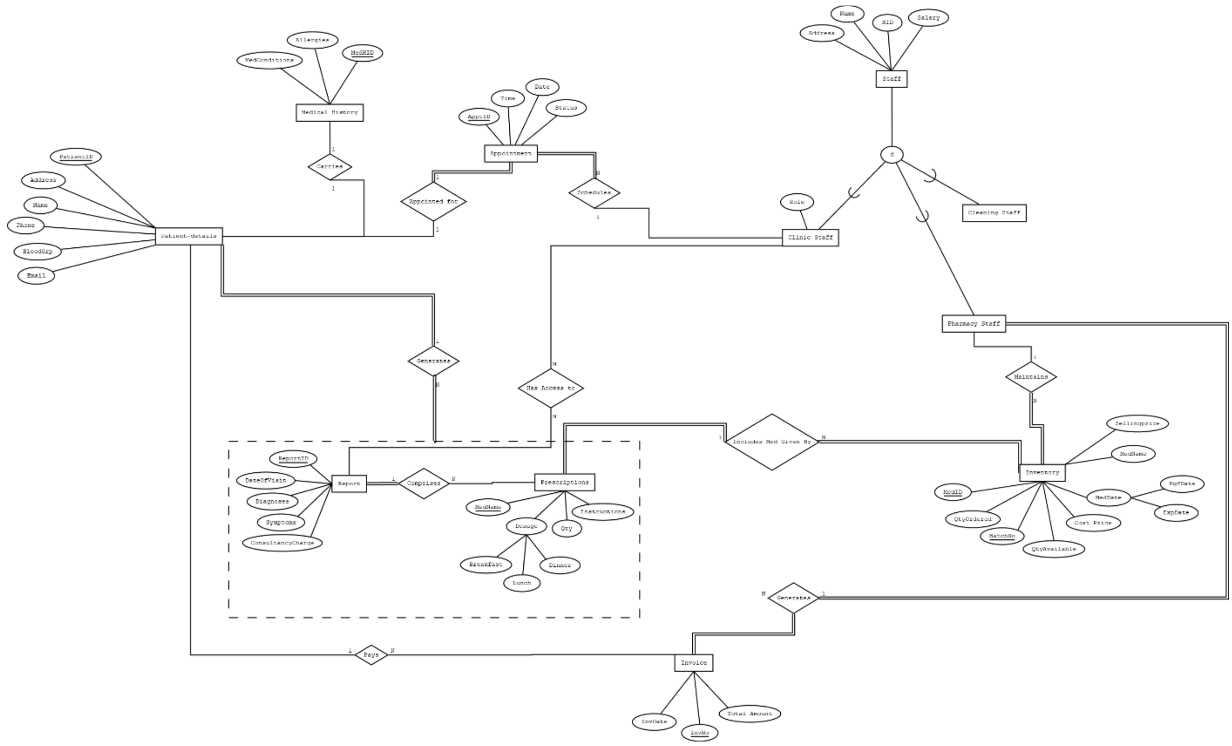
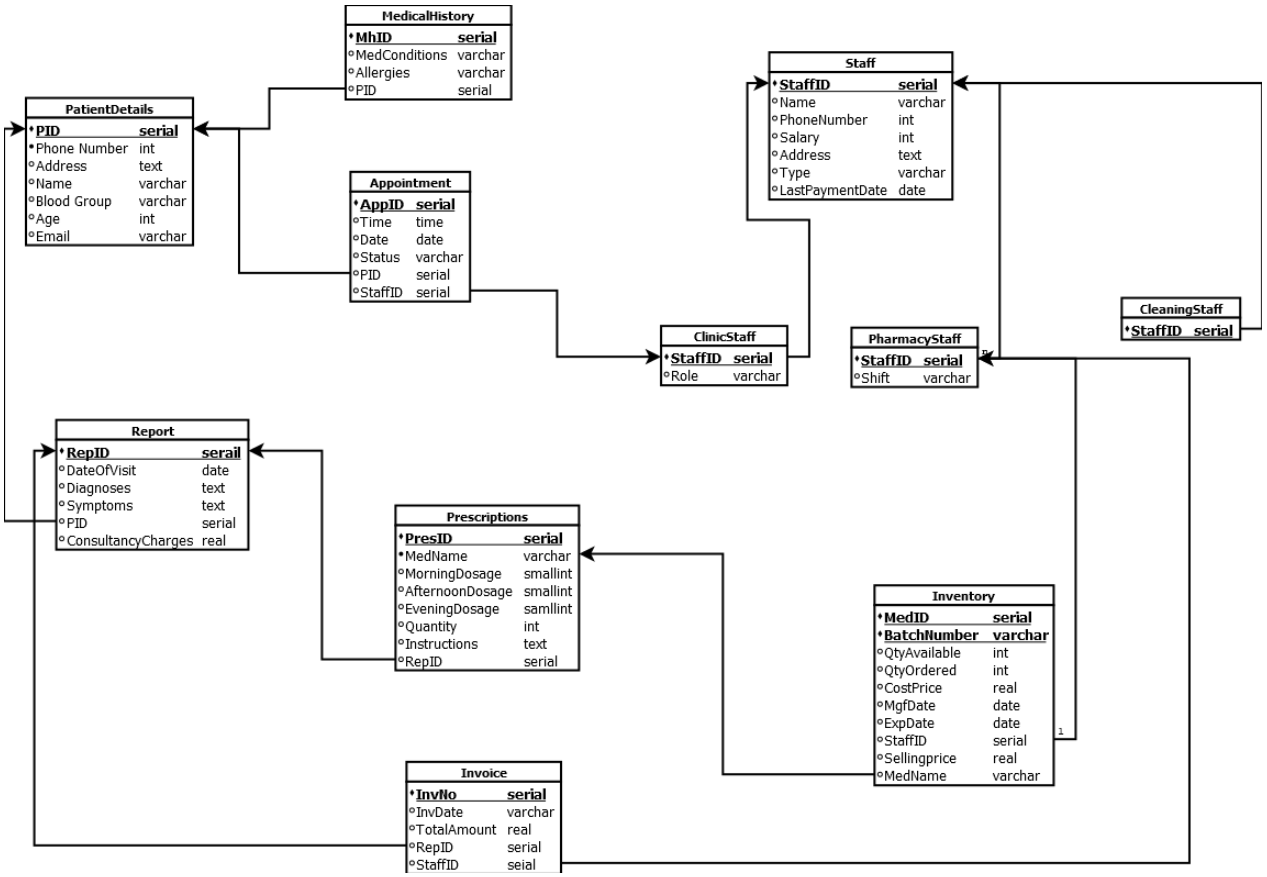
E-R Diagram



Allergies
MedConditions
MedHID
Medical History
Carries
PatientID
Address
Name
Phone
BloodGrp
Email
Patient-details
ApptID
Time
Date
Status
Appointment
Appointed for
Schedules
Name
SID
Salary
Address
Staff
d
Role
Clinic Staff
Cleaning Staff
Pharmacy Staff
Generates
Has Access to
Maintains
ReportID
DateOfVisit
Diagnoses
Symptoms
ConsultancyCharge
Report
Comprises
Prescriptions
MedName
Dosage
Qty
Instructions
Breakfast
Lunch
Dinner
Includes Med Given By
Sellingprice
MedName
Inventory
MedID
QtyOrdered
BatchNo
QtyAvailable
Cost Price
MedDate
MfgDate
ExpDate
Generates
Pays
Invoice
InvDate
InvNo
Total Amount

RELATIONAL SCHEMA



Minimal FD Set

- PID → PhoneNumber
- PID → Address
- PID → Name
- PID → Email
- PID → BloodGroup
- PID → Age
- MhID → MedConditions
- MhID → PID
- MhID → Allergies
- AppID → Time
- AppID → Date
- AppID → Status
- AppID → PID
- AppID → StaffID
- StaffID → Name
- StaffID → Salary
- StaffID → Address
- StaffID → Type
- StaffID → Role
- StaffID →Shift
- RepID → DateOfVisit
- RepID → PID
- RepID → Diagnosis
- RepID → Symptoms
- RepID → ConsultancyCharges
- {PresID, MedName} → MorningDosage
- {PresID, MedName} → AfternoonDosage
- {PresID, MedName} → EveningDosage
- {PresID, MedName} → Quantity
- {PresID, MedName} → Instructions
- {PresID, MedName} → RepID
- {MedID, BatchNumber} → MedName
- {MedID, BatchNumber} → Sellingprice
- {MedID, BatchNumber} → QtyAvailable
- {MedID, BatchNumber} → QtyOrdered
- {MedID, BatchNumber} → CostPrice
- {MedID, BatchNumber} → MfgDate
- {MedID, BatchNumber} →ExpDate
- {MedID, BatchNumber} → StaffID
- InvNo → InvDate
- InvNo → TotalAmount
- InvNo → RepID
- InvNo → StaffID

(3) Proof that relations are in BCNF

1. 'Patient' relation:

• Attributes:

Patient {PID, PhoneNumber, Address, Name, Email, BloodGroup, Age}

• Functional dependencies:

PID → PhoneNumber
PID → Address
PID → Name
PID → Email
PID → BloodGroup
PID → Age

Let X = PID

X^+ = {PID, PhoneNumber, Address, Name, Email, BloodGroup, Age}

Thus, **Primary key = PID**

The left side of all the FDs in a minimal set of FDs for the relation 'Patient' is PID, which is the primary key of this relation, so **"Patient" is in BCNF.**

2. 'MedicalHistory' relation:

• Attributes:

MedicalHistory {PID, MedConditions, Allergies, MhID}

• Functional dependencies:

MhID → MedConditions
MhID → PID
MhID → Allergies

Let X = MhID

X^+ = {PID, MedConditions, Allergies, MhID}

Thus, **Primary key = MhID**

The left side of all the FDs in a minimal set of FDs for the relation 'MedicalHistory' is MhID, which is the primary key of this relation, so **"MedicalHistory" is in BCNF.**

3. 'Appointment' relation:

• Attributes:

Appointment {PID, Time, Date, Status, StaffID, AppID}

• Functional dependencies:

AppID → Time
AppID → Date
AppID → Status
AppID → PID
AppID → StaffID

Let X = AppID

X^+ = {PID, Time, Date, Status, StaffID, AppID}

Thus, **Primary key = AppID**

The left side of all the FDs in a minimal set of FDs for the relation 'Appointment' is AppID, which is the primary key of this relation, so **"Appointment" is in BCNF.**

4. 'Staff' relation:

• Attributes:

Staff { StaffID, Name, Salary, Address, Type}

• Functional dependencies:

StaffID → Name
StaffID → Salary
StaffID → Address
StaffID → Type

Let X = StaffID

X^+ = { StaffID, Name, Salary, Address, Type}

Thus, **Primary key = StaffID**

The left side of all the FDs in a minimal set of FDs for the relation 'Staff' is StaffID, which is the primary key of this relation, so **"Staff" is in BCNF.**

5. 'ClinicStaff' relation:

• Attributes:

ClinicStaff { StaffID, Role}

• Functional dependencies:

StaffID → Role

Let X = StaffID

X^+ = { StaffID, Role}

Thus, **Primary key = StaffID**

The left side of all the FDs in a minimal set of FDs for the relation 'ClinicStaff' is StaffID, which is the primary key of this relation, so **"ClinicStaff" is in BCNF.**

6. 'PharmacyStaff' relation:

• Attributes:

PharmacyStaff { StaffID, Shift}

• Functional dependencies:

StaffID → Shift

Let X = StaffID

X^+ = { StaffID, Shift}

Thus, **Primary key = StaffID**

The left side of all the FDs in a minimal set of FDs for the relation 'PharmacyStaff' is StaffID, which is the primary key of this relation, so **"PharmacyStaff" is in BCNF.**

7. 'Report' relation:

• Attributes:

Report { RepID, DateOfVisit, PID, Diagnosis, Symptoms, ConsultancyCharges}

• Functional dependencies:

RepID → DateOfVisit
RepID → PID
RepID → Diagnosis
RepID → Symptoms
RepID → ConsultancyCharges

Let X = RepID

X^+ = { RepID, DateOfVisit, PID, Diagnosis, Symptoms, ConsultancyCharges}

Thus, **Primary key = RepID**

The left side of all the FDs in a minimal set of FDs for the relation 'Report' is RepID, which is the primary key of this relation, so **"Report" is in BCNF.**

8. 'Prescription' relation:

• Attributes:

Prescription { PresID, MedName, Quantity, MorningDosage, AfternoonDosage, EveningDosage, Instructions, RepID}

• Functional dependencies:

{PresID, MedName} → MorningDosage
{PresID, MedName} → AfternoonDosage
{PresID, MedName} → EveningDosage
{PresID, MedName} → Quantity
{PresID, MedName} → Instructions
{PresID, MedName} → RepID

Let X = {PresID, MedName}

X^+ = { PresID, MedName, Quantity, MorningDosage, AfternoonDosage, EveningDosage, Instructions, RepID}

Thus, **Primary key = {PresID, MedName}**

The left side of all the FDs in a minimal set of FDs for the relation 'Prescription' is {PresID, MedName}, which is the primary key of this relation, so **"Prescription" is in BCNF.**

9. 'Inventory' relation:

• Attributes:

Inventory { MedID, BatchNumber, QtyAvailable, QtyOrdered, CostPrice, MfgDate, ExpDate , StaffID,MedName,SellingPrice}

• Functional dependencies:

{MedID, BatchNumber} → MedName
{MedID, BatchNumber} → SellingPrice
{MedID, BatchNumber} → QtyAvailable
{MedID, BatchNumber} → QtyOrdered
{MedID, BatchNumber} → CostPrice
{MedID, BatchNumber} → MfgDate
{MedID, BatchNumber} →ExpDate
{MedID, BatchNumber} → StaffID

Let X = {MedID, BatchNumber}

X^+ = { MedID, BatchNumber, QtyAvailable, QtyOrdered, CostPrice, MfgDate, ExpDate , StaffID,SellingPrice,MedName}

Thus, **Primary key = {MedID, BatchNumber}**

The left side of all the FDs in a minimal set of FDs for the relation 'Inventory' is {MedID, BatchNumber}, which is the primary key of this relation, so **"Inventory" is in BCNF.**

10. 'Invoice' relation:

• Attributes:

Invoice { InvNo, InvDate, TotalAmount, RepID, StaffID}

• Functional dependencies:

InvNo → InvDate
InvNo → TotalAmount
InvNo → RepID
InvNo → StaffID

Let X = InvNo

X^+ = { RepID, DateOfVisit, PID, Diagnosis, Symptoms, ConsultancyCharges}

Thus, **Primary key = InvNo**

The left side of all the FDs in a minimal set of FDs for the relation 'Invoice' is InvNo, which is the primary key of this relation, so **"Invoice" is in BCNF.**