|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CustName** | **Item** | **ShippingAddress** | **Supplier** | **SupplierPhone** | **Cost** |
| David | iPhone13 | Miami | Apple | 1800-121 | 500 |
| Alexis | S22+ | LA | Apple | 1900-131 | 400 |
| Johnny | iPhone13,S10+ | Miami | Apple, Samsung | tollfree | 800 |
| Moira | S22+ | Texas | Samsung | 1900-131 | 400 |

**UN-NORMALIZED TABLE**

**1NF**

* **Single valued attributes**
* **Same data types in each row**
* **Rows must be uniquely identified by a key**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CustID** | **CustName** | **Item** | **ShippingAddress** | **Supplier** | **SupplierPhone** | **Cost** |
| 001 | David | iPhone13 | Miami | Apple | 1800-121 | 500 |
| 002 | Alexis | S22+ | LA | Samsung | 1900-131 | 400 |
| 003 | Johnny | iPhone13 | Miami | Apple | 1800-121 | 500 |
| 003 | Johnny | S10+ | Miami | Samsung | 1900-131 | 300 |
| 004 | Moira | S22+ | Texas | Samsung | 1900-131 | 400 |

**2NF**

* **No partial dependency, i.e., no non-prime attribute should depend on a proper subset of the candidate key.**
* **All non-prime attributes should be fully dependent on the primary key.**

|  |  |  |
| --- | --- | --- |
| **CustID** | **CustName** | **ShippingAddress** |
| 001 | David | Miami |
| 002 | Alexis | LA |
| 003 | Johnny | Miami |
| 004 | Moira | Texas |

|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | **Supplier** | **SupplierPhone** | **Cost** |
| iPhone13 | Apple | 1800-121 | 500 |
| S22+ | Samsung | 1900-131 | 400 |
| S10+ | Samsung | 1900-131 | 300 |

**CustomerDetails ItemsDetails**

Creating a junction/joining table to identify the transactions

**OrderDetails**

|  |  |
| --- | --- |
| **CustID** | **Item** |
| 001 | iPhone13 |
| 002 | S22+ |
| 003 | iPhone13 |
| 003 | S10+ |
| 004 | S22+ |

**3NF**

* **There shouldn’t be transitive dependency.**
* **The columns should be uniquely identified by the key and not by any other column in the table.**
* **Here, there’s 1-1 relationship between Supplier and SupplierPhone.**

**SupplierPhone can be determined by Supplier alone, and does not require Item key to identify it.**

**CustomerDetails ItemsDetails**

|  |  |  |
| --- | --- | --- |
| **Item** | **Supplier** | **Cost** |
| iPhone13 | Apple | 500 |
| S22+ | Samsung | 400 |
| S10+ | Samsung | 300 |

|  |  |  |
| --- | --- | --- |
| **CustID** | **CustName** | **ShippingAddress** |
| 001 | David | Miami |
| 002 | Alexis | LA |
| 003 | Johnny | Miami |
| 004 | Moira | Texas |

**OrderDetails SupplierDetails**

|  |  |
| --- | --- |
| **CustID** | **Item** |
| 001 | iPhone13 |
| 002 | S22+ |
| 003 | iPhone13 |
| 003 | S10+ |
| 004 | S22+ |

|  |  |
| --- | --- |
| **Supplier** | **SupplierPhone** |
| Apple | 1800-121 |
| Samsung | 1900-131 |

**BCNF**

* **For any functional dependency A🡪B**
* **Every determinant in the relation should be a super key.**

**(i.e., if every attribute on the LHS of the relation(determinant) can uniquely identify every tuple of the table).**

* **All anomalies are handled.**
* **No non-prime attribute is determining a prime attribute.**