

**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**

8

**OBJECTIVES FOR TODAY **

✔ Understand the **problems of a database** without normalization

✔ Understand **how normalization solves these problems**

STUDENT

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Student id**  1001 | **Name**  Lyhour | **Specialisation** WEP | **Manager**  Rady | **Email**  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**  1001 | **Name**  Lyhour | **Specialisation** WEP | **Manager**  Ronan | **Email**  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

|  |  |  |  |  |
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| 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**  1001 | **Name**  Lyhour | **Specialisation** WEP | **Manager**  ~~Ronan~~ Rady | **Email**  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**  1001 | **Name**  Lyhour | **Specialisation** WEP | **Manager**  ~~Ronan~~ Rady | **Email**  pnc.wep@passerelllesnumeriques.org |
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**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**  ~~1001~~ | **Name**  ~~Lyhour~~ | **Specialisation** ~~WEP~~ | **Manager**  ~~Ronan~~ | **Email**  ~~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**  ~~1001~~ | **Name**  ~~Lyhour~~ | **Specialisation** WEP | **Manager**  Ronan | **Email**  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*

First Normal Form 1NF

RULE 1 RULE 2 RULE 3 RULE 4

Second Normal Form 2NF

Third Normal Form 3NF

*CLEAN DB !*

1NF RULE 1

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

*No multiple value*

|  |  |  |
| --- | --- | --- |
| **Student id**  1001 | **Name**  Lyhour | **Course**  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*

❌

|  |  |  |
| --- | --- | --- |
| **Student id**  1001 | **Name**  Lyhour | **Course**  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**  1001 | **Name**  Lyhour | **Course**  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**

|  |  |  |
| --- | --- | --- |
| **Student id**  1001 | **Name**  Lyhour | **Course**  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**  1001 | **Name**  Lyhour | **Age**  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

❌

|  |  |  |
| --- | --- | --- |
| **Student id**  1001 | **Name**  Lyhour | **Age**  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**  1001 | **Name**  Lyhour | **Name**  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

❌ ❌

|  |  |  |
| --- | --- | --- |
| **Student id**  1001 | **Name**  Lyhour | **Name**  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**  1 | **Member name** Lyhour | **Nickname**  The warrior |
| 2 | Vun | The crazy |
| 3 | Sinet | The amazing |
| 4 | Thon | Python master |

=

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

*These two tables are identic*

RULE 1 RULE 2 RULE 3 RULE 4

First Normal Form 1NF

Each column of the table must be **single values** A column should contain values of the **same type** Each column/attribute in a table should have a **unique name** 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 1TABLE 2

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

|  |  |  |
| --- | --- | --- |
| **Flight id**  1 | **Company**  Air France | **Pilot**  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 3TABLE 4

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

|  |  |  |
| --- | --- | --- |
| **Flight id**  1 | **Flight**  **number**  KE990 | **Pilot**  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** 1 | **Name**  Ernest | **Name**  Hemingway | **Book**  The Old Man and the Sea, The Sun also Rises, A Farewell to Arms | **Age**  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 |