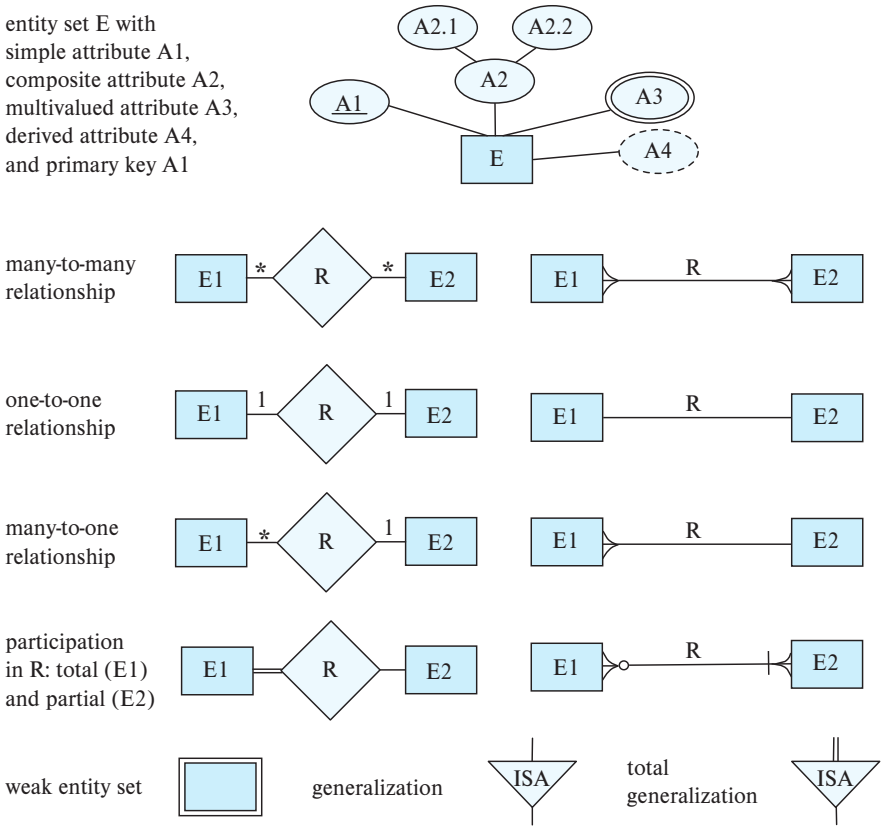

Figure 6.27 Alternative E-R notations.

to-one, and many-to-one relationships. The case of one-to-many is symmetric to many-to-one and is not shown.

In another alternative notation shown on the right side of Figure 6.27, relationship sets are represented by lines between entity sets, without diamonds; only binary relationships can be modeled thus. Cardinality constraints in such a notation are shown by "crow's-foot" notation, as in the figure. In a relationship R between $E1$ and $E2$, crow's feet on both sides indicate a many-to-many relationship, while crow's feet on just the $E1$ side indicate a many-to-one relationship from $E1$ to $E2$. Total participation is specified in this notation by a vertical bar. Note however, that in a relationship R between entities $E1$ and $E2$, if the participation of $E1$ in R is total, the vertical bar is placed on the opposite side, adjacent to entity $E2$. Similarly, partial participation is indicated by using a circle, again on the opposite side.

The bottom part of Figure 6.27 shows an alternative representation of generalization, using triangles instead of hollow arrowheads.