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employee (*person_name*, *street*, *city*)
works (*person_name*, *company_name*, *salary*)
company (*company_name*, *city*)

Figure 2.17 Employee database.

Practice Exercises

2.1   Consider the employee database of Figure 2.17. What are the appropriate primary keys?

2.2   Consider the foreign-key constraint from the *dept_name* attribute of *instructor* to the *department* relation. Give examples of inserts and deletes to these relations that can cause a violation of the foreign-key constraint.

2.3   Consider the *time_slot* relation. Given that a particular time slot can meet more than once in a week, explain why *day* and *start_time* are part of the primary key of this relation, while *end_time* is not.

2.4   In the instance of *instructor* shown in Figure 2.1, no two instructors have the same name. From this, can we conclude that *name* can be used as a superkey (or primary key) of *instructor*?

2.5   What is the result of first performing the Cartesian product of *student* and *advisor*, and then performing a selection operation on the result with the predicate *s_id* = ID? (Using the symbolic notation of relational algebra, this query can be written as $\sigma_{s\_id=ID}(student \times advisor)$.)

2.6   Consider the employee database of Figure 2.17. Give an expression in the relational algebra to express each of the following queries:

    a.   Find the name of each employee who lives in city "Miami".

    b.   Find the name of each employee whose salary is greater than $100000.

    c.   Find the name of each employee who lives in "Miami" and whose salary is greater than $100000.

2.7   Consider the bank database of Figure 2.18. Give an expression in the relational algebra for each of the following queries:

    a.   Find the name of each branch located in "Chicago".

    b.   Find the ID of each borrower who has a loan in branch "Downtown".