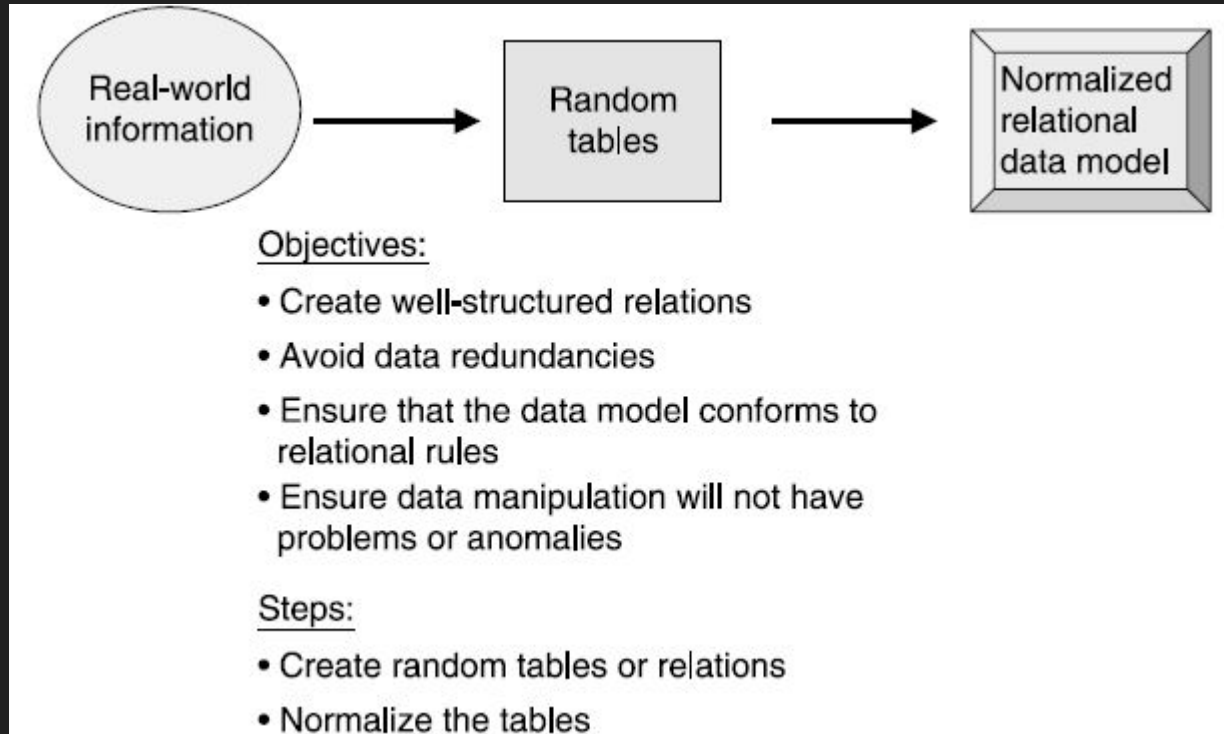


# Normalisation

# What is Normalisation ?



# What is Normalisation ?

- **Normalization is the process of organizing the data in the database.**
- Normalization is used to minimize the redundancy from a relation or set of relations. It is also used to eliminate undesirable characteristics like Insertion, Update, and Deletion Anomalies.
- **Normalization divides the larger table into smaller and links them using relationships.**
- The normal form is used to reduce redundancy from the database table.

# Why do we need normalisation ?

*The main reason for normalizing the relations is removing these anomalies. Failure to eliminate anomalies leads to data redundancy and can cause data integrity and other problems as the database grows. Normalization consists of a series of guidelines that helps to guide you in creating a good database structure.*

# Why do we need Normalisation ?

Data **modification anomalies can be categorized into three types:**

- **Insertion Anomaly:** Insertion Anomaly refers to when one cannot insert a new tuple into a relationship due to lack of data.
- **Deletion Anomaly:** The delete anomaly refers to the situation where the deletion of data results in the unintended loss of some other important data.
- **Updatation Anomaly:** The update anomaly is when an update of a single data value requires multiple rows of data to be updated.

○

# Various types of Normal Forms

	1NF	2NF	3NF	4NF	5NF
Decomposition of Relation	R	R <sub>11</sub> R <sub>12</sub>	R <sub>21</sub> R <sub>22</sub> R <sub>23</sub>	R <sub>31</sub> R <sub>32</sub> R <sub>33</sub> R <sub>34</sub>	R <sub>41</sub> R <sub>42</sub> R <sub>43</sub> R <sub>44</sub> R <sub>45</sub>
Conditions	Eliminate Repeating Groups	Eliminate Partial Functional Dependency	Eliminate Transitive Dependency	Eliminate Multi-values Dependency	Eliminate Join Dependency

# 1NF,2NF and 3NF

Normal Form	Description
1NF	A relation is in 1NF if it contains an atomic value.
2NF	A relation will be in 2NF if it is in 1NF and all non-key attributes are fully functional dependent on the primary key.
3NF	A relation will be in 3NF if it is in 2NF and no transition dependency exists.

# Unnormalized data

Customer	Cust. ID	Transactions		
Abraham	1	<b>Tr. ID</b>	<b>Date</b>	<b>Amount</b>
		12890	14-Oct-2003	-87
		12904	15-Oct-2003	-50
Isaac	2	<b>Tr. ID</b>	<b>Date</b>	<b>Amount</b>
		12898	14-Oct-2003	-21
Jacob	3	<b>Tr. ID</b>	<b>Date</b>	<b>Amount</b>
		12907	15-Oct-2003	-18
		14920	20-Nov-2003	-70
		15003	27-Nov-2003	-60



# FROM UNF TO 1NF

Serial_No.	Titles	Courses
11	Xkon	CN, OS
12	Ykon	Java
13	Zkon	C++, C

Here, you can see there are multiple values in similar columns. We can resolve it as follows:

Serial_No.	Titles	Courses
11	Xkon	CN
11	Xkon	OS
12	Ykon	Java
13	Zkon	C++
13	Zkon	C

# Functional Dependency

A functional dependency occurs when the value of one (a set of) attribute(s) determines the value of a second (set of) attribute(s) in the same table:

StudentID StudentName

StudentID (DormName, DormRoom, Fee)

# Full functional dependency and partial functional dependency

- in case of a composite primary key, ie a primary key consisting of two attributes ; in attribute is said to be partially dep if one of the parts of primary key is dropped still the dep holds
- Eg in the table below if **block + class room** for the composite primary key, then the attribute **block ic** is partially dep while the attrib **no of pcs** is fully dep

<i>block</i>	<i>class room</i>	<i>block ic</i>	<i>no of PCs</i>
Bhaskar	cr-26	Mr ABC	35

# Transitive Dependency

## AUTHORS

Author_ID	Author	Book	Author_Nationality
Auth_001	Orson Scott Card	Ender's Game	United States
Auth_001	Orson Scott Card	Children of the Mind	United States
Auth_002	Margaret Atwood	The Handmaid's Tale	Canada

**Book → Author**

**Author → Author nationality**

**Book → Author nationality**