EECS 341 Final Report

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1. Application Background

This project is designed as a simple database for doctors. The database stores important information on the doctors, the patients and the visits made by a patient. We had five different tables to store that information: patient, doctor, visits, habits, and vaccines.

Each doctor was assigned an ID number that acted as the doctor's primary key in the table. For patients, they were also assigned an ID number that also acted as the primary key in the patients table of our database. There were also weak entities in the Habits and Vaccines tables, both who had primary keys that referenced the patient table of our database. The reasoning behind this was that each patient typically has only one set of habits as well as only one vaccine history. Both tables were intended to be updated if the patient's habits or vaccine history were changed.

For the visits Table, we assigned each visit an ID. There were two foreign keys in each visits tuple which could not be null: patient ID and doctor ID. This makes sense as for each actual appointment requires a doctor and a patient in order to actually qualify as a visit.

2. Data Description:

2.1 Relational Schemas

1. DOCTOR(did, dFirstName, dLastName, dbday, dfield)
2. PATIENT(pID, pFirstName, pLastName, pBday, pDem, pAge, pGender, pMarital)
3. HABITS(hID, hExcercise, hMeal, hSnacks, hSleep, hSmoke, hAlcohol)
4. VACCINES(rid, rTDep, rFlu, rHPV, rHepB, rHepA)
5. VISITS(vID, pID, did, height, weight, waist, bp, pulse, cholesteral, ldc_chol, mdl_chol, triglycerides, glucose, creatinine, GFR, vDate)

2.2 Functional Dependencies

1. did -> dFirstName, dLastName, dbday, dfield
2. pID -> pFirstName, pLastName, pBday, pDem, pAge, pGender, pMarital
3. hID -> hExcercise, hMeal, hSnacks, hSleep, hSmoke, hAlcohol
4. rid -> rTDep, rFlu, rHPV, rHepB, rHepA
5. vID -> pID, did, height, weight, waist, bp, pulse, cholesteral, ldc_chol, mdl_chol, triglycerides, glucose, creatinine, GFR, vDate
6. pID -> rid, hID

2.3 Integrity Constraints

1. Doctor

- did: a not null 10 digit integer as the primary key
- dFirstName: a string of up to 20 characters or numbers
- dLastName: a string of up to 20 characters or numbers
-dbday: a non-null date
- field: a string of up to 20 characters or numbers

2. Patient

- pID: a not null 10 digit integer as the primary key
- pFirstName: a string of up to 20 characters or numbers
- pLastName: a string of up to 20 characters or numbers
- pBday: a not-null date
- pAge: a 3 digit integer
- pGender: a character (male or female)
- pMarital: a character (yes or no)

3. Habits

- hID: a not null 10 digit integer as the primary key which references the Patient pID as a foreign key
- hExcercise: a string of up to 20 characters or numbers
- hMeal: a string of up to 20 characters or numbers
- hSnacks: a string of up to 20 characters or numbers
- hSleep: a 2 digit int referring to the number of hours of sleep per day
- hSmoke: a character (yes or no)
- hAlcohol: a string of up to 10 characters or numbers

4. Vaccines

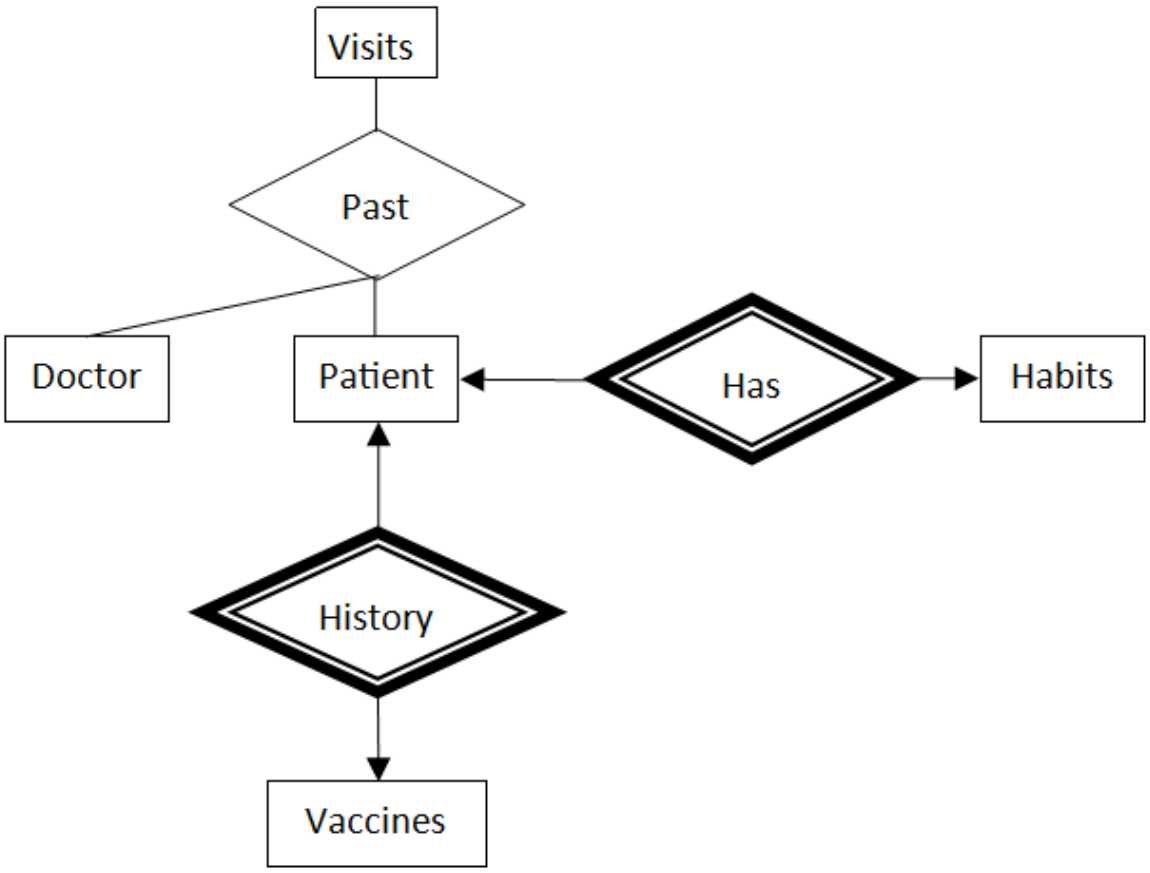
- rid: a not null 10 digit integer as the primary key which references the Patient pID as a foreign key
- rTdep: a character (yes or no)
- rFlu: a character (yes or no)
- rHPV: a character (yes or no)
- rHepB: a character (yes or no)
- rHepA: a character (yes or no)

5. Visits

- vID: a not null 10 digit integer as the primary key
- pID: a not null 10 digit integer as a foreign key referencing the Patient pID
- did: a not null 10 digit integer as a foreign key referencing the Doctor did
- height: a string of up to 10 characters or numbers
- weight: a three digit integer representing the patient’s current weight at time of the visit
- waist: a three digit integer representing the patient’s current height at time of the visit
- bp: a four digit integer representing the patient’s blood pressure at the time of the visit
- pulse: a four digit integer representing the patient’s pulse at time of the visit

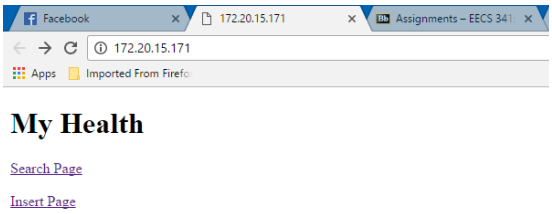
- cholesteral: a six digit integer representing the patient's cholesterol levels at time of the visit
- ldc_chol: a six digit integer representing the patient's ldc cholesterol
- mdl_chol: a six digit integer representing the patient's mdl cholesterol
- triglycerides: a six digit integer representing the patient's triglycerides
- glucose: a six digit integer representing the patient's glucose levels
- creatinine: a six digit integer representing the patient's creatinine levels
- GFR: a six digit integer representing the patient's GFR
- vDate: the date the visit took place

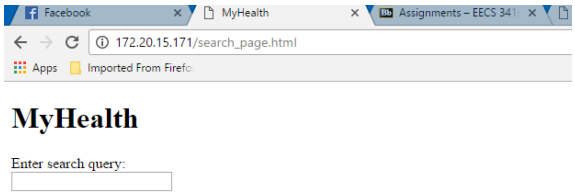
3. ER Diagram:



4. Implementation

Database Management System: MySQL
Operating System: Windows and Linux Mint
Languages: PHP, SQL





We created all tables for the database in MySQL and populated them. On a Linux machine, we used an Apache tomcat server to fetch and execute SQL queries and results via PHP scripts on our web application, which will display the results from those queries.

5. Table Creation and Data Population

```
CREATE TABLE `DOCTOR` (
  `did` int(10) NOT NULL,
  `dLastName` varchar(20) DEFAULT NULL,
  `dbday` int(8) NOT NULL,
  `field` varchar(20) DEFAULT NULL,
  `dFirstName` varchar(20) DEFAULT NULL,
  PRIMARY KEY (`did`)
)
```

```
INSERT INTO `DOCTOR` VALUES
(1,'Wu',1011990,'pediatrics','Ben'),
(2,'Yang',2141995,'physician','Chris'),
(3,'Fields',8111994,'surgeon','Sarah'),
```

```
(4,'Lispen',11151989,'therapist','Blake'),
(5,'Bell',10311998,'Pharmacy Technician','Elizabeth');

CREATE TABLE `PATIENT` (
  `pID` int(10) NOT NULL,
  `pFirstName` varchar(20) DEFAULT NULL,
  `pBday` int(8) NOT NULL,
  `pDem` varchar(20) DEFAULT NULL,
  `pAge` int(3) DEFAULT NULL,
  `pGender` char(1) DEFAULT NULL,
  `pMarital` char(1) DEFAULT NULL,
  `pLastName` varchar(20) DEFAULT NULL,
  PRIMARY KEY (`pID`)
)

INSERT INTO `PATIENT` VALUES
(1,'Cecil',9141993,'Mexican',23,'M','N','Gonzales'),
(2,'Isabel',7161996,'English',20,'F','Y','Garner'),
(3,'Tyler',4011994,'German',22,'M','Y','Robbins'),
(4,'Carla',6171986,'German',30,'F','N','Rogers');


CREATE TABLE `VACCINES` (
  `rid` int(10) NOT NULL,
  `rTdep` char(1) DEFAULT NULL,
  `rFlu` char(1) DEFAULT NULL,
  `rHPV` char(1) DEFAULT NULL,
  `rHepB` char(1) DEFAULT NULL,
  `rHepA` char(1) DEFAULT NULL,
  PRIMARY KEY (`rid`),
  CONSTRAINT `chk_rid` FOREIGN KEY (`rid`) REFERENCES `PATIENT` (`pID`)
)

INSERT INTO `VACCINES` VALUES
 (1,'Y','Y','Y','Y','Y'),
(2,'Y','N','Y','Y','Y'),
(4,'N','N','Y','Y','Y');

CREATE TABLE `HABITS` (
  `hID` int(10) NOT NULL,
  `hExercise` varchar(20) DEFAULT NULL,
  `hMeal` varchar(20) DEFAULT NULL,
  `hSnacks` varchar(20) DEFAULT NULL,
  `hSleep` int(2) DEFAULT NULL,
  `hSmoke` char(1) DEFAULT NULL,
```

```
  `hAlcohol` varchar(10) DEFAULT NULL,
  PRIMARY KEY (`hID`),
  CONSTRAINT `chk_key` FOREIGN KEY (`hID`) REFERENCES `PATIENT` (`pID`)
)

INSERT INTO `HABITS` VALUES
(1,'Some','4 meals per day','occaisional',5,'N','Moderation'),
(2,'None','2 meals/day','4 times a day',8,'N','weekends'),
(3,'14 hours/week','3 meals','when hungry',7,'N','raging'),
(4,'couch potato','3 meals','everytime',14,'Y','everytime');

CREATE TABLE `VISITS` (
  `vID` int(10) NOT NULL AUTO_INCREMENT,
  `pID` int(10) NOT NULL,
  `did` int(10) NOT NULL,
  `height` varchar(10) DEFAULT NULL,
  `weight` int(3) DEFAULT NULL,
  `waist` int(3) DEFAULT NULL,
  `bp` int(4) DEFAULT NULL,
  `pulse` int(4) DEFAULT NULL,
  `cholesteral` int(6) DEFAULT NULL,
  `ldc_chol` int(6) DEFAULT NULL,
  `mdl_chol` int(6) DEFAULT NULL,
  `triglycerides` int(6) DEFAULT NULL,
  `glucose` int(6) DEFAULT NULL,
  `creatinine` int(6) DEFAULT NULL,
  `GFR` int(6) DEFAULT NULL,
  `vDate` date DEFAULT NULL,
  PRIMARY KEY (`vID`),
  KEY `pID` (`pID`),
  KEY `did` (`did`),
  CONSTRAINT `VISITS_ibfk_1` FOREIGN KEY (`pID`) REFERENCES `PATIENT` (`pID`),
  CONSTRAINT `VISITS_ibfk_2` FOREIGN KEY (`did`) REFERENCES `DOCTOR` (`did`)
)
```

6. Sample Queries

`search.php`

```
select pID, pFirstName, pLastName
FROM PATIENT
WHERE pFirstName LIKE '$firstname' or pLastName LIKE '$lastname'
ORDER BY pFirstName ASC;
```

`visits.php`

```
select *
from PATIENT
where pID = '$input';

select vID, vDate
from VISITS
where pID = '$input';
```

details.php

```
select *
from VISITS, VACCINES, PATIENT, HABITS
where vID = '$input' and rid = '$input' and PATIENT.pID = '$input' and
hID = '$input';
```

insert_doctor.php

```
insert into DOCTOR set did=COUNT(did)+1, dFirstName = $firstname,
dLastName = $lastname, dbday=$birthday, field=$field;
```

insert_patient.php

```
insert into PATIENT set pID=COUNT(pID)+1, pFirstName=$firstname,
pLastName=$lastname, pBday=$birthday, pAge=$age, pGender=$gender,
pMarital=$marital_status, pDem=$demographic;
```

7. Team Members and Roles:

Chris Tsuei: Created the database and populated the initial database. Wrote the report and created the ER diagram

Kavan Mally: Imported Chris' database, set up the server, create HTML pages, and used PHP scripts to call and display results from the database on the website.

8. What We Learned:

Chris Tsuei: mainly how to create constraints, enforce the primary key as a foreign key and importing the database from Github. Also functional dependencies.

Kavan: Functional dependencies, php scripting, server management, and a bit of web design.