

CT511 Databases Design 2

Relationship Tables for Hospital System

Ethan Kane

09620371

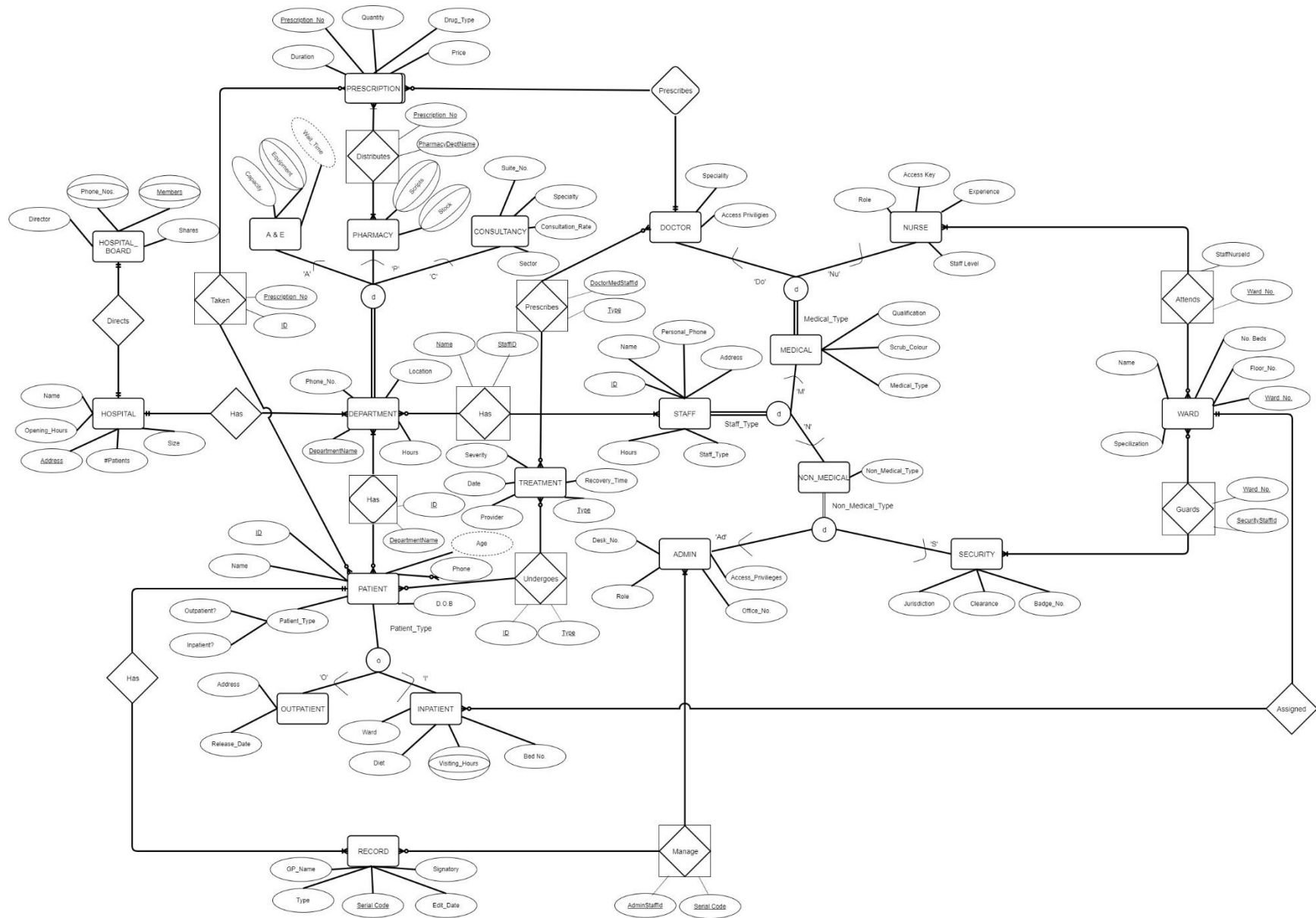


Table 1: Hospital Management

HOSPITAL BOARD

Director	<u>Hospital_Name</u>	<u>Members</u>	Shares	Phone Nos.
----------	----------------------	----------------	--------	------------

HOSPITAL

<u>Hospital_Name</u>	Opening_Hours	Address	#Patients	Size	<u>Department_Name</u>
----------------------	---------------	---------	-----------	------	------------------------

DEPARTMENT

<u>Department_Name</u>	Phone_No	Location	Hours	StaffID
------------------------	----------	----------	-------	---------



A&E

<u>A&E_Name</u>	Equipment	Capacity	Wait-time
---------------------	-----------	----------	-----------

PHARMACY

<u>P_Name</u>	Scripts	Stock
---------------	---------	-------

CONSULTANCY

<u>C_Name</u>	Suite_No	Speciality	Consultation-Rate	Sector
---------------	----------	------------	-------------------	--------

Table 2: Department Staff Relations

DEPARTMENT

<u>Department_Name</u>	Phone_No	Location	Hours
------------------------	----------	----------	-------

STAFF_DEPARTMENT

<u>StaffID</u>	<u>DepartmentName</u>	Pager
----------------	-----------------------	-------

STAFF

StaffType	<u>StaffID</u>	Name	Phone	Address	Hours
-----------	----------------	------	-------	---------	-------

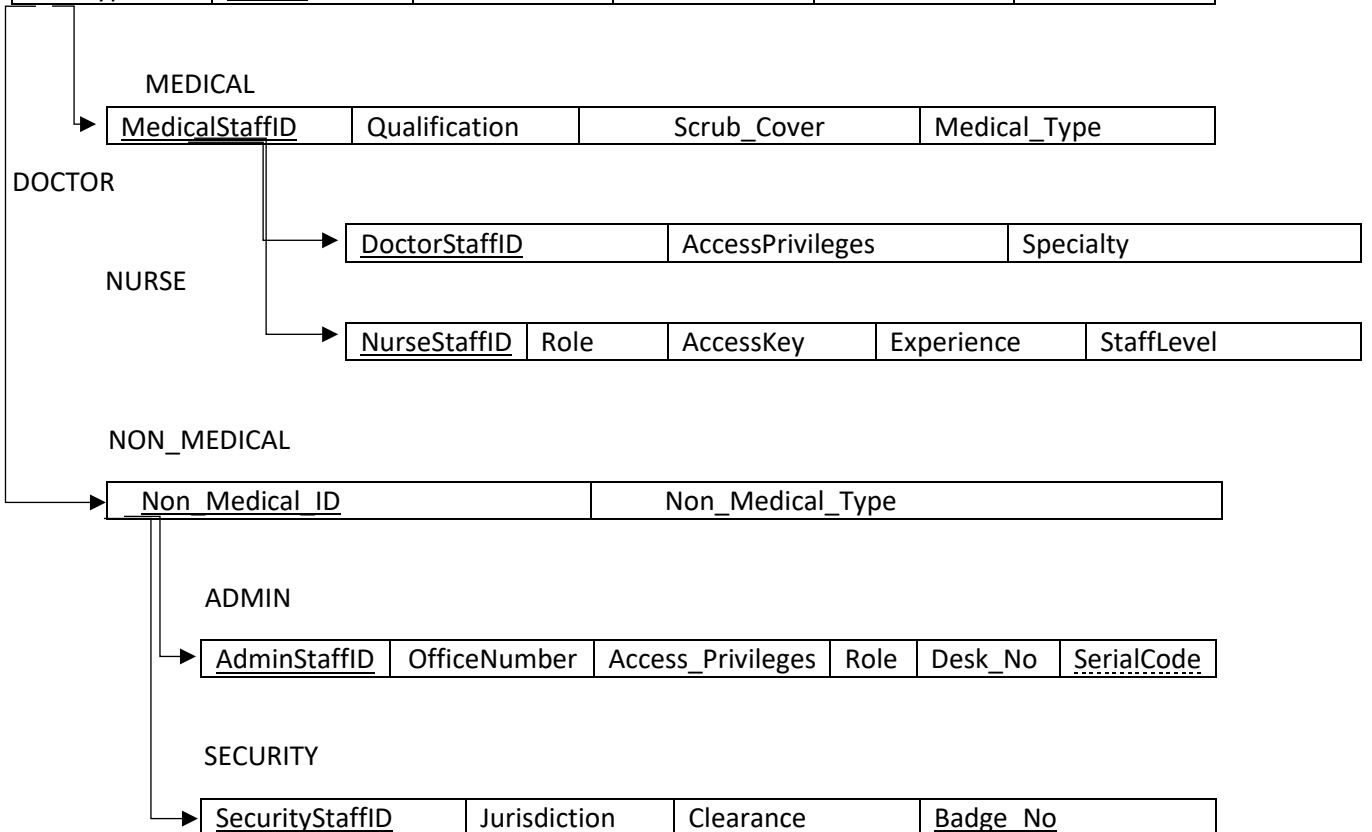


Table 3: Administration

ADMIN

<u>AdminStaffID</u>	OfficeNumber	Access_Privileges	Role	Desk_No	<u>SerialCode</u>
---------------------	--------------	-------------------	------	---------	-------------------

RECORD

<u>SerialCode</u>	Type	GpName	Signatory	EditDate	<u>PatientID</u>
-------------------	------	--------	-----------	----------	------------------

Patient

<u>PatientID</u>	DateOfBirth	Phone	Name	Patient_Type	<u>TreatmentCode</u>
------------------	-------------	-------	------	--------------	----------------------

OUTPATIENT

<u>OutpatientID</u>	Address	ReleaseDate
---------------------	---------	-------------

INPATIENT

<u>InpatientID</u>	Ward	Diet	VisitingHours	<u>BedNo</u>
--------------------	------	------	---------------	--------------

WARD

<u>WardNo.</u>	FloorNo.	No.Beds	Specialisation	<u>BedNo.</u>
----------------	----------	---------	----------------	---------------

Patient Treatment

Patient

<u>PatientID</u>	DateOfBirth	Phone	Name	Patient_Type	<u>TreatmentCode</u>
------------------	-------------	-------	------	--------------	----------------------

TREATMENT

<u>Treatment_Type</u>	Provider	DateofTreatment	RecoveryTime	Severity	<u>TreatmentCode</u>
-----------------------	----------	-----------------	--------------	----------	----------------------

Table 4: Staff Relations

SECURITY

<u>BadgeNo.</u>	Jurisdiction	Clearance
-----------------	--------------	-----------

Security_Ward

BadgeNo	<u>WardNumber</u>	Rota
---------	-------------------	------

WARD

<u>WardNumber</u>	Number-Beds	Name	Specialisation	FloorNumber	BedNo
-------------------	-------------	------	----------------	-------------	-------

DOCTOR

Speciality	Access	Privileges	<u>Doctor_ID</u>
------------	--------	------------	------------------

Doctor_Treatment

<u>Doctor_ID</u>	<u>Treatment_Type</u>
------------------	-----------------------

TREATMENT

<u>TreatmentType</u>	Provider	DateofTreatment	RecoveryTime	Severity	<u>Patient_ID</u>
----------------------	----------	-----------------	--------------	----------	-------------------

DOCTOR_PRESCRIPTION

<u>Doctor_ID</u>	<u>Prescription No.</u>
------------------	-------------------------

PRESCRIPTION

<u>Prescription-No.</u>	Quantity	Duration	Price	Drug_Type
-------------------------	----------	----------	-------	-----------

PHARMACY

Scripts	Stock	<u>Prescription-No.</u>
---------	-------	-------------------------

Patient

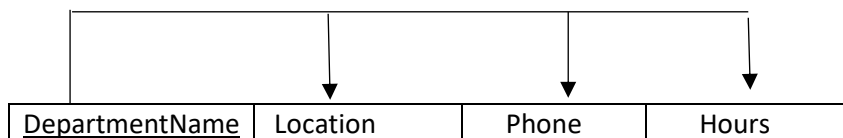
PatientID	DateOfBirth	Phone	Name	Patient_Type	Treatment Code	Prescription_No
-----------	-------------	-------	------	--------------	----------------	-----------------

Tables

DEPARTMENT

Department Table in 2NF as DepartmentName acts as a single column primary key.

<u>DepartmentName</u>	Location	Phone	Hours
Pharmacy	GroundFloor	631776	9am-9pm
A_And_E	SecondFloor	765123	3am-1am
Consultancy	ThirdFloor	091234	9am-6pm



Department is in 3NF by default as there are no transitive dependencies. Each cell is unique.

STAFF

<u>StaffID</u>	StaffType	Name	Phone	Address	Hours	<u>DepartmentID</u>
123456	Medical	Mary Peters	092132451	Labane, Blaney, Co. Galway.	39	AE106
134789	Non_Medical	Joe Alteras	093124576	Labane, Blaney, Co. Galway.	20	P202
145908	Medical	Jane Homand	098123789	Knocknacarra, Westside, Co. Galway.	39	C123
134187	Non-Medical	Larry Keane	097234178	Shannon Rd, Shannon, Co. Clare.	20	P102

This table is in 1NF because it does not contain multiple values per cell.

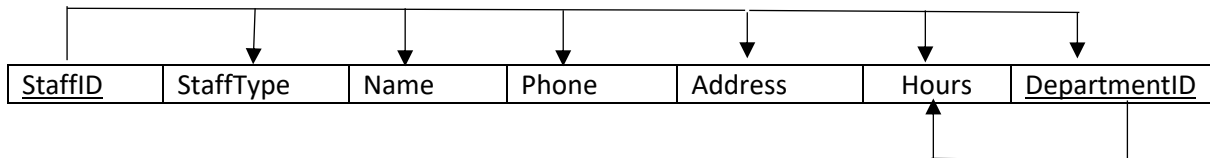
Staff table in 2NF

STAFF

<u>StaffID</u>	StaffType	Name	Phone	Address
----------------	-----------	------	-------	---------

DEPARTMENT-STAFF

Hours	<u>DepartmentID</u>
-------	---------------------



STAFF

<u>StaffID</u>	StaffType	Name	Phone	<u>DepartmentID</u>	Address
123456	Medical	Mary Peters	092132451	AE106	Labane, Blaney, Co. Galway.
134789	Non-Medical	Joe Alteras	093124576	P202	Labane, Blaney, Co. Galway.
145908	Medical	Jane Homand	098123789	C123	Knocknacarra, Westside, Co. Galway.
134187	Non-Medical	Larry Keane	097234178	P102	Shannon Rd, Shannon, Co. Clare.

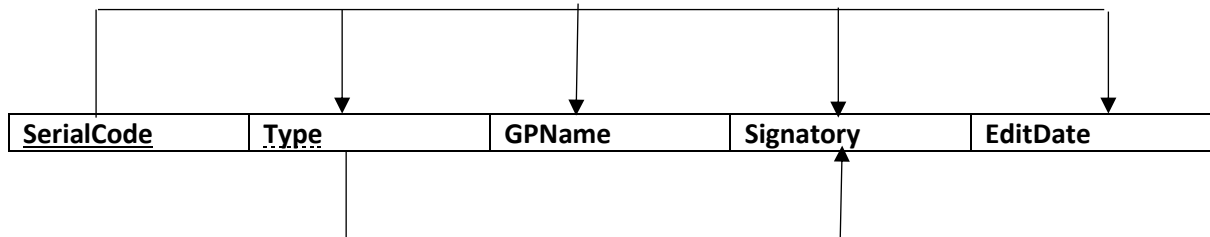
STAFF-HOURS

Hours	<u>DepartmentID</u>
39	AE106
20	P202
39	C123
20	P102

RECORD

Table in 2NF. Assumed to be in 1NF, SerialCode acts as single column primary key.

<u>SerialCode</u>	Type	GpName	Signatory	EditDate
999011	Finance	Dr. Raymond Smyth	Dr. Joyce	05_05_2019
888789	Finance	Dr. Joe Redman	Dr. Joyce	04_05_2019
890777	Medical	Dr. Kenji Tamura	Dr. Larfan	03_05_2019
112233	Medical	Dr. Sam Noonan	Dr. Larfan	04_05_2019



To bring to 3NF, need to split in to two tables, as there are transitive dependencies resulting from SerialCode, Type and Signatory.

<u>SerialCode</u>	GpName	EditDate	<u>Type</u>
999011	Dr. Raymond Smyth	05_05_2019	Finance
888789	Dr. Joe Redman	04_05_2019	Finance
890777	Dr. Kenji Tamura	03_05_2019	Medical
112233	Dr. Sam Noonan	04_05_2019	Medical

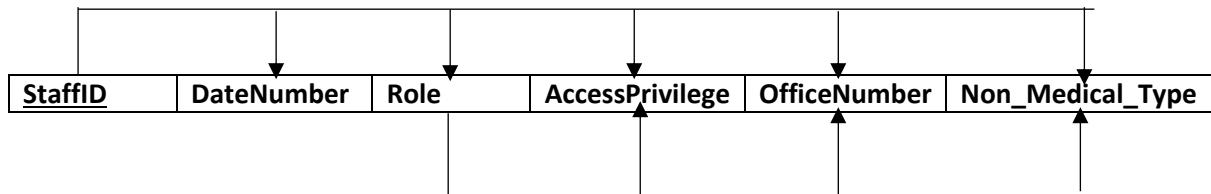
TYPE-SIGNATORY TABLE

<u>Type</u>	Signatory
Finance	Dr Joyce
Medical	Dr Larfan

ADMIN

<u>StaffID</u>	DateNumber	Role	AccessPrivilege	OfficeNumber	Non_Medical_Type
12347	17_09_2019	Account	Yes	1	Admin
12378	17_09_2019	Finance	Yes	2	Admin
24567	17_09_2019	Maintenance	No	5	Admin
45677	18_09_2019	Maintenance	No	5	Admin

Table in 2NF as there is single column primary key. We split the table to get rid of transitive dependencies and bring it to 3NFG.



STAFF-ROLE

<u>StaffID</u>	DateNumber	<u>Role</u>
12347	17_09_2019	Account
12378	17_09_2019	Finance
24567	17_09_2019	Maintenance
45677	18_09_2019	Maintenance

ROLE-ACCESS

<u>Role</u>	AccessPrivilege	OfficeNumber	Non_Medical_Type
Account	Yes	1	Admin
Finance	Yes	2	Admin
Maintenance	No	5	Admin

HOSPITALBOARD

Member_Id	Director	Shares	Member	Phone_No
4657686	Yes	50	Michael O'Leary	0867546354, 0864534234
5768674	No	20	James Corcoran	0875647363
5869873	No	20	Liza Lane	0896574657, 0842312133
3647665	No	20	Diarmuid Connors	0874657362

This table cannot be in 1NF because it does not have single column values to fix this we split the table

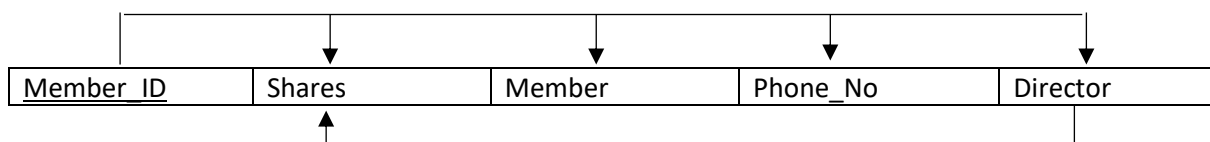
DIRECTOR-SHARES

Director	Shares
Yes	50
No	20
No	20
No	20

MEMBER-INFORMATION

Member_Id	Member	Phone_No
4657686	Michael O'Leary	0867546354
4657686	Michael o'Leary	0864534234
5768674	James Corcoran	0875647363
5869873	Liza Lane	0896574657
3647665	Liza Lane	0842312133
3647665	Diarmuid Connors	0874657362

The table now has single column values and can be brought to 2NF



This table is in 2NF as there is no partial dependencies

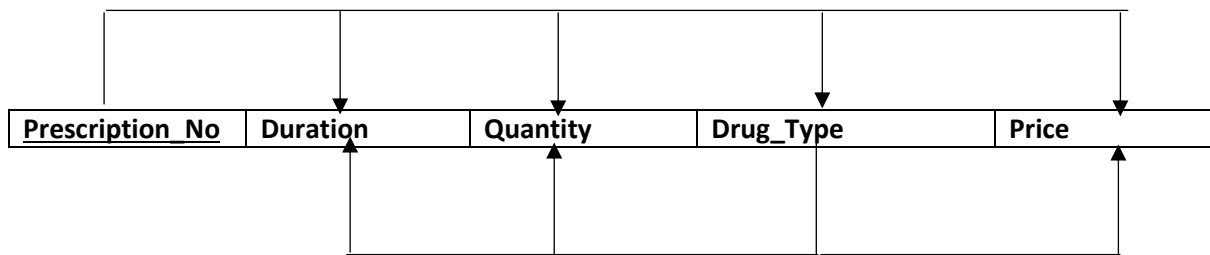
The table is also in 3NF as splitting the tables has removed the Transitive dependencies.

PREScription

<u>Prescription_No</u>	Duration	Quantity	Drug_Type	Price
333334454	7 days, 7 days	7(500mg), 7(500 mg)	Amoxicillin,Cephalexin	20 euro, 5 euro
345366789	10 days	10(100mg)	Doxycycline	90 euro
986008685	3 days	3(2.5mg)	Methotrexate	5 euro
656547899	1 day	1(1mg)	Paracetamol	1 euro

Prescription is not in 1NF, because it contains multiple data points in one cell. To bring to 1NF, prescription no 333334454 needs to be split into two rows.

<u>PrescriptionNo</u>	Duration	Quantity	Drug_Type	Price
333334454	7 days	7(500 mg)	Cephalexin	5 euro
333334454	7 days	7(500mg)	Amoxicillin	20 euro
345366789	10 days	10(100mg)	Doxycycline	90 euro
986008685	3 days	3(2.5mg)	Methotrexate	5 euro
656547899	1 day	1(1mg)	Paracetamol	1 euro



To bring to 3NF, need to split in to two tables so there are no transitive dependencies.

<u>PrescriptionNo</u>	<u>Drug_Type</u>
333334454	Cephalexin
333334454	Amoxicillin
345366789	Doxycycline
986008685	Methotrexate
656547899	Paracetamol

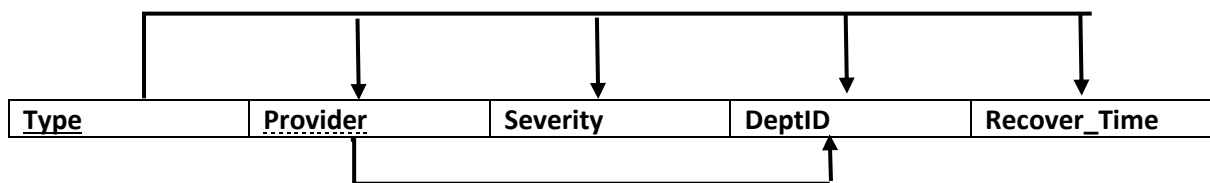
Drug_Type	Duration	Quantity	Price
Cephalexin	7 days	7(500 mg)	5 euro
Amoxicillin	7 days	7(500mg)	20 euro
Doxycycline	10 days	10(100mg)	90 euro
Methotrexate	3 days	3(2.5mg)	5 euro
Paracetamol	1 day	1(1mg)	1 euro

Treatment.

Table in 2NF

All non-key attributes are fully functional dependent on the primary key

Type	Provider	Severity	DeptID	Recover_Time
Dialysis	Nurse	High	AE100	1 Day
Chemotherapy	Doctor	High	CON203	14 Days
Occupational Therapy	Nurse	Low	AE100	1 Day
Transfusion	Doctor	Low	CON203	2 Days
Physio	Doctor	Low	CON203	1 Day
Dialysis	Nurse	High	AE100	1 Day
Transfusion	Doctor	Low	CON203	2 Days



Type → Provider, Severity, Recover_Time

Provider → DeptID

Treatment Type. (Treatment Table in 3NF)

Type	Severity	Recovery_Time
Dialysis	High	1 Day
Chemotherapy	High	14 Days
Occupational Therapy	Low	1 Day
Transfusion	Low	2 Days

Physio	Low	1 Day
Dialysis	High	1 Day
Transfusion	Low	2 Days

Treatment Provider. (Treatment Table in 3NF)

Provider is the primary key in this table

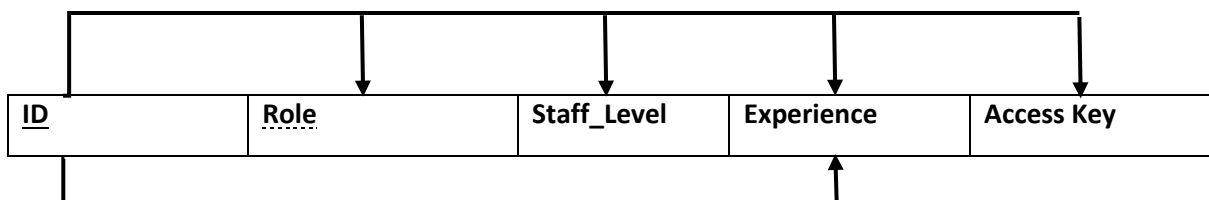
<u>Provider</u>	DeptID
Nurse	AE100
Doctor	CON203
Nurse	AE100
Doctor	CON203
Doctor	CON203
Nurse	AE100
Doctor	CON203

Nurse.

Table in 2NF

All non-key attributes are fully functional dependent on the primary key

<u>ID</u>	Role	Staff_Level	Experience	Access Key
232323	Staff Nurse	Trainee	1 Year	54023
141414	Staff Nurse	Trainee	2 Years	54023
161616	Theatre	Permanent	3 Years	54016
181818	Theatre	Permanent	5 Years	54016
191919	Children Nurse	Permanent	3 Years	54019
212121	Staff Nurse	Permanent	5 Years	54023



ID —————> **Experience**

Role —————> **Access Key, Staff Level**

<u>ID</u>	Age	Phone	Name	D.O.B	Patient_Type
12	25	0867891234, 0865434211	Jane Doe	12/3/94	Inpatient
34	28	0834562345	John Doe	14/5/91	Patient
45	46	0645632165, 0854342312	Michael Scott	23/8/73	Patient
65	34	0892321334	David Tenant	2/5/85	Inpatient

Experience Level. (Nurse Table 3NF)

<u>ID</u>	Experience
232323	1 Year
141414	2 Years
161616	3 Years
181818	5 Years
191919	3 Years
212121	5 Years

Nurse Position. (Nurse Table 3NF)

Role is primary key in this table.

<u>Role</u>	Access Key	Staff Level
Staff Nurse	54023	Trainee
Staff Nurse	54023	Trainee
Theatre	54016	Permanent
Theatre	54016	Permanent

PATIENT

ID	Age	Phone	Name	D.O.B	Patient_Type
12	25	0867891234, 0865434211	Jane Doe	12/3/94	Inpatient
34	28	0834562345	John Doe	14/5/91	Patient
45	46	0645632165, 0854342312	Michael Scott	23/8/73	Patient
65	34	0892321334	David Tenant	2/5/85	Inpatient

This table is not in 1NF because it does not have unique single column values

To fix this we would split the tables up.

PATIENT

<u>ID</u>	Age	Phone	Name	D.O.B
12	25	0867891234	Jane Doe	12/3/94
12	25	0865434211	Jane Doe	12/3/94
34	28	0834562345	John Doe	14/5/91
45	46	0645632165,	Michael Scott	23/8/73
45	46	0854342312	Michael Scott	23/8/73
65	34	0892321334	David Tenant	2/5/85

PATIENT_TYPE

<u>ID</u>	<u>Patient Type</u>
12	Inpatient
34	Patient
45	Patient
65	Inpatient

The tables can now be brought to 2NF as they have single column values

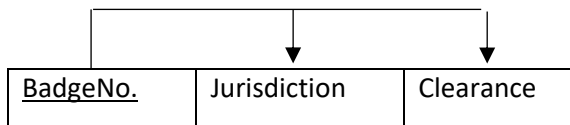
<u>ID</u>	Age	Phone	Name	D.O.B	Patient_Type
-----------	-----	-------	------	-------	--------------

We have removed the Functional dependency by splitting the tables so we can say the table is in 2NF

SECURITY

<u>BadgeNo.</u>	Jurisdiction	Clearance
34	Floor 1, Floor 2	High
45	Floor 2, Floor 3	Low
43	Floor 3	High
56	Floor 4, Floor 3	Low

This table is not in 1NF as it does not contain single column values to fix this and bring it to the normal form we would split the tables.



SECURITY-CLEARANCE

<u>BadgeNo.</u>	Clearance
34	High
45	Low
43	High
56	Low

SECURITY-JURISDICTION

<u>BadgeNo.</u>	Jurisdiction
34	Floor 1
34	Floor 2
45	Floor 2
45	Floor 3
43	Floor 3
56	Floor 4
56	Floor 3

The tables can now be brought to 2NF because they have single column values.

The table is in 3NF as it is reliant on the Primary key for Functional Dependency and there is no partial dependency in the table.