Lab 4.

Go to http://users.csc.calpoly.edu/~lstanche/csc365/ra/ and download both files in a new directory. The server unix11.csc.calpoly.edu works. Check https://users.cs.duke.edu/~junyang/ra2/ for more information. Update the `sample.properties` file and put your database name, login, and password. Execute the program by running

java –jar ra.jar sample.properties

Here is an example of how to use the program.

```
ra> \select_{true} Students;
Output schema: (id INT, name VARCHAR)
-----
2|343
3|353
-----
Total number of rows: 2
```

Here is an overview of the supported operations.

- `\select_{`*`cond`*`}` is the relational selection operator. For example, to select `Drinker` tuples with name Amy or Ben, we can write `\select_{name = 'Amy' or name = 'Ben'} Drinker;`. Note that string literals should be enclosed in ***single*** quotes, and you may use boolean operators `and`, `or`, and `not`. Comparison operators <=, <, =, >, >=, and <> work on both string and numeric types.
- `\project_{`*`attr_list`*`}` is the relational projection operator, where *`attr_list`* is a comma-separated list of attribute names. For example, to find out what beers are served by Talk of the Town (but without the price information), we can write `\project_{bar, beer} (\select_{bar = 'Talk of the Town'} Serves);`.
- `\join_{`*`cond`*`}` is the relational theta-join operator. For example, to join `Drinker(name, address)` and `Frequents(drinker, bar, times_a_week)` relations together using drinker name, we can write `Drinker \join_{name = drinker} Frequents;`. Tables must have different attribute names. If they do not, then use the `rename` operator.
- `\cross` is the relational cross product operator. For example, to compute the cross product of `Drinker` and `Frequents`, we can write `Drinker \cross Frequents;`.
- `\union` is the relational union (set version). For a trivial example, to compute the union between `Drinker` and itself, we can write `Drinker \union Drinker`.

- `\rename_{new_attr_name_list}` is the relational rename operator, where *`new_attr_name_list`* is a comma-separated list of new names, one for each attribute of the input relation. For example, to rename the attributes of relation `Drinker` and compute the cross product of `Drinker` and itself, we can write `\rename_{name1, address1} Drinker \cross \rename_{name2, address2} Drinker;`.

Write the following queries in relational algebra. Populate the tables so that the queries give meaningful output.

1. Print the SSN of John Smith.
2. Print the numbers of all the credit cards of John Smith.
3. Print all the transaction information from January 1st, 2015 for credit card number 1236666.
4. Print the credit limit for all credit cards of Maria Johnson.
5. Print the names of vendors who have transaction on January 2nd, 2015.