

Name	Signature	Student Id Nr	Points

Operating Systems, miniexam 2, 12.2.2020 (12p)

Write your answer on this exam paper in the space given. Please notice, that the exam paper is 2-sided.

- a) [4 p] System has three critical regions (R, S, and T). Thread A uses most of the time only one of them at a time, but sometimes when using S or T it also needs R for a short time. Threads B and C use most of the time only one of them at a time, but sometimes when using R or T they also need S for a short time. System was deployed, and then found to end up with a deadlock once per maybe 2-4 weeks.
- i. [1 p] Give a scenario leading to deadlock, and explain why it leads to deadlock.

- ii. [3 p] How should one modify the codes for A, B and C, so that all possibilities for deadlock would be removed? Explain the modifications needed for each thread. Explain why the scenario leading to deadlock given above is not possible any more.

- b) [3 p] Memory management without virtual memory

- i. [1 p] Which problem caused by Best-fit algorithm is solved with Buddy algorithm?

- ii. [1 p] Will use of Buddy algorithm lead to internal fragmentation? If it does, give an example?

- iii. [1 p] Will use of Buddy algorithm lead to external fragmentation? If it does, give an example?

c) [3 p] Virtual memory page replacement policy

i. [1 p] How does Optimal page replacement policy work? Is it global or local replacement policy? Why it cannot be implemented in practice?

ii. [2 p] What data is Clock page replacement policy based on? Where is that data located, who updates it and when? Is Clock global or local replacement policy?

d) [2 p] Trashing

i. [1 p] Explain the concept “trashing”, which is related to virtual memory systems.

ii. [1 p] How will PFF-algorithm try to prevent trashing dynamically during run time?