Princeton University
COS 333: Advanced Programming Techniques
A Subset of MySQL

Getting Started with MySQL

The CS system administrators already have created a MySQL database for you that you can use for the COS 333 programming assignments. To access it, issue this command from a penguins shell prompt:

```
$ mysql cos333 -h publicdb -u cos333 -p
```

Then type cos333 as the password when prompted.

May need to create another MySQL database for your learning or for your COS 333 project. If so:

Complete and submit the form at this web page:

[https://csguide.cs.princeton.edu/requests/db](https://csguide.cs.princeton.edu/requests/db)

Wait for an e-mail from the CS system administrators indicating that they have created your database, and providing your initial password.

Change your password as described at this web page:

[https://csguide.cs.princeton.edu/db/mysql](https://csguide.cs.princeton.edu/db/mysql)

To access it, issue this command from a penguins shell prompt:

```
$ mysql dbname -h publicdb -u username -p
```

Type your password when prompted.

Type MySQL statements at the “mysql>” prompt.

### SQL Data Types

<table>
<thead>
<tr>
<th>Data Type</th>
<th>Bytes</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHAR(n)</td>
<td>n (&lt;=255)</td>
<td></td>
</tr>
<tr>
<td>VARCHAR(n)</td>
<td>up to n (&lt;= 255)</td>
<td>Common.</td>
</tr>
<tr>
<td>TINYTEXT(n)</td>
<td>up to n (&lt;= 255)</td>
<td></td>
</tr>
<tr>
<td>TEXT(n)</td>
<td>up to n (&lt;= 65535)</td>
<td>Common.</td>
</tr>
<tr>
<td>MEDIUMTEXT(n)</td>
<td>up to n (&lt;= 16777215)</td>
<td></td>
</tr>
<tr>
<td>LONGTEXT(n)</td>
<td>up to n (&lt;= 4294967295)</td>
<td></td>
</tr>
<tr>
<td>TINYBLOB(n)</td>
<td>up to n (&lt;= 255)</td>
<td>BLOB = “binary large object”.</td>
</tr>
<tr>
<td>BLOB(n)</td>
<td>up to n (&lt;= 65535)</td>
<td></td>
</tr>
<tr>
<td>MEDIUMBLOB(n)</td>
<td>up to n (&lt;= 1677215)</td>
<td></td>
</tr>
<tr>
<td>LONGBLOB(n)</td>
<td>up to n (&lt;= 4294967295)</td>
<td></td>
</tr>
<tr>
<td>TINYINT</td>
<td>1</td>
<td>Can be UNSIGNED.</td>
</tr>
<tr>
<td>SMALLINT</td>
<td>2</td>
<td>Can be UNSIGNED.</td>
</tr>
<tr>
<td>MEDIUMINT</td>
<td>3</td>
<td>Can be UNSIGNED.</td>
</tr>
<tr>
<td>Type</td>
<td>Size</td>
<td>Notes</td>
</tr>
<tr>
<td>--------</td>
<td>------</td>
<td>------------------------</td>
</tr>
<tr>
<td>INT</td>
<td>4</td>
<td>Can be UNSIGNED. Common.</td>
</tr>
<tr>
<td>BIGINT</td>
<td>8</td>
<td>Can be UNSIGNED.</td>
</tr>
<tr>
<td>FLOAT</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>DOUBLE</td>
<td>8</td>
<td>Common.</td>
</tr>
<tr>
<td>DATETIME</td>
<td></td>
<td>'yyyy-mm-dd hh:mm:ss'</td>
</tr>
<tr>
<td>DATE</td>
<td></td>
<td>'yyyy-mm-dd'</td>
</tr>
<tr>
<td>TIMESTAMP</td>
<td></td>
<td>'yyyy-mm-dd hh:mm:ss'</td>
</tr>
<tr>
<td>TIME</td>
<td></td>
<td>'hh:mm:ss'</td>
</tr>
<tr>
<td>YEAR</td>
<td></td>
<td>'yyyy'</td>
</tr>
</tbody>
</table>

MySQL Engines

MyISAM: faster, but does not support transactions

InnoDB: slower, but supports transactions

MySQL and SQL Statements

Keywords are case insensitive.

CREATE, DROP, ALTER, SELECT, INSERT, DELETE, UPDATE, BEGIN, COMMIT, and ROLLBACK are standard SQL statements. The others are specific to MySQL.

HELP statement;

   HELP SELECT;
   HELP CREATE;
   HELP CREATE TABLE;

QUIT;

SHOW DATABASES;

USE database;

   USE rdondero;

CREATE TABLE [IF NOT EXISTS] table
(column datatype, ...) ENGINE=engine CHARSET=latin1;

   CREATE TABLE books
   (isbn VARCHAR(20), title VARCHAR(255), quantity INT)
   ENGINE=InnoDB CHARSET=latin1;

SHOW TABLES;

DESCRIBE table;

   DESCRIBE books;

SOURCE file;

   SOURCE books.sql;

DROP TABLE [IF EXISTS] table;
DROP TABLE books;

ALTER TABLE table specification [, specification] …;

ALTER TABLE books ADD price DOUBLE FIRST;
ALTER TABLE books ADD pages INT AFTER quantity;
ALTER TABLE books DROP price, DROP pages;

SELECT expr, … FROM table, … [WHERE condition] [ORDER BY column [ASC | DESC]];

SELECT * FROM books;
SELECT isbn, title FROM books;
SELECT * FROM books ORDER BY quantity DESC;
SELECT * FROM books WHERE quantity = 100;
SELECT * FROM books WHERE quantity >= 100;
SELECT custid, quantity FROM orders WHERE isbn = 123 AND custid = 222;
SELECT custid, quantity FROM orders WHERE isbn = 123 OR custid = 222;
SELECT * FROM books WHERE title LIKE 'The%';
SELECT * FROM books WHERE title LIKE '%of%';
SELECT * FROM books WHERE title LIKE 't_e';
SELECT books.title, authors.author from books, authors;
SELECT books.title, authors.author from books, authors WHERE books.isbn = authors.isbn;
SELECT title, author from books, authors WHERE books.isbn = authors.isbn;
SELECT custname, title, orders.quantity FROM books, customers, orders WHERE books.isbn = orders.isbn AND orders.custid = customers.custid;

INSERT INTO table (column, …) VALUES (expr, …);

INSERT INTO books (isbn, title, quantity) VALUES ('456', 'Core Java', 120);

DELETE FROM table [WHERE condition];

DELETE FROM books;  # Be careful!!!
DELETE FROM books WHERE title LIKE 'The%';

UPDATE table SET column1=expr1 [, column2=expr2 …] [WHERE condition];

UPDATE books SET quantity=60 WHERE isbn=123;
UPDATE books SET quantity = quantity+1 WHERE isbn = 123;

BEGIN;    -- Begin a transaction

COMMIT;   -- Commit and end the active transaction.

ROLLBACK; -- Roll back and end the active transaction.

UPDATE orders SET quantity = quantity+1 WHERE isbn = 123 AND custid = 222;
UPDATE books SET quantity = quantity-1 WHERE isbn = 123;

BEGIN;
UPDATE orders SET quantity = quantity+1 WHERE isbn = 123 AND custid = 222;
UPDATE books SET quantity = quantity-1 WHERE isbn = 123;
COMMIT;

BEGIN;
UPDATE orders SET quantity = quantity+1 WHERE isbn = 123 AND custid = 222;
UPDATE books SET quantity = quantity-1 WHERE isbn = 123;
ROLLBACK;

BEGIN;
UPDATE orders SET quantity = quantity+1 WHERE isbn = 123 AND custid = 222;
UPDATE books SET quantity = quantity-1 WHERE isbn = 123;
QUIT;

Etc.

We'll cover other features of MySQL and SQL throughout the course as necessary.

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