***Normalization on Tables:***

Customer

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cnic[PK] | Name | Password | Postal Code | Address | Contact No | Email | Gender | Credit  Card | Total Payment | Items ID | Category | Brand | Size | Design | Price | Delivery |
| 8080 | Umair Ali | 1234 | 10250 | Mirpur AJK | 03456787654 | [umi@gmail.com](mailto:umi@gmail.com) | Male | 5674 | 2500 | 1 | Cap | Puma | Small | Formal | 2500 | 27-12-2021 |
| 8081 | Ahsan Zia | 7896 | 45600 | Islamabad | 03423457896 | [A324@gmail.com](mailto:A324@gmail.com) | Male | 7864 | 4500 | 56, 104 | Shoes, shirt | Nike, Everlane | Medium, Small | Sports, Dress | 3000, 1500 | 29-12-2021 |
| 8082 | Umar Rauf | 5637 | 40050 | Lahore | 03458765987 | umarr@yahoo.com | Male | 9875 | 4000 | 156 | Jeans | Lee | Large | Tight | 4000 | 01-01-2022 |

We would face update delete anomalies with Items ordered as each customer can order more than one item so it is a multivalued attribute and all respective fields also. So for our table to be in 1NF we will make all entries atomic.

Customer

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cnic[PK] | Name | Password | Postal Code | Address | Contact No | Email | Gender | Credit  Card | Total Payment | Items ID | Category | Brand | Size | Design | Price | Delivery |
| 8080 | Umair Ali | 1234 | 10250 | Mirpur AJK | 03456787654 | [umi@gmail.com](mailto:umi@gmail.com) | Male | 5674 | 2500 | 1 | Cap | Puma | Small | Formal | 2500 | 27-12-2021 |
| 8081 | Ahsan Zia | 7896 | 45600 | Islamabad | 03423457896 | [A324@gmail.com](mailto:A324@gmail.com) | Male | 7864 | 4500 | 56 | Shoes | Nike | Medium | Sports | 3000 | 29-12-2021 |
| 8081 | Ahsan Zia | 7896 | 45600 | Islamabad | 03423457896 | [A324@gmail.com](mailto:A324@gmail.com) | Male | 7864 | 4500 | 104 | shirt | Everlane | Small | Dress | 1500 | 29-12-2021 |
| 8082 | Umar Rauf | 5637 | 40050 | Lahore | 03458765987 | umarr@yahoo.com | Male | 9875 | 4000 | 156 | Jeans | Lee | Large | Tight | 4000 | 01-01-2022 |

Now all the entries are atomic, but we have redundant data as Customer Ahsan Zia is repeated twice and any update in one will have data inconsistency in updating data. And also there is partial dependencies in table as password and item purchased depends on cnic of customer only. To fix this and for our table to be in 2NF we would add a table as login to contain cnic and password and cart that contains all the items customer wants to buy.

Customer

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cnic[PK] | Name | Postal Code | Address | Contact No | Email | Gender | Credit  Card | Total Payment |
| 8080 | Umair Ali | 10250 | Mirpur AJK | 03456787654 | [umi@gmail.com](mailto:umi@gmail.com) | Male | 5674 | 2500 |
| 8081 | Ahsan Zia | 45600 | Islamabad | 03423457896 | [A324@gmail.com](mailto:A324@gmail.com) | Male | 7864 | 4500 |
| 8082 | Umar Rauf | 40050 | Lahore | 03458765987 | [umarr@yahoo.com](mailto:umarr@yahoo.com) | Male | 9875 | 4000 |

Login

|  |  |
| --- | --- |
| Cnic[FK] | Password |
| 8080 | 1234 |
| 8081 | 7896 |
| 8082 | 5637 |

Cart

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Cnic[FK] | Items ID | Category | Brand | Size | Design | Price | Delivery |
| 8080 | 1 | Cap | Puma | Small | Formal | 2500 | 27-12-2021 |
| 8081 | 56 | Shoes | Nike | Medium | Sports | 3000 | 29-12-2021 |
| 8081 | 104 | shirt | Everlane | Small | Dress | 1500 | 29-12-2021 |
| 8082 | 156 | Jeans | Lee | Large | Tight | 4000 | 01-01-2022 |

For Cart table there is transitive dependency as brand, size, price and design depend on item id and item id depends on category so we will break the cart. Furthermore there is transitive dependency in customer also as customer can use multiple card for multiple payment so total payment depends on credit card number and credit card number depends on Customer so a payment table will also be introduced for 3NF.

Customer

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Cnic[PK] | Name | Postal Code | Address | Contact No | Email | Gender |
| 8080 | Umair Ali | 10250 | Mirpur AJK | 03456787654 | [umi@gmail.com](mailto:umi@gmail.com) | Male |
| 8081 | Ahsan Zia | 45600 | Islamabad | 03423457896 | [A324@gmail.com](mailto:A324@gmail.com) | Male |
| 8082 | Umar Rauf | 40050 | Lahore | 03458765987 | [umarr@yahoo.com](mailto:umarr@yahoo.com) | Male |

Payment

|  |  |  |
| --- | --- | --- |
| Cnic[FK] | Credit  Card | Total Payment |
| 8080 | 5674 | 2500 |
| 8081 | 7864 | 4500 |
| 8082 | 9875 | 4000 |

Cart

|  |  |  |  |
| --- | --- | --- | --- |
| Cnic[FK] | Items ID[FK] | Category | Delivery |
| 8080 | 1 | Cap | 27-12-2021 |
| 8081 | 56 | Shoes | 29-12-2021 |
| 8081 | 104 | shirt | 29-12-2021 |
| 8082 | 156 | Jeans | 01-01-2022 |

Products

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Items ID[PK] | Category | Brand | Color | Size | Design | Price |
| 1 | Cap | Puma | Black | Small | Formal | 2500 |
| 56 | Shoes | Nike | Blue | Medium | Sports | 3000 |
| 104 | Shirt | Everlane | Grey | Small | Dress | 1500 |
| 156 | Jeans | Lee | Blue | Large | Tight | 4000 |

After adding few more tables resultant database schema is given next.

# Database Schema:

Customer

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Cnic[PK] | First\_Name | Last\_Name | Postal Code | Address | Contact No | Email | Gender |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

Login

|  |  |
| --- | --- |
| CNIC[FK] | Password |
|  |  |
|  |  |

Payment

|  |  |  |
| --- | --- | --- |
| Cnic[FK] | Credit Card | Total Payment |
|  |  |  |
|  |  |  |

Cart

|  |  |  |  |
| --- | --- | --- | --- |
| Cnic[FK] | Product ID[FK] | Category | Price |
|  |  |  |  |
|  |  |  |  |

Products

|  |  |
| --- | --- |
| Product ID[PK] | Category ID[FK] |
|  |  |
|  |  |

Category

|  |  |  |  |
| --- | --- | --- | --- |
| ID[PM] | Name | Start PID | Max PID |
|  |  |  |  |
|  |  |  |  |

Watches

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ID[PK] | Color | Dial | Brand | Price | Category[ID] |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

Caps

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Items ID[PK] | Category ID[FK] | Brand | Color | Size | Design | Price |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

Jeans

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ItemsID[PK] | Category ID[FK] | Brand | Color | Size | Design | Price |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

Shirts

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Items ID[PK] | Category ID[FK] | Brand | Color | Size | Design | Price |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

Trousers

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Items ID[PK] | Category ID[FK] | Brand | Color | Size | Design | Price |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

Shoes

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Items ID[PK] | Category ID[FK] | Brand | Color | Size | Design | Price |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |