Toets Digitaal Hertentamen Besturingssystemen [5062BEST6Y] 02-07-2019

Toets-ID: 68904
Map: /Preview
Versie: 1.2
At random samengesteld: Nee
Wijzigdatum: Dinsdag, 10 maart 2020 10:32:00
Aantal vragen: 22
Vraagvolgorde: Vast
Vragen eenmalig afnemen: Nee
Spellingchecker browser: Nee
Rekenmachine beschikbaar: Ja
Tijdsduur: 180 minuten
Cesuur: Geen
Maximum score: 88 pt.
Kansscore: 19,99 pt. / 23%
Cijferschaal: -
Scoringsregel: Geen puntenaftrek bij fout antwoord
In serie met: -

Toetsinstructie

COURSE: Besturingssystemen

PROGRAMME: Bachelor Informatica

Digital Retake

Date: 02-07-2019
Time: 09:00-12:00
Duration: 3 hours
Location: NTH A5.01

BEFORE YOU START
Place your ID clearly visible on the right side of the desk.
Read this page carefully. Click on the button on the bottom right: **Start**.
Wait until the teacher gives you the **password**, fill it in and click **OK**.

HOUSEHOLD ANNOUNCEMENT
Permitted aids: paper, will be provided.
You may not leave the room during the first 30 minutes and the last 15 minutes of the test.
On request of the examiner (or his/her representative) you should be able to identify yourself with a valid ID card.
During the test it is not allowed to go to the toilet unless the supervisor allows it.
When you have finished the test, raise your hand and stay seated until a supervisor gives you instruction and checks the submission of the test.

MAKING THE TEST
You can mark unanswered questions with the Tick-Box below the question so you can easily return to them later.
Your answers will be stored automatically. In case of accidentally closing TestVision Online, or when something else happens causing TestVision Online to re-start, you can proceed after logging in where you left off.
Make sure to answer all the questions before handing in the test. You can check this in the strip at the bottom of the screen: Answered questions turn dark-grey. When you have answered all questions: submit the test by clicking "Ready".
When no time is left, the test will automatically be submitted.
The time starts when you fill in the **password** and you click **OK**.

TECHNICAL PROBLEMS OR QUESTIONS
Raise your hand and wait for someone to come over to help you

Good luck!

Resultaat tekst

Thank you for making this test.

Vraag 1 − Ch 1.1 Roles of OS − 135053.2.0

What is/are the role(s) of an operating system?

provide easy of use to the user.

manage the resources of the computer.

manage the execution of user programs to prevent errors.

offer a full suite of applications that users need to do their work.

manage the Level 1 and 2 caches of the system's CPUs for performance.

Vraag 2 − Ch 1.2 Various CPU / storage / time share − 135054.2.0

Which statement(s) is/are true?

in the storage-device hierarchy from registers to tape, storage in the higher levels is cheaper per bit of storage.

in a time-sharing system multiple jobs run or appear to run at the same time.

privileged instructions called from kernel mode cause the CPU to trap.

CPUs with multiple modes of operation are useful for hypervisors.

Vraag 3 − Ch 2.1 System Call Params Linux − 135055.2.0

How are system call parameters passed to the kernel in Linux?
Multiple answer may be correct.

via registers.

via the stack.

via a block in memory.

via interprocess communication.

Vraag 4 − Ch 2.2 Loadable Kernel Mods Architecture − 135056.2.0

An operating system design with loadable kernel modules is similar to?
Multiple answers may be correct.

MS-DOS.

a microkernel.

a layered system.

a monolithic system.

Vraag 5 − Ch 3.1 Mem Layout − 134643.2.0

A process in memory consists of several sections. Place the sections given in order, the sections with the lowest memory address first.

1   Text section

2   Data section

3   Heap section

4   Empty space

5   Stack section

Given the following incomplete process state-graph, match the 1 to 4 and A to D with the following terms: *finished, running, new, blocked, wait for event, event received*, *dispatch* and *pre-empt*.
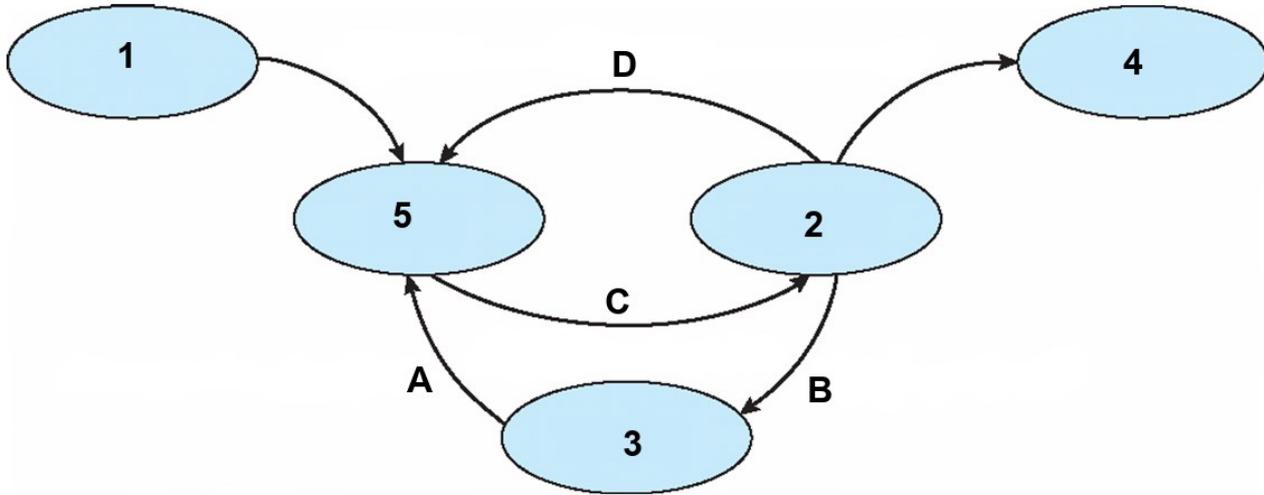
Match each row with its correct answer

1	state: new
2	state: running
3	state: blocked
4	state: finished
5	state: ready
A	transition: event received
B	transition: wait for event
C	transition: dispatch
D	transition: pre-empt

Vraag 7 − Ch 5.1 Priority Schedule Order − 135059.2.0

Consider the following set of processes, arriving at time 0 with the length of the CPU burst given in milliseconds and the given priority. A lower number means a higher priority.

Process	Burst Time	Priority
P1	7	4
P2	2	2
P3	4	1
P4	3	3
P5	5	5

Place the processes in the order they would be scheduled, when Priority Scheduling is used

1   P3

2   P2

3   P4

4   P1

5   P5

Vraag 8 − Ch 5.2 Priority Schedule Avg Wait Time − 135060.3.0

Consider the following set of processes, arriving at time 0 with the length of the CPU burst given in milliseconds and the given priority. A lower number means a higher priority.

Process	Burst Time	Priority
P1	7	4
P2	2	2
P3	4	1
P4	3	3
P5	5	5

Calculate the average waiting time, when Priority Scheduling is used

7

Vraag 9 − Ch 6.1 Common Term Descriptions − 135063.2.0

Match the following terms to their description.

Race condition	Processes are concurrently modifying shared data.
Deadlock	Processes are waiting for eachother indefinitely.
Busy waiting	Processes occupy the CPU whilst synchronizing.
Priority inversion	Processes must wait eventhough they are more important.

Vraag 10 − Ch 6.2 Producer Semaphore 5 items − 135064.3.0

Consider the producer-consumer implementation using semaphores as discussed in the book. The producer code is as follows:

```
do
{
    ...
    /* produce an item in next_produced */
    ...
    wait(empty);
    wait(mutex);
    ...
    /* add next produced to the buffer */
    ...
    signal(mutex);
    signal(full);

} while(true);
```

`mutex`, `empty` and `full` are counting semaphores. Assume the buffer can hold at most 11 items, and currently holds 5.

a. What should the counter value of `empty` be at this point for the code to work correctly?
b. What should the counter value of `full` be at this point for the code to work correctly?

[Numeriek]   [Numeriek]
6   **5**

Vraag 11 − Ch 8.1 Contiguous Paging Various − 135065.2.0

Which statements is/are true?

contiguous memory allocation suffers from external fragmentation.

page-based memory allocation suffers from internal fragmentation.

a limit and relocation register can offer inter-process protection when using paging.

contiguous memory allocation always uses fixed-sized blocks of memory.

Vraag 12 − Ch 8.2 Open What Problem TLB? − 135066.1.1

Briefly describe what problem a translation look-aside buffer (TLB) tries to solve?

Beoordelingsvoorschrift

Criterium 1 (Aantal punten: 1)

Speed up lookups in large page tables.

Criterium 2 (Aantal punten: 1)

Otherwise 2 memory access are needed to read 1 byte: 1 to the page table, 1 the actual memory location
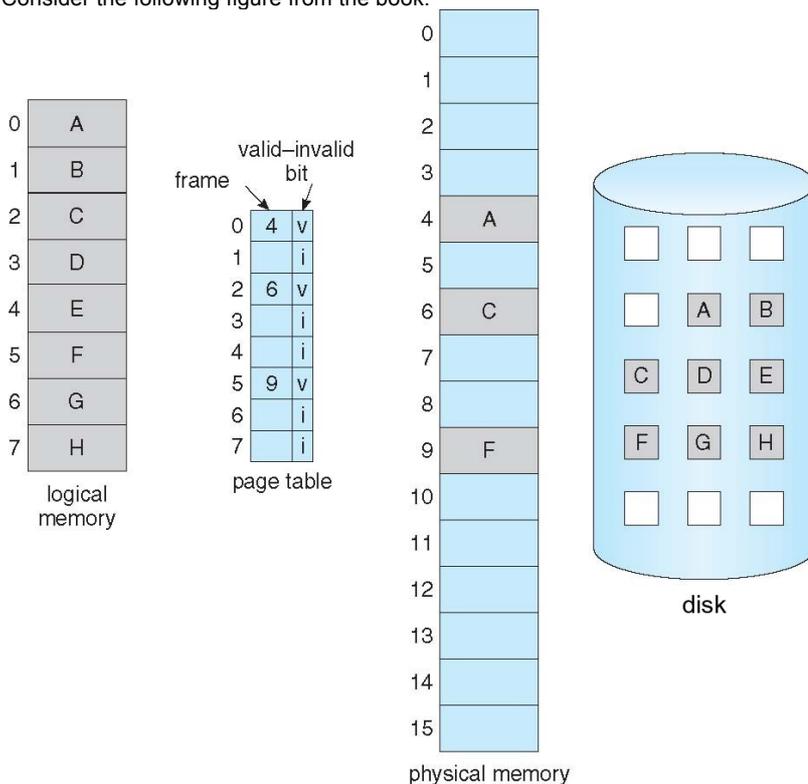
Criterium 3 (Aantal punten: 1)

Implemented in hardware

Criterium 4 (Aantal punten: 1)

Associative cache mapping logical page number to physical frame number

Consider the following figure from the book:

Briefly describe the steps that happen when the CPU accesses page E.

Beoordelingsvoorschrift

Criterium 1 (Aantal punten: 1)

CPU/MMU looks up slot 4 in the page table.
CPU notices this page is not in memory (i bit in entry 4), generate page fault

Criterium 2 (Aantal punten: 1)

Operating system is run, loads page from disk into memory slot

Criterium 3 (Aantal punten: 1)

Operating system updates page table.

Criterium 4 (Aantal punten: 1)

CPU resumes operation on page E.

Which statement is/are true about memory-mapped files?

can make I/O more efficient by not using read()/write() system calls.

the copy of the file in memory is always in sync with that on disk.

memory mapping a file means completely loading it into memory.

can be used to implement communication between processes.

Vraag 15 − Ch 9.5 = 16.1 Virtualization benefits − 135069.2.0

What is/are common benefits of virtualization implementations?

ability to create snapshots of machines.

ability to consolidate multiple machines on a single physical system.

ability to migrate virtual machines to another physical host.

ability to run multiple hypervisors on the same machine.

ability to migrate processes between different virtual machines.

Vraag 16 − Ch 9.6 = 16.2 What Mech User Mode − 135086.2.0

In virtualization, what mechanism(s) can be used to let the Guest Operating System run in User Mode?

trap-and-emulate

binary translation

paravirtualization

virtual CPU

Vraag 17 − Filesystems − Blockgroups − 133886.2.1

Which of the following statement(s) about an indexed filesystem is/are correct?

A blockgroup always contains a copy of the superblock

A blockgroup always contains a copy of the bootblock

A blockgroup always contains a number of datablocks

A blockgroup always contains a copy of the partition table

Vraag 18 − Filesystems − NFS − 133890.3.0

Which of the following statement(s) is/are correct about the Networked File System (NFS)?

it uses remote procedure calls protocol representing a set of basic file operations.

Servers for a Networked File System (modern types) are stateless.

Most NFS requests are idempotent.

Servers for a Networked File System (modern types) are **not** stateless.

Vraag 19 − RT 1a. schedulability − 133884.2.0

1. Given the following Task set:

2.

Task name	Period	Execution Time
T1	7	3
T2	8	4

Suppose the execution time of T2 changes from 4 to 4.5 and we use EDF scheduling. Which of the following statements about the task set is true?

The task set is schedulable because the utilization is 0.99 which is smaller than 1.

The taskset is **not** schedulable because the utilization is 0.99 which is smaller than 1

The taskset is schedulable because the utilization is 0.56 which is smaller than 1.

The taskset is **not** schedulable because the utilization is 0.56 which is smaller than 1

Vraag 20 − RT − 1b WCRT scheduling − 133885.2.1

Suppose we use the same taskset as above with the execution time of T2 changed to 4.5 and we use RM scheduling. Suppose the priority of T1 > T2. What is the worst case response time of T2?
Use 1 digit after the decimal point (depending on the system you will need a comma or dot to represent a floating point number like 1,2 or 2.6)

10,5

Vraag 21 − security − NX flag − 133892.2.1

Which statement(s) about the NX flag is/are true?

NX means "no execute" and determines if a file can be executed

The NX flag is a protection against execution of data which is stored in the stack space

The NX flag is a high order bit in the page table entry

The NX flag is part of the SeLinux protection and gives a layer of protection against unauthorized access of a file.

Which of the following statements correctly represents the actions during mutual ssh key authentication.
(The set of messages is in reality a bit more complicated. This is a simplified version)

1. The client Alice initiates the connection by contacting the server Bob. Both exchange their public keys.
2. Bob generates a random number, encrypts it using the public key of Alice and sends the result to Alice.
3. Alice decrypts the message using her private key and is able to read the original random number.
4. Alice also encrypts the message with Bob's public key and sends the result to Bob.
5. Bob decrypts this message using his private key and compares the result with original sent message.

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