

Homework 2: E/R and Relational Translation (100 points)

Due Date: Friday, Apr 19 (5:00 PM)

Submission

All HW assignments should contain your student ID and your name and must be submitted online (e.g., 12345678_John_Doe.pdf) via the HW2 in **Gradescope**. See the table below for the HW 2 submission opportunities. Note that after 5 PM on Saturday the 20st no further HW 2 submissions will be accepted. (We will be releasing the solution at that time.) Please strive to get all your work in on time! If possible, try to save the one dropped assignment for the end of the term when you are most likely to want/need it.

Date / Time	Grade Implications
Friday, Apr 19 (5:00 PM)	Full credit will be available
Saturday, Apr 20 (5:00PM)	20 points will be deducted

E-R based Relational Schema Design [100 pts]

You have successfully designed an E-R diagram for PHLog.com. Now, to setup a real database, you must design a relational schema to represent the objects described in the E-R diagram that you created. **Specifically, you will need to create a SQL DDL statement for each table.** To make sure your design is a good one, you have given your E-R diagram to an external database consulting firm, DBInstructor, Inc., to have their experts check the correctness of your design. DBInstructor will provide your final E-R diagram soon. Since time is of the essence, though, you should start designing the required relational schema now based on your original E-R diagram. Your final design must be based on the E-R schema that DBInstructor provides, however. That schema will appear after Saturday's 5:00 PM HW 1 "drop dead" deadline has passed.

As you work on your design, if you see opportunities to avoid creating excess relations that stem from relationships, do indeed avoid them so as to make the schema simpler. Clearly list all of the relations and their attributes (including their types), primary keys, foreign keys (including the referenced target relations), and *not null* constraints by writing the SQL DDL statement for each table. The resulting design should capture the information and constraints of the E-R diagram as faithfully as possible. For types, use one of the following types for each column:

Category	Type	Remark
NUMBER	INTEGER	A number type for integer values.
	DECIMAL(x,y)	A number type for real values where x is the maximum number of digits and y is the number of digits to the right of the decimal point.
STRING	CHAR(n)	A fixed-length string type where n is the column length.
	VARCHAR(n)	A variable-length string type where n specifies the maximum column length.
DATETIME	DATE	A type used for values with a date part but no time part. The format is '0000-00-00'.
	TIME	A type used for values with a time part. The format is '00:00:00'.
	DATETIME	A type used for values with both a date part and a time part. The format is '0000-00-00 00:00:00'.
ENUM	String	A String type with the value chosen from a list of permitted values.

Use the entity, relationship, and attribute names from the final E-R diagram while naming your tables and columns (to make it clear how your design corresponds to the E-R diagram). Again, all of the following information should be included in the DDL statements for each table. Be sure to:

- [50pts] List the tables, columns, and column types in your design.
- [20pts] For each of your tables, identify its primary key column(s).
- [30pts] For each of your tables, identify its foreign key column(s) (and indicate which other table each one references) and any *not null* constraints and/or other referential integrity constraints.

Notes:

- When a strong entity instance is deleted from the database, its dependent weak entities should also be removed.
- When an instance of a parent entity type in an ISA hierarchy is deleted, any/all associated child class information should also be removed.
- There are multiple ways of translating an ISA hierarchy. Here we ask you to use :
 - “Delta Table Design” for the ISA relationship between “User” and its subclasses.
 - “Delta Table Design” for the ISA relationship between “Observation” and its **direct** subclasses.
 - “Mashup Table Design” for the ISA relationship between “Observable” and its subclasses.

Here is an example of a DDL statement for a table:

```
DROP DATABASE IF EXISTS cs122a;
CREATE DATABASE cs122a;
USE cs122a;
```

```
Create TABLE Company(  
    name  VARCHAR(40) NOT NULL,  
    PRIMARY KEY (name)  
);
```

```
CREATE TABLE Car (  
    VIN      INTEGER NOT NULL,  
    make     VARCHAR(40),  
    year     DATE NOT NULL,  
    type     ENUM('sedan', 'hatchback', 'convertible', 'suv', 'pickup', 'van') NOT NULL,  
    PRIMARY KEY (VIN),  
    FOREIGN KEY (make) REFERENCES Company(name) ON DELETE CASCADE  
);
```

The best way to make sure that your solution is sound is to actually try it out on a real system – so go ahead and install **MySQL** on your favorite HW platform (e.g., your laptop) and use it to verify that all of your DDL statements will actually run properly. (In other words, do **not** turn in your homework with DDL statements that you haven't actually tested!)

Be sure to download the HW#2 PDF template file from the Attachments area of the CS122a web page and use that as the basis for your submission, as its use is **mandatory**. Your solution should first list the SQL DDL statements for creating tables for entities, including any supporting tables for entity-related information. It should then list **(In a new page)** the additional SQL DDL statements to create any additional tables for relationships. (Please organize your DDL statements in this fashion!) Current template has one page for entities and their supporting tables, and one page for relationships' DDLs. Feel free to append more pages at the end of each part, if you need more space.