

Min –Max Notations for ER Diagrams

There are many alternative diagrammatic notations for displaying ER diagrams. In this section, we describe one alternative ER notation for specifying structural constraints on relationships, which replaces the cardinality ratio (1:1, 1:N, M:N) and single/double line notation for participation constraints. This notation involves associating a pair of integer numbers (min, max) with each *participation* of an entity type E in a relationship type R , where $0 \leq \min \leq \max$ and $\max \geq 1$. The numbers mean that for each entity e in E , e must participate in at least min and at most max relationship instances in R at any point in time. In this method, $\min = 0$ implies partial participation, whereas $\min > 0$ implies total participation. For the ER schema diagram for the COMPANY database shown in Figure 1,

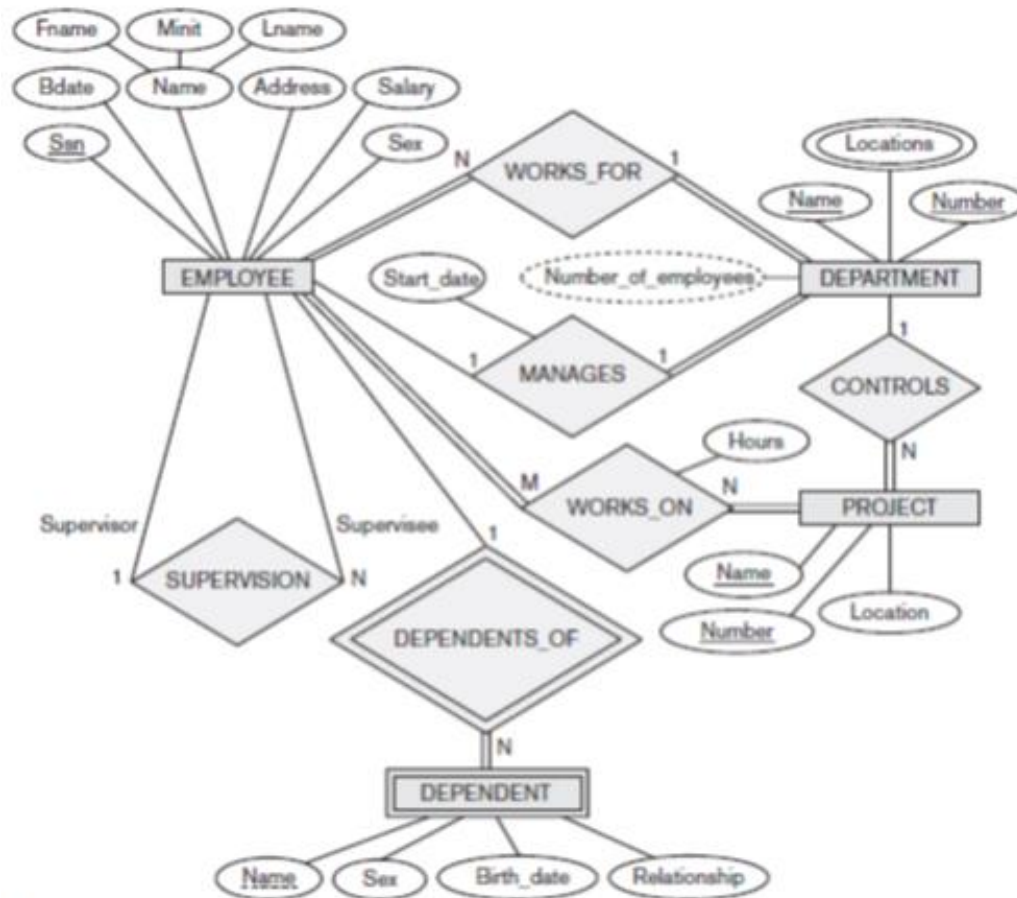


Figure 1

Figure 2 displays the COMPANY database schema using the (min, max) notation.

Usually, one uses either the cardinality ratio/single-line/double-line notation *or* the (min, max) notation. The (min, max) notation is more precise, and we can use it to specify some structural constraints for relationship types of *higher degree*. However, it is not sufficient for specifying some key constraints on higher-degree relationships.

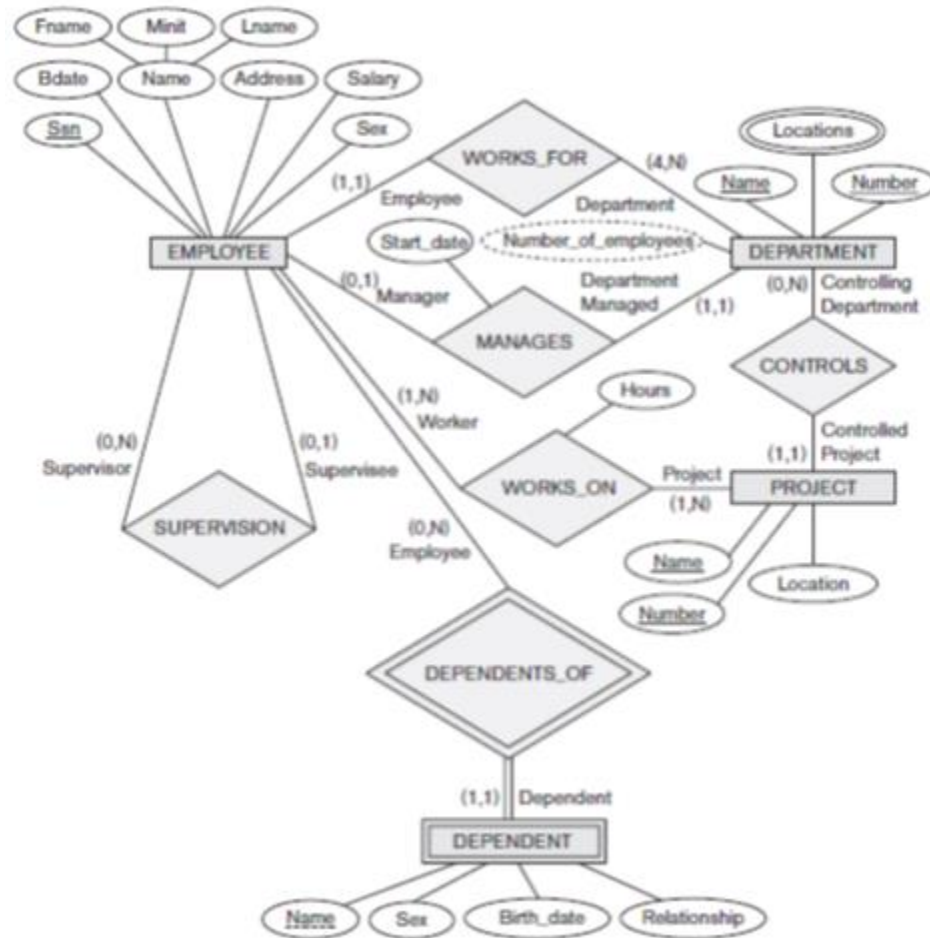


Figure 2

In some notations, the (min,max) is placed on the *opposite sides* to the ones we have shown. For example, for the WORKS_FOR relationship in the figure above, the (1,1) would be on the DEPARTMENT side, and the (4,N) would be on the EMPLOYEE side. Here we used the original notation shown in Figure 2.

