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# DALEK: A Tool for Dialectical Explanations in Inconsistent Knowledge Bases

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**Abstract.** In this paper we present a prototype of a framework called DALEK (DiALectical EXplanation in Knowledge-bases). This framework implements dialectical approaches to explain query answers in inconsistent knowledge bases. The motivation behind the prototype is as follows: given an inconsistent knowledge base represented within *Datalog* $\pm$ , a semantics for handling inconsistency and a query  $Q$ , the goal is to explain why  $Q$  is accepted or not accepted under such semantics. The explanation takes a dialogical form (cf. [1,3]).

**Keywords.** Applications of Argumentation, Explanation and Argumentation Dialogues, *Datalog* $\pm$ .

## 1. DALEK Framework: Explain!

DALEK engages a **User** and the **Reasoner** in a dialogue about the entailment of any boolean conjunctive query in *Datalog* $\pm$  knowledge bases. The dialogue could be of argumentative or explanatory nature. In DALEK the **User** can shift between dialogue types (i.e. dialectical shifts). The framework is general enough to carry out a standalone argumentation dialogue as well as a standalone explanatory dialogue. DALEK also implements commitments and understanding stores.<sup>1</sup>

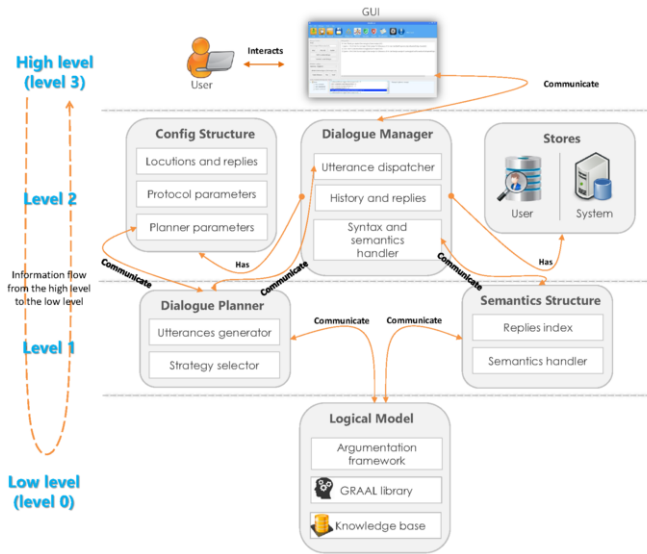
When the **User** interacts with the GUI, the latter communicates with *the dialogue manager* which possesses the *configuration structure* and the *stores*. Then, the dialogue manager, at its turn, communicates with *the semantics structure* through the sub-module “Syntax and semantics handler” and with *the dialogue planner* through the sub-module “Utterance dispatcher”. Next, *the dialogue planner* and *the semantics structure* communicate directly with *the logical model* that uses the *Datalog* $\pm$  GRAAL library [2] to query *the knowledge base*. Hereafter we detail each module of Figure 1.

**Configuration structure.** This module specifies: (1) the set of allowed locutions with their legal replies, (2) the parameters of the protocol, e.g. unique-move, multiple-move, the participants, etc. and (3) the parameters of the planner.

**Dialogue manager.** This is the referee between the **User** and the **Reasoner** (i.e. dialogue planner), it dispatches their utterances through the sub-module “Utter-

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<sup>1</sup>See <http://www.lirmm.fr/~arioua/dkb/#rulesdalek> for more details.



**Figure 1.** The DALEK’s architecture. Each layer is composed of modules and each module is composed of sub-modules.

ance dispatcher” after ensuring their legality. To verify the legality the dialogue manager communicates with the module semantics structure through the sub-module “Syntax and semantics handler” that makes use of the stores. The syntactical verification ensures the legality of any advanced utterance with respect to : (1) legality of the utterance itself, and (2) legality of the reply within the dialogue. The semantics verification ensures, among other things, the legality of the utterances with respect to the content. It checks whether the advanced utterance holds a legal content and it replies with a legal content.

**Semantics structure.** This structure implements an *operational semantics* of the dialogue. It associates with each reply a procedure that should be called by the dialogue manager to check the legality of the reply.

**Dialogue planner.** This module receives the utterances from the **User** through the dialogue manager and plans the next utterance. The planner in its current state tries to answer **User**’s utterances as they come.

## 2. Acknowledgments

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