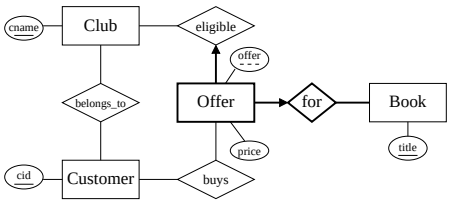
Original Bookstore Design

Problem:

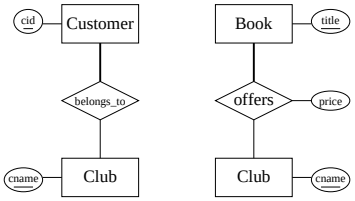
Allows that a customer might buy a book (via an offer), but not belong to the club the offer is under.

Can this be fixed in E-R?!



Starting Over

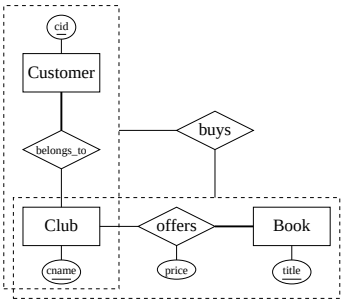
Let's go back to basics. What are the fundamental components of our design?



An Aggregation Solution

What we want is that a *member* (a customer belonging to a given club) accepts (i.e., *buys*) an *offer* (a book via a given club).

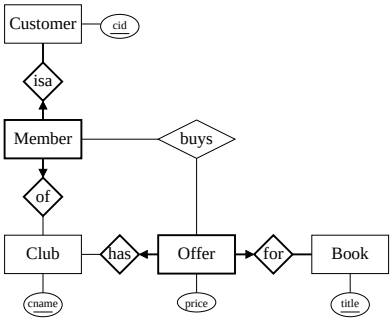
We can say this using aggregation.



Equivalent Weak Entity Solution

Another way to say essentially the same thing is to use "weak entities" to create *Member* and *Offer* explicitly as entities.

For this, we extend the notion of *weak entity* to allow a weak entity to be weak on several entities, not just one.



A Relational Implementation (p.1)

What tables do we need to make?

Certainly, one for each entity: *Customer*, *Club*, and *Book*.

How about for the rel-ships from the "Aggregation Solution" diagram? All three of them are *many-many*, so we must make a table for each: *belongs_to*, *offers*, and *buys*.

The "Equivalent Weak Entity Solution" has the very same logic, so the relational implementation will be the same. In this case, we must make tables for the weak entities *Member* and *Offer*. These are the same as the tables for *belongs_to* and *offers*, respectively, resulting from the other diagram. Again, we need a table to represent the many-many *buys* rel-ship.

Since *Member* and *Offer* sound like better table names, let us use those.

A Relational Implementation (p.2)

Customer(cid)

Club(cname)

Book(title)

Member(cid, cname)

FK (cid) refs **Customer**,

FK (cname) refs **Club**

Offer(title, cname)

FK (title) refs **Book**,

FK (cname) refs **Club**

buys(cid, title, cname)

FK (cid, cname) refs **Member**,

FK (title, cname) refs **Offer**

Solution?

Have we solved our problem?

May a customer only buy a book via an offer if he or she is a member of the club associated with that offer?

Yes, we have! How?

The *buys* table has a single column *cname*. This column is used in both its FKs: one to *Member* to check that the buyer really is a customer (cid) belonging to a club (cname); and the other to *Offer* to check that the thing being bought really is a book (title) as offered by that club (cname).

Clearly no tuple could be inserted into *buys* that involved a member of club A but for an offer via club B. There is no way to record it. It's got to be the same club in both cases.