Distributed Systems

Winter Term 2024/25

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12 Summary, Important Topics

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1. Introduction

- Definition of a distributed system
- **Features / challenges of distributed systems**
- Architecture models: client/server, n-tier

2. Middleware

- Tasks of the middleware
- Communication-oriented and application-oriented middleware
- **Implementation of remote calls (proxy pattern)**

3. Distributed Programming with Java RMI

- **Approach to create an RMI application**
- **Programming of server and client**

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4. Name Services

5. Process Management

- Graph partitioning, list scheduling, code migration

6. Time and Global State

- **Synchronization of physical clocks**
- **Lamport's happended-before relation (causality relation)**
- **Lamport and vector clocks**
- **Consistent cuts, Chandy/Lamport algorithm**

7. Coordination

- Election algorithms
- **Mutual exclusion (centralized, Ricart/Agrawala, ring)**
- **Multicast (reliability, order)**
- Transactions

8. Replication and Consistency

- **Sequential consistency, release consistency**
- Distribution protocols
- **Consistency protocols (primary-based, quorum-based)**

9. Distributed File Systems

10. Distributed Shared Memory

11. Fault Tolerance

- Failure models
- Physical redundancy, agreement
- Recovery