**Normalized Logical Schema (Version 2)**

**Based on: Logical Schema, Version 4**

**Doctor**

|  |  |
| --- | --- |
| **ID** | **Name** |

**Candidate Keys:** ID is the only candidate key because Name cannot guarantee uniqueness.

**Functional Dependencies:**

ID -> Name

**1NF:** Doctor is already in first normal form because there are no composite attributes in this table and all non-key attributes depend on a key-attribute

**2NF:** There are no partial dependencies because there are no partial candidate keys. Therefore, Doctor is already in second normal form

**3NF:** Doctor is in third normal form because there are no non-key attributes that depend on something other than a candidate key

**BCNF:** There are no key-attribute dependencies because there is only one key attribute, therefore the Doctor table is in Boyce-Codd normal form

**Assistant**

|  |  |
| --- | --- |
| **ID** | **Name** |

**Candidate Keys:** ID is the only candidate key because Name cannot guarantee uniqueness.

**Functional Dependencies:**

ID -> Name

**1NF:** Assistant is already in first normal form because there are no composite attributes in this table and all non-key attributes depend on a key-attribute

**2NF:** There are no partial dependencies because there are no partial candidate keys. Therefore, Assistant is already in second normal form

**3NF:** Assistant is in third normal form because there are no non-key attributes that depend on something other than a candidate key

**BCNF:** There are no key-attribute dependencies because there is only one key attribute, therefore the Assistant table is in Boyce-Codd normal form

**Procedure**

|  |  |
| --- | --- |
| **Name** | **Cost** |

**Candidate Keys:** Name is the only candidate key because Cost cannot guarantee uniqueness.

**Functional Dependencies:**

Name -> Cost

**1NF:** Procedure is already in first normal form because there are no composite attributes in this table and all non-key attributes depend on a key-attribute

**2NF:** There are no partial dependencies because there are no partial candidate keys. Therefore, Procedure is already in second normal form

**3NF:** Procedure is in third normal form because there are no non-key attributes that depend on something other than a candidate key

**BCNF:** There are no key-attribute dependencies because there is only one key attribute, therefore the Procedure table is in Boyce-Codd normal form

**Appointment**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ID** | **PatientID** | FK | **DentistID** | FK | **Procedure** | FK | **AssistantID** | FK | **DateOfService** | **TimeIn** | **TimeOut** |

**Candidate Keys:** ID is the only candidate key since associative entities must have their own ID attribute and no combination of DateOfService, TimeIn, and TimeOut can guarantee uniqueness.

**Functional Dependencies:**

There are no functional dependencies

**1NF:** Appointment is in first normal form because there are no composite attributes in this table and all non-key attributes depend on a key-attribute (there are no non-key attributes).

**2NF:** There are no partial dependencies because there are no dependencies. Therefore, the Appointmenttable is in second normal form

**3NF:** There are no transitive dependencies because there are no dependencies. Therefore, the Appointment table is in third normal form.

**BCNF:** There are no dependencies among key attributes. Therefore, Appointment is in Boyce-Codd normal form.

**Patient**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ID** | **Name** | **Address** | **DateOfBirth** | **DentalInsurance** |

**Candidate keys:** ID is the only candidate key because no other combination of attributes can guarantee uniqueness.

**Functional Dependencies:**

ID -> Name

ID -> Address

(Street, City, State, Zip) -> Address

ID -> DateOfBirth

SectionID -> DentalInsurance

**1NF:** Patientis in first normal form because there are no composite attributes in this table and all non-key attributes depend on a key-attribute

**2NF:** There are no partial dependencies because all non-key attributes depend on whole candidate-keys. Therefore, the Patient table is already in second normal form

**3NF:** Patienttable is in third normal form because there are no non-key attributes that depend on something other than a candidate key

**BCNF:** There are no key-attribute dependencies because the only key attribute is the candidate key.

# Normalized Logical Schema

Dentist(ID, Name\*)

Assistant(ID, Name\*)

Appointment(ID, PatientID\*, DentistID\*, Procedure\*, AssistantID, DateOfService\*, TimeIn\*, TimeOut\*)  
PatientID references Patient.ID; DentistID references Dentist.ID; Procedure references Procedure.name; AssistantID references Assistant.ID

Procedure(Name, Cost\*)

Patient(ID, Name\*, Street\*, City\*, State\*, Zip\*, DateOfBirth\*, DentalInsurance)

AssistantHoursWorked(AssistantID, Name, [Hours\_Worked])