

Happy Supplies Parts Warehouse					
Customer Name: Jeff Peterson		Date: 7/1/2024			
Customer Number: H G54587		Time: 10:30 am			
Customer Type: Consumer		Employee: D. Harrison			
Part Number	Name	Type	Cage Code	Quantity Ordered	Unit Price
10654	Float Control	Plumbing	G413	4	12
10456	Modulator	Electrical	H433	3	7
10776	Hose Assembly	Plumbing	G413	7	9
10657	Float Assembly	Plumbing	G413	5	10

- State any assumptions that you make about the data and the attributes shown.
- Describe and illustrate the process of normalizing the attributes shown in this form.
- Identify the primary keys at each step of the normalization process and both the primary and foreign keys in your 3NF relations.
- Ensure that the 3NF relations are named.

Please note that you should not add any additional fields when performing the normalization process, including surrogate keys.

The names of all the relations and attributes must conform to the class naming convention, including use of case and singularity.

(a) Assumptions:

Attributes: customerName, customerNumber, customerType, date, time, employee, partNumber, Name, Type, cageCode, quantityOrdered, unitPrice

Part Number uniquely identifies Name, Type, Cage Code, and Unit Price.  
Parts of the same Type share a Cage Code; different types can share one too.  
Unit Price and Quantity Ordered are always non-negative.

One employee handles one customer at a specific date and time only.  
An order is uniquely identified by Customer Number, Date, Time, and Employee Name.  
Employee Names are unique.  
Employees can serve any customer.

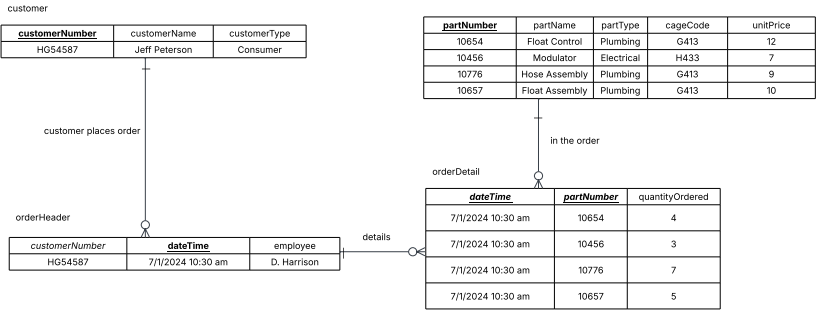
A customer can place multiple orders and include multiple parts per order.  
A part appears only once per order (no duplicates).  
A customer cannot:  
Order the same part multiple times on the same date (1NF).  
Place multiple orders at the same date and time (2NF/3NF).  
Order the same part at the same date and time (2NF/3NF).

#### Order

customerNumber	customerName	customerType	dateTime	employee	partNumber	partName	partType	cageCode	quantityOrdered	unitPrice
HG54587	Jeff Peterson	Consumer	7/1/2024 10:30 am	D. Harrison	10654	Float Control	Plumbing	G413	4	12
HG54587	Jeff Peterson	Consumer	7/1/2024 10:30 am	D. Harrison	10456	Modulator	Electrical	H433	3	7
HG54587	Jeff Peterson	Consumer	7/1/2024 10:30 am	D. Harrison	10776	Hose Assembly	Plumbing	G413	7	9
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The table is in 1NF.  
It uses a combined key of customer number, order date and time, and part number to make each record unique.  
If a customer orders the same part more than once on the same day, order time can be added to keep records unique.

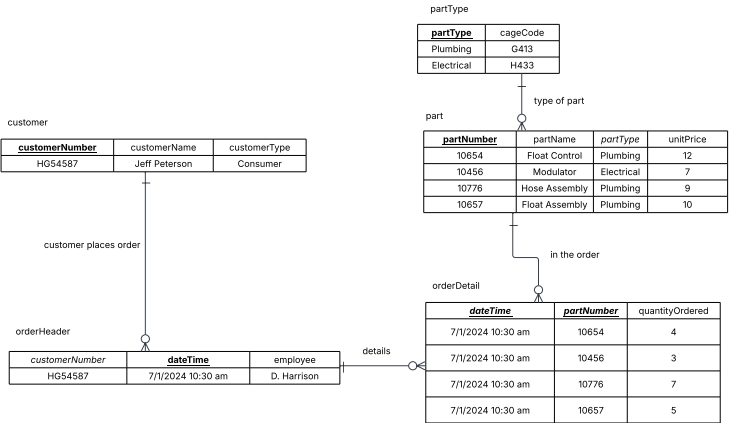
To avoid repeating part details many times, the data is split into two tables: one for orders (keyed by customer number, date, and time) and one for parts (keyed by part number).



The database is in 1NF.  
In the original 1NF table, some attributes depended only on part of the composite primary key (partial dependency). For example, customerName and customerType depend on customerNumber, while partName, type, cageCode, and unitPrice depend on partNumber. QuantityOrdered depends on the full composite key.

After normalization:  
The customer table has customerNumber as the primary key, with customerName and customerType fully dependent on it.  
The part table uses partNumber as the primary key, with all attributes depending on it.  
The order table has a composite primary key (customerNumber, dateTime), and all non-key attributes depend on the entire key.

This eliminates partial dependencies, so the database is in 2NF.



This database is in 3NF.  
Remove transitive dependencies by splitting the table. Since cageCode depends on type, which depends on partNumber, create a separate table with type as the primary key and cageCode dependent on it.  
This simplifies updates, like changing cageCodes for a part type without modifying all records.  
No transitive dependencies, and all non-key fields depend directly on the primary key.