Worksheet 1.2: OS Basics, Multiple-Choice Questions

In the questions below, circle the right answer. There is only one correct answer.

1. Which of the following is (are) managed by the OS?
a. main memory b. disk space
c. CPU registers d. the cache
e. Both a and b are correct. f. a, b and d are correct. g. a, b and c are correct.

Explanation: The OS manages main memory and disk space to allocate resources efficiently among processes. The cache is also managed by the OS to optimize access to frequently used data. CPU registers are managed by the CPU itself, not directly by the OS.

2. Which of the following is (are) true about hardware support for protection?
a. The dual mode is needed to protect the system from programs that perform illegal operations.
b. The dual mode is needed to terminate programs that run into infinite loops.
c. Exceptions are needed to protect the system from programs that perform illegal operations.
d. Exceptions are needed to terminate programs that run into infinite loops.
e. Both a and c are correct. f. a, b and c are correct. g. a, b, c and d are correct.

Explanation: The dual mode (user mode and kernel mode) is necessary to protect the system from illegal operations by programs. Exceptions are also required for the same reason, as they handle errors and special conditions in program execution. Termination of programs in infinite loops is not directly related to dual mode or exceptions.

3. Which of the following hardware features is (are) **required** to support time sharing with the time quanta fully controlled by the OS?
a. A multi-core processor.
b. A large RAM.
c. A fast disk.
d. A large cache.
e. A counter that sets a timed interrupt.
f. A large number of CPU registers.
g. Both a and e are correct. h. Both e and f are correct. i. a, e and f are correct.

Explanation: A counter that sets a timed interrupt is crucial for time-sharing as it allows the OS to control process execution time accurately. A large number of CPU registers can help manage multiple processes efficiently, but the other options are not directly related to time quantum control.

4. What is (are) the advantage(s) of preventing user processes from accessing I/O directly and requiring them to request access through the OS?
a. That provides faster execution of I/O requests.
b. That makes it possible for the same user process to use the CPU and access I/O at the same time.
c. That allows the OS to resolve conflicts among user processes requesting access to the same device.
d. That makes it possible for an application programmer to use I/O without knowing the device details.
e. Both a and c are correct. f. Both c and d are correct. g. Both b and d are correct.

Explanation: By managing I/O requests, the OS can resolve conflicts between processes trying to use the same device and can abstract device details from the programmer, making development easier. Direct access by user processes could lead to conflict and errors.

5. How does an OS handle infinite loops?

a. The OS detects infinite loops and terminates a process that is executing an infinite loop.
b. The OS is not capable of detecting infinite loops in user processes.
c. The OS is capable of detecting infinite loops, but real OSs do not implement that, because the loop detection algorithm is computationally expensive and would slow the system down.
d. The OS is never aware of infinite loops, but time sharing ensures that a process that is stuck in an infinite loop does not prevent other processes from making progress.
e. Both b and d are correct. f. Both c and d are correct. g. None of the above.

Explanation: The OS is generally not capable of detecting infinite loops due to the complexity and resource demands of such detection algorithms. However, time-sharing ensures that even if a process is stuck in an infinite loop, other processes can still make progress.