midnight (GMT) on January 1, 1900, has time 0. The functions *Start* and *End* pick out the earliest and latest moments in an interval, and the function *Time* delivers the point on the time scale for a moment. The function *Duration* gives the difference between the end time and the start time.

$$\forall i \;\; Interval(i) \;\Rightarrow\; Duration(i) = (Time(End(i)) - Time(Start(i)))$$
$$Time(Start(AD1900)) = Seconds(0)$$
$$Time(Start(AD1991)) = Seconds(2871694800)$$
$$Time(End(AD1991)) = Seconds(2903230800)$$
$$Duration(AD1991) = Seconds(31536000)$$

To make these numbers easier to read, we also introduce a function *Date*, which takes six arguments (hours, minutes, seconds, month, day, and year) and returns a point on the time scale:

$$Time(Start(AD1991)) = Date(00, 00, 00, Jan, 1, 1991)$$
$$Date(12, 34, 56, Feb, 14, 1993) = Seconds(2938682096)$$

The simplest relation between intervals is *Meet*. Two intervals *Meet* if the end time of the first equals the start time of the second. It is possible to define predicates such as *Before*, *After*, *During*, and *Overlap* solely in terms of *Meet*, but it is more intuitive to define them in terms of points on the time scale. (See Figure 8.5 for a graphical representation.)

$$\forall i,j \;\; Meet(i,j) \;\Leftrightarrow\; Time(End(i)) = Time(Start(j))$$
$$\forall i,j \;\; Before(i,j) \;\Leftrightarrow\; Time(End(i)) < Time(Start(j))$$
$$\forall i,j \;\; After(j,i) \;\Leftrightarrow\; Before(i,j)$$
$$\forall i,j \;\; During(i,j) \;\Leftrightarrow\; Time(Start(j)) \leq Time(Start(i)) \land Time(End(i)) \leq Time(End(j))$$
$$\forall i,j \;\; Overlap(i,j) \;\Leftrightarrow\; \exists k \;\; During(k,i) \land During(k,j)$$

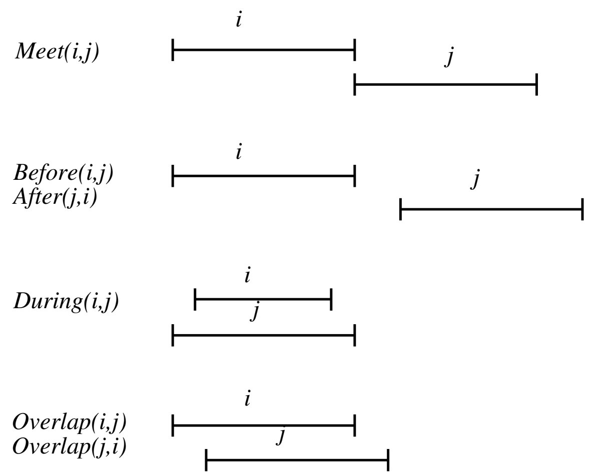

Figure 8.5 Predicates on time intervals.