KINGDOM OF SAUDI ARABIA - QASSIM UNIVERSITY

CS222: OPERATING SYSTEMS - FINAL EXAM (MODEL ANSWER)

SECTION I: OBJECTIVE QUESTIONS

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1. Multiple Choice Questions:

I. The hardware device that maps virtual addresses to physical addresses is:
Answer: (b) MMU

II. The "Cache-consistency problem" in distributed systems is also known as:
Answer: (c) Network virtual memory

III. A memory-management scheme that supports the user view of memory:
Answer: (c) Segmentation

2. Mark (T) for True or (F) for False:

(**T**) Access matrix design separates mechanism from policy.

(**F**) The rows of an Access Matrix represent the objects in the system.

(**T**) Capability list is a protected object maintained by the OS and accessed indirectly.

(**F**) The Base register contains the value of the largest physical address.

(**T**) Revocation of access rights is typically inefficient in Capability List implementations.

SECTION II: SCHEDULING ANSWER

Round Robin (q=4ms) Calculation:

- Waiting Time P1: 0 + (10 - 4) = 6ms
- Waiting Time P2: 4ms
- Waiting Time P3: 7ms
- **Average Waiting Time: (6 + 4 + 7) / 3 = 5.67 ms**

SECTION III: LIST & EXPLAIN ANSWERS

Q1. List six (6) operations performed on a Directory:

1. Search for a file.
2. Create a file.
3. Delete a file.
4. List a directory.
5. Rename a file.
6. Traverse the file system.

Q2. List the five (5) Security Violation Categories:

1. Breach of Confidentiality.
2. Breach of Integrity.
3. Breach of Availability.
4. Theft of Service.
5. Denial of Service (DoS).

Q3. Explain the four (4) Access Matrix Implementation options:

1. **Global Table:** Uses ordered triples <domain, object, rights-set>. Simple but can be very large.
2. **Access Lists:** Each column is an access list for an object, defining domains and their rights.
3. **Capability Lists:** Each row is a capability list for a domain, using secure pointers to objects.
4. **Lock-Key:** Uses unique bit patterns (locks for objects and keys for domains) for access control.

Q4. What is the difference between "Signature-based" and "Behavior-based" detection?

- **Signature-based detection:** Spots known bad patterns or predefined attack signatures.
- **Behavior-based detection:** Spots deviations from established normal system behavior.

SECTION IV: MEMORY MANAGEMENT

Physical Address Calculation:

Formula: (Frame Number * Page Size) + Offset
Calculation: (5 * 4) + 0 = **20**

End of Model Answer Key - Good Luck