

Objective: This lab gives you hand-on experience with Relational Algebra.

Starting RA: RA is a relational algebra interpreter written in Python 3, developed by Professor Yang of Duke University. RA translates relational algebra expressions into SQL queries over the database stored in SQLite. Since relational algebra symbols aren't available on most keyboards, RA uses a special syntax described in <https://users.cs.duke.edu/~junyang/radb/>.

1. Log into your agate account.
2. Make directory *RA* and go to the directory.
\$ mkdir RA
\$ cd RA
3. Create *tool* directory and install binaries and libraries needed for virtual environment.
\$ python3 -m venv tool
4. Make directory *myRADB* under directory *RA*.
\$ mkdir myRADB
5. Start a virtual session.
\$ source tool/bin/activate
6. Go to directory *myRADB*.
\$ cd myRADB
7. Install *radb*. (Note that there are two minus signs before the word *upgrade*.)
\$ pip install --upgrade pip
\$ pip3 install radb
\$ pip3 install antlr4-python3-runtime==4.7
8. Download file *company.ra* from MyCourses into directory *myRADB*.
9. Create the company database.
\$ radb -i company.ra company.db
10. Start RA interactive shell.
\$ radb company.db
You should get a prompt *ra>*:
11. List all tables in the company database.

```
ra> \list;
```

12. To ensure that your tables are properly populated, list the name of each table and check listing.

```
ra> EMPLOYEE;
```

13. List the Fname, Lname of female employees.

```
ra>\project_{Fname, Lname} (
    \select_{Sex = 'F'} (
        EMPLOYEE
    )
);
```

14. To quit:

```
ra> \quit;
```

15. End virtual session.

```
$ deactivate
```

16. **Your data will remain and you can go back into this environment by going into the correct directory and running the activate command.**

```
$ cd RA
```

```
$ source tool/bin/activate
```

```
$ cd myRADB
```

```
$ radb company.db
```

To end virtual session, type

```
$ deactivate
```

17. You should get familiar with RA by trying queries.

18. If you want to play around with the *beers.db* database used by Professor Yang, type the following commands:

```
$ wget https://raw.githubusercontent.com/junyang/radb/master/sample/beers.ra
```

```
$ radb -i beers.ra beers.db
```

```
$ radb beers.db
```

19. To execute queries saved in a file:

- (a) Activate the RA tool

```
$ source tool/bin/activate
```

- (b) Write your query in a file, say **q1**.

(c) To run query saved in **q1**:

```
$ radb company.db -i q1
```

(d) To run query saved in **q1** and redirect output to a file, say **outq1**:

```
$ radb company.db -i q1 -o outq1
```

(e) to run query saved in *q1* from *ra* mode:

```
$ radb company.db
```

```
ra>\source 'q1';
```

20. Problems with set up:

Contact *support@cs.unh.edu*

To speed up response, please cut and paste the commands you typed and the error messages.