

First Normal Form



Creating Tables and Relationships

- It is possible to store all the information in a single table
 - It would be very large and would contain duplicate data
 - Redundancy causes systems to slow down, require additional effort to maintain
 - Updates would require significantly more attempts

Vehicle	Company	Color
Equinox	GM	Blue
Gulf	Volkswagen	Red
Wrangler	Chrysler	Black
Jetta	VW	Silver
Passat	VW	Grey



Creating tables and relationships

- When creating a database or reviewing an existing database, you will undergo a process called **Normalization**
- Normalization is a process that helps to ensure that your database design is free of potential update, redundancy and consistency problems.
- It involves converting tables into various types of normal forms



This an approach that requires repeated splitting of tables and refining



First Normal Form

- A table that contains a repeating group or multiple entries for a single row is called an unnormalized table.
- Removal of repeating groups is required – most database systems do NOT allow tables to contain repeating groups
- If a table does not contain repeating groups is considered to be in the first normal form (1NF)
- A table in first normal form:
 - Has columns that contain atomic values (single values that cannot be subdivided)
 - Has no repeating groups



FIRST NORMAL FORM EXAMPLE

Student Number	Student Name	Coordinator ID	Coordinator	Course Number	Course Name
2001	Clark Kent	1001	Peter Nikita	MAD100 MAD101 MAD102 MAD103 WEB110	Java Programming 1 Working with Graphics Introduction To Programming Data Fundamentals HTML and CSS
2002	Bruce Wayne	1002	Andrew Steele	WEB101 WEB110 MAD101 MAD103 MIT203	Working With Graphics HTML & CSS Introduction to Programming/C# Data Fundamentals Information Technology Essentials
2003	Diana Prince	1001	P Nikita	MAD 100 MAD 101 MAD 102 MAD 103 WEB 110	Java 1 Working with Graphics Introduction To Programming Data Fundamentals HTML & CSS

STUDENT(Student Number, Student Name, Co-ordinator ID, Co-ordinator Name,
Course Number, Course Name)



Conversion to first normal form

- To bring a table to 1NF – store the repeating values in different rows.

Student Number	Student Name	Coordinator ID	Coordinator	Course Number	Course Name
2001	Clark Kent	1001	Peter Nikita	MAD100 MAD101 MAD102 MAD103 WEB110	Java Programming 1 Working with Graphics Introduction To Programming Data Fundamentals HTML and CSS
2002	Bruce Wayne	1002	Andrew Steele	WEB101 WEB110 MAD101 MAD103 MIT203	Working With Graphics HTML & CSS Introduction to Programming/C# Data Fundamentals Information Technology Essentials
2003	Diana Prince	1001	P Nikita	MAD 100 MAD 101 MAD 102 MAD 103 WEB 110	Java 1 Working with Graphics Introduction To Programming Data Fundamentals HTML & CSS

Conversion to first normal form

- To bring a table to 1NF – store the repeating values in different rows.
- No longer repeating – but problems may still exist



Conversion to first normal form

Student Number	Student Name	Coordinator ID	Coordinator	Course Number	Course Name
2001	Clark Kent	1001	Peter Nikita	MAD 100	Java Programming 1
2001	Clark Kent	1001	Peter Nikita	MAD101	Working With Graphics
2001	Clark Kent	1001	Peter Nikita	MAD102	Introduction To Programming
2001	Clark Kent	1001	Peter Nikita	MAD103	Data Fundamentals
2001	Clark Kent	1001	Peter Nikita	WEB110	HTML and CSS
2002	Bruce Wayne	1002	Andrew Steele	WEB 101	Working With Graphics
2002	Bruce Wayne	1002	Andrew Steele	WEB 110	HTML & CSS
2002	Bruce Wayne	1002	Andrew Steele	MAD 101	Introduction to Programming/C#
2002	Bruce Wayne	1002	Andrew Steele	MAD 103	Data Fundamentals
2002	Bruce Wayne	1002	Andrew Steele	MIT 203	Information Technology Essentials
2003	Diana Prince	1001	P Nikita	MAD 100	Java Programming 1
2003	Diana Prince	1001	Peter Nikita	MAD101	Working With Graphics
2003	Diana Prince	1001	Peter Nikita	MAD102	Introduction To Programming
2003	Diana Prince	1001	Peter Nikita	MAD103	Data Fundamentals
2003	Diana Prince	1001	Peter Nikita	WEB110	HTML and CSS



Why is this a problem?

- A database that does not conform to 1NF:
 - Queries become increasingly complex
 - Multiple values in a row-column intersection mean that table name, column name, and key are insufficient to address every value in the database
 - Difficult to update, retrieve, insert or delete a single value because you must rely on the order of the values

