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Software Engineering Group
Prof. Dr. W. Schäfer

An Architecture for Configurable Dependability of Application Services

Matthias Tichy
mtt@uni-paderborn.de
Software Engineering Group
University Of Paderborn

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Introduction

- Dependability
  - Availability
  - Reliability
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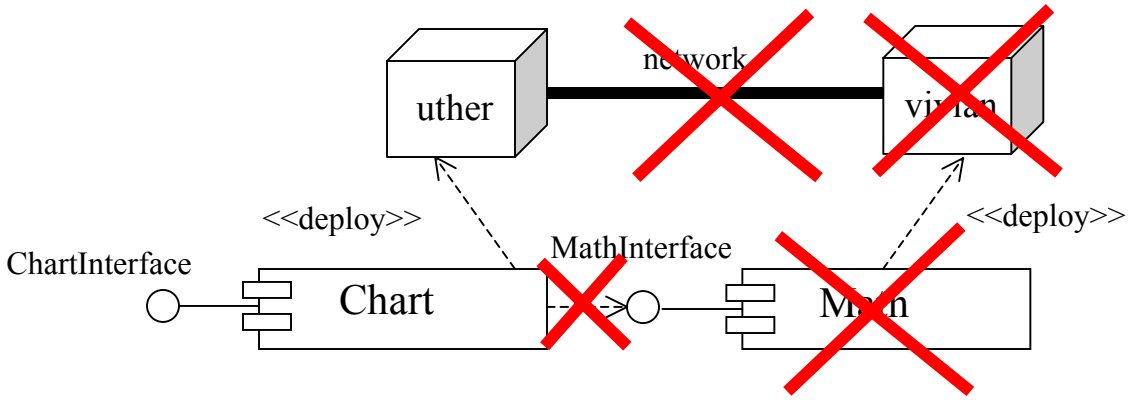

Architectural Principles

- Service Registry

  Provides support for dynamic online binding and spontanous networking.
- Leasing

  The leasing principle extends the allocation of resources with time.The lease represents a period of time during which the resource is offered.
- Proxy

  A proxy is the placeholder for another object.
- Smart Proxy

  Smarter version of the proxy, may be a placeholder for more than one object.
- Redundancy

  Redundant services prevent a single-point-of-failure.
- Replication

  Replicating is the process of maintaining multiple copies of the same entity at different locations.

Architecture

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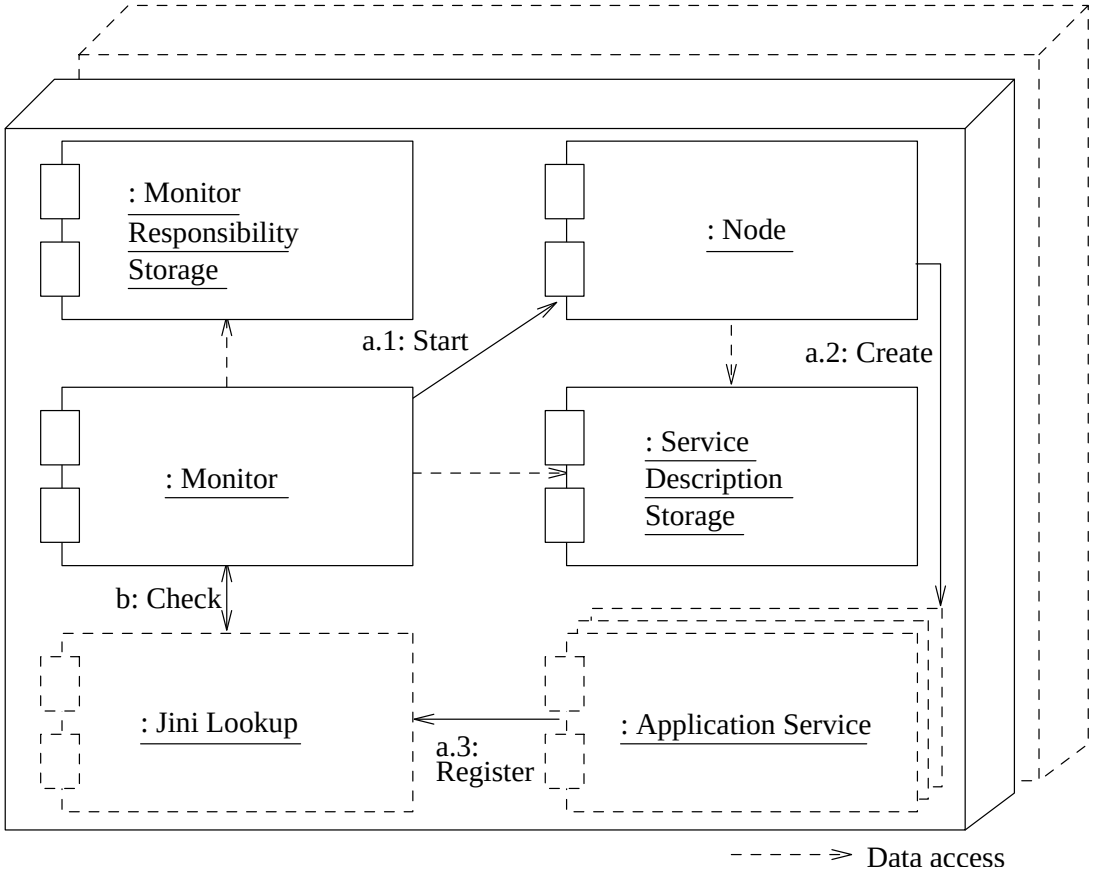
- Architecture provides means to achieve high availability for application services
- Reliability is highly application specific

- Every infrastructure service is executed on every node
  - Redundancy of services
  - Replication of data
  - Service registry



Architecture – Monitor (Availability)

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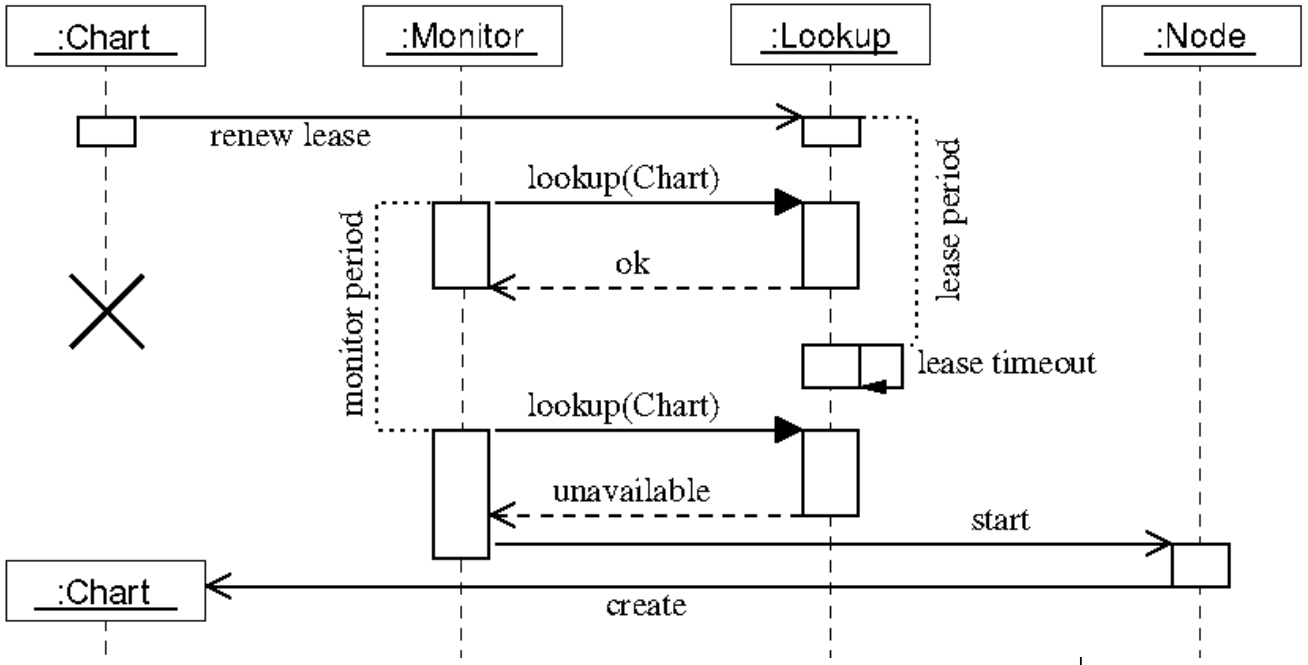
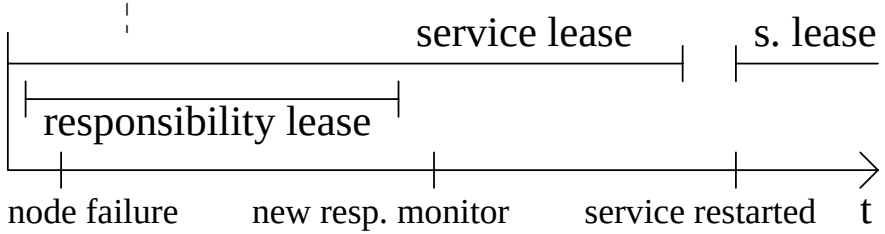
- For each application service instance, one monitor supervises its execution ⇨ configurable degree of availability
- Coordination by monitor responsibilities (registry + leasing)





Reliability

- Highly application specific
- 3 types:
  - Stateless session service
    - No problem, just use another service instance
  - Stateful session service
    - Relevant history must be replayed on another service instance
  - Entity service
    - Replicate data and use an appropriate consistency model

Architecture – Responsibility Storage (Reliability)

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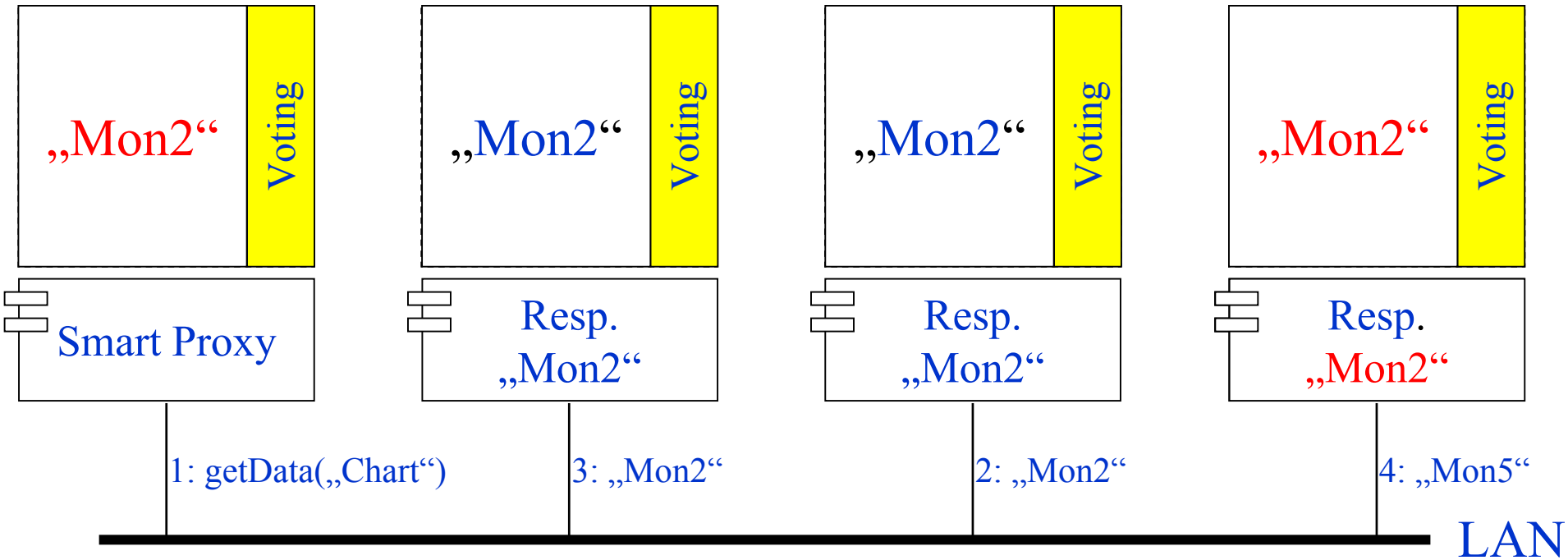
- Example for an entity service
- Smart Proxy communicates via Multicast messages
- Decentral majority voting
- Redundancy, replication, smart proxy



Conclusion & Future Work

- Architectural principles for dependability
- Architecture based on these principles
- Provides means to achieve a configurable degree of availability
- Example for providing application specific reliability
- Implementation based on Jini

- Seamless UML support for service-based architectures
- Runtime measurements to adapt architecture parameters
- Complex embedded and real-time systems

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Thank you for your attention!

Questions?

Service Description Storage (Reliability)

- Redundant and distributed storage of the service descriptions
- Strong consistency (sequentiell)
- Probability: P(Read) >> P(Write)
- Algorithm „Weighted Voting“
- Implemented in a smart proxy