

Group 5 Project 1

1. Team name and members:

Team name: 5

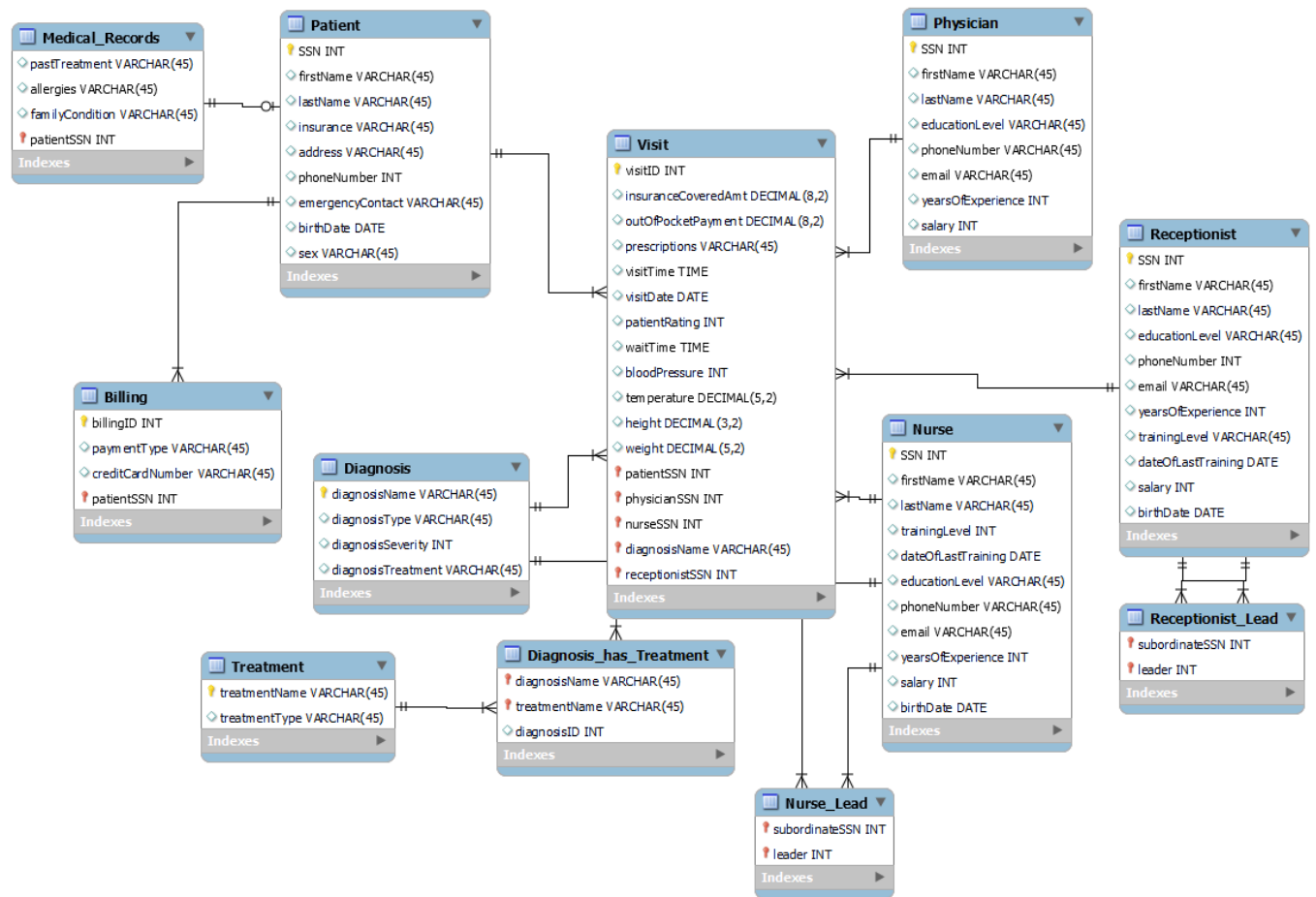
Team Member Name	Github Repo
Annie Cheung	https://github.com/AnnieXCheung/RapidCare-Clinic.git
Grace Wang	https://github.com/gracecwang/MIST4610-Clinic.git
Josh Yi	https://github.com/JoshJYi/MIST4610-GP1.git
Mussie Gebrekidan	https://github.com/MussieEfrem/MIST4610-GP1.git

2. Problem description:

Dr. Smith is a seasoned physician who is in the process of establishing a modern healthcare clinic in a bustling urban area. With years of experience in patient care, Dr. Smith aims to create a comprehensive healthcare facility that provides top-notch medical services to the community. To streamline operations and ensure efficient patient management, Dr. Smith recognizes the critical need for a robust relational database system.

Dr. Smith requires a database to store detailed patient records, maintain comprehensive profiles of all physicians, nurses, and receptionists working at the clinic. The system should also maintain a comprehensive catalog of medical treatments, procedures, and diagnoses. Furthermore, Dr. Smith will also need an organized record that details all patient visits, including check-in/out times, attending physicians, nursing staff assigned, treatments administered, diagnoses made, and any follow-up instructions or prescriptions provided.

3. Data Model:



- The Patient entity has a one-to-one relationship with Medical_Records because there is one medical record for each patient. The patient entity also has a one-to-one relationship with Billing since there is one billing entry for each patient.
- There are one-to-many relationships with the Patient, Physician, Nurse, and Receptionist entities and the Visit entity because each visit can only have one patient, one physician, one nurse, and one receptionist assigned. However, patients, physicians, nurses, and receptionists can be associated with multiple visits.
- Diagnosis has a one-to-many relationship with the Visit entity because a physician can provide multiple diagnoses for each patient visit. Diagnosis also has an associative entity that links it to the Treatment entity to display the treatments for each diagnosis.
- The Nurse entity has a one-to-one recursive relationship with Nurse_Lead because they have the same entities except the column of the nurse lead assigned, effectively displaying the hierarchical structure. The Receptionist entity also has a one-to-one

recursive relationship with the Receptionist Lead entity to effectively identify the hierarchical structure between the 2 entities.

4. Data Dictionary:

a. Table: Billing

Column Name	Description	Data Type	Size	Format	Key?
billingID	Unique ID containing each patient's billing information	Text	5	99999	PK
paymentType	Type of payment (ex: cash, credit card)	Text	45		
creditCardNumber	Patient's credit card number (if applicable)	Text	16	9999999999999999 9	
patientSSN	Patient's social security number	Text	9	999999999	FK (ref. Patient)

b. Table: Diagnosis

Column Name	Description	Data Type	Size	Format	Key?
diagnosisName	Name of the ailment which has been identified in a patient	text	45		PK
diagnosticType	The method for which diagnosis is achieved (e.g. swab, MRI)	text	45		
diagnosisSeverity	Likert scale rating from 1-10, with 1 being the least severe and 10 being the most severe corresponding to the ailment	Numeric	2		

c. Table: Diagnosis_Has_Treatment

Column Name	Description	Data Type	Size	Format	Key?
diagnosisID	Primary key of an entity established by M:M relationship between Diagnosis and Treatment	Numeric	9		PK

treatmentName	Name of the prescribed treatment for a patient's ailment.	text	45		FK(References Treatment.treatmentName)
diagnosisName	Name of the ailment which has been identified in a patient	Text	45		FK(References Diagnosis.diagnosisName)

d. Table: Medical_Records

Column Name	Description	Data Type	Size	Format	Key?
medicalHistoryID	Patient's unique medical ID containing his/her medical history	text	5	99999	PK
pastTreatment	Description of any treatment patient has received at this clinic in the past.	text	250		
allergies	List of patient's allergies	text	250		
familyCondition	List of any known family conditions	text	250		
patientSSN	The patient's social security number	text	9	999999999	FK (ref. Patient)

e. Table: Nurse

Column Name	Description	Data Type	Size	Format	Key?
SSN	Unique number that is the nurse's social security number.	Text	9	999999999	PK
firstName	The nurse's first name	Text	20		
lastName	The nurse's last name	Text	20		
trainingLevel	The level of training a nurse has received	Text	2		
dateOfLastTraining	The date if a nurse's last training	Date		MM/DD/YYYY	

Column Name	Description	Data Type	Size	Format	Key?
SSN	Unique number that is the nurse's social security number.	Text	9	999999999	PK
firstName	The nurse's first name	Text	20		
educationLevel	The level of education a nurse has earned	Text	20		
phoneNumber	The nurse's phone number	Text	10	999-999-9999	
email	The nurse's email	Text	25		
yearsOfExperience	The number of years a nurse has worked	Text	2		
salary	The nurse's salary	Numeric	7	9999999	
birthDate	The nurse's birthdate	Date		MM/DD/YYYY	

f. Table: Nurse Lead

Column Name	Description	Data Type	Size	Format	Key?
subordinateSSN	Unique number that is the subordinate's social security number.	Text	9	999999999	PK, FK(ref Nurse.SSN)
leader	Unique number that is the leader's social security number.	Text	9	999999999	PK, FK(ref Nurse.SSN)

g. Table: Patient

Column Name	Description	Data Type	Size	Format	Key?
SSN	A unique number that indicates the patient's social security number	Text	9	999999999	PK
firstName	The patient's first name	Text	20		
lastName	The patient's last name	Text	20		
insurance	The patient's insurance name	Text	50		

address	The patient's primary address	Text	250		
phoneNumber	The patient's primary phone number	Text	10	9999999999	
emergencyContact	The name of the patient's emergency contact	Text	40		
birthDate	The patient's birthday	Date		YYYY-MM-DD	
sex	The patient's sex assigned at birth	Text	6		

h. Table: Physician

Column Name	Description	Data Type	Size	Format	Key?
SSN	Unique number that is physician's social security number.	Text	9	999999999	PK
firstName	The physician's first name	Text	20		
lastName	The physician's last name	Text	20		
educationLevel	The level of education a physician has earned	Text	20		
phoneNumber	The physician's phone number	Text	10	999-999-9999	
email	The physician's email	Text	25		
yearsOfExperience	The number of years a physician has worked	Text	2		
salary	The physician's salary	Numeric	7	9999999	

i. Table: Receptionists

Column Name	Description	Data Type	Size	Format	Key?
SSN	Unique number that is the receptionist's social security number.	Text	9	999999999	PK
firstName	The receptionist's first name	Text	45		
lastName	The receptionist's last name	Text	45		
trainingLevel	The level of training a receptionist has received	Text	Numeric		
dateOfLastTraining	The date of a receptionist's last training	Date		MM/DD/YYYY	
educationLevel	The level of education a receptionist has earned	Text	45		
phoneNumber	The receptionist's phone number	Text	10	999-999-9999	
email	The receptionist's email	Text	45		
yearsOfExperience	The number of years a receptionist has worked	Numeric	2		
salary	The receptionist's salary	Numeric	7	9999999	
birthDate	The receptionist's birthdate	Date		MM/DD/YYYY	

j. Table: Receptionist Lead

Column Name	Description	Data Type	Size	Format	Key?
subordinateSSN	Unique number that is the subordinate's social security number.	Text	9	999999999	FK(ref Receptionist s.SSN)
leaderSSN	Unique number that is the leader's social security number.	Text	9	999999999	FK(ref Receptionist s.SSN)

k. Table: Treatment

Column Name	Description	Data	Size	Format	Key?
-------------	-------------	------	------	--------	------

		Type			
treatmentName	Name of the prescribed treatment for a patient's ailment.	Text	45		PK,
treatmentType	Category of treatments (e.g., opioid, OTC prescription)	Text	45		

1. Table: Visit

Column Name	Description	Data Type	Size	Format	Key?
VisitID	Unique numeric for each visit	text	5	99999	PK
VisitDate	Date of visit	Date		YYYY-MM-DD	
insuranceCoveredAmt	Amount of visit cost that is covered by insurance	Numeric	8	999999.99	
outOfPocketPayment	Amount paid by patient at visit	Numeric	8	999999.99	
prescriptions	Prescriptions prescribed to patient	Text	45		
visitTime	Time of visit	Time		99:99	
patientRating	Patient rating of visit	Text	1	9	
waitTime	Amount of time patient waited prior to being seen	Numeric	2	99	
bloodPressure	Blood pressure of patient	Text	5	999/99	
temperature	Patient's temperature	Text	5	999.99	
height	Patient's height	Text	3	9.99	
weight	Patient's weight	Text	5	999.99	
patientSSN	Patient's social security number	Text	9	999999999	FK (ref. Patient)
physicianSSN	Physician's social security number	Text	9	999999999	FK (ref. Physician)
nurseSSN	Nurse's social security number	Text	9	999999999	FK (ref. Nurse)
diagnosisName	Name of Patient's diagnosis	Text	45		

receptionistSSN	Receptionist's social security number	Text	9	999999999	FK(ref. Receptionists)
-----------------	---------------------------------------	------	---	-----------	------------------------

5. Ten Queries:

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Multiple table JOIN				✓	✓	✓	✓	✓	✓	
GROUP BY						✓		✓	✓	
Multi-condition WHERE			✓							
Built in functions		✓				✓		✓	✓	
Functions (equation)										✓
REGEXP				✓				✓		
ORDER BY					✓					
WHERE	✓	✓	✓		✓			✓		
CREATE PROCEDURE: CALL					✓					
CONCAT							✓	✓	✓	

- 1) After a performance review, management would like to know if Pam Beesly and Bernadette Rostenkowski-Wolowitz have been compensated for their great work. They believe their just salary should exceed \$40,000.

List all receptionists with a salary greater than \$40000.

SELECT SSN, firstName, lastName, salary

FROM Receptionists
WHERE salary>40000;

	SSN	firstName	lastName	salary
▶	130508170	Pam	Beesly	50000
	130508171	Bernadette	Rostenkowski-Wolowitz	44000
	130518181	Gladys	Ludgate	55000

- 2) The clinic has noticed a lot of people are leaving unattended due to high costs. They would like to estimate the average out of pocket billing for patients so they can fundraise for patients who would otherwise go untreated.

Find average billing in 2023.

SELECT AVG(outOfPocketPayment)
FROM Visit
WHERE visitDate BETWEEN '2022-12-31' AND '2024-01-01';

	AVG(outOfPocketPayment)
▶	440.105000

- 3) Management is planning to send the most highly trained and academically qualified receptionists to a clinic customer service seminar.

List all receptionists names and their training levels having a bachelor's degree or higher

SELECT firstName, lastName, educationLevel, trainingLevel
FROM Receptionists
WHERE educationLevel='bachelors' OR educationLevel='masters' OR
educationLevel='phD';

	firstName	lastName	educationLevel	trainingLevel
▶	Pam	Beesly	bachelors	5
	Gladys	Ludgate	masters	8

- 4) There is a new drug that treats the common flu that has recently been found to be lethal to those with a family history of lung cancers. The clinic wants to conduct a recall and want to know which patients they may need to contact.

List all the patients that have family conditions of 'lung cancer'

```
SELECT Patient.firstName, Patient.lastName, Medical_Records.familyCondition
FROM Patient
JOIN Medical_Records ON Patient.SSN=Medical_Records.patientSSN
WHERE LOWER(Medical_Records.familyCondition) REGEXP 'lung cancer';
```

	firstName	lastName	familyCondition
▶	Jon	Snow	high blood pressure, lung cancer
	Pam	Beesly	heart disease, lung cancer

- 5) There has been a series of complaints launched by patients against nurses but they are unable to identify the nurse who treated them. Some are only able to profile the nurse by their physical attributes. To verify the identity of the nurse, management needs a list of possible patients seen by the nurse described.

List the names of all patients seen by a certain nurse in alphabetical order

```
CREATE PROCEDURE nurseOfPatient(IN nurseFirstName VARCHAR(10))
SELECT DISTINCT Patient.firstName AS 'Patient First Name', Patient.lastName AS
'Patient Last Name', Nurse.firstName'Nurse First Name', Nurse.LastName 'Nurse Last
Name'
FROM Patient
JOIN Visit ON Patient.SSN=Visit.patientSSN
JOIN Nurse ON Visit.nurseSSN=Nurse.SSN
WHERE Nurse.firstName = nurseFirstName
ORDER BY Patient.LastName DESC;
```

```
CALL nurseOfPatient("Aurthur");
```

	Patient First Name	Patient Last Name	Nurse First Name	Nurse Last Name
▶	Daenerys	Targarean	Aurthur	Kadwallider
	Jaime	Lannister	Aurthur	Kadwallider

- 6) Head receptionist, Gladys Ludgate, has reported patients seeming visibly dissatisfied more often after being seen by their physician. Management is launching an investigation to take corrective measures such as additional training, which has not been implemented for physicians. The clinic would benefit by focusing the training on the physicians who need it most.

Count the amount of visits where each physician received a rating of less than 4

```

SELECT Physician.firstName, Physician.lastName, COUNT(visitID) AS 'Number of
Visits'
FROM Visit
JOIN Physician ON Visit.physicianSSN = Physician.SSN
WHERE patientRating<4
GROUP BY Physician.firstName, Physician.lastName;

```

	firstName	lastName	Number of Visits
▶	Bent	Bartolic	1
	Judy	Manntschke	4

- 7) The clinic is launching a post-visit campaign to increase patient retention. They would like to apologize and send a voucher for dissatisfied patients as well as make sure the staff who handled the patient visit are avoided for future visits.

List the phone number of all patients who submitted a satisfaction rating of less than 4 and the staff associated with their visit

```

SELECT CONCAT(p.firstname, ' ', p.lastName) AS patientName, p.phoneNumber,
patientRating, CONCAT(n.firstName, ' ', n.lastname) AS nurseName,
CONCAT(ph.firstName, ' ', ph.lastName) AS physicianName, CONCAT(r.firstname, ' ',
r.lastName) AS receptionistName
FROM Patient p
JOIN Visit v ON p.SSN = v.patientSSN
JOIN Nurse n ON v.nurseSSN = n.SSN
JOIN Physician ph on v.physicianSSN = ph.SSN
JOIN Receptionists r ON v.receptionistSSN = r.SSN
WHERE v.patientRating < 4;

```

patientName	phoneNumber	patientRati...	nurseName	physicianName	receptionistName
Jaime Lannister	6792859773	3	Dyann Bovingdon	Judy Manntschke	Angela Adler
Jaime Lannister	6792859773	3	Micah Lascelles	Judy Manntschke	Gladys Ludgate
Jaime Lannister	6792859773	3	Aurthur Kadwallider	Judy Manntschke	Gladys Ludgate
Jaime Lannister	6792859773	3	Aurthur Kadwallider	Judy Manntschke	Bernadette Rostenkowski-Wolowitz
Olenna Tyrell	6492849256	2	Thorstein Zouch	Bent Bartolic	Pam Beesly

- 8) Clinics around the area such as Walgreens and CVS have alerted management of Rapid-Care to suspiciously high numbers of opioid prescriptions for the size of the clinic. The clinic wants to investigate the physicians responsible.

Count the number of visits where each physician has prescribed opioids.

```
SELECT CONCAT(p.firstname, ' ', p.lastName) AS physicianName,  
COUNT(DISTINCT visitID) AS numVisit  
FROM Physician p  
JOIN Visit v ON p.SSN = v.physicianSSN  
JOIN DiagnosisHasTreatment dht ON v.diagnosisName = dht.diagnosisName  
JOIN Treatments t ON dht.treatmentName = t.treatmentName  
WHERE treatmentType REGEXP("Opioid")  
GROUP BY physicianName;
```

physicianName	numVisit
Bent Bartolic	1
Judy Manntsche	3
Rina Barette	1

- 9) The clinic is planning to hire a number of new nurses and would like to distribute them to nurse leadership, taking care not to overwhelm supervisors with too many nurses.

List the existing roster of nurse supervisors and the number of subordinates they have.

```
SELECT leader, CONCAT(n.firstName, " ", n.lastName) AS nurseName,  
COUNT(subordinateSSN) AS numOfSubordinates  
FROM Nurse n  
JOIN Nurse_Lead ON Nurse_Lead.leader = n.SSN  
GROUP BY Nurse_Lead.leader;
```

leader	nurseName	numOfSubordinat...	
216286159	TadioRedler	3	
299414850	TempGreg	1	
355118260	MicahLascelles	1	
429259680	GannieYankishin	2	
447628643	AurthurKadwallider	2	
563260132	ImmanuelCrickett	7	

- 10) After recent allegations of salary discrimination, the clinic would like to audit its physician's increase in salary proportional to years of experience.

Find the rate of increase in salary per year of experience barring base pay, or salary at years=0, of \$70,000 for each physician.

```
SELECT SSN, firstName, lastName, ((salary-70000)/yearsOfExperience) AS 'PAY
INCREASE/ YEAR OF EXPERIENCE'
FROM Physician;
```

SSN	firstName	lastName	PAY INCREASE/ YEAR OF EXPERIENCE
190768526	Kelli	Johnston	2727.2727
363210416	Bent	Bartolic	2777.7778
613489442	Kiri	Alsopp	1250.0000
679786385	Donald	Cooks	2000.0000
681276691	Lusa	Henric	2600.0000
749313601	Barnebas	Ranger	2500.0000
802110181	Rina	Barette	2142.8571
821917593	Judy	Manntschke	2500.0000

Database Name

al_Group21482_G5