

Chapter 3

Introduction to relational databases and MySQL

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A products table

Columns

productID	categoryID	productCode	productName	listPrice
1	1	strat	Fender Stratocaster	699.00
2	1	les_paul	Gibson Les Paul	1199.00
3	1	sg	Gibson SG	2517.00
4	1	fg700s	Yamaha FG700S	489.99
5	1	washburn	Washburn D10S	299.00
6	1	rodriguez	Rodriguez Caballero 11	415.00
7	2	precision	Fender Precision	799.99
8	2	hofner	Hofner Icon	499.99
9	3	ludwig	Ludwig 5-piece Drum Set with Cymbals	699.99
10	3	tama	Tama 5-Piece Drum Set with Cymbals	799.99

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Objectives

Applied

1. Use phpMyAdmin to review the data and structure of the tables in a database, to import and run SQL scripts that create databases, and to create users with limited privileges.
2. Code simple SELECT, INSERT, UPDATE, and DELETE statements, and use phpMyAdmin to run them.

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Key terms

- relational database
- table
- row
- column
- record
- field
- cell
- primary key
- non-primary key
- unique key

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Objectives (continued)

Knowledge

1. Describe the structure of a database table.
2. Describe how the tables in a relational database are related using these terms: primary key and foreign key.
3. Identify the three types of relationships that can exist between two tables.
4. Describe the way the columns in a table are defined using these terms: data type, NULL value, default value, and auto-increment column.
5. Describe the use of SELECT statements, including the use of inner joins.
6. Describe the use of INSERT, UPDATE, and DELETE statements.
7. Describe the way the creation of users and the assignment of privileges affect how a MySQL database can be used.

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The relationship between two tables in a database

categoryID	categoryName
1	Guitars
2	Basses
3	Drums

productID	categoryID	productCode	productName	listPrice
1	1	strat	Fender Stratocaster	699.00
2	1	les_paul	Gibson Les Paul	1199.00
3	1	sg	Gibson SG	2517.00
4	1	fg700s	Yamaha FG700S	489.99
5	1	washburn	Washburn D10S	299.00
6	1	rodriguez	Rodriguez Caballero 11	415.00
7	2	precision	Fender Precision	799.99
8	2	hofner	Hofner Icon	499.99
9	3	ludwig	Ludwig 5-piece Drum Set with Cymbals	699.99
10	3	tama	Tama 5-Piece Drum Set with Cymbals	799.99

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Key terms

- foreign key
- one-to-many relationship
- one-to-one relationship
- many-to-many relationship

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The SELECT statement syntax for all columns

```
SELECT *
FROM table-1
[WHERE selection-criteria]
[ORDER BY column-1 [ASC|DESC]
[, column-2 [ASC|DESC]] ...]
```

A SELECT statement that gets all columns

```
SELECT * FROM products
WHERE categoryID = 2
```

The result table

productID	categoryID	productCode	productName	listPrice
7	2	precision	Fender Precision	799.99
8	2	hofner	Hofner Icon	499.99

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The columns of the products table

Name	Type	Collation	Attributes	Null	Default	Extra
productID	int(11)			No	None	AUTO_INCREMENT
categoryID	int(11)			No	None	
productCode	varchar(10)	latin1_swedish_ci		No	None	
productName	varchar(255)	latin1_swedish_ci		No	None	
listPrice	decimal(10,2)			No	None	

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The syntax for selected columns

```
SELECT column-1 [, column-2] ...
FROM table-1
[WHERE selection-criteria]
[ORDER BY column-1 [ASC|DESC]
[, column-2 [ASC|DESC]] ...]
```

A statement that gets selected columns and rows

```
SELECT productName, listPrice
FROM products
WHERE listPrice < 500
ORDER BY listPrice ASC
```

The result table

productName	listPrice = 1
Washburn D10S	299.00
Rodriguez Caballero 11	415.00
Yamaha FG700S	489.99
Hofner Icon	499.99

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Common MySQL data types

CHAR
VARCHAR
INT
DECIMAL
DATE, TIME, DATETIME

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The syntax that joins two tables

```
SELECT column-1 [, column-2] ...
FROM table-1
(INNER | LEFT OUTER | RIGHT OUTER) JOIN table-2
ON table-1.column-1 = table-2.column-2
[WHERE selection-criteria]
[ORDER BY column-1 [ASC|DESC] [, column-2 [ASC|DESC]] ...]
```

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A statement that gets data from two related tables

```
SELECT categoryName, productName, listPrice
FROM categories
INNER JOIN products
ON categories.categoryID = products.categoryID
WHERE listPrice > 800
ORDER BY listPrice ASC
```

The result table

categoryName	productName	listPrice
Guitars	Gibson Les Paul	1199.00
Guitars	Gibson SG	2517.00

**The syntax for the UPDATE statement**

```
UPDATE table-name
SET expression-1 [, expression-2] ...
WHERE selection-criteria
```

A statement that updates a column in one row

```
UPDATE products
SET productName =
'Ludwig 5-Piece Kit with Zildjian Cymbals'
WHERE productCode = 'ludwig'
```

A statement that updates multiple rows

```
UPDATE products
SET listPrice = 299
WHERE categoryID = 1
```

**Key terms**

- join
- inner join
- outer join
- left outer join
- right outer join

**The syntax for the DELETE statement**

```
DELETE FROM table-name
WHERE selection-criteria
```

A statement that deletes one row from a table

```
DELETE FROM products
WHERE productID = 1
```

A statement that deletes multiple rows

```
DELETE FROM products
WHERE listPrice > 200
```

**The syntax for the INSERT statement**

```
INSERT INTO table-name [(column-list)]
VALUES (value-list)
```

A statement that adds one row to a table

```
INSERT INTO products
(categoryID, productCode, productName, listPrice)
VALUES
(1, 'tele', 'Fender Telecaster', 599.00)
```

A statement that uses the MySQL NOW function to get the current date

```
INSERT INTO orders (customerID, orderDate)
VALUES (1, NOW())
```

**MySQL is...**

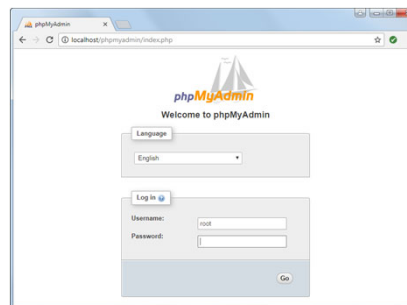
- Inexpensive
- Fast
- Easy to use
- Portable



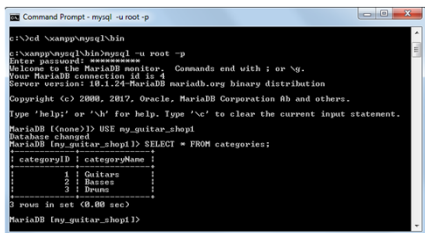
MySQL provides...

- Support for SQL
- Support for multiple clients
- Connectivity
- Security
- Referential integrity
- Transaction processing

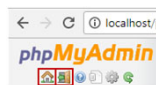
The Welcome page



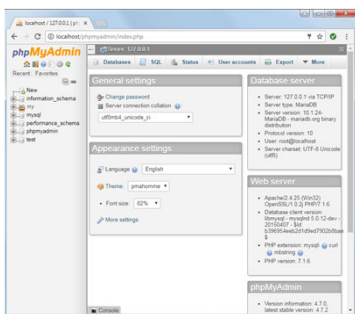
A command-line client



The Home and Logout buttons at the top of the sidebar on most pages



A web-based client



How to start phpMyAdmin on a local computer

1. From the XAMPP Control Panel, start the Apache and MySQL servers if they aren't already running.
2. Click the Admin button for the MySQL module to start the phpMyAdmin tool in your default web browser.

How to log in

- Enter your username and password.

How to log out and return to the Welcome page

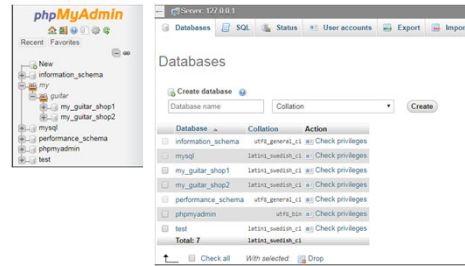
- Click the Log out button (the Exit sign icon).

How to change your password

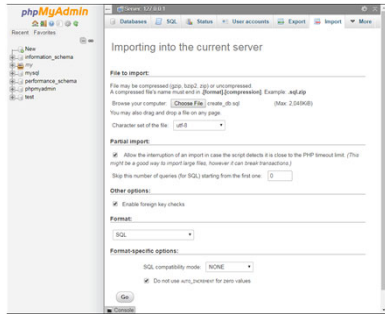
- Click the Home button (the house icon). Then, click the Change Password link in the General Settings box.
- On the Change Password page, enter and re-enter your new password, and click the Go button.



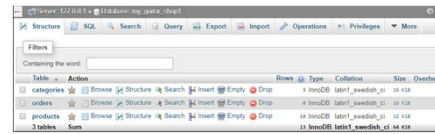
The databases tree and the Databases tab



Running a SQL script that creates a database



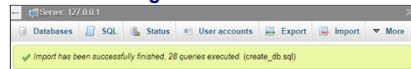
The Structure tab for the my_guitar_shop1 database



How to import and run a SQL script

1. Click the Import tab, go to the "File to Import" section, click the Choose File button, and select the file that contains the script.
2. Click the Go button. This runs the script that's in the file.

A success message

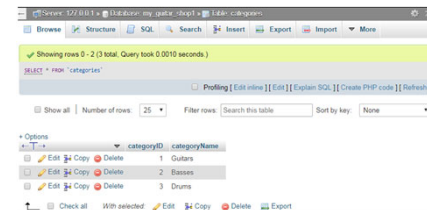


The script for creating the databases for this book

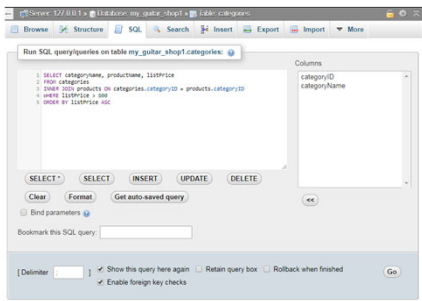
`\\xampp\htdocs\book_apps_create_db\create_db.sql`



The Browse tab for the categories table



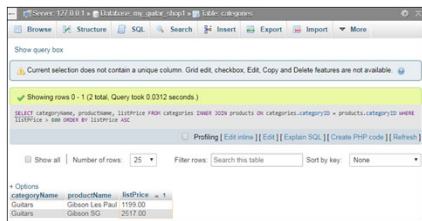
The SQL tab with a statement ready to run



Common privileges

Privilege	Description
SELECT	Lets the user select data.
UPDATE	Lets the user update data.
INSERT	Lets the user insert data.
DELETE	Lets the user delete data.
CREATE TABLE	Lets the user create a table.
DROP TABLE	Lets the user drop a table.

The result of the SQL statement



The error message that's displayed after an UPDATE statement failed



Creating a user with limited privileges on one table

```

GRANT SELECT
ON my_guitar_shop1.products
TO mgs_tester@localhost
IDENTIFIED BY 'pa55word'
    
```

Creating a user with limited privileges on all tables

```

GRANT SELECT, INSERT, DELETE, UPDATE
ON my_guitar_shop1.*
TO mgs_user@localhost
IDENTIFIED BY 'pa55word'
    
```