Department of Computer Science and Engineering
National Sun Yat-sen University
First Semester of 2023 PhD Qualifying Exam

Subject： Operating Systems

1. [Process Management and Coordination: 20%]

(1) Explain five common criteria used to evaluate process scheduling algorithms. (10%)

(2) Explain three requirements for any solution to the critical-section problem. (3%)

(3) Explain how a deadlock avoidance scheme works. (2%)

(4) Explain how the multilevel queue scheduling algorithm works. (3%)

(5) What are conflicting operations? (2%)

2. [Memory Management: 20%]

(1) What is the difference between external and internal fragmentation? (4%)

(2) How does vfork() work? When will it be used? (3%)

(3) What is the difference between static and dynamic linking to libraries? (4%)

(4) What is swap space? What are the two major features of swap space? (3%)

(5) Please give the four steps in the page replacement routine. (4%)

(6) How does the page-fault frequency solution work? (2%)

3. [Storage Management: 20%]

(1) Explain the two interrupt request lines for a CPU. (4%)

(2) Explain the following terms: (10%)

　　(a) mount point, (b) seek time, (c) rotational latency, (d) vectored I/O, (e) spool.

(3) What is the major job of a device adapter? (2%)

(4) What does uniform naming mean in I/O software? (2%)

(5) How will BIOS do for implementing Plug'n Play? (2%)

4. [Distributed and Special Systems: 20%]

(1) Explain how the two-phase locking method works (5%)

(2) Suppose that processes P1, P2, and P3 have timestamps 35, 50, and 65, respectively. P2 is holding a resource that P1 and P3 want to access. Please show the behavior of these processes in the wait-die and wound-wait schemes. (5%)

(3) Explain real-time, safety-critical, and embedded systems. (6%)

(4) Explain the four commands defined in the real time streaming protocol. (4%)

5. [Protection and Security: 20%]

(1) Give four benefits of using language-based protection. (4%)

(2) Explain the least privilege principle and need-to-know principle. (4%)

(3) Give three methods to carry out a protection domain and explain when domain switch occurs. (6%)

(4) Explain Trojan horse, trap door, and stack & buffer overflow. (6%)