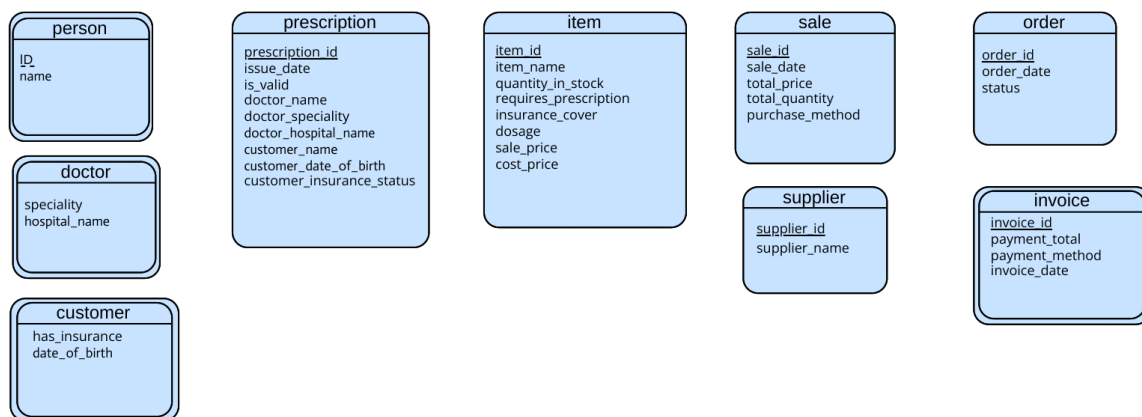


## A) Aim of the Database

The aim of the database is to provide a comprehensive, integrated, and reliable data management system that supports all aspects of the pharmacy's operations—from inventory and supplier management to prescriptions, sales, invoicing, and insurance claims—ensuring accuracy, efficiency, and streamlined workflows.

## B) Entity Sets and Attributes



## C) Relationship Sets and Attributes

1. `writes(doctorID, prescriptionID)`:  
*Relationship between Doctor and Prescription.*
  - One-to-many relationship.
  - A doctor can write multiple prescriptions.
  - Each prescription is written by exactly one doctor.
2. `uses(customerID, prescriptionID)`:  
*Relationship between Customer and Prescription.*
  - One-to-many relationship.
  - A customer can have multiple prescriptions over time.
  - Each prescription is associated with exactly one customer.
  - All registered customers have a prescription.
3. `billed_for(customerID, saleID)`:  
*Relationship between Customer and Sale.*

- One-to-many relationship.
  - Each sale is billed to exactly one customer.
  - A customer can have multiple sales billed to them over time.
4. `sale_item(saleID, itemID)`:  
*Relationship between Sale and Item.*
- Many-to-many relationship.
  - A single sale can include multiple items.
  - Each item can appear in multiple sales.
  - Attributes (e.g., quantity sold) are associated with this relationship.
5. `prescription_item(prescriptionID, itemID)`:  
*Relationship between Prescription and Item.*
- Many-to-many relationship.
  - A prescription can list one or more items.
  - An item can appear in many prescriptions.
6. `order_placed_to(orderID, supplierID)`:  
*Relationship between Order and Supplier.*
- One-to-many relationship.
  - Each order is placed with exactly one supplier.
  - A supplier can receive many orders from the pharmacy.
7. `order_item(orderID, itemID)`:  
*Relationship between Order and Item.*
- Many-to-many relationship.
  - An order can include multiple different items.
  - An item can appear in multiple orders.
  - This relationship will contain attributes like `ordered_quantity`.
8. `order_invoice(orderID, invoiceID)`:  
*Relationship between Order and Invoice.*
- One-to-one relationship.
  - Each invoice is linked to one order, and each order is associated with one invoice for payment.
  - Reflects the link between what was ordered and the billing document that records that order's fulfillment and cost.
9. `ISA(person → doctor, person → customer)`:  
*Is-a relationship for specialization.*

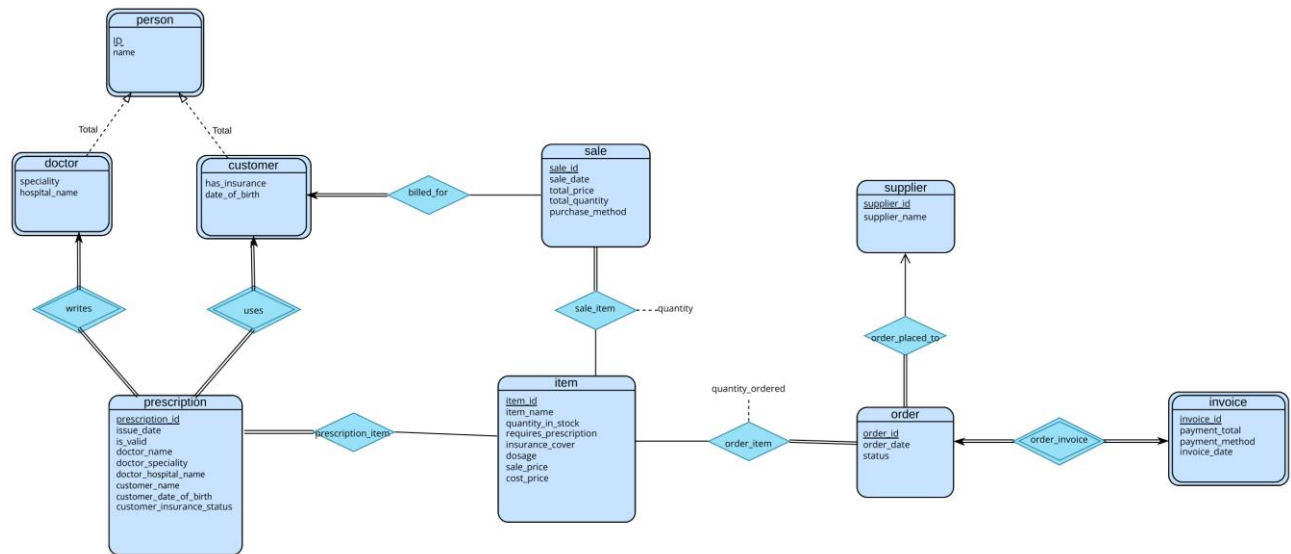
- Person is a general entity. Doctor and Customer are specialized entities that inherit attributes from Person.
- Every Doctor or Customer is a specialized form of a Person. This indicates a total specialization if all Persons in the database are either Doctors or Customers.
- The top of the hierarchy (Person) passes down attributes to its subclasses (Doctor, Customer).

#### D) Relational Schema

- person(id, name)
- doctor(id, speciality, hospital\_name)
- customer(id, hasInsurance, date\_of\_birth)
- item(item\_id, item\_name, quantity\_in\_stock, require\_prescription, insurance\_cover, dosage, sale\_price, cost\_price)
- prescription(prescription\_id, issue\_date, doctor\_id, doctor\_name, doctor\_speciality, doctor\_hospital\_name, customer\_id, customer\_name, customer\_date\_of\_birth, customer\_insurance\_status, isValid, doctor\_id, customer\_id)
- prescription\_item(prescription\_id, item\_id, quantity)
- sale(sale\_id, sale\_date, total\_price, total\_quantity, purchase\_method, customer\_id)
- sale\_item(sale\_id, item\_id, quantity)
- supplier(supplier\_id, supplier\_name)
- order(order\_id, order\_date, status, supplier\_id)
- order\_item(order\_id, item\_id, quantity)
- invoice(invoice\_id, payment\_total, invoice\_date, payment\_method, order\_id)

#### E) Users

- Pharmacy Owner



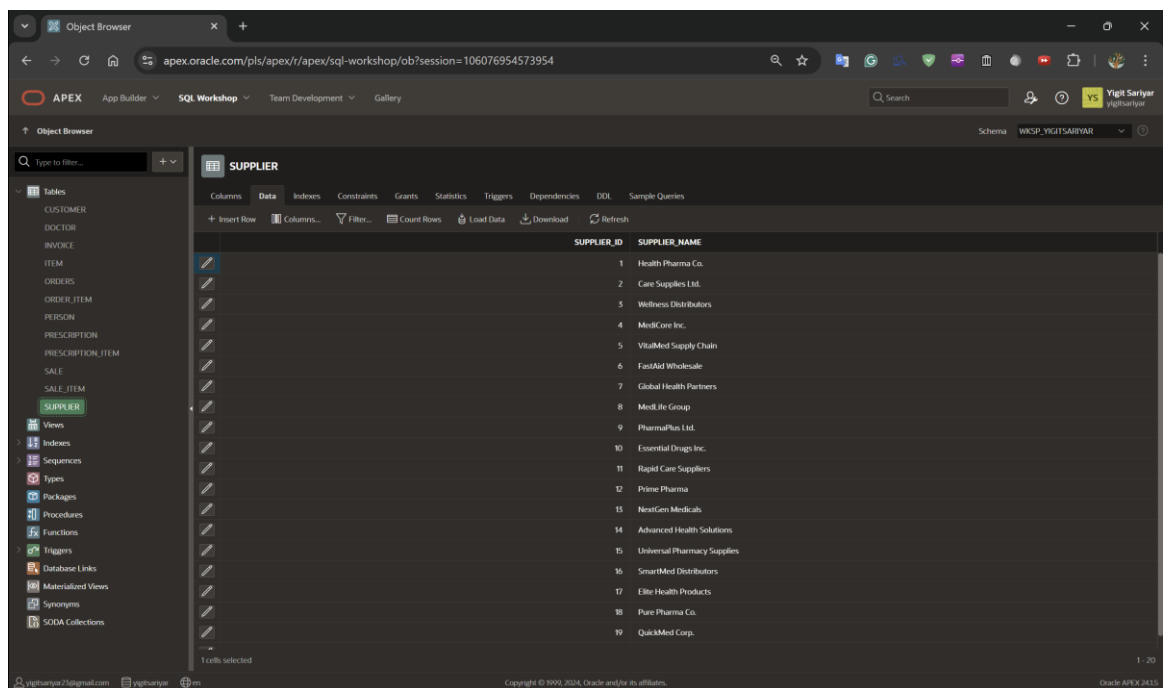
## F) Assumptions

1. Suppliers are assumed to always maintain sufficient inventory to fulfill any placed orders. Managing supplier stock levels is beyond the scope of this system.
2. Insurance coverage is binary and does not vary by plan. There is only a single type of insurance coverage.
3. The database is intended for a small, owner-operated pharmacy. The owner is the sole user and has complete authorization for all operations.
4. All invoices are considered paid in full upon issuance. No payment tracking or installment functionalities are included.
5. Supplier information is accurate and consistently maintained. No additional verification or validation processes are required.
6. Item prices remain constant while in stock. No price fluctuation mechanisms are implemented.
7. All individuals (doctors, customers) are entered into the system exclusively through prescription records.
8. There is only one type of prescription, with no variant categories.

## G) Business Rules

1. Each prescription remains valid for a maximum of four days from its issue date.
2. Each prescription specifies a fixed, predetermined quantity of the prescribed medication.
3. A prescription cannot be edited once it has been used to complete a sale.
4. The total amount of a sale is the sum of the prices of all included items multiplied by their quantities, taking into account any insurance coverage or discounts.
5. All items must have a non-negative stock quantity. Attempting to sell an item that is out of stock is not allowed.
6. When a sale is completed, the stock quantity of the sold items is decreased accordingly.
7. An invoice must be automatically generated upon the completion of each order.

## H) Screenshots for Example Database



The screenshot displays the Oracle APEX SQL Workshop interface. The left sidebar shows the Object Browser with various database objects like CUSTOMER, DOCTOR, INVOICE, ITEM, ORDERS, ORDER\_ITEM, PERSON, PRESCRIPTION, PRESCRIPTION\_ITEM, SALE, SALE\_ITEM, and SUPPLIER. The SUPPLIER table is selected, and its data is displayed in the main area. The table has two columns: SUPPLIER\_ID and SUPPLIER\_NAME. The data is as follows:

SUPPLIER_ID	SUPPLIER_NAME
1	Health Pharma Co.
2	Care Supplies Ltd.
3	Wellness Distributors
4	MediCore Inc.
5	VitalMed Supply Chain
6	FastAid Wholesale
7	Global Health Partners
8	MediLife Group
9	PharmaPlus Ltd.
10	Essential Drugs Inc.
11	Rapid Care Suppliers
12	Prime Pharma
13	NextGen Medicals
14	Advanced Health Solutions
15	Universal Pharmacy Supplies
16	SmartMed Distributors
17	Elite Health Products
18	Pure Pharma Co.
19	QuickMed Corp.

Object Browser

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APEX App Builder SQL Workshop Team Development Gallery

Object Browser Schema WKSP\_YIGITSARIYAR

Tables

CUSTOMER

Columns Data Indexes Constraints Grants Statistics Triggers Dependencies DDL Sample Queries

+ Insert Row Columns... Filter... Count Rows Load Data Download Refresh

ID	HASINSURANCE	DATE_OF_BIRTH
201	Y	05/25/1990
202	N	07/12/1985
203	Y	11/05/1975
205	Y	01/30/1988
206	Y	10/15/1980
207	N	04/20/1995
208	Y	06/11/1978
210	Y	12/01/1991
211	N	05/17/1984
212	Y	02/22/1987
213	Y	07/07/1993
214	N	10/14/1979
215	Y	03/01/1986
216	Y	08/10/1994
218	Y	12/15/1990
219	N	05/20/1981
220	Y	11/09/1989

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Object Browser Schema WKSP\_YIGITSARIYAR

Tables

DOCTOR

Columns Data Indexes Constraints Grants Statistics Triggers Dependencies DDL Sample Queries

+ Insert Row Columns... Filter... Count Rows Load Data Download Refresh

ID	SPECIALITY	HOSPITAL_NAME
101	Pediatrics	City Hospital
102	Dermatology	Health Clinic
103	Cardiology	Heart Center
105	Neurology	Brain Institute
106	Oncology	Cancer Care
107	Gastroenterology	St. Mary Hospital
108	Endocrinology	Specialist Center
110	Pulmonology	Breath Clinic
111	Nephrology	Kidney Care
112	Urology	Mens Health Center
113	Hematology	Blood Institute
114	Ophthalmology	Vision Clinic
115	Radiology	Imaging Center
116	Allergy and Immunology	Allergy Center
118	Family Medicine	Family Health
119	Emergency Medicine	ER Hospital
120	Dermatology	Skin Clinic

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Object Browser Schema WKSP\_YIGITSARIYAR

Type to filter...

ITEM

Columns Data Indexes Constraints Grants Statistics Triggers Dependencies DDL Sample Queries

+ Insert Row Columns... Filter... Count Rows Load Data Download Refresh

ITEMID	ITEMNAME	QUANTITY_IN STOCK	REQUIRE_PRESCRIPTION	INSURANCE_COVER	DOSAGE	SALE_PRICE	COST_PRICE
1	Paracetamol	500	Y	Y	500mg	5	2.5
2	Ibuprofen	300	Y	N	200mg	8	4
3	Cough Syrup	150	N	N	10ml	10	6
4	Antibiotic A	200	Y	Y	250mg	20	10
5	Antibiotic B	250	Y	N	500mg	25	12.5
6	Vitamin C	1000	N	N	500mg	5	1.5
7	Pain Relief Gel	115	N	N	50g	15	8
8	Allergy Medicine	397	N	Y	10mg	12	6
9	Antiseptic Cream	180	N	N	25g	7	3.5
10	Digestive Enzyme	296	N	N	100mg	9	4.5
11	Multivitamin	500	N	N	1 Tablet	2	1
12	Blood Pressure Medicine	350	Y	Y	50mg	30	15
13	Cholesterol Medicine	400	Y	Y	20mg	28	14
14	Diabetes Medicine	300	Y	Y	500mg	35	17.5
15	Cold Medicine	581	N	N	1 Tablet	6	3
16	Energy Drink	798	N	N	250ml	4	2
17	Oral Rehydration Salt	100	N	N	1 Sachet	2.5	1.25
18	Anti-inflammatory Ointment...	150	N	N	30g	10	5
19	Anti-Allergy Drops	76	N	Y	5ml	18	9

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Object Browser Schema WKSP\_YIGITSARIYAR

Type to filter...

ORDER\_ITEM

Columns Data Indexes Constraints Grants Statistics Triggers Dependencies DDL Sample Queries

+ Insert Row Columns... Filter... Count Rows Load Data Download Refresh

ORDER_ID	ITEMID	QUANTITY
1	1	50
1	2	30
1	3	20
2	4	25
2	5	15
2	6	10
3	7	20
3	8	30
3	9	25
4	10	40
4	11	50
4	12	35
5	13	20
5	14	25
5	15	30
6	16	10
6	17	15
6	18	5
7	19	20

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Object Browser Schema WKSP\_YIGITSARIYAR

Type to filter...

ORDERS

Columns	Data	Indexes	Constraints	Grants	Statistics	Triggers	Dependencies	DDL	Sample Queries
+ Insert Row	Columns...	Filter...	Count Rows	Load Data	Download	Refresh			
	ORDER_ID	ORDER_DATE							SUPPLIER_ID
	1	12/09/2024							Pending
	2	11/29/2024							Done
	3	12/04/2024							Pending
	4	11/24/2024							Done
	5	12/14/2024							Pending
	6	12/07/2024							Done
	7	12/11/2024							Pending
	8	12/01/2024							Done
	9	11/23/2024							Pending
	10	11/19/2024							Done
	11	12/12/2024							Pending
	12	12/02/2024							Done
	13	12/10/2024							Pending
	14	11/30/2024							Done
	15	12/16/2024							Pending
	16	12/03/2024							Done
	17	12/15/2024							Pending
	18	11/28/2024							Done
	19	12/13/2024							Pending

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Object Browser Schema WKSP\_YIGITSARIYAR

Type to filter...

PERSON

Columns	Data	Indexes	Constraints	Grants	Statistics	Triggers	Dependencies	DDL	Sample Queries
+ Insert Row	Columns...	Filter...	Count Rows	Load Data	Download	Refresh			
	ID	NAME							
	201	Alice Brown							
	101	Dr. Smith							
	202	Bob Green							
	102	Dr. Johnson							
	203	Carol White							
	103	Dr. Lee							
	205	Eve Blue							
	105	Dr. Garcia							
	206	Frank Yellow							
	106	Dr. Walker							
	207	Grace Red							
	107	Dr. Harris							
	208	Henry Orange							
	108	Dr. Adams							
	210	Jack Purple							
	110	Dr. Carter							
	211	Kate Gray							
	111	Dr. Collins							
	212	Leo Brown							

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Object Browser

Schema WKSP\_YIGITSARIYAR

PRESCRIPTION

PREScription_ID	ISSUE_DATE	DOCTOR_ID	DOCTOR_NAME	DOCTOR_SPECIALTY	DOCTOR_HOSPITAL	CUSTOMER_ID	CUSTOMER_NAME	CUSTOMER_DATE_OF_BIRTH	CUSTOMER_INSURANCE	IS_VALID
1	12/17/2024	101	Dr. Smith	Pediatrics	City Hospital	201	Alice Brown	03/25/1990	Y	Y
2	12/16/2024	102	Dr. Johnson	Dermatology	Health Clinic	202	Bob Green	07/12/1985	N	Y
3	12/18/2024	103	Dr. Lee	Cardiology	Heart Center	203	Carol White	11/05/1975	Y	Y
5	12/17/2024	105	Dr. Garcia	Neurology	Brain Institute	205	Eve Blue	01/30/1988	Y	Y
6	12/18/2024	106	Dr. Walker	Oncology	Cancer Care	206	Frank Yellow	10/15/1980	Y	Y
7	12/16/2024	107	Dr. Harris	Gastroenterology	St. Mary Hospital	207	Grace Red	04/20/1995	N	Y
8	12/17/2024	108	Dr. Adams	Endocrinology	Specialist Center	208	Henry Orange	06/11/1978	Y	Y
10	12/18/2024	110	Dr. Carter	Pulmonology	Breath Clinic	210	Jack Purple	12/03/1991	Y	Y
11	12/16/2024	111	Dr. Collins	Nephrology	Kidney Care	211	Kate Gray	05/17/1984	N	Y
12	12/17/2024	112	Dr. Evans	Urology	Mens Health Center	212	Leo Brown	02/22/1987	Y	Y
13	12/18/2024	113	Dr. Foster	Hematology	Blood Institute	213	Mona White	07/07/1993	Y	Y
14	12/16/2024	114	Dr. Gonzalez	Ophthalmology	Vision Clinic	214	Nate Black	10/14/1979	N	Y
15	12/17/2024	115	Dr. Hayes	Radiology	Imaging Center	215	Olivia Blue	03/01/1986	Y	Y
16	12/18/2024	116	Dr. James	Allergy and Immunology	Allergy Center	216	Paul Yellow	08/10/1994	Y	Y
18	12/16/2024	118	Dr. Lewis	Family Medicine	Family Health	218	Rose Orange	12/15/1990	Y	Y
19	12/17/2024	119	Dr. Martin	Emergency Medicine	ER Hospital	219	Sam Pink	05/20/1981	N	Y
20	12/18/2024	120	Dr. Nelson	Dermatology	Skin Clinic	220	Tina Purple	11/09/1989	Y	Y

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Object Browser

Schema WKSP\_YIGITSARIYAR

PREScription\_ITEM

PREScription_ID	ITEMID	QUANTITY
1	1	10
1	6	5
2	2	8
2	3	4
2	9	2
3	4	7
3	5	3
5	11	12
5	12	4
6	13	5
6	14	3
7	15	9
7	16	2
8	17	4
8	18	6
10	1	5
10	2	7
11	3	6
11	4	2

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Object Browser Schema WKSP\_YIGITSARIYAR

Tables

CUSTOMER  
DOCTOR  
INVOICE  
ITEM  
ORDERS  
ORDER\_ITEM  
PERSON  
PRESCRIPTION  
PRESCRIPTION\_ITEM  
**SALE**  
SALE\_ITEM  
SUPPLIER

Views  
Indexes  
Sequences  
Types  
Packages  
Procedures  
Functions  
Triggers  
Database Links  
Materialized Views  
Synonyms  
SODA Collections

Columns Data Indexes Constraints Grants Statistics Triggers Dependencies DDL Sample Queries

+ Insert Row Columns... Filter... Count Rows Load Data Download Refresh

	SALE_ID	SALE_DATE	TOTAL_PRICE	TOTAL_QUANTITY	PURCHASE_METHOD	CUSTOMER_ID
	1	12/14/2024	30	5	Cash	201
	2	12/15/2024			Card	202
	3	12/15/2024	30	2	Cash	205
	5	12/16/2024	30	4	Card	205
	6	12/17/2024	4	1	Online	206
	7	12/17/2024	86	4	Cash	207
	8	12/18/2024			Card	208
	10	12/18/2024	15	1	Cash	210
	11	12/14/2024	30	5	Cash	218
	12	12/15/2024			Card	212
	13	12/15/2024	30	2	Cash	215
	14	12/12/2024	36	3	Online	214
	15	12/16/2024	30	4	Card	215
	16	12/17/2024	4	1	Online	216
	18	12/10/2024			Card	218
	19	12/09/2024			Online	219
	20	12/18/2024	15	1	Cash	220
	21	12/17/2024	86	4	Online	
	22	12/17/2024			Cash	

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APEX App Builder SQL Workshop Team Development Gallery

Object Browser Schema WKSP\_YIGITSARIYAR

Tables

CUSTOMER  
DOCTOR  
INVOICE  
ITEM  
ORDERS  
ORDER\_ITEM  
PERSON  
PRESCRIPTION  
PRESCRIPTION\_ITEM  
**SALE**  
**SALE\_ITEM**  
SUPPLIER

Views  
Indexes  
Sequences  
Types  
Packages  
Procedures  
Functions  
Triggers  
Database Links  
Materialized Views  
Synonyms  
SODA Collections

Columns Data Indexes Constraints Grants Statistics Triggers Dependencies DDL Sample Queries

+ Insert Row Columns... Filter... Count Rows Load Data Download Refresh

	SALE_ID	ITEMID	QUANTITY
	1	15	5
	3	7	2
	5	10	2
	5	15	2
	6	16	1
	7	19	2
	7	20	2
	10	7	1
	11	15	5
	13	7	2
	14	8	3
	15	10	2
	15	15	2
	16	16	1
	20	7	1
	21	19	2
	21	20	2
	24	7	1
	25	15	5

1 cells selected

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