

# DE LA SALLE UNIVERSITY

**ExpertDB: AN ENTITY-RELATIONSHIP BASED  
EXPERT SYSTEM FOR LOGICAL DATABASE DESIGN**

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## ABSTRACT

The entity-relationship (ER) concept had been used (informally, in most cases) by database designers, systems analysts, and simulationist in the design of systems. Although, very few work discuss the theory and/or applications of the ER concept, there are two noteworthy advantages: it is simple and easy to understand, and conventional data models (such as relational, network and hierarchical) can be derived from the ER model.

Using its formal definition, we present an ER approach to logical database design. The approach is to synthesize a normalized ER schema (which consists of entity set and relationship set expressions) from functional dependencies (FDs). Using as input, sets of attributes and functional dependencies, the approach is to derive the minimal cover of FDs, partition and regroup FDs, and finally form the entities and relationship sets. The output can then be mapped to any conventional data models.

This study presents an expert system database designer, ExpertDB, which is based on the ER approach. It has a knowledge base (KB), an inference engine and dialogue modules. The synthesis method is organized in ExpertDB into 2 sets of rules: simplification and normalization. The first set derives the minimal cover of FDs while the second set normalizes the ER schema. A set of transformation rules were added in the KB to allow the conversion of the ER schema into the relational schema. At certain points in the design process, ExpertDB maintains a dialogue with the user through the dialogue modules to resolve ambiguities and obtain more complete information. ExpertDB was implemented in PROLOG and test runs made on several classical examples showed that ExpertDB was able to derived the correct relational schema.

*Index Terms:* database design, ER schema, expert system

