Specification for Bachelor Thesis

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1 Title

My proposed title for this thesis is "Design and Implementation of a MongoDB Driver for Prolog."

2 Background

MongoDB is a young document-oriented database system that has started to gain much attention recently. Document-orientation involves removing rigid database schemas and advanced transactions, in favor of flexibility. Document-orientation also promotes a certain degree of denormalization which allows embedding documents into each other, leading to potentially much better performance by avoiding the need for expensive join operations.

Prolog, being an untyped language, agrees with the document-oriented approach of relaxing manifests in order to create more dynamic and flexible systems. Embedding terms in other terms is natural in Prolog, and embedding documents in other documents is natural in MongoDB.

Many drivers exist, both official and unofficial, that enable the use of MongoDB from various programming languages. At the time of writing, no such driver for Prolog seems to exist.

3 Task Description

The task is to design and implement an interface between Prolog and MongoDB. This involves creating a BSON (the data format used by MongoDB) serializer/deserializer, and then wrapping the MongoDB API in Prolog predicates.

The task also involves setting up network communication between the Prolog environment and the database server.

4 Method

4.1 Development Environment

Development will be conducted using SWI-Prolog, which is a mature, free and portable Prolog environment with a large standard library.

Unit testing will be pursued using PlUnit, which is bundled with SWI-Prolog.

A local instance of MongoDB will be used for testing the driver.

4.2 Literature

4.2.1 Books

Chodorow, K. & Dirolf, M. (2010) *MongoDB: The Definitive Guide.* Sebastopol, United States of America: O'Reilly Media, Inc.

Bratko, I. (2001) *PROLOG Programming for Artificial Intelligence.* 3rd ed. Essex, England: Pearson Education Limited.

O'Keefe, R. A. (1990) *The Craft of Prolog.* Cambridge, United States of America: The MIT Press.

4.2.2 Technical Documentation

MongoDB Driver Documentation
http://www.mongodb.org/display/DOCS/Drivers

BSON Specification
http://bsonspec.org/

SWI-Prolog Documentation
http://www.swi-prolog.org/pldoc/

5 Scope

Creating a driver that is usable with, or at least easily portable to, other Prolog environments is desirable, but development and testing will focus on SWI-Prolog.

More complex features of MongoDB, such as advanced connection management and GridFS, will not be implemented.

6 Time Plan

Tentative schedule spanning eleven weeks (of which one is unrelated) during 2011. Technical development and writing the thesis will be done in parallel.

March 28 First day.

2 weeks Research MongoDB and BSON. Study drivers for other languages.

3 weeks Implement BSON serializer/deserializer.

April 20-26 Pause from thesis work to study for unrelated exam.

1 week Implement network connection.

4 weeks Implement bulk of driver functionality.

June 10 Last day.