

資格考試科目：高等作業系統

1. (15 pts) Three common approaches to structure an operating system kernel: Monolithic kernel, layered kernel, and microkernel. A monolith approach puts all operating system into one executable while a microkernel approach puts only essential functions to run in privileged mode.
  - a. (5 pts) which approach provides better efficiency and why?
  - b. (5 pts) which approach provides better security for the kernel and why?
  - c. (5 pts) which approach is not suitable for multicore platform and why?
2. (15 pts) Please answer the following questions for process management:
  - a. (10 pts) pagedaemon is a special process in Unix. What is its responsibility? Is it a long-term, mid-term, or short-term scheduler? You must explain why to receive any credits.
  - b. (5 pts) What is the major difference between vfork() and fork()?
3. (20 pts) The emerging of multicore environments provides lots of encouragement to multithread programming and challenges to process scheduling. Please answer questions in process/thread management:
  - a. (10 pts) Is the non-preemptive shortest-job-first scheduling algorithm (SJF) always better than the first-come-first-serve scheduling algorithm (FCFS) in terms of the average waiting time? You must provide explanation to get any points.
  - b. (10 pts) For the round-robin scheduling algorithm (RR), is RR with a big quantum always better than RR with a small time quantum in terms of the average completion time? You must provide explanation to get any points.
4. (15 pts) A virtual memory system can be structured on fixed-size pages and variable-size segments.
  - a. (5 pts) Compare the two approaches; describe one scenario the paging approach work better than the segment approach.
  - b. (5 pts) Following the previous question, describe one scenario the segment-based approach works better than the paging approach.
  - c. (5 pts) Describe the tradeoffs involved in having a design of smaller pages versus larger pages?
5. (10 pts) Please compare Cloud Computing and client-server model for distributed computing in terms of computation resource allocation and scalability.
6. (25 pts) System software for distributed systems
  - a. (10 pts) Many distributed file system uses transaction for file services. Give suitable examples to illustrate how transactions help to enable the concurrent sharing of mutable files by multiple clients in a consistent manner.
  - b. (15 pts) In distributed/multi-core operating systems, it is very often that the system has to adjust the workload on the computing unites/cores so as

to shorten the average response time. Please answer the following questions:

- I. (7pts) Please differentiate between preemptive and non-preemptive process migration.
- II. (8pts) From the point of view of supporting preemptive process migration facility, is a stateless or stateful file server preferable? Please give reasons for your answer.