

## Database normalization Process

Read the steps below, then view the [Normalization Video](#).

1. **Read the business problem** - As you are reading the process, start to identify data elements that you should collect data on and think about how to group them.
2. **Create an Object Diagram** - An object diagram is the starting point of the normalization process. Using a rounded rectangle, list the entity (future table) name at the top and then write the column (future fields) name of the data elements you identified in step 1.
3. **Create an ER diagram** - An Entity - Relationship diagram is used to logically lay out how the data objects interact with one another. Reference your Object Diagram while completing the ER diagram steps below.
  1. Draw a rectangle for each entity and space them appropriately.
  2. Identify which entity has a relationship with what other entity.
  3. Draw a diamond between the entities that are related and write an appropriate verb in the diamond that effectively represents the relationship.
  4. Draw a line on to connect the diamond to the two entities it is has a relationship with.
  5. Test the entities for what type of relationship exists between the two entities.
    1. Start with one entity and on the top of the line write if it is one or many.
    2. For the following image, read it as: One customer places many orders. Use a 1 to label the top line of the customer entity and a many (infinity) symbol for the call entity.



3. Test the relationship the opposite relation. Read it as: One call is placed by one customers. Therefore you relation is a one to many.
  4. If you are unsure of how objects are related, reread the business problem for clues to how entities are related.
4. Rules for working with relationships:
  1. **One-to-Many: In a one-to-many relationship, the primary key of the one side of the relationship become the foreign key on the many side of the relationship.**
  2. **Many-to-Many: In a many-to-many relationship, first create relation C (where entity one is relation A and entity two is relation B. Relation C is the diamond). The primary key for relation C is the combination of of the primary key of relation A and the primary key of relation B.**
5. **Create the shorthand notation** - Shorthand notation is the step between the ER diagram and creating the tables in a database program.

Using ER diagram as a source, create your shorthand notation that lists the tables and columns with designations for the primary and foreign keys. Primary keys are underlines and foreign keys have a dashed underline designation.

For instance, the shorthand notation for the customer table is

tblCustomers(CustomerID, Name, Phone, Address, City, State, Zip)

Continue with the remaining tables. NOTE: for the many-to-many relationships, you will need to create a third table. This table (relation C) typically takes its name from relationships A and B with the word Details added.

6. **Create electronic versions of your sketches.** View the following video for instructions on how to create an Object diagram, E-R Diagram, and Shorthand Notation using Microsoft Visio. View the [database normalization diagrams video](#). NOTE: You will need to download the dbnormalization.vss file below. This file is a stencil file that you will import into Visio to draw your diagrams. Refer to the video for how to import it into Visio.
7. **Create the database** in a database program using the shorthand notation as a guide.
8. **Establish the relationships** between the tables.