

# DATABASE TECHNOLOGIES

## (Part 2)

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BUS3500 - Abdou Illia, Fall 2015

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### LEARNING GOALS

- Understand DB development process
- Discuss concepts like:
  - Entity
  - Attribute
  - Relationship
  - Instance
  - Schema
  - Data dictionary

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	Analyze data needs and use
	Develop conceptual model
	Develop physical model
	Implement database
	Administer database

### Database Development

- 1) Analysis
  - Develop a clear understanding of how the organization works and what data is used
  - Determine data needs of each functional area

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## Database Development Process

(Continued)

- 2) Develop a conceptual model –
  - Show how data are grouped together and related to each other
  - Entity-Relationship diagrams (ERDs) are used
  - Less expensive to correct an ERD than to redesign an already constructed database



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## Database Development Process

(Continued)

- 3) Develop a physical model –
  - Physical model provides specific details about each table and field in the database
  - Normalization used to remove redundant data and therefore minimize any anomalies
  - Optimize the database for performance

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## Database Development Process

(Continued)

- 4) Database implementation
  - Install the DBMS software
  - Build the database
  - Test

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# Database Development Process

(Continued)

- 5) Database administration
  - Ensures database efficiency
  - Manages backup and restoration
  - Sets up user accounts and security

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# Entity

- An *entity*, sometimes called a table, could be
  - a person
  - a place
  - a thing
  - a transaction
  - an event



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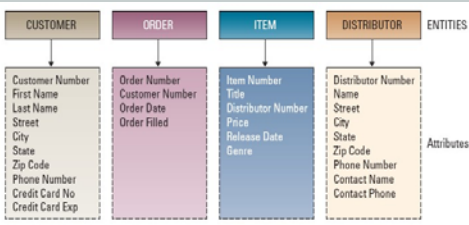
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# Attributes

- Also called fields or columns, *Attributes* are characteristics of an entity.



- An *entity identifier* is the attribute that ensures that each instance of the entity is unique

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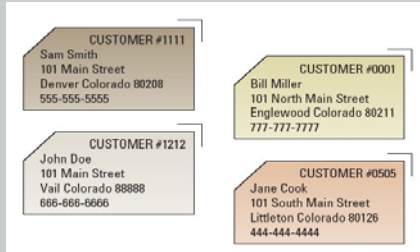
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## Entity Instance

- An entity instance is like a record. Example:



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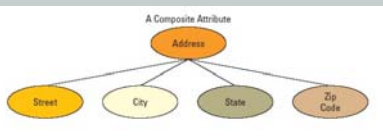
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## Types of attributes

- There are several types of attributes, including:
  - Simple versus composite.
  - Single-valued versus multi-valued.
  - Stored versus derived. Example: a customer with more than one phone number
  - Null-valued.
- When creating a **relational database**, the attributes in the data model **must be single-valued**.



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## Relationships

- The relationships stored in a database are between instances of entities.
- One-to-One (1:1)
  - An instance of *entity A* can be related to only one instance of *entity B*
- One-to-Many (1:M)
  - An instance of *entity B* can be related to many instances of *entity A*



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## Relationships (cont)

- The **relational model cannot handle Many-to-Many (M:M)** relationships directly
- It is limited to 1:1 and 1:M relationships
- M:M relationships need to be replaced with a collection 1:M relationships

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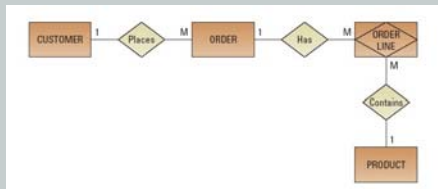
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## Entity-Relationship Diagram (ERD)

- ERD or *schema* is a complete diagram representing the overall, logical plan of a database.



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## Data dictionary

- The *data dictionary* is a file that stores definitions of information types, identifies the primary and foreign keys, and maintains the relationships among the tables.

Table Name	Attribute Name	Constraints	Type	Length	Format	Range	Req'd	Key	Referenced Table
CUSTOMER	Customer Number	Customer Number	VCHAR	18	X(18)		Y	PK	
	First Name	First Name	VCHAR	12	X(12)		Y		
	Last Name	Last Name	VCHAR	15	X(15)		Y		
	Street	Street Address	VCHAR	28	X(28)		Y		
	City	City	VCHAR	20	X(20)		Y		
	State	State	VCHAR	2	X(2)		Y		
	Zip Code	ZIP Code	NUMBER	5	99999		Y		
	Credit Card No.	Credit Card Number	NUMBER	15	X(15)		Y		
	Credit Card Exp.	Credit Card Expiration Date	DATE	8	MM/DD/YYYY		Y		
ORDER	Order Number	Order Number	NUMBER	5	99999	1-99999	Y	PK	
	Customer Number	Customer Number	VCHAR	18	X(18)		Y	FK	CUSTOMER
	Order Date	Order Date	DATE	8	MM/DD/YYYY		Y		
	Order Filed	Order Filed	DATE	8	MM/DD/YYYY		Y		
ORDER LINE	Order Number	Order Number	NUMBER	5	99999	1-99999	Y	FK	ORDER
	Item Number	Item Number	NUMBER	5	99999	1-99999	Y	FK	ITEM
	Quantity	Quantity	NUMBER	3	999	1-999	Y		
	Price	Selling Price	NUMBER	5	9999.99		Y		
	Shipped	Shipped	VCHAR	1	X	Y/N	Y		
ITEM	Item Number	Item Number	NUMBER	5	99999	1-99999	Y	PK	
	Title	Title	VCHAR	25	X(25)		Y		
	Distributor	Distributor	VCHAR	20	X(20)		Y		
	Price	Price	NUMBER	5	9999.99		Y		

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## Summary Questions

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	Notes
1) What an entity? An attribute?	
2) What is meant by 1:1 relationship? 1:M? M:M?	
3) Can relational DBMSs handle 1:M relationships?	
4) What is a schema?	
5) What does a data dictionary usually contain?	

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