
QUIZ

Q1. which relation is many to many?

A. Students and Course

B. Customers and Products

C. Books and Readers

D. All of above are correct

Q2. To manage relation many to many, you need to create an intersection table.

A. False

B. True

Q3. What is ERD stand for?

A. ERD stand for Entity Relationship Diagram.

B. ERD stand for Entity Relationship Database.

C. ERD stand for Entity Relationship Dolphins.

Q4. There are three types of relation in ERD.

A. Zero to one, one to one, one to many

B. One to one, one to many, many to many

C. One to one , one to many, many to zero

Q5. A primary key is used to ensure each record is unique.

A. True

B. False

Q6. Foreign key refers to the field in a table which is the primary key of another table.

A. False

B. True

DB

Relational database
1ST NORMAL FORM

OBJECTIVES FOR TODAY

- ✓ Understand the **problems of a database** without normalization
- ✓ Understand **how normalization solves these problems**

STUDENT

Student id	Name	Specialisation	Manager	Email
1001	Lyhour	WEP	Rady	pnc.wep@passerelllesnumeriques.org
1002	Thon	WEP	Rady	pnc.wep@passerelllesnumeriques.org
1003	Kunthy	SNA	Sopheak	sna.wep@passerelllesnumeriques.org
1004	Channary	WEP	Rady	pnc.wep@passerelllesnumeriques.org

Same data repeated multiple times → **Data redundancy**

What is the problem when we add new students?

STUDENT

Student id	Name	Specialisation	Manager	Email
1001	Lyhour	WEP	Ronan	pnc.wep@passerelllesnumeriques.org
1002	Thon	WEP	Ronan	pnc.wep@passerelllesnumeriques.org
1003	Kunthy	WEP	Ronan	pnc.wep@passerelllesnumeriques.org
1004	Channary	WEP	Ronan	pnc.wep@passerelllesnumeriques.org
1005	**Vantheav**	**WEP**	**Ronan**	**pnc.wep@passerelllesnumeriques.org**
1006	**Sophea**	**WEP**	**Ronan**	**pnc.wep@passerelllesnumeriques.org**

Inserting anomaly/problem

What is the problem when we add new students?

STUDENT

Student id	Name	Specialisation	Manager	Email
1001	Lyhour	WEP	Ronan	pnc.wep@passerelllesnumeriques.org
1002	Thon	WEP	Ronan	pnc.wep@passerelllesnumeriques.org
1003	Kunthy	WEP	Ronan	pnc.wep@passerelllesnumeriques.org
1004	Channary	WEP	Ronan	pnc.wep@passerelllesnumeriques.org
1005	**Vantheav**	**WEP**	**Ronan**	**pnc.wep@passerelllesnumeriques.org**
1006	**Sophea**	**WEP**	**Ronan**	**pnc.wep@passerelllesnumeriques.org**

Data redundancy → Increases the size of the database

What is the problem when the manager changes?

STUDENT

Student id	Name	Specialisation	Manager	Email
1001	Lyhour	WEP	~~Ronan~~ Rady	pnc.wep@passerelllesnumeriques.org
1002	Thon	WEP	~~Ronan~~ Rady	pnc.wep@passerelllesnumeriques.org
1003	Kunthy	WEP	~~Ronan~~ Rady	pnc.wep@passerelllesnumeriques.org
1004	Channary	WEP	Ronan !!	pnc.wep@passerelllesnumeriques.org
1005	Vantheav	WEP	~~Ronan~~ Rady	pnc.wep@passerelllesnumeriques.org
1006	Sophea	WEP	~~Ronan~~ Rady	pnc.wep@passerelllesnumeriques.org

Updating anomaly/problem

What is the problem when the manager changes?

STUDENT

Student id	Name	Specialisation	Manager	Email
1001	Lyhour	WEP	~~Ronan~~ Rady	pnc.wep@passerelllesnumeriques.org
1002	Thon	WEP	~~Ronan~~ Rady	pnc.wep@passerelllesnumeriques.org
1003	Kunthy	WEP	~~Ronan~~ Rady	pnc.wep@passerelllesnumeriques.org
1004	Channary	WEP	Ronan !!	pnc.wep@passerelllesnumeriques.org
1005	Vantheav	WEP	~~Ronan~~ Rady	pnc.wep@passerelllesnumeriques.org
1006	Sophea	WEP	~~Ronan~~ Rady	pnc.wep@passerelllesnumeriques.org

Data redundancy → Increases the risk of making a mistake when modifying data

What is the problem when we the students finish PNC and are erased of the database?

STUDENT

Student id	Name	Specialisation	Manager	Email
~~1001~~	~~Lyhour~~	~~WEP~~	~~Ronan~~	~~pnc.wep@passerelllesnumeriques.org~~
~~1002~~	~~Thon~~	~~WEP~~	~~Ronan~~	~~pnc.wep@passerelllesnumeriques.org~~
~~1003~~	~~Kunthy~~	~~WEP~~	~~Ronan~~	~~pnc.wep@passerelllesnumeriques.org~~
~~1004~~	~~Channary~~	~~WEP~~	~~Ronan~~	~~pnc.wep@passerelllesnumeriques.org~~
~~1005~~	~~Vantheav~~	~~WEP~~	~~Ronan~~	~~pnc.wep@passerelllesnumeriques.org~~
~~1006~~	~~Sophea~~	~~WEP~~	~~Ronan~~	~~pnc.wep@passerelllesnumeriques.org~~

Deleting anomaly/problem

What is the problem when we the students finish PNC and are erased of the database?

STUDENT

Student id	Name	Specialisation	Manager	Email
~~1001~~	~~Lyhour~~	WEP	Ronan	pnc.wep@passerelllesnumeriques.org
~~1002~~	~~Thon~~	WEP	Ronan	pnc.wep@passerelllesnumeriques.org
~~1003~~	~~Kunthy~~	WEP	Ronan	pnc.wep@passerelllesnumeriques.org
~~1004~~	~~Channary~~	WEP	Ronan	pnc.wep@passerelllesnumeriques.org
~~1005~~	~~Vantheav~~	WEP	Ronan	pnc.wep@passerelllesnumeriques.org
~~1006~~	~~Sophea~~	WEP	Ronan	pnc.wep@passerelllesnumeriques.org

Data redundancy → Increases the risk of losing information

What is **NORMALISATION** ?

Technique to organise data into multiple related tables, **to minimize data redundancy**

Normalization process

DIRTY DB

CLEAN DB !

First Normal Form — 1NF

RULE 1 | RULE 2 | RULE 3 | RULE 4

Second Normal Form — 2NF

Third Normal Form — 3NF

1NF RULE 1

Each column of the table must **be a single value**

No multiple value

Student id	Name	Course
1001	Lyhour	Javascript, English
1002	Thon	Javascript, Python
1003	Kunthy	English
1004	Channary	Database, Python

Which column does not follow the rule 1 of the 1st NF ?

1NF RULE 1

Each column of the table must **be a single value**
No multiple value

CORRECTION

Student id	Name	Course
1001	Lyhour	Javascript, English
1002	Thon	Javascript, Python
1003	Kunthy	English
1004	Channary	Database, Python

Which column does not follow the rule 1 of the 1st NF ?

1NF RULE 1 **ACTIVITY 1** 5 MIN

Represent this table in a format where all the columns **have only single values**

Student id	Name	Course
1001	Lyhour	Javascript, English
1002	Thon	Javascript, Python
1003	Kunthy	English
1004	Channary	Database, Python

1NF RULE 1 **ACTIVITY 1** 5 MIN

Represent this table in a format where all the columns **have only single values**

CORRECTION

Student id	Name	Course
1001	Lyhour	Javascript
1001	Lyhour	English
1002	Thon	Javascript
1002	Thon	Python
1003	Kunthy	English
1004	Channary	Database
1004	Channary	Python

1NF RULE 2

A column should contain values of the same type

Student id	Name	Age
1001	Lyhour	20
1002	Thon	eighteen
1003	Kunthy	nineteen
1004	Channary	21

Which column does not follow the rule 2 of the 1st NF ?

1NF RULE 2

A column should contain values of the same type

CORRECTION

Student id	Name	Age
1001	Lyhour	20
1002	Thon	eighteen
1003	Kunthy	nineteen
1004	Channary	21

String vs Numeric

1NF RULE 3

Each column/attribute in a table should have a unique name

Student id	Name	Name
1001	Lyhour	2
1002	Thon	3
1003	Kunthy	2
1004	Channary	4

Which column does not follow the rule 3 of the 1st NF ?

1NF RULE 3

Each column/attribute in a table should have a unique name

CORRECTION

Student id	Name	Name
1001	Lyhour	2
1002	Thon	3
1003	Kunthy	4
1004	Channary	2

1NF RULE 4

The order in which you store the data does not matter

Member ID	Member name	Nickname
1	Lyhour	The warrior
2	Vun	The crazy
3	Sinet	The amazing
4	Thon	Python master

=

Member ID	Member name	Nickname
1	Lyhour	The warrior
4	Thon	Python master
2	Vun	The crazy
3	Sinet	The amazing

These two tables are identic

First Normal Form 1NF

RULE 1	Each column of the table must be **single values**
RULE 2	A column should contain values of the **same type**
RULE 3	Each column/attribute in a table should have a **unique name**
RULE 4	The **order** in which you store the data **does not matter**

ACTIVITY 2

5 MIN

Check the following tables and tell if it respects the 1st Normal Form. If not, explain which rule it does not respect

TABLE 1

Classroom id	Section	Year
1	A	1
2	B	first
3	C	1
4	A	2

TABLE 2

Flight id	Company	Pilot
1	Air France	Paul, Edouard
2	PNC air	Ronan
3	Cambodia air	Rady, Him
4	Air France	Clément, Louis

ACTIVITY 2

5 MIN

Check the following tables and tell if it respects the 1st Normal Form. If not, explain which rule it does not respect

TABLE 3

Author id	Name	Name
1	Ernest	Hemingway
2	William	Shakespeare
3	J. K.	Rowling
4	Agatha	Christie

TABLE 4

Flight id	Flight number	Pilot
1	KE990	Paul
2	KE5040	Rady
2	KE5040	Him
1	KE990	Edouard

ACTIVITY 3

10 MIN

Correct the following table to make it have the 1st Normal Form

Author id	Name	Name	Book	Age
1	Ernest	Hemingway	The Old Man and the Sea, The Sun also Rises, A Farewell to Arms	61
2	William	Shakespeare	Romeo and Juliet, Hamlet	52
3	J. K.	Rowling	Harry Potter 1	Fifty-five
4	Agatha	Christie	And then there were one, Murder on the Orient Express	Eighty-five