

**First Normal Form:**

i) Consider only the unique attribute

ii) Remove the multi valued attribute

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Doc  No | Name | Address | Phone | Department  Id | Designation | Charges  Per hour | Patient  No. | Patient Name | CNIC | Phone | Room No. | Room Type | Bed No. |
| D1 | Dr.  Nadeen | Abc  123 | 0333-123 | Neurology | Professor | 5000 | P1 | Kahlid | 12345-1 | 042-1 | R2 | Normal | B1 |
| D1 | Dr.  Nadeen | Abc  123 | 0333-123 | Neurology | Professor | 5000 | P5 | Ahmed | 12345-2 | 042-2 | R2 | Normal | B1 |
| D1 | Dr.  Nadeen | Abc  123 | 0333-123 | Neurology | Professor | 5000 | P7 | Anum | 12345-3 | 042-3 | Nil |  | Nil |
| D1 | Dr.  Nadeen | Abc  123 | 042-123 | Neurology | Professor | 5000 | P1 | Kahlid | 12345-1 | 042-1 | R2 | Normal | B1 |
| D1 | Dr.  Nadeen | Abc  123 | 042-123 | Neurology | Professor | 5000 | P5 | Ahmed | 12345-2 | 042-2 | R2 | Normal | B1 |
| D1 | Dr.  Nadeen | Abc  123 | 042-123 | Neurology | Professor | 5000 | P7 | Anum | 12345-3 | 042-3 | Nil |  | Nil |
| D2 | Dr.  Nadeen | Kb13 | 0334-124 | Orthopedic | Professor | 5000 | P4 | Mehmood | 12345-4 | 042-4 | R2 | Normal | B1 |
| D2 | Dr.  Nadeen | Kb13 | 0334-124 | Orthopedic | Professor | 5000 | P7 | Anum | 12345-3 | 042-3 | R4 | Two  Bed | B5 |
| D2 | Dr.  Nadeen | Kb13 | 0334-124 | Orthopedic | Professor | 5000 | P9 | Khawar | 12345-6 | 042-5 | R4 | Two  Bed | B7 |
| D2 | Dr.  Nadeen | Kb13 | 0300-123 | Orthopedic | Professor | 5000 | P4 | Mehmood | 12345-4 | 042-4 | R2 | Normal | B1 |
| D2 | Dr.  Nadeen | Kb13 | 0300-123 | Orthopedic | Professor | 5000 | P7 | Anum | 12345-3 | 042-3 | R4 | Two  Bed | B5 |
| D2 | Dr.  Nadeen | Kb13 | 0300-123 | Orthopedic | Professor | 5000 | P9 | Khawar | 12345-6 | 042-5 | R4 | Two  Bed | B7 |
| D4 | Dr.  Erum | Ak123 | 0321-123 | ENT | Asst  Professor | 3000 | P10 | Tanveer | 12345-7 | 042-6 | Nil |  | Nil |
| D4 | Dr.  Erum | Ak123 | 0321-123 | ENT | Asst  Professor | 3000 | P1 | Khalid | 12345-1 | 042-1 | R5 | Special | B8 |
| D4 | Dr.  Erum | Ak123 | 0321-123 | Neurology | Asst  Professor | 3000 | P10 | Tanveer | 12345-7 | 042-6 | Nil |  | Nil |
| D4 | Dr.  Erum | Ak123 | 0321-123 | Neurology | Asst  Professor | 3000 | P1 | Khalid | 12345-1 | 042-1 | R5 | Special | B8 |
| D5 | Dr.  Hafeez | Nd123 | 0321-124 | Skin | Asst.Professor | 3000 | P12 | Sohail | 12345-9 | 042-8 | Nil |  | Nil |
| D5 | Dr.  Hafeez | Nd123 | 0321-124 | Skin | Asst.Professor | 3000 | P13 | Ahmed | 12345-0 | 042-9 | R6 | Special | B9 |
| D5 | Dr.  Hafeez | Nd123 | 0321-124 | Orthopedic | Asst.Professor | 3000 | P12 | Sohail | 12345-9 | 042-8 | Nil |  | Nil |
| D5 | Dr.  Hafeez | Nd123 | 0321-124 | Orthopedic | Asst.Professor | 3000 | P13 | Ahmed | 12345-0 | 042-9 | R6 | Special | B9 |

**Second Normal Form:**

i) Remove the partial dependency

Doctor table

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

Doctor table further split into two tables

1. Doc-Info table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Doc No | Name | Address | Designation | Charges Per hour |
| D1 | Dr.  Nadeen | Abc  123 | Professor | 5000 |
| D2 | Dr.  Nadeen | Kb13 | Professor | 5000 |
| D4 | Dr.  Erum | Ak123 | Asst  Professor | 3000 |
| D5 | Dr.  Hafeez | Nd123 | Asst  Professor | 3000 |

1. Doc-phone-dept table

|  |  |  |
| --- | --- | --- |
| Phone | DepartmentD | Doc No |
| 0333-123 | Neurology | D1 |
| 042-123 | Neurology | D1 |
| 0334-124 | Orthopedic | D2 |
| 0300-123 | Orthopedic | D2 |
| 0321-123 | ENT | D4 |
| 0321-123 | Neurology | D4 |
| 0321-124 | Skin | D5 |
| 0321-124 | Orthopedic | D5 |

Patient Table

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Doc  No | Patient  No. | Patient Name | CNIC | Phone | Room No. | Room Type | Bed No. |
| D1 | P1 | Kahlid | 12345-1 | 042-1 | R2 | Normal | B1 |
| D1 | P5 | Ahmed | 12345-2 | 042-2 | R2 | Normal | B1 |
| D1 | P7 | Anum | 12345-3 | 042-3 | Nil |  | Nil |
| D2 | P4 | Mehmood | 12345-4 | 042-4 | R2 | Normal | B1 |
| D2 | P7 | Anum | 12345-3 | 042-3 | R4 | Two  Bed | B5 |
| D2 | P9 | Khawar | 12345-6 | 042-5 | R4 | Two  Bed | B7 |
| D4 | P10 | Tanveer | 12345-7 | 042-6 | Nil |  | Nil |
| D4 | P1 | Khalid | 12345-1 | 042-1 | R5 | Special | B8 |
| D5 | P12 | Sohail | 12345-9 | 042-8 | Nil |  | Nil |
| D5 | P13 | Ahmed | 12345-0 | 042-9 | R6 | Special | B9 |

Patient table split into two tables

1. Patient- doc table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Patient No. | Doc No | Room No. | Room Type | Bed No. |
| P1 | D1 | R2 | Normal | B1 |
| P5 | D1 | R2 | Normal | B1 |
| P7 | D1 | Nil |  | Nil |
| P4 | D2 | R2 | Normal | B1 |
| P7 | D2 | R4 | Two  Bed | B5 |
| P9 | D2 | R4 | Two  Bed | B7 |
| P10 | D4 | Nil |  | Nil |
| P1 | D4 | R5 | Special | B8 |
| P12 | D5 | Nil |  | Nil |
| P13 | D5 | R6 | Special | B9 |

1. Patient - info table

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

**Third Normal Form:**

i) Remove the transitive dependencies

Doc-Info table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Doc No | Name | Address | Designation | Charges Per hour |
| D1 | Dr.  Nadeen | Abc  123 | Professor | 5000 |
| D2 | Dr.  Nadeen | Kb13 | Professor | 5000 |
| D4 | Dr.  Erum | Ak123 | Asst  Professor | 3000 |
| D5 | Dr.  Hafeez | Nd123 | Asst  Professor | 3000 |

Doc-Info table split into two tables

1. Doc-info-details table:

|  |  |  |  |
| --- | --- | --- | --- |
| Doc No | Name | Designation | Charges Per hour |
| D1 | Dr.  Nadeen | Professor | 5000 |
| D2 | Dr.  Nadeen | Professor | 5000 |
| D4 | Dr.  Erum | Asst  Professor | 3000 |
| D5 | Dr.  Hafeez | Asst  Professor | 3000 |

Candidate Key: Doc No --->Name

Doc No---> Address

Doc No---> Designation

Doc No---> ChargesPerHour

1. Doc-info-Address table

|  |  |
| --- | --- |
| Doc No | Address |
| D1 | Abc  123 |
| D2 | Kb13 |
| D4 | Ak123 |
| D5 | Nd123 |

Candidate Key: Doc No---> Address

Doc-phone-dept table

|  |  |  |
| --- | --- | --- |
| Phone | DepartmentD | Doc No |
| 0333-123 | Neurology | D1 |
| 042-123 | Neurology | D1 |
| 0334-124 | Orthopedic | D2 |
| 0300-123 | Orthopedic | D2 |
| 0321-123 | ENT | D4 |
| 0321-123 | Neurology | D4 |
| 0321-124 | Skin | D5 |
| 0321-124 | Orthopedic | D5 |

Candidate Key: Phone ,DepartmentId-----> Doc No

Patient- doc table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Patient No. | Doc No | Room No. | Room Type | Bed No. |
| P1 | D1 | R2 | Normal | B1 |
| P5 | D1 | R2 | Normal | B1 |
| P7 | D1 | Nil |  | Nil |
| P4 | D2 | R2 | Normal | B1 |
| P7 | D2 | R4 | Two  Bed | B5 |
| P9 | D2 | R4 | Two  Bed | B7 |
| P10 | D4 | Nil |  | Nil |
| P1 | D4 | R5 | Special | B8 |
| P12 | D5 | Nil |  | Nil |
| P13 | D5 | R6 | Special | B9 |

Patient -doc table split into two tables

1. Patient-doc-bed table

|  |  |  |
| --- | --- | --- |
| Patient No. | Doc No | Bed No. |
| P1 | D1 | B1 |
| P5 | D1 | B1 |
| P7 | D1 | Nil |
| P4 | D2 | B1 |
| P7 | D2 | B5 |
| P9 | D2 | B7 |
| P10 | D4 | Nil |
| P1 | D4 | B8 |
| P12 | D5 | Nil |
| P13 | D5 | B9 |

Candidate Key: Patient No, Doc No---> Bed No.

1. Patient-doc-roomInfo table

|  |  |  |
| --- | --- | --- |
| Bed No. | Room No. | Room Type |
| B1 | R2 | Normal |
| Nil | Nil |  |
| B5 | R4 | Two Bed |
| B7 | R4 | Two Bed |
| B8 | R5 | Special |
| B9 | R6 | Special |

Patient - info table

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

**BCNF:**

Doc-info-details table:

|  |  |  |  |
| --- | --- | --- | --- |
| Doc No | Name | Designation | Charges Per hour |
| D1 | Dr.  Nadeen | Professor | 5000 |
| D2 | Dr.  Nadeen | Professor | 5000 |
| D4 | Dr.  Erum | Asst  Professor | 3000 |
| D5 | Dr.  Hafeez | Asst  Professor | 3000 |

Doc-info-Address table

|  |  |
| --- | --- |
| Doc No | Address |
| D1 | Abc  123 |
| D2 | Kb13 |
| D4 | Ak123 |
| D5 | Nd123 |

Doc-phone-dept table

|  |  |  |
| --- | --- | --- |
| Phone | DepartmentD | Doc No |
| 0333-123 | Neurology | D1 |
| 042-123 | Neurology | D1 |
| 0334-124 | Orthopedic | D2 |
| 0300-123 | Orthopedic | D2 |
| 0321-123 | ENT | D4 |
| 0321-123 | Neurology | D4 |
| 0321-124 | Skin | D5 |
| 0321-124 | Orthopedic | D5 |

Patient-doc-bed table

|  |  |  |
| --- | --- | --- |
| Patient No. | Doc No | Bed No. |
| P1 | D1 | B1 |
| P5 | D1 | B1 |
| P7 | D1 | Nil |
| P4 | D2 | B1 |
| P7 | D2 | B5 |
| P9 | D2 | B7 |
| P10 | D4 | Nil |
| P1 | D4 | B8 |
| P12 | D5 | Nil |
| P13 | D5 | B9 |

Patient-doc-roomInfo table

|  |  |  |
| --- | --- | --- |
| Bed No. | Room No. | Room Type |
| B1 | R2 | Normal |
| Nil | Nil |  |
| B5 | R4 | Two Bed |
| B7 | R4 | Two Bed |
| B8 | R5 | Special |
| B9 | R6 | Special |

Patient - info table

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