

Perancangan Basis Data(IFWP1007)

3 sks



Major: Informatics
Topic: Normalization and First
Normal Form



Dosen Pengampu

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Skills





Objectives

- ✧ This lesson covers the following objectives:
 - Define the purpose of normalization in database models
 - Define the rule of First Normal Form in the normalization process
 - Determine if an entity conforms to the rule of First Normal Form
 - Convert an entity to First Normal Form if needed



Purpose

- Think about storing your friends' phone numbers in three different places: your address book, your cell phone, and a sheet of paper that you have taped to your refrigerator.
- It's a lot of work if a friend changes his/her phone number.
- You have to change it in your address book, cell phone, and the sheet of paper taped to you





Purpose

- What happens if data is stored in more than one place in a database?
- What if someone changes the information in one place **and not the other**—how do you know which information is correct?
- Redundancy like this causes unnecessary problems in a database.





Purpose

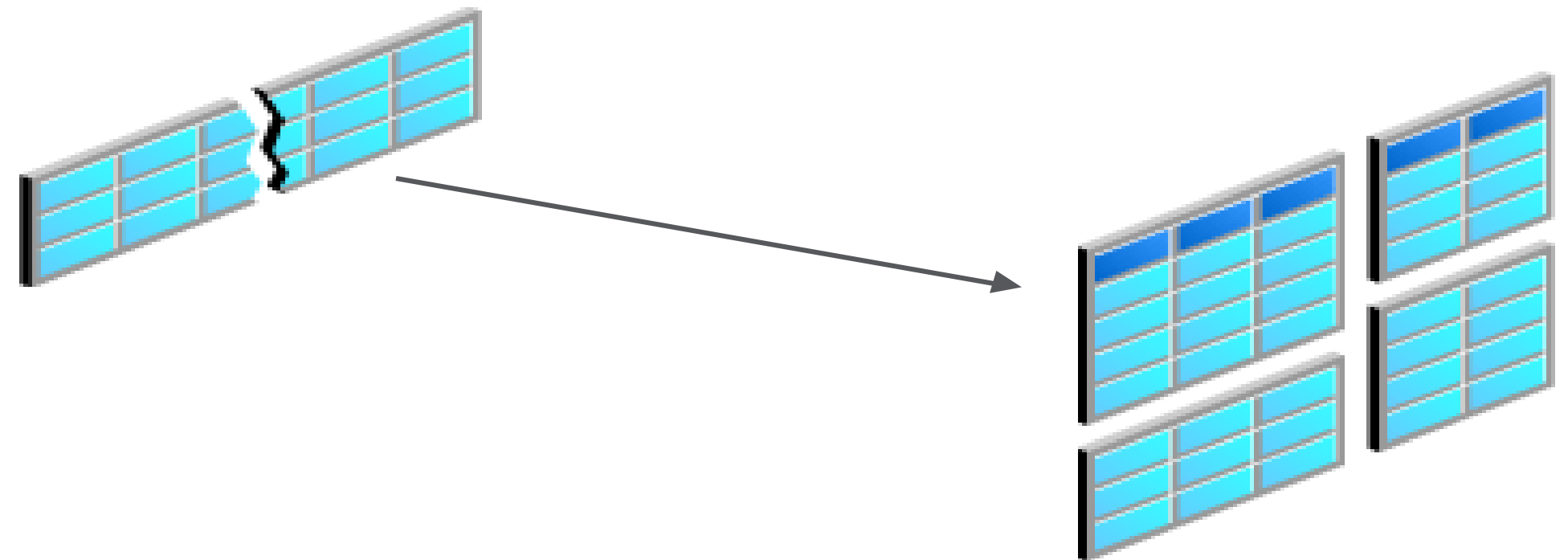
- Normalization is a process that is used to eliminate these kinds of problems.
- One of your goals as a database designer is to "store information in one place and in the best possible place".
- If you follow the rules of normalization, you will achieve this goal.





Normalization

- Is the process of organizing the attributes and tables of a relational database to minimize redundancy.
- Helps in handling insert, update, and delete anomalies, ensuring a better performance of the database.





Why Should You Normalize Data?

- **Reduce redundant data** in the existing design
- **Increase the integrity** of data and the design's stability
- Eliminate other types of data inconsistencies and anomalies
- **Identify** missing tables, columns, and constraints





What Is Normalization?

- Normalization is a **relational database** concept, but its principles **apply to data modeling**.
- The goal is to normalize data to 3NF before transforming the model to your relational design.
- Main types of normal forms introduced by E.F. Codd:

Rule	Description
First Normal Form (1NF)	All attributes must be single-valued.
Second Normal Form (2NF)	An attribute must be dependent on its entity's entire UID .
Third Normal Form (3NF)	No non-UID attributes can be dependent on another non-UID attribute.



First Normal Form (1NF)

- First Normal Form requires that **no multi-valued attributes exist**.
- To check for 1NF, validate that each attribute has **a single value** for each instance of the entity.
- One code, one name, and one address exist for the school building, but not one classroom.
- Since many classrooms exist in a school building, **classroom is multi-valued and violates 1NF**
- If an attribute is multi-valued, create an additional entity and relate it to the original entity with a 1:M relationship.

SCHOOL BUILDING 1NF

SCHOOL BUILDING

code
* name
* address
o classroom

The classroom attribute will have multiple values.

This entity is not in First Normal Form.

SCHOOL BUILDING

code
* name
* address

the location
of
located
in

CLASSROOM

number
* floor
* size

CLASSROOM is now its own entity.

All attributes have only one value per instance.

Both entities are in First Normal Form.



1NF Violations

Diketahui UKRIDA memiliki 2 buah kampus dengan lokasi yang berbeda, yaitu kampus 1 berlokasi di Jl. Tanjung Duren dan kampus 2 berlokasi di Jl. Arjuna.

Pada kampus 1 terdapat 3 buah gedung yaitu

- Gedung A memiliki 3 buah lantai dengan beberapa ruang kelas. Setiap lantai memiliki 5 buah ruangan dengan kapasitas dan fasilitas yang berbeda-beda. Pada lantai 1 terdapat ruangan Matius (A101), Markus (A102). Sedangkan pada Lantai 2 terdapat ruangan Lukas (A201), Yohanes (A202), Roma (A205). Pada Lantai 3 terdapat ruangan Filipi (A302), Ibrani (A305).
- Gedung E memiliki 2 buah lantai dengan beberapa ruang kelas. Setiap lantai memiliki 5 buah ruangan dengan kapasitas dan fasilitas yang berbeda-beda. Pada lantai 1 terdapat ruangan Kejadian (E101), Keluaran (E102), sedangkan pada lantai 2 terdapat ruangan Mazmur (E203)
- Gedung Kapel merupakan satu bangunan besar yang berfungsi untuk ibadah para civitas.

Sedangkan pada kampus 2 terdapat 2 buah gedung, yaitu Gedung B dan Gedung C yang banyak memiliki ruangan laboratorium kesehatan.

SCHOOL BUILDING

code

* name

* address

o classroom



1NF Violations

code	name	address	classroom
A	A building	Jl. Tanjung Duren Second floor	Matius
			Markus
			Lukas
			Yohanes
			Roma
			Filipi
			Ibrani
E	E building		Kejadian
			Keluaran
			Mazmur
K	Kapel	-	
B	B building	Jl. Arjuna	Laboratorium1
C	C building		Laboratorium2

SCHOOL BUILDING

code

* name

* address

o classroom



1NF

code	name	address	classroom
A	A building	Jl. Tanjung Duren	Matius
A	A building	Jl. Tanjung Duren	Markus
A	A building	Jl. Tanjung Duren	Lukas
A	A building	Jl. Tanjung Duren	Yohanes
A	A building	Jl. Tanjung Duren	Roma
A	A building	Jl. Tanjung Duren	Filipi
A	A building	Jl. Tanjung Duren	Ibrani
E	E building	Jl. Tanjung Duren	Kejadian
E	E building	Jl. Tanjung Duren	Keluaran
E	E building	Jl. Tanjung Duren	Mazmur
K	Kapel	Jl. Tanjung Duren	-
B	B building	Jl. Arjuna	Laboratorium1
C	C building	Jl. Arjuna	Laboratorium2

SCHOOL BUILDING

code

* name

* address

o classroom



Tabel tidak memenuhi First Normal Form

Tabel berisi atribut Item ID, Color, dan Unit Price pada masing-masing dalam satu baris.

Item ID	Color	Unit Price
IT001	Red, Blue	\$16.56
IT002	Yellow	\$17.48
IT003	Green	\$19.76
IT004	Blue, Yellow	\$20.00

Tidak atomik

Item ID	Color	Unit Price
IT001	Red, Blue	\$16.56
IT002	Yellow	\$17.48
IT003	Green	\$19.76
IT004	Blue, Yellow	\$20.00



Item ID	Color	Unit Price
IT001	Red, Blue	\$16.56
IT002	Yellow	\$17.48
IT003	Green	\$19.76
IT004	Blue, Yellow	\$20.00

Rule First Normal Form (1NF):
All attributes must be single-valued.

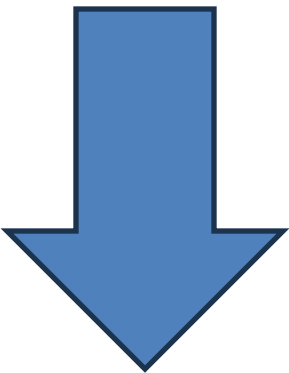


TABLE1: ITEM_COLOR

Item ID	Color
IT001	Red
IT001	Blue
IT002	Yellow
IT003	Green

kode_faktur	tanggal	kode_barang	nama_barang	harga	qty
KD_001	13/07/2020	BRG_001	Indomie Goreng	2500	5
		BRG_002	Indomie Goreng Jumbo	3000	8
		BRG_003	Mie Sedaap Goreng	2500	9
		BRG_004	Mie Sedaap Soto	2300	3
KD_002	13/07/2020	BRG_005	Intermie Goreng	1500	6
		BRG_006	Intermie Soto	1500	6
KD_003	14/07/2020	BRG_007	Pop Mie Ayam	4500	3

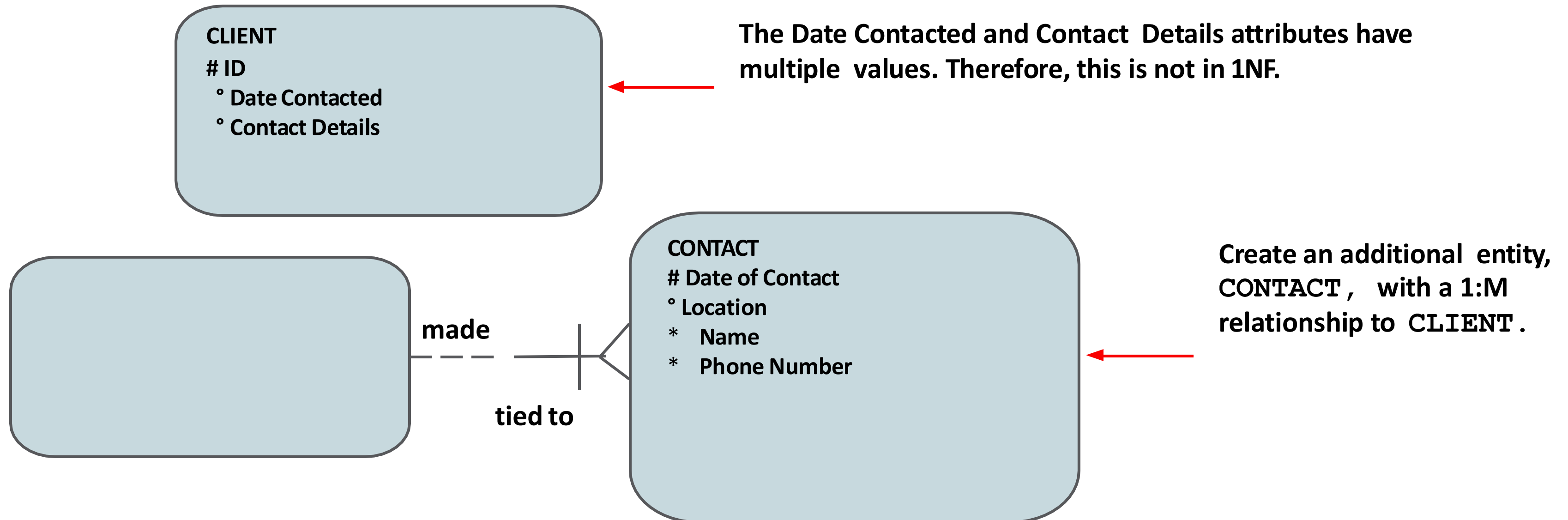


1NF					
kode_faktur	tanggal	kode_barang	nama_barang	harga	qty
KD_001	13/07/2020	BRG_001	Indomie Goreng	2500	5
KD_001	13/07/2020	BRG_002	Indomie Goreng Jumbo	3000	8
KD_001	13/07/2020	BRG_003	Mie Sedaap Goreng	2500	9
KD_001	13/07/2020	BRG_004	Mie Sedaap Soto	2300	3
KD_002	13/07/2020	BRG_005	Intermie Goreng	1500	6
KD_002	13/07/2020	BRG_006	Intermie Soto	1500	6
KD_003	14/07/2020	BRG_007	Pop Mie Ayam	4500	3



First Normal Form (1NF)

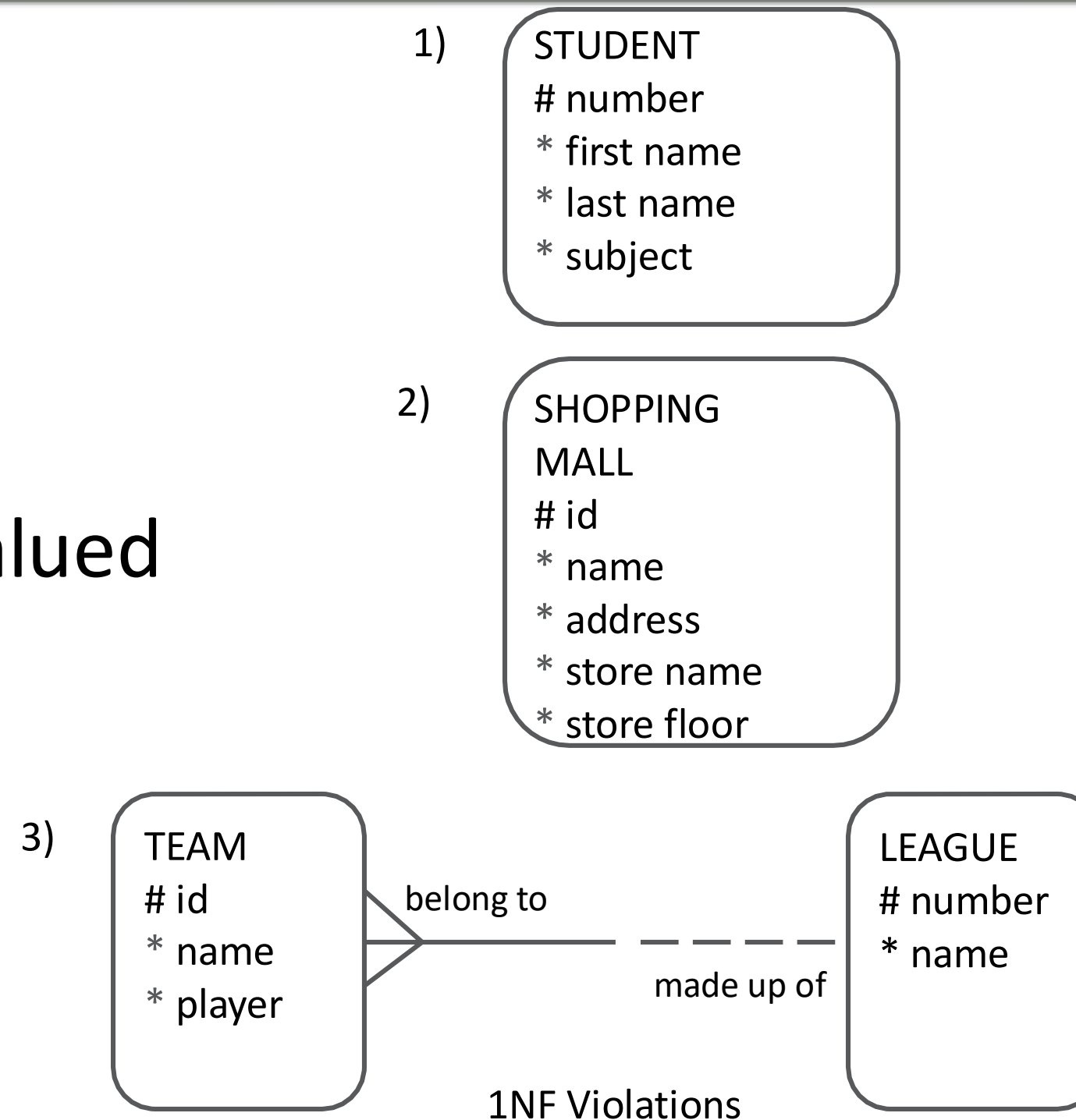
- Each attribute must have a single value for each occurrence of the entity.





1NF Violations

- Examine the entities.
- Are there any multi-valued attributes?





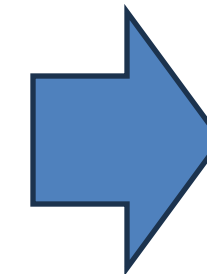
1NF Violations

1)

STUDENT
number
* first name
* last name
* subject

Table STUDENTS

number	first_name	last_name	subject
101	Ani	Mayohara	PE
			Calculus
			Biology
102	Bob	Thomson	Calculus
			PE
103	Lisa	May	PE
			Biology
104	Lolita	Jon	PE
			Calculus
			Biology
			Geography



Form1

number	first_name	last_name	subject
101	Ani	Mayohara	PE
101	Ani	Mayohara	Calculus
101	Ani	Mayohara	Biology
102	Bob	Thomson	Calculus
102	Bob	Thomson	PE
103	Lisa	May	PE
103	Lisa	May	Biology
104	Lolita	Jon	PE
104	Lolita	Jon	Calculus
104	Lolita	Jon	Biology
104	Lolita	Jon	Geography



1NF Violations

2)

SHOPPING
MALL

id

* name

* address

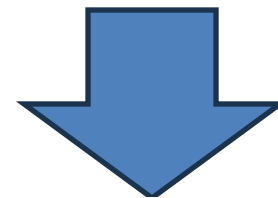
* store name

* store floor

Berikan instances yang mencerminkan bentuk unnormal

Table SHOPPING_MALL

id	name	address	store_name	store_floor
??	??	??	??	??
??	??	??	??	??
??	??	??	??	??
??	??	??	??	??
??	??	??	??	??



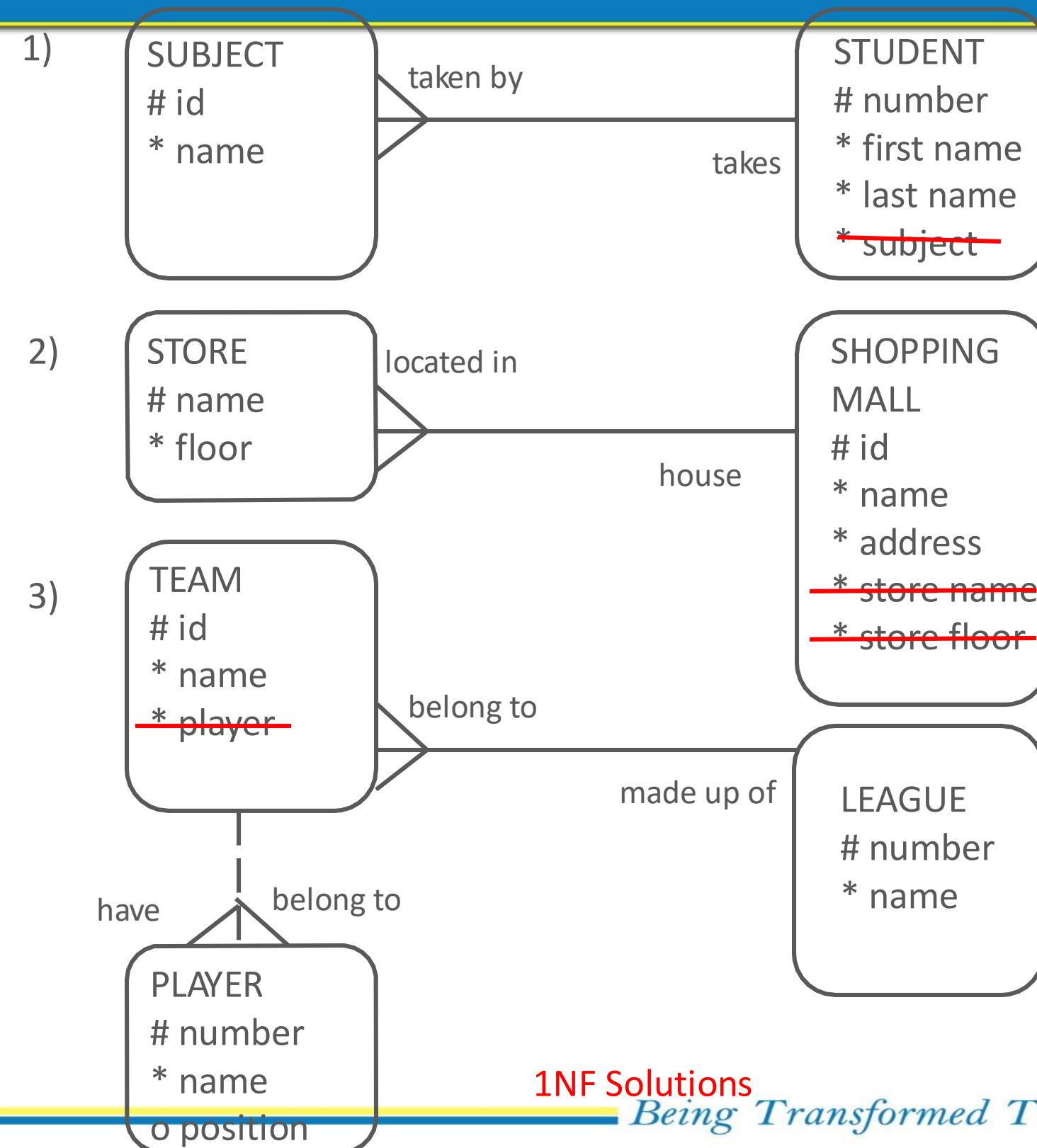
Transformasi Table SHOPPING_MALL yang mencerminkan pemenuhan syarat bentuk 1NF

id	name	address	store_name	store_floor
??	??	??	??	??
??	??	??	??	??
??	??	??	??	??
??	??	??	??	??
??	??	??	??	??



1NF Solutions

- When all the attributes in an entity are single-valued, that entity is said to be in First Normal Form.



1NF Solutions

Being Transformed To Win The Future



Terminology

Key terms used in this lesson included:

- First Normal Form (1NF)
- Normalization
- Redundancy



Summary

- ✧ In this lesson, you should have learned how to:
 - Define the purpose of normalization in database models
 - Define the rule of First Normal Form in the normalization process
 - Determine if an entity conforms to the rule of First Normal Form
 - Convert an entity to First Normal Form if needed

Thank You

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