Sheet2
Threads

1) What are the two separate and potentially independent characteristics embodied in the concept of process?
2) Give four general examples of the use of threads in a single-user multiprocessing system.
3) What resources are typically shared by all of the threads of a process?
4) List three advantages of ULTs over KLTs.
5) List two disadvantages of ULTs compared to KLTs.
6) Define jacketing.
7) In the discussion of ULTs versus KLTs, it was pointed out that a disadvantage of ULTs is that when a ULT executes a system call, not only is that thread blocked, but also all of the threads within the process are blocked. Why is that so?
8) OS/2 is an obsolete OS for PCs from IBM. In OS/2, what is commonly embodied in the concept of process in other operating systems is split into three separate types of entities: session, processes, and threads. A session is a collection of one or more processes associated with a user interface (keyboard, display, mouse). The session represents an interactive user application, such as a word processing program or a spreadsheet. This concept allows the personal computer user to open more than one application, giving each one or more windows on the screen. The OS must keep track of which window, and therefore which session, is active, so that keyboard and mouse input are routed to the appropriate session. At any time, one session is in foreground mode, with other sessions in background mode. All keyboard and mouse input is directed to one of the processes of the foreground session, as dictated by the applications. When a session is in foreground mode, a process performing video output sends it directly to the hardware video buffer and thence to the user's screen. When the session is moved to the background, the hardware video buffer is saved to a logical video buffer for that session. While a session is in background, if any of the threads of any of the processes of that session executes and produces screen output, that output is directed to the logical video buffer. When the session returns to foreground, the screen is updated to reflect the current contents of the logical video buffer for the new foreground session.
   There is a way to reduce the number of process-related concepts in OS/2 from three to two. Eliminate sessions, and associate the user interface (keyboard, mouse, screen) with processes. Thus one process at a time is in foreground mode. For further structuring, processes can be broken up into threads.
   a) What benefits are lost with this approach?
   b) If you go ahead with this modification, where do you assign resources (memory, files, etc.): at the process or thread level?
9) Consider an environment in which there is a one-to-one mapping between user-level threads and kernel-level threads that allows one or more threads within a process to issue blocking system calls while other threads continue to run. Explain why this model can make

multithreaded programs run faster than their single-threaded counterparts on a uniprocessor computer.

How to submit the homework assignments?

- Solve the sheet individually without looking up the solution on the Internet. The sheet is to practice; it is a learning tool not an exam.
- Assignments are to be **handwritten**.
- Papers are to be scanned (I like camscanner app). Put all images in a pdf file (camscanner does that for you)
- Use MS Teams to submit
    - Your filename should be your user id
