

# Module 3: Normalization

- Now you know about:
  - What Entity Relationship Models are.
  - Converted Entity Relationship Diagrams to Relational Models
- This module will introduce:
  - Data redundancy problems.
  - Functional Dependencies
  - Normal Form, and Normalization Process



# Learning Objectives

- Finishing this module, you will be able to:
  - Explain the problems associated with Data redundancy.
  - Explain and identify Functional Dependencies.
  - Explain different Normal Form,
  - Normalize relations to 3NF.



# Data Redundancy

- What is data redundancy?
  - Major aim of relational database design is to group attributes into relations to minimize data redundancy.

EmpID	FirstName	LastName	DoB	Position	Department	StoreID	Address
#20399	John	Ford	1998/2/12	Manager	HR	#1506	1200 W Dillon Rd, Louisville
#30123	Anne	Brand	2001/3/12	Intern	Marketing	#1546	1600 29th Street, Boulder
#12524	David	Biden	2000/2/20	Assistant	Sales	#1524	1271 Sheridan Blvd, Broomfield
#14517	William	Potter	2001/9/12	Senior Manager	HR	#1506	1200 W Dillon Rd, Louisville
#15214	Mary	Alexander	2001/9/12	Assistant	IT	#1524	1271 Sheridan Blvd, Broomfield
#11032	Rose	Smith	1999/1/21	Intern	IT	#1503	10003 Grant Street, Thornton
#02012	Julie	Smith	1977/12/1	Senior Manager	IT	#1503	10003 Grant Street, Thornton
#78123	Angela	White	1967/4/4	Senior Manager	HR	#1546	1600 29th Street, Boulder
#21342	John	Ford	1983/11/11	Manager	IT	#1546	1600 29th Street, Boulder

# Data Redundancy

- What are the problems?
  - Insert, Delete, Update

EmpID	FirstName	LastName	DoB	Position	Department	StoreID	Address
#20399	John	Ford	1998/2/12	Manager	HR	#1506	1200 W Dillon Rd, Louisville
#30123	Anne	Brand	2001/3/12	Intern	Marketing	#1546	1600 29th Street, Boulder
#12524	David	Biden	2000/2/20	Assistant	Sales	#1524	1271 Sheridan Blvd, Broomfield
#14517	William	Potter	2001/9/12	Senior Manager	HR	#1506	1200 W Dillon Rd, Louisville
#15214	Mary	Alexander	2001/9/12	Assistant	IT	#1524	1271 Sheridan Blvd, Broomfield
#11032	Rose	Smith	1999/1/21	Intern	IT	#1503	10003 Grant Street, Thornton
#02012	Julie	Smith	1977/12/1	Senior Manager	IT	#1503	10003 Grant Street, Thornton
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#21342	John	Ford	1983/11/11	Manager	IT	#1546	1600 29th Street, Boulder

# A Better Design

EmpID	FirstName	LastName	DoB	Position	Department	StoreID
#20399	John	Ford	1998/2/12	Manager	HR	#1506
#30123	Anne	Brand	2001/3/12	Intern	Marketing	#1546
#12524	David	Biden	2000/2/20	Assistant	Sales	#1524
#14517	William	Potter	2001/9/12	Senior Manager	HR	#1506
#15214	Mary	Alexander	2001/9/12	Assistant	IT	#1524
#11032	Rose	Smith	1999/1/21	Intern	IT	#1503
#02012	Julie	Smith	1977/12/1	Senior Manager	IT	#1503
#78123	Angela	White	1967/4/4	Senior Manager	HR	#1546
#21342	John	Ford	1983/11/11	Manager	IT	#1546

StoreID	Street	City	Zip
#1506	1200 W Dillon Rd	Louisville	80027
#1546	1600 29th Street	Boulder	80301
#1524	1271 Sheridan Blvd	Broomfield	80020
#1517	7125 W 88th Ave	Westminster	80021
#1548	16420 Washington Street	Thornton	80023
#1503	10003 Grant Street	Thornton	80229
#1502	5215 Wadsworth Blvd	Arvada	8002

# Normalization

- Normalization is a technique for producing a set of **suitable** relations that support the data requirements of an enterprise.





# What Is Suitable?

- Characteristics of suitable relations are:
  - the **minimal** number of attributes necessary to support the data requirements of the enterprise;
  - **minimal** redundancy with each attribute represented only once with the important exception of attributes that form all or part of foreign keys.
  - attributes with a close logical relationship are found in the **same** relation;



# Benefit of Normalization

- Remove problems caused by **data redundancy**
- Easier for users to **access** and **maintain** data
- Take up **minimal** storage space

