RELATIONSHIPS OF ER MODEL

Relationships

A *relationship type* is a meaningful association between entity types

A *relationship* is an association of entities where the association includes one entity from each participating entity type.

Relationship types are represented on the ER diagram by a series of lines.

As always, there are many notations in use today...

In the original Chen notation, the relationship is placed inside a diamond, e.g. managers manage employees:

Figure : Chens notation for relationships

For this module, we will use an alternative notation, where the relationship is a label on the line. The meaning is identical

Figure : Relationships used in this document

2.3.1 Degree of a Relationship

The number of participating entities in a relationship is known as the degree of the relationship.

If there are two entity types involved it is a *binary* relationship type

Figure : Binary Relationships

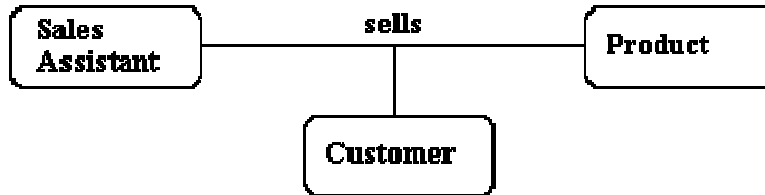If there are three entity types involved it is a *ternary* relationship type

Figure : Ternary relationship

It is possible to have a n-array relationship (e.g. quaternary or unary).

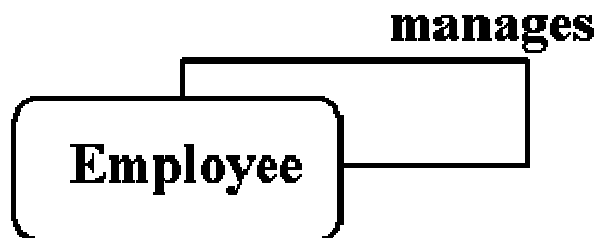Unary relationships are also known as a *recursive* relationship.

Figure : Recursive relationship

It is a relationship where the same entity participates more than once in different roles.

In the example above we are saying that employees are managed by employees.

If we wanted more information about who manages whom, we could introduce a second entity type called manager.

2.3.2 Replacing ternary relationships

When a ternary relationship occurs in an ER model they should always be removed before finishing the model. Sometimes the relationships can be replaced by a series of binary relationships that link pairs of the original ternary relationship.
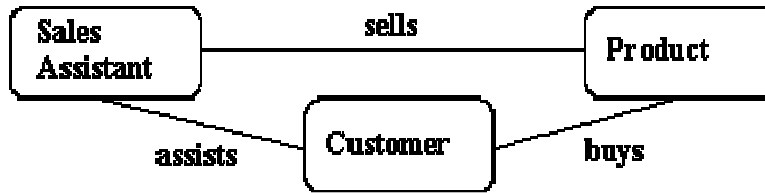

Figure : A ternary relationship example

This can result in the loss of some information - It is no longer clear which sales assistant sold a customer a particular product.

Try replacing the ternary relationship with an entity type and a set of binary relationships.

Relationships are usually verbs, so name the new entity type by the relationship verb rewritten as a noun.

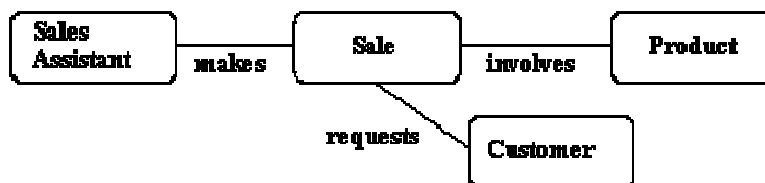The relationship *sells* can become the entity type *sale*.

Figure : Replacing a ternary relationship

So a sales assistant can be linked to a specific customer and both of them to the sale of a particular product.

This process also works for higher order relationships.

Cardinality

Relationships are rarely one-to-one

For example, a manager usually manages more than one employee

This is described by the *cardinality* of the relationship, for which there are four possible categories.

One to one (1:1) relationship

One to many (1:m) relationship

Many to one (m:1) relationship

Many to many (m:n) relationship

On an ER diagram, if the end of a relationship is straight, it represents 1, while a "crow's foot" end represents many.

A one to one relationship - a man can only marry one woman, and a woman can only marry one man, so it is a one to one (1:1) relationship

Figure : One to One relationship example

A one to may relationship - one manager manages many employees, but each employee only has one manager, so it is a one to many (1:n) relationship

Figure : One to Many relationship example

A many to one relationship - many students study one course. They do not study more than one course, so it is a many to one (m:1) relationship

Figure : Many to One relationship example

A many to many relationship - One lecturer teaches many students and a student is taught by many lecturers, so it is a many to many (m:n) relationship

Figure : Many to Many relationship example