Reliability of Computer Systems

Peter Sobe

HTW Dresden, Germany
Faculty of Computer Science and Mathematics

27th July 2016

Aim of this lecture

Problem Awareness, Responsibilty

Introduction of the common dependability problem, particularly in the scope of computer system reliability.

Technical Treatment

Overview of techniques to improve the reliability of systems.

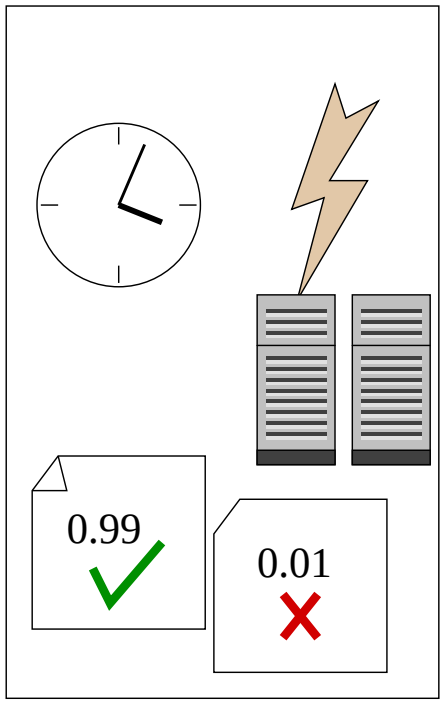
Reliability Quantification, Modeling, Decisions

Overview on mathematical models for reliability quantification of technical systems

Overview

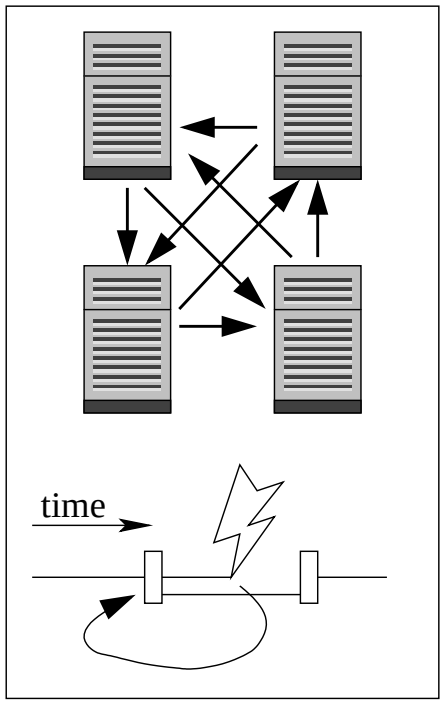
Part 1: Basic Reliability Quantification

- Probabilities of fault free operation and failures
- Availability of a functionality
- Time:
  - How long is a system operational / faultfree?
  - Mean time to failure, Mean time to repair.
  - Mission time?
- Influence of the system structure / complexity on reliability



Overview

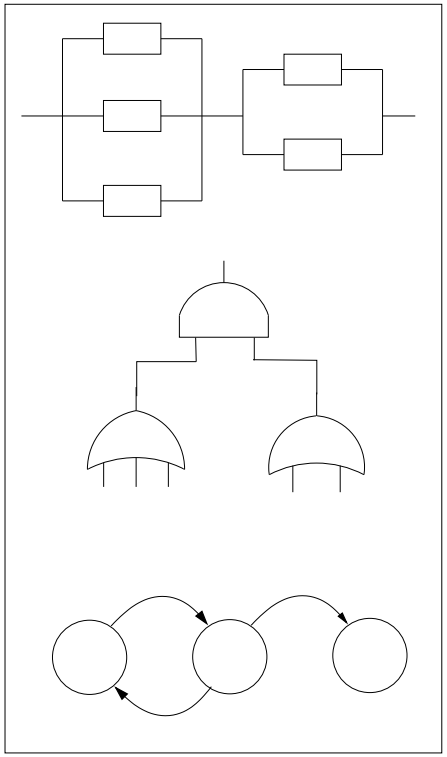
Part 2: Reliable Systems/ Fault-tolerant Systems



- Technical treats to improve the reliability of a system.
- Failure classes (crash vs. wrong results)
- Fault detection, failure detection and diagnosis
- Failure tolerance techniques

Overview

Part 3: Modeling of Fault-tolerant Systems



Systems without repair

- System structure and Boolean models
- Graphic Presentations: Fault trees and Reliability block diagrams
- Probabilistic quantification

Systems including repair

- Modeling: birth/death processes, Markov models