

## Final Exam Review

### III Distributed Communication

- A. Network Types and OSI Reference Model
- B. Remote Procedure Calls
  - 1. objectives
  - 2. steps
  - 3. marshaling
  - 4. stubs
  - 5. passing parameters
  - 6. Asynchronous RPC
- C. Remote Object Invocation and Java RMI
  - 1. Distributed Objects
    - a. Proxy and skeleton
    - b. Compile-time vs Run-time objects
    - c. Implicit vs explicit binding
  - 2. Remote Method Invocation
    - a. Parameter passing of objects
  - 3. Java RMI
    - a. Remote objects
    - b. Monitors
    - c. Locking
    - d. Serializable objects
    - e. Passing proxies

### IV. Distributed File Systems

- A. DFS Structure
- B. Naming
  - 1. Location Transparency
  - 2. Mapping
  - 3. Naming structure
- C. Remote File Access (Caching)
  - 1. Cache consistency
  - 2. Disk vs memory caches
  - 3. Write-through vs delayed-write
  - 4. Flushing caches
- D. Stateful vs stateless file service
- E. File Replication
- F. Andrew File System
  - 1. Vice and Virtue
  - 2. Whole file caching
  - 3. fid
  - 4. Venus

## V. Clocks, Synchronization and Logical Clocks

- A. The science of keeping accurate time
- B. UTC
- C. Clock Synchronization Algorithms
  - 1. Cristian's Algorithm
  - 2. Berkeley Algorithm
  - 3. Averaging Algorithms
- D. Logical Clocks
  - 1. Lamport Timestamps
  - 2. Totally-ordered multicast

## VI. Election, Mutual Exclusion, Distributed Transactions

- A. Election Algorithms
  - 1. Bully Algorithm
  - 2. Ring Algorithm
- B. Mutual Exclusion
  - 1. Centralized Algorithm
  - 2. Distributed Algorithm
  - 3. Token Ring Algorithm
- C. Distributed Transactions
  - 1. Transaction Model
  - 2. ACID Properties
  - 3. Flat, Distributed and Nested
  - 4. Private Workspace
  - 5. Writeahead Log
- D. Concurrency Control
  - 1. Two-Phase Commit
  - 2. Atomicity
  - 3. Two-Phase Lock

**Generic questions for all five papers:**

- 1. What aspect of distributed systems/Web were the authors evaluating?**
- 2. What significant result did they produce?**
- 3. What mechanisms did the authors use for evaluation.**

**Specific items to review from each paper:**

Paper #1 *Aspects of Networking in Multiplayer Computer Games*

1. degrees of deployment
2. peer-to-peer
3. client/server
4. server-network
5. consistency and responsiveness
6. interest management
7. dead reckoning

8. scalability
9. sublinear communication
10. security and cheating
11. information exposure
12. design defects

Paper #2 *Tracking the Evolution of Web Traffic: 1995-2003*

1. *Years and schools where data was collected*
2. *Type of data collected; data collection method*
3. *Limitations of data collection*
4. *Significant results*
5. *Sampling conclusions*

Paper #3 *The War Between Mice and Elephants*

1. *Current distribution of mice and elephants on Web*
2. *Drop Tail, RED and RIO-PS.*
3. *Edge versus Core Router*
4. *Fairness and goodput*
5. *Proposed architecture*

Paper #4 *An Analysis of Internet Content Delivery Systems*

1. *Data collection techniques*
2. *Four distinct CDN types*
3. *time-based behavior of different CDNs*
4. *bandwidth usage distinctions for four CDNs*
5. *caching conclusions*

Paper #5 *The Effectiveness of Request Redirection on CDN Robustness*

1. *Chash*
2. *HRW*
3. *Static*
4. *Dynamic*
5. *Network Proximity*
6. *CDR*
7. *FDR*
8. *Flash crowd behavior*