Operating Systems

List 2

Exercise 1

Present shortly how did the concept of processes and threads emerge. What was the motivation for OS designers to devise such mechanisms? What is the main difference between a process and a thread? Can a robust operating system be build without processes?

Exercise 2

Give a short description of batch system and its constituents. What was the motivation to introduce multiprogrammed batch systems? Devise a job control language (ie. a language for job declaration) - describe directives and give justification for them. Are batch systems still in use nowadays, if yes then what for?

Exercise 3

Describe the way multiprogrammed batch systems evolved into time-sharing systems. Does an interactive operating system have to be multiprogrammed? If no, the give an example of such system.

Exercise 4

Define preemption term and give mechanisms necessary to employ it in an operating system. Explain how the round-robin algorithm can be used in systems with cooperative and preemptive multitasking.

Exercise 5

Windows NT operating system was primarily designed as microkernel based OS. However, after some considerations, it was redesigned in hybrid architecture. Why it was done?

Exercise 6

Usually addresses, referred by process running under control of contemporary OSes, are not directly related to memory cells in the main memory. Why is that? Give three reasons, why such solution is employed. What are the drawbacks? Make sure you use proper terms to give the answer (ie. address space, real memory, virtual memory, MMU, etc.)

Exercise 7

Operating memory of Sony PSP console is divided into two blocks. First block has size of about 8MB and is reserved for the system. The remaining, size of which depends on the console model, is available for the user without the need for special reservation. Why such design is well-justified in this case? Can it be employed in PCs?

Exercise 8

Give examples of services and functions found in a typical monolithic OS that may be external subsystems to a microkernel OS.

Exercise 9

List four functions you would expect to find even in a minimal microkernel OS.

Exercise 10

Give a short description of IPC service in microkernel OS. Consider its limitations. In order to overcome them, devise an efficient method for exchange of large messages, that uses memory management mechanism (ie. Grant / Map / Flush operations).