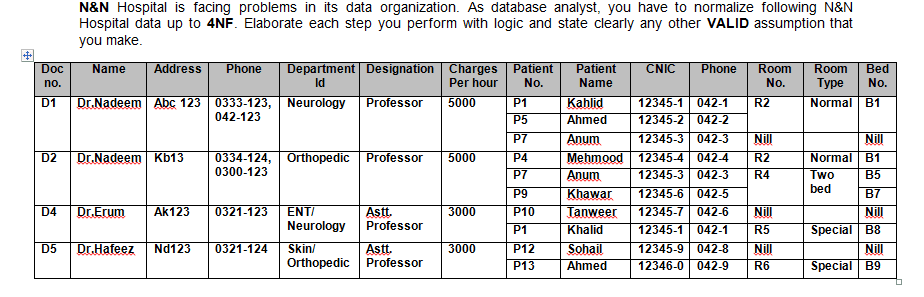
Assignment By – raghav Mandowara, group2 banglore.



**1NF:**

The table contains multivalue attributes so we will have to add rows to remove multivalue in a cell.

So the table will look like –

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Doc.No. | Name | Address | Phone | Department Id | Designnation | Charges Per hour | Patient No. | Patient Name | CNIC | Phone | Room No. | Room Type | Bed No. |
| D1 | Dr. Nadeem | Abc 123 | 0333-123 | Neurology | Professor | 5000 | P1 | Kahlid | 12345-1 | 042-1 | R2 | Normal | B1 |
| D1 | Dr. Nadeem | Abc 123 | 042-123 | Neurology | Professor | 5000 | P1 | Kahlid | 12345-1 | 042-1 | R2 | Normal | B1 |
| D1 | Dr. Nadeem | Abc 123 | 0333-123 | Neurology | Professor | 5000 | P5 | ahmed | 12345-2 | 042-2 | R2 | Normal | B1 |
| D1 | Dr. Nadeem | Abc 123 | 042-123 | Neurology | Professor | 5000 | P5 | ahmed | 12345-2 | 042-2 | R2 | Normal | B1 |
| D1 | Dr. Nadeem | Abc 123 | 0333-123 | Neurology | Professor | 5000 | P7 | anum | 12345-3 | 042-3 | NILL |  | NILL |
| D1 | Dr. Nadeem | Abc 123 | 042-123 | Neurology | Professor | 5000 | P7 | anum | 12345-3 | 042-3 | NILL |  | NILL |

For each value a unique row will be created. The same will be followed for doc no. D2,D4,D5.

Primary Key for the table – (doc no. patient No.)

The combination of both can uniquely identify each row.

**2NF:**

For database to be in 2NF there should be no partial dependency.

But in the above table partial dependencies are present.

1. Phone -> Doctor No., name, address, department Id, designation, charges per hour (**Assumption that every phone number is unique to a doctor**)
2. Patient No. -> patient name, CNIC, phone
3. (Doc No., patient No.) -> room No., bed No., Room No. ,room Type

So we will divide the table in 3 tables.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Phone | Doc No. | Name | Address | Department Id | Designation | Charges per hour |
| 0333-123 | D1 | Dr. Nadeem | Abc123 | Neurology | Professor | 5000 |
| 042-123 | D1 | Dr. Nadeem | Abc123 | Neurology | Professor | 5000 |
| 0334-124 | D2 | Dr. Nadeem | Kb13 | Orthopedic | Professor | 5000 |
| 0300-123 | D2 | Dr. Nadeem | Kb13 | Orthopedic | Professor | 5000 |
| 0321-123 | D4 | Dr. Erum | Ak123 | ENT/Neurology | Astt. Professor | 3000 |
| 0321-124 | D5 | Dr. Hafeez | Nd123 | Skin/Orthopedic | Astt. Professor | 3000 |

Doctor table

|  |  |  |  |
| --- | --- | --- | --- |
| Patient No. | Patient Name | CNIC | Phone |
| P1 | Kahlid | 12345-1 | 042-1 |
| P5 | Ahmed | 12345-2 | 042-2 |
| P7 | Anum | 12345-3 | 042-3 |
| P4 | Mehmood | 12345-4 | 042-4 |
| P9 | Khawar | 12345-6 | 042-5 |
| P10 | Tanweer | 12345-7 | 042-6 |
| P12 | Sohali | 12345-9 | 042-8 |
| P13 | Ahmed | 12346-0 | 042-9 |

Patient Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Doc No. | Patient No. | room No. | Room Type | bed No. |
| D1 | P1 | R2 | Normal | B2 |
| D1 | P5 | R2 | Normal | B2 |
| D2 | P4 | R2 | Normal | B1 |
| D2 | P7 | R4 | Two Bed | B5 |
| D2 | P9 | R4 | Two Bed | B7 |
| D4 | P1 | R5 | Special | B8 |
| D5 | P13 | R6 | Special | B9 |

Bed Allocation table

Now in Any table there is no partial dependency. So we can say the database is in 2NF.

**3NF:**

3NF states that in any table there should be no transitive dependency.

**In table doctor** we can see that the charges per hour functionally depends on the designation.

Designation -> charges per hour (neither Designation is a superkey nor charges per hour is a prime attribute)

And Name,Address,Department Id, Designation functionally depends on Doc. No.

Doc No -> Name,Address,Department Id, Designation Id (neither Doc No. is superkey nor RHS is prime attribute)

And designation depends on Name. (nonprime attribute -> non prime attribute)

So we will divide the table in 3 tables as follow

Doc No -> Name,Address,Department Id, Designation Id

Designation Id -> Designation, charges per hour

Phone No. -> Doc. No.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Doc No. | Name | Address | Department Id | Designation Id |
| D1 | Dr. Nadeem | Abc123 | Neurology | 1 |
| D2 | Dr. Nadeem | Kb13 | Orthopedic | 1 |
| D4 | Dr. Erum | Ak123 | ENT/Neurology | 2 |
| D5 | Dr. Hafeez | Nd123 | Skin/Orthopedic | 2 |

Doctor1 table

|  |  |
| --- | --- |
| Phone | Doc No. |
| 0333-123 | D1 |
| 042-123 | D1 |
| 0334-124 | D2 |
| 0300-123 | D2 |
| 0321-123 | D4 |
| 0321-124 | D5 |

Phone Table

|  |  |  |
| --- | --- | --- |
| Designation Id | Designation | Charges per hour |
| 1 | Professor | 5000 |
| 2 | Astt. Professor | 3000 |

Charge table

**In table Patient**

Candidate keys - patient Id, CNIC.

We can’t assume phone to be different in patient case. It might be.

So Name depends on patient Id, CNIC. Both are superkey so the table is in 3NF as there is no transitive dependency.

In Bed Allocation Table there is no transitive dependency as both nonprime attribute depends on the primary key i.e. (doctor No. , Patient No.)

**In Bed allocation table** there is a functional dependency where LHS is not super key Nor RHS is a prime attribute.

i.e. Room No-> Room type

so we will divide the table in 2 tables.

|  |  |  |  |
| --- | --- | --- | --- |
| Doc No. | Patient No. | room No. | bed No. |
| D1 | P1 | R2 | B2 |
| D1 | P5 | R2 | B2 |
| D2 | P4 | R2 | B1 |
| D2 | P7 | R4 | B5 |
| D2 | P9 | R4 | B7 |
| D4 | P1 | R5 | B8 |
| D5 | P13 | R6 | B9 |

Bed Allocation table

|  |  |
| --- | --- |
| Room No. | Room type |
| R2 | Normal |
| R4 | Two Bed |
| R5 | Special |
| R6 | Special |

Room table

**BCNF –**

In Doctor1, Bed allocation table, Room table, Phone1, charge, patient table there is no functional dependency x->y where x is not a super key. As all attribute depends on primary key Doc. No. only.

**SUMMERY**

Now we have the following tables-

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Doc No. | Name | Address | Department Id | Designation Id |
| D1 | Dr. Nadeem | Abc123 | Neurology | 1 |
| D2 | Dr. Nadeem | Kb13 | Orthopedic | 1 |
| D4 | Dr. Erum | Ak123 | ENT/Neurology | 2 |
| D5 | Dr. Hafeez | Nd123 | Skin/Orthopedic | 2 |

Doctor1 table

|  |  |
| --- | --- |
| Phone | Doc No. |
| 0333-123 | D1 |
| 042-123 | D1 |
| 0334-124 | D2 |
| 0300-123 | D2 |
| 0321-123 | D4 |
| 0321-124 | D5 |

Phone Table

|  |  |  |
| --- | --- | --- |
| Designation Id | Designation | Charges per hour |
| 1 | Professor | 5000 |
| 2 | Astt. Professor | 3000 |

Charge table

|  |  |  |  |
| --- | --- | --- | --- |
| Patient No. | Patient Name | CNIC | Phone |
| P1 | Kahlid | 12345-1 | 042-1 |
| P5 | Ahmed | 12345-2 | 042-2 |
| P7 | Anum | 12345-3 | 042-3 |
| P4 | Mehmood | 12345-4 | 042-4 |
| P9 | Khawar | 12345-6 | 042-5 |
| P10 | Tanweer | 12345-7 | 042-6 |
| P12 | Sohali | 12345-9 | 042-8 |
| P13 | Ahmed | 12346-0 | 042-9 |

Patient Table

|  |  |  |  |
| --- | --- | --- | --- |
| Doc No. | Patient No. | room No. | bed No. |
| D1 | P1 | R2 | B2 |
| D1 | P5 | R2 | B2 |
| D2 | P4 | R2 | B1 |
| D2 | P7 | R4 | B5 |
| D2 | P9 | R4 | B7 |
| D4 | P1 | R5 | B8 |
| D5 | P13 | R6 | B9 |

Bed Allocation table

|  |  |
| --- | --- |
| Room No. | Room type |
| R2 | Normal |
| R4 | Two Bed |
| R5 | Special |
| R6 | Special |

Room table