**CONSUMPTION OF NATURAL GAS IN FERTILIZER INDUSTRIES**



**BTech/II Year CSE/III Semester**

**19CSE202/Database Management Systems**

**Project Review -2**

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**Normalization:**

1. **Write out the relation including all attribute names. Write down all Functional Dependencies.**

**a. Find FD closure and attribute closure**

**b. Determine Canonical Cover**

**c. Determine candidate keys**

**Relations with all the attribute names:**

**R(lic\_no,fact\_no,base\_year,fact\_name,pincode,f\_name,street,indus\_id,percent\_of\_consumption,min\_threshold,density\_level,pipeland,shipland,contact\_no,sector\_id,govt,private,trade\_code,import,export,src\_id,quantity,year,market\_value,fert\_id,composition,exp\_year,excess,deficit,uses)**

**FUNCTIONAL DEPENDENCIES**

**Fertilizer:**

**•** **Lic\_no, -> Fact\_no ,Fact\_name,Base Year , Street , Pincode**

**•** **Fact\_no,Fact\_name->Base Year,Street,Pincode (AS there would be same**  **factory names )**

**•** **Base Year -> Fact\_name,Street**

**Natural Gas:**

**•** **Indus\_Id -> Pipeland,Ship,% of consumption,density level, Min\_Threshold,**  **Density level**

**•** **% of consumption -> density level**

**•** **Min\_Threshold Density level -> Pipeland,Ship**

**Consumes:**

**•** **Lic\_no->Indus\_Id**

**•** **Indus\_id->Lic\_no**

**Contact\_info:**

**•** **Lic\_no -> Contact\_No ( 1NF and check in ER )**

**Sector\_Info:**

**•** **Sector\_id -> Govt,Private**

**International Trade:**

**•** **Trade\_Code -> Import**

**•** **Trade\_Code -> Export**

**Performing:**

**•** **Sector\_id -> Trade\_Code**

**Source:**

**•** **Src\_id -> Quantity**

**CLOSURES:**

**Table 1:**

**•** **(Lic\_No)+ = { Lic\_No ,Fact\_no ,Fact\_name,Base Year , Street , Pincode}**

**•** **(Fact\_no,Fact\_name)+ = { Fact\_no,Fact\_name, Base Year,Street,Pincode }**

**•** **(Base Year)+ = { Base Year ,Fact\_name,Street}**

**Table 2 :**

**•** **(Indus\_Id)+ = { Indus\_Id , Pipeland , Ship,% of consumption ,density level**  **}**

**•** **(% of consumption)+ = {% of consumption , density level }**

**•** **(Min\_Threshold Density level)+= { Min\_Threshold Density level ,Pipeland**  **,Ship }**

**Table 3:**

**•** **(Lic\_no)+ = { Lic\_no,Indus\_id}**

**•** **(Indus\_id)+ = { Indus\_id , Lic\_no, }**

**Table 4:**

**•** **(Lic\_no)+ = { Lic\_no ,Contact\_No }**

**Table 5:**

**•** **(Sector\_id)+ = { Sector\_id,Govt,Private }**

**Table 6:**

**•** **(Trade\_Code)+ = { Trade\_Code,Import,Export }**

**Table 7:**

**•** **(Sector\_id)+ = { Sector\_id,Trade\_code) }**

**Table 8:**

**•** **(Src\_id)+= { Src\_id ,Quantity }**

**Table 9:**

**•** **(Year)+ = { Year,Market Value,Quantity }**

**Table 10:**

**•** **(Fert\_id)+ = { Fert\_id , Composotion , Exp\_Year , Excess , Deficit ,Uses }**

**Yearly Report:**

**•** **Year -> Market Value ,Quantity**

**Production of Fertilizers :**

**•** **Fert\_id -> Composition , Exp year , Excess , Deficit**

**•** **Exp\_Year -> Excess , deficit .**

**•** **Compostion , Exp\_Year -> Uses**

**CANDIDATE KEY:**

**The candidate Key for the whole table is**

**(Lic\_no , Indus\_id , Sector\_id , Src\_id , Year , Fert\_id )**

**MINIMAL COVER:**

**Minimal Cover for each tables :**

**Table 1 :**

**•** **Lic\_no -> Fact\_no**

**•** **Lic\_no -> Base Year**

**•** **Fact\_no , Fact\_name -> Base Year**

**•** **Fact\_no , Fact\_name -> Pincode**

**•** **Base Year -> F\_name**

**•** **Base Year -> Street**

**Table 2:**

**•** **Indus\_id -> % of consumption**

**•** **Indus\_id -> Min\_Threshold Density Level**

**•** **% of consumption -> density level**

**•** **Min\_Threshold Density Level -> Pipeland**

**•** **Min\_Threshold Density Level -> Shipland**

**Table 3:**

**•** **Lic\_no->Indus\_Id**

**•** **Indus\_id->Lic\_no**

**Table 4:**

**•** **Lic\_no -> Contact\_No**

**Table 5:**

**•** **Sector\_id -> Govt**

**•** **Sector\_id -> Private**

**Table 6:**

**•** **Trade\_code -> import**

**•** **Trade\_code -> export**

**Table 7:**

**•** **Sector\_id -> trade\_code**

**Table 8:**

**•** **Src\_id -> quantity**

**Table 9:**

**•** **Year -> market\_value**

**•** **Year -> quantity**

**Table 10:**

**•** **Fert\_id -> composition**

**•** **Fert\_id -> exp\_year**

**•** **Exp\_year -> excess**

**•** **Exp\_year -> deficit**

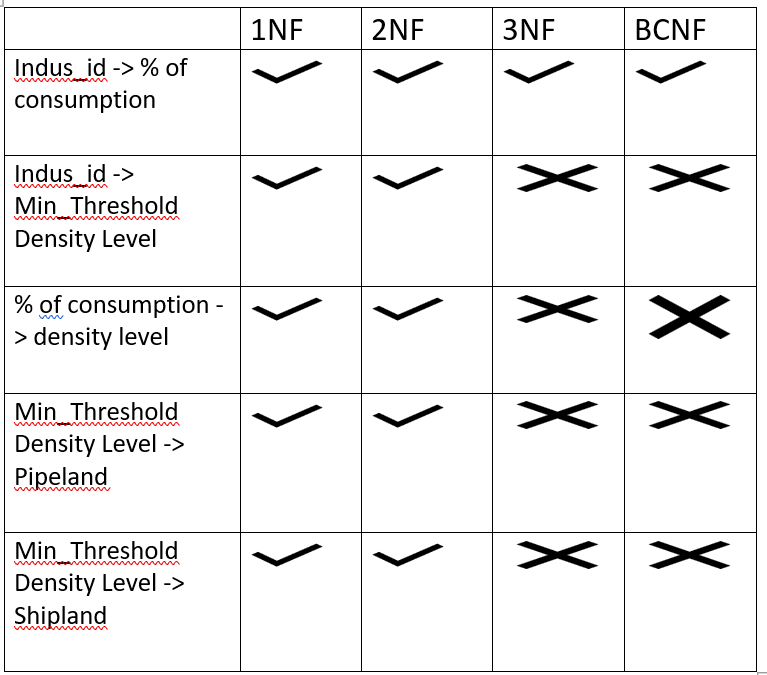
**•** **Composition, exp\_year -> uses**

1. **Check if it is in First normal form**
2. **Identify the Partial dependencies and decompose the table and check if it is 2NF**
3. **Check Transitive dependencies and decompose the table and check if it is 3NF**
4. **If possible, normalize to BCNF.**

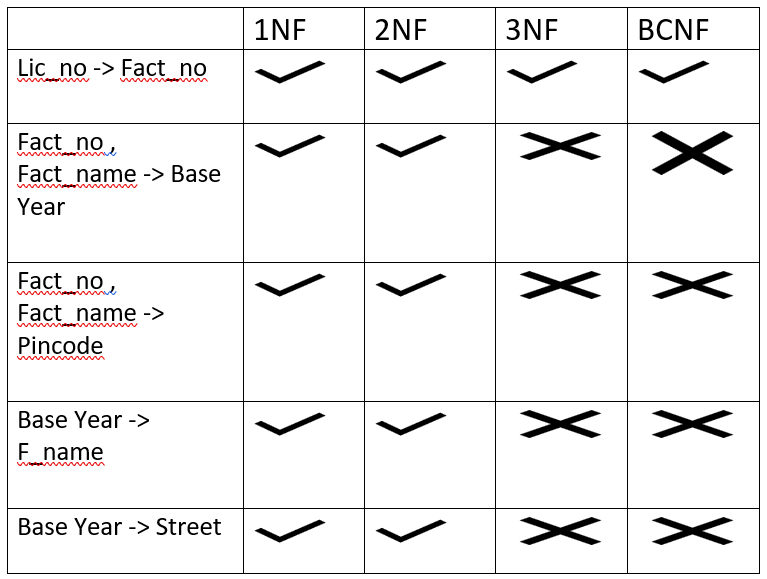
**Normalization:**

**First normal form, Second normal form**

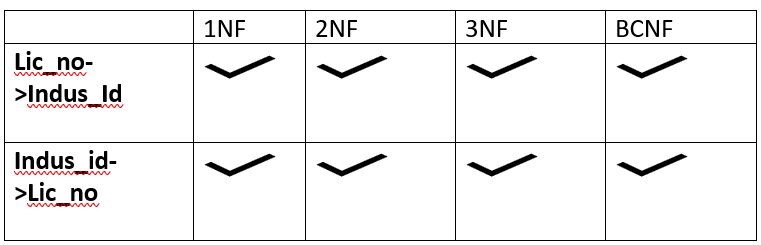
**Table 1: 2NF**



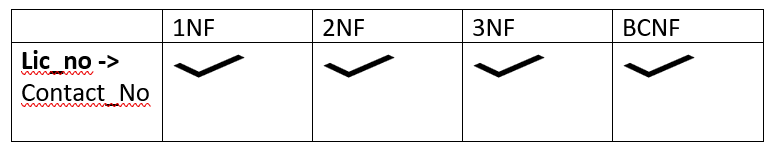
**Table 2: 2NF**



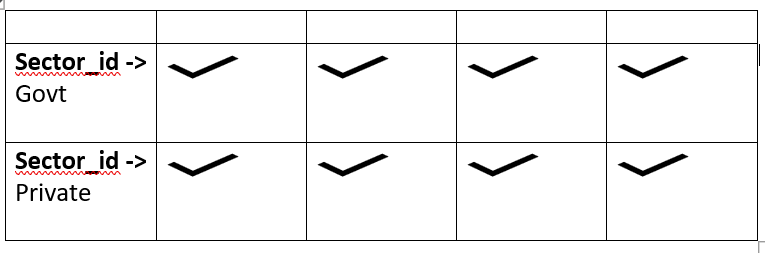
**Table 3: BCNF**



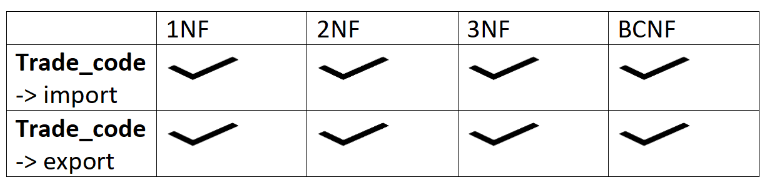
**Table 4: BCNF**



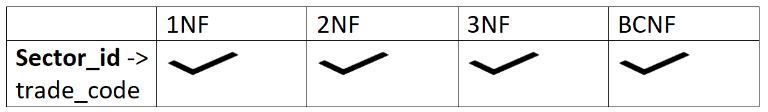
**Table 5: BCNF**



**Table 6: BCNF**



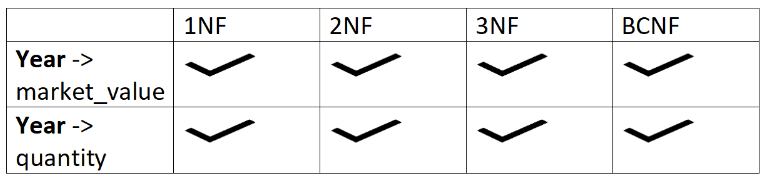
**Table 7: BCNF**



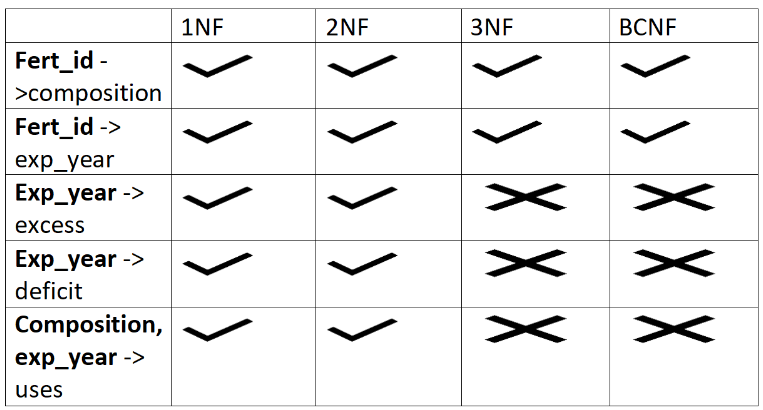
**Table 8: BCNF**



**Table 9: BCNF**



**Table 10: 2NF**



**The table, considered one as a whole is in 2NF, now we have to convert it into 3NF and then to BCNF**

**FUNCTIONAL DEPENDENCIES in 3NF:**

**lic\_no -> fact\_no,base\_year,contact\_no**

**fact\_name,fact\_no -> base\_year,pincode**

**base\_year -> street,fact\_name**

**indus\_id -> percent\_of\_consumption,min\_threshold**

**percent\_of\_consumption -> density\_level**

**min\_threshold -> shipland,pipeland**

**sector\_id -> trade\_code,private,govt**

**trade\_code -> export,import**

**src\_id -> quantity**

**year -> quantity,market\_value**

**fert\_id -> composition,exp\_year**

**exp\_year -> deficit,excess**

**composition,exp\_year -> uses**

**lic\_no -> indus\_id**

**indus\_id -> lic\_no**

**3NF RELATIONS:**

**R1 (Lic\_no,contact\_no,base\_year,fact\_no)**

**R2 (fact\_no,fact\_name,pincode,base\_year)**

**R3 (base\_year,street,fact\_name)**

**R4 (indus\_id,percent\_of\_consumption,min\_threshold)**

**R5 (percent\_of\_consumption,density\_level)**

**R6 (min\_threshold,shipland,pipeland)**

**R7 (sector\_id,trade\_code,private,govt)**

**R8 (trade\_code,export,import)**

**R9 (src\_id,quantity)**

**R10 (year,quantity,market\_value)**

**R11 (fert\_id,composition,exp\_year)**

**R12 (exp\_year,deficit,excess)**

**R13 (composition,exp\_year,uses)**

**R14 (lic\_no,indus\_id)**

**Candidate Key:**

**{fact\_name, sector\_id, src\_id, year, fert\_id, lic\_no}**

**{fact\_name, sector\_id, src\_id, year, fert\_id, indus\_id}**

**CONVERSION TO BCNF:**

**lic\_no -> fact\_no,base\_year,contact\_no**

|  |  |
| --- | --- |
| **Lic\_no, fact\_no, base\_year, contact\_no** | **Lic\_no, fact\_name, pincode, f\_name, street, indus\_id, percent\_of\_consumption, min\_threshold, density\_level, pipeland, shipland, sector\_id, govt, private, trade\_code, import, export, src\_id, quantity, year, market\_value, fert\_id, composition, exp\_year, excess, deficit, uses** |

**indus\_id -> percent\_of\_consumption,min\_threshold**

|  |  |
| --- | --- |
| **Indus\_id, percent\_of\_consumption, min\_threshold** | **Lic\_no, fact\_name, pincode, f\_name, street, indus\_id, density\_level, pipeland, shipland, sector\_id, govt, private, trade\_code, import, export, src\_id, quantity, year, market\_value, fert\_id, composition, exp\_year, excess, deficit, uses** |

**sector\_id -> trade\_code,private,govt**

|  |  |
| --- | --- |
| **Sector\_id, trade\_code, private, govt** | **Lic\_no, fact\_name, pincode, f\_name, street, indus\_id, density\_level, pipeland, shipland, sector\_id, import, export, src\_id, quantity, year, market\_value, fert\_id, composition, exp\_year, excess, deficit, uses** |

**src\_id -> quantity**

|  |  |
| --- | --- |
| **Src\_id, quantity** | **Lic\_no, fact\_name, pincode, f\_name, street, indus\_id, density\_level, pipeland, shipland, sector\_id, import, export, src\_id, year, market\_value, fert\_id, composition, exp\_year, excess, deficit, uses** |

**fert\_id -> composition,exp\_year**

|  |  |
| --- | --- |
| **Fert\_id, composition, exp\_year** | **Lic\_no, fact\_name, pincode, f\_name, street, indus\_id, density\_level, pipeland, shipland, sector\_id, import, export, src\_id, year, market\_value, fert\_id, excess, deficit, uses** |

**lic\_no -> indus\_id**

|  |  |
| --- | --- |
| **Lic\_no, indus\_id** | **Lic\_no, fact\_name, pincode, f\_name, street, density\_level, pipeland, shipland, sector\_id, import, export, src\_id, year, market\_value, fert\_id, excess, deficit, uses** |

**Therefore, at the end of the BCNF conversion, we’re left with 6 tables, and their relations are like:**

**R1( Lic\_no, fact\_no, base\_year, contact\_no )**

**R2( Indus\_id, percent\_of\_consumption, min\_threshold )**

**R3( Sector\_id, trade\_code, private, govt )**

**R4( Src\_id, quantity )**

**R5( Fert\_id, composition, exp\_year )**

**R6( Lic\_no, indus\_id )**

# **CREATION OF TABLES**

# **USER INTERFACE DESIGN**

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