

CS2506

2018/2019

## Review

### Sample of questions and problems

Prepare all lecture notes for the exam and review the problems solved during lectures. The exam paper may include questions as listed below, variations of them and problems.

Give comprehensive answers that address the respective question.

### I. Process management

1. Explain the structure of the OS and the role of each layer.
2. Analyse the structure and functions provided by the kernel of an OS.
3. How can a user program enter the kernel? Explain the trap mechanism.
4. Give a classification of OS.
5. Give a definition of the process and analyse it.
6. What are the main components of the process context?
7. Analyse the set of operations used for process management, considering their outcome.
8. Use an example to discuss what a child process is and how it is created.
9. Explain the concept of thread and its benefits. How is a thread managed?
10. What is thread affinity?
11. Explain the purpose of process scheduling.
12. Use a numeric example to analyse the shortest process first scheduling strategy.
13. What is priority scheduling? In this context, explain the concept of dynamic priorities.
14. Use a diagram to analyse the multilevel feedback queue scheduling strategy.
15. What is the purpose of priority inversion?
16. Explain the rationale behind two-level scheduling.
17. In the context of real-time scheduling, explain the earliest deadline first scheduling technique.
18. What is the main challenge of the scheduler in a multi-core system?
19. Analyse the idea of group scheduling.
20. Explain how the scheduling domain works. Present and discuss examples of policies.
21. What is active balancing?
22. What is the impact on the scheduler of a heterogeneous multi-core architecture?
23. Explain the component structure of TinyOS.
24. Analyse Android application's lifecycle using a diagram.
25. How are activities managed with tasks in Android?
26. Compare two different OS in terms of process management.

27. Show and comment Linux process state diagram.
28. How is the process ID allocated in Linux?
29. Present the steps of creating a child process in Linux by fork(), vfork(0) or clone().
30. Analyse the differences between fork() and vfork().
31. What is a race condition? Explain using an example.
32. What rules govern mutual exclusion?
33. How does a semaphore work?

## II. Memory management

34. Comment on the difference between virtual addresses and physical addresses.
35. Present methods used to translate virtual addresses into physical addresses.
36. Explain the mechanism of memory pages management and the general content of the page table entry.
37. What mechanisms can be used and how for the effective management of page tables?
38. How does the OS manage free memory space? Explain the free bitmap solution.
39. How does the OS manage free memory space? Explain the linked list solution. Discuss how this solution can be made more efficient.
40. What is memory fragmentation and how can it be minimized?
41. Compare the first fit, next fit, best fit and worst fit memory allocation strategies by using an example.
42. Analyse the buddy memory allocation algorithm.
43. Analyse the swapping technique of memory management. What is demand paging?
44. Compare two memory replacement strategies, “first in first out” and “second chance”.
45. Compare two memory replacement strategies, “second chance” and “the clock algorithm”.
46. Compare two memory replacement strategies, “not recently used” and “least recently used”.
47. Compare two memory replacement strategies, “least recently used” and “not frequently used”.
48. Analyse the working set strategy for memory replacement. What criterion is used to set the values of the two thresholds? Discuss how Win NT implements this strategy.
49. Explain Linux slab allocator system.

## III. I/O Devices Management

50. How does a device driver work?
51. Explain the concept of driver families.
52. What happens when a new device is plugged into the PCI bus of a computer?
53. Explain the structure of a device driver. What are water marks?
54. How are I/O devices represented in UNIX?
55. Compare two I/O schedulers.
56. Draw and discuss Android sensor subsystem.
57. What is the role of the Android application framework and how does it operate?

- 58. What is an Android sensor event?
- 59. Describe the Android event report modes.

## IV. The File System

- 60. What is a file and what is a directory?
- 61. How does the OS provide exclusive access to a file?
- 62. Explain the concept of file metadata. What is included in the metadata?
- 63. How does the OS manage free storage space?
- 64. Explain the purpose of Linux Virtual File System.
- 65. What are the main components of Linux VFS and how do they interact?
- 66. What are a superblock and an inode?
- 67. What is the connection between the inode and the file structure created when a file is opened?