Medical Office Appointment Reminder (MOAR)

Team:

Owen Richman

Dilkirat Kaur

Link to webapp: http://flip3.engr.oregonstate.edu:2469/

Executive Summary:

In the initial stages of the project, we had to make some corrections to our ERD and schema. We had some inconsistencies in our attributes where some attributes used camel case while others used snake case. We switched all our attributes and table names to use snake case formatting. Additionally, while writing the draft of the project, we were indecisive on whether some attributes should be nullable or not. We wanted our app users to be able to enter either a phone number or an email address. While working on the project, we decided to make both inputs mandatory. For the final version, users must enter a valid email and a valid phone number to add a patient to the database.

Users were not given specific information on how to enter data to the forms. While entering data on the add and edit forms, we implemented example formats to ensure that users are understanding how to correctly add the information. We also added a "required" symbol to all the required data, so the user knows which information needs to be entered. Originally, our tables displayed the date and the local time together in one column for the appointment page. We decided that this was not aesthetically pleasing and divided the information to present the date in one column and the local time in the next column. This also allowed for the add and update tables to allow users to enter information more clearly.

While implementing the CRUD features of our project, we were implementing the drop-down menus with the IDs of patients and services. For example, the drop-down menus for the patient pages showed patient ID and no additional information. We decided that this was not useful, as the user would have to go back and forth between the different pages to see what information was being edited. Thus, we implemented our drop-down menus to show the names of the patients and services. Similarly, some of our tables did not present useful information. For example, our appointments table used an appointment ID to present the information to users. We decided to add columns to show the corresponding patient information on the appointments page table so the user can identify the correct patient without hovering over the patient table again. We did this by re-writing our SQL statements to pull data from other pages and present it on the current page.

Project Outline:

The "Medical Office Appointment Reminder" (MOAR) aims to enhance effectiveness and facilitate communication between patients and their medical practitioner offices. The system has been specifically designed for utilization in medium- to large-sized clinics, offices, or hospitals, with an average monthly appointment count of up to 10,000. The use of a database backend will help clinics by keeping track of patient information, such as appointment schedules and contact information.

Frequently, patients, particularly elderly individuals, overlook their appointments or encounter difficulties in contacting a busy office. MOAR will address this issue by sending timely reminders prior to their appointment, offering the option to cancel or reschedule if necessary. This also reduces the number of no-shows on busy schedules, as well as the need to manually confirm appointments; ultimately saving the office valuable time and money.

Each patient will have a corresponding chart in the system. They may schedule multiple appointments and have multiple reminders for each appointment. Additionally, patients may have multiple appointments in multiple different departments. There is no limit. The appointment reminders can be sent via text message or email only. Patients have the option of providing either an email address, a phone number, or both. Patients can only provide up to 1 email and 1 phone number. In the case of a family, each family member's chart may have the same phone number or email.

The reminders for appointments will be sent out to both the email and phone numbers if both are provided. If not, the reminder for the appointment will be sent to one of the options listed. The patient can choose to opt out of either of the appointment reminder options or to not receive any kind of reminder.

MOAR can be tailored to each of the needs of individual offices as the quantity and timing of reminders can be adjusted. For example, one office may choose to send a maximum of three reminders. As soon as the appointment is made, a first reminder will be sent. The second and third reminders will be sent a week before the appointment and 24 hours before the appointment, respectively. The patient can choose to confirm or cancel the appointment with any of the three reminders sent out. There is no time frame for replying to the first two reminders. If they confirm the appointment a week prior, they have the option to cancel it in the reminder sent 24 hours before the appointment. However, for the reminder sent out 24 hours before the appointment, the patient must respond within a two-hour time frame in order for the office to accommodate another patient if the appointment is to be canceled. This is just an example of one utilization of MOAR, as each of these time frames and reminders can be adjusted.

Database Outline:

a. ## Patients: records each patient's primary contact details
  - patient_ID: int, auto_increment, PK
  - f_name: varchar, not NULL

1. Must include patient's FIRST name
- l_name: varchar, not NULL
    1. Must include patient's LAST name
- pt_email: varchar, NULL
    1. Patient may provide EITHER a phone number or an email. Patient does not need to provide both.
    2. Patient may provide up to 1 email.
- pt_ phone: varchar, NULL
    1. Patient may provide up to 1 phone number.
- Note/Constraint:
    1. A function/method will be implemented in addition to raise an error message if neither pt_email or pt_phone is provided.
- Relationship:
    1. A one-to-many relationship with Appointments, as one patient can have many appointments.
    2. A many-to-many relationship with MedicalServices, indicating the range of services needed by the patient.

b. **Appointments:** Records the specifics of each appointment regarding its status
- appointment_ID: int, auto_increment, PK
- patient_ID: int, FK
- appt_date: date, not NULL
- appt_time: time, not NULL
- appt_status: varchar (whether patient Confirmed, Cancelled, Pending), not NULL
- Relationship:
    1. A one-to-many relationship with Reminders, as one appointment can have many reminders.
    2. One patient can have multiple appointments.

c. **Reminders:** Records reminders assigned to each patient.
- reminder_ID: int, auto_increment, PK
- rem_type: varchar (email or SMS)
- rem_content: text, not NULL
    o The reminder will include the patient's name, appointment date/time and service description. Additionally, it will include the option of confirming or cancelling the appointment.
- appointment_ID: int, FK, not NULL
- Relationship:
    o A many-to-one relationship with Appointments, as multiple reminders can relate to one appointment.

d. **Medical_Services:** Lists the various medical services available to book appointments for
- service_ID: int, auto_increment, unique, not NULL, PK
- svc_name: varchar, not NULL
- svc_descr: text, not NULL
- svc_cost: decimal, not NULL
- Relationship:

1. A many-to-many relationship with Patients, facilitated through the PatientServices intersection table, showing the range of patients requiring each service.

Entity-Relationship Diagram:
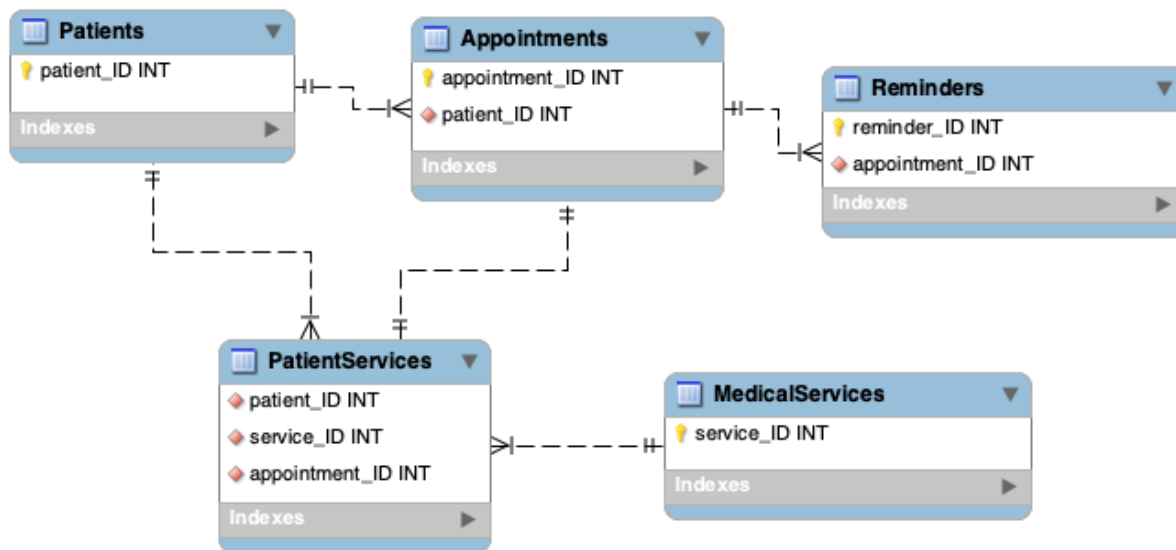
Schema:
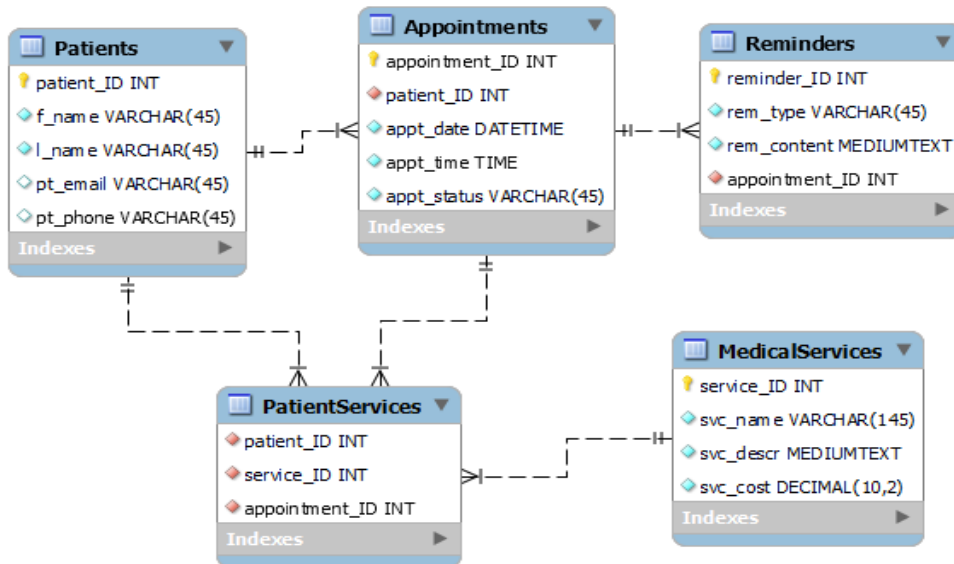
- Each table has a PK, and all attributes in each table are dependent on that PK thus meets 1NF.

- Each table meets 1NF and has no partial dependencies thus meets 2NF.

- Each table meets 2NF and contains no transitive properties thus meets 3NF.

Conclusion: The current schema is already normalized up to 3NF.

E. Example Data:

Patients:

ID	First Name	Last Name	Email	Phone
1	Homer	Simpson	homer@email.com	123-432-1234
2	Bugs	Bunny	bugsy@email.com	234-567-7890
3	Tweety	Bird	tbird@email.com	242-241-1231
4	Daffy	Duck	dduck@email.com	823-523-7490
5	Lola	Bunny	lolabun@email.com	234-522-7330
6	Yosemite	Sam	notsam@email.com	145-322-5550

Appointments:

Appointment ID	Patient ID	First Name	Last Name	Date	Time	Status
34	2	Bugs	Bunny	11/01/2023	10:00:00	Pending
42	40	Barack	Obama	12/21/2023	22:44:00	Confirmed
43	1	Homer	Simpson	12/27/2023	17:45:00	Unconfirmed
44	5	Yosemite	Sam	12/25/2023	14:45:00	Unconfirmed
49	1	Homer	Simpson	01/04/2023	13:03:00	Canceled
21	1	Homer	Simpson	12/13/2024	05:30:00	Confirmed

Reminders:

Reminder ID	Type	Content	Appointment ID	First Name	Last Name
60	Email	Check Check	42	Barack	Obama
62	SMS	Hello	34	Bugs	Bunny
66	SMS	Come through	44	Yosemite	Sam
72	Email	new email reminder	42	Barack	Obama

74	Email	new reminder here	50	Newlymade	Patientguy

Medical_Services:

Service ID	Service Name	Description	Cost
48	Medical	Yearly Physical Checkup	$100.00
49	Dental Checkup	Teeth cleaning and xrays	$150.00
50	Psychologist	Weekly Therapy Session	$450.00
51	Chiropractor	Bone adjustment	$250.00

Patient_Services:

Service ID	Service Name	Service Description	Service Cost	Appointment ID	Patient ID	Patient Name
47	New change	New description	123	34	2	Bugs Bunny
50	Vaccines	Update shots.	123	44	5	Yosemite Sam
50	Vaccines	Update shots.	123	42	1	Homer Simpson
50	Vaccines	Update shots.	123	52	40	Barack Obama
51	Physical	Annual Check up	120	43	1	Homer Simpson
51	Physical	Annual Check up	120	51	40	Barack Obama
51	Physical	Annual Check up	120	49	4	Daffy Duck

Screen Captures of UI:

Patients page:

Patient Read and Delete Form:

Patient Management

View and manage patient information

Home | Patients | Appointments | Reminders | Medical Services | Patient Services

Patient ID	First Name	Last Name	Email	Phone	Actions
1	Homer	Simpson	homer@email.com	123-432-1234	Delete
2	Bugs	Bunny	bugsy@email.com	145-322-5550	Delete
3	Tweety	Bird	tbird@email.com	823-523-7490	Delete
4	Daffy	Duck	duckd@email.com	242-241-1231	Delete
5	Yosemite	Sam	notsam@email.com	234-567-7890	Delete
23	Yucky	Richardson	Test@gmail.com	916-524-6666	Delete
40	Barack	Obama	michelleisbetter@usa.com	423-111-2222	Delete
45	Newlymade	Patientguy	newemail@email.com	123-456-7890	Delete

Search Patient Form:

Search for a Patient

Search by the patient's first name using the field below.

Enter Patient's First Name:		*Required
Search		

Create Patient Form:

Add a New Patient

To add a new patient, please enter their information below and click 'Submit'!

First Name:		*Required
Last Name:		*Required
Email:		*Required
Phone (123-456-7890):		*Required
Add Patient		

Update Patient Form:

Update Existing Patient

Select the patient name from the drop-down menu and update their information using the input textboxes below.

Patient Name:	Select a Patient ⌄	*Required
First Name:		*Required
Last Name:		*Required
Email:		*Required
Phone (123-456-7890):		*Required

Update Patient

Appointments page:

Appointments Read and Delete Form:

Deletes a NULLable relationship. There can be a patient without an appointment.

Patient Appointments

View and manage patient appointments

| Home | Patients | Appointments | Reminders | Medical Services | Patient Services |

Appointment ID	Patient ID	First Name	Last Name	Date	Time	Status	Actions
34	2	Bugs	Bunny	11/01/2023	10:00:00	Pending	Cancel
42	40	Barack	Obama	12/21/2023	22:40:00	Confirmed	Cancel
43	1	Homer	Simpson	12/27/2023	17:45:00	Unconfirmed	Cancel
44	5	Yosemite	Sam	12/25/2023	14:45:00	Unconfirmed	Cancel
49	4	Daffy	Duck	12/13/2023	13:03:00	Unconfirmed	Cancel
50	45	Newlymade	Patientguy	12/13/2023	05:30:00	Confirmed	Cancel

Create Appointment Form (schedule new appointment):

Schedule New Appointment

To add a new appointment, select the correct patient to add an appointment and press submit.

Patient Name:	Select a Patient ⌄	*Required
Date:	mm/dd/yyyy 🗓	*Required
Time:	--:-- -- 🕓	*Required

Schedule

Update Appointment Form:

Update Appointment Status

Update an existing appointment status to Pending or Confirmed. *CAUTION* please pick the appropriate appointmentID to update status to prevent errors.

Patient Name:	Select a Patient ⌄	*Required
Appointment ID:	Select an Appointment ⌄	*Required
Status:	Confirmed ⌄	*Required

Update Appointment

Reminders Page:

Reminders Read and Delete Form:

Deletes a NULLable relationship. There can be an appointment without a reminder.

Reminder Management

View and manage appointment reminders

| Home | Patients | Appointments | Reminders | Medical Services | Patient Services |

Reminder ID	Type	Content	Appointment ID	First Name	Last Name	Action
60	Email	Check Check	42	Barack	Obama	Delete
62	SMS	Hello	34	Bugs	Bunny	Delete
66	SMS	Come through	44	Yosemite	Sam	Delete
72	Email	new email reminder	42	Barack	Obama	Delete
74	Email	new reminder here	50	Newlymade	Patientguy	Delete

Create Appointment Form:

Schedule New Appointment

To add a new appointment, select the correct patient to add an appointment and press submit.

Patient Name:	Select a Patient ⌄	*Required
Date:	mm/dd/yyyy 📅	*Required
Time:	--:-- -- 🕐	*Required

Schedule

Create Reminder Form:

Add a new Reminder

To add a new reminder, select the correct patient, appointment, date, time, reminder type, and type the reminder content, then click 'Submit'!

Patient Name:	Select a Patient ▾	*Required
Appointment:	Select an Appointment ▾	*Required
Reminder Type:	SMS ▾	*Required
Reminder Content:		*Required

| Add Reminder |

Medical Services Page:

Medical Services Read/Delete Form:

Medical Services Management

View and manage the medical services offered

| Home | Patients | Appointments | Reminders | Medical Services | Patient Services |

Service ID	Service Name	Description	Cost	Actions
47	New change	New description	123	Delete
48	Mental Health	Therapy	15000	Delete
49	Testing	Testing	12312	Delete
50	Vaccines	Update shots.	123	Delete
51	Physical	Annual Check up	120	Delete
55	Nutrition	Diet Advice	123	Delete
61	Nice	Test	1232131	Delete

Create Medical Service Form:

Add New Medical Service

To add a new medical service, please enter the service name, a brief service description and service cost.

Service Name:		*Required
Service Description:		*Required
Service Cost:		*Required

| Add Service |

Update Medical Service Form:

Update Medical Service

Update the name, description or cost of a service below.

Service Name:	Select a Service ⌄	*Required
Service Name:		
Service Description:		
Service Cost:		

Update Service

Patient Services Page:

Patient Services Read/Delete Form:

Deletes a M:N relationship. One patient can have appointments for multiple services. One service can have multiple patients utilizing it.

Patient Services

View the patients and the current services they are scheduled to utilize.

Home | Patients | Appointments | Reminders | Medical Services | Patient Services

Service ID	Service Name	Service Description	Service Cost	Appointment ID	Patient ID	Patient Name	Actions
47	New change	New description	123	34	2	BugsBunny	Delete
50	Vaccines	Update shots.	123	44	5	YosemiteSam	Delete
50	Vaccines	Update shots.	123	42	40	BarackObama	Delete
51	Physical	Annual Check up	120	43	1	HomerSimpson	Delete
51	Physical	Annual Check up	120	49	4	DaffyDuck	Delete

Create Patient Service Form:

Add a new Patient Service

Each patient appointment can correlate to only one type of service at a time. You will recieve an error otherwise. Only patients will valid appointment will appear in the patient dropdown menu.

Patient Name:	Select a Patient ⌄	*Required
Appointment:	Select an Appointment ⌄	*Required
Service Name:	Select a Service ⌄	*Required

Add Patient Service

Update Patient Service Form:

Updates a M:N relationship. Can update 1 patient to utilize multiple services.

Update an exisiting Patient Service

Select the patient and appropriate appointment that you wish to change services for.

Patient Name:	Select a Patient ⌄	*Required
Appointment:	Select an Appointment ⌄	*Required
Service Name:	Select a Service ⌄	*Required

Update Patient Service