Introduction to databases

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June 24, 2015

What databases can do

- Read and write data
- Store more data
- Better organized
- Faster access to data
- Easier to manipulate
- Relate data to other data

Why databases

- Manage large datasets
- Updating our dataset
- Maintaining fedility of data
- Keep data secure
- Manage redundancy

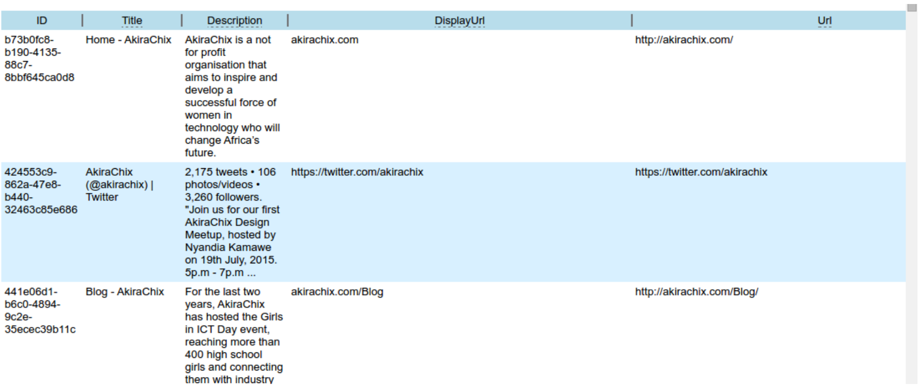
Common databases

- MySQL
- Postgres
- SQLite
- Cassandra
- MongoDB

Why MySQL

- It's free
- Easy to install and use
- Popular
- General purpose. This makes it especially good for teaching

Sample data



ID	Title	Description	DisplayUrl	Url
b73b0fc8-b190-4135-88c7-8bbf645ca0d8	Home - AkiraChix	AkiraChix is a not for profit organisation that aims to inspire and develop a successful force of women in technology who will change Africa's future.	akirachix.com	http://akirachix.com/
424553c9-862a-47e8-b440-32463c85e686	AkiraChix (@akirachix) | Twitter	2,175 tweets • 106 photos/videos • 3,260 followers. "Join us for our first AkiraChix Design Meetup, hosted by Nyandia Kamawe on 19th July, 2015. 5p.m - 7p.m ...	https://twitter.com/akirachix	https://twitter.com/akirachix
441e06d1-b6c0-4894-9c2e-35ecec39b11c	Blog - AkiraChix	For the last two years, AkiraChix has hosted the Girls in ICT Day event, reaching more than 400 high school girls and connecting them with industry	akirachix.com/Blog	http://akirachix.com/Blog/

Do note that a database provides more features than a typical spreadsheet

- Define and query relations
- Issue commands to a database
- Optimized for data can do only rudimentary calculations

Common terms

Database

- Set of related tables
- What holds our data
- Permissions and relations defined at this level

Tables

- Set of columns and rows
- Holds entities in our application
- Eg users table to hold the collection of user entities
- They can hold foreign relations to other tables

Column

- Set of data of a single type
- eg column of first names

Row

- Single entry of data
- eg row with first names, last names, age etc

Field

- Intersection of column and row

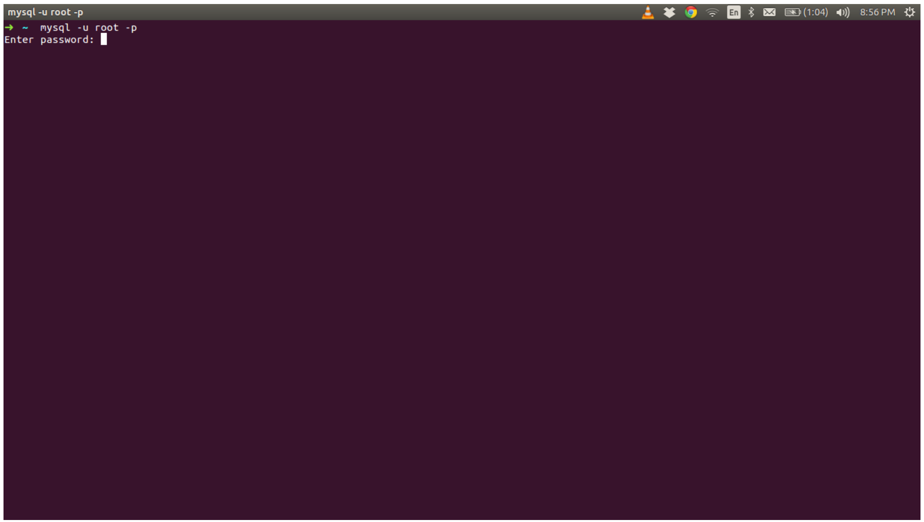
Index

- Metadata meant to increase speed of lookup

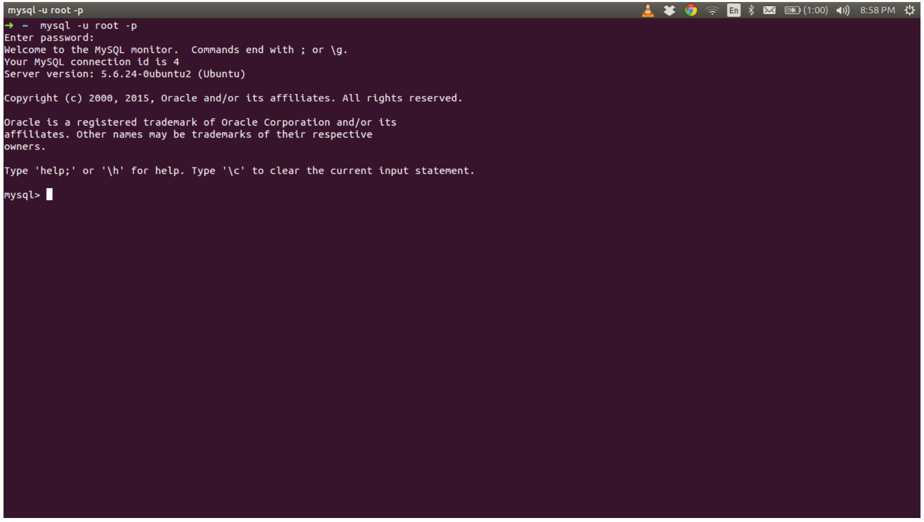
Foreign key

- Table column whose values references rows in another table

Login into MySQL



```
➜  ~  mysql -u root -p
Enter password: 
```



```
➜  ~  mysql -u root -p
Enter password: 
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 4
Server version: 5.6.24-0ubuntu2 (Ubuntu)

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owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> 
```
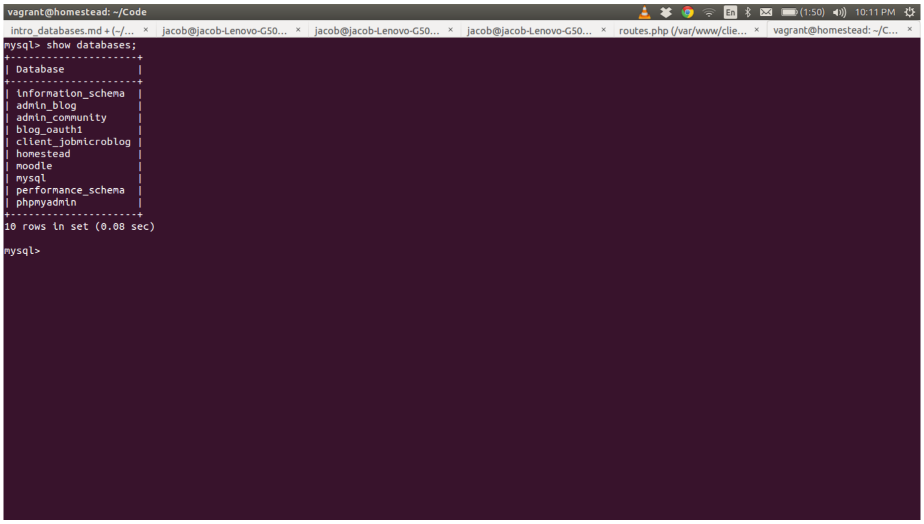
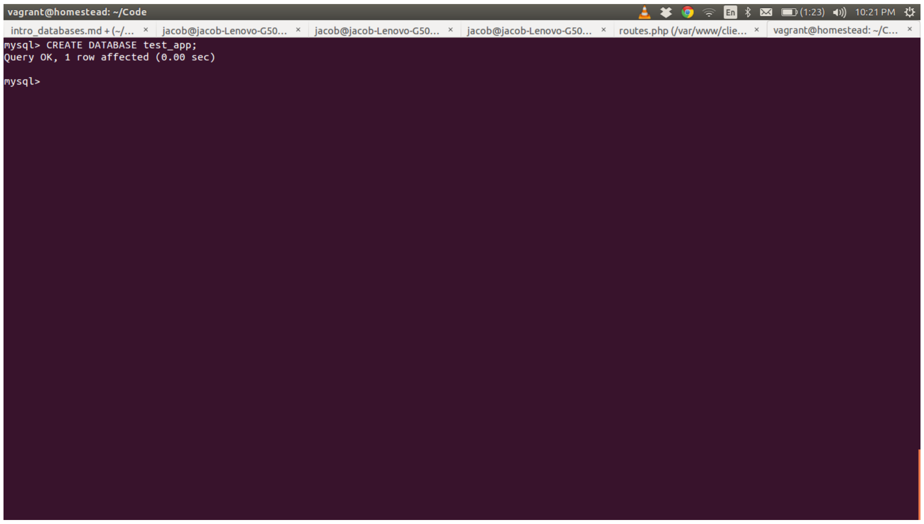

Check databases



vagrant@homestead: ~/Code
En
(1:50)
10:11 PM
intro_databases.md + (~/...
jacob@jacob-Lenovo-G50...
jacob@jacob-Lenovo-G50...
jacob@jacob-Lenovo-G50...
routes.php (/var/www/clie...
vagrant@homestead: ~/C...

```
mysql> show databases;
+--------------------+
| Database           |
+--------------------+
| information_schema |
| admin_blog         |
| admin_community    |
| blog_oauth1        |
| client_jobmicroblog |
| homestead          |
| moodle             |
| mysql              |
| performance_schema |
| phpmyadmin         |
+--------------------+
10 rows in set (0.08 sec)

mysql>
```

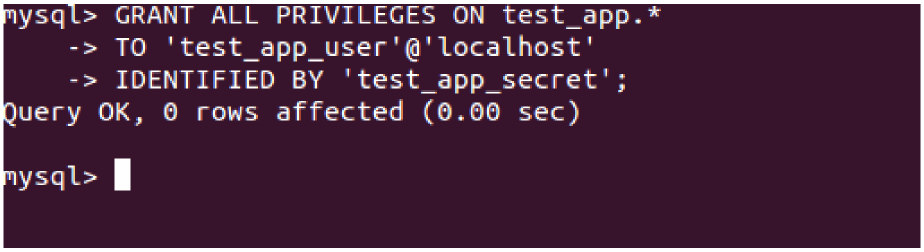
Create database


vagrant@homestead: ~/Code
En
(1:23)
10:21 PM
intro_databases.md + (~/...
jacob@jacob-Lenovo-G50...
jacob@jacob-Lenovo-G50...
jacob@jacob-Lenovo-G50...
routes.php (/var/www/clie...
vagrant@homestead: ~/C...

```
mysql> CREATE DATABASE test_app;
Query OK, 1 row affected (0.00 sec)

mysql>
```

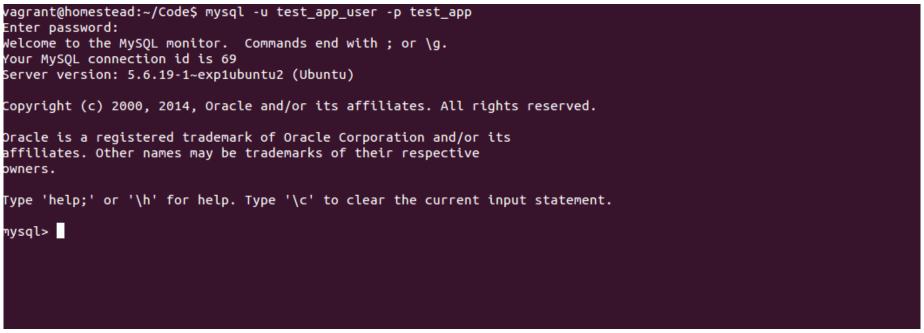
Granting privileges

```
GRANT ALL PRIVILEGES ON db_name.*
TO 'username'@'localhost'
IDENTIFIED BY 'password';

SHOW GRANTS FOR 'username'@'localhost';
```



```
mysql> GRANT ALL PRIVILEGES ON test_app.*
    -> TO 'test_app_user'@'localhost'
    -> IDENTIFIED BY 'test_app_secret';
Query OK, 0 rows affected (0.00 sec)

mysql> 
```

Specific user



```
vagrant@homestead:~/Code$ mysql -u test_app_user -p test_app
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 69
Server version: 5.6.19-1~exp1ubuntu2 (Ubuntu)

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Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> 
```
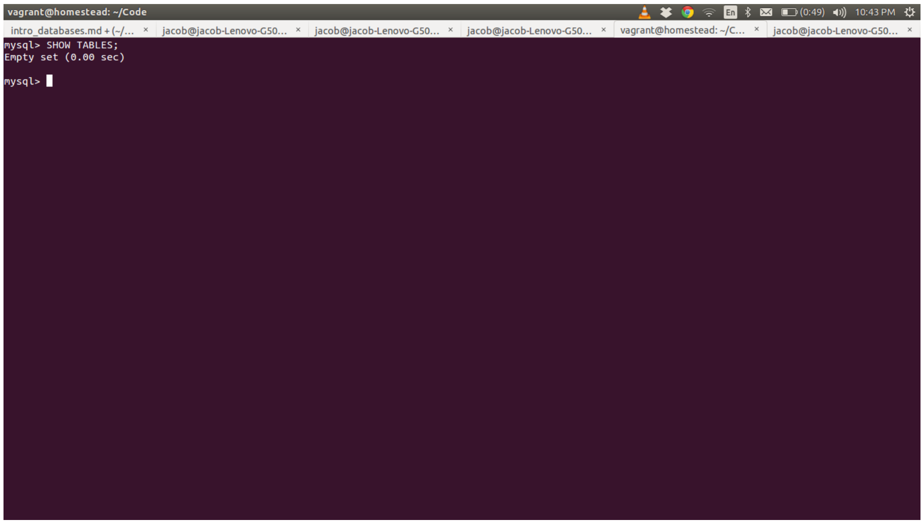
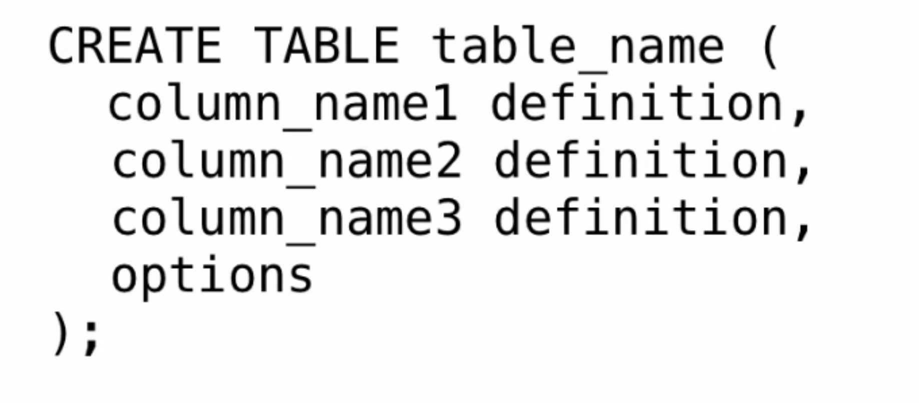

Checking tables


vagrant@homestead: ~/Code
(0:49)
10:43 PM
intro_databases.md + (~/...
jacob@jacob-Lenovo-G50...
jacob@jacob-Lenovo-G50...
jacob@jacob-Lenovo-G50...
vagrant@homestead: ~/C...
jacob@jacob-Lenovo-G50...

```
mysql> SHOW TABLES;
Empty set (0.00 sec)

mysql> 
```

Creating table



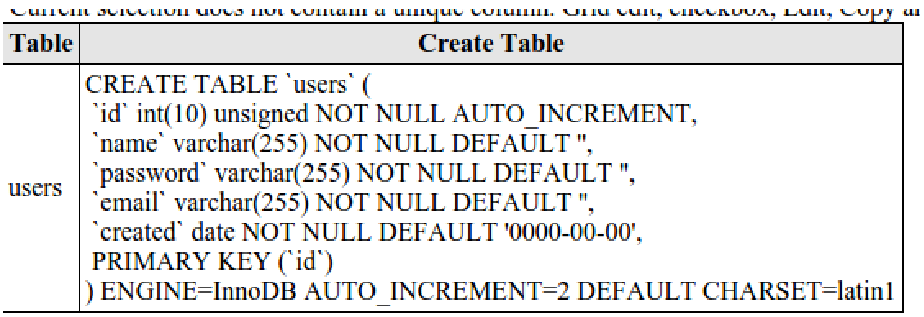
```
CREATE TABLE table_name (
  column_name1 definition,
  column_name2 definition,
  column_name3 definition,
  options
);
```

Simple users table

Let us create a simple users table with the columns

- name
- password
- email
- created

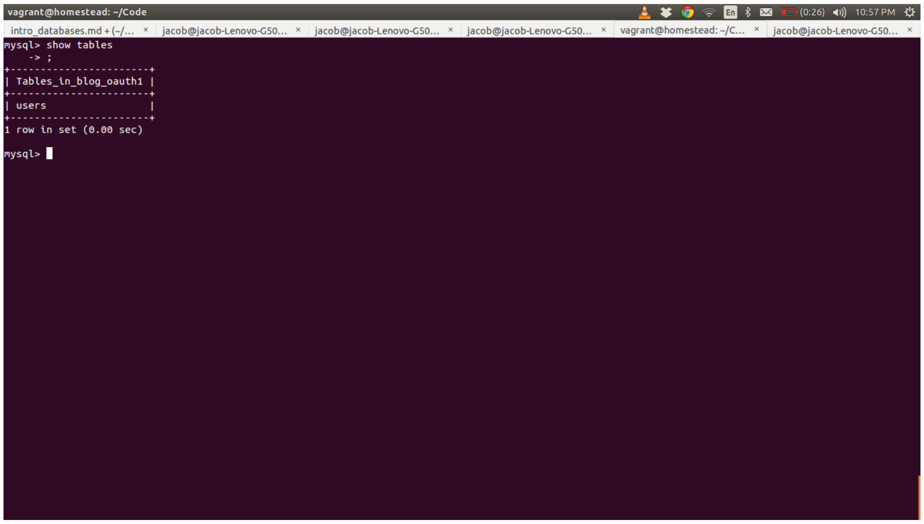
Simple users table sql



Current selection does not contain a unique column. Grid edit, checkbox, Edit, Copy ar

Table	Create Table
users	CREATE TABLE \`users\` (\`id\` int(10) unsigned NOT NULL AUTO_INCREMENT, \`name\` varchar(255) NOT NULL DEFAULT '', \`password\` varchar(255) NOT NULL DEFAULT '', \`email\` varchar(255) NOT NULL DEFAULT '', \`created\` date NOT NULL DEFAULT '0000-00-00', PRIMARY KEY (\`id\`)) ENGINE=InnoDB AUTO_INCREMENT=2 DEFAULT CHARSET=latin1

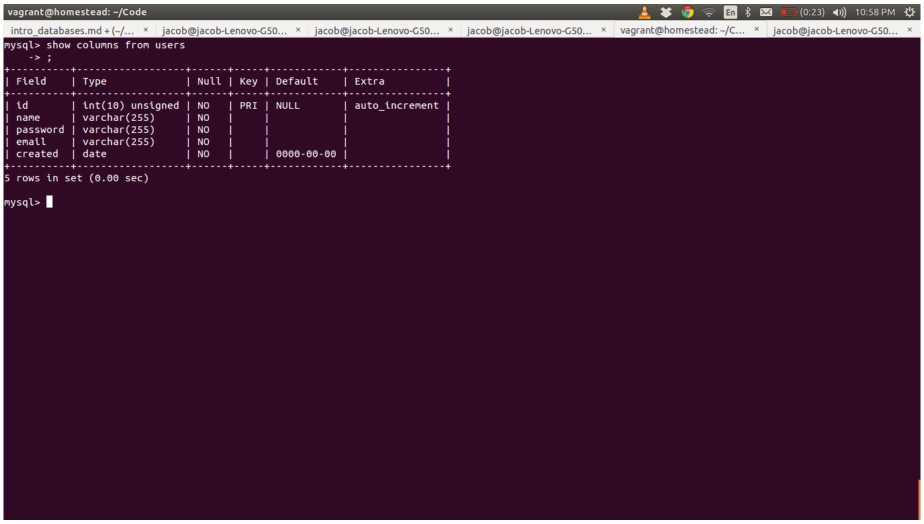
Checking tables after



vagrant@homestead: ~/Code
(0:26)
10:57 PM
intro_databases.md + (~/...
jacob@jacob-Lenovo-G50...
jacob@jacob-Lenovo-G50...
jacob@jacob-Lenovo-G50...
vagrant@homestead: ~/C...
jacob@jacob-Lenovo-G50...

```
mysql> show tables
    -> ;
+-----------------------+
| Tables_in_blog_oauth1 |
+-----------------------+
| users                 |
+-----------------------+
1 row in set (0.00 sec)

mysql> 
```

Checking columns


vagrant@homestead: ~/Code
En
(0:23)
10:58 PM
intro_databases.md + (~/...
jacob@jacob-Lenovo-G50...
jacob@jacob-Lenovo-G50...
jacob@jacob-Lenovo-G50...
vagrant@homestead: ~/C...
jacob@jacob-Lenovo-G50...

```
mysql> show columns from users
    -> ;
+----------+------------------+------+-----+------------+----------------+
| Field    | Type             | Null | Key | Default    | Extra          |
+----------+------------------+------+-----+------------+----------------+
| id       | int(10) unsigned | NO   | PRI | NULL       | auto_increment |
| name     | varchar(255)     | NO   |     |            |                |
| password | varchar(255)     | NO   |     |            |                |
| email    | varchar(255)     | NO   |     |            |                |
| created  | date             | NO   |     | 0000-00-00 |                |
+----------+------------------+------+-----+------------+----------------+
5 rows in set (0.00 sec)

mysql> 
```

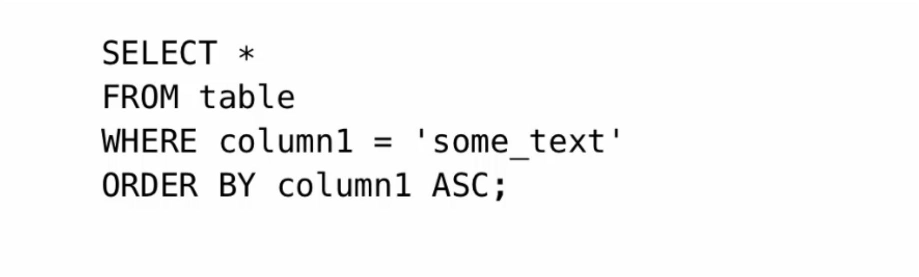
CRUD with MySQL

What is CRUD

- Create
- Read
- Update
- Delete

SQL Select

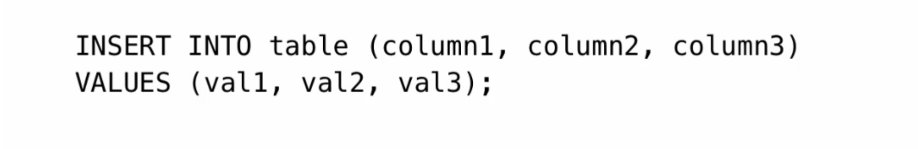
This is the read part



```
SELECT *
FROM table
WHERE column1 = 'some_text'
ORDER BY column1 ASC;
```

SQL Insert

This is the create part

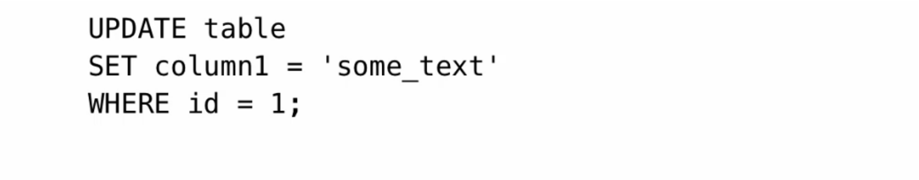


```
INSERT INTO table (column1, column2, column3)
VALUES (val1, val2, val3);
```

- Note columns and values must match
- It is not a must we look into all columns

SQL Update

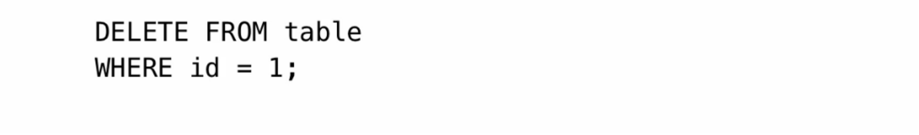
This is the update part



```
UPDATE table
SET column1 = 'some_text'
WHERE id = 1;
```

SQL Delete

This is the most dangerous component

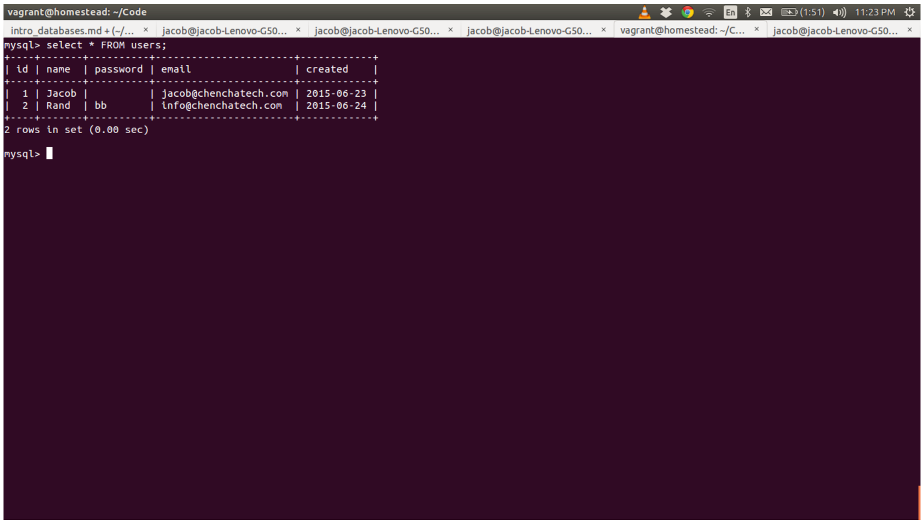


```
DELETE FROM table
WHERE id = 1;
```

Add data to SQL Database

```
INSERT INTO `users` (`id`, `name`, `password`, `email`, `created`) VALUES
(1, 'Jacob', 'secret', 'jacob@chenchatech.com', '2015-06-23');

INSERT INTO `users` (`id`, `name`, `password`, `email`, `created`) VALUES
(2, 'Rand', 'bb', 'info@chenchatech.com', '2015-06-24');

INSERT INTO `users` (`id`, `name`, `password`, `email`, `created`) VALUES
(3, 'To be deleted', 'password', 'someone@chenchatech.com', '2015-06-24');
```

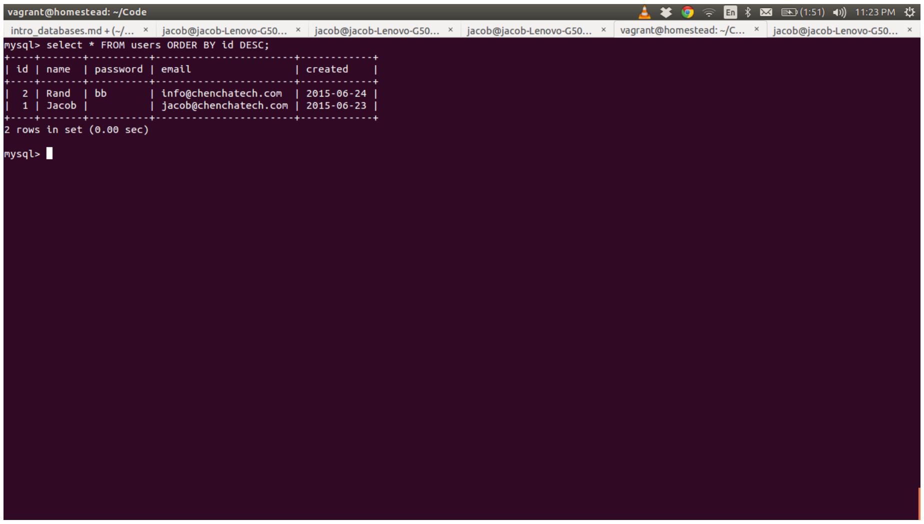
Show users



vagrant@homestead: ~/Code
(1:51) 11:23 PM
intro_databases.md + (~/... ×
jacob@jacob-Lenovo-G50... ×
jacob@jacob-Lenovo-G50... ×
jacob@jacob-Lenovo-G50... ×
vagrant@homestead: ~/C... ×
jacob@jacob-Lenovo-G50... ×

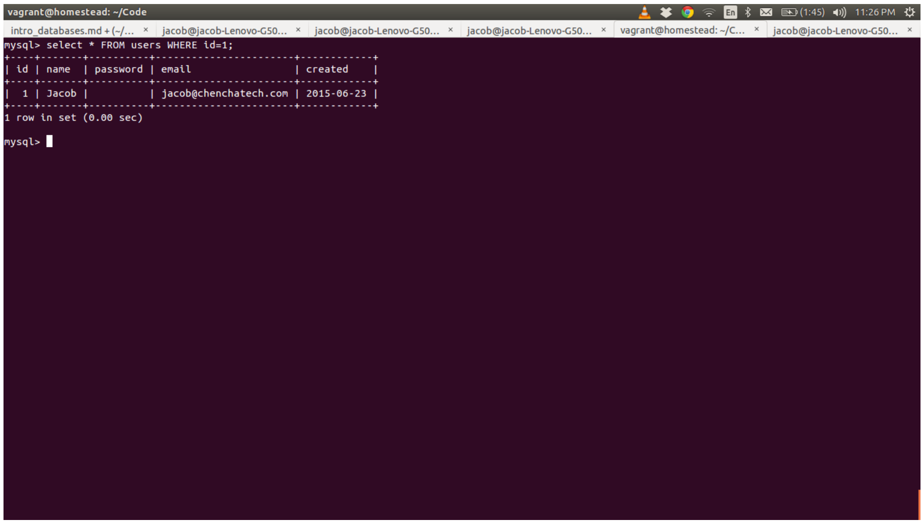
```
mysql> select * FROM users;
+----+-------+----------+-----------------------+------------+
| id | name  | password | email                 | created    |
+----+-------+----------+-----------------------+------------+
|  1 | Jacob |          | jacob@chenchatech.com | 2015-06-23 |
|  2 | Rand  | bb       | info@chenchatech.com  | 2015-06-24 |
+----+-------+----------+-----------------------+------------+
2 rows in set (0.00 sec)

mysql> 
```

Order users


vagrant@homestead: ~/Code
En
(1:51)
11:23 PM
intro_databases.md + (~/...
jacob@jacob-Lenovo-G50...
jacob@jacob-Lenovo-G50...
jacob@jacob-Lenovo-G50...
vagrant@homestead: ~/C...
jacob@jacob-Lenovo-G50...

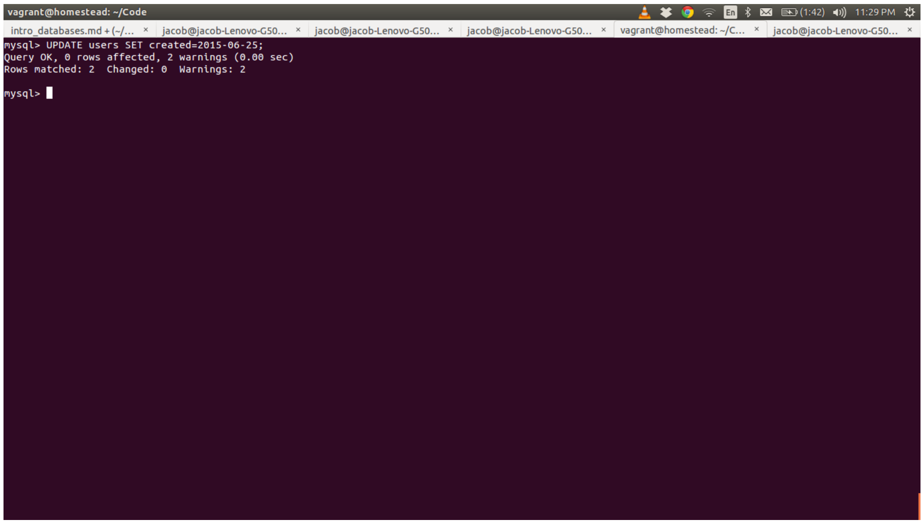
```
mysql> select * FROM users ORDER BY id DESC;
+----+-------+----------+-----------------------+------------+
| id | name  | password | email                 | created    |
+----+-------+----------+-----------------------+------------+
|  2 | Rand  | bb       | info@chenchatech.com  | 2015-06-24 |
|  1 | Jacob |          | jacob@chenchatech.com | 2015-06-23 |
+----+-------+----------+-----------------------+------------+
2 rows in set (0.00 sec)

mysql> 
```

Get a specific user


vagrant@homestead: ~/Code
En
(1:45)
11:26 PM
intro_databases.md + (~/...
jacob@jacob-Lenovo-G50...
jacob@jacob-Lenovo-G50...
jacob@jacob-Lenovo-G50...
vagrant@homestead: ~/C...
jacob@jacob-Lenovo-G50...

```
mysql> select * FROM users WHERE id=1;
+----+-------+----------+-----------------------+------------+
| id | name  | password | email                 | created    |
+----+-------+----------+-----------------------+------------+
|  1 | Jacob |          | jacob@chenchatech.com | 2015-06-23 |
+----+-------+----------+-----------------------+------------+
1 row in set (0.00 sec)

mysql> 
```

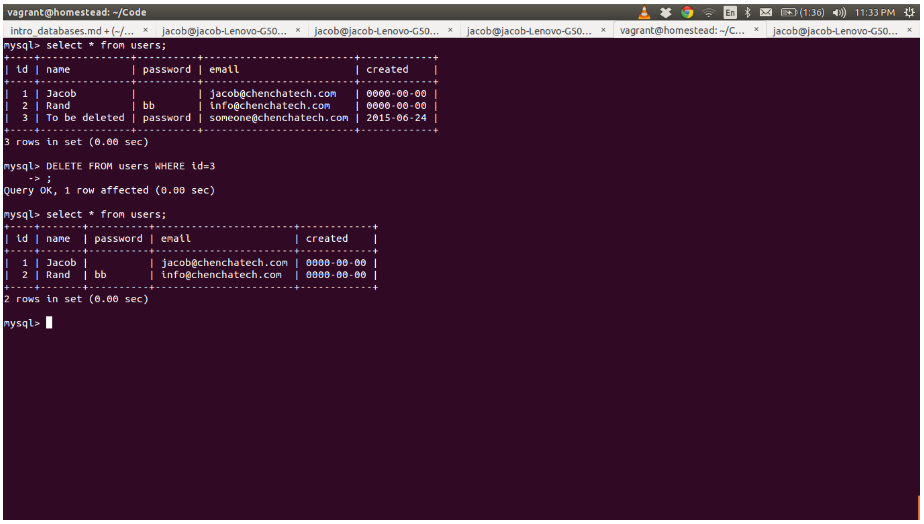
Updating users



vagrant@homestead: ~/Code
En
(1:42)
11:29 PM
intro_databases.md + (~/...
jacob@jacob-Lenovo-G50...
jacob@jacob-Lenovo-G50...
jacob@jacob-Lenovo-G50...
vagrant@homestead: ~/C...
jacob@jacob-Lenovo-G50...

```
mysql> UPDATE users SET created=2015-06-25;
Query OK, 0 rows affected, 2 warnings (0.00 sec)
Rows matched: 2  Changed: 0  Warnings: 2

mysql> 
```

Deleting users


vagrant@homestead: ~/Code
En
(1:36)
11:33 PM
intro_databases.md + (~/...
jacob@jacob-Lenovo-G50...
jacob@jacob-Lenovo-G50...
jacob@jacob-Lenovo-G50...
vagrant@homestead: ~/C...
jacob@jacob-Lenovo-G50...

```
mysql> select * from users;
+----+---------------+----------+-------------------------+------------+
| id | name          | password | email                   | created    |
+----+---------------+----------+-------------------------+------------+
|  1 | Jacob         |          | jacob@chenchatech.com   | 0000-00-00 |
|  2 | Rand          | bb       | info@chenchatech.com    | 0000-00-00 |
|  3 | To be deleted | password | someone@chenchatech.com | 2015-06-24 |
+----+---------------+----------+-------------------------+------------+
3 rows in set (0.00 sec)

mysql> DELETE FROM users WHERE id=3
    -> ;
Query OK, 1 row affected (0.00 sec)

mysql> select * from users;
+----+-------+----------+-----------------------+------------+
| id | name  | password | email                 | created    |
+----+-------+----------+-----------------------+------------+
|  1 | Jacob |          | jacob@chenchatech.com | 0000-00-00 |
|  2 | Rand  | bb       | info@chenchatech.com  | 0000-00-00 |
+----+-------+----------+-----------------------+------------+
2 rows in set (0.00 sec)

mysql> 
```

Assignment

Write SQL that does the following

1. Creates a database called Shop
2. Creates a table called products in the database
3. The table should have the columns (id, item, price)
4. The id should be auto populated

Submit as a document