WEEK 2 ASSIGNMENT

1. **How do you declare and use a variable in a shell script.**

   A. var=5; echo $var
   B. int var = 5; print(var)
   C. set var 5; display var
   D. variable: 5; output $variable

Answer: var=5; echo $var

2. **How do you check if a file exists using an if condition in a shell script.**

   A. [-d file1]
   B. [-f file1]
   C. [-e file1]
   D. [-x file1]

Answer: [-f file1]

3. **What is the primary function of the Process Scheduler in the Linux kernel.**

   A. To allocate memory to processes
   B. To manage CPU time allocation for processes
   C. To monitor network packets
   D. To synchronize file operations

Answer: To manage CPU time allocation for processes

4. **Which of the following is NOT a key element of the Network Sub-System in Linux.**

   A. Socket API
   B. Inode Table
   C. Network Protocol Layers
   D. Packet Processing

Answer: Inode Table

5. **What is the default signal sent by the kill command in Linux.**

   A. SIGKILL (9)
   B. SIGTERM (15)
   C. SIGSTOP (19)
   D. SIGCONT (18)

Answer: SIGTERM (15)

6. **The performance of supercomputers is typically measured in.**

   A. FLOPS (Floating-Point Operations Per Second)
   B. GHz (Gigahertz)
   C. IOps (Input/Output Operations Per Second)
   D. GBps (Gigabytes per Second)

Answer: FLOPS (Floating-Point Operations Per Second)

7. **What benchmark is used to measure the performance of a supercomputer**

   A. SPECint
   B. Linpack
   C. Geekbench
   D. Cinebench

Answer: Linpack

8. **What is the primary goal of parallel computing.**

   A. To execute tasks sequentially
   B. To increase the complexity of the algorithm
   C. To minimize hardware usage
   D. To reduce computation time by executing tasks simultaneously

Answer: To reduce computation time by executing tasks simultaneously

9. **Which of the following attributes of a parallel algorithm directly impacts its ability to efficiently utilize additional processors as the system size increases.**

   A. Scalability
   B. Concurrency
   C. Data locality
   D. Modularity

Answer: Scalability

10. **Which of the following categories in Flynn's Taxonomy represents a system where one instruction operates on a single data stream.**

   A. MISD
   B. SIMD
   C. MIMD
   D. SISD

Answer: SISD

11. Which memory type in HPC systems acts as a buffer between the CPU and RAM to speed up processing.

 A. Flash memory
 B. Registers
 C. Hard disk
 D. Cache memory

Answer: Cache memory

12. Which hardware component is responsible for copying information from main memory to cache memory automatically.

 A. DMA controller
 B. CPU
 C. Memory management unit (MMU)
 D. Cache controller

Answer: Cache controller

13. Which of the following best highlights the primary advantage of NUMA over UMA in large-scale multiprocessor systems, especially concerning memory access efficiency and system scalability.

 A. NUMA minimizes memory access contention by ensuring each processor has faster access to its local memory and reduces bandwidth bottlenecks across processors
 B. NUMA architecture is simpler to implement because it requires fewer memory management techniques and results in less software overhead
 C. UMA systems benefit from uniform memory access latency, ensuring predictable performance regardless of the number of processors, which is particularly beneficial for real-time systems
 D. UMA architectures scale better with increasing processor count by maintaining uniform memory access, resulting in less complexity in managing memory locality

Answer: NUMA minimizes memory access contention by ensuring each processor has faster access to its local memory and reduces bandwidth bottlenecks across processors

14. Which of the following situations can still lead to race conditions, even when a mutex is used.

A. A thread releases the mutex before completing the critical section
B. The critical section is too small to cause race conditions
C. Multiple mutex locks are used in a consistent order across threads
D. Threads use a recursive mutex that supports multiple locks by the same thread

Answer: A thread releases the mutex before completing the critical section

15. In parallel programming, what happens if a thread fails to reach a barrier in a multi-threaded program

A. The program will terminate all other threads immediately
B. Threads that have reached the barrier will remain blocked indefinitely
C. The barrier will adjust automatically to the number of threads that reach it
D. All threads will proceed regardless of synchronization

Answer: Threads that have reached the barrier will remain blocked indefinitely