

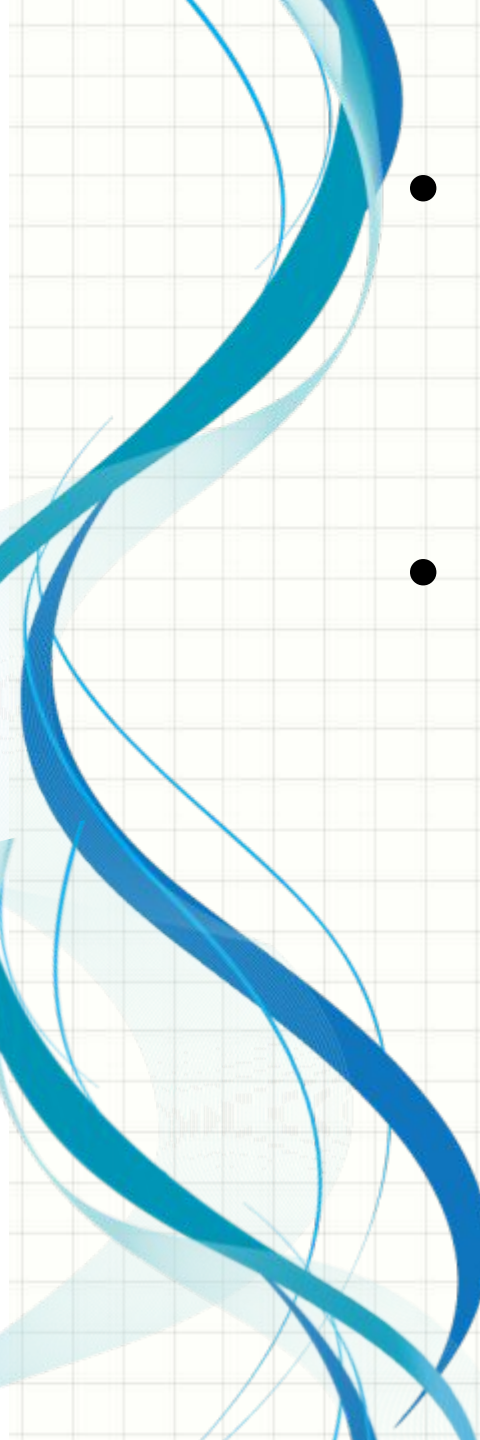


# **EVEN MORE NORMALIZATION**

DBS201

# Agenda:

1. Foreign Keys
2. FK Example: Customer and Sales Rep
3. Three ways to detect a Foreign Key
4. Normalization Example
5. A first-look at Merging Relations

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- Foreign Keys Support “1-to-Many” Relationships
  - Foreign Keys Are Used to Look Up Information in another relation

- Example

CUSTOMER

<u>CustNo</u>	<u>Name</u>	<u>Phone</u>	<u>Rep#(FK)</u>
12	Josephine	416-889-4545	336
22	Roberto	416-889-2121	401
57	Justin	416-889-8989	336
65	Julia	416-889-7373	401

SALESREP

<u>Rep#</u>	<u>RName</u>	<u>RFax</u>
305	R.Fasttalk	416-886-5623
336	JJ. QuickSale	416-886-1045
401	A.Bribeplease	416-886-3202
402	B.J.Bigmouth	416-886-1928

# Three ways to detect a Foreign Key

1. A FK occurs when removing a transitive relation from a 2NF relation.
  2. Look at an ERD diagram. Every time there is a 1:M relationship and relational integrity is enforced, it means there is a FK. The Foreign Key is on the relation which is on the Many side of the One-to-Many relationship.
  3. Examine all tables in the 3NF solution. If the Primary Key of a relation is present in a second relation, then that attribute in the second relation is a Foreign Key.
- \* Foreign keys can be made of attributes that are part of the PK as well as non-key attributes.

## Normalization Example:

### ABC PRINTER COMPANY

Part#	Part_Name	Qty used	Supplier Name	Supplier Phone	Model Description	Unit Price
PF123	Paper spool	2	ABC Plastics	416-234-2342	Laserjet Printer	\$423.56
LC432	Laserject cartridge	4	Jetson Carbons	905-434-3333	Laserjet Printer	\$123.00
MT123	120v power unit	1	ACME Power Supply	767-232-2221	Laserjet Printer	\$200.00
PF123	Paper spool	1	ABC Plastics	416-234-2342	256 Colour Printer	\$89.99
IJ345	Ink jet tray	3	Para Inks	416-323-2345	256 Colour Printer	\$67.00
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UNF: [ model#, modelDesc, (part#, part\_name, qty, suppName, suppPhone, unitPrice) ]

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**MODEL\_PART** [ model#, part#, part\_name, qty, suppName, suppPhone, unitPrice) ]



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UNF: [ model#, modelDesc, (part#, part\_name, qty, suppName, suppPhone, unitPrice) ]

1NF: **MODEL** [ model#, modelDesc ]

**MODEL\_PART** [ model#, part#, part\_name, qty, suppName, suppPhone, unitPrice) ]

2NF: **MODEL** [ model#, modelDesc ]

**PART** [ part#, part\_name, unitPrice ]

**MODEL\_PART** [ model#, part#, qty, suppName, suppPhone ]

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**MODEL\_PART** [ model#, part#, part\_name, qty, suppName, suppPhone, unitPrice) ]

2NF: **MODEL** [ model#, modelDesc ]

**PART** [ part#, part\_name, unitPrice ]

**MODEL\_PART** [ model#, part#, qty, unitPrice, suppName, suppPhone ]

3NF: **MODEL** [ model#, modelDesc ]

**PART** [ part#, part\_name, unitPrice ]

**MODEL\_PART** [ model# (FK1), part# (FK2), sup#,(FK3), qty ]

**SUPPLIER** [ supp#, suppName, suppPhone ]

# NORMALIZATION - Merging Relations

**Understanding how to merge relations is important for three reasons:**

1. On large projects, the work of several sub-teams comes together during logical design, so there is often a need to merge relations.
2. Integrating existing databases with new information requirements often leads to the need to integrate different views.
3. New data requirements may arise during the life cycle, so there is a need to merge any new relations with what has already been developed.

## Merging Relations (view integration)

- a. As part of the logical design process, normalized relations may have been created from a number of separate ERDs and possibly other user views. There may be bottom-up or parallel database development activities for different areas of the organization as well as top-down ones.
  
- b. The result is that some of the relations generated from these various processes may be redundant; that is, they may refer to the same entities. In such cases, we should **merge** those relations to remove the redundancy.

# Some Terms to Remember

## **Synonym**

- two (or more) attributes that have different names but the same meaning (alias)

## **Homonym**

- an attribute that may have more than one meaning

## **Transitive Dependency**

- When two 3NF relations are merged to form a single relation, transitive dependencies may result.

## **Enterprise Key**

- a primary key whose value is unique across all relations

1. Makes a primary key more like what (in object-oriented databases) is called an object identifier

2. Should be a surrogate key (where the primary key of a relation is a value internal to the database system and has no business meaning).

**Multiple Entity Sets --> Final Entity Set**



# Merging Relations (View Integration)

## Example:

Suppose that modelling a user view results in the following 3NF relation:

STUDENT1 (STUDENTID, NAME, ADDRESS, PHONE, GUARDIAN).

Modelling a second user view might result in the following relation:

STUDENT2 (STUDENTID, NAME, ADDRESS, DEPT)

Since these two relations have the same primary key (STUDENTID), they describe the same entity and may be merged into one relation. Therefore the result of the merging is:

STUDENT (STUDENTID, NAME, ADDRESS, PHONE, GUARDIAN, DEPT)

This reduces duplication of NAME and ADDRESS.