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Assignment -01

Ans1 Because OS provides essential services that hardware alone cannot like process scheduling memory management. I/o handling security & user Interface. Even with advanced hardware, an OS is needed to manage resources efficient & make the system OS able by applications & users

Ans-2

A real time operating system (RTOS) is most suitable because it provides fast & predictable response to time-critical event like heart rate monitoring Reliability low power usage & quick task switching are crucial in health devices

Ans-3

I would avoid 2 layered kernel because the strict layer hierarchy increase overhead (each request passed through multiple layers) which reduces performance for performance critical environment

Ans4

Refute - OS structure affects performance security scalability & maintainability e.g. a monolithic OS may be faster but harder to maintain

while a microkernel is more modular and secure but slightly slower

Ans D PCB stores process state, program counter CPU register memory info etc by checking PCB value, we can detect if register or process states were incorrectly saved or restored during Content switching

ii) Content switching saving the current process state (register, program counter etc) into its PCB & Loads the state of next process from its PCB, switching CPU control to the waiting process

iii) use a non-blocking asynchronous system call, because the process can continue execution without waiting for I/O, To finish improving performance and responsiveness

Ans Given

- Save state 2ms
Load state 3ms
Schedule overhead 1ms

a Total Content Switching time = Save time + Load time + Schedule overhead
= 2+3+1 = 6ms

context switching introduces overhead since CPU spend time switching instead of executing user process

- If switching takes too long or happens too frequently, CPU efficiency decreases

- In this case, 6 ms is small compared to execution times, so the system can still multitask efficiently. But with many processes, frequent switching will reduce throughput

Ans

Thread efficiency check

- Total time in single + threaded = 40 sec
- 8 thread per process (ideal conditions)

a) execution time (with 8 thread) = $\frac{40}{8}$ = 5 sec

b) Multithreading divides a process into smaller task that run in parallel

- It reduces execution times by utilizing multiple CPU cores

- Improves CPU utilization, responsiveness & throughput