

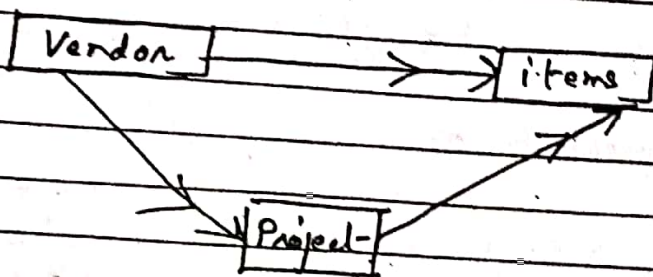
Fourth Normal Form (4NF) - A normal form called 4NF has been defined for relations that have FDs as well as MVDs. Like functional dependencies, multivalued dependencies among attributes of a relation scheme may lead to undesirable updating problems. In order to avoid this Fagin introduced 4NF as an extension of BCNF.

4NF eliminates cases in which the composite key of a second type contains two or more data items that are independent & multivalued. The fields are independent, if there are no combinations that are logically related.

Consider a vendor supplying many items to many projects in an organisation with following assumptions:

- i) A vendor is capable of supplying many items
- ii) A project uses many items.
- iii) A vendor supplies to many projects.
- iv) An item may be supplied many vendors.

Functional dependency can be shown as,



Consider the relation supply with following attributes-

Vendorcode	Projectcode	Itemcode
V1	P1	I1
V1	P1	I2
V1	P2	I1
V2	P2	I2
V3	P3	I3

+ Vendor V1 has to supply to project P3 but the item is not decided yet, then a row with blank itemcode is to be introduced. To avoid to overcome this problem the relation Supply can be expressed into two relations

- i) Vendor-supply (Vendorcode, itemcode)
- ii) Vendor-project (Vendorcode, projectcode)

Vendor supply

Vendorcode	Itemcode
V1	I1
V1	I2
V2	I2
V3	I3

Vendor-Project

Vendorcode	Projectcode
V1	P1
V1	P2
V2	P2
V3	P3