FINAL Exam Results for Mualla Argin

Score for this quiz: **27** out of 50
Submitted Apr 28 at 4:45pm
This attempt took 51 minutes.

Question 1

1 / 1 pts

sigprocmask() is used by a process to block/unblock signals.

Correct!

- (selected) True
- False

Question 2

1 / 1 pts

A soft link keeps the new name in the directory entry and the original file name in the data block.

Correct!

- (selected) True
- False

Question 3

0 / 1 pts

Datagram sockets would be a good choice for transmitting background music for elevators instead of automated teller machine transactions

orrect Answer

- True

ou Answered

- (selected) False

Question 4

0 / 1 pts

A shared memory segment is maintained by the process creating it.

ou Answered

- (selected) True

orrect Answer

- False

Question 5

0 / 1 pts

Making a symbolic link increases the inode's reference/link count.

ou Answered

- (selected) True

orrect Answer

- False

Question 6

1 / 1 pts

When a TCP server (e.g., web server) needs to send data back to the TCP client, it writes on to the master socket (as opposed to the accepted connection socket).

- True

Correct!

- False

Question 7

1 / 1 pts

A hard link to the original file does not share the same inode

- True

Correct!

- False

Question 8

1 / 1 pts

One major difference between datagram (UDP) sockets and stream (TCP) sockets is that the stream sockets are not reliable.

- True

Correct!

- False

Question 9

1 / 1 pts

Processes maintain one-bit per signal type vector for the blocked signals and another one-bit per signal type vector for the pending signals.

Correct!

- True
- False

Question 10

1 / 1 pts

Doubling the block size of a Unix FFS file system will double the capacity for maximum file size.

- True
- False

Correct!

Question 11

4.5 / 6 pts

ou Answered

UDP — Protocol for Data Layer

Protocol for Network Layer in Internet Programming

Correct!

Socket — Represented by addres

Correct!

Mailbox — Mechanism for IPC via r

ou Answered

SIGWAIT — Waits till all blocked sigr

Waits till all id'd signals are caught

Correct! **Page** A fixed-sized block of lo

Correct! **Frame** A fixed-sized block of ph

Correct! **Index Block** A block that contains po

Correct! **Single indirect block** A block containing point

Other Incorrect Match Options:

- Protocol for Data Layer in Internet Programming
- Mechanism for IPC via mailboxes in shared memory
- Waits till all blocked signals are handled

Question 12

2 / 2 pts

What best explains why shared memory is typically faster than message passing?

- Message passing is typically used for sharing large amount of data
- Message passing is only used in distributed systems where communication takes place across a slower network

Correct!

- Message passing is implemented in system calls which require kernel intervention; shared memory only requires a system call to establish the shared memory segment

Question 13

2 / 2 pts

Which of the following system calls can fail due to a network failure?

- socket()
- listen()
- bind()
- gethostbyname()

Correct!

Question 14

2 / 2 pts

A 32-bit virtual address paging system with an 8 KB page size has how many entries in the page table?

- 2^13
- 2^19

Correct!

- None of the provided values for the number of page table entries are correct
- 2^32

Question 15

2 / 2 pts

A server program uses the bind system call to

Correct!

- attach an address to its socket
- lock the socket in memory

Question 16

0 / 2 pts

Suppose that the kernel delivers two SIGCHILD signals to a process X while it is not scheduled. When the kernel finally schedules the process X how many times will the SIGCHILD handler be called?

orrect Answer

- Exactly once, because signals are not queued.
- None, because sending multiple signals will always crash the program.

ou Answered

- More than twice, depending on how the handler is installed.
- Exactly twice, because signals are queued.

Question 17

0 / 6 pts

The function **fetch_emails(userid)** of an e-mail app fetches emails for the user but can take a random amount of time depending on network performance. The function **fetch_emails(userid)** is a blocking function that does not return unless emails are fetched completely. In order to keep the users informed while waiting for e-mails to arrive **you are tasked to create an extension of the e-mail app** to print the following messages by calling another given function **status_update(message) every second** based on how much time has elapsed since **fetch_emails(userid)** function was invoked:

Sketch a pseudo code of the proposed extension by utilizing UNIX(LINUX) signaling features. Some important things to consider:

1. You must update status every second. Printing the same message again is fine.
2. Assume that **SIGALRM** is being generated every second – you do not need to set it up. You just need to decide what to do with **SIGALRM.**
3. Assume that a function **timediff()** is also given which returns *seconds* elapsed since **fetch_emails(userid)** invocation.
4. Your pseudo code solution for the extension must have a **main()** function and any necessary variables and supporting function(s).

Your Answer:

sigalrm acts as alarm clock

fetch_emails(userid){

status_update(message)

fetch_emails(userid)

}

No usage of signal(). -3 No bounds, timediff or main. -3

Question 18

3 / 6 pts

A computer system has 4 GB of Virtual Memory, 1 MB of Physical Memory, and 1 KB page size. How many page faults will result from the following 4 memory transactions:

READ 0xF0012345

WRITE 0x5432100F

READ 0x54321012

WRITE 0xF0011012

Please write the number of page faults and a brief explanation for your answer in the space provided below. Answers without explanation will receive significant point deduction.

Note: the addresses are in HEXADECIMAL notation with prefix 0x. Also assume that all page table entries are assumed to be initialized as invalid.

Your Answer:

- Page miss causes page fault (an exception)
  *Page fault handler selects a victim to be evicted (here VP 4)
  *Offending instruction is restarted: page hit
- Page Fault: When a virtual address reference results in a miss in the page table then it requires the page to be fetched from the disk. The page miss is called a “page fault”. The opposite of that is called a “page hit”. Page faults are treated as ‘exceptions’ in operating system terminology. These exceptions are recoverable in the sense that when a page fault occurs, the OS takes over and services it and then restores the execution back to the program that caused the page fault

Page Offset = log2(page size) = log2(1KB) = 10

READ 0xF0012345 (PAGE FAULT HERE)

WRITE 0x5432100F (PAGE FAULT HERE)

READ 0x54321012

WRITE 0xF0011012

There is a total of 2 page faults because in the first two read and write we try to access parts of the page that do not exist (out of bounds)

The second WRITE is also a page fault because it resides on a different page than the first READ.

Question 19

4.5 / 6 pts

You are to modify an ancient file system implementation that is structured as follows: Each inode contains 13 block numbers (pointers) of 4B (bytes) each; the first 10 block numbers point to the first 10 blocks of the file, and the remaining 3 are used for the rest of the file. The 11th block number in the inode points to an indirect block containing 128 block numbers, the 12th block number in the inode points to a double-indirect block, containing 128 indirect block numbers, and the 13th block number in the inode points to a triple-indirect block, containing 128 double-indirect block numbers. The inode contains a 4B file-size field. The block size is 512B.

Which of the following adjustments will allow files larger than the current limit to be stored? Write YES or NO for EACH along with a short explanation for your answer. Answers without explanation will receive significant point deduction.

A. Increase just the file-size field in the inode from a 32-bit to a 64-bit value
B. Increase just the number of bytes per block from 512 to 2048 bytes
C. Reformat the disk to increase the number of inodes allocated to the inode table
D. Replace one of the direct block numbers in each inode with an additional triple-indirect block number

Your Answer:

A. NO, because increasing the file size does not guarantee the inode blocks and direct indecrect double indirect blocks will be used.

B. YES, because increasing the number of bytes per block from 512 to 2048 will cause the individual blocks to hold more data hence in total holding more memory and allowing files larger than the current limit to be stored.

C. YES, because freshly after a reformat, the filesystem contains exactly one directory. With more inodes allocated to the inode table more blocks can be stored. With more blocks more information can be stored.

D. YES, if a direct block number is replaced by a indirect block number the number of bytes reachable would increase by a factor of 16

-1.5 c is incorrect

Question 20

0 / 6 pts

In a system that implements virtual memory, assume the following parameters:

- Virtual Memory = 4 GB
- Physical Memory = 256 MB
- Page Size = 4 KB
- The physical memory frame number stored at the highest address entry in the page table is 0x0123

Calculate the physical address that is translated from the virtual address: 0xFFFFFF10. Write your answer in HEX notation. Explain your reasoning. Answers without explanation will receive significant point deduction.

Your Answer:

1. First partition the virtual address into its components: virtual page number of VPN and the page (frame) offset.

page offest log of page(frame) = log2(4KB) = 2

Since we know that the virtual address is composed of 4 GB we now know that the number of page offset bits will be 4 -2 = 2 bits. So in summary, the vpn is 3 bits and the page offset is 2.

Second ,now that we have the partition info, we can figure out the actual vpn and page (frame offest from the provided virtual address OxFFFFFF10.

Unanswered

Question 21

0 / 0 pts

This is a placeholder "**NOTES**" item (UNGRADED) where you may **OPTIONALLY** typewrite any explanation/assumptions/rough work in support of your answers to **non-essay questions**. We may refer to it to resolve auto-grading concerns.

Your Answer:

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