

The first NF requires that no column can have more than one value stored in a cell. In other words, it should only store atomic values. None of the tables in *shoeshop* database holds columns containing multiple values.

As for the second NF it states that 1NF must be granted (as we've said it is) but also no non-prime attribute is dependent on the proper subset of any candidate key of table. In our tables there aren't any redundancies nor separable values disrespecting the 2NF.

Finally, the third NF requires 2NF and that any transitive functional dependency of non-prime attribute on any super key should be removed.

Since in all of our database's tables all attribute types depend are fully functional dependent on the primary key of their table and all attribute types are atomic and single-valued and there are no transitive dependencies, all tables are in 3NF

The tables below detail the dependencies between each table's fields, showing there are no transitive functional dependencies.

3NF Demonstration

Field 1	Field 2	Dependency
customer_id (pk)	name	PK Dependency
customer_id (pk)	phone_number	PK Dependency
customer_id (pk)	phone_number_country_prefix	PK Dependency
customer_id (pk)	email_address	PK Dependency
customer_id (pk)	home_address	PK Dependency
Name	phone_number	None
Name	phone_number_country_prefix	None
Name	email_address	None
Name	home_address	None
phone_number	phone_number_country_prefix	None
phone_number	email_address	None
phone_number	home_address	None
phone_number_country_prefix	email_address	None
phone_number_country_prefix	home_address	None
email_address	home_address	None
email_address	name	None

Table 1: Customer

Field 1	Field 2	Dependency
supplier_id (pk)	name	PK Dependency
supplier_id (pk)	phone_number	PK Dependency
supplier_id (pk)	email_address	PK Dependency
supplier_id (pk)	business_address	PK Dependency
name	phone_number	None
name	email_address	None
name	business_address	None
phone_number	email_address	None
phone_number	business_address	None
email_address	business_address	None

Table 2: Supplier

Field 1	Field 2	Dependency
product_id (pk)	name	PK Dependency
product_id (pk)	type	PK Dependency
product_id (pk)	available_quantity	PK Dependency
product_id (pk)	unit_price	PK Dependency
name	type	None
name	available_quantity	None
name	unit_price	None
type	available_quantity	None
type	unit_price	None
available_quantity	unit_price	None

Table 3: Stock

Field 1	Field 2	Dependency
supplier_order_id (pk)	order_date	PK Dependency
supplier_order_id (pk)	products_received	PK Dependency
supplier_order_id (pk)	supplier_id	PK Dependency
supplier_order_id (pk)	invoice_date	PK Dependency
supplier_order_id (pk)	paid	PK Dependency
order_date	products_received	None
order_date	supplier_id	None
order_date	invoice_date	None
order_date	paid	None
products_received	supplier_id	None
products_received	invoice_date	None
products_received	paid	None
supplier_id	invoice_date	None
supplier_id	paid	None
invoice_date	paid	None

Table 4: Supplier_Order

Field 1	Field 2	Dependency
order_item_id (pk)	supplier_order_id	PK Dependency
order_item_id (pk)	product_id	PK Dependency
order_item_id (pk)	quantity	PK Dependency
supplier_order_id	product_id	None
supplier_order_id	quantity	None
product_id	quantity	None

Table 5: Supplier_Order_Item

Field 1	Field 2	Dependency
customer_order_id (pk)	order_date	PK Dependency
customer_order_id (pk)	shipping_date	PK Dependency
customer_order_id (pk)	customer_id	PK Dependency
customer_order_id (pk)	shipping_address	PK Dependency
customer_order_id (pk)	payment_received	PK Dependency
customer_order_id (pk)	invoice_date	PK Dependency
customer_order_id (pk)	invoice_address	PK Dependency
customer_order_id (pk)	tax_percent_rate	PK Dependency
order_date	shipping_date	None
order_date	customer_id	None
order_date	shipping_address	None
order_date	payment_received	None
order_date	invoice_date	None
order_date	invoice_address	None
order_date	tax_percent_rate	None
shipping_date	customer_id	None
shipping_date	shipping_address	None
shipping_date	payment_received	None
shipping_date	invoice_date	None
shipping_date	invoice_address	None
shipping_date	tax_percent_rate	None
customer_id	shipping_address	None
customer_id	payment_received	None
customer_id	invoice_date	None
customer_id	invoice_address	None
customer_id	tax_percent_rate	None
shipping_address	payment_received	None
shipping_address	invoice_date	None
shipping_address	invoice_address	None
shipping_address	tax_percent_rate	None
payment_received	invoice_date	None
payment_received	invoice_address	None
payment_received	tax_percent_rate	None
invoice_date	invoice_address	None
invoice_date	tax_percent_rate	None
invoice_address	tax_percent_rate	None

Table 6: Customer_Order

Field 1	Field 2	Dependency
order_item_id (pk)	customer_order_id	PK Dependency
order_item_id (pk)	product_id	PK Dependency
order_item_id (pk)	quantity	PK Dependency
order_item_id (pk)	discount_percent	PK Dependency
customer_order_id	product_id	None
customer_order_id	quantity	None
customer_order_id	discount_percent	None
product_id	quantity	None
product_id	discount_percent	None
quantity	discount_percent	None

Table 7: Customer_Order_Item

Field 1	Field 2	Dependency
log_id (pk)	product_id	PK Dependency
log_id (pk)	old_unit_price	PK Dependency
log_id (pk)	new_unit_price	PK Dependency
log_id (pk)	update_date	PK Dependency
product_id	old_unit_price	None
product_id	new_unit_price	None
product_id	update_date	None
old_unit_price	new_unit_price	None
old_unit_price	update_date	None
new_unit_price	update_date	None

Table 8: Log_Price