# SQL 学习笔记（Structured Query Language）

This document includes SQL fundamentals, CRUD operations, and String Functions.  
本文档包含 SQL 基础、CRUD 操作及字符串函数部分。

## 十二、String Functions（字符串函数）

### 1️⃣ How to Load SQL Files

In MySQL Workbench:  
1. Select the target database.  
2. Run: SOURCE /path/to/book\_data.sql;  
  
In Terminal:  
1. Login: mysql -u root -p  
2. USE database\_name;  
3. SOURCE /path/to/book\_data.sql;  
  
在 Workbench 选择数据库后执行 SOURCE 命令；Terminal 中先登录再执行文件。

### 2️⃣ CONCAT() and CONCAT\_WS()

CONCAT() joins multiple strings together:  
SELECT CONCAT(author\_fname, ' ', author\_lname) AS author\_name FROM books;  
  
CONCAT\_WS() joins strings with a separator:  
SELECT CONCAT\_WS('-', title, author\_fname, author\_lname) FROM books;  
  
CONCAT 拼接多个字符串；CONCAT\_WS 在字符串间自动添加分隔符。

### 3️⃣ SUBSTRING() / SUBSTR()

Extract part of a string:  
SELECT SUBSTRING('Hello World', 1, 4);  
SELECT SUBSTRING('Hello World', 7);  
SELECT SUBSTRING('Hello World', -3);  
SELECT SUBSTRING(title, 1, 10) AS 'short title' FROM books;  
  
SUBSTR() is alias of SUBSTRING():  
SELECT SUBSTR(author\_lname, 1, 1) FROM books;  
  
Combine with CONCAT:  
SELECT CONCAT(SUBSTRING(title, 1, 10), '...') AS 'short title' FROM books;  
SELECT CONCAT(SUBSTR(author\_fname,1,1), '.', SUBSTR(author\_lname,1,1), '.') FROM books;  
  
SUBSTRING 或 SUBSTR 用于截取子字符串；可结合 CONCAT 使用。

### 4️⃣ REPLACE()

Replace part of a string:  
SELECT REPLACE('Hello World', 'Hell', '%$#@');  
SELECT REPLACE('Hello World', 'l', '7');  
SELECT REPLACE(title, ' ', '-') FROM books;  
  
REPLACE 将字符串中指定内容替换为新的文本。

### 5️⃣ REVERSE()

Reverse the order of characters:  
SELECT REVERSE('abc');  
SELECT REVERSE('Hello World');  
SELECT CONCAT(author\_fname, REVERSE(author\_fname)) FROM books;  
  
REVERSE 反转字符串字符顺序。

### 6️⃣ CHAR\_LENGTH() vs LENGTH()

CHAR\_LENGTH() returns number of characters; LENGTH() returns bytes.  
SELECT LENGTH('海豚'), CHAR\_LENGTH('海豚');  
SELECT author\_lname, CHAR\_LENGTH(author\_lname) AS length FROM books;  
  
CHAR\_LENGTH 计算字符数量，LENGTH 计算字节数。

### 7️⃣ UPPER() / LOWER()

Convert to uppercase or lowercase:  
SELECT UPPER('Hello World');  
SELECT LOWER('Hello World');  
SELECT CONCAT('My favorite book is ', UPPER(title)) FROM books;  
  
UPPER 转大写；LOWER 转小写。

### 8️⃣ INSERT()

Insert or replace part of string:  
SELECT INSERT('Quadratic', 3, 4, 'What');  
SELECT INSERT('Quadratic', 3, 100, 'What');  
  
INSERT(str,pos,len,newstr) 从 pos 开始替换 len 个字符为 newstr。

### 9️⃣ LEFT() and RIGHT()

Get leftmost or rightmost characters:  
SELECT LEFT('foobarbar', 5);  
SELECT RIGHT('omghahalol!', 4);  
  
LEFT 从左取字符；RIGHT 从右取字符。

### 🔟 REPEAT()

Repeat a string:  
SELECT REPEAT('ha', 4);  
  
REPEAT 将字符串重复指定次数。

### 11️⃣ TRIM()

Remove spaces or specific characters:  
SELECT TRIM(' bar ');  
SELECT TRIM(LEADING 'x' FROM 'xxxbarxxx');  
SELECT TRIM(BOTH 'x' FROM 'xxxbarxxx');  
SELECT TRIM(TRAILING 'xyz' FROM 'barxxyz');  
  
TRIM 删除两端空格或指定字符；LEADING 为开头，TRAILING 为结尾，BOTH 为两端。

### 12️⃣ SQL Formatting Tools

Workbench: use brush icon to format.  
Shortcut: Ctrl + B / Cmd + B  
Online Tool: https://codebeautify.org/sqlformatter  
  
可使用 Workbench 或在线工具格式化 SQL 代码。