

# Distributed and Networked Systems

(formerly known as Communication Systems)

Distributed Systems

Prof. Dr. Jens Schmitt



**disco**  
DISTRIBUTED COMPUTER SYSTEMS

Networked Systems

Prof. Dr. Reinhard Gotzhein

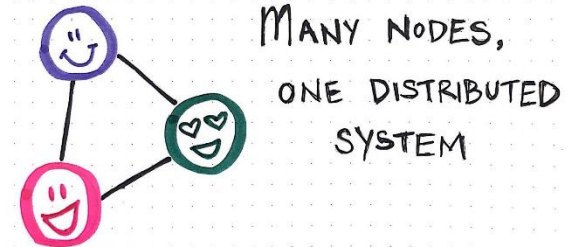


Vernetzte  
Systeme

# Distributed and Networked Systems – What are they?

## Distributed System

- Collection of interacting components
- Realization of distributed applications and large-scale systems
- Improve scalability and avoid performance bottlenecks
- Increase resilience to service outages

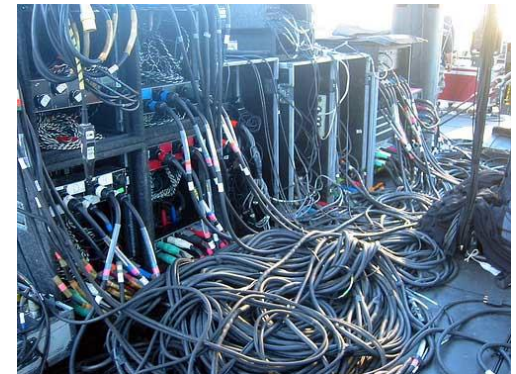


“A distributed computer system is one in which the failure of a computer you didn’t even know existed can render your own computer unusable.”

Leslie Lamport

## Networked System

- Collection of components exchanging messages
- Wired vs. wireless communication
- Stationary vs. mobile nodes
- Infrastructure vs. ad hoc



# Trend Towards Distributed and Networked Systems

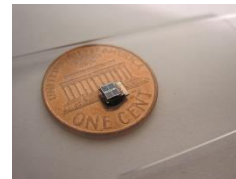
## Past: Centralized, Sequential Systems

- Mainframes hosted in computing centers
- Batch-processing
- Stand-alone embedded systems



## Today: Distributed and Networked Systems

- Internet (of Things), World Wide Web
- Mobile communication: 3G, 4G, 5G, ...
- Distributed embedded systems, Industrie 4.0
- Cloud Computing
- Automotive Systems
- Sensor networks, Cyber-Physical systems



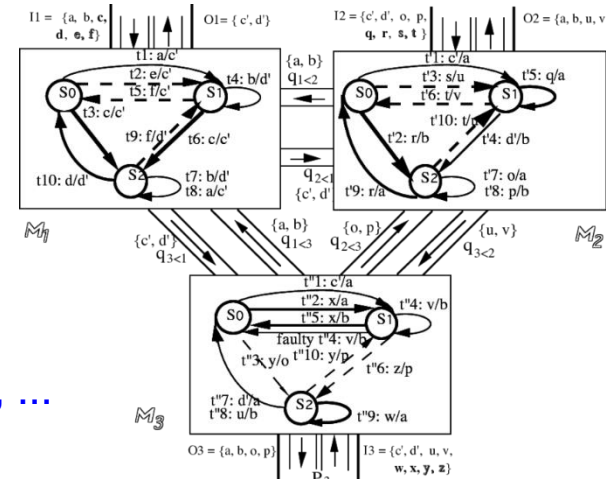
# What We Offer in Distributed and Networked Systems (Close To Our Research)

## Functional Aspects

- Systematic Development
- Correctness of Protocols
- Fundamental Algorithms
  - time synchronization, duty cycling, clustering, ...

## Non-Functional Aspects

- Performance Analysis, Control, Optimization
  - meeting (hard) deadlines
  - achieving high utilization at good QoS
  - flexible dimensioning
- Security
  - what threats are out there?
  - how to defend: reactive vs. proactive



# Classes, Seminars, Projects

Networked Systems, Quantitative Aspects of Distributed Systems (Foundations)



Gotzhein



Schmitt

Protocol Engineering

Protocols and Algorithms for  
Network Security

Specification of Networked Systems

Network Security

Algorithms in Ad-Hoc-Networks

Worst-Case Analysis of  
Distributed Systems

Stochastic Analysis of  
Distributed Systems

Communication Systems (S)

Distributed Computer Systems (S)

Development of  
Networked Systems (P)

Performance Evaluation of  
Distributed Systems (P)

