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CMPG324 TEST 1 2024 MEMO

Operating Systems (North-West University)

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STUDENT NAME:
STUDENT NUMBER:

Module Name: OPERATING SYSTEMS
Module Code: CMPG324
CLASS: THIRD YEAR MODULE
TIME ALLOWED: ONE HOUR
INSTRUCTIONS: ATTEMPT ALL QUESTIONS AND WRITE ON THIS SHEET AND SUBMIT
Turn and write at the back of the sheet in case the space provided is not enough.

MEMO

1. How does the operating system found on a smartphone differ from one used for home automation? The home automation system has various environmental sensors and switches to control lights. The information from the sensors is sent to a web service. Discuss the types of operating systems, as well as the properties of the operating system types for the given example. (15 marks)

Any **software** attribute, e.g. multiprogramming, multi-processing, multi-threading, 3rd party app support, etc. Hardware attributes, such as size of memory, battery, processing power, etc. do not qualify	2 marks for each attribute for a maximum of 2 correct of a handheld OS (4marks)	2 marks for each attribute for a maximum of 2 correct of a personal computer (home automation) OS (4marks)

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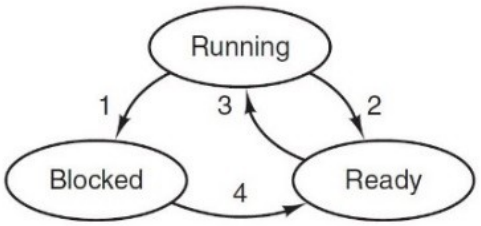
Any **software** attribute, e.g. multiprogramming, multi-processing, multi-threading, 3rd party app support, etc. Hardware attributes, such as size of memory, battery, processing power, etc. do not qualify	2 marks for each attribute for a maximum of 2 correct of a handheld OS (4marks)	1,5 marks for each attribute for a maximum of 2 correct of a personal computer (home automation) OS (3marks)

2. Give a diagram and discuss the process states, as well as the process state transitions, for a small database management system with threads for data management, UI, and I/O, that runs on a local computer. Also discuss threading and its impact on the process states (15marks).

! marks for each state including a state for block and termination.

1 mark for each for links to the appropriate state.

5 marks for explanation relating the diagram to the question. Links are threads



1. Process blocks for input
2. Scheduler picks another process
3. Scheduler picks this process
4. Input becomes available

Figure 2-2. A process can be in running, blocked, or ready state. Transitions between these states are as shown.

3. Discuss 4 ways in which race conditions can be avoided (10 marks).

(2.5 marks for any 4 steps listed from the list below = 10marks)

- Disable interrupts
- Lock shared variables
- Strict alternation
- Peterson's solution
- TSL instructions
- Semaphores

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4. Illustrate, using a diagram, the basic functioning of a system call (for example reading a file) 10marks.

Any diagram containing the following:

I mark for each step got correctly in the diagram.

If a step is listed but without the diagram drawn, give 0.5 marks for each step without diagram.

(total 10 marks)

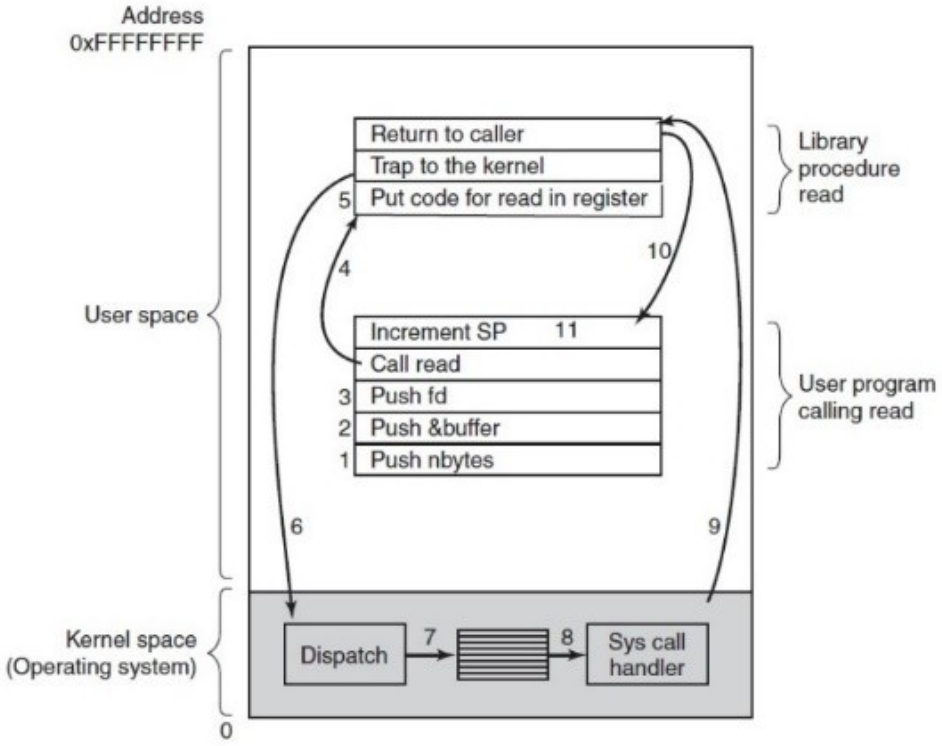

Figure 1-17. The 11 steps in making the system call read(fd, buffer, nbytes).

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