

Database Project Final Report

INFO 364

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Introduction

A database system will be designed for a doctor's office located in Richmond, VA. Our database management system will be used to organize data in a general physician's office for patients and all office staff and will be named Care4You. All members of our group have had negative experiences with physician's offices, so we chose to develop a more efficient office database system that will organize patient information so that the doctors are able to access, update and delete patient data efficiently in the system, reducing overall wait time for patients while also allowing enough doctor-patient time.

Physician's office visits that could be done in 20 minutes often take multiple hours purely based on wait times. Currently, when patients arrive, they spend a lot of time just waiting to see the doctor in the lobby, and again in the room, whereas the appointment itself may not take that long. Also, it is not very easy to access one's data from a physician's office, so we plan to make the database accessible from a phone app so patients can access their information from the comfort of their home. A more accessible database could mean patient data being uploaded to the database 24/7 to reflect updated changes to their records. This would enable physicians to be updated on the patient's status without having to check on them in person. However, we realize that patient data is very sensitive information, so necessary security precautions would need to be taken in order to prevent data theft, unauthorized access, hacking and loss of confidential information.

This database would help the clinic staff retrieve data and maintain updated patient records. It would also prove beneficial for the patients as well by providing them easy access to their own records in an organized and timely manner. This database would also be accessed

securely and safely in a user-friendly environment for both the staff and the patients. A very big benefit in implementing this database would be scalability because most clinics struggle with providing accessible and updated information to patients, despite having a database system in place. With this industry growing at a fast pace, implementing a system that incorporates these changes will have a huge impact on overall patient care.

The information needed to build this database would include general patient information (name, age, address, phone number, insurance), staff information, and treatment and appointment information of patients. Transactions of the patients will be registered within the database as well as inflow of cash, if paid by the patient for the copay. All major credit cards will be accepted and registered within the system for reference.

Users of the database would be all office staff and patients. Staff would include physicians, radiologists, phlebotomists, secretaries, technicians, and assistants. Physicians focus on a more general treatment of patients whereas radiologists and phlebotomists focus on treatment using radiology and drawing blood, respectively. Every patient who has been seen at the office will be put into the database system for recording purposes.

User Requirements:

- The database stores every patient who visits the office as well as all office staff information.
- Patients can access their own data at any time via a phone application.
- The database keeps track of appointments and sends a reminder to patients one day prior.
- Database keeps track of all equipment used by staff.
- Rooms for appointments are stored and booked in the database.
- Payment information is stored in database.

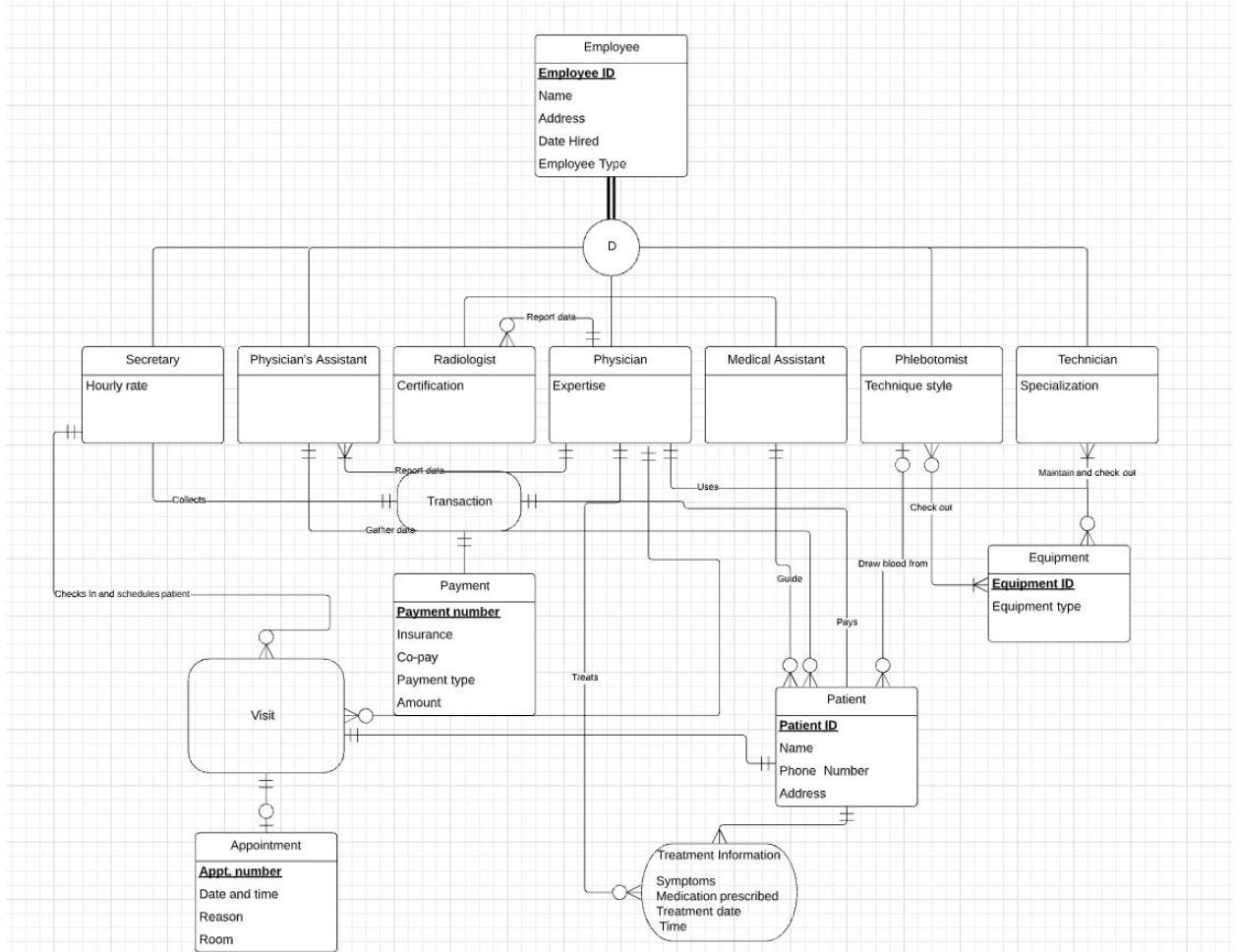
Business Rules:

- The database stores the following EMPLOYEE types: RADIOLOGIST, PHYSICIAN'S ASSISTANT, SECRETARY, PHYSICIAN, MEDICAL ASSISTANT, PHLEBOTOMIST TECHNICIAN.
- At any given time an EMPLOYEE must be one and only one of these subtypes.
- Upon a visit, A SECRETARY checks in PATIENTS and schedules their future APPOINTMENT with a particular PHYSICIAN.
- A PATIENT may or may not schedule a future APPOINTMENT during the visit.
- A SECRETARY collects PAYMENT from PATIENTS and this data is recorded in TRANSACTION INFORMATION.
- PHYSICIANS treat PATIENTS and the database records which medication was prescribed and due to which symptoms and this data is recorded in TREATMENT INFORMATION.
- A PATIENT is treated by one PHYSICIAN.
- PHYSICIANS can treat many PATIENTS or none.
- MEDICAL ASSISTANTS guide PATIENTS to their rooms.
- TECHNICIANS maintain and check out EQUIPMENT to be used by the PHYSICIAN.
- A PHYSICIAN may use many pieces of EQUIPMENT or may not use any EQUIPMENT.
- RADIOLOGISTS report data to the PHYSICIAN.
- A PHYSICIAN may not need to receive any data from a RADIOLOGIST.
- PHYSICIAN'S ASSISTANTS gather medical data from PATIENTS and report it to the PHYSICIAN for further diagnosis.
- PHLEBOTOMISTS draw blood from PATIENTS.
- A PATIENT may or may not have their blood drawn during a visit.
- PHLEBOTOMISTS check out equipment to draw blood.

Entities and their attributes (no unique attributes if blank):

- PATIENT: Patient ID (identifier), name, phone number, address
- EMPLOYEE: Employee ID (identifier) and name
- SECRETARY: Hourly rate
- PHYSICIAN: Expertise
- MEDICAL ASSISTANT
- TECHNICIAN: Specialization
- RADIOLOGIST: Certification
- PHYSICIAN'S ASSISTANT
- PHLEBOTOMIST: Technique style
- APPOINTMENT: Appt. Number (identifier), Date and time, reason, room
- EQUIPMENT: Equipment ID (identifier), equipment type
- PAYMENT: Insurance, Co-pay, Amount due on account, payment type (card or cash)

EER Diagram



Relations

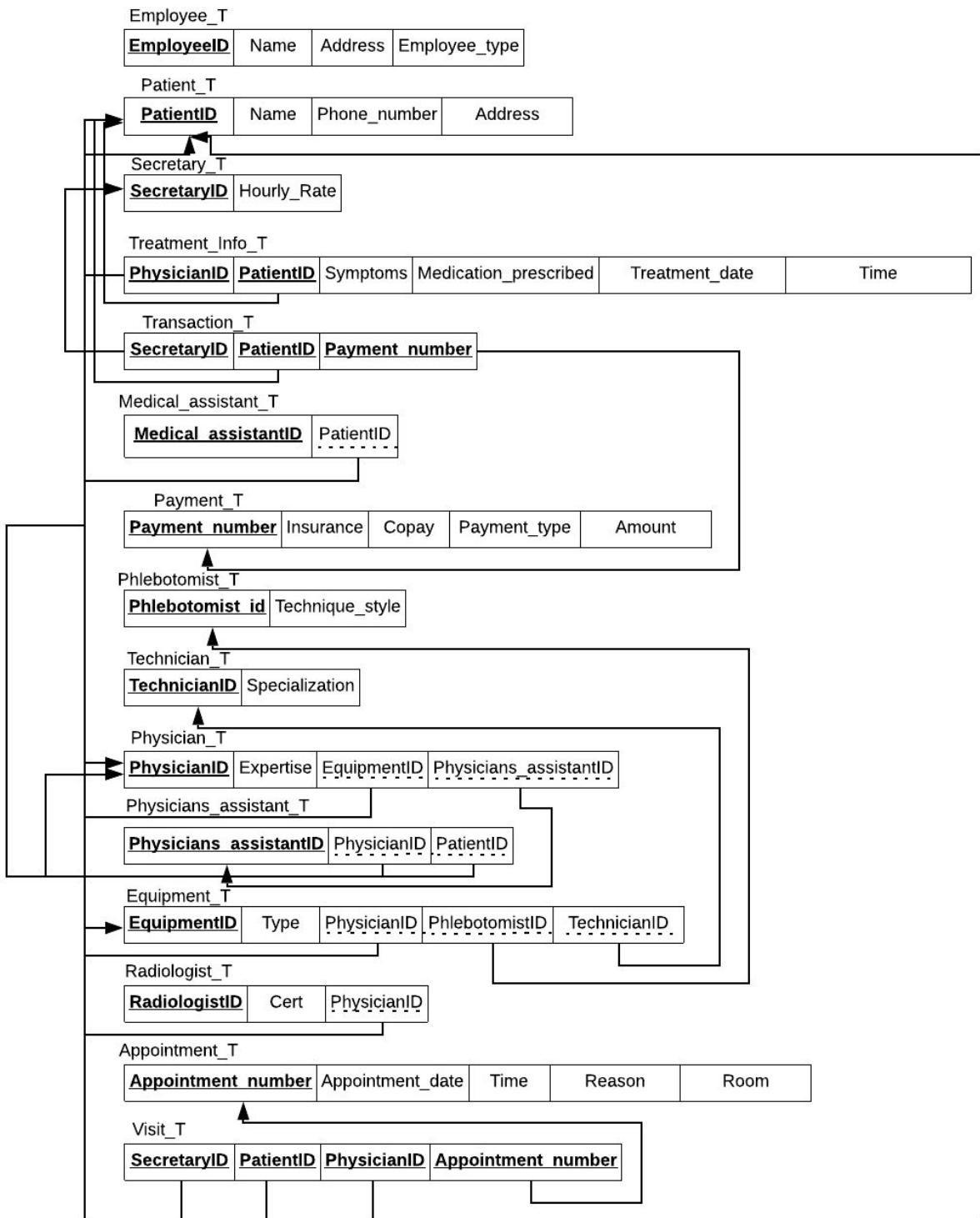


Table and Record Screenshots

Appointment_T

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
APPOINTMENT_T	APPOINTMENT_NUMBER	NUMBER	22	-	0	1	-	-	-
	APPOINTMENT_DATE	DATE	7	-	-	-	✓	-	-
	TIME	VARCHAR2	50	-	-	-	✓	-	-
	REASON	VARCHAR2	2000	-	-	-	✓	-	-
	ROOM	VARCHAR2	50	-	-	-	✓	-	-
1 - 5									

APPOINTMENT_NUMBER	APPOINTMENT_DATE	TIME	REASON	ROOM
3847	12/11/2019	2:00pm	hurt knee	Room 101
2494	12/13/2019	12:30pm	chest pain	Room 102
8374	12/13/2019	1:30pm	yearly checkup	Room 103
1	12/11/2019	2:00pm	hurt knee	Room 101
1249	12/02/2019	3:00pm	broken arm	Room 104

Employee_T

Object Type TABLE Object EMPLOYEE_T									
Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
EMPLOYEE_T	EMPLOYEEID	NUMBER	22	-	0	1	-	-	-
	NAME	VARCHAR2	50	-	-	-	✓	-	-
	ADDRESS	VARCHAR2	50	-	-	-	✓	-	-
	EMPLOYEE_TYPE	VARCHAR2	50	-	-	-	✓	-	-
1 - 4									

EMPLOYEEID	NAME	ADDRESS	EMPLOYEE_TYPE
2509	Daisy Alphabet	1359 Cool Blvd	Physicians Assistant
1110	Rachel Johnson	22366 Plympton sq Richmond, VA 23220	Physician
2790	Arthur Jones	1043 Elephant Blvd	Technician
1111	Jessica Roberts	123 Grove St Richmond, VA 23220	Radiologist
5555	Ben Bolster	8 1/2 W Canal St Richmond, VA 23220	Radiologist
8888	Elizabeth Warren	2305 Water Ave Richmond, VA 23220	Secretary
9999	Ali Johnson	2306 Black Ave Richmond, VA 23220	Physicians Assistant
3899	Michael Lee	2900 Dormers Court Richmond, VA 23220	Phlebotomist
9990	Eli Whitney	1359 Toyota St	Medical Assistant
5500	Binal Patel	6799 Belvidere St Richmond, VA 23220	Phlebotomist
7551	Alfonso Garcia	750 Why St	Medical Assistant
2222	William Johnson	150 W Clay St Richmond, VA 23220	Radiologist
3333	Alfred Schmidt	2350 Clever Ave Richmond, VA 23220	Radiologist
4444	Claire Lewis	2036 W Cherry St Midlothian, VA 23204	Radiologist
6666	Rajni Patel	12 Lewis Street Richmond, VA 23220	Secretary
7777	Mike Palmer	105 Alfred Blvd Richmond, VA 23220	Secretary
2350	Bill Williams	3609 SQL Street	Physicians Assistant
2319	John Smith	44579 Huckleberry St Richmond, VA 23222	Physician
5834	Michael Jackson	3159 Cow Ave	Technician
6799	Jupiter Pluto	3634 C++ Ave	Physician
1136	Rebecca Black	1350 Tiger St	Technician
4459	OJ Simpson	1249 Star St	Medical Assistant
9944	Jason Booth	1116 Cary St Richmond, VA 23220	Phlebotomist

Equipment_T

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
EQUIPMENT_T	EQUIPMENTID	NUMBER	22	-	0	1	-	-	-
	TYPE	VARCHAR2	50	-	-	-	✓	-	-
	PHYSICIANID	NUMBER	22	-	0	-	✓	-	-
	PHLEBOTOMIST_ID	NUMBER	22	-	0	-	✓	-	-
	TECHNICIANID	NUMBER	22	-	0	-	✓	-	-
1 - 5									

EQUIPMENTID	TYPE	PHYSICIANID	PHLEBOTOMIST_ID	TECHNICIANID
6538	stethoscope	2319	8429	5834
9284	first aid kit	1110	7573	1136
3947	blood pressure cuff	6799	1122	2790

Medical_Assistant_T

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
MEDICAL_ASSISTANT_T	MEDICAL_ASSISTANTID	NUMBER	22	-	0	1	-	-	
	PATIENTID	NUMBER	22	-	0	-	✓	-	
1 - 2									

MEDICAL_ASSISTANTID	PATIENTID
4459	1259
9990	1260
7551	1261

Patient_T

Object Type	TABLE Object	PATIENT_T	Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
PATIENT_T	PATIENTID	NUMBER	22	-	0	1	-	-	-	-	-	
	NAME	VARCHAR2	50	-	-	-	-	✓	-	-	-	
	PHONE_NUMBER	VARCHAR2	15	-	-	-	-	✓	-	-	-	
	ADDRESS	VARCHAR2	50	-	-	-	-	✓	-	-	-	
	MEDICAL_ASSISTANTID	NUMBER	22	-	0	-	-	✓	-	-	-	
	PHYSICIANS_ASSISTANTID	NUMBER	22	-	0	-	-	✓	-	-	-	
	PHLEBOTOMIST_ID	NUMBER	22	-	0	-	-	✓	-	-	-	
1 - 7												

PATIENTID	NAME	PHONE_NUMBER	ADDRESS	MEDICAL_ASSISTANTID	PHYSICIANS_ASSISTANTID	PHLEBOTOMIST_ID
1240	Mike Lewis	8042930129	3591 Dumb Street Richmond, VA 23220	7551	2350	8429
1258	Jose Calderon	8041240642	0124 Okay Ave Richmond, VA 23220	9990	2509	7573
1259	Rose Flower	8043591049	1259 I Hate This St Richmond, VA 23220	4459	9999	1122
1260	Jesus Rodriguez	8041350912	4691 My Head Hurts Blvd Richmond, VA 23220	9990	9999	8429
1261	Rosa Parks	1240532913	2498 W Clay St, VA 23220	7551	2509	7573

5 rows returned in 0.01 seconds [Download](#)

Payment_T

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
PAYMENT_T	PAYMENT_NUMBER	NUMBER	22	-	0	1	-	-	-
	INSURANCE	VARCHAR2	50	-	-	-	✓	-	-
	COPAY	VARCHAR2	50	-	-	-	✓	-	-
	PAYMENT_TYPE	VARCHAR2	50	-	-	-	✓	-	-
	AMOUNT	VARCHAR2	50	-	-	-	✓	-	-
1 - 5									

PAYMENT_NUMBER	INSURANCE	COPAY	PAYMENT_TYPE	AMOUNT
2299	Aetna Group	\$20	card	\$126
8890	Cigna Health Group	\$10	card	\$100
2344	UnitedHealth Group	\$10	card	\$159
7000	UnitedHealth Group	\$15	cash	\$200
5000	Anthem Group	\$50	card	\$250

5 rows returned in 0.01 seconds

[Download](#)

Phlebotomist_T

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
PHLEBOTOMIST_T	PHLEBOTOMIST_ID	NUMBER	22	-	0	1	-	-	-
	TECHNIQUE_STYLE	VARCHAR2	50	-	-	-	✓	-	-
1 - 2									

PHLEBOTOMIST_ID	TECHNIQUE_STYLE
8429	good motor skills
7573	empathy
1122	good at data entry

Physician_T

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
PHYSICIAN_T	PHYSICIANID	NUMBER	22	-	0	1	-	-	-
	EXPERTISE	VARCHAR2	50	-	-	-	✓	-	-
	EQUIPMENTID	NUMBER	22	-	0	-	✓	-	-
	PHYSICIANS_ASSISTANTID	NUMBER	22	-	0	-	✓	-	-
1 - 4									

PHYSICIANID	EXPERTISE	EQUIPMENTID	PHYSICIANS_ASSISTANTID
2319	Diagnose illness or injury	6538	2350
1110	Prescribe antibiotics	9284	2509
6799	Order diagnostic tests	3947	9999

Physicians_Assistant_T

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
PHYSICIANS_ASSISTANT_T	PHYSICIANS_ASSISTANTID	NUMBER	22	-	0	1	-	-	
	PHYSICIANID	NUMBER	22	-	0	-	✓	-	
	PATIENTID	NUMBER	22	-	0	-	✓	-	
1 - 3									

PHYSICIANS_ASSISTANTID PHYSICIANID PATIENTID

2350	1110	1240
2509	1110	1261
9999	6799	1260

Radiologist_T

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
RADIOLOGIST_T	RADIOLOGISTID	NUMBER	22	-	0	1	-	-	
	CERT	VARCHAR2	50	-	-	-	✓	-	
	PHYSICIANID	NUMBER	22	-	0	-	✓	-	
1 - 3									

RADIOLOGISTID CERT PHYSICIANID

5555	Bone Densitometry	1110
1111	Basic X-Ray	2319
2222	Mammography	6799
3333	MRI	6799
4444	Fluoroscopy	1110

Secretary_T

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
SECRETARY_T	SECRETARYID	NUMBER	22	-	0	1	-	-	-
	HOURLY_RATE	VARCHAR2	10	-	-	-	✓	-	-
1 - 2									

SECRETARYID	HOURLY_RATE
8888	\$18/hr
6666	\$15/hr
7777	\$15/hr

Technician_T

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
TECHNICIAN_T	TECHNICIANID	NUMBER	22	-	0	1	-	-	-
	SPECIALIZATION	VARCHAR2	50	-	-	-	✓	-	-
1 - 2									

TECHNICIANID	SPECIALIZATION
2790	operate medical equipment
1136	report findings to physician
5834	take blood samples

Transaction_T

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
TRANSACTION_T	SECRETARYID	NUMBER	22	-	0	1	-	-	-
	PATIENTID	NUMBER	22	-	0	2	-	-	-
	PAYMENT_NUMBER	NUMBER	22	-	0	3	-	-	-
1 - 3									

SECRETARYID	PATIENTID	PAYMENT_NUMBER
6666	1258	8890
6666	1261	5000
7777	1259	2344
7777	1260	7000
8888	1240	2299

5 rows returned in 0.00 seconds

Treatment_Info_T

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
TREATMENT_INFO_T	PHYSICIANID	NUMBER	22	-	0	1	-	-	-
	PATIENTID	NUMBER	22	-	0	2	-	-	-
	SYMPTOMS	VARCHAR2	2000	-	-	-	✓	-	-
	MEDICATION_PRESCRIBED	VARCHAR2	2000	-	-	-	✓	-	-
	TREATMENT_DATE	DATE	7	-	-	-	✓	-	-
	TIME	VARCHAR2	50	-	-	-	✓	-	-

1 - 6

PHYSICIANID	PATIENTID	SYMPTOMS	MEDICATION_PRESCRIBED	TREATMENT_DATE	TIME
2319	1258	hurt arm	advil	12/14/2019	11:00 am
6799	1260	none	none	12/14/2019	12:00 pm
1110	1259	shortness of breath	inhaler	12/15/2019	12:30 pm
1110	1261	sore throat/strep throat symptoms	antibiotics	12/16/2019	1:30 pm
1110	1240	headache	excedrin	12/10/2019	4:00 pm

Visit_T

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
VISIT_T	SECRETARYID	NUMBER	22	-	0	1	-	-	-
	PATIENTID	NUMBER	22	-	0	2	-	-	-
	PHYSICIANID	NUMBER	22	-	0	3	-	-	-
	APPOINTMENT_NUMBER	NUMBER	22	-	0	4	-	-	-
							1 - 4		

SECRETARYID	PATIENTID	PHYSICIANID	APPOINTMENT_NUMBER
6666	1258	1110	2494
6666	1261	6799	1249
7777	1259	6799	8374
8888	1240	2319	3847
8888	1260	2319	1

Forms Screenshots

The screenshot shows a 'PATIENT_T' form window. At the top left is a breadcrumb navigation: 'Home > Patient T'. The title bar says 'PATIENT_T'. On the right side of the title bar are 'Cancel' and 'Create' buttons. The main area contains several input fields: 'Name' (with a blue border), 'Phone Number', 'Address', 'Medical Assistantid', 'Physicians Assistantid', and 'Phlebotomist Id'. Below this is a table with five rows of data:

Name	Phone Number	Address	Medical Assistantid	Physicians Assistantid	Phlebotomist Id
Jesus Rodriguez	8041350912	4691 My Head Hurts Blvd Richmond, VA 23220	9999	9999	8429
Jose Calderon	8041240642	0124 Okay Ave Richmond, VA 23220	9999	2509	7573
Mike Lewis	8042930129	3591 Dumb Street Richmond, VA 23220	7551	2350	8429
Rosa Parks	1240532913	2498 W Clay St, VA 23220	7551	2509	7573
Rose Flower	8043591049	1259 I Hate This St Richmond, VA 23220	4459	9999	1122

At the bottom of the table is a 'Spread Sheet' link and the page number '1 - 5'.

Queries

Single Table Access

- List all patients
 - select*from patient_t

PATIENTID	NAME	PHONE_NUMBER	ADDRESS	MEDICAL_ASSISTANTID	PHYSICIANS_ASSISTANTID	PHLEBOTOMIST_ID
1240	Mike Lewis	8042930129	3591 Dumb Street Richmond, VA 23220	7551	2350	8429
1258	Jose Calderon	8041240642	0124 Okay Ave Richmond, VA 23220	9990	2509	7573
1259	Rose Flower	8043591049	1259 I Hate This St Richmond, VA 23220	4459	9999	1122
1260	Jesus Rodriguez	8041350912	4691 My Head Hurts Blvd Richmond, VA 23220	9990	9999	8429
1261	Rosa Parks	1240532913	2498 W Clay St, VA 23220	7551	2509	7573

- What is the address of the patient named Rosa Parks?
 - select name, address
from patient_t
where name = 'Rosa Parks'

NAME	ADDRESS
Rosa Parks	2498 W Clay St, VA 23220

- What is the expertise of physician with PhysicianID 2319
 - select physicianid, expertise
from physician_t
where physicianid = '2319'

PHYSICIANID	EXPERTISE
2319	Diagnose illness or injury

- Alphabetically, what is the last patient name in the patient table? Use an alias NAME.
 - select max(name)
from patient_t

MAX(NAME)
Rose Flower

- Count all appointments
 - select count(*)
from appointment_t

COUNT(*)
5

Multiple Table Join

- Find the name of the patient who was helped by the physician assistant with id '2350'
 - select patient_t.name from physicians_assistant_t, patient_t where patient_t.patientid = physicians_assistant_t.patientid and physicians_assistant_t.physicians_assistantid = 2350

NAME
Mike Lewis

- Find the date of the appointment checked in by secretary with id 8888
 - Select appointment_t.appointment_date from secretary_t, visit_t, appointment_t Where visit_t.secretaryid= secretary_t.secretaryid and visit_t.appointment_number = appointment_t.appointment_number And secretary_t.secretaryid=8888

APPOINTMENT_DATE
12/11/2019
12/11/2019

- Find the certifications of the radiologist with physicianID 1110
 - Select radiologist_t.cert from radiologist_t, physician_t Where radiologist_t.physicianid=physician_t.physicianid And physician_t.physicianid= '1110'

CERT
Bone Densitometry
Fluoroscopy

- Find the treatment information for the patient named Rose Flower
 - select treatment_info_t.medication_prescribed from treatment_info_t, patient_t where patient_t.patientid = treatment_info_t.patientid and patient_t.name = 'Rose Flower';

MEDICATION_PRESCRIBED
inhaler

- Find the name of the medical assistant that helped patient with patient id 1260
 - select patient_t.name from medical_assistant_t, patient_t
where patient_t.patientid = medical_assistant_t.patientid
and patient_t.patientid = 1260;

NAME
Jesus Rodriguez

- Find the symptoms of the patient named Jose Calderon
 - select treatment_info_t.symptoms from treatment_info_t, patient_t
where patient_t.patientid = treatment_info_t.patientid
and patient_t.name = 'Jose Calderon'

SYMPTOMS
hurt arm

- Find the hourly rate of the secretary named Elizabeth Warren
 - select secretary_t.hourly_rate from employee_t, secretary_t
where employee_t.employeeid = secretary_t.secretaryid
and employee_t.name = 'Elizabeth Warren'

HOURLY_RATE
\$18/hr

- Find the equipment type checked out by the physician named Rachel Johnson
 - select equipment_t.type from equipment_t, employee_t
where employee_t.employeeID = equipment_t.physicianid
and employee_t.name = 'Rachel Johnson'

TYPE
first aid kit

- Find the specialization of the technician named Michael Jackson
 - select technician_t.specialization from technician_t, employee_t
where employee_t.employeeID = technician_t.technicianid
and employee_t.name = 'Michael Jackson'

SPECIALIZATION
take blood samples

- What is the name of the radiologist with certification MRI
 - select employee_t.name from employee_t, radiologist_t
where employee_t.employeeid = radiologist_t.radiologistid
and radiologist_t.cert = 'MRI'

NAME
Alfred Schmidt

- What is the name of the medical assistant that saw the patient with id 1259
 - select employee_t.name from employee_t, medical_assistant_t
where employee_t.employeeid = medical_assistant_t.medical_assistantid
and medical_assistant_t.patientid = 1259

NAME
OJ Simpson

- What is the name of the physician's assistant who saw patient with id 1260
 - select employee_t.name from employee_t, physicians_assistant_t
where employee_t.employeeid = physicians_assistant_t.physicians_assistantid
and physicians_assistant_t.patientid = 1260

NAME
Ali Johnson

- Find the expertise of the physician named Rachel Johnson
 - select physician_t.expertise from physician_t, employee_t
where employee_t.employeeid = physician_t.physicianid
and employee_t.name = 'Rachel Johnson'

EXPERTISE
Prescribe antibiotics

- Find the medication prescribed to the patient named Rosa Parks
 - select treatment_info_t.medication_prescribed from treatment_info_t, patient_t
where patient_t.patientid = treatment_info_t.patientid
and patient_t.name = 'Rosa Parks'

MEDICATION_PRESCRIBED
antibiotics

- Find the treatment time of the patient named Jesus Rodriguez
 - select treatment_info_t.time from treatment_info_t, patient_t where patient_t.patientid = treatment_info_t.patientid and patient_t.name = 'Jesus Rodriguez'

TIME
12:00 pm

Peer Evaluation

“By signing this, I agree that all group members participated and contributed full effort into this project”

Signature: Date:

Benjamin Bolster 5 December 2019

Shravani Deshmukh 5 December 2019

Archana Ravishankar 5 December 2019