Statement of Interest

BACK Project Group
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The BACK project:

The project started in January 1985 as the TUB part of a larger project funded by the European Community. Our task in the overall project has been the specification, design and implementation of a knowledge representation component. We decided to base our work on the KL-ONE tradition, and the result was the hybrid reasoning system BACK, the Berlin Advanced Computational Knowledge Representation System.

Work in connection with BACK has covered a broad range of topics, such as theoretical work on term subsumption formalisms, the development of an elaborated assertional component with database access, and case studies on possible applications. In general, we have tried to combine methodological investigations on knowledge representation issues with the development of a usable software prototype.

After having built several prototypes in the past, the system was reimplemented recently leading to a version with a well-balanced, uniform interface language consisting of a KL-ONE-like term forming language and a closely integrated assertional language.
Our project is part of the European Research project ESPRIT P311 in which an advanced DB/KB management system is being built. The overall project includes two industrial research groups developing natural language handlers (Olivetti for Italian and Nixdorf for German) which use BACK as their central KR system, another research group developing an extended application together with graphical interface tools for BACK (Data- mont/Quinary), and finally a DB-oriented group (Universitaet Hildesheim) providing an extended SQL component with e.g. built-in transitive closure operators. The intensive usage of BACK by our partners is providing us with substantial feedback from people working with the system.

The BACK system is written in Prolog; there are various installations on e.g. Symbolics, Sun, IBM mainframe, Mac2.

**Current interest and potential contributions:**

One of the topics we are especially interested in is the incorporation of time into the KL-ONE based formalism and eventually also into the actual system. Previous work towards this goal has been a survey on constraint types suitable for representing temporal information, and a paper describing data structures and algorithms for a temporal constraint network. We have also considered an assertional formalism (for ground facts only, i.e. TBox concepts and roles applied to constants) where assertions are made with respect to certain intervals of time. This seems to be fairly straightforward from a semantic point of view although it still remains difficult to clearly draw a line between the easy and tractable inferences and the hard and intractable ones.

On the other hand it seems to be much more difficult to incorporate time into the term language itself. Maybe that is a hopeless endeavor, but it would nevertheless be an interesting topic to discuss. Is a term language conceivable that allows for concepts with internal temporal structure, such as "a former president", or "a house which was painted grey and is now painted red"? Or, put in other words, what could a term language be like that allows descriptions in terms of the changes an object has undergone in the course of time?

Concerning the assertional component we have been experimenting with different approaches of connecting ground facts with terminological concepts (abstraction and realization). A final decision should be seen in the context
of large knowledge bases. In what cases is it appropriate to use a relational database as the underlying component and how should a coupling look like?

Another important topic of our recent work has been the design of a Knowledge Retrieval (ABox) language, which on one side can be related to traditional DB languages, and on the other side fully exploits the functionality of the hybrid reasoner.

We felt that many of these aspects can be decided more concisely based on an application scenario. Therefore, another potential contribution to the workshop could be a discussion of the entire system and its embedding in a concrete working environment. This may help to shed some light on the question whether term subsumption systems are to be used for sophisticated database access or more for typical AI problem solving.

**Collection of Some Reports:**


A comprehensive report on the new BACK system written by C. Peltason, A. Schmiedel, C. Kindermann, J. Quantz, and K. Schild will be published soon and will be available at the workshop.