

Review moment

Exam

Name	Besturingssystemen Final Exam 2017
Study	Besturingssystemen
Status	Closed

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Result

Score	17 (Maximum score: 23)
Result	Voldoende

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- Questions answered correctly: 6 (60%)
- Questions mostly answered correctly: 2 (20%)
- Questions mostly answered incorrectly: 1 (10%)
- Questions answered incorrectly: 1 (10%)

Order by **Question number**

- Question 1



Answered on	May 31, 2017, 9:05:24 AM	Duration	1 min. and 34 sec.	Score	4 of 4 points
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i Response model changed by Sebastian Altmeyer on Jun 8, 2017, 10:32:22 PM for reason "Previous answer was incorrect,"

Given the following table:

Segment	Base	Limit
1	700	200
2	1000	1750
3	3700	150
4	4100	1500
5	200	325
6	6000	3500

Provide for the following list of access the physical address and indicate for each access, if it is valid or not. Please fill in blank only one word: valid or invalid

- 4, 1547: physical address: Is it valid or invalid?

- 5, 433: physical address: Is it valid or invalid?

- 2, 1375: physical address: Is it valid or invalid?

- 1, 135: physical address: Is it valid or invalid?

- Question 2



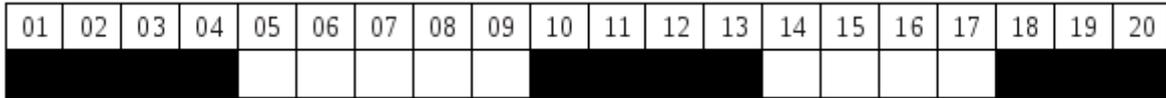
Answered on May 31, 2017, 9:07:54 AM Duration 2 min. and 57 sec. Score 3 of 3 points

The motivation for this change was:

Response model changed by Natasa Brouwer on Jun 13, 2017, 11:05:21 AM for reason "Now the answer model is complete with 6, instead of only 3 options per question."

Comparison First-Fit, Best-Fit, Worst-Fit

Given the following memory layout, where black boxes indicate occupied memory slots, and white boxes free memory.



Assume now that we need to allocate three contiguous memory requests of sizes 2, 3, and 4.

Assume the memory requests arrive in the order 2, 3, 4 and assume that *first-fit* starts from the left-most block, i.e. memory block #1. Indicate for each policy (first, worst, best) if its able to serve all memory requests.

first: yes
 worst: no
 best: no

Provide an order of the memory requests 2, 3, 4 so that *worst-fit* is able to allocate all requests, but *best-fit* is not.

2,4,3 3 4 2 1 pt. (correct) 3,4,2 1 pt. 3, 4, 2 1 pt. 2 4 3 1 pt. 2,4,3 1 pt. 2, 4, 3 1 pt. 2-4-3 1 pt.
 3-4-2 1 pt.

Provide an order of memory requests 2, 3, 4 so that *best-fit* is able to allocate all requests, but *worst-fit* is not.

4,3,2 4 3 2 1 pt. (correct) 4,3,2 1 pt. 4, 3, 2 1 pt. 4 2 3 1 pt. 4,2,3 1 pt. 4, 2, 3 1 pt. 4-2-3 1 pt.
 4-3-2 1 pt.

Checked by Taco Walstra

Score part a: (max 1 point)	1	Correction criterion: first-fit only
Given score:	2	

Question 3

Answered on May 31, 2017, 9:33:37 AM Duration 11 min. and 37 sec. Score 1.5 of 3 points

The motivation for this change was:

Response model changed by Sebastian Altmeyer on Jun 6, 2017, 11:52:11 PM for reason "The initial miss numbers were off by one for FIFO and LRU"

Replacement policies

Given an initial empty page-table of size 3 and the following series of page requests:

1 2 3 1 4 2 5 3 4

When showing the content of the page table, you can skip the first 3 accesses.

What is the minimal number of page faults? 2 5 0.5 pt.

Show the content of the page table after each access.

1 2 3
4 2 3
4 2 3
4 5 3
4 5 3
4 5 3

How many page faults occur with FIFO replacement?

0.5 pt.

Show the content of the page table after each access.

1 2 3
4 2 3
4 2 3
4 5 3
4 5 3
4 5 3

How many page faults occur with LRU replacement?

0.5 pt.

Show the content of the page table after each access.

1 2 3
1 4 3
1 4 2
5 4 2
5 3 2
5 3 4

Checked by Sebastian Altmeyer

Score part b: (max 0.5 points)	0.5	Correction criterion: 1 1 1 1 4 4 5 5 5 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3
Score part d: (max 0.5 points)	0.5	Correction criterion: 1 1 1 1 4 4 4 4 3 2 2 2 2 5 5 5 3 3 3 3 2 2
Score part f: (max 0.5 points)	0.5	Correction criterion: 1 2 3 1 4 2 5 2 3 1 2 3 1 4 2 5 2 1 2 3 1 4 4 5
Given score:	1.5	

■ Question 4

Answered on May 31, 2017, 9:00:38 AM **Duration** 10 sec. **Score** 1 of 1 points

Translation Look-Aside Buffer

What is the purpose of the TLB?

Indicate what is correct.

- Detect segmentation faults.
- Implement separation between processes.
- Detect page faults.
- Improve performance of memory accesses.

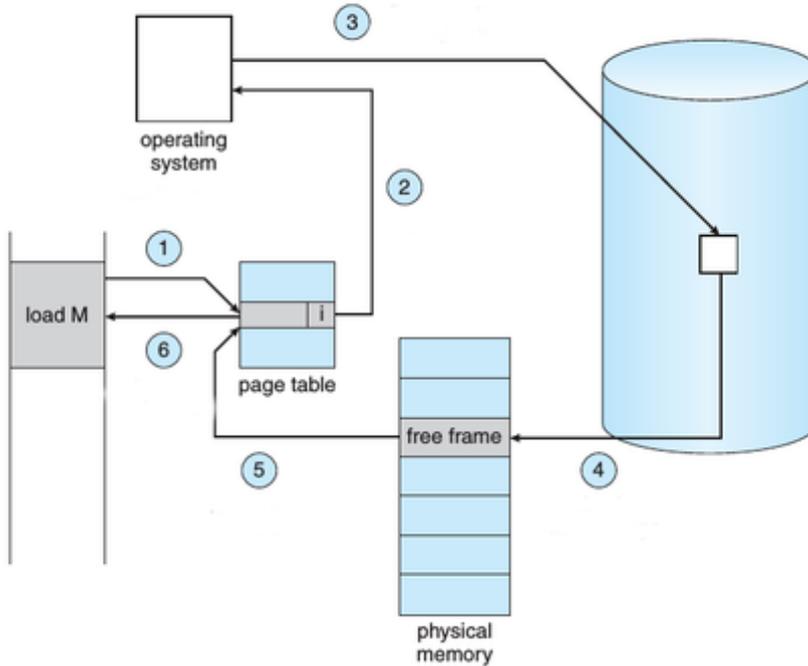


Question 5

Answered on May 31, 2017, 9:10:25 AM Duration 2 min. and 43 sec. Score 1 of 1 points

Handling a page fault

Given the following figure, correctly assign steps to number 1-6



Drag the steps below and drop them to the frame on the right hand side in the correct order. You can change the order after this if you wish.

The correct order	The specified order
Reference a page	Reference a page
Trap	Trap
Request a page from disk	Request a page from disk
Load a missing page	Load a missing page
Update page table	Update page table
Restart instruction	Restart instruction

Question 6

Answered on May 31, 2017, 9:44:13 AM Duration 1 min. and 28 sec. Score 0 of 2 points

File Allocation Table

Indicate which answers are correct.

A File Allocation Table

- suffers from internal fragmentation but not external fragmentation.
- uses an indexed allocation of data blocks.
- stores file names and the blocks of data that each file in the file system uses.
- is a bitmap identifying unused blocks that can be used for file data.

Question 7

Answered on May 31, 2017, 9:37:51 AM Duration 5 min. and 52 sec. Score 0.5 of 2 points

i The motivation for this change was:

Unix File System

Consider an Unix File System using index based allocation. An inode in this system uses 64 direct indexes, 1 indirect, 1 double indirect and 1 triple indirect index. Each index takes 4 bytes. The block size in this system 2000 bytes.

How many disk accesses does it take to read one disk block at location 6,000,000 within a file.

3

4 0.5 pt.

We assume that no file caching takes place. Give a correct motivation with calculation for your answer.

We need block nr $6000000/2000 = 3000$.
This can't be satisfied using direct index, but one indirect index. $3000 / 64 \approx 47$, which fits with one indirect index.
And finally one read for the block itself, so the total count is three reads.

Checked by Taco Walstra

Score part b:
(max 1.5 points)

0.
5

Correction criterion:

$6000000/2000 = 3000 = \text{blocknr}$. so we need to look up ino, the double indirect pointer + direct index + datablock = 4

Given score:

0.5

Comment

On part b: $6000000/2000 = 3000 = \text{blocknr}$. so we need to look up inode, the double indirect pointer + direct index + datablock = 4

Question 8

Answered on May 31, 2017, 9:38:57 AM Duration 3 min. and 27 sec. Score 2 of 2 points

i The motivation for this change was:

Log structured File System

Evaluate the pro's and con's of a log structured file system. Mention at least one problem and one positive aspect.

pro: because the file system is one big log, at any point one can revert back to an older version. This is especially handy in relation to system crashes, where an old, working version of the state of the file system can be restored.

con: because of it's forward-writing nature, writes are handled faster than reads. This is because the engineers of log structured file systems thought that write would occur more often than reads, because of improvements of caches. Because of this, reading often requires reading backwards multiple times on the disk, which hurts performance.

Checked by Taco Walstra

Score part a:
(max 2 points)

2

Correction criterion:

garbage collection. There can be multiple copies of the same file. GC needs to compact holes in the FS between datablocks after mods. How often to exe the GC, select only latest version or not. It's suitable for flash systems (yaffs2, jffs2)

Given score:

2

Question 9

Answered on May 31, 2017, 9:45:49 AM Duration 7 min. and 46 sec. Score 3 of 4 points

i The motivation for this change was:

Setuid bit

What is the setuid bit used for in Unix/Linux?

Give a short explanation in max. 4 lines.

If a program has the setuid bit set, then when executing the OS will set the executing user id of the process to the owner of the file. For example, if the owner of a program is user id 4, and the setuid bit is set, then when executing the program by any user the user id will be set to 4 when executing the program and thus the program will have access to the all files for user id 4.

What are the risks of using setuid? Give an example.

Any user can in this way use the program to gain privileges of the user that is the owner of the file. The program has to be programmed carefully with this in mind. For example, the passwd utility has the setuid bit set and the owner of it is root. passwd has to take care that any user can execute it with root permissions.

Key authentication

Anna and Bert have never met. How can Anna prove her identity to Bert using a public key infrastructure, i.e. public keys have been exchanged already? Describe the different steps.

If Anna wants to prove her identity to Bert, then Bert can check if Anna has the same public key as the one what was exchanged.

Checked by Taco Walstra

Score part a: (max 2 points)	2	Correction criterion: setuid indicates that a process should be run with permissions of the owner rather than user Owner of new created files is owned by owner directory
Score part b: (max 1 point)	1	Correction criterion: Criterium 1
Score part c: (max 1 point)	0	Correction criterion: Anna needs to sign a message from Bert with her private key that can be verified with her public key.
Given score:	3	

Comment

On part c: private key???

Question 10



Answered on May 31, 2017, 9:22:41 AM Duration 2 min. and 10 sec. Score 1 of 1 points

i The motivation for this change was:

Ransomware

Are ransomware typically carried out using a Trojan horse or a virus?

Explain your choice.

Ransomware typically comes in both forms. Ransomware can come in the trojan horse variant if it for example was attached to a downloadable program, tricking the user that it installs a normal program, while it in fact contains the ransomware. Other ways are virusses, exploiting OS or other program vulnerabilities to gain access to the user's system, unknowingly to the user.

Checked by Taco Walstra

Score part a: (max 1 point)	1	Correction criterion: typically a trojan horse, because it will not replicate itself to other systems
Given score:	1	

Close review moment