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|---|---|
| **Started on** | Tuesday, 14 May 2024, 3:15 PM |
| **State** | Finished |
| **Completed on** | Tuesday, 14 May 2024, 4:00 PM |
| **Time taken** | 44 mins 52 secs |
| **Marks** | 12.25/60.00 |
| **Grade** | **4.08** out of 20.00 (**20.42**%) |

Question **1**

Correct

Mark 1.00 out of 1.00

Semaphores are used to solve the problem:

- a. process scheduling
- b. races
- c. mutual exclusion ✔
- d. Belady problem

The correct answer is: mutual exclusion

Question **2**

Incorrect

Mark 0.00 out of 1.00

When the processor is released, the scheduler selects one of the queued processes:

Select one or more:

- a. suspended
- b. waiting
- c. ready ✔
- d. running ✖

Twoja odpowiedź jest niepoprawna.

The correct answer is: ready

Question 3

Incorrect

Mark 0.00 out of 1.00

There are three processes in the system:

- C - calculation process (batch process performing complex calculations lasting several hours),
- T - text editor (user edits text document)
- K - compiler (the user compiles the program, e.g. in C++).

Assign processes to priorities in the operating system from the highest to the lowest priority.

highest C ✖

intermediate T ✖

lowest K ✖

Twoja odpowiedź jest niepoprawna.

The correct answer is:

There are three processes in the system:

- C - calculation process (batch process performing complex calculations lasting several hours),
- T - text editor (user edits text document)
- K - compiler (the user compiles the program, e.g. in C++).

Assign processes to priorities in the operating system from the highest to the lowest priority.

highest [T]

intermediate [K]

lowest [C]

Question 4

Correct

Mark 1.00 out of 1.00

Semaphore function is to:

- a. synchronize processes for better CPU utilization
- b. synchronize critical resources to prevent deadlock ✔
- c. memory management
- d. process scheduling

The correct answer is: synchronize critical resources to prevent deadlock

Question 5

Correct

Mark 1.00 out of 1.00

At the blocked state is a process that:

Select one or more:

- a. occupies a processor
- b. waits for a processor
- c. waits for an I/O operation to complete ✔
- d. fills the processor idle time

Twoja odpowiedź jest poprawna.

The correct answer is: waits for an I/O operation to complete

Question 6

Correct

Mark 1.00 out of 1.00

In the running state, there is a process that:

Select one or more:

- a. waits for an I/O operation to complete
- b. fills the CPU idle time
- c. waits for a processor
- d. occupies a processor ✔

Twoja odpowiedź jest poprawna.

The correct answer is: occupies a processor

Question 7

Incorrect

Mark 0.00 out of 1.00

What are the functions of the kernel?

- a. Program management ✖
- b. Memory management ✖
- c. Interrupt handling ✔
- d. File management ✖

The correct answer is: Interrupt handling

Question 8

Incorrect

Mark 0.00 out of 1.00

The system stack must provide space for:

Select one or more:

- a. Processor registers in as many copies as there are interrupt lines and possible software interrupts ✖
- b. Processor registers in as many copies as there are interrupt lines +1 ✔
- c. Processor registers in as many copies as there are devices in the system +1
- d. CPU registers

Twoja odpowiedź jest niepoprawna.

The correct answer is: Processor registers in as many copies as there are interrupt lines +1

Question 9

Partially correct

Mark 0.33 out of 1.00

Interrupt vector is saved in a case of:

Select one or more:

- a. subroutine call
- b. accepting a non-maskable interrupt
- c. accepting a hardware interrupt ✔
- d. jump with trace

Twoja odpowiedź jest częściowo poprawna.

You have correctly selected 1.
The correct answers are: accepting a hardware interrupt, accepting a non-maskable interrupt, jump with trace

Question 10

Incorrect

Mark 0.00 out of 1.00

The environment in which the process is executed includes:

Select one or more:

- a. Open files ✔
- b. Contents of the interrupt request register
- c. General purpose registers content ✔
- d. The content in the memory management unit ✖

Twoja odpowiedź jest niepoprawna.

The correct answers are: General purpose registers content, Open files

Question 11

Partially correct

Mark 0.50 out of 1.00

The return from interrupt instruction:

Select one or more:

- [x] a. restores the program counter ✔
- [ ] b. restores the conditions register
- [ ] c. restores the process stack
- [ ] d. causes the processor to switch to a process other than the interrupted one

Twoja odpowiedź jest częściowo poprawna.

You have correctly selected 1.

The correct answers are: restores the program counter, restores the conditions register

Question 12

Partially correct

Mark 0.50 out of 1.00

What mechanism is part of batch systems?

- [ ] a. low-level scheduler
- [ ] b. no scheduler is needed
- [ ] c. medium-tevel scheduler
- [x] d. high-level scheduler ✔

The correct answers are: high-level scheduler, medium-tevel scheduler

Question 13

Incorrect

Mark 0.00 out of 1.00

Operation V on a raised binary semaphore:

Select one or more:

- a. It is stored in order to be able to perform as many operations P as there were V
- b. Increases semaphore value by 1 ✖
- c. It does not change the value of the semaphore

Twoja odpowiedź jest niepoprawna.

The correct answer is: It does not change the value of the semaphore

Question 14

Incorrect

Mark 0.00 out of 1.00

The scheduler decisions take the form:

Select one or more:

- a. change from waiting to active state
- b. change from active to ready state
- c. change from ready to active state ✔
- d. change from waiting to ready state ✖

Twoja odpowiedź jest niepoprawna.

The correct answer is: change from ready to active state

Question 15

Incorrect

Mark 0.00 out of 1.00

The multi-level interrupt controller includes:

Select one or more:

- a. Priority encoder ✔
- b. Individual interrupt mask ✔
- c. The register of interrupt being serviced ✖
- d. Collective interrupt mask

Twoja odpowiedź jest niepoprawna.

The correct answers are: Collective interrupt mask, Individual interrupt mask, Priority encoder

Question 16

Partially correct

Mark 0.50 out of 1.00

Scheduling aims to optimize:

Select one or more:

- a. reaction time
- b. wait time ✔
- c. processor utilization
- d. system throughput ✔

Twoja odpowiedź jest częściowo poprawna.

You have correctly selected 2.

The correct answers are: processor utilization, system throughput, wait time, reaction time

Question 17

Incorrect

Mark 0.00 out of 1.00

Which mechanism is a part of Time-sharing systems?

Select one or more:

- a. no scheduler is needed
- b. Long-Term Scheduler ✖
- c. Medium-Term Scheduler
- d. Short-Term Scheduler ✔

Twoja odpowiedź jest niepoprawna.

The correct answer is:
Short-Term Scheduler

Question 18

Correct

Mark 1.00 out of 1.00

When an exception is raised in user mode, the operating system switches to the kernel system stack, and what happens when an exception is raised in system mode?

Select one or more:

- a. initializes the kernel system stack from the scratch
- b. switches back to the application program stack
- c. switches to the next kernel system stack
- d. nothing special, it builds the context on the kernel system stack ✔

Twoja odpowiedź jest poprawna.

The correct answer is: nothing special, it builds the context on the kernel system stack

Question 19

Incorrect

Mark 0.00 out of 1.00

The interrupt acceptance sequence consists of (in the sequence):

Select one or more:

- a. identification of the interrupt level, performing a jump with the trace according to the interrupt table, saving the interrupt vector
- b. identification of the interrupt level, performing a jump according to the interrupt table, saving the interrupt vector
- c. identification of the interrupt level, saving the interrupt vector, performing a jump with a trace according to the interrupt table
- d. identification of the interrupt level, saving the interrupt vector, performing a jump according to the interrupt table ✖

Twoja odpowiedź jest niepoprawna.

The correct answer is: identification of the interrupt level, saving the interrupt vector, performing a jump with a trace according to the interrupt table

Question 20

Correct

Mark 1.00 out of 1.00

Round-robin scheduling is the best mechanism for:

Select one or more:

- a. every system
- b. system with different classes of tasks
- c. time-sharing system ✔
- d. real-time system

Twoja odpowiedź jest poprawna.

The correct answer is: time-sharing system

Question 21

Incorrect

Mark 0.00 out of 1.00

Which scheduler is also called a job planner?

- a. long-term
- b. medium-term
- c. short-term ✖
- d. auxiliary

The correct answer is: long-term

Question 22

Incorrect

Mark 0.00 out of 1.00

Which of the following statements applies to the process?

- a. A process is a running program.
- b. A process is defined as a set of resources needed to run a program. ✔
- c. A process is code and data loaded into main memory. ✖
- d. The execution of the process must proceed in a sequential manner.

The correct answers are: A process is a running program., The execution of the process must proceed in a sequential manner., A process is defined as a set of resources needed to run a program.

Question 23

Incorrect

Mark 0.00 out of 1.00

Which scheduling is used to organize concurrency?

Select one or more:

- a. preempting ✖
- b. short-term
- c. long-term
- d. medium-term

Twoja odpowiedź jest niepoprawna.

The correct answer is: short-term

Question 24

Incorrect

Mark 0.00 out of 1.00

What can happen when a job leaves the critical section and more than 1 task is waiting for the critical section?

Select one or more:

- a. letting both tasks into the critical section ✖
- b. active waiting for a critical section ✖
- c. deadlock waiting for critical section
- d. starvation awaiting a critical section ✔

Twoja odpowiedź jest niepoprawna.

The correct answer is: starvation awaiting a critical section

Question 25

Correct

Mark 1.00 out of 1.00

Context switch is:

Select one or more:

- a. calling the kernel of the operating system
- b. switching to the system stack
- c. writing registers to the task stack and retrieving them from another task stack ✔
- d. extracode execution

Twoja odpowiedź jest poprawna.

The correct answer is: writing registers to the task stack and retrieving them from another task stack

Question 26

Incorrect

Mark 0.00 out of 1.00

Using the Test-And-Set instruction in synchronization:

Select one or more:

- a. Stops the processor if 0 is read
- b. Requires organizing inactive waiting in queues
- c. Requires the use of semaphores ✖
- d. It requires processes to actively wait

Twoja odpowiedź jest niepoprawna.

The correct answer is: It requires processes to actively wait

Question 27

Partially correct

Mark 0.75 out of 1.00

How does the operating system call the task completion subroutine?

4. recreates the context programmatically and executes the IRET instruction ✔
2. sets the trace in the terminating subroutine to the current position ✔
3. recreates the context programmatically and executes the IRET instruction ✖
1. builds the frame of the terminating subroutine on the task stack ✔

Twoja odpowiedź jest częściowo poprawna.

You have correctly selected 3.

The correct answer is: 4. → recreates the context programmatically and executes the IRET instruction, 2. → sets the trace in the terminating subroutine to the current position, 3. → builds an interrupt vector on the system stack pointing to the terminating subroutine code, 1. → builds the frame of the terminating subroutine on the task stack

Question 28

Correct

Mark 1.00 out of 1.00

Interrupt request register is:

Select one or more:

- [ ] a. a register that blocks or unblocks all interrupts
- [x] b. a register where interrupt line states are stored ✔
- [ ] c. a register that blocks or unblocks individual interrupts
- [ ] d. a combinational circuit that calculates the number of the interrupt received

Twoja odpowiedź jest poprawna.

The correct answer is: a register where interrupt line states are stored

Question 29

Correct

Mark 1.00 out of 1.00

What mechanism is part of time-sharing systems?

- a. medium-term scheduler
- b. swapping
- c. short-term scheduler ✔
- d. long-term scheduler

The correct answer is: short-term scheduler

Question 30

Partially correct

Mark 0.67 out of 1.00

The environment in which the process is executed includes:

Select one or more:

- a. General purpose registers content
- b. Process address space ✔
- c. Contents of the interrupt request register
- d. A set of environment variables ✔

Twoja odpowiedź jest częściowo poprawna.

You have correctly selected 2.
The correct answers are: A set of environment variables, Process address space, General purpose registers content

Question 31

Incorrect

Mark 0.00 out of 5.00

What is the average time in the system for tasks in the batch, using SJF algorithm?

The system is equipped with 4 processors

| task | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| processing time | 3.6 | 4.6 | 2.4 | 1.2 |

Answer: 4.35 ✖

The correct answer is: 2.9

Question 32

Complete

Mark 0.00 out of 25.00

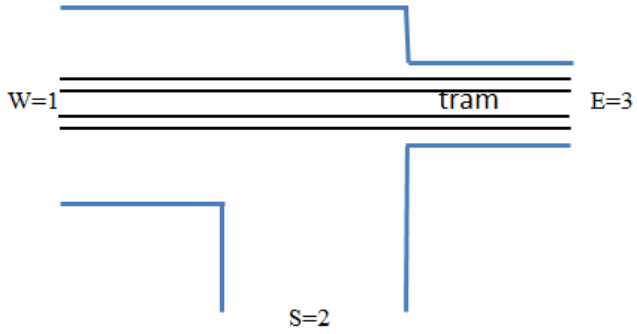
Design a priority semaphore and use it to control traffic at the intersection.

Trams have priority over cars.

Note: tram tracks close to the edge mean that a car cannot fit parallel to a tram, far from the edge means a car can fit.

WSE - direction numbering.

Topography of the intersection:




```
class IntersectionSemaphore:
  def __init__(self):
    self.tram_priority = False  # Flag indicating if trams have priority
    self.tram_queue = []  # Queue for trams waiting at the intersection
    self.car_queue = []  # Queue for cars waiting at the intersection

  def tram_arrival(self, direction):
    if not self.tram_priority and not self.car_queue:
      self.tram_priority = True
    self.tram_queue.append(direction)

  def car_arrival(self, direction):
    if self.tram_priority or self.tram_queue:
      self.car_queue.append(direction)

  def tram_departure(self):
    if self.tram_queue:
      self.tram_queue.pop(0)
    if not self.tram_queue:
      self.tram_priority = False

  def car_departure(self):
    if self.car_queue:
      self.car_queue.pop(0)
```

```
    def print_intersection_status(self):
        print("Tram Priority:", self.tram_priority)
        print("Tram Queue:", self.tram_queue)
        print("Car Queue:", self.car_queue)


# Example usage:
intersection = IntersectionSemaphore()

# Tram arrives
intersection.tram_arrival("WSE")

# Car arrives
intersection.car_arrival("WSE")

# Tram departs
intersection.tram_departure()

# Car departs
intersection.car_departure()

# Print intersection status
intersection.print_intersection_status()
```

Comment:
A vehicle should not reserve the entire crossing