1. Multi-tasking lets several programs appear to run at once by:

   ☐ deleting idle programs

   ☐ using several monitors

   ☐ switching the CPU quickly between processes

   ☐ compressing the programs

2. A benefit of virtual memory is that it:

   ☐ removes the need for a disk drive entirely

   ☐ lets the total memory used exceed the physical RAM, and isolates processes

   ☐ encrypts all the data held in RAM

   ☐ makes the CPU run faster by adding cache

3. An interpreter:

   ☐ runs faster than compiled code once loaded

   ☐ always produces a stand-alone executable file

   ☐ reports all the errors before running any code

   ☐ translates and runs the program one statement at a time, with no executable produced

4. In BNF, a terminal symbol is:

   ☐ always recursive

   ☐ literal text that appears in the program

   ☐ the name of another rule

   ☐ a syntax error

5. Spooling helps the system because:

   ☐ print jobs queue on disk, so the CPU never waits for the slow printer

   ☐ it deletes old documents to free up the disk

   ☐ it encrypts print jobs before they are sent

   ☐ it speeds up the CPU clock while printing

6. What does giving each process a virtual address space achieve? Select **all** that apply.

   ☐ each process sees a simple private contiguous range of addresses

   ☐ processes are protected from each other's memory

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   ☐ the memory in use can exceed the physical RAM installed

   Tick every correct option.

7. An interpreter can execute a program without producing a translated version of it.

   ☐ True ☐ False

8. Using those rules, which strings are valid identifiers? Select **all** that apply.

   ☐ 2count

   ☐ count2

   ☐ my_var

   ☐ x

   Tick every correct option.

9. Which techniques help an OS get the most from its resources? Select **all** that apply.

   ☐ caching recently used data in fast memory

   ☐ spooling output to a disk queue so the processor never waits for a printer

   ☐ deleting processes that have been waiting too long

   ☐ multi-tasking, switching the processor rapidly between processes

   Tick every correct option.

10. Segmentation divides memory into variable-sized logical units (code, stack, heap), each with its own permissions, whereas paging uses fixed-size pages.

    ☐ True ☐ False

1. **switching the CPU quickly between processes**

   The OS rapidly switches the single CPU between processes so they all seem to progress together.

2. **lets the total memory used exceed the physical RAM, and isolates processes**

   Virtual memory gives each process a private space and lets the working set exceed installed RAM by using disk.

3. **translates and runs the program one statement at a time, with no executable produced**

   It works line by line, reporting errors as it reaches them; nothing is saved as an executable, and it is generally slower.

4. **literal text that appears in the program**

   Terminals are literal tokens; non-terminals are names of other production rules.

5. **print jobs queue on disk, so the CPU never waits for the slow printer**

   Spooling buffers print jobs to disk so the fast CPU is not held up by the slow printer.

6. **each process sees a simple private contiguous range of addresses; processes are protected from each other's memory; the memory in use can exceed the physical RAM installed**

   Virtual memory buys simplicity, isolation and capacity. It costs speed, since part of the memory is really on disk.

7. **True**

   The translation exists only in memory, statement by statement, and is discarded. That is why the interpreter must be present every time the program runs.

8. **count2; x**

   A single letter is an identifier by the first alternative. 2count cannot start with a digit, and _ is not a terminal in any rule here.

9. **caching recently used data in fast memory; spooling output to a disk queue so the processor never waits for a printer; multi-tasking, switching the processor rapidly between processes**

   Sharing time, queueing for slow devices and keeping hot data close. Killing waiting processes would lose the user's work, not improve utilisation.

10. **True**

    Segments match the program's logical structure; pages are uniform fixed-size blocks – some systems combine both.

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