Chapter 10
Evaluation of Algorithms and FACETS

This chapter reports on the experiments conducted to evaluate the techniques (algorithms) and system (FACETS) developed in this research. Based on a fictitious manufacture company, a data warehouse, an ontology and an experience base were developed and linked with FACETS. Students and professors were invited to the experiments. The FACETS and the major algorithms for SA parsing and query construction were evaluated based on the interaction between subjects and FACETS.

10.1 Experiment Preparation

10.1.1 Data Warehouse

In order to practically evaluate the algorithms, we applied FACETS in an illustrative company, called *Adventure Works Cycles Ltd*, which is a fictitious organization described in the manual of SQL Server 2005 (Microsoft 2007a). *Adventure Works* (AW) is a large, multinational manufacturing company. The company manufactures and sells bicycles and relevant accessories to commercial markets in North America, Europe and Asia. *Adventure Works* is headquartered in Bothell, Washington with 290 employees and several regional sales teams located throughout their market base.

We developed a data warehouse called *Adventure Works Data Warehouse* (AWDW) for this company based on a sample database in SQL Server 2005. In the sample database, there are twenty-nine tables including seven fact tables and twenty-two dimension tables. The data stored in the sample database covers a wide variety of business sectors such as product, account, customer, geography,
reseller and sales. In order to make the sample database suitable for this experiment, e.g., creating appropriate business scenarios (decision situations), we extended the sample database in two ways. First, some table definitions were modified. Second, new tables were defined and populated with relevant data. Based on the extended sample database, we developed AWDW which represents 75 tables in total with more business sectors covered, such as advertisement, research, government policy, competitors and product delivery. Based on the amended tables, we created six cubes: internet sales, reseller sales, sales orders, finance, exchange rates and delivery.

10.1.2 Ontology

The data warehouse AWDW presents a business application domain. Accordingly, we developed an ontology called Adventure Works Ontology (AWO) for this application domain using the Ontology Management subsystem of FACETS. In AWO, 111 classes are defined which correspond to 111 subsumption relationships in the class tree. Among these classes, 80 classes are correlated to tables or cubes in AWDW. We also defined over 1000 property-share relationships across these classes. The excerpt of the class tree and the class graph is shown in Figure 6.1 and Figure 6.2 respectively.

10.1.3 Experience Base

We used the method of experience elicitation discussed in Section 6.2.2 to produce a set of experiences and stored them in the experience base. This experience base is used for all subjects. Experience per se is individual-specific, that is, experience is different from person to person even within the same domain. However, it is also common that people might share the same opinions in some situations, or are able to eventually come up with a consensus after communication. In this sense, it was appropriate to create common experiences for all subjects in this experiment. The advantages of using the same experience base for all subjects are twofold. Firstly, much engineering time in eliciting the experience of every subject was saved. Secondly, the experience base provided a common basis for every subject in the experiments to formulate his/her subjective rating, which might be able to reduce the negative effect of subjective data.

We conducted two experiments to respectively evaluate the related algorithms and the prototype system FACETS. In Experiment one, the following algorithms were evaluated: NumericPlainParser, LiteralPlainParser, SemanticParser, LocalContextDetermination, SqlBuilder and MdxBuilder (Chapter 7). These algorithms represent the major points of the technical part of this research. In Experiment two FACETS, which represents the combination of all related algorithms, was evaluated based on a decision scenario.