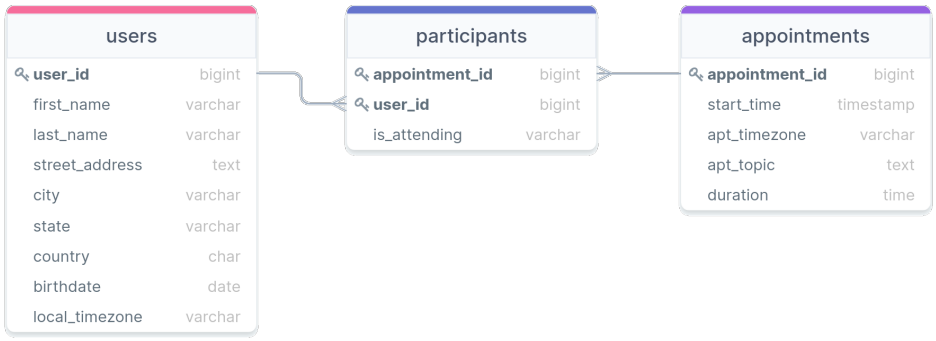
This week you will be taking a look at a set of tables constructed to hold meeting or appointment data for something like a calendar application. You have three tables:

- `users` – Contains information about users of the application, including such information as their name, location, and birthday.
- `appointments` – Contains information about the individual meetings or appointments, including information such as the meeting time (and time zone), duration and topic.
- `participants` – Contains information about which users have been invited to which meetings, and to which they are actually planning on attending.



I have prepared the data for you in two possible methods this week, depending on whichever works best for you. The file `auto_gen.sql` is a database schema dump, so if you want to run it using `psql -d <your dbname> -U <your username> -f auto_gen.sql` like previously, it will take care of creating a new schema (hw9) in your indicated database, and then creating, populating, and adding constraints to the tables. Alternatively, I have included the CSV files for each of the tables and a preparation script named `manual_gen.sql`. It includes the basic table creation commands and constraints, but you would need to import in the data yourself from the provided CSV files. Follow the link here to accept the assignment and get access to the repository:

Assignment link: https://classroom.github.com/a/SJaiHggc

1. (8 points) All the users in the database have a street address given that is comprised of a numeric digit (of a variable number of digits) and then a street name. Determine which street name has the greatest number of users living on it. (*Note that these street names may not be in the same city, but that is ok. All you care about is the name of the street here.*)

2. Unfortunately, some users have committed to appointments that they can't possibly attend, owing to also having committed to another appointment at the same time. We'll start simply here and then build up in complexity. At any time though, it is useful to keep in mind that using `AT TIME ZONE` on a timestamp *without* a current time zone will attach the time zone to that timestamp (essentially creating a `TIMESTAMPTZ` object). Using `AT TIME ZONE` on a `TIMESTAMPTZ` object will return a time **without** a timezone attached but converted to the desired time zone. Both will be useful here. You may also want to look up the Postgres `OVERLAPS` keyword, as it can simplify the logical checks here (but it certainly is not necessary).

   (a) (4 points) Consider the case of Simon Smith (`user_id = 12`). What appointments did Simon sign up to *attend* that conflict with another appointment (that he also signed up to *attend*)? Report both the appointment ids and the starting and ending times of each appointment *as measured in Simon's local time zone*. Don't double count here, each combination should only show up once. Good use of a CTE can clean this query up a lot!

   (b) (6 points) Now let's expand things. What are the total number of conflicts for which an individual has signed up to attend two appointments that are overlapping in time? Be careful not to double count here: for a given individual, Event A conflicting with Event B is the same as Event B conflicting with Event A. Multiple individuals could have the same pair of appointments conflicts however, so each of those should be counted. (User 1 having Event A and Event B conflict and User 2 also having Event A and Event B conflict should count as 2.)

3. (10 points) If you looked closely at the appointment topics (`appointments.apt_topic`), you likely realized that they are all generated using only a handful of starting prompts. In particular, the possible starting prompts are:

   - "I am angry about ..."
   - "Important topic: ..."
   - "Thoughts on ..."
   - "I love ... and you should too!"
   - "Ruminations on the existence of ..."

   Suppose you wanted to know the distribution of these appointment "categories" over the 7 days of the week. To do so, create a cross-tabulation or pivot table where the appointment categories (angry, ruminations, etc.) are down the first column in alphabetical order and the days of the week are across the first row as column headings. Counts of

how many appointments of each category are *starting* on each day should be the data represented within the pivot table. You can assume that these start times are determined by the appointment local time zone in each instance. Remember that to use the `crosstab` function, you will first need to ensure that you have installed the `tablefunc` extension to the database where your data is residing. So to be clear, your table should look something like:

topic_type	sun	mon	tues	wed	thur	fri	sat
angry	19	12	14	13	16	15	18
important_topic	⋮	⋮	⋮	⋮	⋮	⋮	⋮
love	⋮	⋮	⋮	⋮	⋮	⋮	⋮
ruminations	⋮	⋮	⋮	⋮	⋮	⋮	⋮
thoughts	⋮	⋮	⋮	⋮	⋮	⋮	⋮

where I have again given you the first row to serve as a sanity check. Export this table to a CSV file named `cat_counts_over_week.csv` and be sure to upload it back to the GitHub repository alongside this problem's template.

4. This question returns you to the ongoing scraping data that you have been collecting. At the moment the data is in a very raw form, and you are going to want to populate tables in a nicer format before you need to analyze the data. As such, this problem tasks you with two main problems:

   (a) (4 points) Create a 3NF table (or tables) in which you will store your cleaned data. Include an entity-relationship diagram for your table or tables (you can use a site like `drawsql.com`).

   (b) (4 points) Construct a query that will read in data from your `raw_data` table and insert it in a cleaned form into the other necessary table(s). The easiest way to accomplish this is likely to write a `SELECT` statement to parse the information out of your JSONB column, which you can then wrap in an `INSERT INTO` statement to insert the information into the necessary table(s). Additionally, because you likely don't want to keep inserting the same rows again and again each time you run the query, you may want to the delete the data in `raw_data` after you have transferred it over. **Do not run this unless you have made a backup table first!** Ideally, you'd wrap both queries up inside a single transaction block, so that when you run the entire thing, either all the data gets correctly copied into the cleaned table(s) and then removed, or nothing happens (and you don't lose your raw data). Package this entire bit of SQL up in a single file called `process.sql`, and upload it back to GitHub. We'll showcase in class how you could then run this query automatically on a schedule using a Docker container to systematically process and transform the data you are scraping.