

CSSE4004/7014
The University of Queensland

Tutorial 2

Processes

1. Sketch out in pseudocode the algorithms for a server using the three given variations in implementation strategy, and in each case, comment on advantages and disadvantages:
 - a. Multiple threads using blocking system calls.
 - b. Single thread using non-blocking system calls.
 - c. Finite-state machine, using nonblocking system calls.

2. One of the key issues in the viability of process migration is whether the gain (moving computation where it's more efficient) outweighs the cost (time to ship the code and any state which may be needed). In each of the following, estimate the likely cost versus gain:
 - a. A web server, with a total of 20Mbytes of address space, is loading a machine too much, and you would like to move it to another which can access the same files. In about 10 minutes, other users of the machine it's running on will have finished, but their processes are very large and even less practical to move. Your network has a bandwidth of 100Mbit/s, and the web server is continuously active, so you will need to move the entire state, then update anything which has changed at the end of the move.
 - b. A picture is drawn as part of a web user interface. The code which draws it, in Java, is 20Kbytes. The data for the picture is 70Kbytes, and the finished picture is 80Kbytes.
 - i. If it is unlikely to be drawn more than once for a given client, does it make sense to ship the Java code over, rather than just sending the picture? Explain if there are situations where it may make sense, and others where it does not.
 - ii. How would your answer change, if you knew that the picture would be drawn more than once? If you knew that slight variations on the picture could be drawn, as the user interacted with the web page?

3. In the X Window system, explain which of the following components plays the role of a client, and which plays the role of a server:
 - a. The machine on your desktop launches a large computation on a machine with high-speed computation capability.
 - b. The machine with high-speed computation capability asks the X software on your desktop to display some output.
 - c. The machine on your desktop runs a window manager on another machine in your previous office.

4. Is a server that maintains a TCP connection to a client stateful or stateless?
5. A web server maintains a table in which client IP addresses are mapped to the most recently accessed Web pages. When a client connects to the server, the server looks up the client in its table, and if found, returns the registered page. Is this server stateful or stateless?
6. Discuss why code migration across heterogeneous systems with programs written in C++ is a hard problem. List issues which are difficult to solve, and potential solutions.