Lab 8 Solution

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Identifying Keys

1. Sales Order

Sales Order ID	20115	
Order Date	12-Apr-2022	

Customer ID 7802 **Name** Gray Market Electronics
Address 1175 Jolly Roger Blvd.
Ancaster, ON
L9T 3Y7

Item ID	Description	Quantity	Price	Amount
304	SONY PS 2 Clone	50	50.00	2,500.00
452	MS Controller Clone	20	10.00	200.00
			Total	2,700.00

▸

2. Invoice

Invoice ID	25154	
Invoice Date	19-Apr-2022	
Sales Order ID	20115	

Customer ID 7802 **Name** Gray Market Electronics
Address 1175 Jolly Roger Blvd.
Ancaster, ON
L9T 3Y7

Item ID	Description	Quantity	Price	Amount
304	SONY PS 2 Clone	10	50.00	500.00
			Total	500.00

3. Inventory Status

Item ID	Description	On Hand	Allocated	On Order	Available
281	Memory Pack	48	28	50	70
307	PS 2 Stand	12	5	10	17
		(A) −	(B) +	(C) =	(D)

4. Purchase Order

Purchase Order ID	31087	**Order Date**	11-Apr-2022
Vendor ID	403	**Name**	Knock Off Electronics

Address   318 Greasy Jungle Rd.
Kuala Lampur
Malaysia

Item ID	Description	Quantity	Cost	Amount
215	PS 1 Controller Clone	10	5.00	50.00
219	PS 1 Screen	25	12.00	300.00
304	SONY PS 2 Clone	20	45.00	900.00
307	PS 2 Stand	10	8.00	80.00
			Total	1,330.00

5. Items On Order

Item ID	Description	Vendor ID	Purchase Order ID	Quantity
215	PS 1 Controller Clone	403	31087	10
215	PS 1 Controller Clone	518	32034	25
219	PS 1 Screen	403	31087	25
275	Rumble Pack	188	30095	20
304	SONY PS 2 Clone	403	31087	20
307	PS 2 Stand	403	31087	10
452	MS Controller Clone	52	32354	25

6. A/P Cheque

Date	30-Apr-2022	Cheque Number	550417
Vendor ID	403		
Name	Knock Off Electronics		
Amount	$****22,000.00		

Twenty Two Thousand   DOLLARS and 00 CENTS

7. A/P Inquiry

Invoice To Be Paid By   15-Apr-2022

Vendor ID	Name	Vendor Invoice ID	Amount
403	Knock Off Electronics	421	10,000.00
518	Midnight Micro	11087	5,000.00
518	Midnight Micro	11342	3,000.00
644	Copy Cat Mfg.	P-904-91	2,000.00
704	Pirate Cove Works	11087	450.00

Note: On purpose, two Vendor Invoices are shown with the same Invoice No. Is this coincidence likely? But, can you guarantee that it would never occur? Do you understand that many companies use a Voucher system where they create their own internal document to reflect the receipt of a Vendor's Invoice?

8. Open Purchase Order Inquiry

Of primary interest here are the Purchase Orders overdue, i.e. the ones where the goods have not been received yet.

Purchase Order ID	Vendor ID	Item ID	Quantity	Purchase Order Date
29932	403	215	25	15-Feb-2022
		291	50	15-Feb-2022
29945	644	275	12	22-Feb-2022
		304	10	22-Feb-2022

Normalization Progressions

1. Sales Order

ONF: SalesOrderID + ItemID -> OrderDate, CustomerID, Name, Address, City, Province,
                              PostalCode, Country, Description, Quantity, Price, Amount,
                              Total

1NF: SalesOrderID + ItemID -> OrderDate, CustomerID, Name, Address, City, Province,
                              PostalCode, Description, Quantity, Price

2NF: SalesOrderID + ItemID -> Quantity
2NF: SalesOrderID -> OrderDate, CustomerID, Name, Address, City, Province, PostalCode,
                     Country
2NF: ItemID -> Description, Price

3NF: SalesOrderID + ItemID -> Quantity
3NF: SalesOrderID -> OrderDate, CustomerID
3NF: ItemID -> Description, Price
3NF: CustomerID -> Name, Address, City, Province, PostalCode, Country

2. Invoice

ONF: InvoiceID + ItemID -> InvoiceDate, SalesOrderID, CustomerID, Name, Address, City,
                           Province, PostalCode, Country, Description, Quantity, Price,
                           Amount, Total

1NF: InvoiceID + ItemID -> InvoiceDate, SalesOrderID, CustomerID, Name, Address, City,
                           Province, PostalCode, Country, Description, Quantity, Price

2NF: InvoiceID + ItemID -> Quantity
2NF: InvoiceID -> InvoiceDate, SalesOrderID, CustomerID, Name, Address, City, Province,
                  PostalCode, Country
2NF: ItemID -> Description, Price

3NF: InvoiceID + ItemID -> Quantity
3NF: InvoiceID -> InvoiceDate, SalesOrderID
3NF: ItemID -> Description, Price
3NF: SalesOrderID -> CustomerID
3NF: CustomerID -> Name, Address, City, Province, PostalCode, Country

3. Inventory Status

ONF: ItemID -> Description, OnHand, Allocated, OnOrder, Available

1NF: ItemID -> Description, OnHand, Allocated, OnOrder

2NF: ItemID -> Description, OnHand, Allocated, OnOrder

3NF: ItemID -> Description, OnHand, Allocated, OnOrder

4. Purchase Order

ONF: PurchaseOrderID + ItemID -> OrderDate, VendorID, Name, Address, City, Province,
                                 PostalCode, Country, Description, Quantity, Cost,
                                 Amount, Total

1NF: PurchaseOrderID + ItemID -> OrderDate, VendorID, Name, Address, City, Province,
                                 PostalCode, Country, Description, Quantity, Cost

2NF: PurchaseOrderID + ItemID -> Quantity
2NF: PurchaseOrderID -> OrderDate, VendorID, Name, Address, City, Province, PostalCode,
                        Country
2NF: ItemID -> Description, Cost

3NF: PurchaseOrderID + ItemID -> Quantity
3NF: PurchaseOrderID -> OrderDate, VendorID
3NF: ItemID -> Description, Cost
3NF: VendorID -> Name, Address, City, Province, PostalCode, Country

5. Items On Order

0NF: PurchaseOrderID + ItemID -> Description, VendorID, Quantity

1NF: PurchaseOrderID + ItemID -> Description, VendorID, Quantity

2NF: PurchaseOrderID + ItemID -> Quantity
2NF: PurchaseOrderID -> VendorID
2NF: ItemID -> Description

3NF: PurchaseOrderID + ItemID -> Quantity
3NF: PurchaseOrderID -> VendorID
3NF: ItemID -> Description

6. A/P Cheque

0NF: ChequeNumber -> Date, VendorID, Name, Amount

1NF: ChequeNumber -> Date, VendorID, Name, Amount

2NF: ChequeNumber -> Date, VendorID, Name, Amount

3NF: ChequeNumber -> Date, VendorID, Amount
3NF: VendorID -> Name

7. A/P Inquiry

0NF: VendorID + VendorInvoiceID -> Date, Name, Amount

1NF: VendorID + VendorInvoiceID -> Date, Name, Amount

2NF: VendorID + VendorInvoiceID -> Date, Amount
2NF: VendorID -> Name

3NF: VendorID + VendorInvoiceID -> Date, Amount
3NF: VendorID -> Name

8. Open Purchase Order Inquiry

0NF: PurchaseOrderID + ItemID -> VendorID, Quantity, OrderDate

1NF: PurchaseOrderID + ItemID -> VendorID, Quantity, OrderDate

2NF: PurchaseOrderID + ItemID -> Quantity
2NF: PurchaseOrderID -> VendorID, OrderDate

3NF: PurchaseOrderID + ItemID -> Quantity
3NF: PurchaseOrderID -> VendorID, OrderDate

Forming Entities

Forming Entities

1. Gather all 3NF relations and group by key
2. Merge relations into entities and Name them

3NF: SalesOrderID -> OrderDate, CustomerID = Sales Order

3NF: SalesOrderID + ItemID -> Quantity = Sales Order Detail

3NF: CustomerID -> Name, Address, City, Province, PostalCode, Country = Customer

3NF: ItemID -> Description, Price
3NF: ItemID -> Description, Price
3NF: ItemID -> Description, OnHand, Allocated, OnOrder
3NF: ItemID -> Description, Cost
3NF: ItemID -> Description
3NF: ItemID -> Description, Price, Cost, OnHand, Allocated, OnOrder = Item

3NF: InvoiceID -> InvoiceDate, SalesOrderID = Invoice

3NF: InvoiceID + ItemID -> Quantity = Invoice Detail

3NF: PurchaseOrderID -> OrderDate, VendorID
3NF: PurchaseOrderID -> VendorID
3NF: PurchaseOrderID -> VendorID, OrderDate = Purchase Order

3NF: PurchaseOrderID + ItemID -> Quantity = Purchase Order Detail
3NF: PurchaseOrderID + ItemID -> Quantity
3NF: PurchaseOrderID + ItemID -> Quantity

3NF: VendorID -> Name, Address, City, Province, PostalCode, Country = Vendor
3NF: VendorID -> Name
3NF: VendorID -> Name

3NF: VendorID + VendorInvoiceID -> Date, Amount = Payables

3NF: ChequeNumber -> Date, VendorID, Amount = Cheque

Entity Relationship Diagram

Vintage Console Nation

customers

PK	customer_id
	name
	address
	city
	province
	postal_code
	country

sales_orders

PK	sales_order_id
	order_date
FK	customer_id

invoices

PK	invoice_id
	invoice_date
FK	sales_order_id

sales_orders_detail

PK FK1	sales_order_id
PK FK2	item_id
	quantity

invoice_details

PK FK1	invoice_id
PK FK2	item_id
	quantity

payables

PK FK	vendor_id
PK	vendor_invoice_id
	date
	amount

items

PK	item_id
	description
	price
	cost
	on_hand
	allocated
	on_order

purchase_order_details

PK FK1	purchase_order_id
PK FK2	item_id
	quantity

vendors

PK	vendor_id
	name
	address
	city
	province
	postal_code
	country

purchase_orders

PK	purchase_order_id
	order_date
FK	vendor_id

cheques

PK	cheque_number
	date
FK	vendor_id
	amount