

Name:	Neptun code:
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I. Test questions**Σ / 30 points****Description:**

Mark the proper answers! Mark Y, if you think that the statement is correct. Mark N, if you think that the statement is false. If you do not know the answer mark the "?" sign (question mark). If you would like to correct your answer, write the your answer in line with the question on the right side of the paper, your written answer should be correct, false, or "I don't know".

Scoring: A good answer is 1 point, a bad answer is -0.5 point. No less than zero points can be earned from a question group (negative points are counted only for a question group, not for the whole test).

1st question group. Operating system history.

1.	An operating system (OS) is an interface between hardware and user which is responsible for the management and coordination of activities and the sharing of the resources of a computer.	Y	N	?
2.	Early operating systems (50s and early 60s) allowed only character based on-line access for users using terminals.	Y	N	?
3.	The aim of multiprogramming is to increase CPU utilization to 100%, but 100% CPU utilization cannot be reached due to administrative overheads.	Y	N	?
4.	First operating systems allowing on-line user access did not allow users to run batch jobs in the background.	Y	N	?

2nd question group. Modern operating system taxonomy.

5.	Linux is a general purpose operating systems used only on PCs (x86 or amd64/x64 architecture).	Y	N	?
6.	Embedded operating systems are for specially designed hardware, they cannot run on the PC.	Y	N	?
7.	Hard real time systems server incoming request in a predefined time or the answer in considered erroneous.	Y	N	?
8.	A hard real-time operating system guarantees that certain operating system services can run with hard real-time constraints.	Y	N	?

3rd question group. Simplified state diagram of tasks.

9.	Tasks are put into the "RUNNING" state after task creation in a typical modern scheduler.	Y	N	?
10.	Tasks can only go to the "READY TO RUN" state from the "WAITING" state.	Y	N	?
11.	Task cannot go from "RUNNING" state directly to "READY TO RUN" state in non-preemptive (cooperative) operating systems.	Y	N	?
12.	State transitions in the in the state diagram are always started by interrupts (HW, SW or exception) in modern operating systems.	Y	N	?

4th question group. Multilevel queue scheduling.

13.	In priority based multilevel queue schedulers the tasks entering the "READY TO RUN" state are assigned to wait queues based on their priority.	Y	N	?
14.	In priority based multilevel queue schedulers the tasks scheduled for execution is selected from the queue with priority 0.	Y	N	?

15.	In priority based multilevel queue schedulers round-robin scheduling is used on a priority level.	Y	N	?
16.	If none of the tasks is in "READY TO RUN" state, the scheduler runs continuously, i.e., CPU is actively waiting for tasks.	Y	N	?

5th question group. Processes and threads.

17.	Processes have their own physical CPU and memory to execute, this is the so called sandbox for processes.	Y	N	?
18.	A process has its own heap, stack, data, code memory area, which cannot be directly accessed by other processes.	Y	N	?
19.	Threads are lightweight processes primarily developed to reduce the overhead of inter-process communication.	Y	N	?
20.	Threads running in a context of a process can communicate with each other directly using shared memory.	Y	N	?

6th question group. Resources, shared resources, and mutual exclusion.

21.	A shared resource may be used by more than one task in a time. And because mutual exclusion may not operate correctly in this situation, mutual exclusion must be provided.	Y	N	?
22.	In the field of parallel programming the main task of the system architect and the programmer is to efficiently parallelize the code.	Y	N	?
23.	Atomic operation is a single machine instruction, which cannot be interrupted.	Y	N	?
24.	Semaphore is an alternative solution to atomic operations to solve mutual exclusion problems.	Y	N	?

7th question group. Message passing implementations.

25.	Mailbox is an indirect form of inter-process communication, in which processes may leave messages for other processes using system calls.	Y	N	?
26.	TCP and UDP are a direct form of inter-process communications. However, they cannot be used between processes running on the same machine to communicate.	Y	N	?
27.	Remote procedure call (RPC) sends the function call parameters and the return value encoded in a hardware platform specific binary form.	Y	N	?

8th question group. Deadlocks.

28.	Deadlock is a circular waiting among a set of processes on a system halting the entire system.	Y	N	?
29.	If a system implements "Hold and Wait" type of resource allocation deadlocks can occur in the system.	Y	N	?
30.	The banker algorithm allocates resources to tasks in a way that results in a deadlock free operation. However, it is pessimistic; it may detect the possibility of deadlock that would not appear in the real system (the real system can run without problem).	Y	N	?

II/1. Task**Σ / 10 points**

See problems presented during lectures or in the book, and prepare yourself to reason about complex figures.

Problem solving example: See the comparison of FIFO, SJF, SRTF and RR scheduling on a given task set (task name, arrival time, and CPU burst are given. Compute CPU utilization or other scheduling metrics. You have to know and use the units of the metrics (% , s as unit of time) also!

II/2. Task**Σ / 10 points**

See problems presented during lectures or in the book, and prepare yourself to reason about complex figures.

Reasoning about figures and solutions: Describe the operation of Multilevel Feedback Queues (MFQ) scheduler. Draw a figure with three queues, one with normal time slice, one with double time slice, and with FIFO scheduling. Detail how tasks with various CPU bursts sequences are scheduled and queued!