

Internes Kolloquium

Am Montag, dem 11. April 2011 um 16:15 Uhr hält

Msc CS Kinga Kiss-Iakab
Universität Oldenburg

einen Vortrag mit dem Titel

Probabilistic Quorum Systems for Dependable Distributed Data Management

Der Vortrag findet im OFFIS, Escherweg 2, Konferenzraum F02 statt.

Abstract:

Among failure-prone and dynamic distributed systems there is a significant subclass of systems which strive for high availability and can function with inconsistent data. Examples include flight reservation systems which implement overbooking or emergency ambulance systems which return informative answers to timeliness-critical queries.

Data replication is a well-known technique for tolerating failures and dependably managing data in distributed systems. Therefore, quorums (i.e., subsets of the set of nodes in the distributed system) are used for executing the basic operations: writing a new data and reading previously written data. Strict quorum systems rely on sequential consistency by ensuring the mutual exclusion between read and write operations and write and write operations. The guarantee of this strict consistency notion upper-bounds their availability. Probabilistic quorum systems increase the availability of operations by relaxing the previously mentioned mutual exclusions. This relaxation concerns the intersection of read and write and write and write probabilistic quorums only with high probability.

The first objective of this work is to construct probabilistic quorum systems which rely on some input strict quorum systems. During construction their selection regarding intersections with the previous operation's quorums is driven by consistency. Additionally, they preserve characteristics of the strict quorum systems like virtual structures connecting the nodes or priorities regarding the usage of quorums. Furthermore, different priorities when combining strict and probabilistic quorums are possible to consider. The second objective is to analyze the different probabilistic quorum system constructions by quantifying the trade-off between data consistency and operation availabilities. By the means of a Markov chain analysis qualitative and quantitative aspects of the trade-off are identified. The third objective is to optimize the construction of probabilistic quorum systems in terms of data consistency and operation availabilities. Concepts and methods from the field of strict quorum systems are translated into the field probabilistic quorum systems. By this, a more abstract data consistency measure can be defined. The analysis of the data consistency vs. operation availabilities trade-off using the optimized probabilistic quorum constructions is repeated with the help of the new measure to uncover additional properties. Finally, evaluation by implementation and simulation in the field of wireless sensor networks is planned.

Supervisors: Prof. Dr.-Ing. Oliver Theel, Prof. Dr. Eike Best

Weitere Kolloquiumstermine sind im WWW abrufbar.