Spatial Databases: 52-59, 79-82

Query languages define how the user will interact with the database. For spatial databases, this involves handling ADTs and inheritance. A new proposed SQL standard is designed to deal with such queries (as well as provide a visual interface, a key difference from traditional data). The way databases will be extended is to insert foreign keys for spatial items in traditional data tables. The foreign keys will lead back to tables that somehow encode the spatial data.

The authors use most of the section to describe the formalized query language known as RA. Relational Algebra provides a mathematical basis for real languages like SQL, and thus has the same power as such languages. The common operations are select (retrieve a subset of tuples from the relation), project (display a subset of attributes from tuples), union (combine all tuples that are in two relations), difference (return all the tuples in one relation but not the other), intersection (returns the tuples that occur in both relations), and cross product (returns a relation with all the attributes of both relations). There also exist two joins. A natural join operation automatically selects tuples that have common attributes with equivalent values. A conditional join can do the same but with operations that extend beyond equivalency.

A number of examples are given using the RA language. One interesting one is number 4, which as the comment states it is barely right. This comment may be referring to the fact that in the example the intersection defined would not return any results.
The authors discuss query languages in great deal in the chapter. They note that most query languages are declarative, meaning the language specifies what the database should return, not how it should perform the query. The aforementioned operations (select, project,...) are described in detail and illustrated in a number of examples. They go beyond the other book by identifying the rename operation (which handles the case when data needs to be selected in relation to itself), extended operation which simplify expressions and aggregate functions.

The new operations, not mentioned in the other text, include division (which simplifies queries that find all instances of some piece of data), assignment (which stores the results of temporary queries) and generalized projection (which allows math to be performed on the data being projected). Aggregate functions are also introduced which can do operations like summing and averaging, as well as grouping data and selecting distinct data from the set. The resulting language is a complete RA which can do everything that a modern language like SQL can do.