposition the file descriptor's *offset* (position within the open file) to the beginning of the file;

   - read and output some bytes (you should see the same bytes as you did with the first `read()`);

   - use `lseek()` to reposition the file descriptor's *offset* somewhere else; and

   - read and output some more bytes, which you can use to verify that the `lseek()` moved to the right place.

2. Modify `mopen.c` to recognize the command string `"lseek"` that tests the system call `lseek()`. Follow the same strategy as you did for `dup()` in a previous homework.

3. Create a git `commit` containing your work on this segment.
   ```
   % git add lseek.c mopen.c
   % git commit -m "HW3 A complete:  lseek.c mopen.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. **Linux system calls**

1. Describe the use of Linux system calls for the following shell input lines, using process diagrams as discussed in class.

   a) `sort < mydata.txt > sort.out`

b) `emacs & xclock &`

c) `man ls | lpr`

d) `ls -als | sort -r > ls.out`

C. **Socket programming**

1. Carry out steps 1 and 2 of `https://www.stolaf.edu/people/rab/os/sockets.html` .

D. **Submission**

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 HW3: 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: `lseek.c mopen.c`

To submit by-hand parts, use the page `https://www.stolaf.edu/people/rab/os/asgt/hw3+.html`