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# Distributed Systems

Winter Term 2025/26

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## 12 Summary, Important Topics



### 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

- ➔ **Approach to create a Java RMI application**
- ➔ **Programming of a Java RMI server and client**



### 4. Name Services

- ➔ Task and purpose of a name service

### 5. Process Management

- ➔ Graph partitioning, list scheduling, code migration

### 6. Time and Global State

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



### 7. Fault Tolerance

- ➔ **Failure models**
- ➔ Physical redundancy, agreement
- ➔ Recovery

### 8. Coordination

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



### 9. Replication and Consistency

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

### 10. Distributed File Systems

### 11. Distributed Shared Memory