Database Project – Group 3

**Student Names:**

Bandana Pachabhaiya Magar (C0916126)

Kusum Lamichhane (C0917362)

Ranish Shrestha (C0916260)

Roshan Dhakal (C0916271)

Utsav Bajracharya (C0913555)

**Submitted date:** 11/26/2023

**Table of Contents**

[**Part 1 – Company Overview and Product** 1](#_Toc151927103)

[Company Name 1](#_Toc151927104)

[Company Overview/Description 1](#_Toc151927105)

[Products 1](#_Toc151927106)

[Product Attributes 2](#_Toc151927107)

[**Part 2 – Customer Sales Invoice** 3](#_Toc151927108)

[Customer Sales Invoice 3](#_Toc151927109)

[**Part 3 – Database Design** 4](#_Toc151927110)

[ER diagram 4](#_Toc151927111)

[Relational Model 5](#_Toc151927112)

[Relational Schema 7](#_Toc151927113)

[Business Rules 8](#_Toc151927114)

[**Part 4 – Constraint Testing** 9](#_Toc151927115)

[Employee Table 9](#_Toc151927116)

[Product Table 11](#_Toc151927117)

[Customer Table 12](#_Toc151927118)

[Order Table 13](#_Toc151927119)

[Order\_Items Table 14](#_Toc151927120)

[Company Table 16](#_Toc151927121)

[Warehouse Table 18](#_Toc151927122)

[Category Table 19](#_Toc151927123)

[Inventory Table 19](#_Toc151927124)

**Table of Figures**

[Figure 1 Product Attributes 2](#_Toc151927125)

[Figure 2 ER diagram 4](#_Toc151927126)

[Figure 3 Checking Primary Key Constraint for Employee\_Id 9](#_Toc151927127)

[Figure 4 Checking DataType Constraint for Middle\_Name 9](#_Toc151927128)

[Figure 5 Checking Check Constraint for Gender 9](#_Toc151927129)

[Figure 6 Checking Unique Key Constraint for Email 9](#_Toc151927130)

[Figure 7 Checking Foreign Key Constraint for Manager\_Id 10](#_Toc151927131)

[Figure 8 Checking Foreign Key Constraint for Warehouse 10](#_Toc151927132)

[Figure 9 Checking Default Constraint for Hire\_Date 10](#_Toc151927133)

[Figure 10 Checking Not Null Constraint – Product 11](#_Toc151927134)

[Figure 11 Checking Foreign Key Constraint - Product 11](#_Toc151927135)

[Figure 12 Checking Unique Key Constraint – Product 11](#_Toc151927136)

[Figure 13 Checking Primary Key Constraint 12](#_Toc151927137)

[Figure 14 Checking Unique Key Constraint for Username 12](#_Toc151927138)

[Figure 15 Checking Unique Key Constraint for Email 12](#_Toc151927139)

[Figure 16 Checking Gender Constraint 13](#_Toc151927140)

[Figure 17 Checking Unique Key Constraint for Mobile\_Number 13](#_Toc151927141)

[Figure 18 Checking Primary Key Constraint for Order\_Id 13](#_Toc151927142)

[Figure 19 Checking Foreign Key Constraint for Customer\_Id 14](#_Toc151927143)

[Figure 20 Checking Unique Key Constraint for Tracking\_Number 14](#_Toc151927144)

[Figure 21 Checking Primary Key Constraint 14](#_Toc151927145)

[Figure 22 Checking Foreign Key Constraint for Order\_Id 15](#_Toc151927146)

[Figure 23 Checking Foreign Key Constraint for Product\_Id 15](#_Toc151927147)

[Figure 24 Checking Not Null Constraint for Quantity 15](#_Toc151927148)

[Figure 25 Checking Not Null Constraint for Discount 15](#_Toc151927149)

[Figure 26 Checking Primary Key Constraint for Company\_Id 16](#_Toc151927150)

[Figure 27 Checking Unique Key Constraint for Name 16](#_Toc151927151)

[Figure 28 Checking Unique Key Constraint for Phone\_Number 17](#_Toc151927152)

[Figure 29 Checking Unique Key Constraint for Email 17](#_Toc151927153)

[Figure 30 Checking Primary Key Constraint for Warehouse\_Id 18](#_Toc151927154)

[Figure 31 Checking Foreign Key Constraint for Warehouse\_Manager\_Id 18](#_Toc151927155)

[Figure 32 Checking Unique Key Constraint for Email 18](#_Toc151927156)

[Figure 33 Checking Primary Key Constraint for Category\_Id 19](#_Toc151927157)

[Figure 34 Checking Unique Key Constraint for Name 19](#_Toc151927158)

[Figure 35 Checking Primary Key Constraint for Inventory\_Id 19](#_Toc151927159)

[Figure 36 Checking Foreign Key Constraint for Warehouse\_Id 19](#_Toc151927160)

[Figure 37 Checking Foreign Key Constraint for Product\_Id 20](#_Toc151927161)

[Figure 38 Checking Unique Key Constraint for Shelves\_Number 20](#_Toc151927162)

# **Part 1 – Company Overview and Product**

## Company Name

Oasis Hardware

## Company Overview/Description

Oasis Hardware Company specialize in the design, manufacturing, and distribution high-quality of different hardware products. It has consistently delivered different hardware solutions, and exceptional services and gained customer satisfaction. Our mission is to become the oasis of reliability in the hardware industry where people can find the perfect hardware solution that meets their needs, backed by strong support and services. Innovation is continuously run in Oasis Hardware Company where our research and development team constantly explore new technology, materials, and design to create more reliable solutions. We value customer feedback and continuously refine our products and services.

## Products

Oasis Hardware company provides a wide range of goods and equipment for building, house renovation, maintenance, and repair. Our goal is to offer top-notch hardware solutions to a variety of sectors and uses. The products we have are known for their quality and reliability. Here are some of the products offered by our company:

**Safety Gears department** – In this department, we store safety gear and equipment to prioritize worker safety. We have everything you need, such as safety helmets, gloves, dust masks, knee pads, work boots, ear protection, eye protection.

**Electrical Supply department** – Electrical tools, Extension cords, Switches, Circuit breakers, Wiring, Electrical outlets, Electrical connectors.

**Paint and painting supplies** – Paint color, Paint brushes, Rollers, Drop cloths, Painter tape and Paint trays.

**Home appliances** – Flooring (Tiles, Laminate, Hardwood), locks, knobs, handles, shelving, and organizers for cabinets.

## Product Attributes

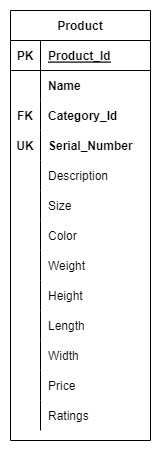


Figure Product Attributes

# **Part 2 – Customer Sales Invoice**

## Customer Sales Invoice

**Customer ID**: 0001 **Order ID**: 00001

**Customer Name**: ABCD Company **Order Date**: 05/11/2023

**Customer Address**: 333 N Rivermede Rd **Associate ID**: 501

Toronto, ON L4K 3N7 **Associate Name**: Bob Smith

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |
| **Product ID** | **Model** | **Brand** | **Description** | **Qty** | **Unit Price** | **Extended Price** |
| S011 | 62-12345 | Lawn-Boy | Helmets | 2 | 595.00 | 1190.00 |
| E668 | 59-98765 | Black & Decker | Switches | 1 | 1449.00 | 1449.00 |
| P763 | 36-59278 | Craftsman | Paint and brush | 2 | 625.00 | 1250.00 |
| H004 | 45-78233 | Craftsman | Locks | 1 | 150.00 | 150.00 |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  | **Sub-total** | 4039.00 |
|  |  |  |  |  | **Tax** | 525.07 |
|  |  |  |  | **Invoice Total** | | 4,564.07 |

**Customer ID**: 0002 **Order ID**: 00002

**Customer Name**: XYZ Company **Order Date**: 07/11/2023

**Customer Address**: 1120 Newkirk Rd **Associate ID**: 502

Toronto, ON L4K 3N7 **Associate Name**: Robin

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |
| **Product ID** | **Model** | **Brand** | **Description** | **Qty** | **Unit Price** | **Extended Price** |
| S011 | 62-12345 | Lawn-Boy | Knee Pads | 10 | 200.00 | 2000.00 |
| E668 | 59-98765 | Black & Decker | Switches | 1 | 1449.00 | 1449.00 |
| E700 | 36-59278 | Craftsman | Electric Connectors | 2 | 625.00 | 1250.00 |
| H004 | 45-78233 | Craftsman | Locks | 1 | 150.00 | 150.00 |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  | **Sub-total** | 4849.00 |
|  |  |  |  |  | **Tax** | 630.37 |
|  |  |  |  | **Invoice Total** | | 5,479.37 |

Product id:

**Safety Gears department** – S

**Electrical Supply department** – E

**Paint and painting supplies** – P

**Home appliances** – H

# **Part 3 – Database Design**

## ER diagram

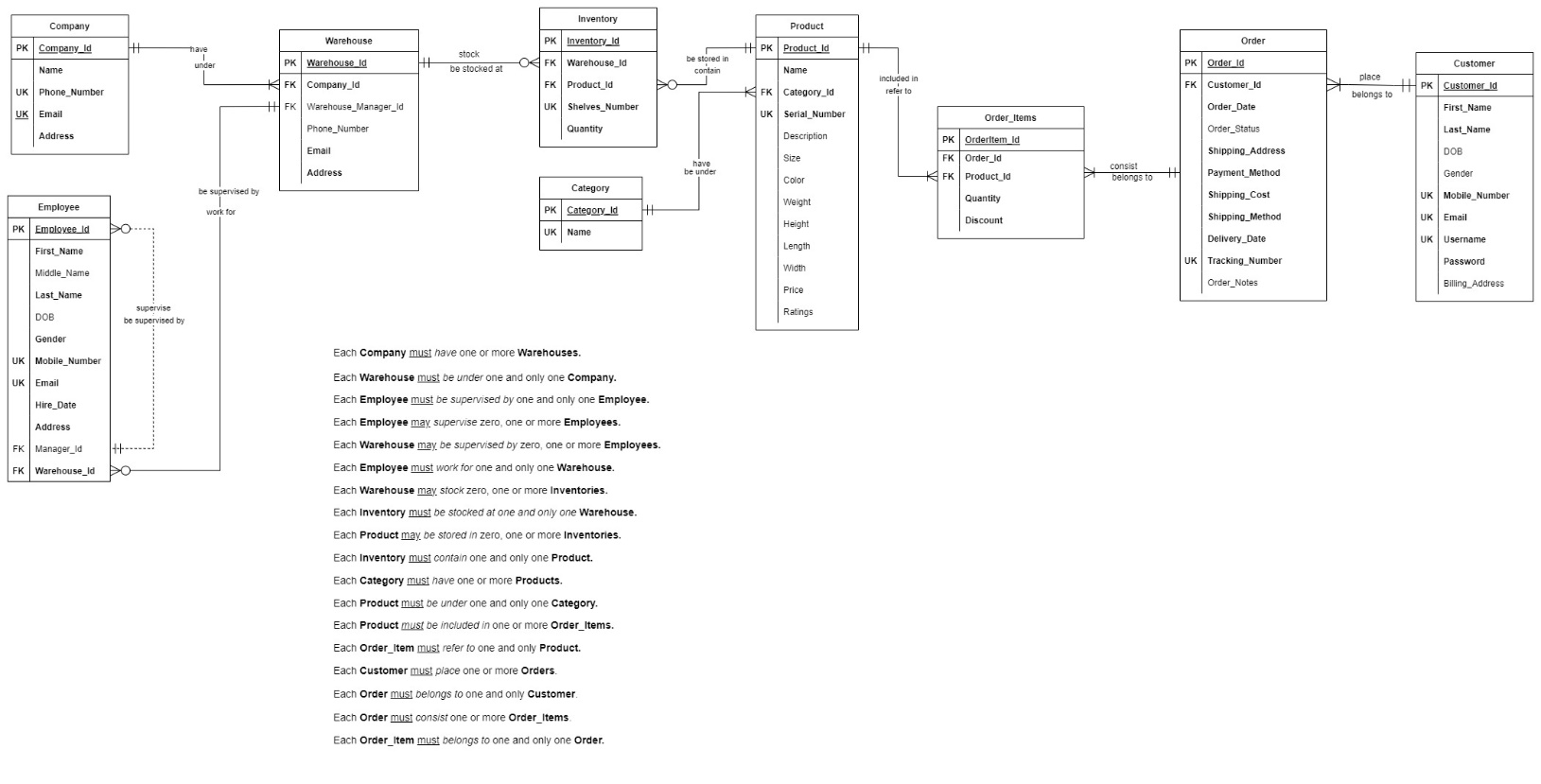


Figure ER diagram

*Figure SEQ Figure \\* ARABIC 4 Customers ER Diagram*

## Relational Model

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| PRODUCTS | | | | | |
| Key Type | Optionality | Column Name | Data Type | Length | Constraints |
| PK | \* | Product\_Id | integer |  | Unique identifier |
|  | \* | Name | varchar | (20) |  |
| FK | \* | Category\_Id | integer |  | Must be a valid category |
| UK | \* | Serial\_number | character | (15) | Unique identifier |
|  | 0 | Description | varchar | (100) |  |
|  | 0 | Size | integer |  |  |
|  | 0 | Color | varchar | (20) |  |
|  | 0 | Weight | decimal | (5,2) |  |
|  | 0 | Height | decimal | (3,2) |  |
|  | 0 | Length | decimal | (3,2) |  |
|  | 0 | Width | decimal | (3,2) |  |
|  | 0 | Price | decimal | (10,2) |  |
|  | 0 | Ratings | decimal | (2,1) |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| WAREHOUSES | | | | | |
| Key Type | Optionality | Column Name | Data Type | Length | Constraints |
| PK | \* | Warehouse\_Id | integer |  | Unique identifier |
| FK | \* | Company\_Id | integer |  | Must be a valid company |
| FK | 0 | Warehouse\_Manager\_Id | integer |  | Must be a valid employee |
|  | 0 | Phone\_Number | varchar | (10) |  |
| UK | \* | Email | varchar | (50) | Unique identifier |
|  | \* | Address | varchar | (50) |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| INVENTORY | | | | | |
| Key Type | Optionality | Column Name | Data Type | Length | Constraints |
| PK | \* | Inventory\_Id | integer |  | Unique identifier |
| FK | \* | Warehouse\_Id | integer |  | Must be a valid warehouse |
| FK | \* | Product\_Id | integer |  | Must be a valid product |
| UK | \* | Shelves\_Number | integer |  | Unique identifier |
|  | \* | Quantity | decimal | (10, 2) |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| COMPANY | | | | | |
| Key Type | Optionality | Column Name | Data Type | Length | Constraints |
| PK | \* | Company\_Id | integer |  | Unique identifier |
| UK | \* | Name | varchar | (50) | Unique identifier |
| UK | \* | Phone\_Number | integer |  | Unique identifier |
| UK | \* | Email | varchar | (50) | Unique identifier |
|  | \* | Address | varchar | (20) |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| EMPLOYEES | | | | | |
| Key Type | Optionality | Column Name | Data Type | Length | Constraints |
| PK | \* | Employee\_Id | integer |  | Unique identifier |
|  | \* | First\_Name | varchar | (10) |  |
|  | 0 | Middle\_Name | character | (1) |  |
|  | \* | Last\_Name | varchar | (10) |  |
|  | \* | DOB | date |  |  |
|  | \* | Gender | character | (1) | Must be 'M', 'F', or 'O' |
| UK | \* | Mobile\_Number | varchar | (10) | Unique identifier |
| UK | \* | Email | varchar | (50) | Unique identifier |
|  | \* | Hire\_Date | Date |  | * If unknown, use current date. * Must be greater than birth date |
|  | \* | Address | varchar | (50) |  |
| FK | 0 | Manager\_Id | integer |  | Must be a valid employee |
| FK | \* | Warehouse\_Id | integer |  | Must be a valid warehouse |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| CUSTOMERS | | | | | |
| Key Type | Optionality | Column Name | Data Type | Length | Constraints |
| PK | \* | Customer\_Id | integer |  | Unique identifier |
|  | \* | First\_Name | varchar | (10) |  |
|  | \* | Last\_Name | varchar | (10) |  |
|  | 0 | DOB | date |  |  |
|  | 0 | Gender | character | (1) | Must be ‘M’, ‘F’, or ‘O’ |
| UK | \* | Mobile\_Number | varchar | (10) | Unique identifier |
| UK | \* | Email | varchar | (50) | Unique identifier |
| UK | \* | Username | varchar | (10) | Unique identifier |
|  | \* | Password | varchar | (12) |  |
|  | 0 | Billing\_Address | varchar | (50) |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ORDERS | | | | | |
| Key Type | Optionality | Column Name | Data Type | Length | Constraints |
| PK | \* | Order\_Id | integer |  | Unique identifier |
| FK | \* | Customer\_Id | integer |  | Must be a valid Customer |
|  | \* | Order\_Date | date |  |  |
|  | 0 | Order\_Status | varchar | (8) |  |
|  | \* | Shipping\_Address | varchar | (50) |  |
|  | \* | Payment\_Method | varchar | (8) |  |
|  | \* | Shipping\_Cost | decimal | (10, 2) |  |
|  | \* | Delivery\_Date | date |  |  |
|  | \* | Shipping\_Method | varchar | (8) |  |
| UK | \* | Tracking\_Number | varchar | (10) | Unique identifier |
|  | 0 | Order\_Notes | varchar | (50) |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ORDER\_ITEMS | | | | | |
| Key Type | Optionality | Column Name | Data Type | Length | Constraints |
| PK | \* | OrderItem\_Id | integer |  | Unique identifier |
| FK | \* | Order\_Id | integer |  | Must be a valid order |
| FK | \* | Product\_Id | integer |  | Must be a valid product |
|  | \* | Quantity | decimal | (10, 2) |  |
|  | \* | Discount | decimal | (10, 2) |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| CATEGORY | | | | | |
| Key Type | Optionality | Column Name | Data Type | Length | Constraints |
| PK | \* | Category\_Id | integer |  | Unique identifier |
| UK | \* | Name | varchar | (50) | Unique identifier |

## Relational Schema

PRODUCT(**Product\_Id**, Name, *Category\_Id*, Serial\_Number, Description, Size, Color, Weight, Height, Length, Width, Price, Ratings)

FK *Category\_Id* -> CATEGORY

WAREHOUSE(**Warehouse\_Id** *Warehouese\_Manager\_Id*, Phone\_Number, Email, *Postal\_Code*, Address)

FK *Warehouese\_Manager\_Id* -> EMPLOYEE

FK *Postal\_Code* -> POSTAL\_ ADDRESS

INVENTORY(**Inventory\_Id**, *Warehouse\_Id*, *Product\_Id*, *Department\_Id*, Shelves\_Number Quantity, DiscountAmount)

FK *Warehouse\_Id* -> WAREHOUSE

FK *Product\_Id* -> PRODUCT

FK *Department\_Id* -> DEPARTMENT

DEPARTMENT(**Department\_Id**, Name)

COMPANY(**Company\_Id**, Name, Phone\_Number, Email, *Postal\_Code*, Address)

FK *Postal\_Code* -> POSTAL\_ ADDRESS

POSTAL\_ADDRESS(**Postal\_Id**, Postal\_Code, City, State, Country)

EMPLOYEE(**Employee\_Id**, First\_Name, Middle\_Name, Last\_Name, DOB, Gender, Mobile\_Number, Email, Hire\_Date, *Postal\_Code*, Address, *Manager\_Id*, *Department\_Id, Warehouse\_Id*)

FK *Postal\_Code* -> POSTAL\_ ADDRESS

FK *Department\_Id* -> DEPARTMENT

FK *Manager\_Id* -> EMPLOYEE

FK *Warehouse\_Id* -> WAREHOUSE

CUSTOMERS(**Customer\_Id**, First\_Name, Last\_Name, DOB, Gender, Mobile\_Number, Email, Username, Password, Billing\_Address)

ORDER(**Order\_Id**, *Customer\_Id*, Order\_Date, Order\_Status, Shipping\_Address, Payment\_Method, Shipping\_Cost, Shipping\_Method, Delivery\_Date, Tracking\_Number, Order\_Notes)

FK *Customer\_Id* -> CUSTOMER

ORDER\_ITEMS(**OrderItem\_Id**, *Order\_Id*, *Product\_Id,* Quantity, Discount)

FK *Order\_Id* -> ORDER

FK *Product\_Id* -> PRODUCT

CATEGORY(**Category\_Id**, Name)

## Business Rules

Business rules for Oasis Hardware Company can help establish guidelines and standards for various aspects of your business operations. Here are some business rules of Oasis Hardware Company:

* A company has different types of products with different attributes.
* Company can have one or many warehouses.
* Products are kept in a warehouse for sale. Some products might not be available for sale.
* The company has a few employees. Each employee, except the CEO, is supervised by one manager.
* All managers are employees, but all employees are not managers.
* Each manager may supervise many employees.
* A manager may not have any employees reporting to him/her.
* Products are categorized into different categories.
* Some departments might only be categorized in the warehouse to store or display products.
* Each employee should work for at least one department.
* Customer should make one or more orders.
* Customer can make the same Orders once or many times.
* Customer can place an order for the same product or a different one.
* Quantity for an order should be one at least.
* Each employee should work for one warehouse. There should be a manager at warehouse.
* Each warehouse may have one or many employees to work for.

# **Part 4 – Constraint Testing**

## Employee Table

A white rectangular object with red text

Description automatically generated

Figure Checking Primary Key Constraint for Employee\_Id

A screenshot of a computer

Description automatically generated

Figure Checking DataType Constraint for Middle\_Name

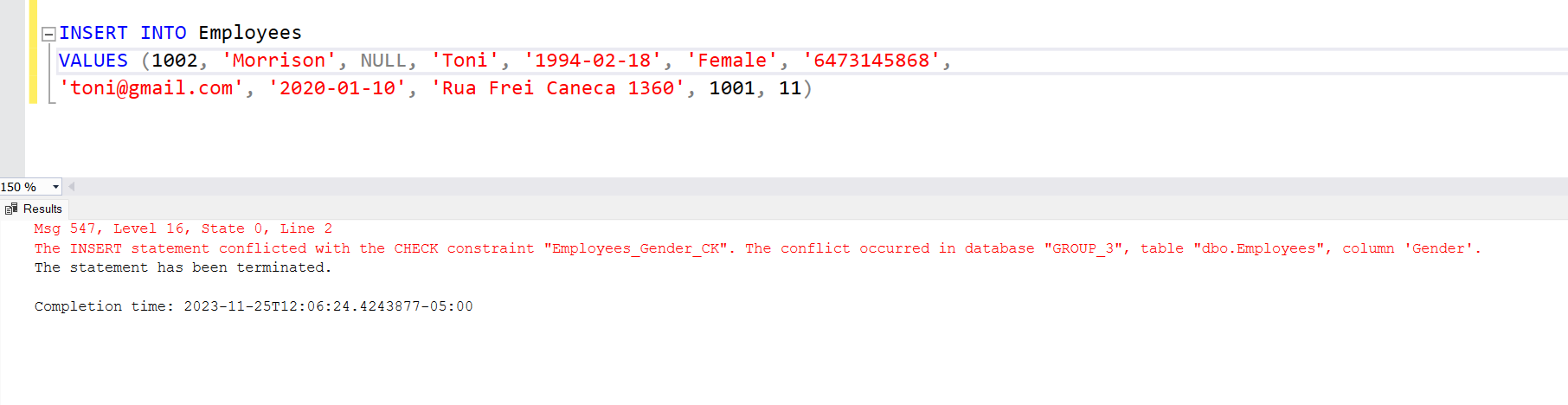


Figure Checking Check Constraint for Gender

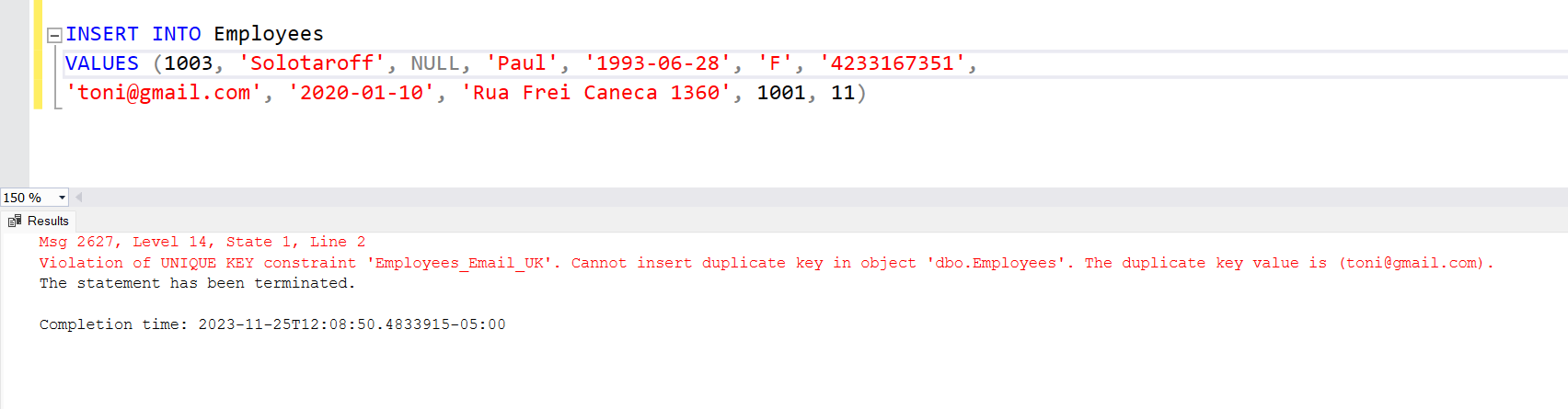


Figure Checking Unique Key Constraint for Email

A screenshot of a computer

Description automatically generated

Figure Checking Foreign Key Constraint for Manager\_Id

A screenshot of a computer

Description automatically generated

Figure Checking Foreign Key Constraint for Warehouse

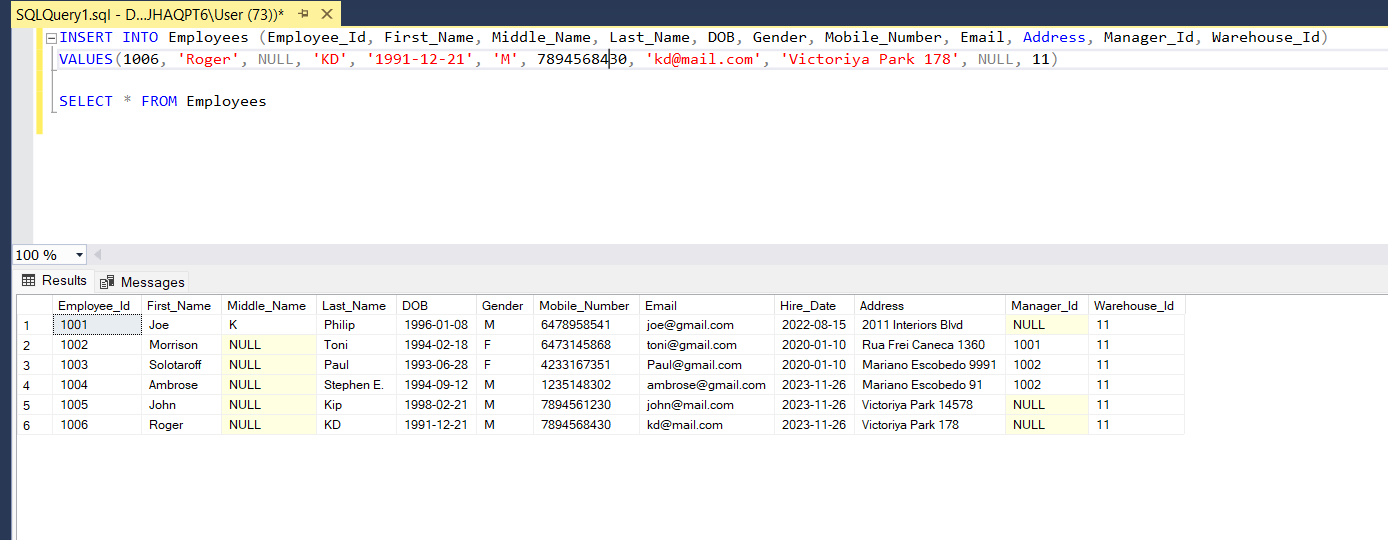


Figure Checking Default Constraint for Hire\_Date

## Product Table

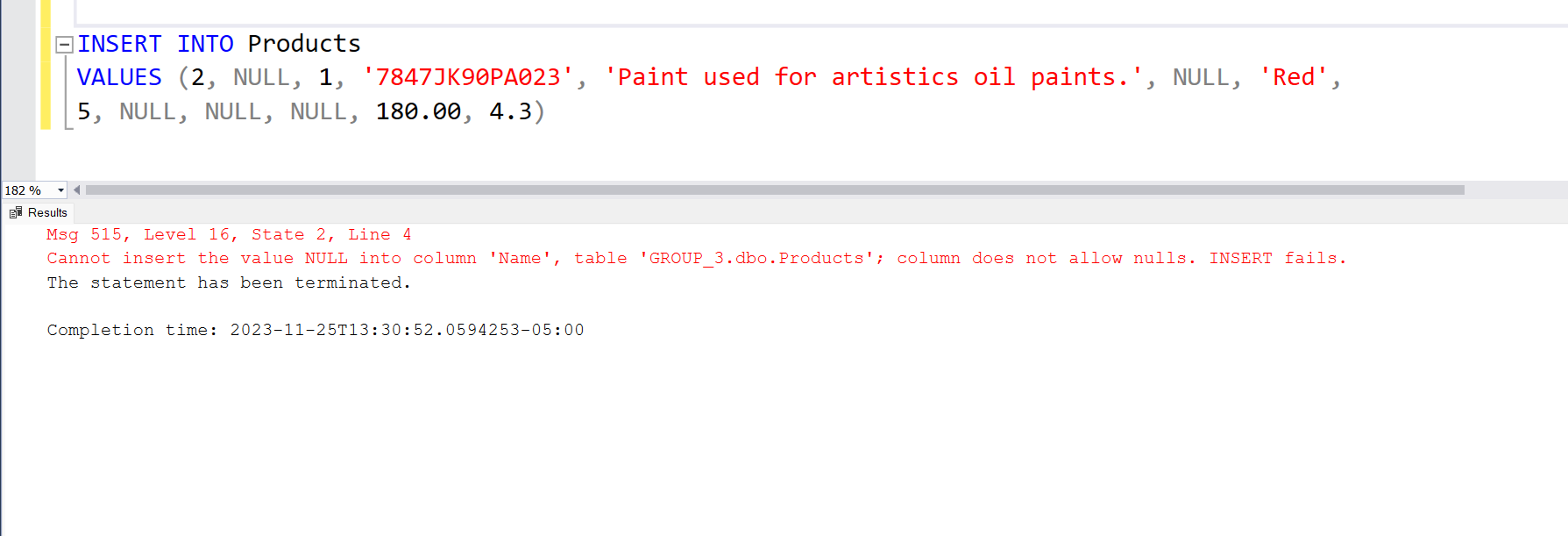


Figure Checking Not Null Constraint – Product

A screenshot of a computer

Description automatically generated

Figure Checking Foreign Key Constraint - Product



Figure Checking Unique Key Constraint – Product

## Customer Table

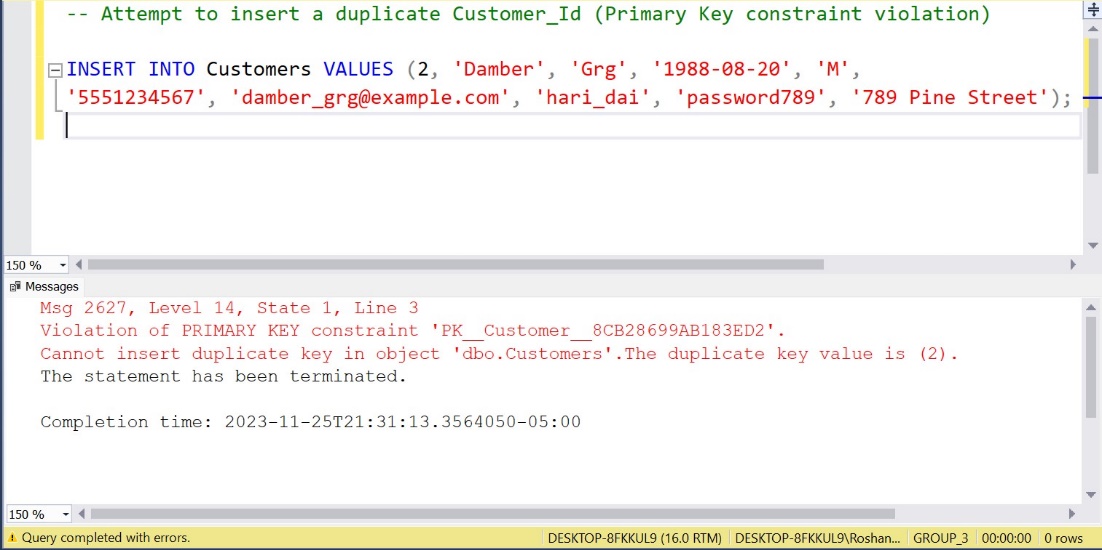


Figure Checking Primary Key Constraint

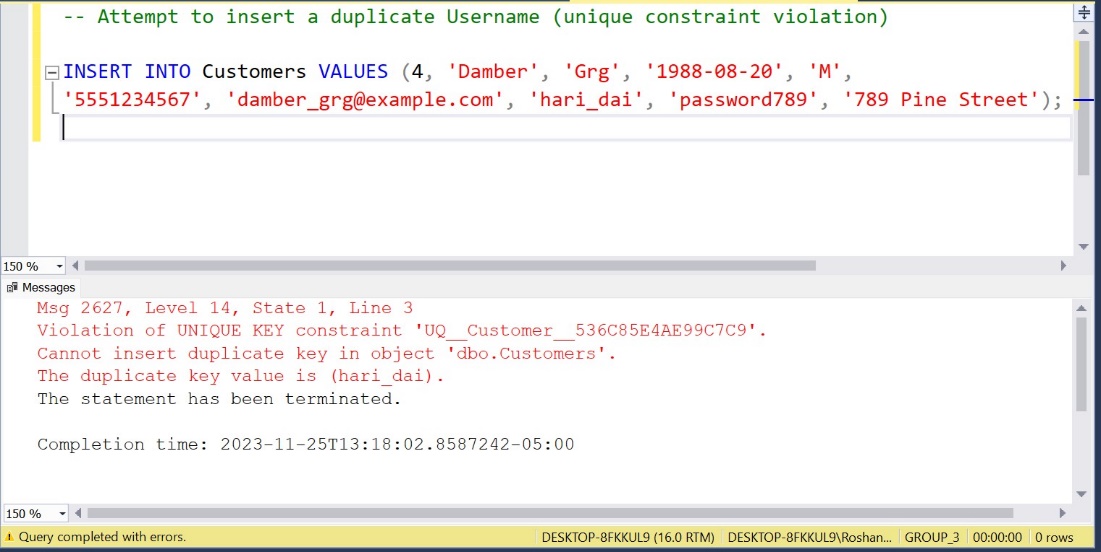


Figure Checking Unique Key Constraint for Username

A screenshot of a computer

Description automatically generated

Figure Checking Unique Key Constraint for Email

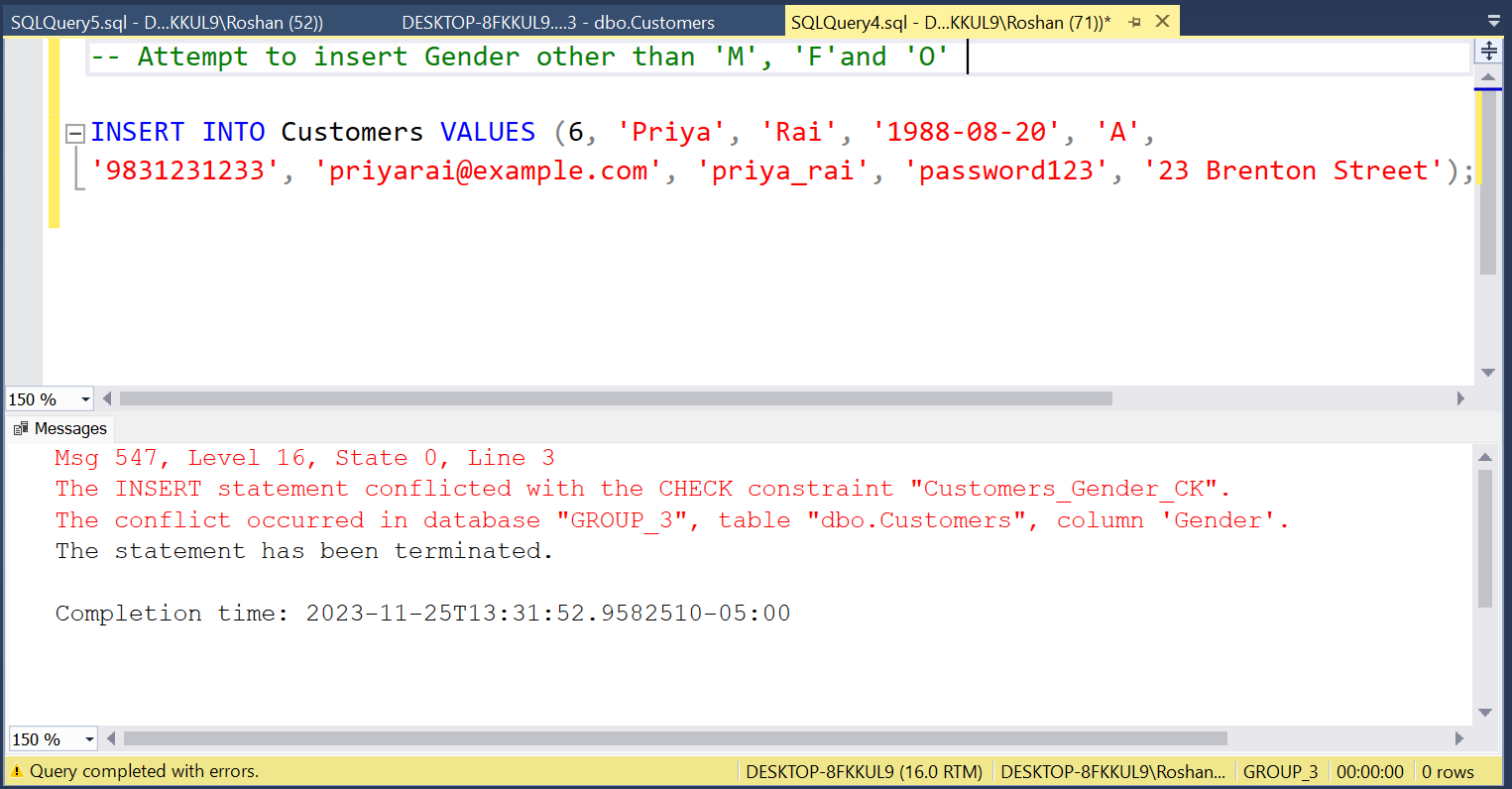


Figure Checking Gender Constraint

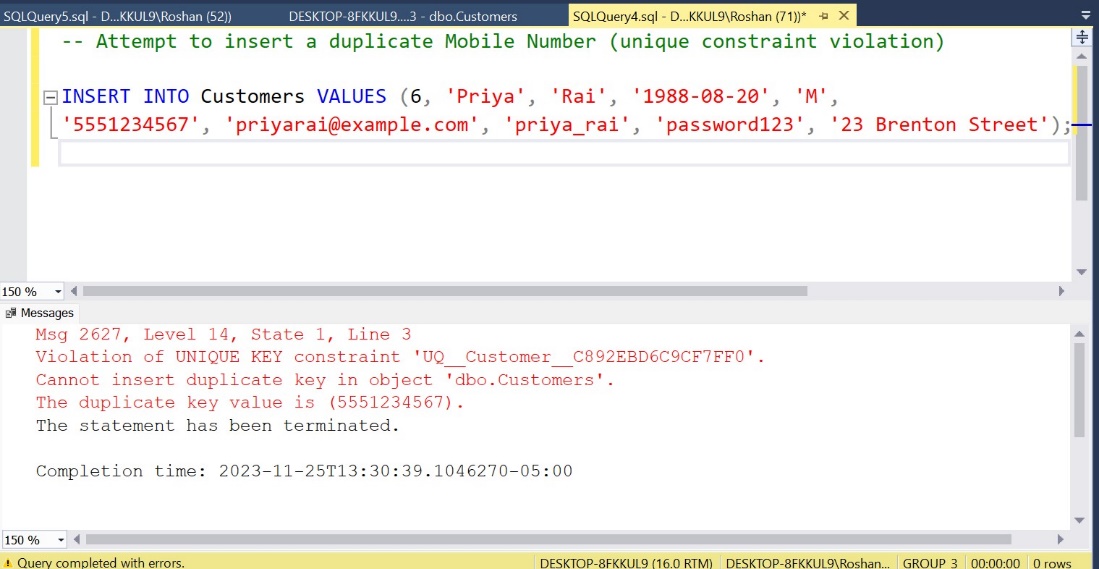


Figure Checking Unique Key Constraint for Mobile\_Number

## Order Table

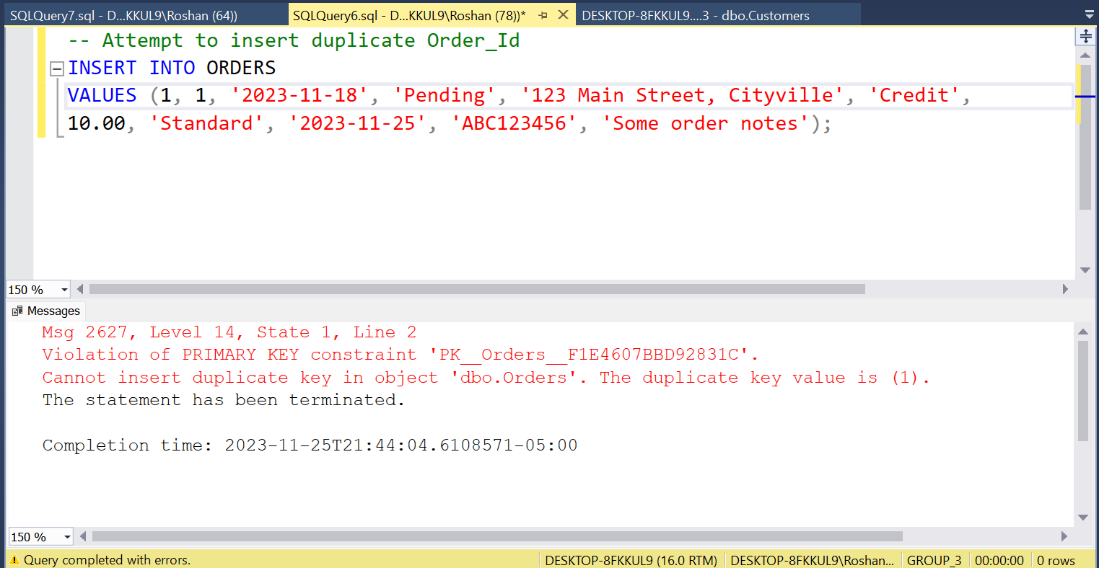


Figure Checking Primary Key Constraint for Order\_Id

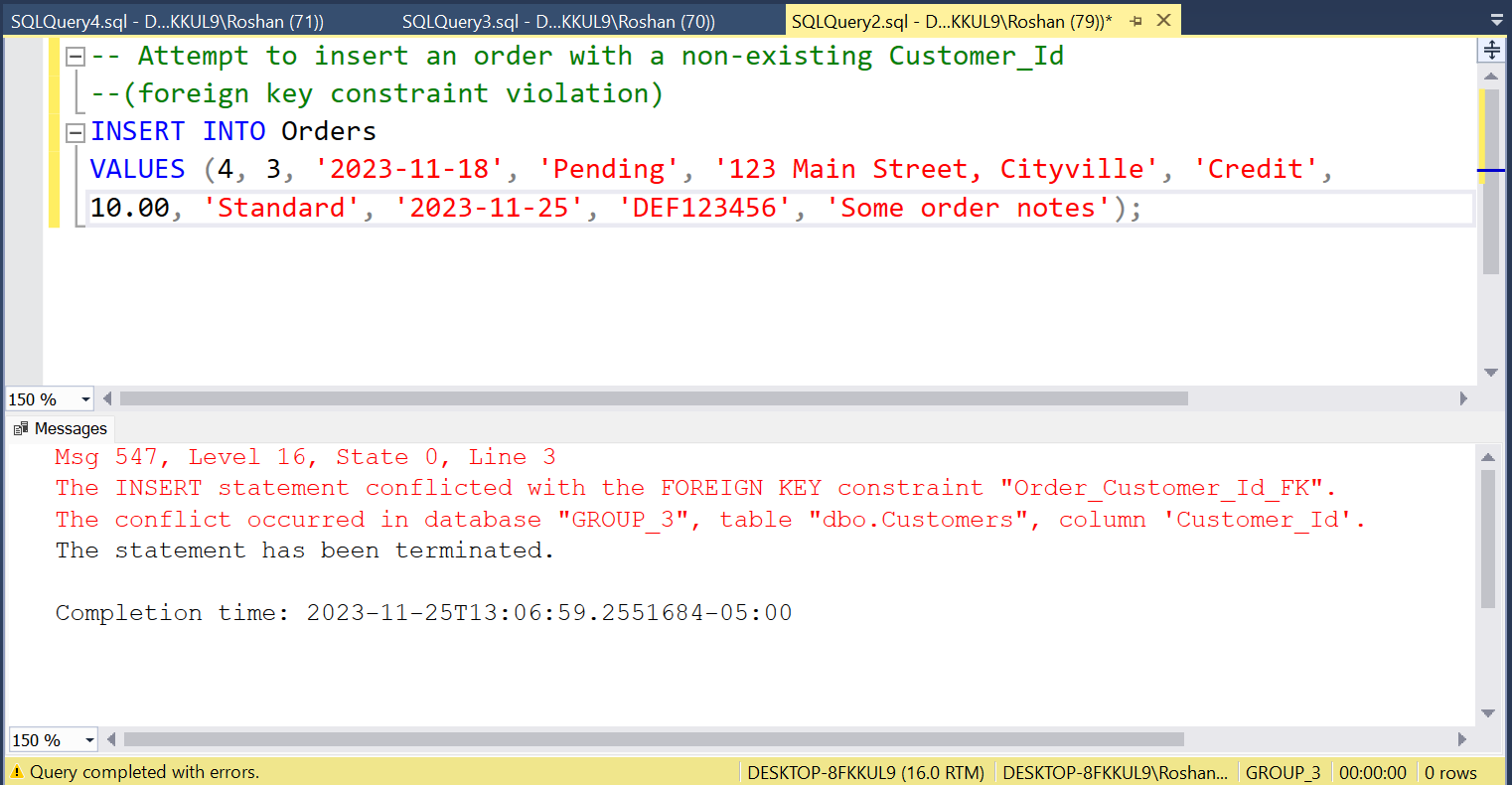


Figure Checking Foreign Key Constraint for Customer\_Id

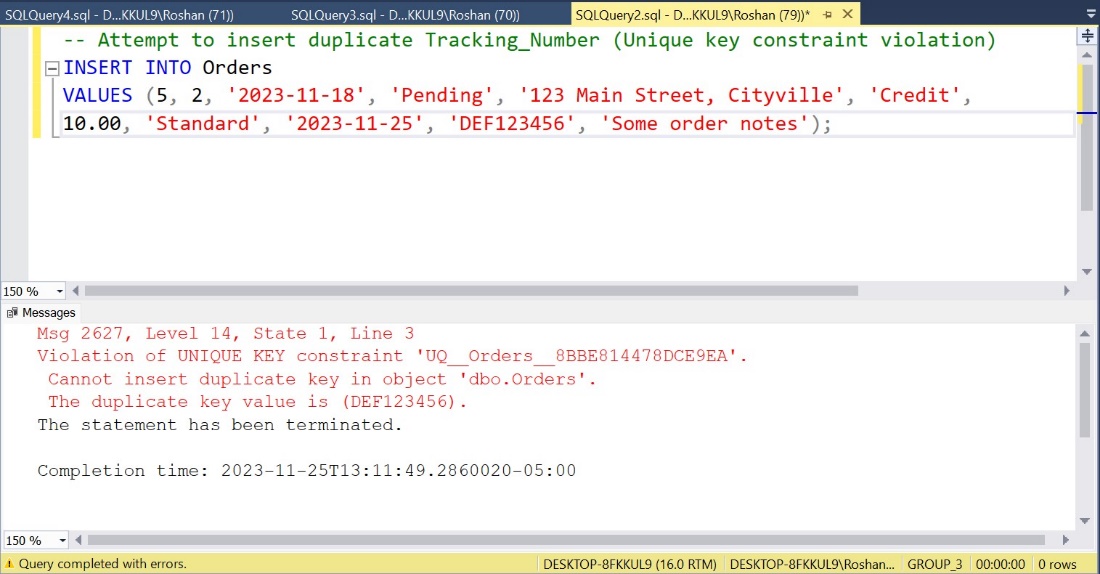


Figure Checking Unique Key Constraint for Tracking\_Number

## Order\_Items Table

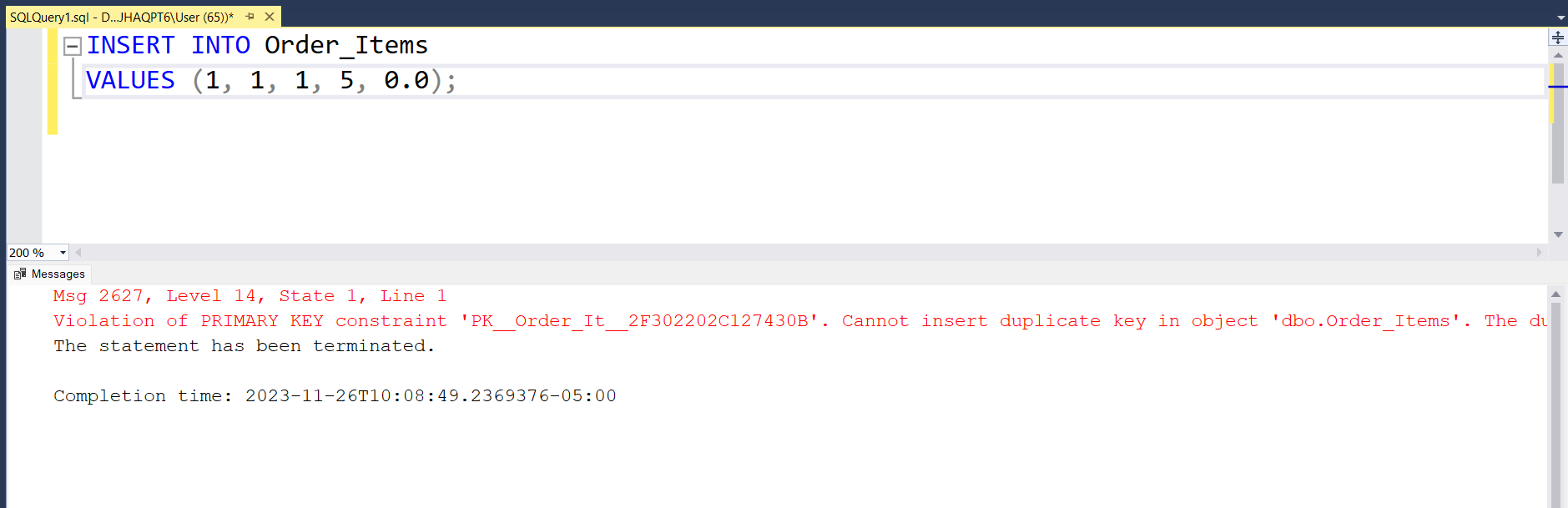


Figure Checking Primary Key Constraint

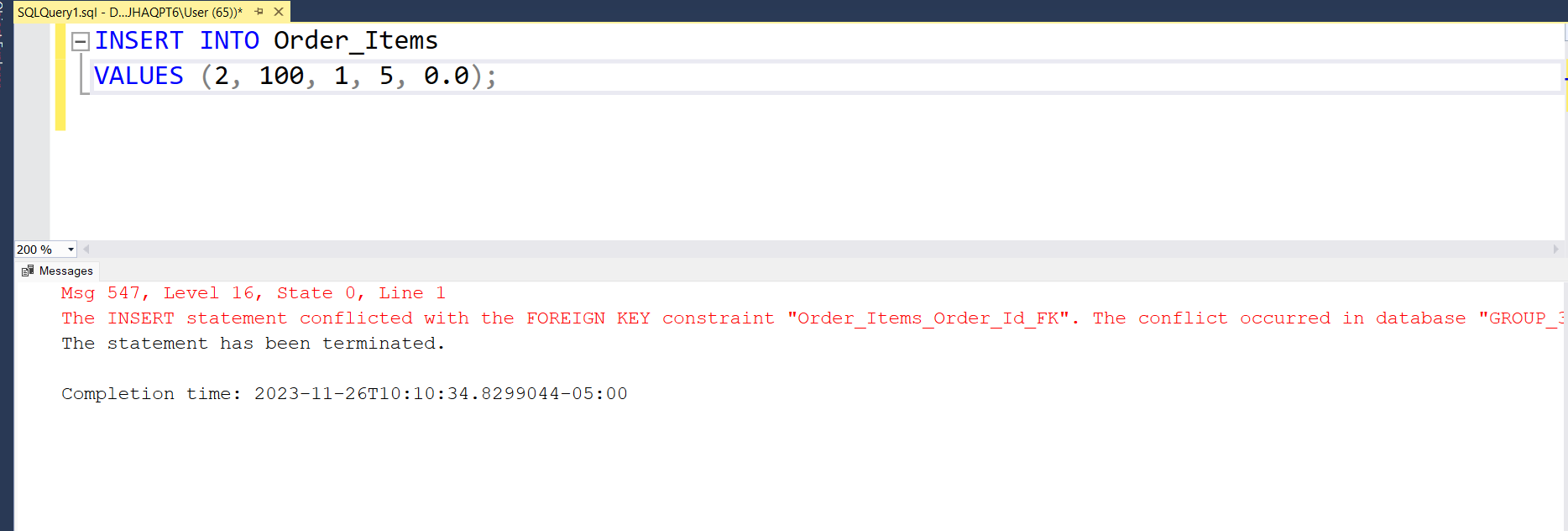


Figure Checking Foreign Key Constraint for Order\_Id

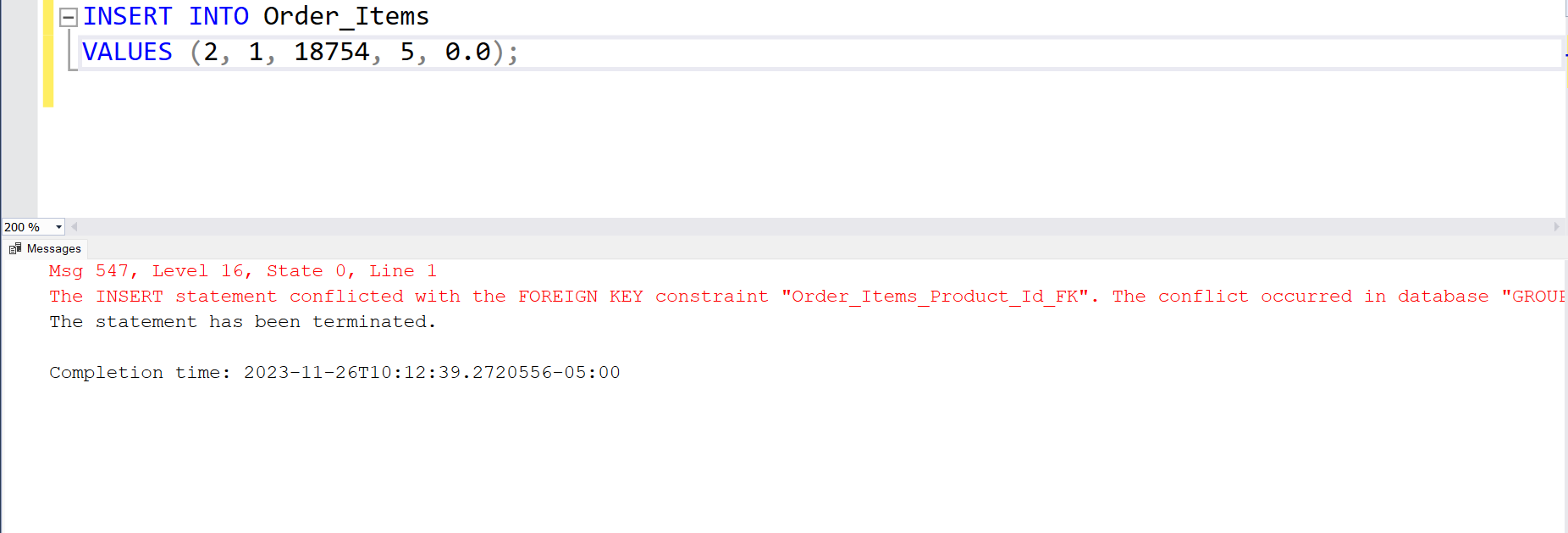


Figure Checking Foreign Key Constraint for Product\_Id

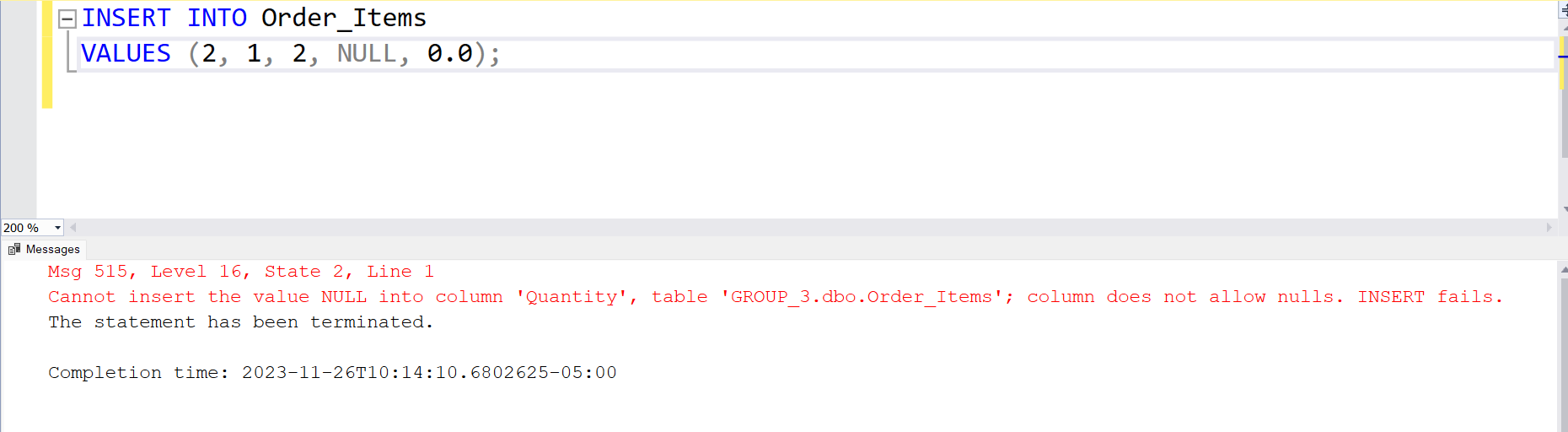


Figure Checking Not Null Constraint for Quantity

A screenshot of a computer

Description automatically generated

Figure Checking Not Null Constraint for Discount

## Company Table



Figure Checking Primary Key Constraint for Company\_Id

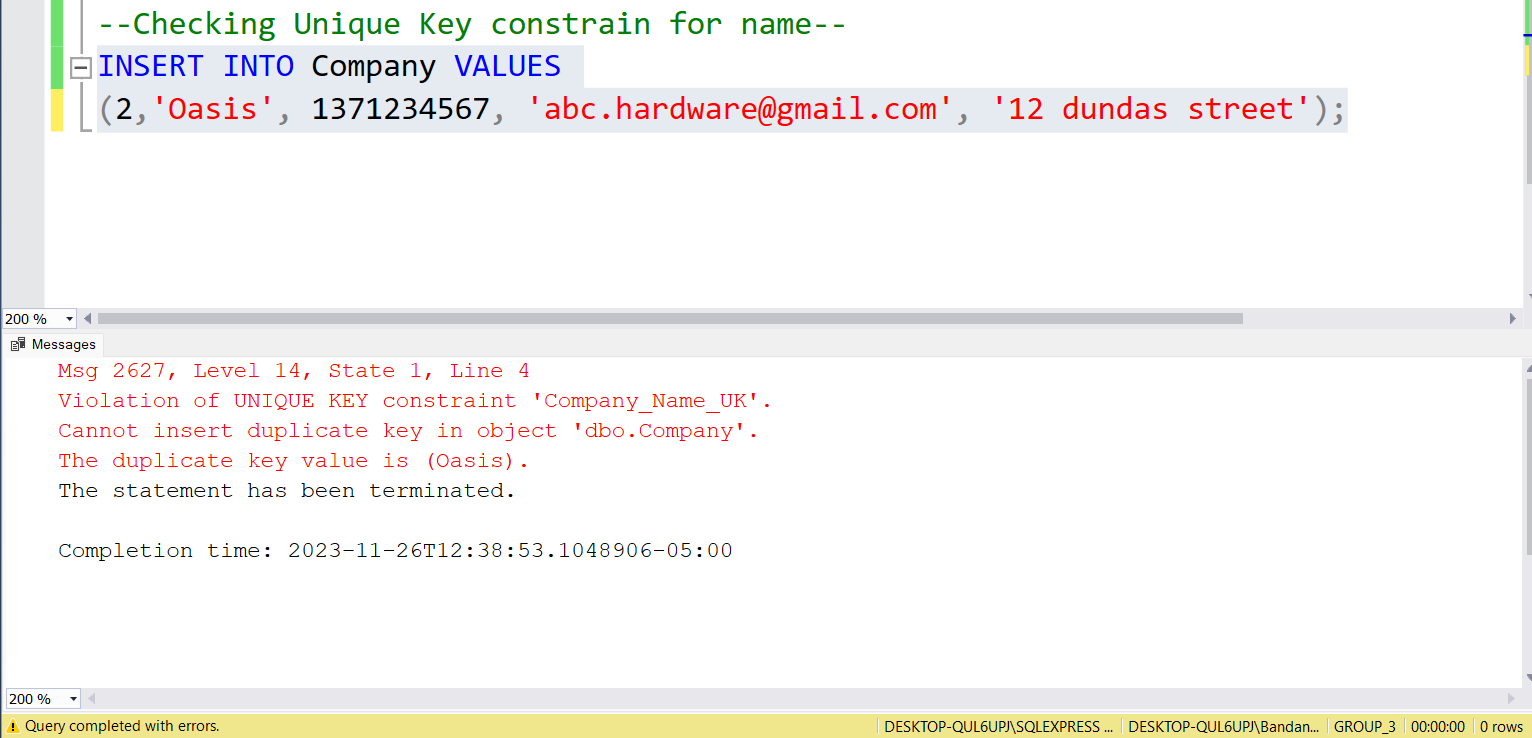


Figure Checking Unique Key Constraint for Name

A screenshot of a computer

Description automatically generated

Figure Checking Unique Key Constraint for Phone\_Number

A screenshot of a computer

Description automatically generated

Figure Checking Unique Key Constraint for Email

## Warehouse Table

A screenshot of a computer

Description automatically generated

Figure Checking Primary Key Constraint for Warehouse\_Id

A screenshot of a computer

Description automatically generated

Figure Checking Foreign Key Constraint for Warehouse\_Manager\_Id

A screenshot of a computer

Description automatically generated

Figure Checking Unique Key Constraint for Email

## Category Table

A screenshot of a computer

Description automatically generated

Figure Checking Primary Key Constraint for Category\_Id

A screenshot of a computer

Description automatically generated

Figure Checking Unique Key Constraint for Name

## Inventory Table

A screenshot of a computer

Description automatically generated

Figure Checking Primary Key Constraint for Inventory\_Id

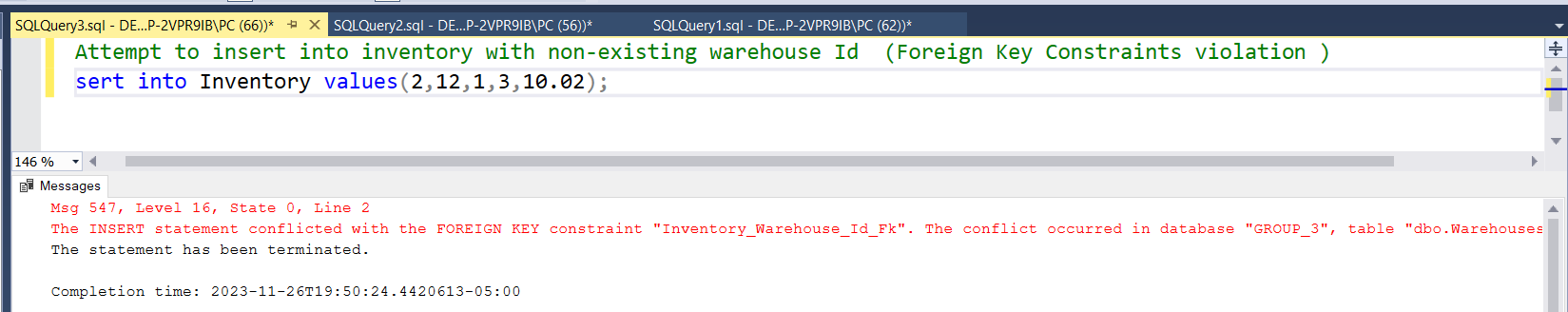


Figure Checking Foreign Key Constraint for Warehouse\_Id

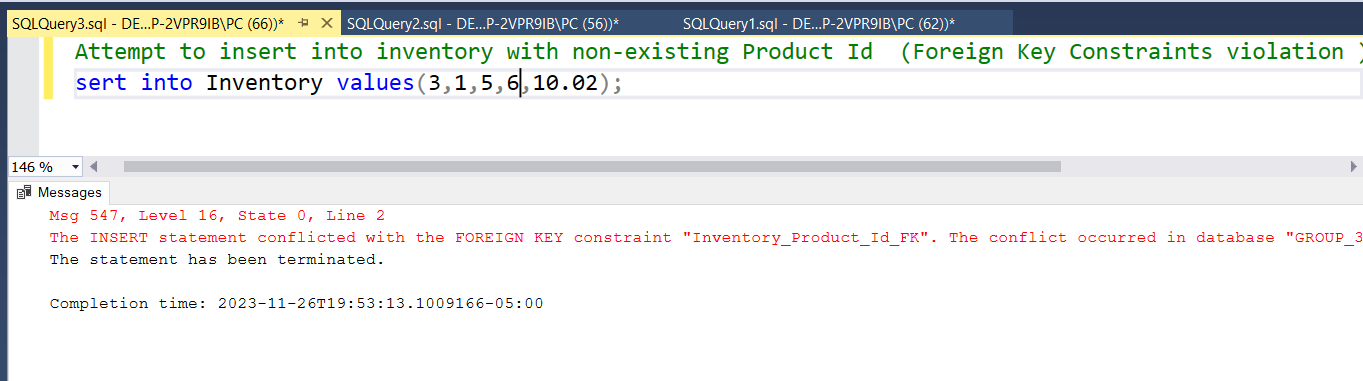


Figure Checking Foreign Key Constraint for Product\_Id

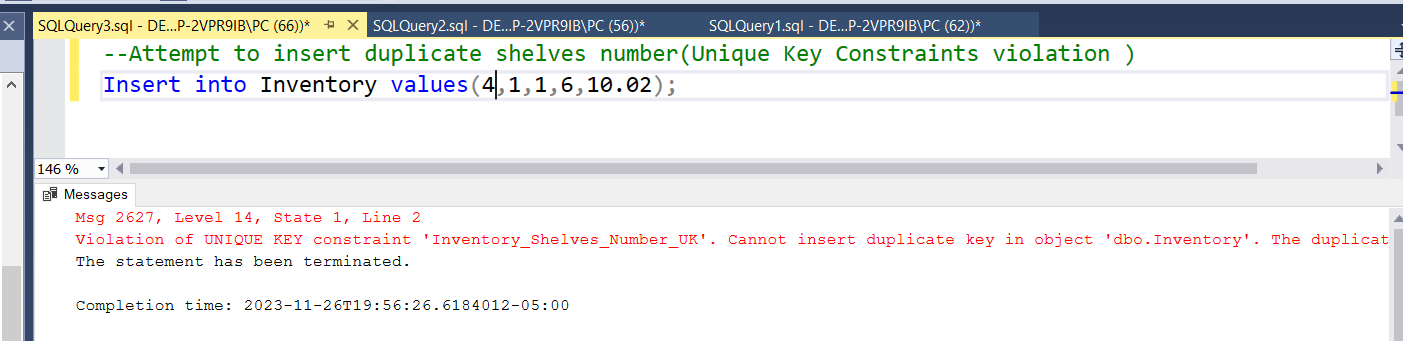


Figure Checking Unique Key Constraint for Shelves\_Number