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Academy

Database Design

2-3

Entity Relationship Modeling and ERDs

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The ERD (or Entity Relationship Diagram) is a tool for discussion, especially when designing a system. It gives you and the customer something to react to, validate, and correct.
Other examples that help illustrate this point: getting a haircut based on a picture in a magazine (have you ever forgotten the picture?); having a dress made from a picture in a magazine (what if you could only explain it?); describing a gift that you want to your parents who have never seen this item. Pictures help!

Objectives

- This lesson covers the following objectives:
  - Define the meaning of “implementation-free” as it relates to data models and database design implementation
  - List the four goals of entity relationship modeling
  - Identify an entity relationship diagram (ERD)

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Purpose

- An entity relationship diagram (ERD) is a consistent tool that can be used to represent the data requirements of a business regardless of the type of database that is used, and even in the absence of one!

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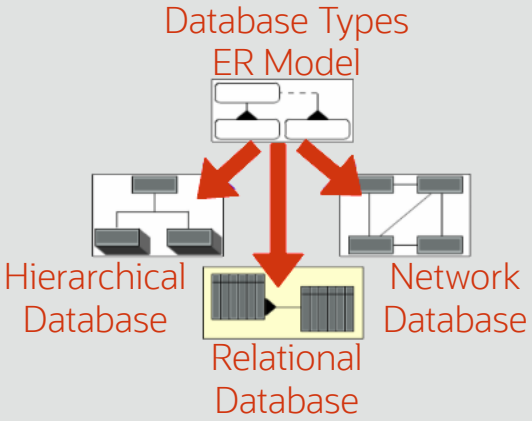
Entity relationship diagram (ERD): A drawing that is used to represent a data model.
Students will need to know what an ERD looks like – as you will be drawing ERDs in the next section and throughout the course. This is where you will become architects and draw their clients' "dream" models.

Implementation-Free Models

- A good conceptual data model stays the same regardless of the type of database the system is eventually built—or implemented—on
- This is what we mean when we say that the model is "implementation-free"



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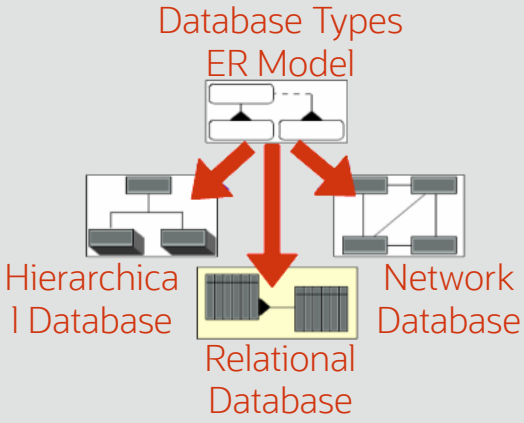
Implementation free: Not dependent on the physical model.
Ask yourself - do entities change depending on the type of database, computer, or programming language used. Answer: No. This is what is meant when we say that data modeling is "implementation-free."

Implementation-Free Models

- The data model should stay the same even if a database is not used at all
- For example: when the data is eventually stored on pieces of paper in a filing cabinet



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Database Types: Hierarchical, Relational, Network
This picture shows us that an ER model captures business information that can be used as a basis for any database. The ER model tells us something about the business, not about the implementation. Having said that, in practice, the majority of the ER models lead to relational database implementations.

What is an Entity Relationship Model?

- An Entity Relationship Model:
  - Is a list of all entities and attributes as well as all relationships between the entities that are of importance
  - Provides background information such as entity descriptions, data types, and constraints
  - Note: The model does not require a diagram, but the diagram is typically a very useful tool

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Goals of ER Modeling

- There are four goals of ER modeling:
  - Capture all required data
  - Ensure that data appears only once
  - Model no data that is derivable from other data already modeled
  - Locate data in a predictable, logical place

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An Entity Relationship Diagram (ERD) is a picture, a representation of the model or a part of the model.

Goals of ER Modeling

- Imagine your school record—from your earliest days in school, data about you was captured
- Your absences, discipline history, classes taken, and grades earned are probably part of your record
- This data needs to be stored in a logical way, to allow accessing and updating records to be carried out easily and efficiently
- Following the goals of ER Modeling helps to achieve this

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H.R. Department Business Scenario

- Read the complete business scenario for the Human Resource Department below
- Then examine the completed ERD
  - I manage the Human Resources Department for a large company
  - We need to store data about each of our company's employees
  - We need to track each employee's first name, last name, job or position, hire date and salary
  - For each employee on commission, we also need to track his/her potential commission
  - Each employee is assigned a unique employee number

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H.R. Department Business Scenario

- Read the complete business scenario for the Human Resource Department below
- Then examine the completed ERD
  - Our company is divided into departments
  - Each employee reports to a department -- for example, accounting, sales, or development
  - We need to know the department responsible for each employee and the department location
  - Each department has a unique number.
  - Some of the employees are managers
  - We need to know each employee's manager and all of the employees that are managed by each manager

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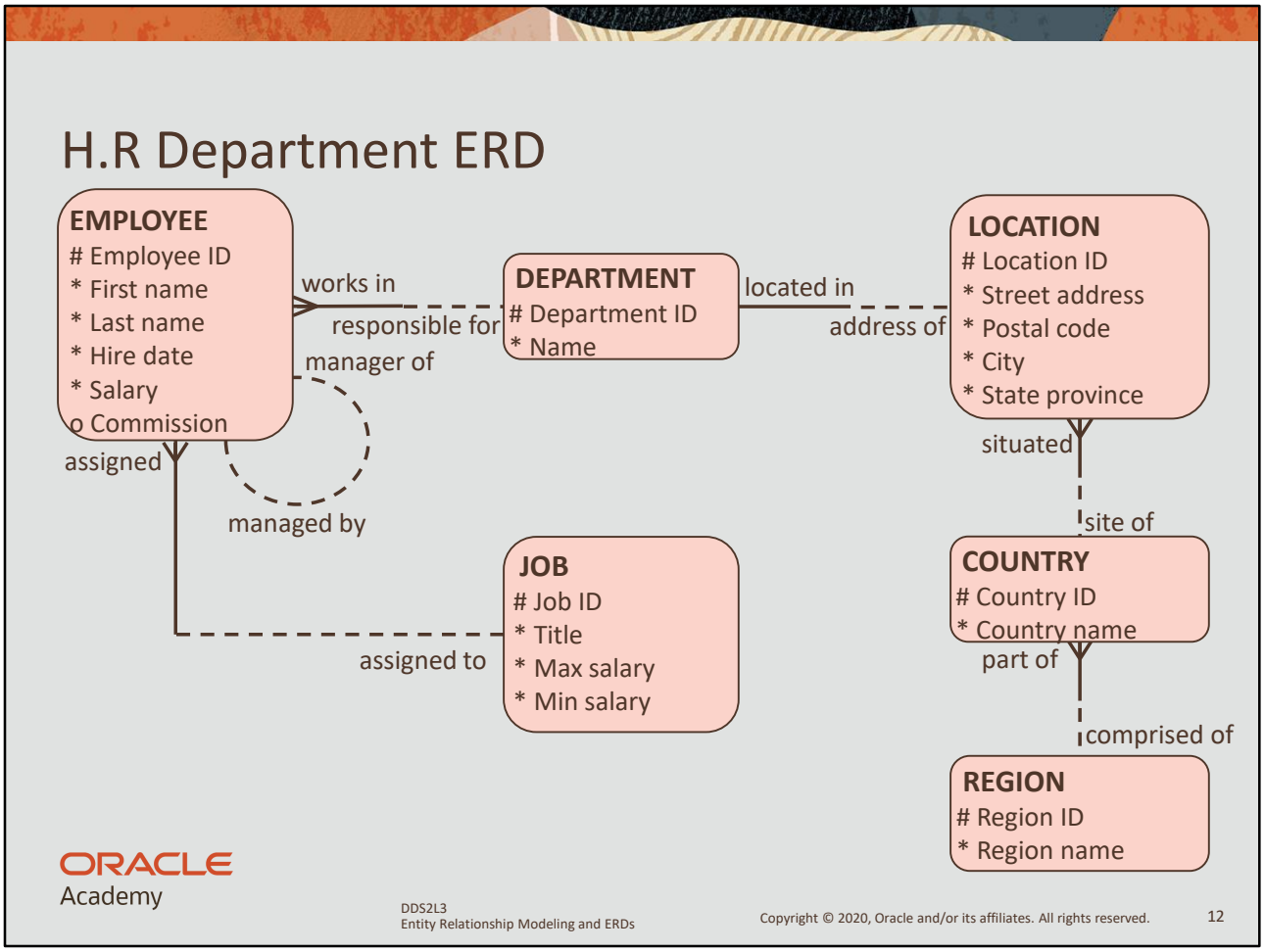

An ERD is the design plan for a database, just as a set of blueprints is the design plan for a house. Untrained individuals cannot accurately read or communicate the details of the plans, but the details are important in the building phase of the project. You will learn how to draw and interpret all of the symbols on the ERD in the lessons that follow.

Terminology

- Key terms used in this lesson included:
  - Entity relationship diagram (ERD)
  - Implementation-free

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Summary

- In this lesson, you should have learned how to:
  - Define the meaning of “implementation-free” as it relates to data models and database design implementation
  - List the four goals of entity relationship modeling
  - Identify an entity relationship diagram (ERD)

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Quiz

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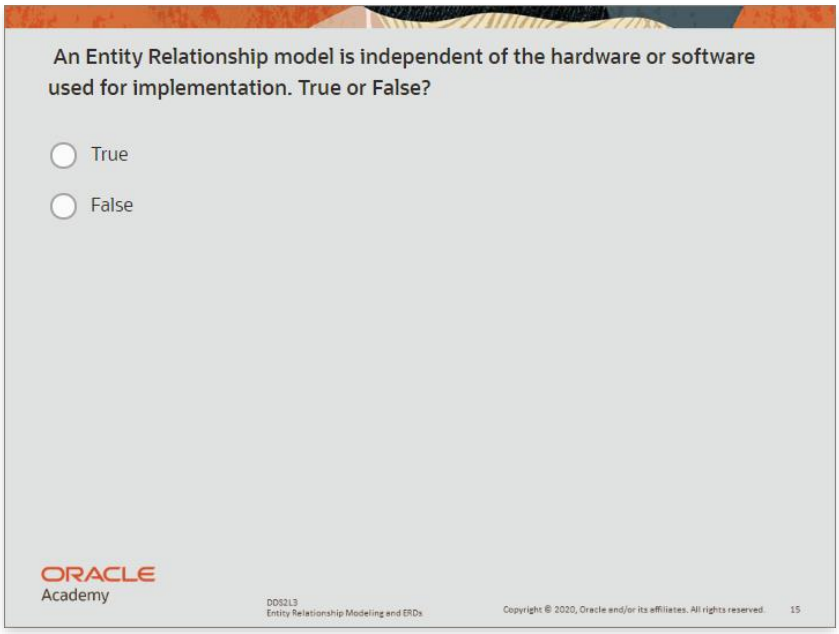

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