

ORACLE®

ACADEMY

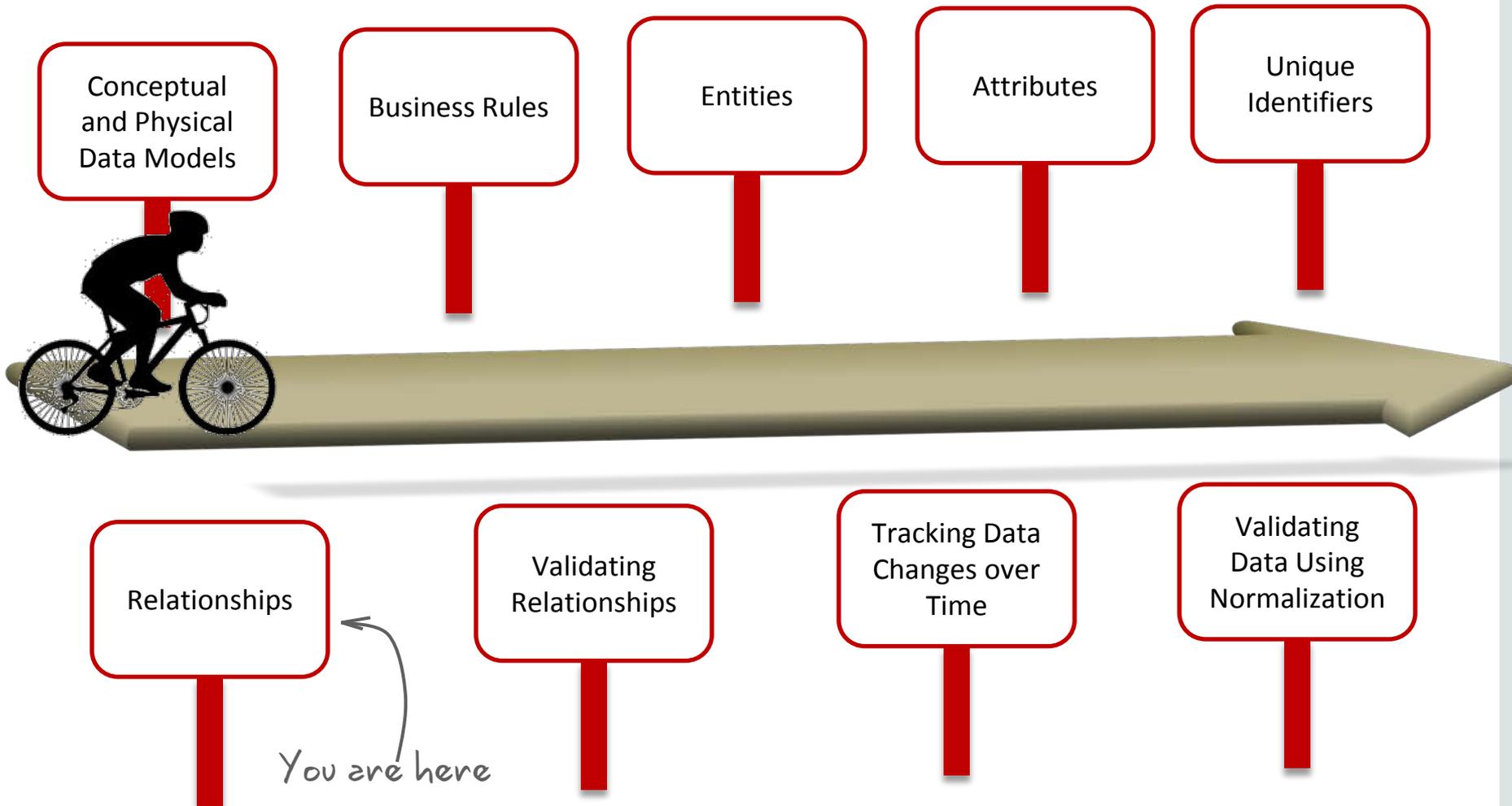
Database Foundations

Relationships

3-6



Roadmap



Objectives

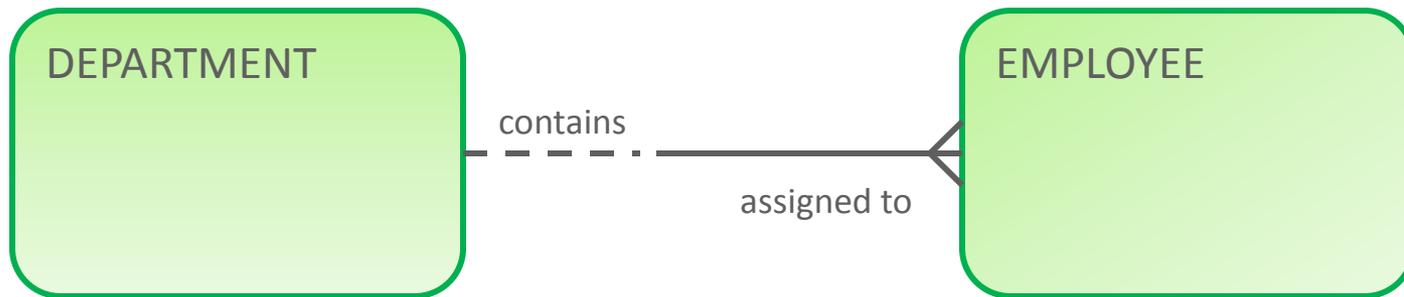
This lesson covers the following objectives:

- Identify relationships
- Identify the optionality of relationships
- Identify the cardinality of relationships
- Identify nontransferable relationships
- Name relationships



Relationships

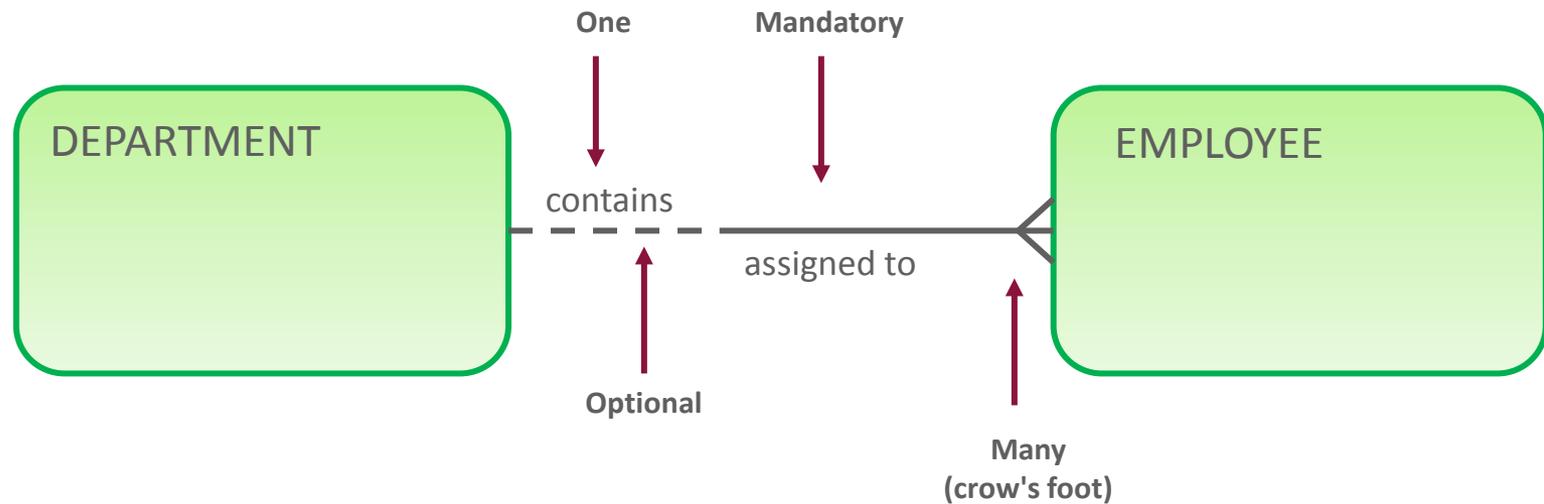
A relationship is a bidirectional, significant association between two entities or between an entity and itself.



Components of a Relationship

Each direction of a relationship has:

- A name
- Cardinality



What Is Optionality in a Relationship?

Relationships are either mandatory or optional. Consider the two entities, `EMPLOYEE` and `JOB`. Based on what you know about instances of the entities, you can determine optionality by answering two questions:

- Must every employee have a job? In other words, is this a mandatory or an optional relationship for an employee?
- Must every job be done by an employee? In other words, is this a mandatory or optional relationship for a job?

What Is Cardinality in a Relationship?

- Cardinality measures the quantity of something.
- In a relationship, it determines the degree to which one entity is related to another by answering “How many?”

For example:

- How many jobs can one employee hold? One job only? Or more than one job?
- How many employees can hold one specific job? One employee only? Or more than one employee?

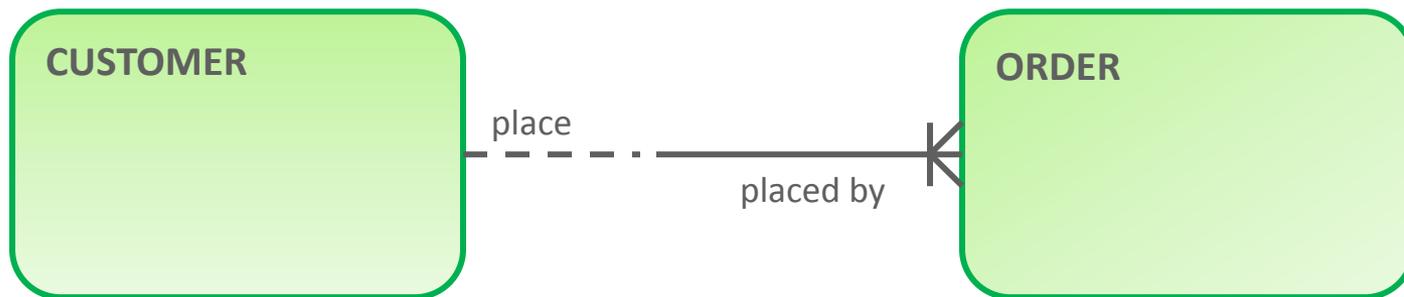
Optionality and Cardinality: Examples

- Each EMPLOYEE must hold one and only one JOB.
- Each JOB may be held by one or more EMPLOYEEs.
- Each PRODUCT must be classified by one and only one PRODUCT TYPE.
- Each PRODUCT TYPE may classify one or more PRODUCTs.

Relationship Types

All relationships represent the information requirements and the rules of the business.

- Many-to-one (M:1) or one-to-many (1:M)
- Many-to-many (M:M)
- One-to-one (1:1)



Example of a 1:M relationship

Many-to-One and One-to-Many Relationships

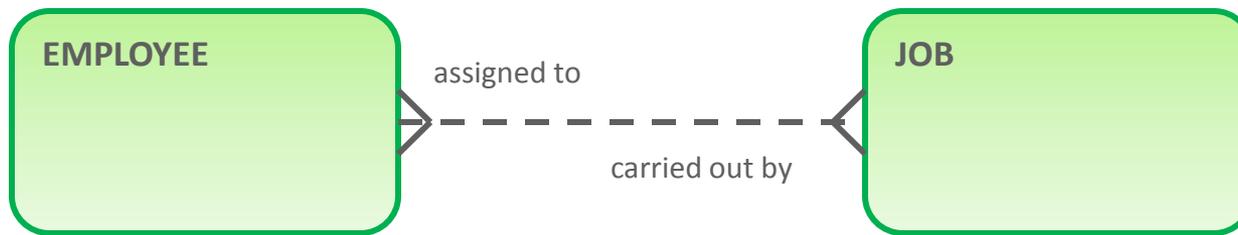
- Many-to-one and one-to-many relationships (M:1 and 1:M) have cardinality of one or more in one direction and one and only one in the other direction.



- Business rules:
 - Each CUSTOMER must be visited by one and only one SALES REPRESENTATIVE.
 - Each SALES REPRESENTATIVE may be assigned to one or more CUSTOMERS.

Many-to-Many Relationships

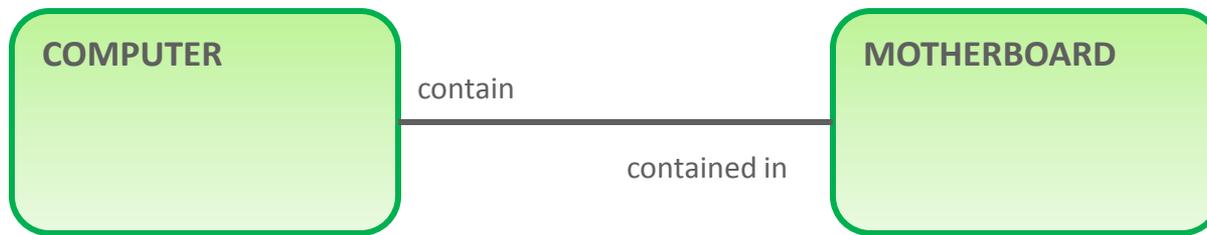
- Many-to-many relationships (M:M) have cardinality of one or more in both directions.



- Business rules:
 - Each `EMPLOYEE` may be assigned to one or more `JOBS`.
 - Each `JOB` may be carried out by one or more `EMPLOYEEs`.

One-to-One Relationships

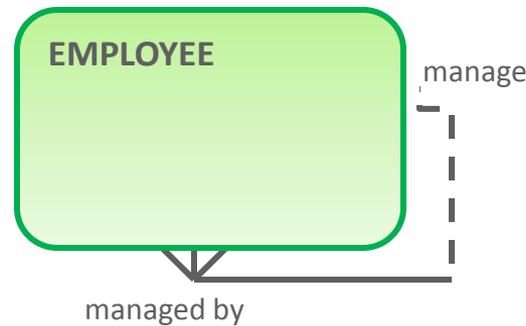
- One-to-one relationships (1:1) have cardinality of one and only one in both directions.



- Business rules:
 - Each COMPUTER must contain one and only one MOTHERBOARD.
 - Each MOTHERBOARD must be contained in one and only one COMPUTER.

Recursive Relationships

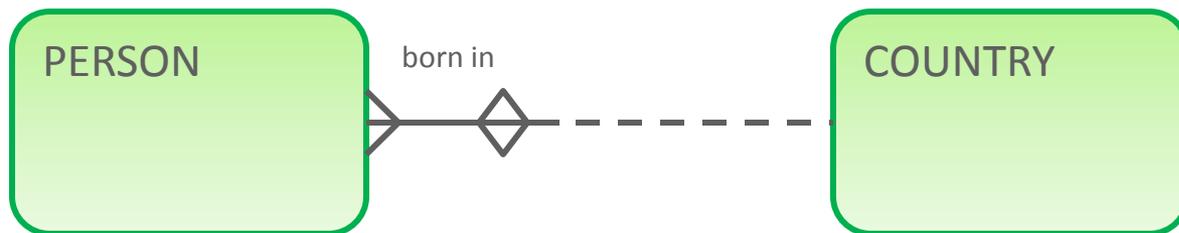
- A relationship with an entity and itself



- Business rules:
 - Each EMPLOYEE may manage one or more EMPLOYEEs.
 - Each EMPLOYEE must be managed by one and only one EMPLOYEE.

Non-Transferable Relationships

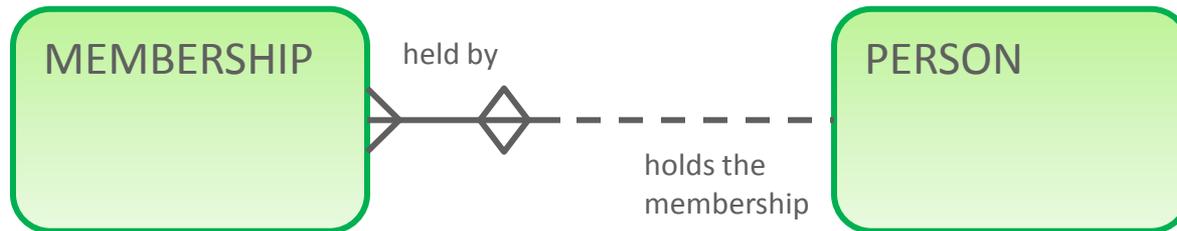
- A non-transferable relationship cannot be moved between instances of the entities it connects.
- A non-transferable relationship is represented by a diamond on the relationship.
- Non-transferable relationships can only be mandatory. For example, the birth country of a person is non-transferable.



Case Scenario

A membership must be held by exactly one person. The membership relationship cannot be moved to another person.

Transferable or
Non-transferable ?



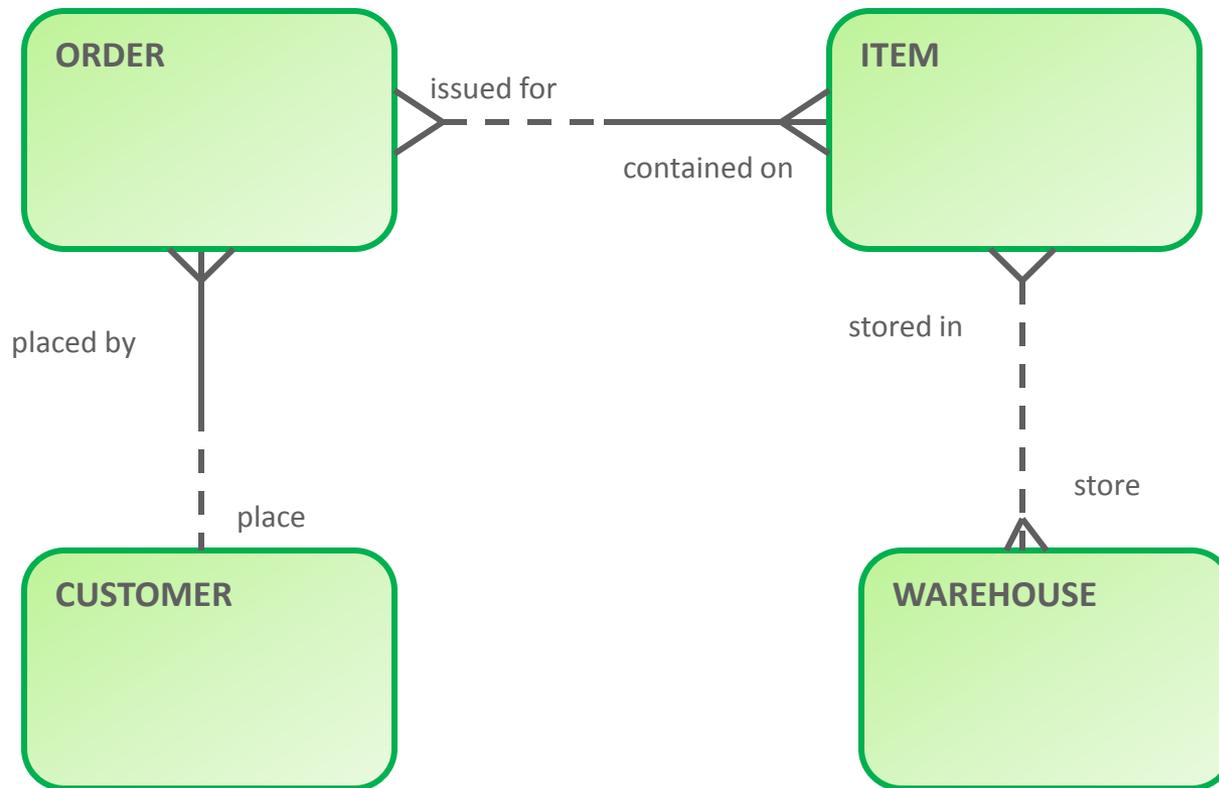
Relationship Matrix: Collecting Information

A relationship matrix can be used to collect initial information about the relationships among a set of entities.

	CUSTOMER	ITEM	ORDER	WAREHOUSE
CUSTOMER			place	
ITEM			contained on	stored in
ORDER	placed by	issued for		
WAREHOUSE		store		

Relationship Matrix: Mapping the Contents

Map the contents of the relationship matrix to an ERD.



Determining a Relationship's Existence

Examine each pair of entities to determine whether a relationship exists.

	ACTIVITY	DEPARTMENT	EMPLOYEE
ACTIVITY			✓
DEPARTMENT			✓
EMPLOYEE	✓	✓	

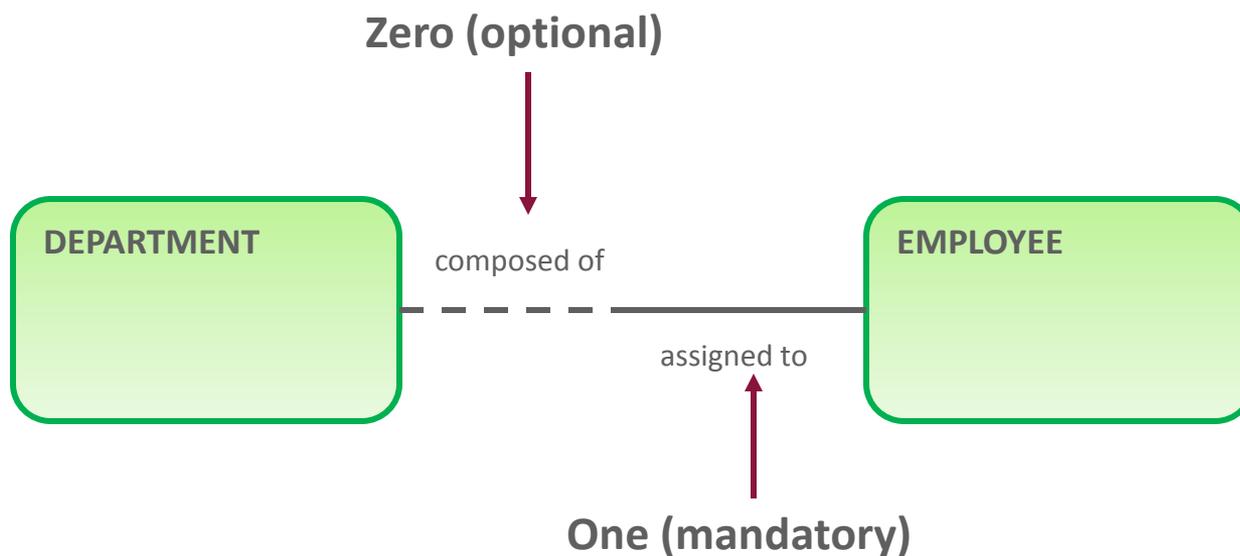
Naming the Relationship

Name each direction of a relationship.

	ACTIVITY	DEPARTMENT	EMPLOYEE
ACTIVITY			assigned to
DEPARTMENT			composed of
EMPLOYEE	participate in	assigned to	

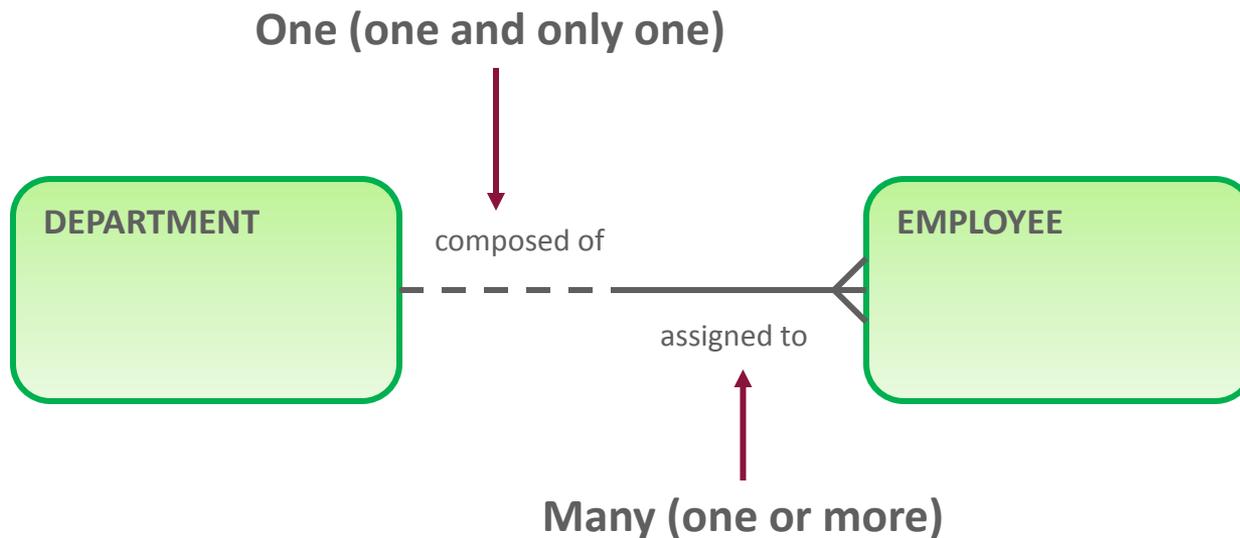
Determining the Relationship's Minimum Cardinality

What is the minimum cardinality in each direction?



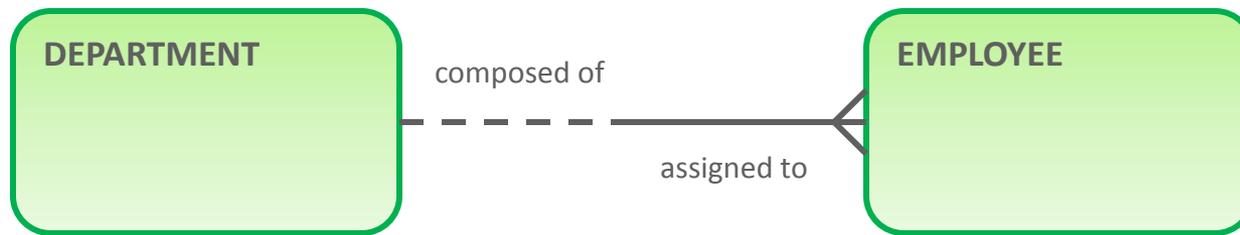
Determining the Relationship's Maximum Cardinality

What is the maximum cardinality in each direction?



Validating the Relationship

Reexamine the ERD and validate the relationship.



- Each EMPLOYEE must be assigned to one and only one DEPARTMENT .
- Each DEPARTMENT may be composed of one or more EMPLOYEES .

Create ERDish sentences to represent ERDs

- Use ERDish language to state relationships between entities in an ERD.
- Simply break down each ERDish sentence into its components.

Breaking down ERDish

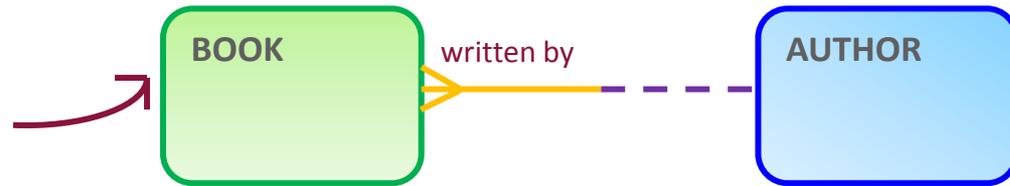


Components of ERDish

- EACH
- Entity A
- OPTIONALITY (must be/may be)
- RELATIONSHIP NAME
- CARDINALITY (one and only one/ one or more)
- Entity B

ERDish Example

Because a relationship has two sides, first read one side from left to right.



1. EACH
2. **BOOK** (entity A)
3. **MUST BE** (optionality, solid line)
4. **WRITTEN BY**(relationship name)
5. **ONE (AND ONLY ONE)** (cardinality, single toe)
6. **AUTHOR**(entity B)



Next, read the relationship from right to left.

1. EACH
2. **AUTHOR** (entity B)
3. **MAY BE** (optionality, dotted line)
4. **THE AUTHOR OF**(relationship name)
5. **ONE OR MORE** (cardinality, crow's foot)
6. **BOOK** (entity A)

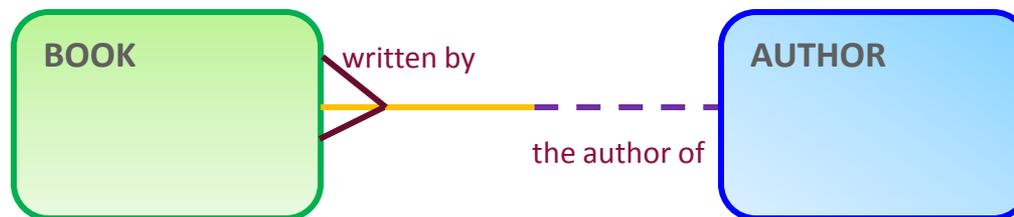
Case Scenario



1. EACH
2. **BOOK** (entity A)
3. **MUST BE** (optionality, solid line)
4. **WRITTEN BY**(relationship name)
5. **ONE AND ONLY ONE** (cardinality, single toe)
6. **AUTHOR**(entity B)



1. EACH
2. **AUTHOR** (entity B)
3. **MAY BE** (optionality, dotted line)
4. **THE AUTHOR OF**(relationship name)
5. **ONE OR MORE** (cardinality, crow's foot)
6. **BOOK** (entity A)



Summary

In this lesson, you should have learned how to :

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- Identify the cardinality of relationships
- Identify nontransferable relationships
- Name relationships

