**Unit 9 Quiz**

1. In the xv6 logging filesystem, filesystem operations are grouped into transactions, where each transaction consists of the following operations:
2. **Write each modified block to the log area, along with its eventual destination.**
3. **Write a commit record.**
4. For each entry in the log, copy the block to its final destination.
5. Clear the log.

Which of the following steps would we lose all our data if we crashed?

Answer: At step a) and step b), the data has yet to be committed to the log system. If we crashed at those two steps, then our OS would no longer know what changes were made to the file system and would have no record of what changes the OS would need to make.

Step c) would be fine because of idempotence. The OS can revert to a previous checkpoint and replay the remaining log entries.

At step d), the OS can just resume clearing the logs as all data modifications have already been committed.

1. Consider the allocation and request matrix

A = Our currently available resources: (1, 2, 1)

E = The vector represented the resources that exist in our system: (6, 6, 6)

**Current Allocation Matrix Request Matrix**

|  |  |  |
| --- | --- | --- |
| 1 | 1 | 0 |
| 1 | 0 | 1 |
| 2 | 2 | 3 |
| 1 | 1 | 1 |

|  |  |  |
| --- | --- | --- |
| 0 | 2 | 1 |
| 2 | 0 | 2 |
| 1 | 1 | 3 |
| 2 | 3 | 1 |

Is this system deadlocked? True or false?

* Allocate to line 1 and finish, this frees (1, 1, 0)
  + A = (2, 3, 1)
* Allocate to line 4 and finish, this frees (1, 1, 1)
  + A = (3, 4, 2)
* Allocate to line 2 and finish, this frees (1, 0, 1)
  + A = (4, 4, 3)
* Allocate to line 3, this frees (2, 2, 3)
  + A = (6, 6, 6)
* Therefore, the answer is **true**

1. Check the following Deadlock Model, is there a deadlock detected in this system? If so, select all of the following lettered symbols that are a part of the deadlock.

Diagram

Description automatically generated

* A
* B
* C
* D
* E
* F
* G
* H
* I
* J
* K
* L
* **There is no deadlock**

**Answer:** There is no loop in the graph, so there is no deadlock.

1. What type of hypervisor does xv6 run on?

* Type 1
* **Type 2**
* Type 3
* Type 4

Answer: Type 2 because xv6 has to run on top of QEMU’s underlying systems. It doe not run directly on hardware.

1. Which of the following does a host machine use to manage the page tables of a guest OS?
2. **The host machine will create a shadow page table to map the guest OS’s virtual pages**
3. The host machine will initiate a guest-induced page fault to load the guest OS’s page table
4. **If the host machine uses virtual memory, it can already create a mapping for the guest OS’s virtual addresses**
5. The host machine will simply just map the guest OS’s page table onto the host machine’s own memory directly.

Answer: The host machine can create shadow page tables or use virtual memory to create a separate set of memory addresses and virtual memory mappings to be used by the guest OS. A) and c) are true.