Database Systems, CSCI 4380-01
## Homework # 4
Due Wednesday September 25, 2019 at 11:59:59 PM

Homework Statement. This homework is worth 2.5% of your total grade. If you choose to skip it, Midterm #1 will be worth 2.5% more. Remember, practice is extremely important to do well in this class. I recommend that not only you solve this homework, but also work on homeworks from past semesters. Link to those is provided in the Piazza resources page.

This homework is for practicing Entity-Relationship Models. A note on drawing ER diagrams. You will find that the diagrams can get very large if entities have a lot of attributes. To avoid this, you can simply list the attributes for the entities inside the box for that entity. Remember to underline the key attributes. My model in Question 2 shows an example of this.

Question 1.
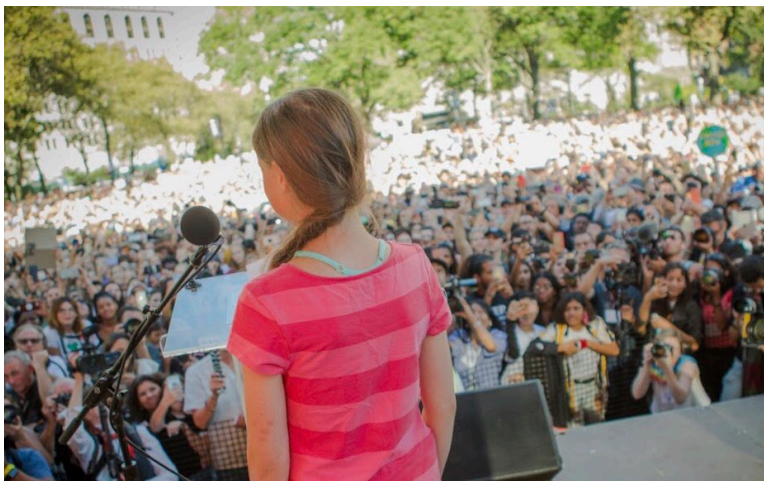
In this question, you are asked to create an E-R diagram that represents all the requirements below precisely. Note that while there are multiple potential correct models, not all answers are right. Be extra careful about choosing entities and correctly implementing the participation requirements. ER-modeling is an iterative process. Work on a model first and then refine it.

We are creating a database to help Greta Thunberg in her efforts to communicate to everyone the urgency of the climate crisis. Note that for this database, the location always refers to a latitude and longitude value. Here is the data we will store in this database:

We will store a number of stations. Each station will have an id, name, sensor type, description, location, country, city, first year of operation. Stations have capabilities, types of things they can measure. Each capability type for a station has a name such as temperature, humidity, rain fall, snow fall, air quality, water quality, wind, depth (for underwater stations) and a precision (float) and a unit of precision (string).

We will store actual measurements from these stations. Each measurement has an id, value (float), type of measurement, day and time of measurement and any description. The measurement type is similar to the capability of the station taking values like temperature, humidity, etc.

Next we will store the major storms in the database. For each storm, we will store the name, day it was first spotted, the initial location of the eye of storm (center), its radius and strength (integer). We will then store the location and radius of the storm for each day it was active, its strength,

total rain amount and average wind for that day (note that climate crisis is not just causing storms to be stronger, but also may cause them to linger longer and cause more damage).

We will also store political units in the database to understand which communities are most effected from the climate change. For each political unit, we will store name, population and a polygon which is represented as a string for now. A political unit may be a part of a country. For each country, we will store its name, GDP (gross domestic product), population and contribution to pollution (percentage value).

Question 2. You are given the figure below representing an E-R diagram. Convert this model to relational data model. List your relations and underline your keys.
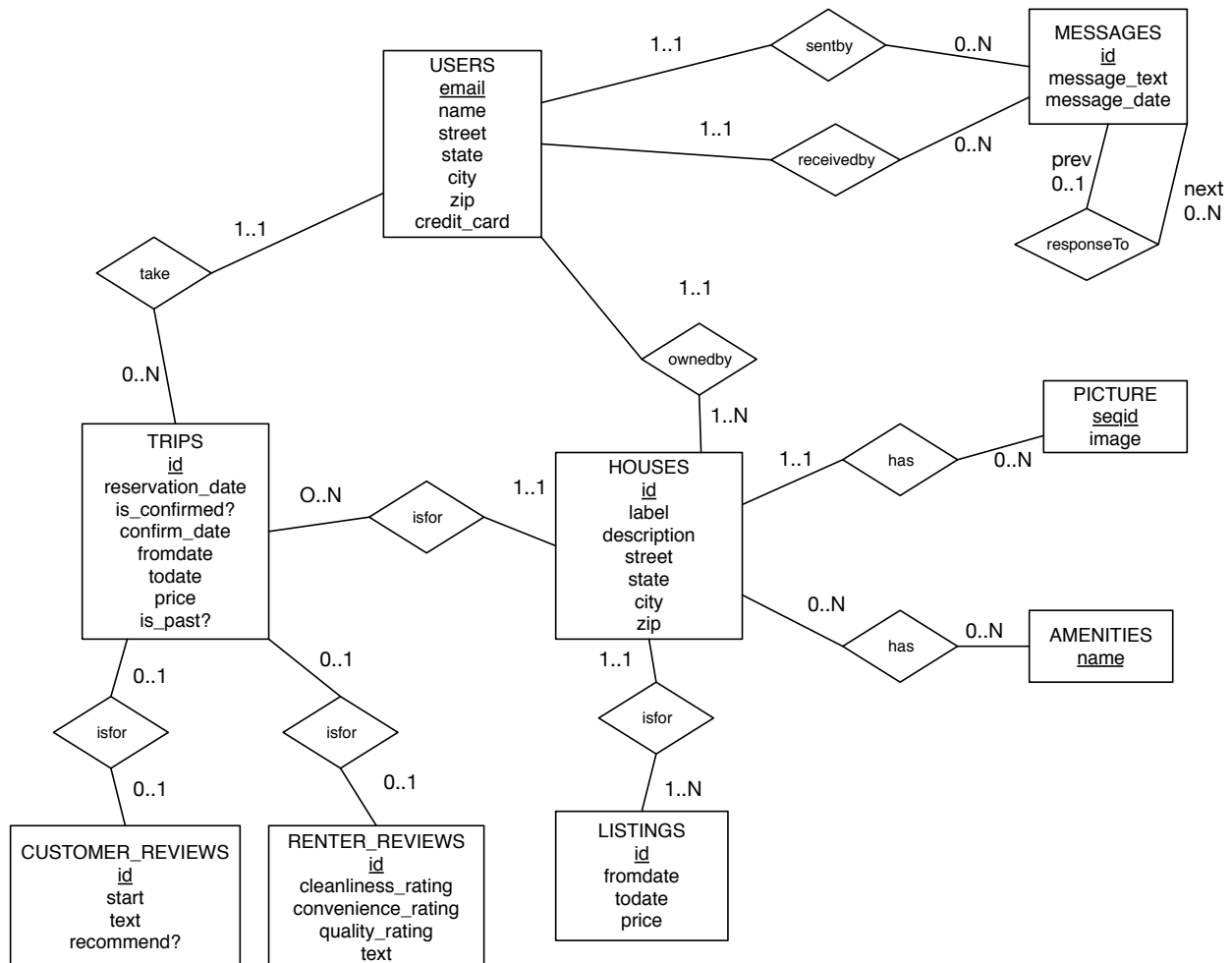
SUBMISSION INSTRUCTIONS. Submit a PDF document for this homework using Gradescope. No other format and no hand written homeworks please. No late submissions will be allowed.

If the gradescope for homework submissions is not immediately available, we will announce it on Piazza when it becomes available.