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Master's Thesis

Live Queries in the CELUM Reactive Server Platform

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Start date: October 2017

Master-Thesis:

CELUM GmbH (http://www.celum.com) is a leading developer and vendor for digital asset management systems. In a current research and development project, CELUM is setting up a collaboration platform which should support creating digital content in a collaborative fashion in globally distributed teams. Core of the system is a reactive server platform which is based on the reactive frameworks *vert.x* (http://vertx.io) and RxJava (http://reactivex.io/) as well a key-value data base system with the query language Gremlin (http://tinkerpop.apache.org/).

A main challenge in these systems is to handle the workload of small database updates. Typically, data base updates affect a subset of the connected clients which must be notified of changes. However, currently there is no way to determine which clients are affected by which changes and thus all the clients connected must be updated eventually. Obviously, this represents and a significant workload on the server as well as the client side.

Goal of this Master's thesis therefore is to investigate, develop concepts and implement a prototype for incremental notifications of clients after data base updates. The approach should allow finding out which clients must be updated when modifications of the database occur. The approach should work as follows:

- analyze the client queries to find out the kind of data base updates which will require an update of the client data;
- set up an index structure for efficiently retrieving the queries to be updated for a data base change;
- analyze the update statements on the database for finding out which updates happen;
- efficiently retrieve all the queries based on the update statement as well as from the results of the update;
- selectively execute the retrieved client queries for precise client updates.

The thesis work includes

- Investigation and development of different possibilities for incremental updates of clients
- Comparison of the possible approaches
- Prototypical implementation of a selected approach
- Run-time evaluation in the CELUM context
- Improvements and optimization

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