Operating Systems (COMP2006)

CURTIN UNIVERSITY
Discipline of Computing
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Worksheet 2

1. Describe the actions taken by a kernel to context switch between processes.

2. Including the initial parent process, how many processes are created in the following program? Verify your answer by executing the program in a computer.

```
#include <stdio.h>
#include <unistd.h>

int main()
{
    /* fork a child process */
    fork();

    /* fork another child process */
    fork();

    /* fork another child process */
    fork();

    return 0;

}
```

3. Cooperating processes require an inter process communication mechanism to communicate with each other. The two major communication schemes are: shared memory and message passing. Contrast the two mechanisms. What is the responsibility of the OS for each mechanism?

4. The `send() and receive()` used in the message-passing system for inter process communication may apply the following methods:

    - Synchronous and asynchronous communication
    - Automatic and explicit buffering
    - Send by copy and send by reference
    - Fixed-sized and variable-sized messages

a) Describe each of the methods.

b) What are the benefits and detriments of each of methods?

5. Discuss the differences, advantages and disadvantages of the user-level threads and the kernel-supported threads.

6. Describe the actions taken by a thread library to context switch between user level threads.

7. Under what circumstances does a multithreaded solution using multiple kernel threads provide better performance than a single-threaded solution on a single-processor system?

8. Consider a multiprocessor system and a multithreaded program written using the many-to-many threading model. Let the number of user-level threads in the program be greater than the number of processors in the system. Discuss the performance implications when the number of kernel threads allocated to the program is less than the number of processors.