Final Review – 2018F

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The University of Texas at San Antonio
Outline

- Lecture-06: Intro to DS
- Lecture-07: Application-Level Communication
- Lecture-08: Remote Objects and RMI
- Lecture-09: Naming
- Lecture-10: DS Synchronization
- Lecture-11: Consistency & Replication
Outline of Lecture-06

- Different Distributed Systems
  - Distributed computing systems
  - Distributed information systems
  - Distributed pervasive systems

- OS in distributed systems
  - Distributed OS vs. Network OS vs. Middleware

- Design objectives of distributed systems
  - Transparency, openness and scalability

- Architecture of distributed systems
  - Software vs. system architectures
Important Points of Lecture-06

- Definition and difference of DCS, DIS and DPS (A)
- Definition of distributed systems (B)
- Three aspects of scalability in DS (B)
- Techniques of Scalability (B)
- Basic client-server model, two-tiered and multitiered architecture (A)
Outline of Lecture-07

- **Fundamentals**
  - Client/Server communication protocols
    - Request vs. Request-reply vs. Request-reply-acknowledge
  - Invocation semantics
    - Exact once vs. at least once vs. at most once
  - Communication types
    - Transient vs. persistent
    - Synchronous vs. asynchronous

- **Models for application communications**
  - **RPC**: remote procedure call
  - Message-oriented communication
  - Stream-Oriented communication
  - Multicast communication
Important Points of Lecture-07

- Client/server communication protocols (R, RR, RRA) (B)
- Traditional failure handling in RR (B)
- Idempotent operations (A)
- Server invocation semantics in RR (A)
- Type of communications (recognition: persistent/transient synchronous/asynchronous) (B)
- RPC steps, parameter passing, basic mechanism (B)
- Problems of RPC (B)
- Guarantee QoS for streams (A)
Outline of Lecture-08

- Distributed/Remote Objects
- Remote object reference (ROR)
- Remote Method Invocation (RMI)
- Case study and example: Java RMI

Other issues for remote objects
  - Factory method; Transient vs. Permanent objects;
  - Callback objects; Distributed Garbage collection;
Important Points of Lecture-08

- Remote object, remote object reference, remote interface (B)
- Parameters for remote methods (B)
- RMI steps - overall (B)
- RPC vs. RMI (B)
Outline of Lecture-09

- Overview: name and name services
  - Naming space and implementation

- Flat name and simple resolutions

- Structure name
  - Name space and resolution
  - Case study: DNS

- Attributed-based naming
  - Directory service
  - Hierarchical Implementations: LDAP
  - Decentralized Implementations
Important Points of Lecture-09

- Name, access point, and identifier (B)
- Naming systems and their goals (B)
- Flat name and simple resolutions (B)
- Distributed hash table and finger table (A)
- Structure name (B)
- Name resolution: iterative and recursive (B)
- Steps of DNS resolution (B)
- How DNS achieves the scalability (B)
Outline of Lecture-10

- Physical clock/time in distributed systems
  - No global time is available
  - Network Time Protocol
  - Berkeley Algorithm

- Logical clock/time and ‘Happen Before’ Relation
  - Lamport’s logical clock → total ordering multicast
  - Vector clocks → Causally ordering

- Mutual Exclusion: Distributed synchronizations
  - De/Centralized algorithms
  - Distributed algorithms (Ricart & Agrawala)
  - Logical token ring
Important Points of Lecture-10

- Network time protocol: basic idea (B)
- Berkeley algorithm (B)
- Logic Time and why? (B)
- Happened-Before relations (B)
- Logic clocks (example) (B)
- Issues of logic clock (B)
- Vector clocks (B)
- Comparison between logic clock vs. vector clock (B)
- Mutual exclusion of distributed synchronization (B)
Outline of Lecture-11

■ Motivations for replications
  ➢ Performance and/or fault-tolerance

■ Data-Centric Consistency Models
  ➢ Continuous Consistency, Consistent Ordering of Operations

■ Client-Centric Consistency Models
  ➢ Eventual Consistency
  ➢ Monotonic Reads, Monotonic Writes
  ➢ Read Your Writes, Writes Follow Reads

■ Replica Management
  ➢ Replica-Server Placement, Content Replication&Placement
  ➢ Content Distribution

■ Consistency Protocols
  ➢ Implementation of the consistency models
Important Points of Lecture-11

- Motivations for replication (B)
- Consistency models: data/client centric (B)
- Sequential consistency and causal consistency (B)
- Client-centric consistency model (B)
- Replica management (A)
Final Score Distribution

- Traditional OS (~50%)
- Distributed Systems (~50%)

- Total: 320 points
- Examination Time: 12/11 6:30pm~8:30pm