1814ICT & 2814ICT – DATA MANAGEMENT
7003ICT – DATABASE DESIGN
School of Information & Communication Technology
Trimester 1, 202…

Assignment Part 1:
Designing a Database for a*Fashion

ASSIGNMENT TITLE: Logical Database Model for a*Fashion

GROUP NUMBER: 120

s-Number	Full name	Course Code	Contribution %	Signature*
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	Total contributions		100%	

*Follow the note below.

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Declaration
Except where appropriately acknowledged, this assignment is our own work, has been expressed in our own words and has not previously been submitted for assessment. We have also retained a copy of this assessment piece for our own records.

Student 1:	Student 2:	Student 3:
Name: Shehryar Mallick	Name: Vinol Chris Dsouza	Name: Dewaan J Darroca
Signature: *	Signature: *	Signature: *
Date: 04-04-2024*	Date: 04-04-2024*	Date: 04-04-2024*

*Follow the note below.

Note: All students in the group must sign & date (electronically or with pen) on this first page.

Table of Contents

[Generate a table of content with page numbers.]

List of Illustrations

[Generate a list of figures and tables with page numbers.]

Acknowledgements:

[List names of staff and students you have discussed with about this assessment.]

1) Shehryar Mallick
2) Vinol Chris Dsouza
3) Dewaan J Darroca
4) Sebastain Binnewies
5) John Wang

Entity Relationship Diagram [for all students]

[Place your ERD only below. No need to copy the business case.]

INITIAL ER DIAGRAM:

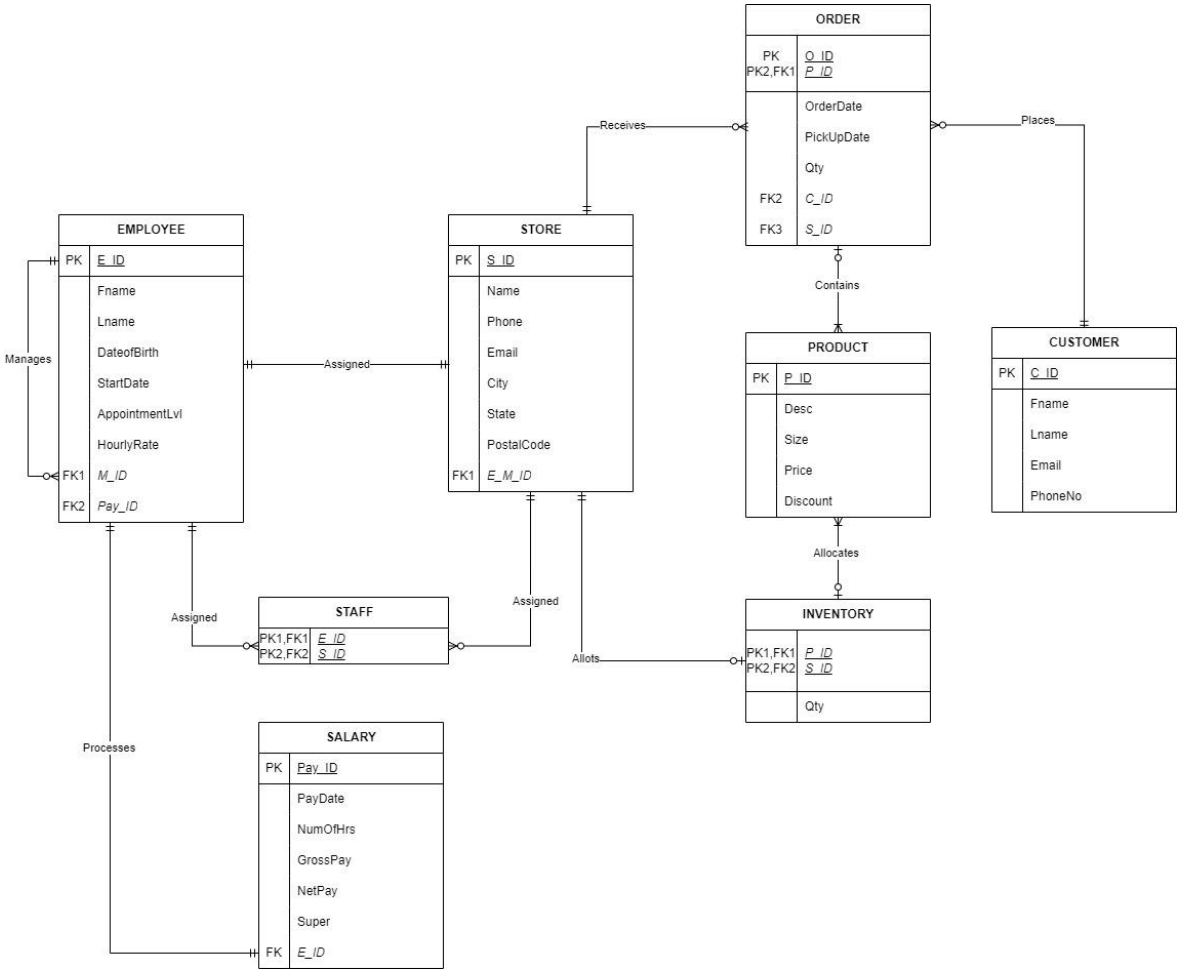


Figure1: Initial Draft of Entity Relationship Diagram

FINAL ER DIAGRAM:

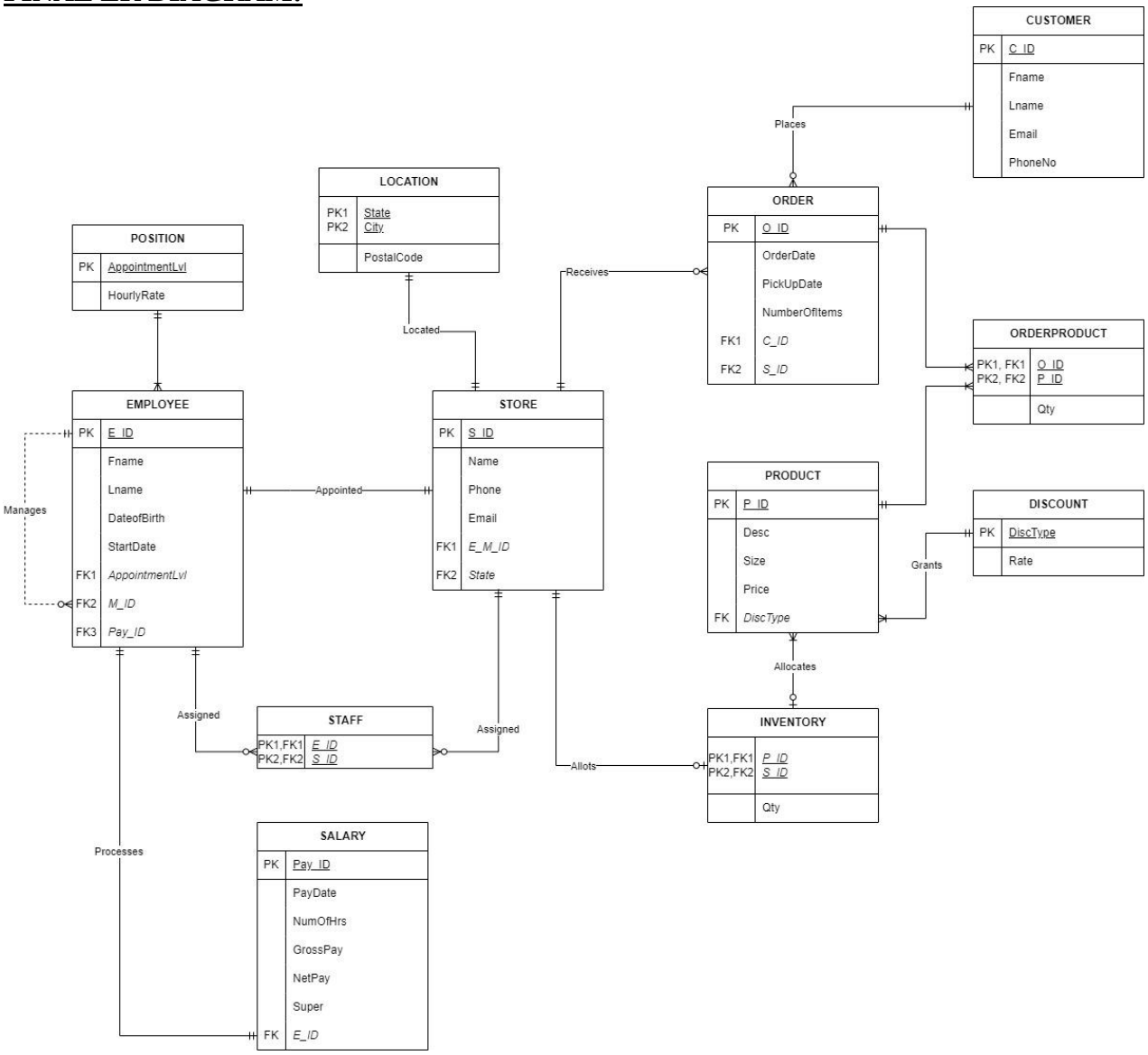


Figure 2: Final Entity Relationship Diagram

Assumptions [for all students] (optional)

[Write any assumptions you may have considered.]

- The employee can only work in one store at a time.
- Every order placed must have a store id as it must be picked up.
- Every store must exist in a certain location.
- There are different categories of discount with no discount being one of them, hence it is mandatory for the Product entity to have the discount attribute with the default value being 1 which when mapped to the Discount entity the id 1 has rate would be 0%.
- City is dependent on State; Postalcode can be identified using both a specific state and city therefore we use a composite key of both city and state.

Anomalies [for 7003ICT students only]

[Provide reasons why there are / are not anomalies]

In SALARY, STAFF, CUSTOMER, PRODUCT, ORDER and INVENTORY entities there are no insertion, deletion, or update anomalies as in each entity its primary key will uniquely identify each row of data and a non-key attribute will not be dependent on any part of the primary key or other non-key attribute.
The EMPLOYEE entity will have anomalies as Hourly Rate depends on the Appointment level.

E_ID	Fname	Lname	DateOfBirth	StartDate	Appointment Lvl	Hourly Rate	M_ID	Pay_ID
1	Max	Smith	12/12/1988	23/03/2022	Manager	100		1001
2	Ella	White	06/08/1990	05/05/2023	Staff	50	1	1002
3	Jenny	Chris	09/02/1985	08/01/2023	Staff	50	1	1003

Update anomaly: If we need to modify the HourlyRate for the AppointmentLvl of STAFF, it would be necessary to update multiple records. If it is not updated for all the STAFF it would lead to an update anomaly as there would be inconsistencies within the table.

Deletion anomaly: If we delete the M_ID, Max's entry, we will lose the AppointmentLvl of manager as Max was the only manager in the table. This means that we would also lose the HourlyRate of the manager when it should have been retained, giving rise to a deletion anomaly.

The STORE entity will also have some anomalies as PostalCode depends on City and State.

S_ID	Name	Phone	Email	State	City	Postal Code	E_M_ID
1	a*Fashion1	0428740984	Astar1@gmail.com	QLD	Kuraby	4112	1
2	a*Fashion2	0490807047	Astar2@gmail.com	QLD	Nerang	4211	5
3	a*Fashion3	0455338813	Astar3@gmail.com	QLD	Nerang	4211	7

Update anomaly: If the postcode of Nerang needs to be updated, it would have to be changed in multiple records and if not done correctly could lead to different records with Nerang as a city having different Postcode which causes inconsistencies within the table.

Deletion anomaly: If we delete the entry for the store in Kuraby QLD, we lose the information about the State, City and the PostalCode of Kuraby QLD. Losing all this data which should have been retained leads to a deletion anomaly.

Normalisation [for all students]

[Convert each entity from your ERD into a relation schema, draw dependency diagram and/or step-by-step convert it to 3NF. Mention the reason why a relation schema cannot be converted to the 3NF.]

1. For **EMPLOYEE** table the dependency diagram is:

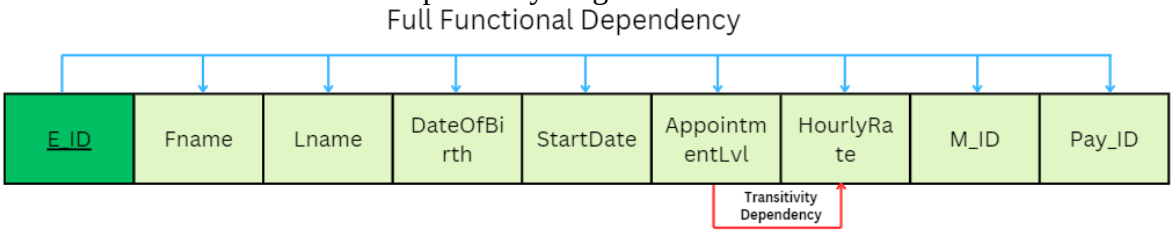
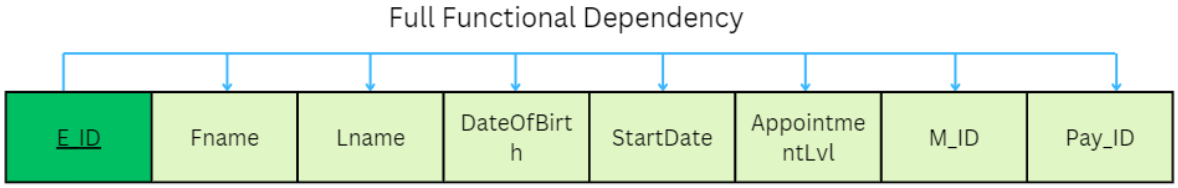


Table is in a 2NF because it has a transitive dependency (and but no partial dependency):
o Full dependency: E_ID ➔ Fname, Lname, DateOfBirth, StartDate, AppointmentLvl, HourlyRate, M_ID and Pay_ID
o Transitive dependency: AppointmentLvl ➔ HourlyRate

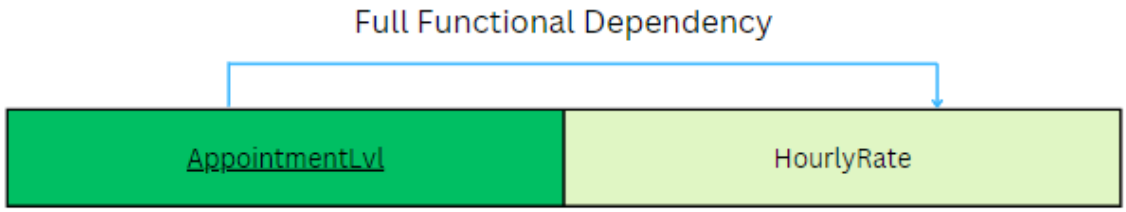
There is a transitive functional dependency among E_ID, AppointmentLvl, and HourlyRate. The HourlyRate is related to the AppointmentLvl, i.e. transitivity dependency and is not in 3NF.
o E_ID ➔ AppointmentLvl
o AppointmentLvl ➔ HourlyRate

Therefore, we will decompose the table as follows:

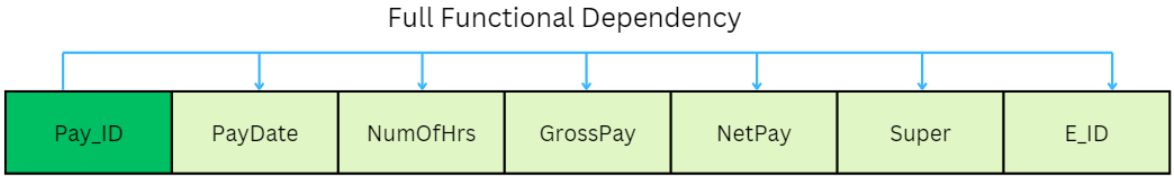
EMPLOYEE table



POSITION table



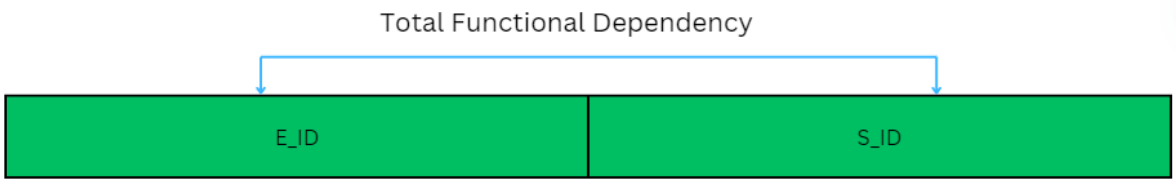
2. For **SALARY** table the dependency diagram is:



The table is in 3NF because it has only the full dependency (and no partial & transitive dependencies):

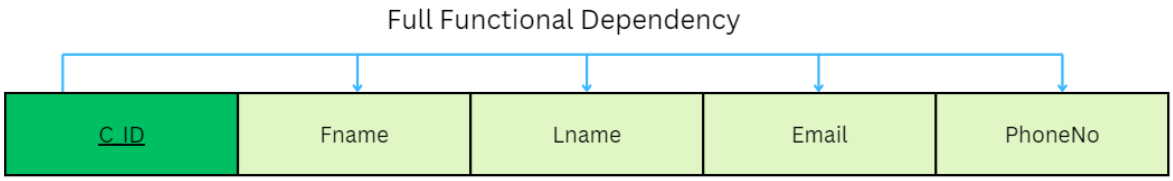
o Pay_ID ➔ PayDate, NumOfHrs, GrossPay, NetPay, Super, E_ID

3. For **STAFF** table the dependency diagram is:



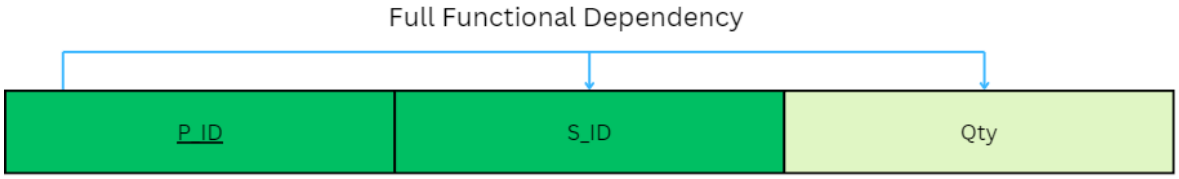
The table is in 3NF because it has only the full dependency (and no partial & transitive dependencies):
o E_ID ↔P_ID

4. For **CUSTOMER** table the dependency diagram is:



The table is in 3NF because it has only the full dependency (and no partial & transitive dependencies):
o C_ID ➔ Fname, Lname, Email, PhoneNo

5. For **INVENTORY** table the dependency diagram is:



The table is in 3NF because it has only the full dependency (and no partial & transitive dependencies):
o {P_ID,S_ID} ➔ Qty

6. For **STORE** table the dependency diagram is:

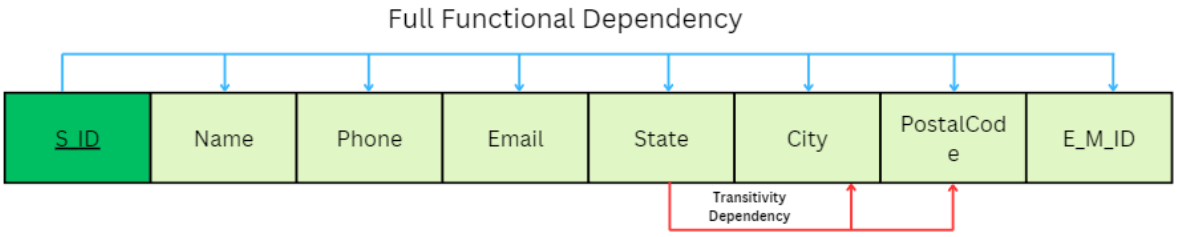


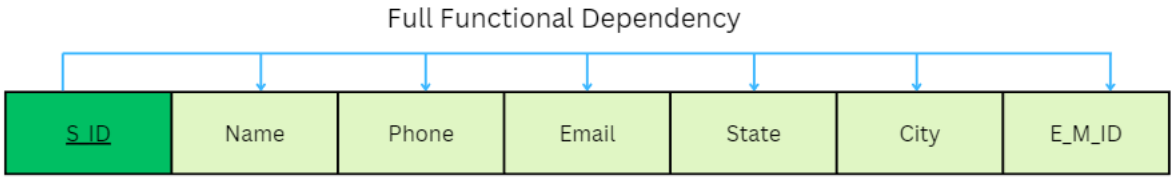
Table is in a 2NF because it has a transitive dependency (and but no partial dependency):
o Full dependency: S_ID ➔ Name, Phone, Email, State, City, PostalCode, E_M_ID
o Transitive dependency: State➔ PostalCode

There is a transitive functional dependency among S_ID, State, and PostalCode. The PostalCode is related to the State, i.e. transitivity dependency and is not in 3NF.

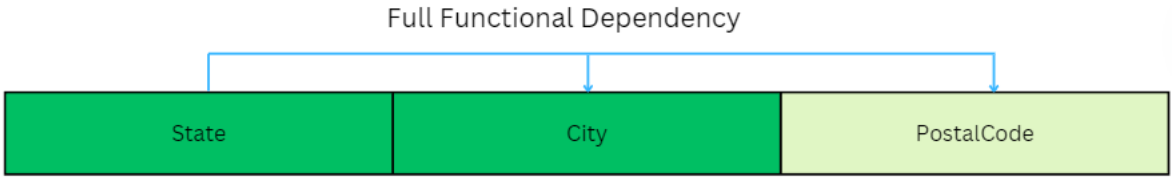
o S_ID ➔ State
o {State}➔ PostalCode

Therefore we will decompose the table as follows:

STORE table



LOCATION table



7. For **PRODUCT** table the dependency diagram is:

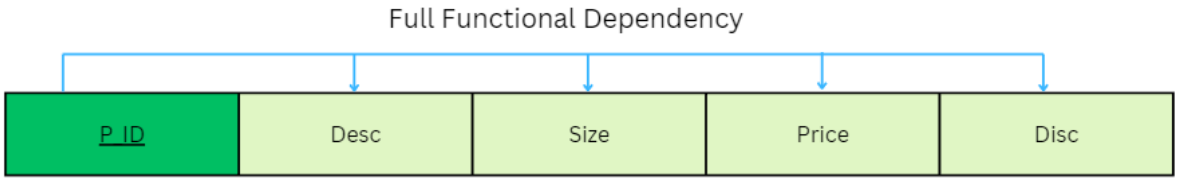
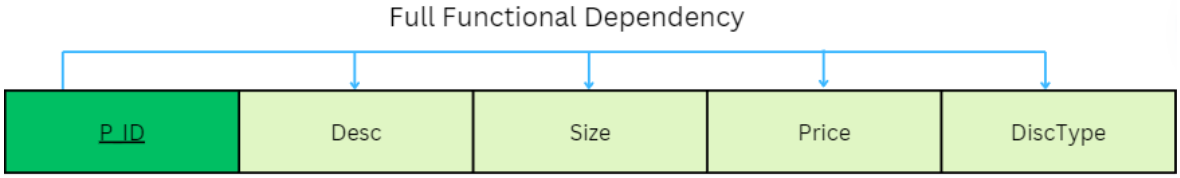


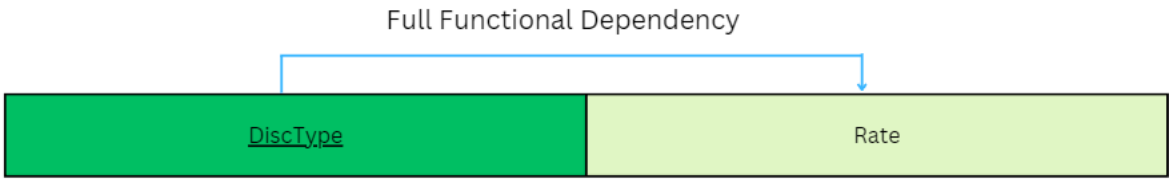
Table is in a 1NF because Disc will have null values if there is no discount specified so we will make a separate table for discount and associate all the relevant values to the DiscType attribute:
o Full dependency: P_ID ➔ Desc, Size, Price, Disc

Therefore we will decompose the table as follows:

PRODUCT table



DISCOUNT table



8. For **ORDER** table the dependency diagram is:

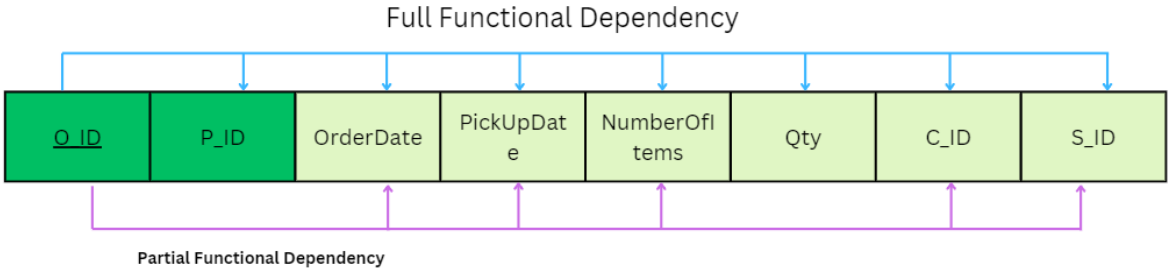
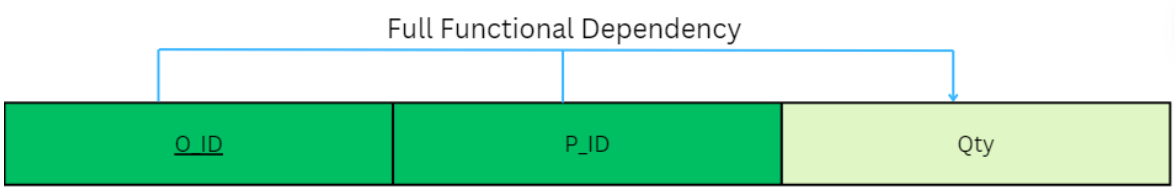


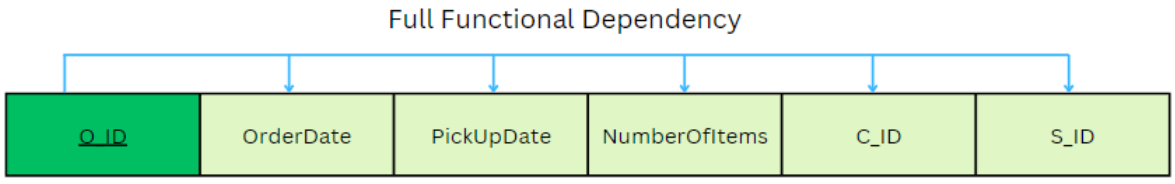
Table is in a 2NF because it has a Partial dependency (and but no transitive dependency):
o Full dependency: {O_ID, P_ID} ➔ OrderDate, PickUpDate, NumberOfItems, Qty, C_ID, and S_ID
o Partial dependency: O_ID ➔ OrderDate, PickUpDate, NumberOfItems, C_ID, and S_ID

Therefore we will decompose the table as follows:

ORDERPRODUCT table



ORDER table



Relational database schema [for all students]

[Convert your ERD into a relational database schema showing appropriate tables, columns, primary keys, and foreign keys, foreign key references, field type & format, etc.]

Table Name	Field	Type	Description
EMPLOYEE	E_ID	VARCHAR(4)	PRIMARY KEY
	Fname	VARCHAR(20)	
	Lname	VARCHAR(20)	
	DateOfBirth	DATE	**Format**: DD-MM-YYYY
	StartDate	DATE	**Format**: DD-MM-YYYY
	AppointmentLvl	VARCHAR(20)	FOREIGN KEY REFERENCES POSITION(AppointmentLvl)
	M_ID	VARCHAR(4)	FOREIGN KEY SELF REFERENCES EMPLOYEE(E_ID)
	Pay_ID	VARCHAR(4)	FOREIGN KEY REFERENCES SALARY(Pay_ID)
POSITION	AppointmentLvl	VARCHAR(20)	PRIMARY KEY
	HourlyRate	FLOAT(4)	
SALARY	Pay_ID	VARCHAR(4)	PRIMARY KEY
	PayDate	DATE	**Format**: DD-MM-YYYY
	NumOfHrs	INT(3)	
	GrossPay	FLOAT(4)	
	NetPay	FLOAT(4)	
	Super	FLOAT(4)	
	E_ID	VARCHAR(4)	FOREIGN KEY REFERENCES EMPLOYEE(E_ID)
STAFF	E_ID	VARCHAR(4)	PRIMARY KEY, FOREIGN KEY REFERENCES EMPLOYEE(E_ID)
	S_ID	VARCHAR(4)	PRIMARY KEY, FOREIGN KEY REFERENCES STORE(S_ID)
CUSTOMER	C_ID	VARCHAR(4)	PRIMARY KEY
	Fname	VARCHAR(20)	
	Lname	VARCHAR(20)	
	Email	VARCHAR(20)	
	PhoneNo	VARCHAR(10)	

INVENTORY	P_ID	VARCHAR(4)	PRIMARY KEY, FOREIGN KEY REFERENCES PRODUCT(P_ID)
	S_ID	VARCHAR(4)	PRIMARY KEY, FOREIGN KEY REFERENCES STORE(S_ID)
	Qty	INT(5)	
STORE	S_ID	VARCHAR(4)	PRIMARY KEY
	Name	VARCHAR(20)	
	Phone	VARCHAR(10)	
	Email	VARCHAR(20)	
	State	VARCHAR(3)	FOREIGN KEY REFERENCES LOCATION(State)
	E_M_ID	VARCHAR(4)	FOREIGN KEY REFERENCES EMPLOYEE(E_ID)
LOCATION	State	VARCHAR(3)	PRIMARY KEY
	City	VARCHAR(20)	PRIMARY KEY
	PostalCode	VARCHAR(20)	
PRODUCT	P_ID	VARCHAR(4)	PRIMARY KEY
	Desc	VARCHAR(40)	
	Size	TEXT(3)	
	Price	FLOAT(4)	
	DiscType	INT(2)	FOREIGN KEY REFERENCES DISCOUNT(DiscType), DEFAULT VALUE= 1
DISCOUNT	DiscType	INT(2)	PRIMARY KEY AUTO INCREMENT
	Rate	INT(2)	
ORDER	O_ID	VARCHAR(4)	PRIMARY KEY
	OrderDate	DATE	**Format**: DD-MM-YYYY
	PickupDate	DATE	**Format**: DD-MM-YYYY
	NumberOfItems	INT(5)	
	C_ID	VARCHAR(4)	FOREIGN KEY REFERENCES CUSTOMER(C_ID)
	S_ID	VARCHAR(4)	FOREIGN KEY REFERENCES STORE(S_ID)

ORDERPRODUCT	O_ID	VARCHAR(4)	PRIMARY KEY, FOREIGN KEY REFERENCES ORDER(O_ID)
	P_ID	VARCHAR(4)	PRIMARY KEY FOREIGN KEY REFERENCES PRODUCT(P_ID)
	Qty	INT(3)	

Appendices [for all students] (optional)

[Add any additional work other than what has been requested. Your marker may not look at and mark the content in this section.]

Bibliography [for all students]

[Add any references (e.g., books, online documents, etc.) that you have used. Your marker may not look at and mark the content in this section.]