Database Systems Mini Project

Report

Department

Information Technology

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Mentor

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Title

E-Commerce Website

PROBLEM STATEMENT FOR E-COMMERCE WEBSITE

An E-Commerce Website selling a wide variety of products needs to be developed. Products must be grouped into categories based on their characteristics. Some of the broad categories include Electronics, Apparel, Books& Media.

For eg, mobile phone and laptop comes under the category **Electronics**, T-shirts and pants come under the category **Apparel**.

The webpage should provide a search bar for the user to search for the products of his/her choice and should provide functionality for an admin to log in and modify the database. The backend of the website should comprise a database to store:

1. The list of products available
2. The various categories of products available
3. The list of sellers available
4. Table of details of all the users who have purchased items.

The specifications of the various items in the database are given below. A

PRODUCT has the following requirements

- Each Product has the following attributes to identify it
  Name, ID, Seller, Price, Colour, Number of Items Left
- Each product may have a number of SELLERS.
- Each Seller has a location, products he/she is selling, discount he/she is willing to offer on the products as well as time of delivery.

The products are organized into CATEGORIES.

- Each Category has a name and an ID.
- Each Category may be further subdivided into more categories.

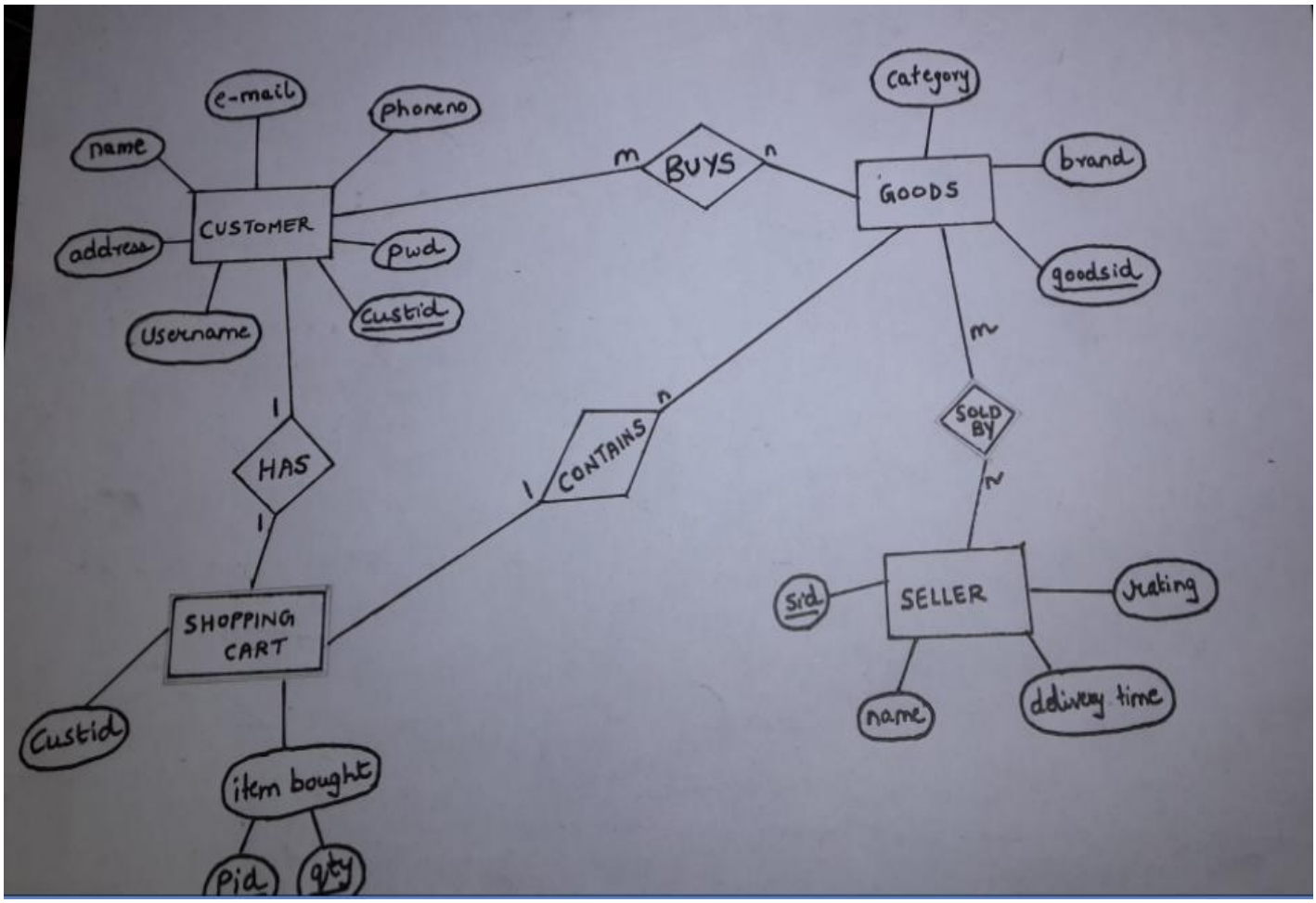
Eg: Electronics is a broad category which is comprised of a number of products such as Laptops, of which Dell Inspiron is a type of Laptop.

The database must store data of the various USERS of the website

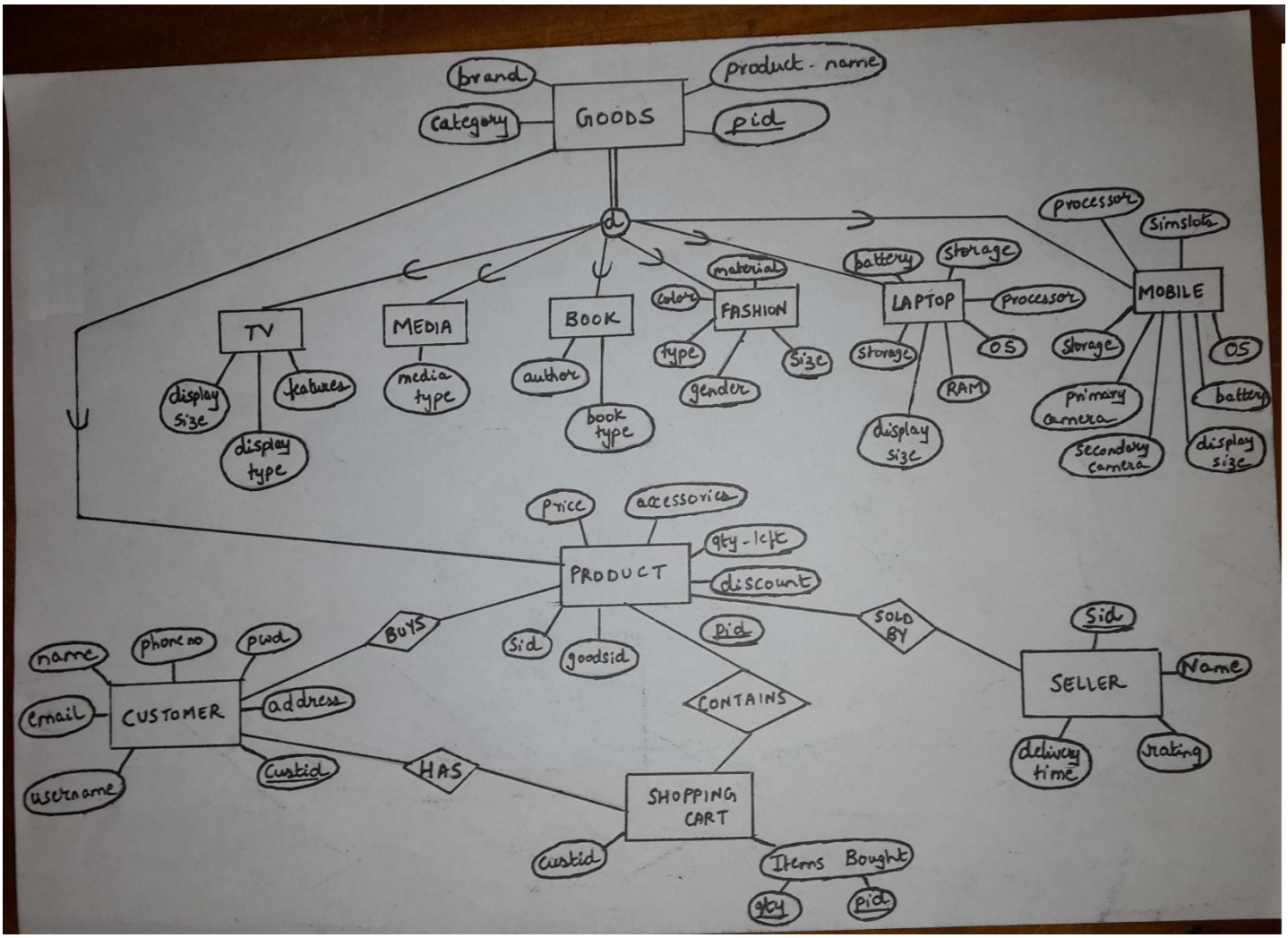
- Each user has a name, address, price to be paid and ID of the product purchased.

An Admin logs in to the PRODUCT database to add new products, delete and modify the existing database.

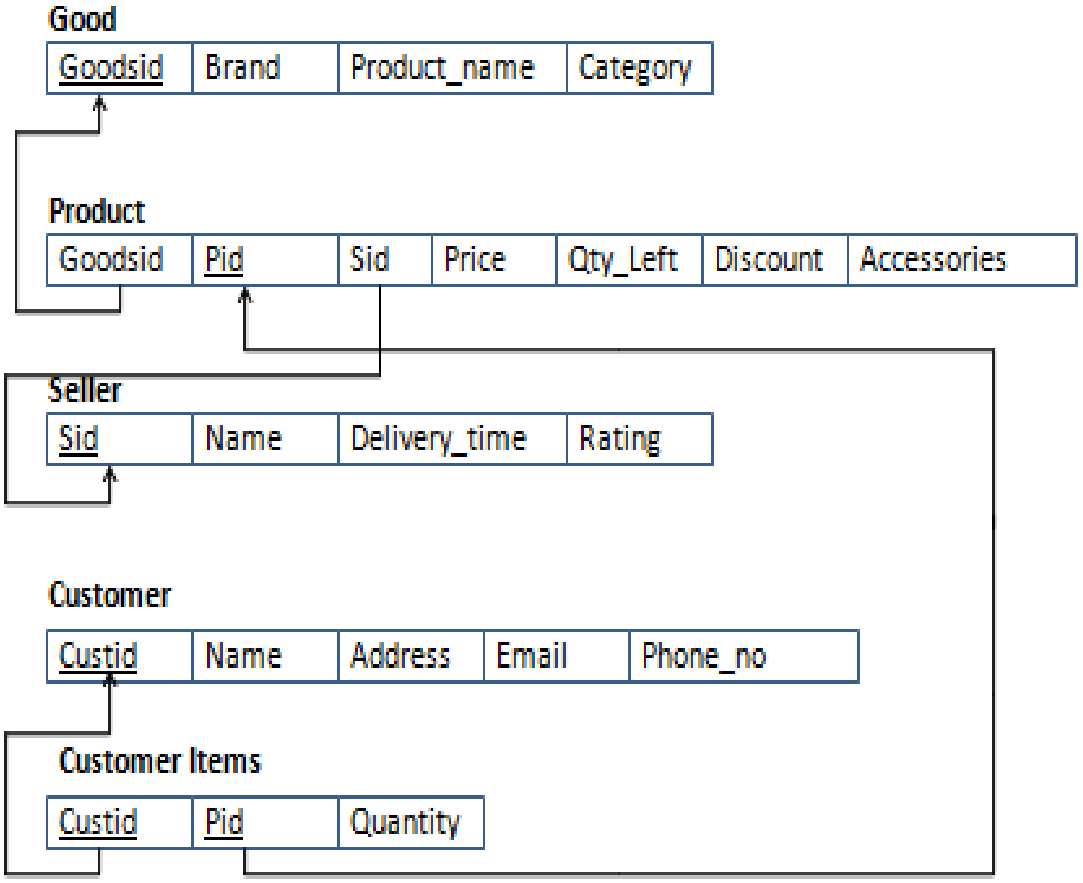
ER Diagram

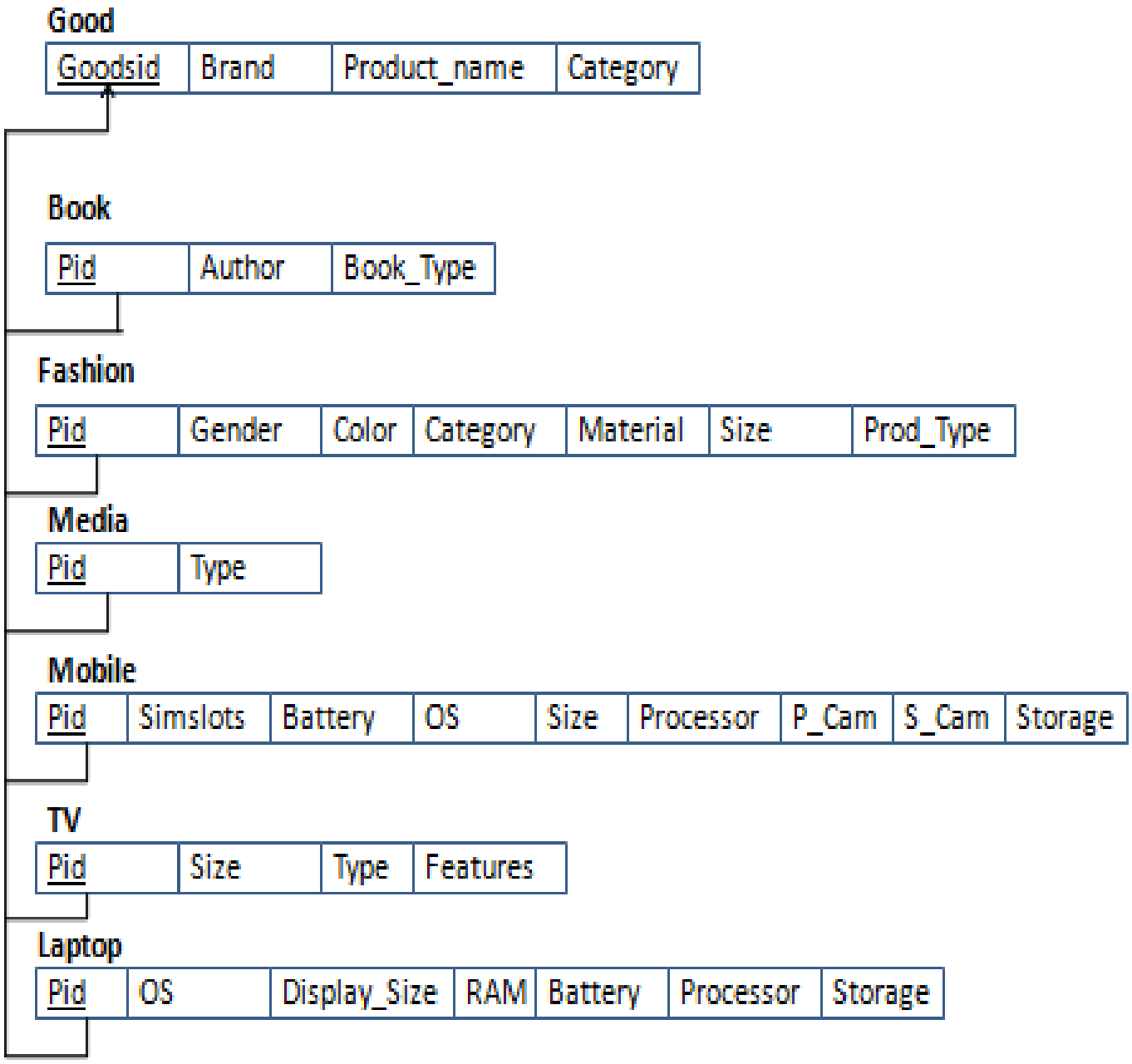

e-mail
phoneno
name
CUSTOMER
address
pwd
Username
custid
m
BUYS
n
Category
GOODS
brand
goodsid
m
SOLD BY
n
1
HAS
1
1
CONTAINS
n
SHOPPING CART
custid
item bought
Pid
qty
Sid
SELLER
rating
name
delivery time

EER Diagram


brand
product - name
category
GOODS
pid
d
processor
Simslots
material
battery
storage
TV
MEDIA
BOOK
color
FASHION
LAPTOP
Processor
MOBILE
display size
features
media type
author
type
size
storage
OS
storage
OS
display type
book type
gender
RAM
primary camera
battery
display size
secondary camera
display size
price
accessories
qty - left
PRODUCT
discount
BUYS
Sid
goodsid
Pid
SOLD BY
Sid
name
phoneno
pwd
SELLER
Name
email
CUSTOMER
address
CONTAINS
delivery time
rating
username
Custid
HAS
SHOPPING CART
Custid
Items Bought
qty
Pid

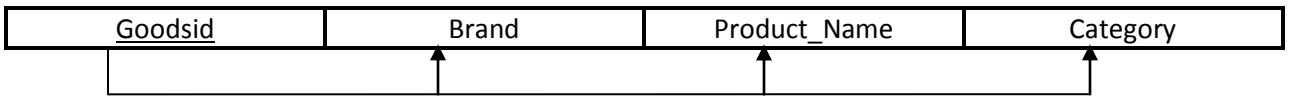
Relational Schema



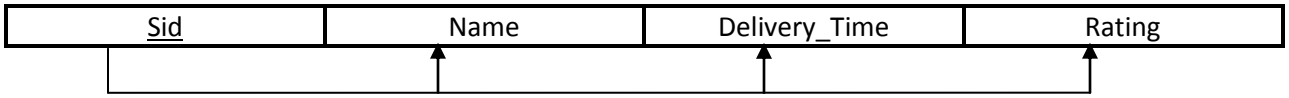

Good
Goodsid
Brand
Product_name
Category
Book
Pid
Author
Book_Type
Fashion
Pid
Gender
Color
Category
Material
Size
Prod_Type
Media
Pid
Type
Mobile
Pid
Simslots
Battery
OS
Size
Processor
P_Cam
S_Cam
Storage
TV
Pid
Size
Type
Features
Laptop
Pid
OS
Display_Size
RAM
Battery
Processor
Storage

Functional Dependencies

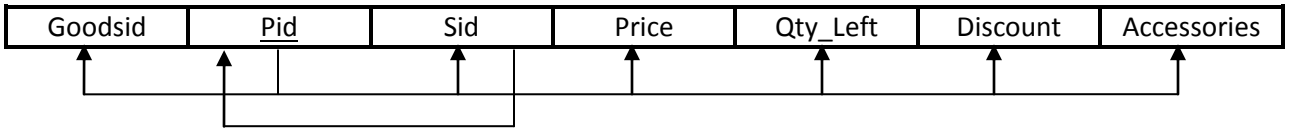
Goods



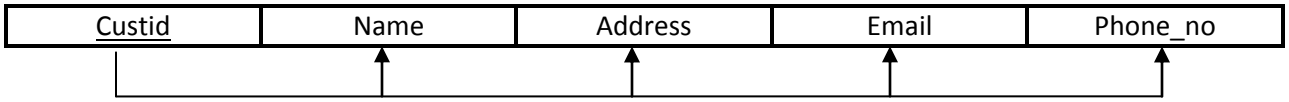
Seller



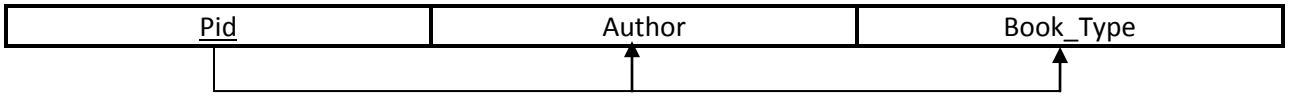
Product



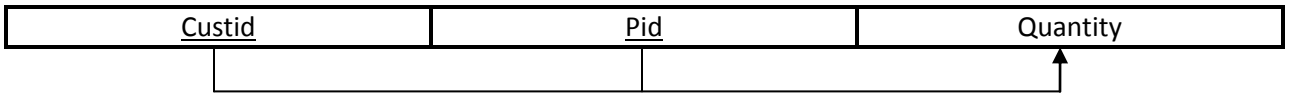
Customer



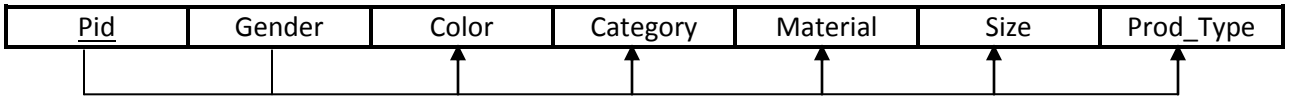
Book



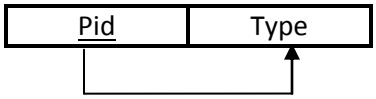
Customer Items



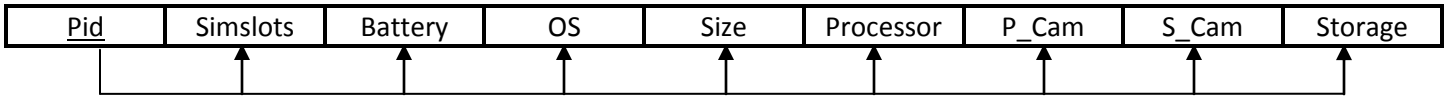
Fashion



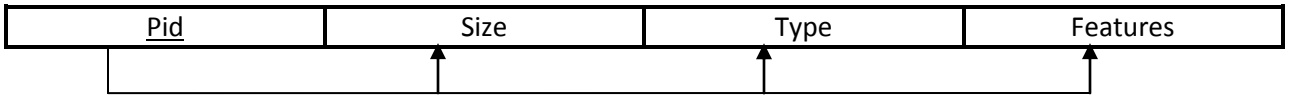
Media



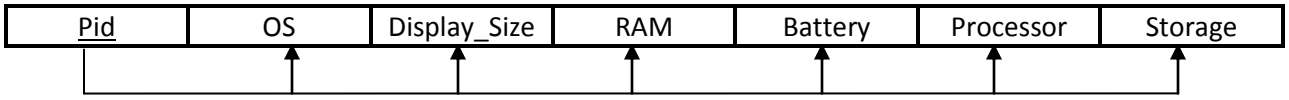
Mobile



TV



Laptop



NORMALIZATION

We check each of the tables in the database for the various levels of Normalization.

(Up to a maximum of BCNF)

1. **Goods**
   - 1NF: Yes. The given relation does not have any multi-valued or composite attributes. Hence it is in 1NF.
   - 2NF: Yes. The primary key *PID* is a single attribute. Hence it is obviously in 2NF.
   - 3NF: PID -> {Brand, Product_Name, Category}
     For all non-trivial functional dependencies X -> A, X is a superkey. Hence the given relation is in 3NF.
   - BCNF: Yes. For all non-trivial functional dependencies X -> A, X is a superkey. Hence the given relation is in BCNF.
2. **Seller**
   - 1NF: Yes. The given relation does not have any multi-valued or composite attributes. Hence it is in 1NF.
   - 2NF: Yes. The primary key *Sid* is a single attribute. Hence it is obviously in 2NF.
   - 3NF: Yes. Sid -> {Name, Delivery Time, Rating}
     For all non-trivial functional dependencies X -> A, X is a superkey. Hence the given relation is in 3NF.
   - BCNF: Yes. For all non-trivial functional dependencies X -> A, X is a superkey. Hence the given relation is in BCNF.
3. **Product**
   - 1NF: Yes. The given relation does not have any multi-valued or composite attributes. Hence it is in 1NF.
   - 2NF: Yes. The primary key *Pid* is a single attribute. Hence it is obviously in 2NF.
   - 3NF: Yes. Pid -> {Price,Qty_left,Goodsid,Sid,Discount,Accessories}.
   - Sid -> Pid.
     For all non-trivial functional dependencies X -> A, X is a superkey or A is a prime attribute(second dependancy). Hence the given relation is in 3NF.
   - BCNF: No. Because of the second functional Dependancy.
4. **Customer**
   - 1NF: Yes. The given relation does not have any multi-valued or composite attributes. Hence it is in 1NF.
   - 2NF: Yes. The primary key *Custid* is a single attribute. Hence it is obviously in 2NF.
   - 3NF: Yes. Sid -> {Name, Address,E-mail,Phoneno,Username,Pwd}

For all non-trivial functional dependencies X -> A, X is a superkey. Hence the given relation is in 3NF.

- BCNF: Yes. For all non-trivial functional dependencies X -> A, X is a superkey. Hence the given relation is in BCNF.

5. **Customer Items**
   - 1NF: Yes. The given relation does not have any multi-valued or composite attributes. Hence it is in 1NF.
   - 2NF: Yes. The attribute qty is fully functionally dependant on the primary key *{CustId,Pid}.*
   - 3NF: Yes. *{CustId,Pid}.* -> {Qty}
     For all non-trivial functional dependencies X -> A, X is a superkey. Hence the given relation is in 3NF.
   - BCNF: Yes. For all non-trivial functional dependencies X -> A, X is a superkey. Hence the given relation is in BCNF.
6. **Book**
   - 1NF: Yes. The given relation does not have any multi-valued or composite attributes. Hence it is in 1NF.
   - 2NF: Yes. The primary key *Pid* is a single attribute. Hence it is obviously in 2NF.
   - 3NF: Yes. Pid -> {Book_Type,Author}
     For all non-trivial functional dependencies X -> A, X is a superkey. Hence the given relation is in 3NF.
   - BCNF: Yes. For all non-trivial functional dependencies X -> A, X is a superkey. Hence the given relation is in BCNF.
7. **Fashion**
   - 1NF: Yes. The given relation does not have any multi-valued or composite attributes. Hence it is in 1NF.
   - 2NF: Yes. All non prime attributes are fully functionally dependant on the primary key *{Pid,Gender}.*
   - 3NF: Yes. *{Pid,Gender}* -> {Color,Material,Size,Prod_Type}
     For all non-trivial functional dependencies X -> A, X is a superkey. Hence the given relation is in 3NF.
   - BCNF: Yes. For all non-trivial functional dependencies X -> A, X is a superkey. Hence the given relation is in BCNF.
8. **Media**
   - 1NF: Yes. The given relation does not have any multi-valued or composite attributes. Hence it is in 1NF.
   - 2NF: Yes. The primary key *Pid* is a single attribute. Hence it is obviously in 2NF.
   - 3NF: Yes. Pid -> {Media_Type}
     For all non-trivial functional dependencies X -> A, X is a superkey. Hence the given relation is in 3NF.

- BCNF: Yes. For all non-trivial functional dependencies X -> A, X is a superkey. Hence the given relation is in BCNF.

9. Mobile

- 1NF: Yes. The given relation does not have any multi-valued or composite attributes. Hence it is in 1NF.
- 2NF: Yes. The primary key *Pid* is a single attribute. Hence it is obviously in 2NF.
- 3NF: Yes. Pid -> {Simslots,Battery,OS,Size,Processor,Primary_Camera,Secondary_Camera,Display_Size,Storage}
  For all non-trivial functional dependencies X -> A, X is a superkey. Hence the given relation is in 3NF.
- BCNF: Yes. For all non-trivial functional dependencies X -> A, X is a superkey. Hence the given relation is in BCNF.

10. TV

- 1NF: Yes. The given relation does not have any multi-valued or composite attributes. Hence it is in 1NF.
- 2NF: Yes. The primary key *Pid* is a single attribute. Hence it is obviously in 2NF.
- 3NF: Yes. Pid -> {Display_Size,Display_Type,Features}
  For all non-trivial functional dependencies X -> A, X is a superkey. Hence the given relation is in 3NF.
- BCNF: Yes. For all non-trivial functional dependencies X -> A, X is a superkey. Hence the given relation is in BCNF.

11. Laptop

- 1NF: Yes. The given relation does not have any multi-valued or composite attributes. Hence it is in 1NF.
- 2NF: Yes. The primary key *Pid* is a single attribute. Hence it is obviously in 2NF.
- 3NF: Yes. Pid -> {Battery,OS,Display_Size,Processor,RAM,Storage}
  For all non-trivial functional dependencies X -> A, X is a superkey. Hence the given relation is in 3NF.
- BCNF: Yes. For all non-trivial functional dependencies X -> A, X is a superkey. Hence the given relation is in BCNF.

List of Entity Types

Goods

This table has details of all the Goods in the Database.

Attribute	Data Type	Key Type	Characteristics
Brand	Varchar(10)		
Product_Name	Varchar(20)		
Pid	Integer	Primary key	Positive Integer
Category	Varchar(20)		

Seller

This table has the details of all the Sellers in the database.

Attribute	Data Type	Key Type	Characteristics
Sid	Varchar(20)	Primary key	
Name	Varchar(20)		Unique
Delivery_Time	Integer		Positive Integer
Rating	Integer		Positive Integer

Product

This table has the details of all products being sold.

Attribute	Data Type	Key Type	Characteristics
Pid	Varchar(20)	Primary key	
Goodsid	Integer	Foreign Key referring to Goods table on Goods.Pid	Positive Integer
Sid	Varchar(20)	Foreign Key referring to Seller Table on Seller.Sid	
Price	Integer		Positive Integer
Qty_Left	Integer		Positive Integer
Disount	Integer		Positive Integer
Accessories	Varchar(60)		

Customer

This table has the details of all customers who have registered with the website.

Attribute	Data Type	Key Type	Characteristics
Name	Varchar(20)		
Address	Varchar(50)		

Username	Varchar(20)		Unique
Email	Varchar(20)		Unique
Phone no	Integer		Positive Integer
Custid	Varchar(20)	Primary key	
PWD	Varchar(20)		

Customer Items

This table has the shopping cart of all the customers.

Attribute	Data Type	Key Type	Characteristics
Custid	Varchar(20)	Combination of Custid and Pid is Primary Key	
Pid	Varchar(20)		
Qty	Integer		Positive Integer

Book

This table has the specifications of all books being sold.

Attribute	Data Type	Key Type	Characteristics
Author	Varchar(20)		
Pid	Integer	Primary Key,Foreign Key referring Goods Table on Goods.Pid	Positive Integer
Book_Type	Varchar(20)		

Fashion

This table has the specifications of all fashion apparel being sold.

Attribute	Data Type	Key Type	Characteristics
Pid	Integer	Foreign Key referring Goods Table on Goods.Pid	Combination of Pid and Gender is unique, Positive Integer
Gender	Varchar(6)		
Color	Varchar(10)		
Material	Varchar(10)		
Size	Varchar(10)		
Product_Type	Varchar(20)		

Media

This table has the specifications of all Media being sold.

Attribute	Data Type	Key Type	Characteristics
Pid	Integer	Primary Key,Foreign Key referring Goods Table on Goods.Pid	Positive Integer
Media_Type	Varchar(20)		

Mobile

This table has the specifications of all Mobiles being sold.

Attribute	Data Type	Key Type	Characteristics
Pid	Integer	Primary Key,Foreign Key referring Goods Table on Goods.Pid	Positive Integer
Simslots	Integer		Positive Integer
Battery	Varchar(10)		
OS	Varchar(10)		
Processor	Varchar(20)		
Storage	Varchar(10)		
Secondary_Camera	Varchar(10)		
Primary_Camera	Varchar(10)		
Display_Size	Varchar(10)		

TV

This table has the specifications of all TVs being sold.

Attribute	Data Type	Key Type	Characteristics
Pid	Integer	Primary Key,Foreign Key referring Goods Table on Goods.Pid	
Display_Size	Varchar(10)		
Display_Type	Varchar(10)		
Features	Varchar(50)		

Laptop

This table has the specifications of all Laptops being sold.

Attribute	Data Type	Key Type	Characteristics
Pid	Integer	Primary Key,Foreign Key referring Goods Table on Goods.Pid	
Battery	Varchar(20)		

OS	Varchar(20)		
Processor	Varchar(20)		
Storage	Varchar(10)		
RAM	Varchar(10)		
Display_Size	Varchar(20)		

All Columns are NOT NULL unless explicitly mentioned..