

Many to Many

The third and final type of binary relationship is many to many (M:N), in which an entity of one type corresponds to many entities of the second type, and an entity of the second type corresponds to many entities of the first type.

This **figure** presents an E-R diagram of the many – many relationship between students and classes. A STUDENT entity can correspond to many CLASS entities, and a CLASS entity can correspond to many STUDENT entities. Notice that both participants in the relationship are optional: A student does not need to be enrolled in a class, and a class does not need to have any students. **Figure also** gives sample data.

Many-to-Many relationships cannot be directly represented by relations in the same way that one-to-one and one-to-many relationships are. To understand why this is so, try using the same strategy we did for 1:1 and 1:N relationships—placing the key of one relation as a foreign key in the other relation. First, define a relation for each of the entities; call them STUDENT and CLASS. Now try putting the key of STUDENT in CLASS.

Because multiple values are not allowed in the cells of a relation, we have room for only one StudentNumber, so we have no place to record the StudentNumber of the second and subsequent students.

The same problem will occur if we try to put the key of CLASS in STUDENT. We can readily store the identifier of the first class in which a student is enrolled, but we have no place to store the identifier of additional classes.