Some Simple ER Crowsfoot Examples (with MySQLWorkbench)

Attempting to illustrate all possible relationship types.

example 1 boat:sailor is one-to-many

A boat has many sailors assigned to it. Every sailor is assigned to just one boat. No sailor can be unassigned (boat_id cannot be NULL).

example 2 boat:sailor is one-to-many optional

A boat has many sailors assigned to it. Every sailor is assigned at most one boat. A sailor may be assigned to no boat (boat_id can be NULL).
**example 3** *boat:sailor* is many-to-one

A sailor may be assigned to many boats. A boat has at most one sailor assigned to it. Every boat must have a sailor assigned to it (sailor_num cannot be NULL).

**example 4** *boat:sailor* is many-to-one optional

A sailor may be assigned to many boats. A boat has at most one sailor assigned to it. A boat need not have a sailor assigned to it (sailor_num can be NULL).
**Example 5** *boat:sailor* is one-to-one optional

A sailor may be assigned to at most one boat. A boat has at most one sailor assigned to it. A boat need not have a sailor assigned to it (sailor_num can be NULL).

Or
example 6 boat:sailor is many-to-many (non-specific)

A boat may be assigned many sailors, and a sailor may be assigned to many boats. This uses a non-specific relationship, and no foreign keys are created. Note: not possible in MySQLWorkbench, which automatically creates a bridge table.

example 7 boat:sailor is many-to-many (with bridge entity)

Same situation as the previous example, but with a weak entity representing the many-to-many relationship. Note how the identifying relationships place the key of one table (SAILOR or BOAT) into the key of the identified entity (BOAT_has_SAILOR).
example 8 confused about open circles?

Consider this change to example 1.

What does the circle on the crowsfoot side mean? It means not every boat has to appear in the SAILOR table. This is probably what we would normally mean (and is the default style in ER Studio).

But, it doesn’t matter in the following sense. It makes no difference one way or another to the table design. To check whether every boat appears in the SAILOR table would require writing a script to check that. MySQLWorkbench doesn’t do that for us.