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# Distributed Systems

SoSe 2019

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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 with Java RMI

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



## 4. Name Services

## 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. Coordination

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

## 8. Replication and Consistency

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



## 9. Distributed File Systems

## 10. Distributed Shared Memory

## 11. Fault Tolerance

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