

# The KM/KnEd System: An Integrated Approach to Building Large-scale Multifunctional Knowledge Bases\*

Erik Eilerts

Department of Computer Science  
University of Texas  
Austin, Texas 78712-1188  
(512) 471-9565  
eilerts@cs.utexas.edu

## 1 Background

In 1987, Dr. Bruce Porter began work at the University of Texas at Austin on the Botany Knowledge Base Project. The goal of the project is to develop a large-scale multi-functional knowledge base in the area of Botany. This Botany Knowledge Base (BKB) is used to support research projects in question answering, automated modeling, and intelligent tutoring. Due to the size and complexity of the BKB, a decision was made in 1990 to begin construction of a new knowledge representation language and interface to support the knowledge base. The knowledge representation language was named KM, for Knowledge Manager, and the interface was named KnEd, for Knowledge Editor. The KM/KnEd system is similar to Doug Lenat's CYC project and Doug Skuce's CODE4 system.

## 2 KM/KnEd

KM is a frame-based knowledge representation language that uses slot-and-filler structures. KM's most important feature is that it allows the *annotation* of values with extra details.

Value annotations are used to represent information contextually. Consider the assertion "Texas Bluebonnets secrete nectar that contains a low concentration of sugar." This problem could be solved by creating the frame **The-Sugar-contained-in-the-Nectar-secreted-by-a-Texas-Bluebonnet** and adding the "concentration Low" attribute to it. But, this removes all contextual information about the frame. Instead, KM allows the user to retain contextual information by recursively nesting annotations (KM is one of the few languages with this feature). Figure 1 shows how this assertion is represented using KM's value annotation mechanism. In this figure, the (Texas-Bluebonnet secretes Nectar contains Sugar) address is connected to the "concentration Low" attribute.

\*Support for this research was provided by a grant from the National Science Foundation (IRI-9120310), a contract from the Air Force Office of Scientific Research (F49620-93-1-0239), and donations from the Digital Equipment Corporation. This work was conducted at the University of Texas at Austin.

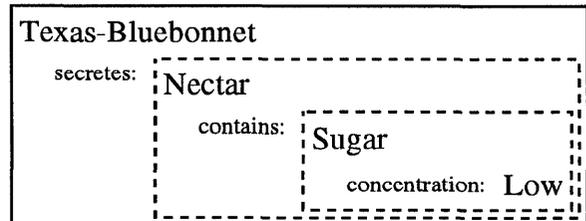


Figure 1: Value Annotation

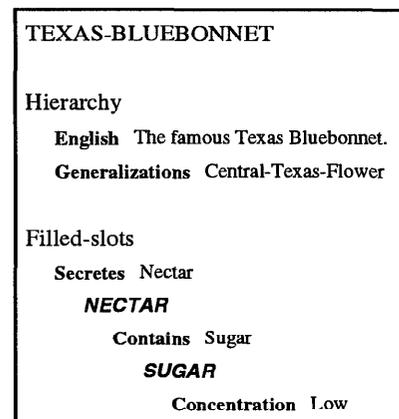


Figure 2: KnEd Text Pane

KnEd is a graphical user interface for viewing and editing large-scale knowledge bases. The basic display mechanism used is the text pane. It displays all the relations associated with a frame. Figure 2 is an example of a text pane display of the Texas-Bluebonnet frame. KnEd provides several tools to aid the user in adding, removing, changing, and copying values in the knowledge base. KnEd also supports navigation around the knowledge base and distributed editing.

With the help of KM and KnEd, the BKB has successfully grown to contain more than 150,000 facts. The complexity added by the annotation mechanism of KM made KnEd's viewing and editing capabilities indispensable. As knowledge bases increase in size, tools such as KM's annotation mechanisms and the KnEd interface will become essential.