MVCH DATABASE PROPOSAL

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*For Stephen Forbes' DBAS5206 class

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INTRODUCTORY MEMO

Mountain View Community Hospital (MVCH) is a non-profit, short-term general hospital that serves the surrounding rural areas and city of Mountain View. Its current information systems are batch-oriented and include functionality to related accounting tasks such as: Patient Accounting, Billing, Accounts Receivable and Financial Accounting.

Nathan Heller, the current head of Information Systems in MVCH has identified a handful of deficiencies within MVCH's present information systems. These include unable to record/report results of laboratory tests and procedures for medical staff, does not accumulate costs by department or cost centre, and the lack of flexibility to keep up with continuous changes such as management needs and reporting requirements.

In order to mitigate the deficiencies mentioned above, we plan to convert MVCH's batch-oriented information systems into a more interactive system. An interactive system can process and store information immediately than a batch-oriented system where a set number of tasks is executed simultaneously at a set point of time. This will mainly involve running queries against a database. We will be creating various tables to store related: patient, physician, room and revenue data.

Our project plan will include a mission statement and a list of mission objectives, the system description, 3NF design, a list of all functional dependencies for all tables, and a data dictionary. In a separate attachment (not included here), our database with the corresponding tables filled with sample data (to simulate its functionality) and two generated Crystal Reports: a Room Utilization Report and Physician-Patient Report.

MISSION STATEMENT

The purpose of the MVCH database system is to ensure that all necessary data is easily stored in real-time and accessible throughout the system and to make sure that it is scalable to be able to adapt to changing requirements in the future.

Mission Objectives

- To maintain (enter, update, and delete) data on patients.
- To maintain (enter, update, and delete) data on physicians.
- To maintain (enter, update, and delete) data on physician specialties.
- To maintain (enter, update, and delete) data on admittances.
- To maintain (enter, update, and delete) data on rooms.
- To maintain (enter, update, and delete) data on cost centres.
- To maintain (enter, update, and delete) data on appointments.
- To maintain (enter, update, and delete) data on medical equipment.
- To maintain (enter, update, and delete) data on item details.
- To maintain (enter, update, and delete) data on patient medical histories.
- To maintain (enter, update, and delete) data on invoices.
- To maintain (enter, update, and delete) data on transactions.
- To maintain (enter, update, and delete) data on treatments.
- To maintain (enter, update, and delete) data on lab results.
- To maintain (enter, update, and delete) data on examinations.

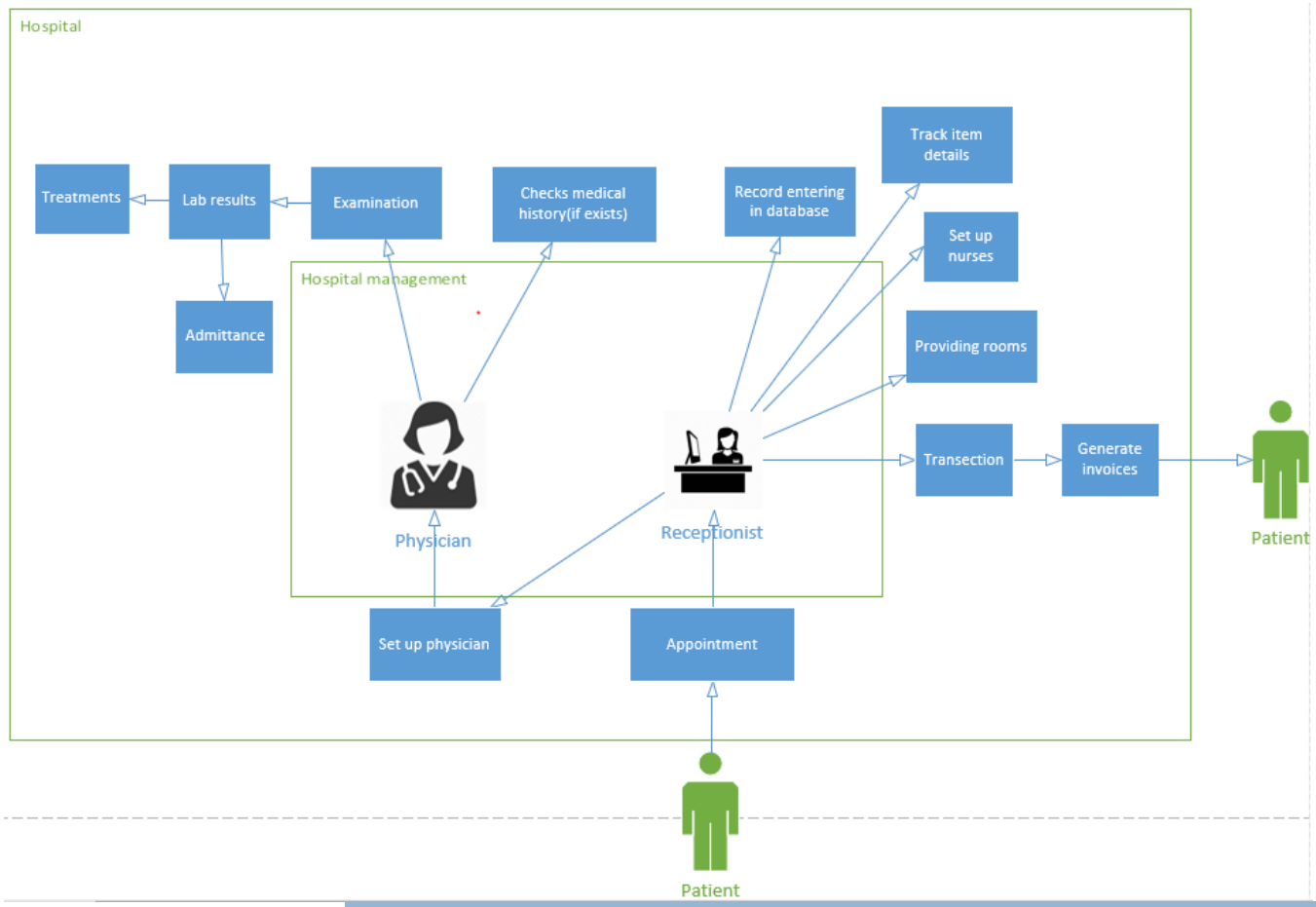
- To perform searches on patients.
- To perform searches on physicians.
- To perform searches on physician specialties.
- To perform searches on invoices.
- To perform searches on rooms.
- To perform searches on lab results.
- To perform searches on medical equipment.

- To track the status of a patient's readmittance date.
- To track the status of a patient's discharge date.
- To track the status of a patient's financial status.
- To track the status of the occupancy of a room.

- To report on daily revenue.
- To report on room utilization.
- To report on revenue analysis.

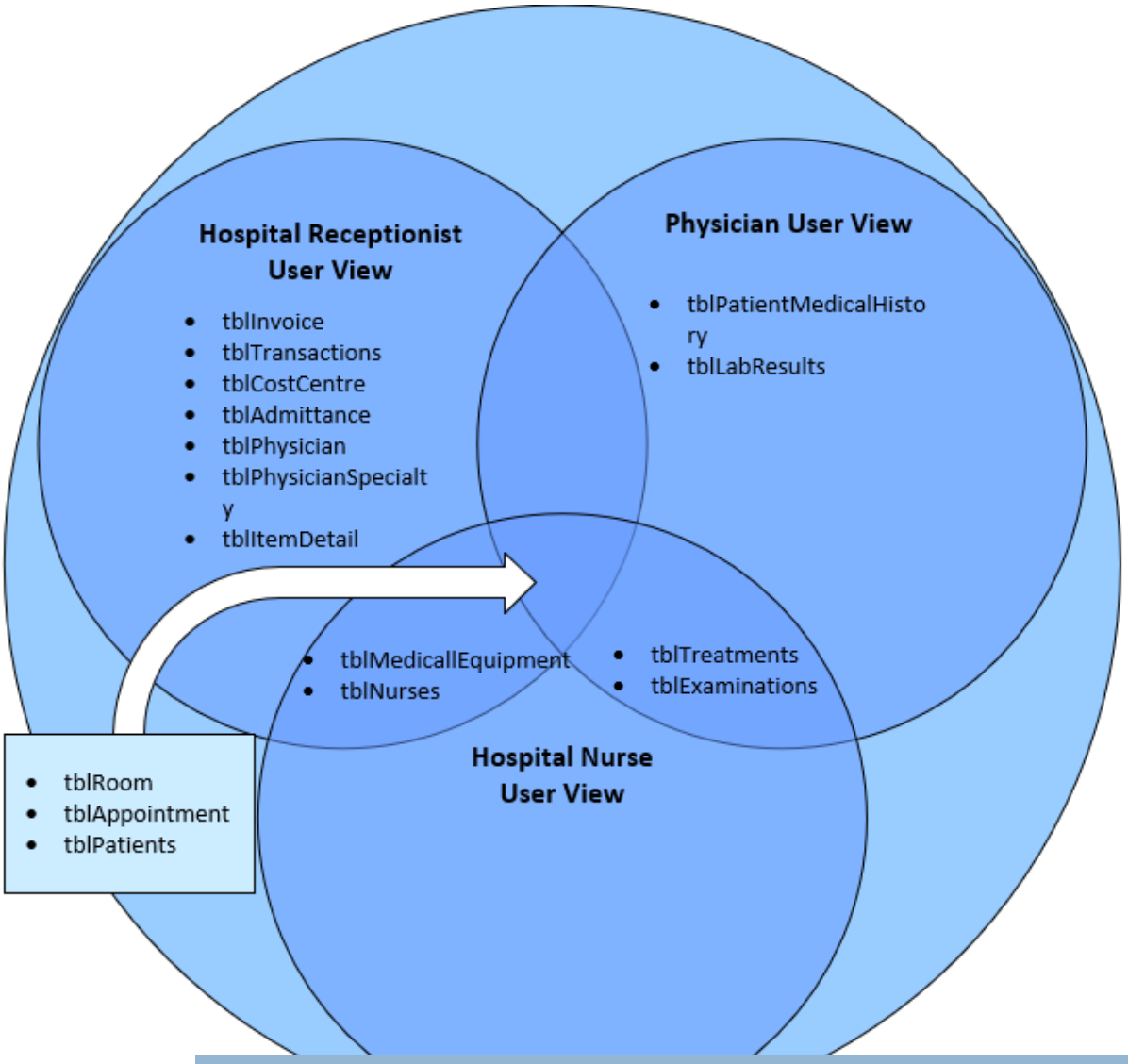
SYSTEM DESCRIPTION

System Boundary



This diagram shows how a patient books an appointment with the receptionist and then the receptionist checks if the patient record exists in the database, sets up the patient with an appropriate physician capable of resolving their problem. The matched physician checks the patient's medical history of patient (if it exists) which is only accessible to them and perform an examination. After getting the lab results, either the physician prescribes medicine or admits the patient in the hospital. The receptionist is the one who manages most of the work like enters the record in data base, keeps the track of medical equipment and items, arranges room and nurses for admittances and for operations. The transaction and invoice generation are also done by receptionist for patients.

Major User Views



This use case diagram is used to illustrate what kind of access that some of the commonly know users (which is the receptionist, the physician and nurse) have with the database system. As you can see most of the data will be handled by the receptionist, as they usually handle most of the database information. The physician is the only one given access to the patient medical history as well as the lab results of any test done. We also have some shared tables that usually everybody uses like patients, rooms, and appointments as well as tables that would be used by either the nurse/receptionist or by the physician/nurse.

3NF

tblPatients (PatientNum, PatientFirstName, PatientLastName, Address, City, Province, PC, Telephone, Sex, HCN, FinancialStatus)

tblPhysician (PhysicianNum, PhysicianSpecialtyID, PhysicianFirstName, PhysicianLastName, PhysicianTelephone)

tblPhysicianSpecialty (PhysicianSpecialtyID, SpecialtyDescription)

tblAdmittance (AdmittanceID, PhysicianNum, PatientNum, RoomNum, DateAdmitted, DateDischarged)

tblRoom (RoomNum, RoomType, Extension)

tblItemDetails (ItemCodeID, CostCentreID, ItemDescription, ItemCost)

tblCostCentre (CostCentreID, CostCentreName)

tblInvoice (InvoiceID, AdmittanceID, FinancialSource, InvoiceDate)

tblTransaction (TransactionID, InvoiceID, ItemCodeID, Charge, TransactionDate)

tblLabResults (LabResultID, PhysicianNum, RecordedDate, LabDetails, TransactionID)

tblExamination (ExaminationID, ExaminedDate, ExamDetails, TransactionID)

tblTreatments (TreatmentID, TreatedDate, TreatmentDetails, TransactionID)

tblAppointments (AppointmentID, PatientNum, PhysicianNum, AppointmentDetails, AppointedDateTime)

tblMedicalEquipment (EquipmentID, Description, TransactionID)

tblNurses (NurseID, NurseFirstName, NurseLastName, Telephone)

tblPatientMedicalHistory (MedicalHistoryID, AdmittanceID, InvoiceID, TransactionID)

FUNCTIONAL DEPENDENCIES

tblPatients

PatientFirstName	→	PatientNum
PatientLastName	→	PatientNum
Address	→	PatientNum
City	→	PatientNum
Province	→	PatientNum
PC	→	PatientNum
PatientTelephone	→	PatientNum
Sex	→	PatientNum
HCN	→	PatientNum
FinancialStatus	→	PatientNum

tblPhysician

PhysicianSpecialtyID	→	PhysicianNum
PhysicianFirstName	→	PhysicianNum
PhysicianLastName	→	PhysicianNum
PhysicianTelephone	→	PhysicianNum

tblPhysicianSpecialty

SpecialtyDescription	→	PhysicianSpecialtyID

tblAdmittances

PhysicianNum	→	AdmittanceID
PatientNum	→	AdmittanceID
RoomNum	→	AdmittanceID
DateAdmitted	→	AdmittanceID
DateDischarged	→	AdmittanceID

tblRoom

RoomType	→	RoomNum
Extension	→	RoomNum

tblItemDetails

CostCentreID	→	ItemCodeID
ItemDescription	→	ItemCodeID
ItemCost	→	ItemCodeID

tblCostCentres

CostCentreName	→	CostCentreID

tblInvoice

AdmittanceID	→	InvoiceID
FinancialSource	→	InvoiceID
InvoiceDate	→	InvoiceID

tblTransaction

InvoiceID	→	TransactionID
ItemCodeID	→	TransactionID
Charge	→	TransactionID
TransactionDate	→	TransactionID

tblLabResults

PhysicianNum	→	LabResultID
RecordedDate	→	LabResultID
LabDetails	→	LabResultID
TransactionID	→	LabResultID

tblExaminations

ExaminedDate	→	ExaminationID
ExamDetails	→	ExaminationID
TransactionID	→	ExaminationID

tblTreatments

TreatedDate	→	TreatmentID
TreatmentDetails	→	TreatmentID
TransactionID	→	TreatmentID

tblAppointments

PatientNum	→	AppointmentID
PhysicianNum	→	AppointmentID
AppointmentDetails	→	AppointmentID
AppointedDateTime	→	AppointmentID

tblMedicalEquipment

EquipmentDescription	→	EquipmentID
TransactionID	→	EquipmentID

tblNurses

NurseFirstName	→	NurseID
NurseLastName	→	NurseID
NurseTelephone	→	NurseID

tblPatientMedicalHistory

AdmittanceID	→	MedicalHistoryID
InvoiceID	→	MedicalHistoryID
TransactionID	→	MedicalHistoryID

DATA DICTIONARY

tblPatients

Attribute Name	Data Type	Domain	Field Size	Primary/Foreign	Description	Example
PatientNum	int	All positive integers	4 bytes	Primary	This field will hold the unique ID of the patient.	100683221
PatientFirstName	varchar	Letters A-Z and spaces	20 chars	-	This field will hold the first name of the patient.	Ian
PatientLastName	varchar	Letters A-Z and spaces	30 chars	-	This field will hold the last name of the patient.	Carlos
Address	varchar	Letters A-Z, numbers 1-9, and spaces	50 chars	-	This field will hold the address of the patient.	123 ABC Street, Durham ON
City	varchar	Letters A-Z	30 chars	-	This field will hold the city of where patient lives.	Durham
Province	varchar	Letters A-Z	2 chars	-	This field will hold of the patient's province.	ON
PC	varchar	Letters A-Z, numbers 1-9	6 chars	-	This field will hold the patient's postal code.	L6B1M3
PatientTelephone	varchar	Numbers 1-9	10 chars	-	This field hold the contact information(phone number) of the patient.	1234567890
Sex	char	M (Male) or F (Female)	1 char	-	This will hold the gender of the patient.	M
HCN	varchar	Numbers 1-9	9 chars	-	This field stores the patient's hospital card number.	6789321097
FinancialStatus	varchar	Letters A-Z and spaces	8 chars	-	This field holds the financial status of patient.	ESI

tblPhysicians

Attribute Name	Data Type	Domain	Field Size	Primary/Foreign	Description	Example
PhysicanNum	int	All positive integers	4 bytes	Primary	This field will hold the unique ID of the physician.	500123456
PhysicianSpecilatyID	int	All positive integers	4 bytes	Foreign	This field will hold the physican's specialty which is referenced from tblPhysicianSpecialty.	1
PhysicianFirstName	varchar	Letters A-Z and spaces	20 chars	-	This field will hold the first name of the physician.	Roshan
PhysicianLastName	varchar	Letters A-Z and spaces	30 chars	-	This field will hold the last name of the physician.	Persaud
PhysicianTelephone	varchar	Numbers 1-9	10 chars	-	This field hold the contact information(phone number) of the physician.	1234567890

tblPhysicianSpecialty

Attribute Name	Data Type	Domain	Field Size	Primary/Foreign	Description	Example
PhysicianSpecialtyID	int	All positive integers	4 bytes	Primary	This field will hold the unique ID of the physician specialty.	1
SpecialtyDescription	varchar	Letters A-Z plus spaces	20 chars	-	This field will describe the brief description of physician's specialty.	Paediatrics

tblAdmittances

Attribute Name	Data Type	Domain	Field Size	Primary/Foreign	Description	Example
AdmittanceID	int	All positive integers	4 bytes	Primary	This field will hold the unique ID of the patient admittance.	700123456
PhysicianNum	int	All positive integers	4 bytes	Foreign	This field will hold the unique ID of the physician which is referenced from tblPhysicians.	500683221
PatientNum	int	All positive integers	4 bytes	Foreign	This field will hold the unique ID of the patient which is referenced from tblPatients.	100123456
RoomNum	int	All positive integers	4 bytes	Foreign	This field will hold the unique ID of the room number which is referenced from tblRooms.	100
DateAdmitted	date	-	3 bytes	-	This field will hold when the patient was admitted.	1/7/2019
DateDischarged	date	-	3 bytes	-	This field will hold the patient was discharged.	4/18/2019

tblRoom

Attribute Name	Data Type	Domain	Field Size	Primary/Foreign	Description	Example
RoomNum	char	Letters A-Z, numbers 1-9	4 chars	Primary	This field will hold the unique ID of the room number.	100A
RoomType	char	Letters A-Z, numbers 1-9	2 chars	-	This field will hold the type of room available.	PR
Extension	char	Numbers 1-9	3 chars	-	This field will hold the the room's extension number.	649

tblItemDetails

Attribute Name	Data Type	Domain	Field Size	Primary/Foreign	Description	Example
ItemCodeID	int	All positive integers	4 bytes	Primary	This field will hold the unique ID of the items.	2000
CostCentreID	int	All positive integers	4 bytes	Foreign	This field will hold the unique ID of the cost centre.	100
ItemDescription	varchar	Letters A-Z plus spaces	20 chars	-	This field will hold the brief description of the item.	Semi-Private Room
ItemCost	decimal	All positive decimals	5 bytes	-	This field will hold the cost of item.	200.00

tblCostCentre

Attribute Name	Data Type	Domain	Field Size	Primary/Foreign	Description	Example
CostCentreID	int	All positive integers	4 bytes	Primary	This field will hold the unique ID of cost center.	100
CostCentreName	varchar	Letters A-Z plus spaces	25	-	This field will hold the service provided.	Room & Board

tblInvoice

Attribute Name	Data Type	Domain	Field Size	Primary/Foreign	Description	Example
InvoiceID	int	All positive integers	4 bytes	Primary	This field will hold the invoice number.	900547832
AdmittanceID	int	All positive integers	4 bytes	Foreign	This field will hold the unique ID of the patient admittance which is referenced from tblAdmittances.	700123456
FinancialSource	varchar	Letters A-Z and spaces	8 chars	-	This field holds the financial source of the patient.	ESI
InvoiceDate	date	-	3 bytes	-	This field holds when the invoice was created.	4/12/2019

tblTransaction

Attribute Name	Data Type	Domain	Field Size	Primary/Foreign	Description	Example
TransactionID	int	All positive integers	4 bytes	Primary	This field will hold the unique ID of the transaction number.	300198712
InvoiceID	int	All positive integers	4 bytes	Foreign	This field will hold the invoice number which is referenced from tblInvoices.	900547832
ItemCodeID	int	All positive integers	4 btyes	Foreign	This field will hold the unique id of the items which is referenced from tblItemDetails.	100
Charge	decimal	All positive decimals	5 bytes	-	This field will hold the charges of services applied to the patient	5000.00
TransactionDate	date	-	3 bytes	-	This field holds the date of when the transaction was created.	4/18/2019

tblLabResults

Attribute Name	Data Type	Domain	Field Size	Primary/Foreign	Description	Example
LabResultID	int	All positive integers	4 bytes	Primary	This field will hold the unique ID of the lab results.	200543098
PhysicianNum	int	All positive integers	4 btyes	Foreign	This field will hold the unique ID of the physician which is referenced from tblPhysician.	500123456
RecordedDate	date	-	3 bytes	-	This field will hold the date of when the lab results were recorded.	4/10/2019
LabDetails	varchar	Letters A-Z, numbers 1-9, and spaces	200 chars	-	This field will hold the details of lab results.	Cancer cells present in culture.
TransactionID	int	All positive integers	4 bytes	Foreign	This field will hold the unique ID of the transaction number which is referenced from tblTransaction.	300198712

tblExaminations

Attribute Name	Data Type	Domain	Field Size	Primary/Foreign	Description	Example
ExaminationID	int	All positive integers	4 bytes	Primary	This field will hold the unique ID of the examination.	400425097
ExaminedDate	date	-	3 bytes	-	This field will hold the date when the examination was conducted.	4/13/2019
ExaminationDetails	varchar	Letters A-Z, numbers 1-9	200 chars	-	This field will hold the details of examination.	Anomaly present in patient's white blood cells.
TransactionID	int	All positive integers	4 bytes	Foreign	This field will hold the unique ID of the transaction number which is referenced from tblTransatcion.	300198712

tblTreatments

Attribute Name	Data Type	Domain	Field Size	Primary/Foreign	Description	Example
TreatmentID	int	All positive integers	4 bytes	Primary	This field will hold the unique id of the treatment.	600098142
TreatedDate	date	-	3 bytes	-	This field will hold the date of when the treatment was conducted.	4/14/2019
TreatmentDetails	varchar	Letters A-Z, numbers 1-9	200 chars	-	This field will hold the details of treatment.	Performed radtiation therapy on the patient.
TransactionID	int	All positive integers	4 bytes	Foreign	This field will hold the unique ID of the transaction number which will be referenced from tblTransaction.	300198712

tblAppointments

Attribute Name	Data Type	Domain	Field Size	Primary/Foreign	Description	Example
AppointmentID	int	All positive integers	4 bytes	Primary	This field will hold the unique ID of the appointment.	800078654
PatientNum	int	All positive integers	4 bytes	Foreign	This field will hold the unique ID of the patient which is referenced from tblPatients.	100683221
PhysicianNum	int	All positive integers	4 bytes	Foreign	This field will hold the unique ID of the physician which is referenced from tblPhysicians.	500123456
AppointmentDescription	varchar	Letters A-Z, numbers 1-9	200 chars	-	This field will hold the description of what the appointment is for.	Patient feels something wrong with her body and requires an examination.
AppointedDateTime	datetime	-	8 bytes	-	This field hold the date and time of the appointment with a physician.	4/13/19 13:30

tblMedicalEquipment

Attribute Name	Data Type	Domain	Field Size	Primary/Foreign	Description	Example
EquipmentID	int	All positive integers	4 bytes	Primary	This field will hold the unique ID of the Equipment.	404123456
EquipmentDescription	varchar	Letters A-Z, numbers 1-9	200 chars	-	This field will describe what the equipment was for and when it is used for.	Syringe
TransactionID	int	All positive integers	4 bytes	Foreign	This field will hold the unique ID of the transaction number which is referenced from tblTransaction.	300198712

tblNurses

Attribute Name	Data Type	Domain	Field Size	Primary/Foreign	Description	Example
NurseID	int	All positive integers	4 bytes	Primary	This field will hold the unique ID of the nurse.	505747981
NurseFirstName	varchar	Letters A-Z	20 chars	-	This field will hold the first name of the nurse.	Vinay
NurseLastName	varchar	Letters A-Z	30 chars	-	This field will hold the last name of the nurse	Thapar
NurseTelephone	varchar	Numbers 1-9	10 chars	-	This field hold the contact information(phone number) of the nurse.	7413214567

tblPatientMedicalHistory

Attribute Name	Data Type	Domain	Field Size	Primary/Foreign	Description	Example
MedicalHistoryID	int	All positive integers	4 bytes	Primary	This field will hold the unique id of the patient's history.	100021845
AdmittanceID	int	All positive integers	4 bytes	Foreign	This field will hold the unique ID of the patient admittance which is referenced from tblAdmittances.	700123456
InvoiceID	int	All positive integers	4 bytes	Foreign	This field will hold the invoice number which is referenced from tblInvoices.	900547832
TransactionID	int	All positive integers	4 bytes	Foreign	This field will hold the unique ID of the transaction number.	300198712