



Figure 6.18 Specialization and generalization.

6.8.2 Generalization

The refinement from an initial entity set into successive levels of entity subgroupings represents a **top-down** design process in which distinctions are made explicit. The design process may also proceed in a **bottom-up** manner, in which multiple entity sets are synthesized into a higher-level entity set on the basis of common features. The database designer may have first identified:

- *instructor* entity set with attributes *instructor_id*, *instructor_name*, *instructor_salary*, and *rank*.
- *secretary* entity set with attributes *secretary_id*, *secretary_name*, *secretary_salary*, and *hours_per_week*.

There are similarities between the *instructor* entity set and the *secretary* entity set in the sense that they have several attributes that are conceptually the same across the two entity sets: namely, the identifier, name, and salary attributes. This commonality can be expressed by **generalization**, which is a containment relationship that exists between a *higher-level* entity set and one or more *lower-level* entity sets. In our example, *employee* is the higher-level entity set and *instructor* and *secretary* are lower-level entity sets. In this case, attributes that are conceptually the same had different names in the two lower-level entity sets. To create a generalization, the attributes must be given a common name and represented with the higher-level entity *person*. We can use the attribute names *ID*, *name*, *street*, and *city*, as we saw in the example in Section 6.8.1.