



Enhanced ER Modelling (Part I)

Databases

Topics



- ▶ **Entity-Relationship Model**
 - ▼ **Optional and mandatory participation in relationships**
 - ▼ **Owner and Weak Entity**



Participation Constraints

Constraints on Relationship: Participation Constraint

- ▶ **Participation Constraint specifies whether the existence of an entity depends upon it being related to another entity through the relationship.**
- ▶ **There are 2 types of participation constraint:**

- 1. Partial Participation**
- 2. Total Participation**

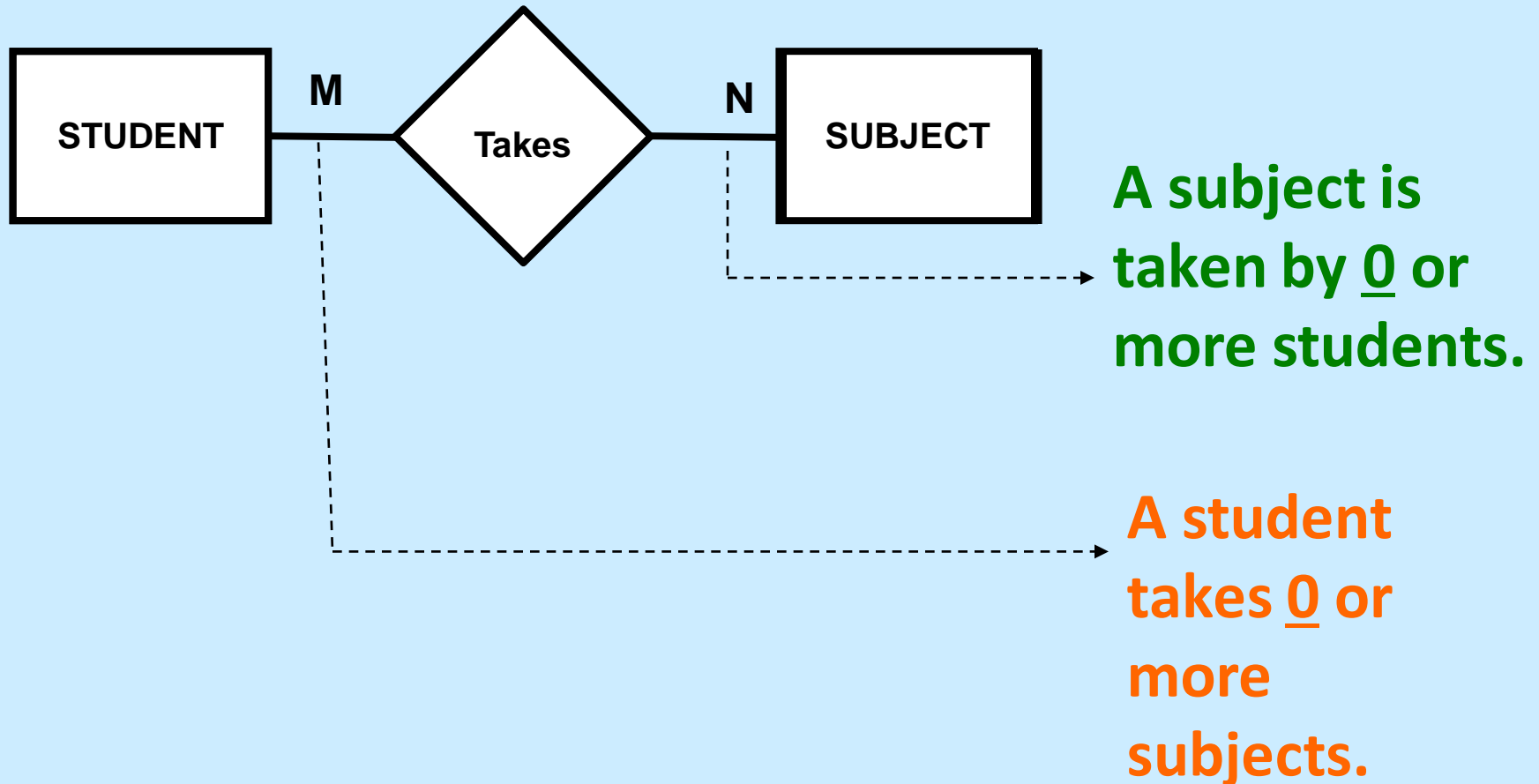
Participation Constraint: Partial Participation

- ▶ Partial Participation means that some of the instances of an entity are related to instances of another entity through this relationship, but not necessarily all.
- ▶ Also known as **Optional Participation**.

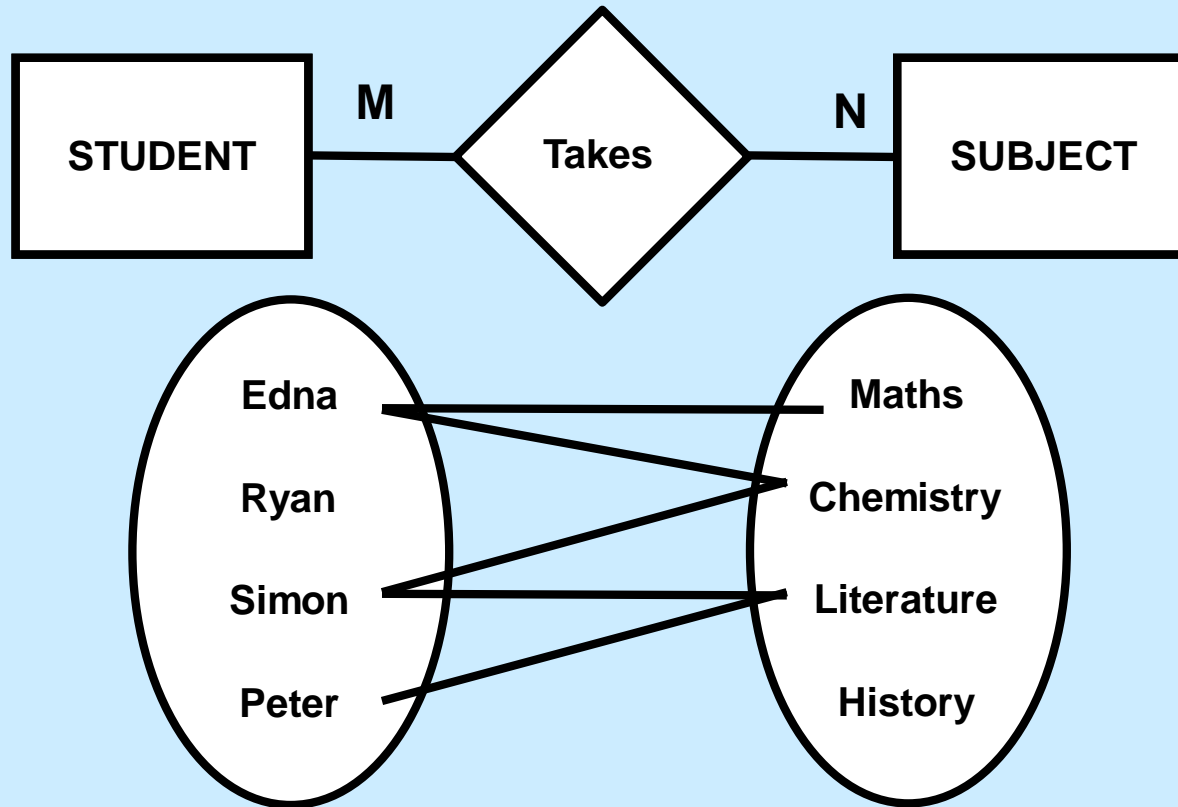
Notation:

Single line represents Partial or Optional Participation.

Participation Constraint: Partial Participation



Participation Constraint: Partial Participation



STUDENT Ryan does not Take any SUBJECT.

SUBJECT History is not Taken by any STUDENT.

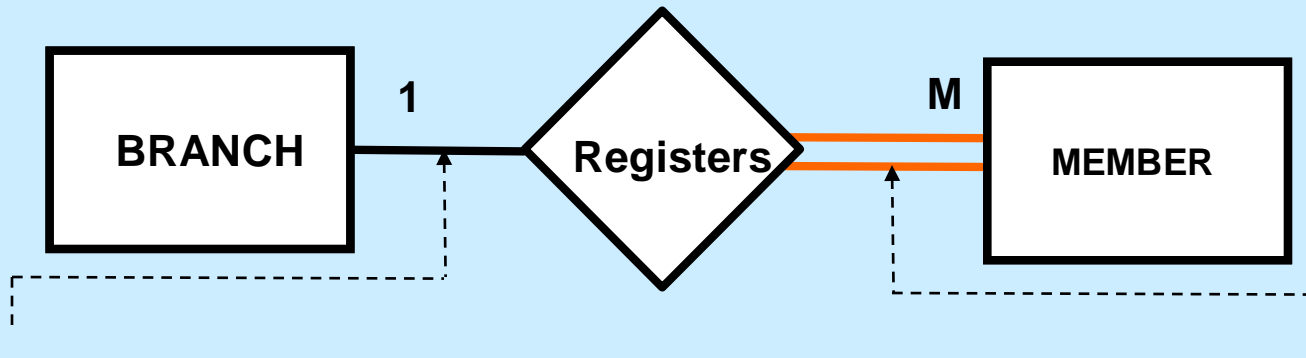
Participation Constraint: Total Participation

- ▶ For a particular relationship, Total Participation specifies every instance of an entity must be associated with an instance of the related entity.
- ▶ Also known as **Mandatory Participation**.

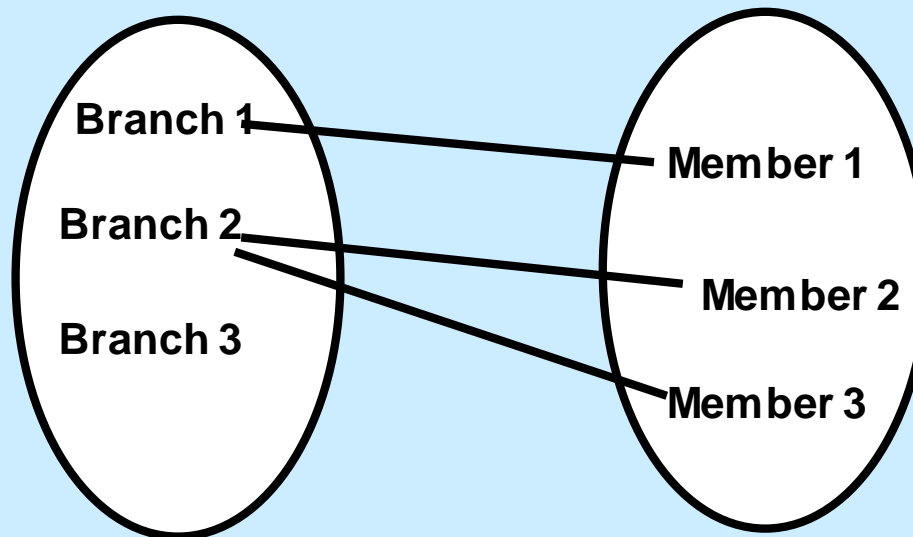
Notation

Double lines drawn next to the entity represents
Total or Mandatory Participation of the entity.

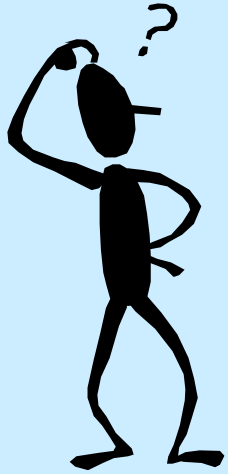
Participation Constraint: Total Participation



A branch may not have members (**Partial participation** of BRANCH entity in Registers relationship).



A member must have registered at one branch (**Total participation** of MEMBER entity in Registers relationship).



Weak Entity

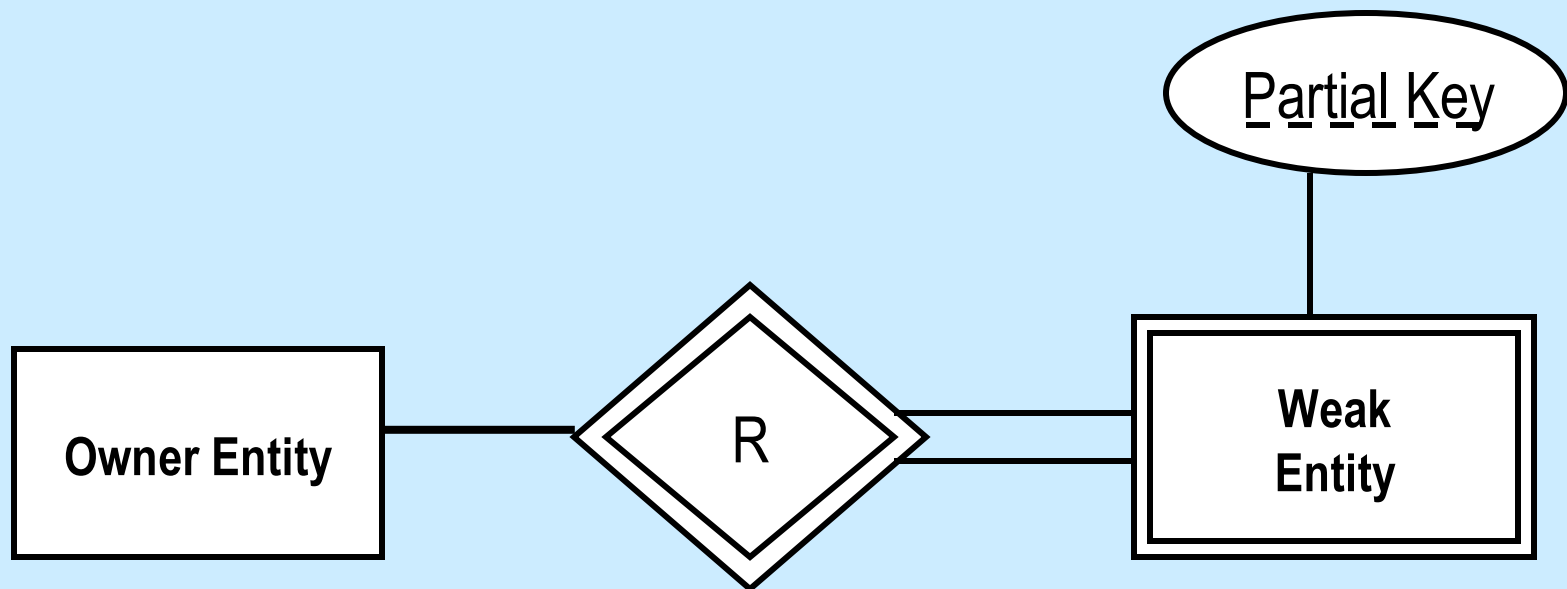
Weak Entity

- ▶ Does not have any key attribute of its own.
- ▶ Can only be identified by relating it to an OWNER ENTITY.
 - ▼ Entity instances belonging to a weak entity are identified by being related to specific entity instances from the owner entity, in combination with some attribute values of the weak entity.
 - ▼ A weak entity always has a total participation constraint with its owner entity.

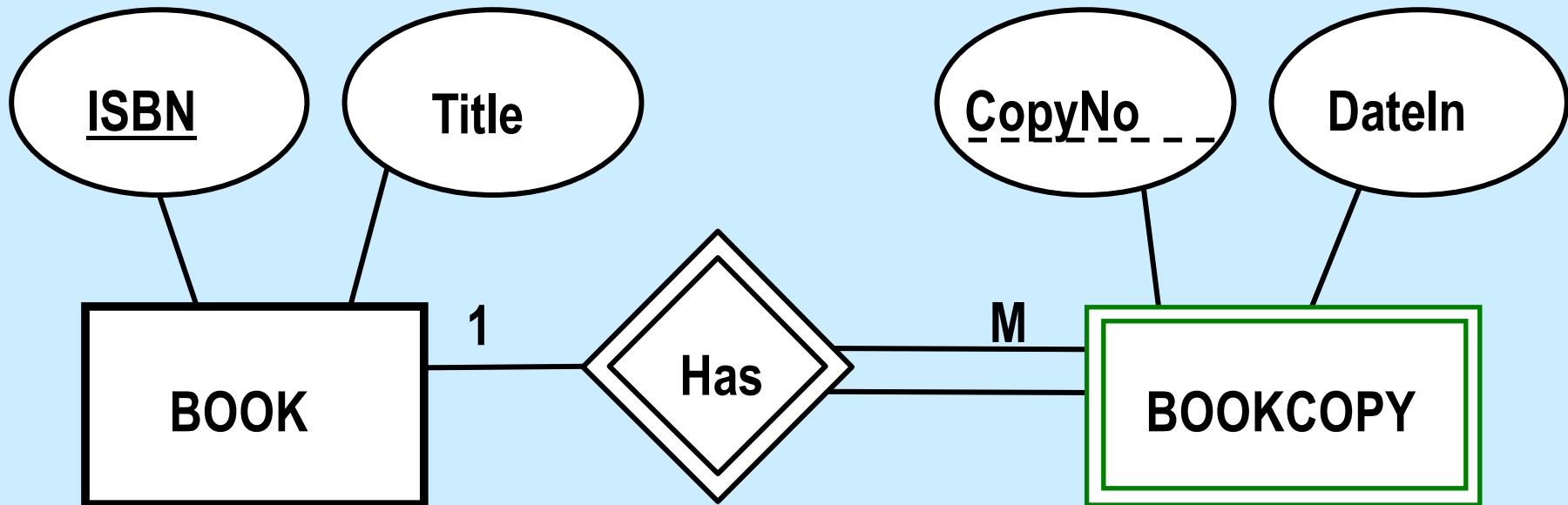
Weak Entity

Notation

A weak entity is represented by a double-line box. The identifying relationship is represented by a double-line diamond. The partial key is underlined with a dashed line.



Weak Entity



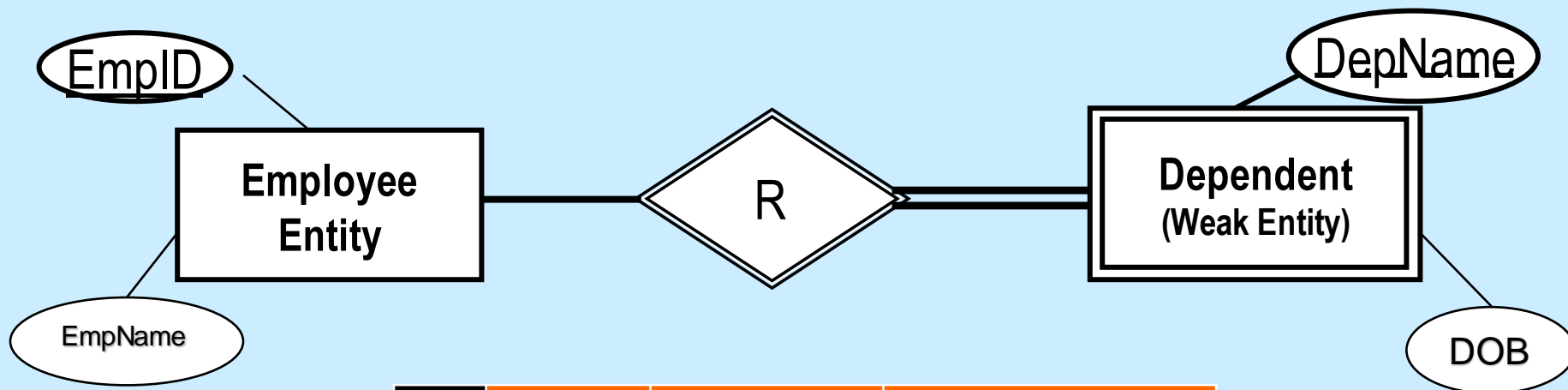
BOOKCOPY is a Weak Entity and its Owner Entity is BOOK.
Each BOOKCOPY entity is uniquely identified by the primary key (ISBN) of its Owner Entity and its Partial Key (CopyNo).

Weak Entity: Partial Key

- ▶ A weak entity normally has a Partial Key, which is an attribute or a set of attributes that can uniquely identify weak entities related to the same owner entity.
 - ▼ For example, DepName is a partial key, which means that no two dependents of the SAME employee can have the same name.

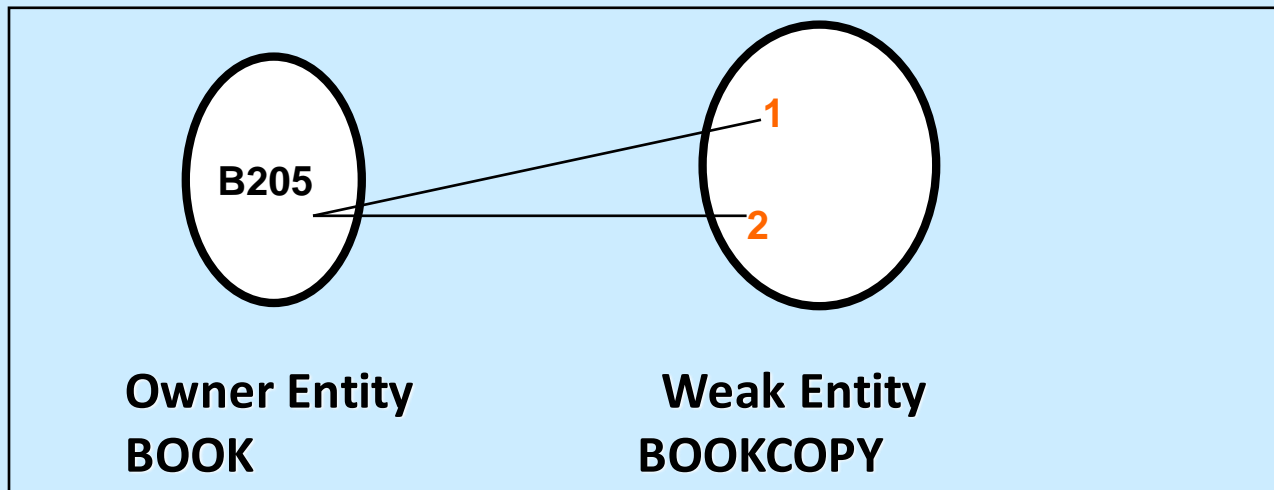
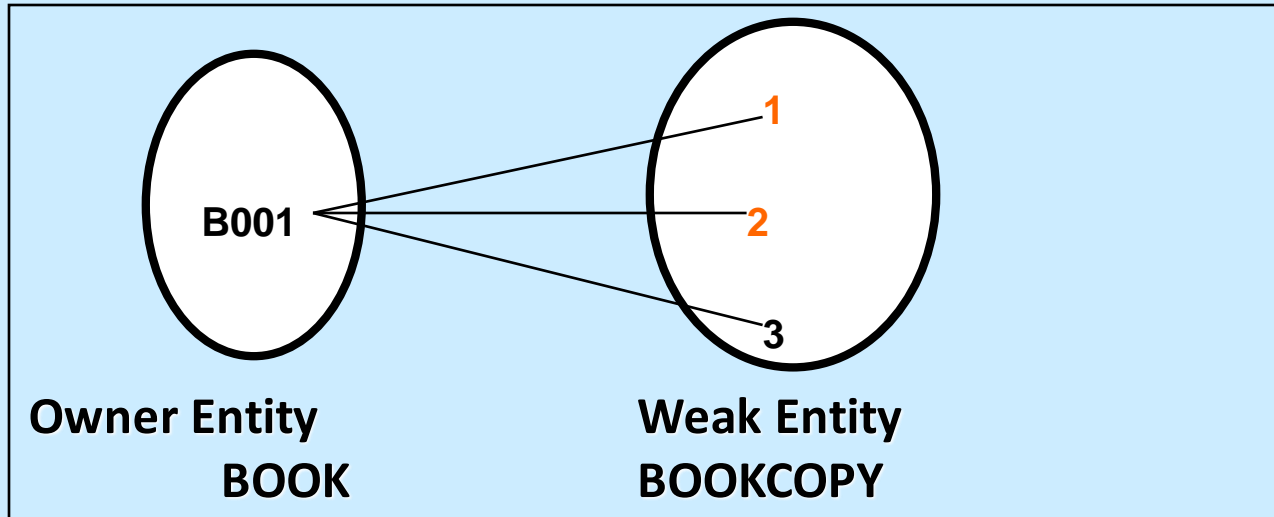
Weak Entity: Partial Key Example

- For example, DepName is a partial key, which means that no two dependents of the SAME employee can have the same name.



S/N	EmpID	DepName	DateOfBirth
1	1	Susie Tan	25 Apr 1999
2	2	Susie Tan	15 May 2013
3	1	Mary Lim	01 Jan 2015

Weak Entity



Weak Entity

- ▶ Primary key of owner entity is used as part of the primary key of the weak entity.
- ▶ Example: the primary key of BOOKCOPY becomes:

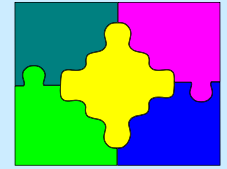
ISBN, CopyNo

- ▶ Weak entity can have more than one owner entities.

Regular Entity

- ▶ Any entity that is not classified as weak entity is classified as a **REGULAR** entity.
- ▶ A Regular entity is represented by a single-line rectangle.
 - ▼ **BOOK is a regular entity.**

Summary



- ▶ **Participation Constraint include Total and Partial participations**
 - ▼ In Partial Participation some of the instances of an entity are related to instances of another entity.
 - ▼ In Total Participation every instance of an entity must be associated with an instance of the related entity.
- ▶ **Weak entity refers to an entity that does not have any key attribute of its own.**
 - ▼ Weak entity depends on a owner entity (or entities) for its existence.