New York University

CSCI-UA.0202-003: Operating Systems (Undergrad): Fall 2025

Quiz 6

- Write your full name on both:
  - the bubble sheet in the "Name" field
  - the quiz booklet
- Write your NYU NetID on the quiz booklet and the bubble sheet in the "ID" field
- Use a #2 pencil to fill in your answers on the bubble sheet (preferred, but you can also use a pen)
- This quiz contains 10 questions only. Each question has choices from A to D
- Fill the bubbles completely by darkening the entire circle, as shown in the example
- Only mark answers for questions 1-10. Do not mark any bubbles beyond question 6
- Choose only one answer per question
- Submit your bubble sheet **together with your quiz booklet**

Name:

NetId:

1. What is a key characteristic of kernel-level threading?
   (A) The kernel is unaware of the threads and sees only a single process.
   (B) Threads are managed by a user-space library, not the kernel.
   (C) Kernel-level threads are always preemptive.
   (D) Context switching between threads does not require a mode switch.

2. When a system uses user-level threading, how does the kernel typically perceive the application?
   (A) As a collection of independent, preemptive kernel threads.
   (B) As a single process, with the kernel unaware of the user-level threads.
   (C) As a process that requires special scheduling priority.
   (D) As a cooperative process that cannot be interrupted.

3. How can preemptive multithreading be implemented for user-level threads?
   (A) By requiring threads to call `yield()` frequently.
   (B) By using a hardware-based Translation Lookaside Buffer
   (C) By delivering a periodic timer signal to the thread scheduler.
   (D) This is not possible; user-level threads must be cooperative.

4. After a successful `mmap()` call, when is the data from the file first read from the disk?
   (A) Immediately; `mmap()` blocks until the entire file is loaded into RAM.
   (B) When the `mmap()`-ed region is first accessed, triggering a page fault.
   (C) When the process explicitly calls a `load_mmap()` function.
   (D) When the file is closed using `close()`.

5. The Clock Algorithm for page replacement is designed to approximate which "optimal" policy?
   (A) MIN.
   (B) FIFO.
   (C) LRU.
   (D) LIFO.

6. In an HDD, what is a "cylinder"?
   (A) A single circular path on one platter's surface.
   (B) A chunk or section of a single track.
   (C) The locus of all tracks at a fixed radius on all platters.
   (D) The central component that the platters rotate around.

7. Why does the "settle" phase of a seek generally take longer for a write operation than for a read operation?
   (A) Write data is larger than read data and requires more verification.
   (B) If a write strays, it clobbers data on another track, so it must be more precise.
   (C) The disk's write cache must be flushed first, adding latency.
   (D) Read heads are physically smaller and can settle faster.

8. What is the key difference between Programmed I/O (PIO) and Direct Memory Access (DMA)?
   (A) PIO uses memory-mapped I/O, while DMA uses explicit I/O instructions.
   (B) In PIO, the CPU is responsible for transferring all data; in DMA, the device transfers data directly to/from main memory.
   (C) PIO is used for disks, while DMA is used for keyboards.
   (D) PIO is asynchronous, while DMA is synchronous.

9. What is the primary role of a device driver?
   (A) To provide a standardized hardware interface for all devices of one type
   (B) To act as a bridge between the hardware device and the operating system kernel.
   (C) To execute user-level applications and manage their memory.
   (D) To replace the need for a DMA controller.

10. In a system using polling for I/O, what does the CPU do?
    (A) It enters a low-power sleep state until the device triggers an interrupt.
    (B) It repeatedly checks the status register of the device at regular intervals.
    (C) It gets stuck in a "busy-wait" loop, consuming 100% of its cycles .
    (D) It hands off the I/O operation to a DMA controller and does other work.