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Spring 2020

Operating Systems Principles

Spring 2020 - COM SCI111-1 - REIHER

Started on	Friday, 12 June 2020, 8:59 PM PDT
State	Finished
Completed on	Friday, 12 June 2020, 11:32 PM PDT
Time taken	2 hours 33 mins
Grade	**92.77** out of 100.00

Question **1**
Correct
2.00 points out of 2.00
Flag question

Which of the following properties are true of the LRU cache replacement algorithm?

Select one or more:

☑ a. The clock algorithm is used to approximate LRU ✓
☑ b. The information required to perform LRU is expensive on large memory systems ✓
☐ c. It exhibits the same performance regardless of workload
☑ d. LRU's behavior depends on the degree of locality of access in the workload ✓
☐ e. LRU always performs better than a random algorithm on all workloads

Your answer is correct.

The correct answers are: The clock algorithm is used to approximate LRU, The information required to perform LRU is expensive on large memory systems, LRU's behavior depends on the degree of locality of access in the workload

Question **2**
Correct
2.00 points out of 2.00
Flag question

What are the benefits of lazy writes (write buffering)?

Select one or more:

☑ a. accumulate larger batches of requests, which can be more efficiently scheduled. ✓
☑ b. reduce number of writes by combining distinct updates to a single block. ✓
☐ c. eliminate writes for data that is already on disk.
☐ d. reduce the likelihood of data loss in case of system crash.
☑ e. eliminate writes rendered moot by subsequent deletions. ✓

Your answer is correct.

The correct answers are: accumulate larger batches of requests, which can be more efficiently scheduled., reduce number of writes by combining distinct updates to a single block., eliminate writes rendered moot by subsequent deletions.

Question **3**
Correct
2.00 points out of 2.00
Flag question

What is the end-to-end argument?

Select one:

○ a. The entire path from one end of the network to the other should be set up before sending messages along it
○ b. Only the end points of a network should be exposed to applications using it
○ c. You can't determine anything useful about a network connection until you have obtained information from both end points
○ d. Important functionality must be provided at every point from one end of the network to the other
● e. The end points in a layered system are frequently the only or best points to implement functionality ✓

Your answer is correct.

The correct answer is: The end points in a layered system are frequently the only or best points to implement functionality

Question **4**
Correct
2.00 points out of 2.00
Flag question

Match the following problems in providing correct behavior in NFSv2 with the solutions used in that system.

Stale cache contents	Check update time on cached file on open	✓
Non-idempotent mkdir semantics	Ignore the problem	✓
Update visibility	Flush-on-close	✓

Your answer is correct.

The correct answer is: Stale cache contents → Check update time on cached file on open, Non-idempotent mkdir semantics → Ignore the problem, Update visibility → Flush-on-close

Question **5**
Correct
2.00 points out of 2.00
Flag question

What problem do condition variables solve?

Select one:

○ a. defining the conditions under which a computation should continue
○ b. determining whether or not a condition has been satisfied
○ c. cooperating parallel processes
● d. awaiting the completion of asynchronous events ✓
○ e. shared resource allocation

Your answer is correct.

The correct answer is: awaiting the completion of asynchronous events

Question **6**
Correct
2.00 points out of 2.00
Flag question

Which of the following are valid observations about shared memory inter-process communication?

Select one or more:

☐ a. The extra memory segment isolates processes from one-another
☑ b. It is a high throughput, low latency mechanism. ✓
☐ c. It generalizes well to distributed systems.
☑ d. The Operating System is involved in set-up, but not the data transfer. ✓
☑ e. It involves fewer data copies. ✓

Your answer is correct.

The correct answers are: The Operating System is involved in set-up, but not the data transfer., It involves fewer data copies., It is a high throughput, low latency mechanism.

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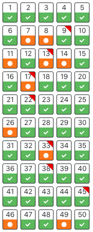

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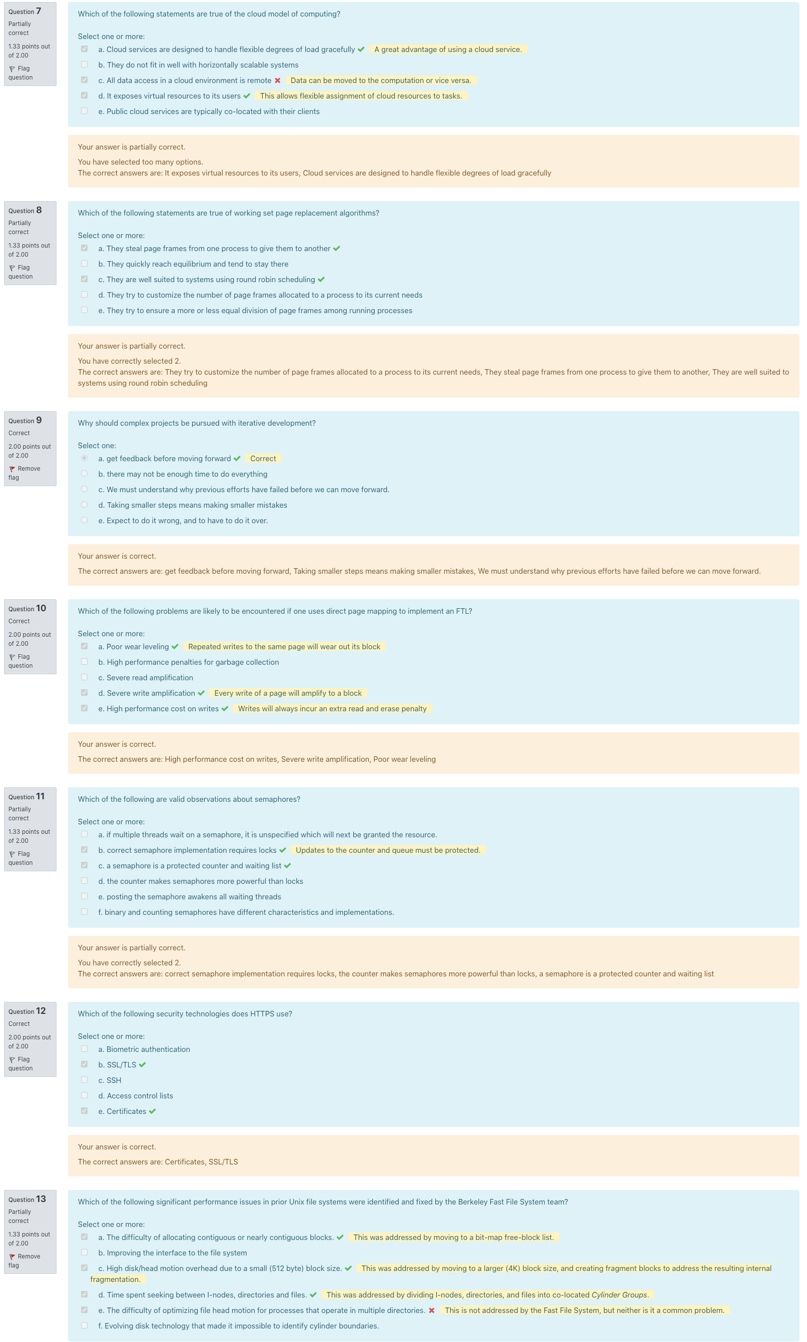

Question **7**
Partially correct
1.33 points out of 2.00
Flag question

Which of the following statements are true of the cloud model of computing?

Select one or more:
- ☑ a. Cloud services are designed to handle flexible degrees of load gracefully ✓ A great advantage of using a cloud service.
- ☐ b. They do not fit in well with horizontally scalable systems
- ☑ c. All data access in a cloud environment is remote ✗ Data can be moved to the computation or vice versa.
- ☑ d. It exposes virtual resources to its users ✓ This allows flexible assignment of cloud resources to tasks.
- ☐ e. Public cloud services are typically co-located with their clients

Your answer is partially correct.

You have selected too many options.
The correct answers are: It exposes virtual resources to its users, Cloud services are designed to handle flexible degrees of load gracefully

Question **8**
Partially correct
1.33 points out of 2.00
Flag question

Which of the following statements are true of working set page replacement algorithms?

Select one or more:
- ☑ a. They steal page frames from one process to give them to another ✓
- ☐ b. They quickly reach equilibrium and tend to stay there
- ☑ c. They are well suited to systems using round robin scheduling ✓
- ☐ d. They try to customize the number of page frames allocated to a process to its current needs
- ☐ e. They try to ensure a more or less equal division of page frames among running processes

Your answer is partially correct.

You have correctly selected 2.
The correct answers are: They try to customize the number of page frames allocated to a process to its current needs, They steal page frames from one process to give them to another, They are well suited to systems using round robin scheduling

Question **9**
Correct
2.00 points out of 2.00
Remove flag

Why should complex projects be pursued with iterative development?

Select one:
- ● a. get feedback before moving forward ✓ Correct
- ○ b. there may not be enough time to do everything
- ○ c. We must understand why previous efforts have failed before we can move forward.
- ○ d. Taking smaller steps means making smaller mistakes
- ○ e. Expect to do it wrong, and to have to do it over.

Your answer is correct.

The correct answers are: get feedback before moving forward, Taking smaller steps means making smaller mistakes, We must understand why previous efforts have failed before we can move forward.

Question **10**
Correct
2.00 points out of 2.00
Flag question

Which of the following problems are likely to be encountered if one uses direct page mapping to implement an FTL?

Select one or more:
- ☑ a. Poor wear leveling ✓ Repeated writes to the same page will wear out its block
- ☐ b. High performance penalties for garbage collection
- ☐ c. Severe read amplification
- ☑ d. Severe write amplification ✓ Every write of a page will amplify to a block
- ☑ e. High performance cost on writes ✓ Writes will always incur an extra read and erase penalty

Your answer is correct.

The correct answers are: High performance cost on writes, Severe write amplification, Poor wear leveling

Question **11**
Partially correct
1.33 points out of 2.00
Flag question

Which of the following are valid observations about semaphores?

Select one or more:
- ☐ a. if multiple threads wait on a semaphore, it is unspecified which will next be granted the resource.
- ☑ b. correct semaphore implementation requires locks ✓ Updates to the counter and queue must be protected.
- ☑ c. a semaphore is a protected counter and waiting list ✓
- ☐ d. the counter makes semaphores more powerful than locks
- ☐ e. posting the semaphore awakens all waiting threads
- ☐ f. binary and counting semaphores have different characteristics and implementations.

Your answer is partially correct.

You have correctly selected 2.
The correct answers are: correct semaphore implementation requires locks, the counter makes semaphores more powerful than locks, a semaphore is a protected counter and waiting list

Question **12**
Correct
2.00 points out of 2.00
Flag question

Which of the following security technologies does HTTPS use?

Select one or more:
- ☐ a. Biometric authentication
- ☑ b. SSL/TLS ✓
- ☐ c. SSH
- ☐ d. Access control lists
- ☑ e. Certificates ✓

Your answer is correct.

The correct answers are: Certificates, SSL/TLS

Question **13**
Partially correct
1.33 points out of 2.00
Remove flag

Which of the following significant performance issues in prior Unix file systems were identified and fixed by the Berkeley Fast File System team?

Select one or more:
- ☑ a. The difficulty of allocating contiguous or nearly contiguous blocks. ✓ This was addressed by moving to a bit-map free-block list.
- ☐ b. Improving the interface to the file system
- ☑ c. High disk/head motion overhead due to a small (512 byte) block size. ✓ This was addressed by moving to a larger (4K) block size, and creating fragment blocks to address the resulting internal fragmentation.
- ☑ d. Time spent seeking between I-nodes, directories and files. ✓ This was addressed by dividing I-nodes, directories, and files into co-located *Cylinder Groups*.
- ☑ e. The difficulty of optimizing file head motion for processes that operate in multiple directories. ✗ This is not addressed by the Fast File System, but neither is it a common problem.
- ☐ f. Evolving disk technology that made it impossible to identify cylinder boundaries.

Your answer is partially correct.

You have selected too many options.
The correct answers are: Time spent seeking between I-nodes, directories and files., High disk/head motion overhead due to a small (512 byte) block size., The difficulty of allocating contiguous or nearly contiguous blocks.

Question **14**
Partially correct
0.33 points out of 2.00
Flag question

Which of the following statements about cache consistency in AFSv2 is correct?

Select one or more:

- ☑ a. If multiple clients write to the same cached file simultaneously, whichever closes the file first has his writes persist ✗ Last writer wins
- ☐ b. If multiple clients write to the same cached file simultaneously, whichever closes the file last has his writes persist
- ☑ c. Cache consistency can be different for processes running on the same client versus processes running on different clients ✓ Processes running on the same client as a writing process see the writes at once. Processes running on other clients only see the writes after the callback is delivered.
- ☑ d. Updates registered with the server invalidate other clients' cached copies of that file ✓ The close of a written file causes callbacks to other clients caching the file, which invalidate their copy.
- ☐ e. Updates made at one cached copy are instantly visible at all cached copies

Your answer is partially correct.

You have correctly selected 2.
The correct answers are: Updates registered with the server invalidate other clients' cached copies of that file, Cache consistency can be different for processes running on the same client versus processes running on different clients, If multiple clients write to the same cached file simultaneously, whichever closes the file last has his writes persist

Question **15**
Correct
2.00 points out of 2.00
Flag question

Match each desired function with the steps to implement it with **public key** encryption.

private message for one participant	encrypt w/public key; decrypt w/private key	✓
authenticated signature	encrypt w/private key; decrypt w/public key	✓
U1 sends private, authenticated message to U2	encrypt w/ U1 private key, U2 public key; decrypt w/U2 private key, U1 public key	✓

Your answer is correct.

The correct answer is: private message for one participant → encrypt w/public key; decrypt w/private key, authenticated signature → encrypt w/private key; decrypt w/public key, U1 sends private, authenticated message to U2 → encrypt w/ U1 private key, U2 public key; decrypt w/U2 private key, U1 public key

Question **16**
Correct
2.00 points out of 2.00
Flag question

Which of the following kinds of memory systems is likely to require compaction?

Select one or more:

- ☐ a. A paged virtual memory system
- ☑ b. A log structured file system ✓
- ☑ c. A variable sized partition management system for RAM ✓
- ☐ d. FFS
- ☐ e. Swap space

Your answer is correct.

The correct answers are: A variable sized partition management system for RAM, A log structured file system

Question **17**
Partially correct
1.33 points out of 2.00
Remove flag

Which of the following statements are true of swap space for a memory hierarchy?

Select one or more:

- ☐ a. It is typically the same size as a process' virtual memory
- ☑ b. It is typically the same size as physical main memory ✗ Usually much larger
- ☐ c. TLB misses always result in a page fault that accesses swap space
- ☑ d. TLB misses never result in page faults that access swap spaces ✗ They don't directly cause a page fault, but if the page is also not present in main memory, a page fault will result
- ☑ e. It is typically reserved on the secondary storage device only for this use ✓ It needs to be there when required, so it is usually not in a shared area of the secondary storage device

Your answer is partially correct.

You have selected too many options.
The correct answer is: It is typically reserved on the secondary storage device only for this use

Question **18**
Correct
2.00 points out of 2.00
Flag question

What is the purpose of priority boosting in MLFQ schedulers?

Select one or more:

- ☐ a. To ensure that interactive jobs get a fair share of the processor
- ☐ b. To ensure that interactive jobs meet their real time requirements
- ☑ c. To ensure that long running jobs are not starved ✓ Long running jobs get boosted to the higher priority queue every so often
- ☑ d. To handle jobs whose run behavior changes over time ✓ Some such jobs will change from processor-bound to interactive, and require the boost to be treated properly
- ☐ e. To prevent gaming of the scheduler

Your answer is correct.

The correct answers are: To ensure that long running jobs are not starved, To handle jobs whose run behavior changes over time

Question **19**
Correct
2.00 points out of 2.00
Flag question

Which of the following tend to be true of device drivers?

Select one or more:

- ☑ a. Applications can only use hardware features exposed by the device driver ✓ If the device driver doesn't offer a way to get to the hardware feature, it's effectively not there.
- ☑ b. They are specific to a particular hardware device ✓
- ☐ c. Because they encapsulate control of hardware functionality, they can't crash the operating system
- ☐ d. They are not part of the operating system
- ☑ e. They comprise a large percentage of the code of a typical operating system ✓ 70% of one Linux kernel, for example.

Your answer is correct.

The correct answers are: Applications can only use hardware features exposed by the device driver, They are specific to a particular hardware device, They comprise a large percentage of the code of a typical operating system

Question **20**
Correct
2.00 points out of 2.00
Flag question

Which of the following statements are true about side effects in complex systems?

Select one or more:
- ☑ a. Side effects often lead to difficult debugging problems ✓
- ☑ b. Side effects can be avoided by not sharing data between system modules ✓
- ☐ c. Side effects are generally inherent in the system's defined interfaces
- ☐ d. Side effects can be avoided by sharing data between system modules
- ☑ e. Side effects can lead to behaviors not planned by the system designers ✓

Your answer is correct.

The correct answers are: Side effects can lead to behaviors not planned by the system designers, Side effects can be avoided by not sharing data between system modules, Side effects often lead to difficult debugging problems

Question **21**
Correct
2.00 points out of 2.00
Flag question

Which statement best characterizes the relationship between Flash Translation Layers and Logging File Systems

Select one:
- ● a. NAND Flash is often managed as a Logging File System because of the wear-leveling that is inherent in a circular log. ✓
- ○ b. Because NAND Flash imposes no penalties for random access, the benefits of sequential logging to a circular buffer are much less compelling.
- ○ c. Because the FTL is implemented in the SSD, it cannot maintain a large in-memory index/mapping table.
- ○ d. Flash has a write-amplification problem that is not addressed by Logging File System garbage collection.

Your answer is correct.

The correct answer is: NAND Flash is often managed as a Logging File System because of the wear-leveling that is inherent in a circular log.

Question **22**
Correct
2.00 points out of 2.00
Remove flag

Which of the following are true observations about spinning?

Select one or more:
- ☐ a. waiting lists can eliminate spinning, and they can be implemented without locks
- ☐ b. if many processes contend for the resource, yielding is the correct choice, rather than spinning
- ☐ c. it is almost always the wrong thing to do on a multi-processor
- ☑ d. it is almost always the wrong thing to do on a uni-processor ✓
- ☑ e. it ensures prompt response when the resource becomes available ✓
- ☑ f. it may delay the availability of the required resource ✓

Your answer is correct.

The correct answers are: it is almost always the wrong thing to do on a uni-processor, it ensures prompt response when the resource becomes available, it may delay the availability of the required resource

Question **23**
Correct
2.00 points out of 2.00
Flag question

Which of the following are valid observations about hard links?

Select one or more:
- ☑ a. adding a hard link increments the reference count on an I-node. ✓
- ☐ b. adding a hard link creates a new copy of the file, with a new name.
- ☑ c. adding a hard link can prevent a file from being deleted. ✓
- ☑ d. a hard link is another directory entry (name) referring to the same I#. ✓
- ☐ e. a hard-link may be left dangling if the underlying file is deleted.
- ☐ f. a hard link is another directory entry (name) referring to another file (by name).

Your answer is correct.

The correct answers are: a hard link is another directory entry (name) referring to the same I#., adding a hard link increments the reference count on an I-node., adding a hard link can prevent a file from being deleted.

Question **24**
Correct
2.00 points out of 2.00
Flag question

For each of the following deadlock conditions, which answer is an example of preventing deadlock by attacking that particular condition?

Mutual exclusion	Accessing a resource using single atomic instructions ⬍	✓
Circular dependencies	Granting locks only based on a total order of all locks ⬍	✓
No preemption	Using leases to control access to resources ⬍	✓
Incremental allocation	Disallowing blocking on a desired lock when any other locks are held ⬍	✓

Your answer is correct.

The correct answer is: Mutual exclusion → Accessing a resource using single atomic instructions, Circular dependencies → Granting locks only based on a total order of all locks, No preemption → Using leases to control access to resources, Incremental allocation → Disallowing blocking on a desired lock when any other locks are held

Question **25**
Correct
2.00 points out of 2.00
Flag question

Which of the following will free memory held by a program in a Unix/Linux style system?

Select one or more:
- ☐ a. Explicitly making the proper library call frees automatic memory
- ☐ b. Removing the last reference to a piece of memory frees it
- ☑ c. Exiting a subroutine frees automatic memory ✓
- ☑ d. Terminating a program frees automatic and heap memory ✓ Even static memory, as well
- ☐ e. Exiting a subroutine frees both automatic and heap memory
- ☐ f. Exiting a subroutine frees heap memory
- ☑ g. Explicitly making the proper library call frees heap memory ✓

Your answer is correct.

The correct answers are: Exiting a subroutine frees automatic memory, Terminating a program frees automatic and heap memory, Explicitly making the proper library call frees heap memory

Question **26**
Partially correct
1.50 points out of 2.00
Flag question

Which of the following are key principles of horizontally scalable system design?

Select one or more:
- ☑ a. Service protocols optimized for LAN-scale latencies. ✗ Large pools of servers are seldom a local resource.
- ☑ b. increase capacity by adding nodes ✓ This is the definition of a horizontally scalable system.
- ☑ c. No shared resources between nodes in the system. ✓ Single failures won't halt the system.
- ☐ d. Horizontally scalable systems must implement a cloud model
- ☐ e. Peer-to-Peer vs Client-Server communication.
- ☑ f. Non-disruptive node addition and removal. ✓ This is a critical requirement in a system whose capacity is continuously adjusted.

Your answer is partially correct.

You have selected too many options.
The correct answers are: No shared resources between nodes in the system., increase capacity by adding nodes, Non-disruptive node addition and removal.

Question **27**
Correct
2.00 points out of 2.00
Flag question

Match the following terms with their definitions:

mutual exclusion	an operation that only one thread at a time can perform	✓
transaction	a group of distinct operations that will be executed all-or-none	✓
Atomic	an operation that completes without interruption	✓

Your answer is correct.

The correct answer is: mutual exclusion → an operation that only one thread at a time can perform, transaction → a group of distinct operations that will be executed all-or-none, Atomic → an operation that completes without interruption

Question **28**
Correct
2.00 points out of 2.00
Flag question

Which is the best description of Java synchronized methods?

Select one:
- ○ a. the object is locked against any access by any other thread
- ○ b. Java synchronized methods enforce mutual exclusion, but not before-or-after semantics.
- ○ c. Java synchronized methods support lock breaking.
- ○ d. Java synchronized methods provide full semaphore semantics.
- ○ e. the class is locked for the duration of any of its synchronized methods
- ● f. while a thread executes an object's synchronized method, no other thread can execute a synchronized method for that object. ✓
- ○ g. the object is locked against other invocations of the same synchronized method

Your answer is correct.

The correct answer is: while a thread executes an object's synchronized method, no other thread can execute a synchronized method for that object.

Question **29**
Correct
2.00 points out of 2.00
Flag question

What are the key characteristics of a good metric?

Select one or more:
- ☐ a. it is an accepted industry standard
- ☑ b. it is closely related to an important system characteristic ✓
- ☑ c. it is practically measurable ✓
- ☐ d. it must be measurable from outside of the system under investigation.
- ☑ e. it can be expressed as a numerical quantity ✓

Your answer is correct.

The correct answers are: it is closely related to an important system characteristic, it can be expressed as a numerical quantity, it is practically measurable

Question **30**
Correct
2.00 points out of 2.00
Flag question

Which of the following are benefits of dynamic allocation of a resource to multiple parties, as opposed to static allocation of the resource?

Select one or more:
- ☐ a. Dynamic allocation provides more predictable performance
- ☑ b. Dynamic allocation is likely to achieve better utilization of the resource ✓
- ☐ c. Dynamic allocation better ensures that no party is starved of any share of the resource
- ☐ d. Dynamic allocation is simpler and cheaper than static allocation
- ☑ e. Dynamic allocation can better adjust to different needs among the parties ✓

Your answer is correct.

The correct answers are: Dynamic allocation is likely to achieve better utilization of the resource, Dynamic allocation can better adjust to different needs among the parties

Question **31**
Correct
2.00 points out of 2.00
Flag question

Which of the following are effective means of reducing resource contention?

Select one or more:
- ☐ a. increase the number of threads (and processors to run them)
- ☐ b. use a smaller number of more global locks to reduce the number of locking operations
- ☑ c. divide resources into sub-pools, each with its own lock ✓ (e.g. as was done with the multiple lists in the concurrent hash table)
- ☑ d. identify the conflicting computations, and avoid running them at the same time ✗ delaying the execution of conflicting operations is the problem
- ☑ e. reduce the size of the critical section ✓ (e.g. doing setup and validation before obtaining the lock)
- ☑ f. reduce the number of updates to the shared data structure ✓ (e.g. sloppy counters, where most of the updates were to private counters)

Your answer is correct.

The correct answers are: reduce the number of updates to the shared data structure, reduce the size of the critical section, divide resources into sub-pools, each with its own lock

Question **32**
Correct
2.00 points out of 2.00
Flag question

Which of the following must be true for a program to be indeterminate?

Select one or more:
- ☐ a. It must contain more than one race condition
- ☐ b. The program must contain mutual exclusion primitives
- ☑ c. The program must contain multiple threads of control ✓
- ☑ d. The program must contain a critical section ✓
- ☑ e. It must contain at least one race condition ✓

Your answer is correct.

The correct answers are: It must contain at least one race condition, The program must contain a critical section, The program must contain multiple threads of control

Question **33**
Partially correct
1.60 points out of 2.00
Remove flag

Match the following security design principles to an example of their use.

Complete mediation	Testing that each security-relevant action meets the desired policy	✓
Fail safe defaults	Requiring two factor authentication	✗
Least privilege	Opening files just for read when only reading is required	✓
Open design	Publishing the source code for your system	✓

Economy of mechanism	Choosing simple algorithms over complex ones	✓

Your answer is partially correct.

You have correctly selected 4.
The correct answer is: Complete mediation → Testing that each security-relevant action meets the desired policy, Fail safe defaults → Setting a firewall to only allow known good traffic through, Least privilege → Opening files just for read when only reading is required, Open design → Publishing the source code for your system, Economy of mechanism → Choosing simple algorithms over complex ones

Question **34**
Correct
2.00 points out of 2.00
Flag question

Which of the following general synchronization solutions is most suitable for dealing with the following kinds of synchronization bugs?

Order-violation bugs	Using condition variables to ensure proper serialization	✓
Livelock	Add random delays to lock acquisitions	✓
Deadlock	Lock preemption	✓
Atomicity-violation bugs	Using locks to ensure proper serialization	✓

Your answer is correct.

The correct answer is: Order-violation bugs → Using condition variables to ensure proper serialization, Livelock → Add random delays to lock acquisitions, Deadlock → Lock preemption, Atomicity-violation bugs → Using locks to ensure proper serialization

Question **35**
Correct
2.00 points out of 2.00
Flag question

Which of the following are key elements in terms of which a load can be broadly characterized?

Select one or more:
☐ a. required hardware
☑ b. sequence fidelity ✓
☑ c. request rate ✓
☑ d. request mix ✓
☐ e. complexity of operations

Your answer is correct.

The correct answers are: request rate, request mix, sequence fidelity

Question **36**
Correct
2.00 points out of 2.00
Flag question

Which of the following are primary goals of stress testing?

Select one or more:
☑ a. generate a wide range of changing loads ✓
☐ b. to measure maximum capacities
☑ c. generate errors in different orders and combinations ✓
☑ d. generate combinations of different (and potentially conflicting) usage scenarios. ✓
☑ e. to verify correct handling of all requests ✗ this is functional validation

Your answer is correct.

The correct answers are: generate a wide range of changing loads, generate errors in different orders and combinations, generate combinations of different (and potentially conflicting) usage scenarios.

Question **37**
Correct
2.00 points out of 2.00
Flag question

The best definition of "livelock" is:

Select one:
○ a. a safe allocation state
● b. not blocked, but unable to make progress ✓
○ c. available for locking
○ d. deadlock has been avoided, but not prevented
○ e. continuing to execute with a locked resource

Your answer is correct.

The correct answer is: not blocked, but unable to make progress

Question **38**
Correct
2.00 points out of 2.00
Remove flag

Which of the following statements are true of DMA?

Select one or more:
☐ a. Devices can always seize the bus to perform DMA
☐ b. It can only be used when the CPU is idle
☑ c. It is controlled by a scheduler that determines who uses the bus at any given moment ✓
☐ d. It is most efficient for small data transfers
☑ e. It permits devices to obtain data in RAM without going through the CPU ✓
☑ f. It can only be performed when the CPU is not using the memory bus ✓

Your answer is correct.

The correct answers are: It permits devices to obtain data in RAM without going through the CPU, It can only be performed when the CPU is not using the memory bus, It is controlled by a scheduler that determines who uses the bus at any given moment

Question **39**
Correct
2.00 points out of 2.00
Flag question

What is the purpose of a password salt?

Select one:
○ a. To ensure users don't reuse old passwords
○ b. To increase the types of characters used in a password
● c. To make dictionary attacks expensive ✓
○ d. To increase the number of characters in a password
○ e. To make on-line guessing attacks more expensive
○ f. To make up for a weak cryptographic hashing algorithm

Your answer is correct.

The correct answer is: To make dictionary attacks expensive

Question **40**

Correct

2.00 points out of 2.00

Flag question

Match the following elements of the FAT file system with their role in that system.

Directory entries	Holds metadata for individual files	✓
FDISK table	Describes disk partitioning	✓
FAT table	Describes usage status of disk blocks	✓
BIOS block	Describes basic parameters of the file system	✓

Your answer is correct.

The correct answer is: Directory entries → Holds metadata for individual files, FDISK table → Describes disk partitioning, FAT table → Describes usage status of disk blocks, BIOS block → Describes basic parameters of the file system

Question **41**

Correct

2.00 points out of 2.00

Flag question

What is the convoy effect?

Select one:

○ a. Using SJF scheduling to run a group of short jobs before running a long one

○ b. Once a schedule of jobs has been set up, one can efficiently move from one to the next

● c. In a FIFO system, one long running job can seriously delay shorter jobs' completion ✓

○ d. Gaining performance benefit by scheduling jobs that use the same memory segments on the same CPU of a multicore system

○ e. High priority jobs keep interrupting the processing of a low priority job, increasing its turnaround time

Your answer is correct.

The correct answer is: In a FIFO system, one long running job can seriously delay shorter jobs' completion

Question **42**

Correct

2.00 points out of 2.00

Flag question

Which of the following are advantages of the class and sub-class based structure of device drivers in typical Unix systems?

Select one or more:

☐ a. Provides better tolerance to errors in low-level device-specific software

☐ b. Provides easy ways to expose special device functionality to higher level software

☑ c. Predictable behavior for a wide range of different hardware devices ✓

☑ d. Less work is required to build new sub-class software ✓

☑ e. Implementing functionality in high level code automatically causes it to be applied to all devices of the class ✓

Your answer is correct.

The correct answers are: Predictable behavior for a wide range of different hardware devices, Implementing functionality in high level code automatically causes it to be applied to all devices of the class, Less work is required to build new sub-class software

Question **43**

Correct

2.00 points out of 2.00

Flag question

Which of the following would likely be included in a file system consistency check?

Select one or more:

☑ a. no block is allocated to multiple files ✓

☑ b. all blocks are either assigned to a file or in the free list ✓

☑ c. link counts in I-nodes agree with referencing directory entries ✓

☐ d. no two files in the same directory have the same name

☐ e. Illegal/non-graphic characters in file names.

☐ f. symbolic links to non-existent files

Your answer is correct.

The correct answers are: all blocks are either assigned to a file or in the free list, link counts in I-nodes agree with referencing directory entries, no block is allocated to multiple files

Question **44**

Correct

2.00 points out of 2.00

Flag question

Match each REST constraint with a reason why it is required in RESTful systems.

Cacheable	To eliminate some interactions between system components	✓
Stateless	To avoid storing client context on the server	✓
Layered	To allow optional intermediate servers to perform beneficial operations	✓
Client-server	Separation of responsibility by system components	✓
Uniform interface	Allows independent evolution of different system components	✓

Your answer is correct.

The correct answer is: Cacheable → To eliminate some interactions between system components, Stateless → To avoid storing client context on the server, Layered → To allow optional intermediate servers to perform beneficial operations, Client-server → Separation of responsibility by system components, Uniform interface → Allows independent evolution of different system components

Question **45**

Correct

2.00 points out of 2.00

Remove flag

Which of the following are advantages of a kernel-supported thread approach vs. user-mode threads?

Select one or more:

☐ a. Kernel threads are always cheaper to schedule

☐ b. Kernel threads can protect against infinite loops in threads, while user threads cannot

☐ c. Kernel supported threads can make use of a single shared stack per process

☑ d. Kernel threads provide better support for intra-process parallelism ✓ Kernel threads allow multiple threads of one process to run on different cores, while user threads don't.

☑ e. Thread blocking on system calls does not reduce parallelism for kernel threads ✓ Other threads in the same process can still run, while they can't with user level threads

Your answer is correct.

The correct answers are: Kernel threads provide better support for intra-process parallelism, Thread blocking on system calls does not reduce parallelism for kernel threads

Question **46**

Partially correct

1.33 points out of 2.00

Flag question

Which of the following actions occur when you create a file?

Select one or more:

☑ a. A file descriptor is chosen and filled in ✓

☐ b. The caller doesn't block, but receives a signal from the OS when the creation is complete

☑ c. A name is written into a directory ✓

☑ d. The file is reliably written to disk or other persistent media ✗ Not unless you fsync

☐ e. The initial data is written into the file

Your answer is partially correct.

You have selected too many options.
The correct answers are: A file descriptor is chosen and filled in, A name is written into a directory

Question **47**
Correct
2.00 points out of 2.00
Flag question

Which of the following statements are true of file metadata?

Select one or more:
- ☑ a. Metadata is usually attached to a persistent OS data structure ✓
- ☐ b. Metadata is created when a file is created and never changes
- ☐ c. Directories do not have metadata
- ☑ d. Metadata for a Linux file includes information about file ownership ✓
- ☑ e. Each file has its own set of metadata ✓

Your answer is correct.

The correct answers are: Each file has its own set of metadata, Metadata for a Linux file includes information about file ownership, Metadata is usually attached to a persistent OS data structure

Question **48**
Correct
2.00 points out of 2.00
Flag question

Where is an operating system trap gate specified?

Select one:
- ○ a. In the system's ABI
- ○ b. In the system's API
- ● c. In the level 2 trap table ✓
- ○ d. In the application making a system call
- ○ e. In the level 1 trap table

Your answer is correct.

The correct answer is: In the level 2 trap table

Question **49**
Partially correct
1.33 points out of 2.00
Flag question

Which of the following statements about Unix/Linux signals are true?

Select one or more:
- ☐ a. Processes can arrange to ignore all signals
- ☑ b. Processes can arrange to have particular functions called when a specific signal arrives ✓
- ☐ c. Calling kill() on a process will halt its execution
- ☑ d. Signals are sent from one process to one process ✗ Some options allow signals to be sent to groups of processes
- ☑ e. A process can send signals to its parent ✓ The parents will have the same real or effective UID, so the child can send signals to it

Your answer is partially correct.

You have selected too many options.
The correct answers are: Processes can arrange to have particular functions called when a specific signal arrives, A process can send signals to its parent

Question **50**
Correct
2.00 points out of 2.00
Flag question

Which of the following statements are true of cryptographic hashes?

Select one or more:
- ☐ a. They require a shared secret key between sender and receiver
- ☐ b. They are a form of public key cryptography
- ☑ c. It should be hard to deduce characteristics of the plaintext based on the hash ✓
- ☐ d. They must be collision-free
- ☑ e. It should be hard to find two plaintexts that hash to the same thing ✓
- ☐ f. The algorithm used is typically secret

Your answer is correct.

The correct answers are: It should be hard to deduce characteristics of the plaintext based on the hash, It should be hard to find two plaintexts that hash to the same thing

Finish review

◀ Discussion Section 1B ... Jump to... Answers to practice final ▶

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