

## Part 5:

### Data Model Documentation for NoSQL (MongoDB) E-commerce database

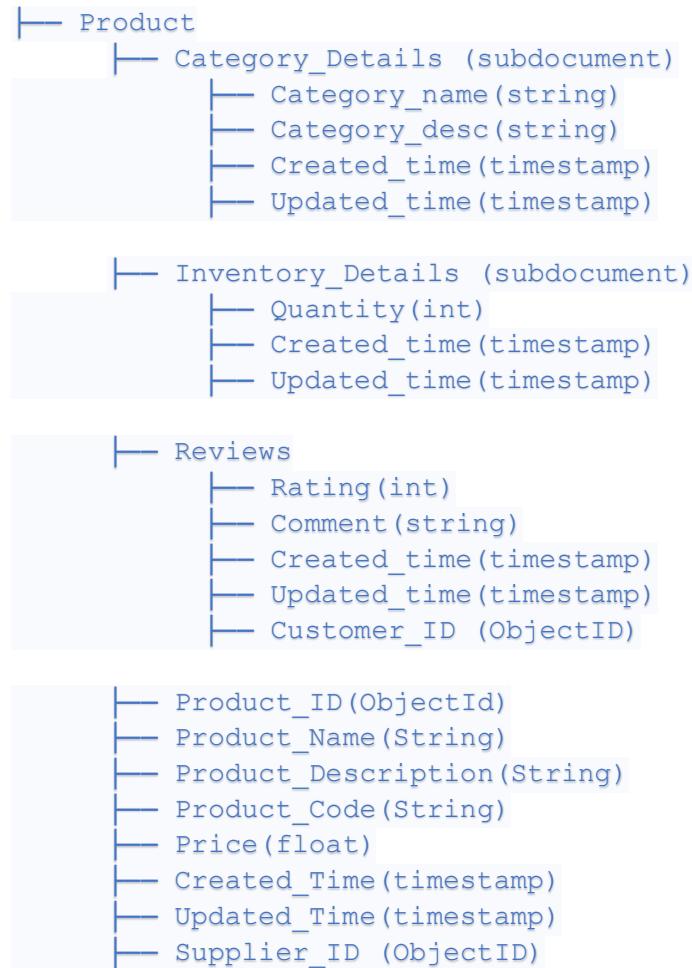
- **Document Title:** Data Model Documentation for E-commerce Distributed database system
- **Description:** This document describes the data model for a E-commerce database using MongoDB(NoSql) as the database management system.

#### 1. Introduction

The e-commerce data model is designed to support and streamline the operations of an online retail platform. It acts as the backbone for storing, organizing, and retrieving critical information related to products, customers, orders, and more. The primary objectives and context of the data model are Product Management, Inventory Control, Order Processing, Customer Engagement, Customer Feedback, Transaction Tracking.

#### Data model:

##### Collections



## Customers

```
  └── Contact_Details (subdocument)
      ├── Email(string)
      ├── Mobile_Num(string)
      └── Website(string)
  └── Customer_ID (ObjectId)
  └── First_Name (string)
  └── Last_Name (string)
  └── Created_Time (timestamp)
  └── Updated_Time (timestamp)
  └── Address_IDs (array of subdocuments)
```

## Orders

```
  └── Transaction_Details (subdocument)
      ├── Amount (float)
      ├── Status (string)
      ├── Type (string)
      ├── Created_Time (Timestamp)
      └── Updated_Time (Timestamp)
  └── Details (subdocument)
      ├── Product_ID (int)
      └── Quantity (int)
  └── Delivery (subdocument)
      ├── Type (string)
      ├── Status (string)
      ├── Address_ID (int)
      ├── Created_Time (Timestamp)
      └── Updated_Time (Timestamp)
  └── OrderID (ObjectId)
  └── Order_Date (Timestamp)
  └── Delivery_ID (ObjectId)
  └── Customer_ID (ObjectId)
```

## Suppliers

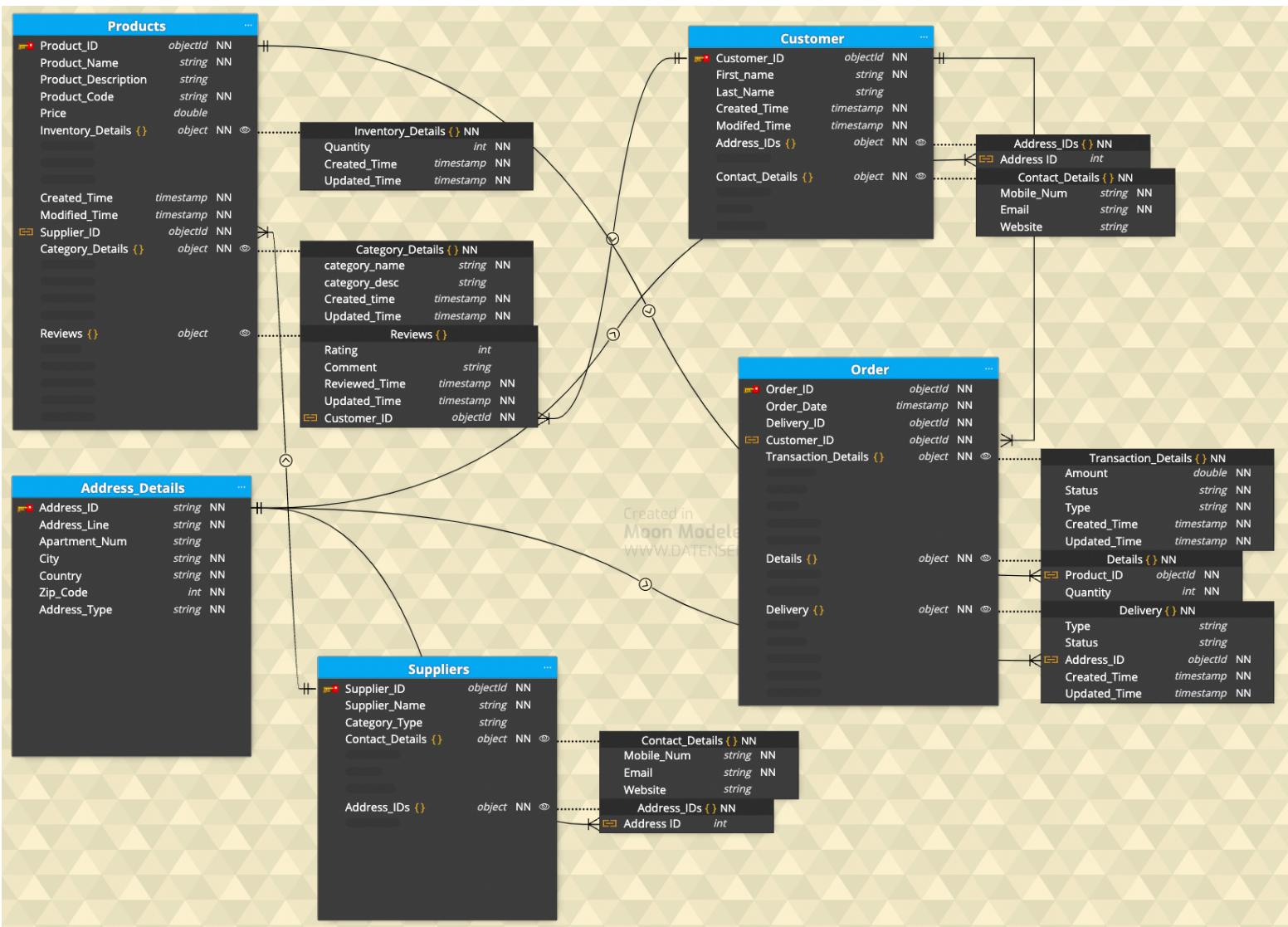
```
  └── Contact_Details (subdocument)
      ├── Email(string)
      ├── Mobile_Num(string)
      └── Website(string)
  └── Supplier_ID (ObjectId)
  └── Supplier_Name (string)
  └── Category_type (string)
  └── Address_IDs (array of subdocuments)
```

## Address\_Details

```

    └── Address_ID (ObjectId)
    └── Line (string)
    └── Apartment_Num (int)
    └── City (string)
    └── Zip_Code (string)
    └── Country (string)
    └── Address_Type (string)

```



## Collections and Relationships:

### Products Collection:

- **Category\_Details** (subdocument): Contains category-related information for the product.
  - **Category\_name** (string): Name of the category to which the product belongs.
  - **Category\_desc** (string): Description of the category.
  - **Created\_time** (timestamp): Timestamp indicating when the category details were created.
  - **Updated\_time** (timestamp): Timestamp indicating when the category details were last updated.
- **Inventory\_Details** (subdocument): Contains information about the product's inventory.
  - **Quantity** (int): The quantity of the product available in inventory.
  - **Created\_time** (timestamp): Timestamp indicating when the inventory details were created.
  - **Updated\_time** (timestamp): Timestamp indicating when the inventory details were last updated.
- **Reviews** (array of subdocuments): Contains customer reviews for the product.
  - **Rating** (int): The rating given by the customer.
  - **Comment** (string): Customer's comment or review.
  - **Created\_time** (timestamp): Timestamp indicating when the review was created.
  - **Updated\_time** (timestamp): Timestamp indicating when the review was last updated.
  - **Customer\_ID** (ObjectID): Reference to the customer who provided the review
- **Product\_ID** (ObjectID): Unique identifier for the product.
- **Product\_Name** (string): Name of the product.
- **Product\_Description** (string): Description of the product.
- **Product\_Code** (string): Product code or identifier.
- **Price** (float): Price of the product.
- **Created\_Time** (timestamp): Timestamp indicating when the product was created.
- **Updated\_Time** (timestamp): Timestamp indicating when the product details were last updated.
- **Supplier\_ID** (ObjectID): Reference to the supplier who provides the product. - Database reference to Customer collection.

### Customers Collection:

- **Contact\_Details** (subdocument): Contains customer's contact information.
  - **Email** (string): Customer's email address.
  - **Mobile\_Num** (string): Customer's mobile phone number.
  - **Website** (string): Customer's website, if applicable.
- **Customer\_ID** (ObjectID): Unique identifier for the customer.
- **First\_Name** (string): Customer's first name.

- **Last\_Name** (string): Customer's last name.
- **Created\_Time** (timestamp): Timestamp indicating when the customer record was created.
- **Updated\_Time** (timestamp): Timestamp indicating when the customer record was last updated.
- **Address\_IDs** (array of subdocuments): References to address details for the customer.

### **Orders Collection:**

- **Transaction\_Details** (subdocument): Contains transaction-related information for the order.
  - **Amount** (float): Total amount for the order.
  - **Status** (string): Status of the transaction (e.g., "Completed," "Pending").
  - **Type** (string): Type of transaction (e.g., "Online Payment," "COD").
  - **Created\_Time** (timestamp): Timestamp indicating when the transaction details were created.
  - **Updated\_Time** (timestamp): Timestamp indicating when the transaction details were last updated.
- **Details** (array of subdocuments): Contains product details for the order.
  - **Product\_ID** (int): Identifier for the product included in the order.
  - **Quantity** (int): Quantity of the product in the order.
- **Delivery** (subdocument): Contains information about the delivery of the order.
  - **Type** (string): Type of delivery (e.g., "Standard," "Express").
  - **Status** (string): Delivery status (e.g., "Delivered," "Dispatched").
  - **Address\_ID** (int): Reference to the delivery address.
  - **Created\_Time** (timestamp): Timestamp indicating when the delivery details were created.
  - **Updated\_Time** (timestamp): Timestamp indicating when the delivery details were last updated.
- **OrderID** (ObjectID): Unique identifier for the order.
- **Order\_Date** (timestamp): Timestamp indicating the date and time when the order was placed.
- **Delivery\_ID** (ObjectID): Reference to the delivery details for the order.
- **Customer\_ID** (ObjectID): Reference to the customer who placed the order.

### **Suppliers Collection:**

- **Contact\_Details** (subdocument): Contains supplier's contact information.
  - **Email** (string): Supplier's email address.
  - **Mobile\_Num** (string): Supplier's mobile phone number.
  - **Website** (string): Supplier's website, if applicable.
- **Supplier\_ID** (ObjectID): Unique identifier for the supplier.
- **Supplier\_Name** (string): Name of the supplier.
- **Category\_type** (string): Category or type of products supplied by the supplier.
- **Address\_IDs** (array of subdocuments): References to address details for the supplier.

### **Address\_Details Collection:**

- **Address\_ID** (ObjectID): Unique identifier for the address details.

- **Line** (string): Street address line.
- **Apartment\_Num** (int): Apartment number, if applicable.
- **City** (string): City name.
- **Zip\_Code** (string): ZIP code.
- **Country** (string): Country name.
- **Address\_Type** (string): Type of address (e.g., "Home," "Work").

## Snapshots of our NoSQL DB:

### Read Operations:

```
/Users/priyadarshiniramakrishnan/Python_interpreter/bin/python /Users/priyadarshiniramakrishnan/Documents/DDS/DDS_Final_Project/script.py
-----Printing products above 500 dollars-----
[0: 'Wireless Mouse', 2: 'Android Smartphone', 3: 'Laptop', 4: 'Smartwatch', 6: 'Webcam', 7: 'Ergonomic Keyboard', 9: 'Gaming Monitor']

-----Printing orders of a given customer-----
[{'Product_ID': 4, 'Quantity': 4, 'Price': 1096.5332031471053}, {'Product_ID': 6, 'Quantity': 1, 'Price': 863.6406028580836}, {'Product_ID': 1, 'Quantity': 2, 'Price': 66.05124959416634}, {'Product_ID': 1, 'Quantity': 2, 'Price': 1204.624438595019}]

[{'Product_ID': 3, 'Quantity': 4, 'Price': 298.32040425997315}, {'Product_ID': 8, 'Quantity': 2, 'Price': 542.59430120574}, {'Product_ID': 5, 'Quantity': 2, 'Price': 390.9875810588146}, {'Product_ID': 3, 'Quantity': 3, 'Price': 187.37506601480783}]

[{'Product_ID': 1, 'Quantity': 5, 'Price': 625.0838971591139}]

[{'Product_ID': 7, 'Quantity': 1, 'Price': 1079.8861620887444}]
```

```
-----Printing average rating of products in an e-commerce website-----
{'_id': 'Laptop', 'average_rating': 3.5}
{'_id': 'Bluetooth Headphones', 'average_rating': 3.0}
{'_id': 'Smartwatch', 'average_rating': 4.0}
{'_id': 'Webcam', 'average_rating': 3.5}
{'_id': 'Ergonomic Keyboard', 'average_rating': 3.6666666666666665}
{'_id': 'Android Smartphone', 'average_rating': 4.0}
{'_id': 'Wireless Mouse', 'average_rating': 3.4}
{'_id': 'USB-C Charging Cable', 'average_rating': 2.6666666666666665}
{'_id': 'Gaming Monitor', 'average_rating': 3.8}
{'_id': 'External Hard Drive', 'average_rating': 3.5}
#####
```

### Update Operations:

```
Status of order before update:
[{'_id': ObjectId('655eaf479105f3fd888fb08'), 'Order_ID': 3, 'Order_Date': datetime.datetime(2023, 11, 22, 18, 47, 51, 162000), 'Delivery_ID': 3, 'Customer_ID': 9, 'Transaction_Details': {'Amount': 135.1533326260518, 'Status': 'Completed', 'Type': 'Online Payment', 'Created_Time': datetime.datetime(2023, 11, 22, 18, 47, 51, 162000), 'Updated_Time': datetime.datetime(2023, 11, 22, 18, 47, 51, 162000)}, 'Details': [{'Product_ID': 8, 'Quantity': 3, 'Price': 814.3008158289301}, {'Product_ID': 4, 'Quantity': 1, 'Price': 1349.4598397743027}, {'Product_ID': 9, 'Quantity': 3, 'Price': 414.1240899505919}], 'Delivery': {'Type': 'Standard', 'Status': 'Dispatched', 'Address_ID': 7, 'Created_Time': datetime.datetime(2023, 11, 22, 18, 47, 51, 162000), 'Updated_Time': datetime.datetime(2023, 11, 22, 18, 47, 51, 162000)}}

Status of order after update:
[{'_id': ObjectId('655eaf479105f3fd888fb08'), 'Order_ID': 3, 'Order_Date': datetime.datetime(2023, 11, 22, 18, 47, 51, 162000), 'Delivery_ID': 3, 'Customer_ID': 9, 'Transaction_Details': {'Amount': 135.1533326260518, 'Status': 'Completed', 'Type': 'Online Payment', 'Created_Time': datetime.datetime(2023, 11, 22, 18, 47, 51, 162000), 'Updated_Time': datetime.datetime(2023, 11, 22, 18, 47, 51, 202000)}, 'Details': [{'Product_ID': 8, 'Quantity': 3, 'Price': 814.3008158289301}, {'Product_ID': 4, 'Quantity': 1, 'Price': 1349.4598397743027}, {'Product_ID': 9, 'Quantity': 3, 'Price': 414.1240899505919}], 'Delivery': {'Type': 'Standard', 'Status': 'Dispatched', 'Address_ID': 7, 'Created_Time': datetime.datetime(2023, 11, 22, 18, 47, 51, 162000), 'Updated_Time': datetime.datetime(2023, 11, 22, 18, 47, 51, 162000)}}]
```

```

Price details before update:
[{"_id": ObjectId('655eaf479105f3fd888fbaf4'), "Product_ID": 3, "Product_Name": "Laptop", "Product_Description": "Laptop with high performance", "Product_Code": "L", "Price": 902.9955917008782, "Inventory_Details": {"Quantity": 53, "Created_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 120000), "Updated_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 120000)}, "Created_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 120000), "Modified_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 120000), "Supplier_ID": 8, "Category_Details": {"Category_ID": 4, "Category_desc": "Wearables", "Created_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 120000), "Updated_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 120000)}, "Reviews": [{"Rating": 2, "Comment": "Great Laptop! Totally worth the price."}, {"Rating": 5, "Comment": "Great Laptop! Totally worth the price."}], "Customer_ID": 4, "Updated_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 120000), "Review_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 120000), "Updated_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 120000), "Customer_ID": 9}]]}

Price details after update:
[{"_id": ObjectId('655eaf479105f3fd888fbaf4'), "Product_ID": 3, "Product_Name": "Laptop", "Product_Description": "Laptop with high performance", "Product_Code": "L", "Price": 3000, "Inventory_Details": {"Quantity": 53, "Created_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 120000), "Updated_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 120000)}, "Created_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 120000), "Modified_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 120000), "Supplier_ID": 8, "Category_Details": {"Category_ID": 4, "Category_desc": "Wearables", "Created_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 120000), "Updated_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 120000)}, "Reviews": [{"Rating": 2, "Comment": "Great Laptop! Totally worth the price."}, {"Rating": 5, "Comment": "Great Laptop! Totally worth the price."}], "Customer_ID": 4, "Updated_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 120000), "Review_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 120000), "Updated_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 120000), "Customer_ID": 9}]]]

Before updating customer details:
[{"_id": ObjectId('655eaf479105f3fd888fbafe'), "Customer_ID": 3, "First_Name": "Laura", "Last_Name": "Williams", "Created_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 151000), "Modified_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 151000), "Address_IDs": [7], "Contact_Details": {"Email": "customer3@example.com", "Mobile_Num": "123-456-7893", "Website": "http://techsupplies.com"}]]]

After updating customer details:
[{"_id": ObjectId('655eaf479105f3fd888fbafe'), "Customer_ID": 3, "First_Name": "Laura", "Last_Name": "Williams", "Created_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 151000), "Modified_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 199000), "Address_IDs": [7], "Contact_Details": {"Email": "mynewemail@gmail.com", "Mobile_Num": "987-654-3210", "Website": "http://mywebsite.com"}]]]

```

## Delete Operations:

```

#####
Delete Operation#####

Before deletion:
{"_id": ObjectId('655eaf479105f3fd888fb02'), "Customer_ID": 7, "First_Name": "John", "Last_Name": "Garcia", "Created_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 155000), "Modified_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 155000), "Address_IDs": [6], "Contact_Details": {"Email": "customer7@example.com", "Mobile_Num": "123-456-7897", "Website": "http://devicemarket.com"}}

Order of the customer:
{"_id": ObjectId('655eaf479105f3fd888fbb06'), "Order_ID": 1, "Order_Date": datetime.datetime(2023, 11, 22, 18, 47, 51, 159000), "Delivery_ID": 1, "Customer_ID": ObjectId('655eaf479105f3fd888fb02'), "Transaction_Details": {"Amount": 866.805902609781, "Status": "Completed", "Type": "Online Payment", "Created_Time": datetime.datetime(2023, 11, 22, 18, 47, 159000), "Updated_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 159000)}, "Details": [{"Product_ID": 4, "Quantity": 4, "Price": 1096.5332031471053}, {"Product_ID": 6, "Quantity": 1, "Price": 863.6406028580836}, {"Product_ID": 1, "Quantity": 2, "Price": 66.05124959416634}, {"Product_ID": 1, "Quantity": 2, "Price": 1204.624438595019}], "Delivery": {"Type": "Standard", "Status": "Cancelled", "Address_ID": 4, "Created_Time": datetime.datetime(2023, 11, 22, 18, 47, 159000), "Updated_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 159000)}}

Deleted Customer:
None

Deleted Order:
None

```

```

Before deleting Product:
{"_id": ObjectId('655eaf479105f3fd888fbaf3'), "Product_ID": 2, "Product_Name": "Android Smartphone", "Product_Description": "Android Smartphone with high performance", "Product_Code": "SP", "Price": 1083.0943879146084, "Inventory_Details": {"Quantity": 92, "Created_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 119000), "Updated_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 119000)}, "Created_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 119000), "Modified_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 119000), "Supplier_ID": 2, "Category_Details": {"Category_ID": 5, "Category_desc": "Wearables", "Created_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 119000), "Updated_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 119000)}, "Reviews": [{"Rating": 3, "Comment": "Great Android Smartphone! Totally worth the price."}, {"Rating": 5, "Comment": "Great Android Smartphone! Totally worth the price."}], "Customer_ID": 2, "Updated_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 119000), "Review_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 119000), "Updated_Time": datetime.datetime(2023, 11, 22, 18, 47, 51, 119000), "Customer_ID": 4}]]}

Deleted Product:
None

Process finished with exit code 0

```