

DATA HACK 2023 MAKER WORKSHOP:

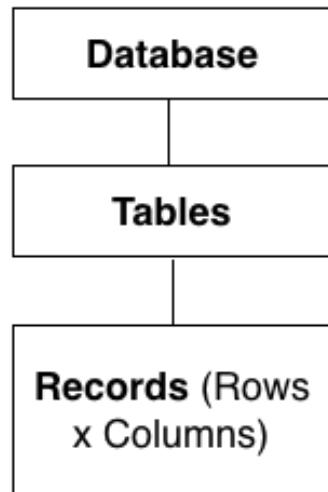
DATA FILTERING, SORTING & GROUPING IN SQL

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Center for Entrepreneurship
Chinese University of Hong Kong

Today's agenda.

1. **Storing Data**: CSV file vs. Relational (SQL) Database.
2. Learning relational database in DB Browser for SQLite3.
3. What is SQL (Structured Query Language)?

What is a “relational database”?



“A **relational database** is made up of a collection of **tables** which relate to each other for storing and managing data entries (**records**), organised by rows and columns.

A database can be used for representing and tracking people, things, events. and transactions.

- People (e.g. students, employees, customers, donors, volunteers)
- Things (e.g. properties, stocks, products, books)
- Events (e.g. campaigns, courses, conferences)
- Transactions (e.g. billings, orders, tasks, donations)

Relational Database vs. Delimited CSV (Comma Separated Values) File

Relational Database

Columns (Fields)

Contacts						
	id	name	age	birthday	email	country_id
	1	Peter Chan	52	1968-05-01	peter@gmail.com	1
	3	Tony Wong	16	2005-07-11	robert@gmail.com	2
	4	Robert Choi	36	1983-03-23	rchoi@cuhk.edu.hk	3
	5	John Li	16	2005-05-23	jli@gmail.com	4

Primary Key (PK)

Foreign Key (FK)

Columns (Fields)

Countries

	country_id	country_name
	1	PRC
	2	USA
	3	France
	4	Japan
	5	Italy
	6	Germany

Rows
(Records)

Primary Key (PK)

CSV File

	id	name	age	birthday	email	country
	1,	"Peter Chan",	52,	"1968-05-01",	peter@gmail.com,	PRC
	3,	"Tony Wong",	16,	"2005-07-11",	robert@gmail.com,	USA
	4,	"Robert Choi",	36,	"1983-03-23",	rchoi@cuhk.edu.hk	France
	5,	"John Li",	16,	"2005-05-23",	jli@gmail.com,	Japan
	6,	"Coco Zhang",	16,	"2005-07-23",	coco@yahoo.com,	People Republic of China
	7,	"	"	"	"	"
	8,	"	"	"	"	PRC
	9,	"	"	"	"	"

country
PRC
USA
France
Japan
People Republic of China
PRC



Advantages and Disadvantages in Using CSV File

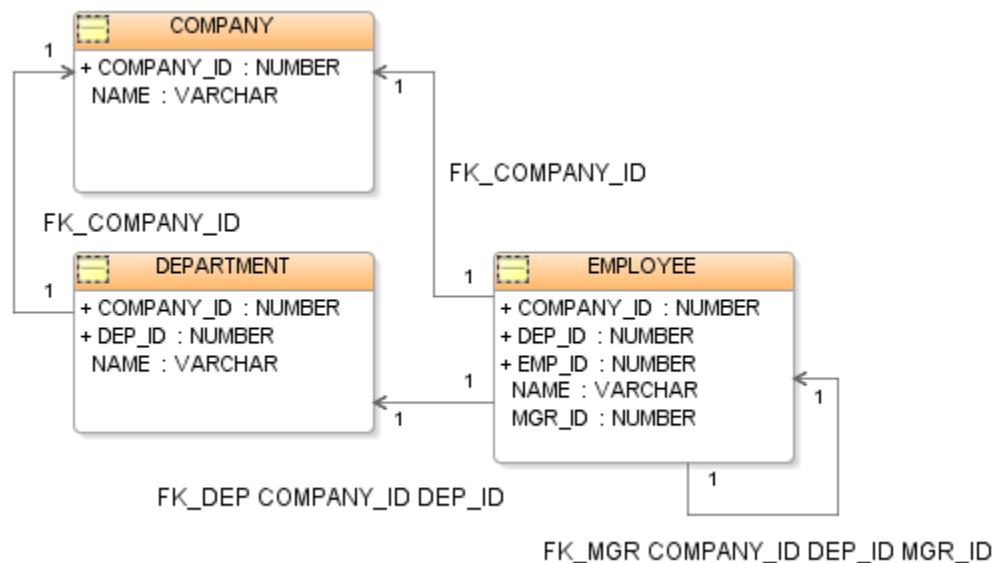
- **Simple to use and build.**
- **Hard to update (when field value changes, all related entries have to be changed manually).**
- **Lend itself to inconsistent entries when different people enter different values representing the same attribute (e.g. country name).**
- **Lead to enormous number of fields (columns) per table when dealing with complex data models.**
- **Make data modelling overly complicated.**
- **CSV file is not as secured as relational database.**

How to Build Data Relationships with Primary Key and Foreign Key

Building relationships between tables by using foreign keys.

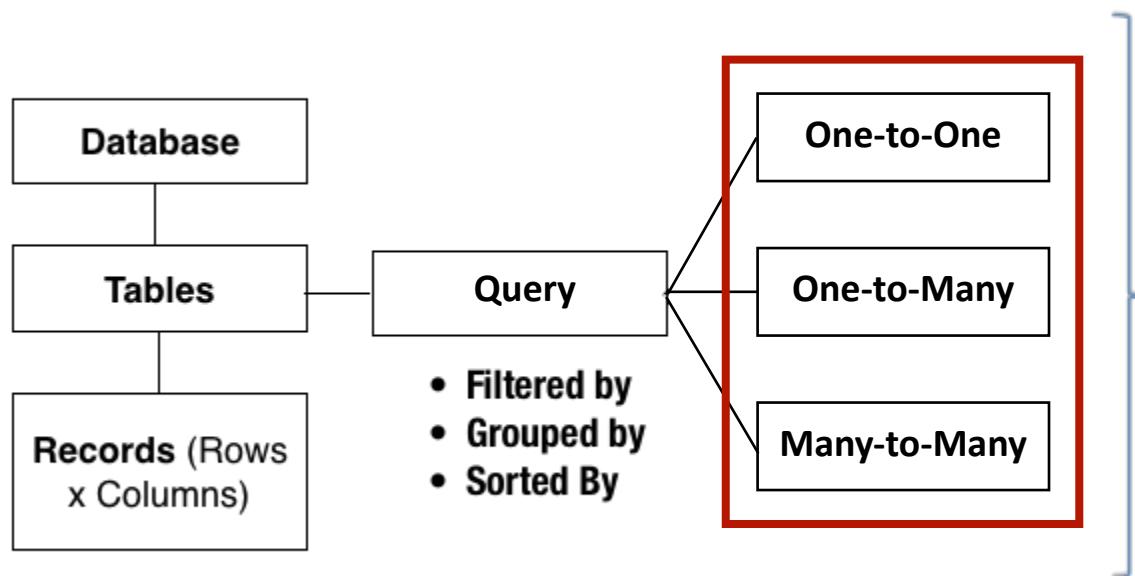
- Every entry in a table should be uniquely defined by a **primary key**.
- Build relationships between tables by making one of the fields in the table as a **foreign key** linked to the **primary key** of another table.

Entity Relationship Diagram (ERD)

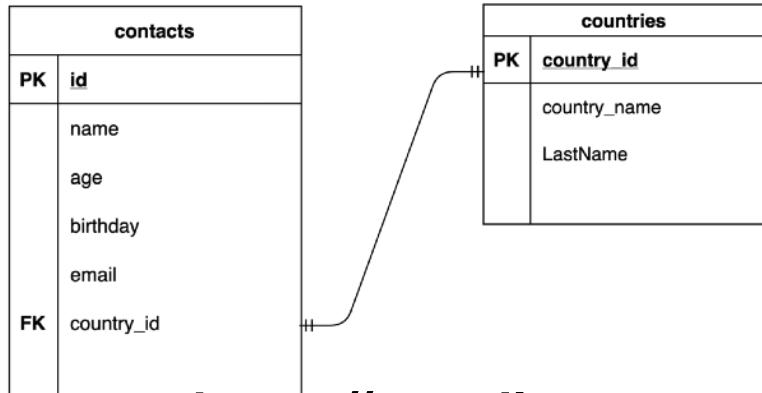


Source: commons.wikimedia.org

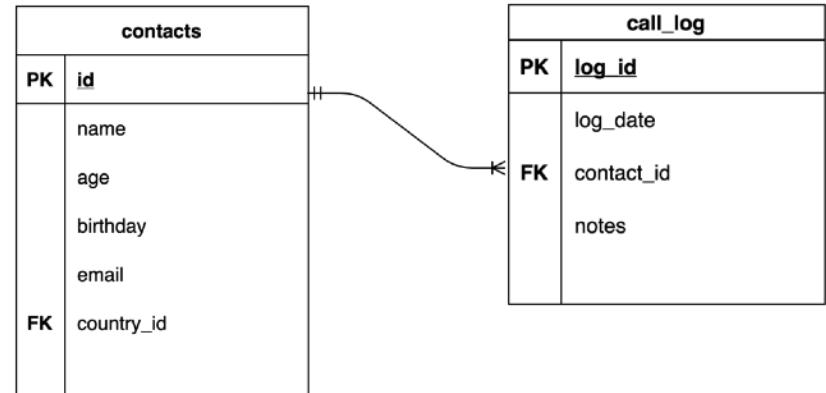
The Three Most Common Types of Relationship in Relational Database



• One-to-One

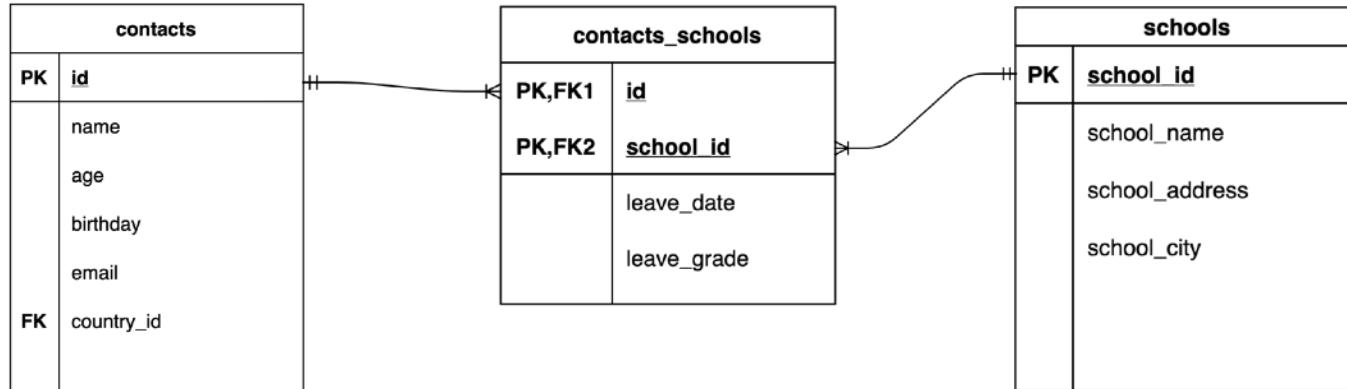


• One-to-Many



<https://app.diagrams.net/>

• Many-to-Many



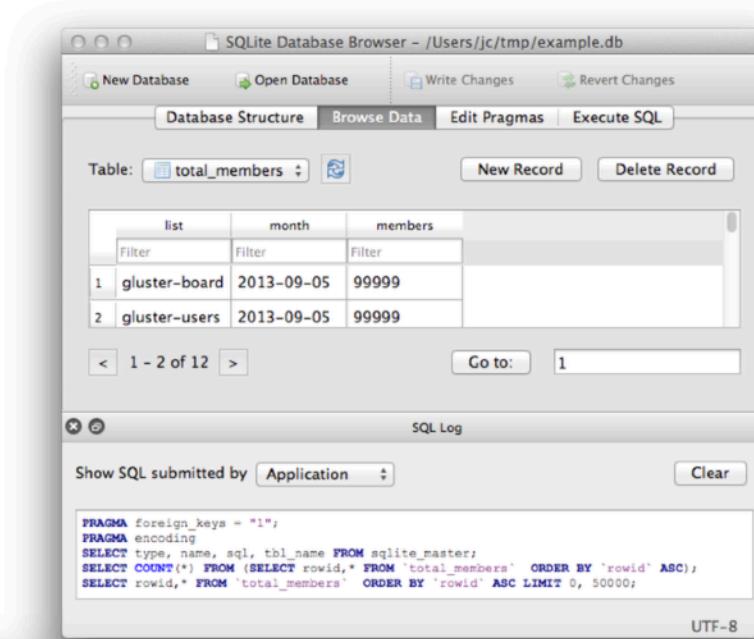
Learning Relational Database with the WP Data Access Plugin



DB Browser for SQLite

The Official home of the DB Browser for SQLite

Screenshot



<https://sqlitebrowser.org/>

Downloads

(Please consider sponsoring us on Patreon 😊)

Windows

Our latest release (3.12.2) for Windows:

- [DB Browser for SQLite – Standard installer for 32-bit Windows](#)
- [DB Browser for SQLite – .zip \(no installer\) for 32-bit Windows](#)
- [DB Browser for SQLite – Standard installer for 64-bit Windows](#)
- [DB Browser for SQLite – .zip \(no installer\) for 64-bit Windows](#)

Windows PortableApp

- [DB Browser for SQLite – PortableApp](#)

Note – If for any reason the standard Windows release does not work (e.g. gives an error), try a nightly build ([below](#)).

Nightly builds often fix bugs reported after the last release. 😊

macOS

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<https://sqlitebrowser.org/dl/>



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DB Browser for SQLite

The Official home of the DB Browser for SQLite

Screenshot

The screenshot shows the SQLite Database Browser interface. At the top, there's a menu bar with options like 'New Database', 'Open Database', 'Write Changes', 'Revert Changes', and tabs for 'Database Structure', 'Browse Data', 'Edit Pragmas', and 'Execute SQL'. Below the menu, a table named 'total_members' is displayed with two rows:

	list	month	members
1	gluster-board	2013-09-05	99999
2	gluster-users	2013-09-05	99999

Below the table, there are navigation buttons for 'Go to:' and a page number '1'. At the bottom, there's a 'SQL Log' section showing the following SQL commands:

```
PRAGMA foreign_keys = "1";
PRAGMA encoding
SELECT type, name, sql, tbl_name FROM sqlite_master;
SELECT COUNT(*) FROM (SELECT rowid,* FROM "total_members" ORDER BY 'rowid' ASC);
SELECT rowid,* FROM "total_members" ORDER BY 'rowid' ASC LIMIT 0, 50000;
```

The interface is set to 'UTF-8' encoding.

What is SQL (Structured Query Language)?

Structured Query Language (SQL**)**

“Language (commands) for instructing the database to perform data creation, manipulation, queries, and controls.”

1. **Sort** single or multiple fields as sorting criteria.
2. **Group** entries by a single field or multiple fields to create data segments.
3. **Filter** entries by single or multiple fields as searching conditions.

Use sort, group, and filter to search for information in a table.

Retrieve Record

SELECT FROM table name **WHERE** condition
GROUP BY field name
ORDER BY field name **ASC | DESC**

Retrieve Records by Aggregate/Statistic Functions

SELECT COUNT (field name)
FROM table name GROUP BY field name WHERE condition

SELECT SUM (field name)
FROM table name GROUP BY field name WHERE condition

SELECT AVG (field name)
FROM table name GROUP BY field name WHERE condition

SELECT MAX I MIN (field name)
FROM table name GROUP BY field name WHERE condition

Learning Relational Database with SQLite



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DB Browser for SQLite

The Official home of the DB Browser for SQLite

Screenshot

The screenshot shows the SQLite Database Browser interface. At the top, there's a menu bar with 'New Database', 'Open Database', 'Write Changes', and 'Revert Changes'. Below the menu is a toolbar with tabs: 'Database Structure', 'Browse Data' (which is selected), 'Edit Pragmas', and 'Execute SQL'. A dropdown menu labeled 'Table:' shows 'total_members'. To the right of the table are 'New Record' and 'Delete Record' buttons. The main area displays a table with three columns: 'list', 'month', and 'members'. The data is as follows:

	list	month	members
1	gluster-board	2013-09-05	99999
2	gluster-users	2013-09-05	99999

Below the table are navigation buttons ('<', '1 - 2 of 12', '>'), a 'Go to:' input field (set to '1'), and an 'SQL Log' section. The SQL Log contains the following commands:

```
PRAGMA foreign_keys = "1";
PRAGMA encoding;
SELECT type, name, sql, tbl_name FROM sqlite_master;
SELECT COUNT(*) FROM (SELECT rowid,* FROM `total_members` ORDER BY `rowid` ASC);
SELECT rowid,* FROM `total_members` ORDER BY `rowid` ASC LIMIT 0, 50000;
```

<https://sqlitebrowser.org/>

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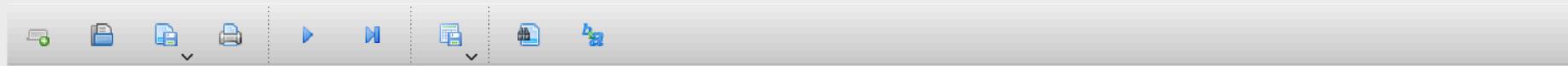
The interface is set to 'UTF-8' encoding.

What is SQL (Structured Query Language)?

SELECT “Distinct” command.

Filter Query with “Where” clause.

Database Structure | Browse Data | Edit Pragmas | Execute SQL



× SQL 1 | × SQL 2 | **× SQL 3**

1 SELECT company, city FROM customers WHERE city = 'Boston'

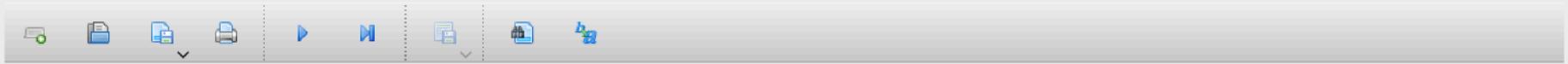
	company	city
1	Company B	Boston
2	Company R	Boston

Result: 2 rows returned in 17ms

At line 1:

SELECT company, city FROM customers WHERE city = 'Boston'

Database Structure | Browse Data | Edit Pragmas **Execute SQL**



× SQL 1 | × SQL 2 | × SQL 3 | **× SQL 4**

1 `SELECT company, city FROM customers WHERE city = 'Boston' AND company = 'Company B'`

	company	city
1	Company B	Boston

Result: 1 rows returned in 3ms

At line 1:

`SELECT company, city FROM customers WHERE city = 'Boston' AND company = 'Company B'`

Use of wildcards using the “Like“ clause.

SQL Tutorial

SQL HOME

SQL Intro

SQL Syntax

SQL Select

SQL Select Distinct

SQL Where

SQL And, Or, Not

SQL Order By

SQL Insert Into

SQL Null Values

SQL Update

SQL Delete

SQL Select Top

SQL Min and Max

SQL Count, Avg, Sum

SQL Like

SQL Wildcards

SQL In

SQL Between

SQL Aliases

SQL Joins

SQL Inner Join

SQL Left Join

SQL Right Join

SQL Full Join

SQL Self Join

SQL Union

SQL Group By

SQL Having

SQL Exists

SQL Any, All

[]	Represents any single character within the brackets	h[oa]t finds hot and hat, but not hit
^	Represents any character not in the brackets	h[^oa]t finds hit, but not hot and hat
-	Represents any single character within the specified range	c[a-b]t finds cat and cbt

All the wildcards can also be used in combinations!

Here are some examples showing different **LIKE** operators with '%' and '_' wildcards: **"Like" is used as wildcard for filling in the blank.**

LIKE Operator	Description
WHERE CustomerName LIKE 'a%'	Finds any values that starts with "a"
WHERE CustomerName LIKE '%a'	Finds any values that ends with "a"
WHERE CustomerName LIKE '%or%'	Finds any values that have "or" in any position
WHERE CustomerName LIKE '_r%'	Finds any values that have "r" in the second position
WHERE CustomerName LIKE 'a__%'	Finds any values that starts with "a" and are at least 3 characters in length
WHERE ContactName LIKE 'a%o'	Finds any values that starts with "a" and ends with "o"

Demo Database

The table below shows the complete "Customers" table from the Northwind sample database:

CustomerID	CustomerName	ContactName	Address	City	PostalCode	Country
1	Alfreds Futterkiste	Maria Anders	Obere Str. 57	Berlin	12209	Germany
2	Ana Trujillo Emparedados y helados	Ana Trujillo	Avda. de la Constitución 2222	México D.F.	05021	Mexico
3	Antonio Moreno Taquería	Antonio Moreno	Mataderos 2312	México D.F.	05023	Mexico

https://www.w3schools.com/sql/sql_like.asp



Get started

CODE GAME

Play Game

ADVERTISEMENT



Database Structure | Browse Data | Edit Pragmas | Execute SQL

SQL 1 | SQL 2 | SQL 3 | SQL 4 | SQL 5

1 SELECT company, city FROM customers WHERE city LIKE 'Bos%'

	company	city
1	Company B	Boston
2	Company R	Boston

Result: 2 rows returned in 19ms
At line 1:
SELECT company, city FROM customers WHERE city LIKE 'Bos%'

Database Structure | Browse Data | Edit Pragmas | Execute SQL

SQL 1 | SQL 2 | SQL 3 | SQL 4 | SQL 5 | SQL 6

1 SELECT company, city FROM customers WHERE city LIKE '%ton'

	company	city
1	Company B	Boston
2	Company R	Boston

Result: 2 rows returned in 18ms
At line 1:
SELECT company, city FROM customers WHERE city LIKE '%ton'

Database Structure | Browse Data | Edit Pragmas | Execute SQL

SQL 1 | SQL 2 | SQL 3 | SQL 4 | SQL 5 | SQL 6 | SQL 7

1 SELECT company, city FROM customers WHERE city LIKE '%os%'

	company	city
1	Company B	Boston
2	Company C	Los Angelas
3	Company R	Boston
4	Company S	Los Angelas

Result: 4 rows returned in 19ms
At line 1:
SELECT company, city FROM customers WHERE city LIKE '%os%'

Use of the “In” clause.

Database Structure | Browse Data | Edit Pragmas | **Execute SQL**

SQL 1 | SQL 2 | SQL 3 | SQL 4 | SQL 5 | SQL 6 | SQL 7 | **SQL 8**

```
1 SELECT id, company, city, address FROM Customers
2 WHERE City IN ('Boston', 'Los Angelas', 'San Francisco');
```

	id	company	city	address
1	2	Company B	Boston	123 2nd Street
2	3	Company C	Los Angelas	123 3rd Street
3	16	Company P	San Francisco	456 16th Street
4	18	Company R	Boston	456 18th Street
5	19	Company S	Los Angelas	789 19th Street

Result: 5 rows returned in 23ms
At line 1:
SELECT id, company, city, address FROM Customers
WHERE City IN ('Boston', 'Los Angelas', 'San Francisco');

Use of the “Between” clause.

Database Structure | Browse Data | Edit Pragmas **Execute SQL**

X SQL 1 | X SQL 2 | X SQL 3 | X SQL 4 | X SQL 5 | X SQL 6 | X SQL 7 | X SQL 8 | X SQL 9 | X SQL 10 | X SQL 11

1 `SELECT * FROM products WHERE unitPrice BETWEEN 19 AND 20`

	productID	productName	supplierID	categoryID	quantityPerUnit	unitPrice	unitsInStock	unitsOnOrder	reorderLevel	discontinued
1	2	Chang	1	1	24 - 12 oz bottles	19	17	40	25	0
2	36	Inlagd Sill	17	8	24 - 250 g jars	19	112	0	20	0
3	44	Gula Malacca	20	2	20 - 2 kg bags	19.45	27	0	15	0
4	49	Maxilaku	23	3	24 - 50 g pkgs.	20	10	60	15	0
5	57	Ravioli Angelo	26	5	24 - 250 g pkgs.	19.5	36	0	20	0

Result: 5 rows returned in 22ms
At line 1:
`SELECT * FROM products WHERE unitPrice BETWEEN 19 AND 20`

Select of Select Subset

Database Structure | Browse Data | Edit Pragmas | **Execute SQL**

X SQL 1 | X SQL 2 | X SQL 3 | X SQL 4 | X SQL 5 | X SQL 6 | X SQL 7 | X SQL 8 | X SQL 11 | X SQL 12

```
1 SELECT *
2 FROM (SELECT id, Company, city, address FROM customers ORDER BY Company)
3 WHERE city = "Boston"
```

	id	Company	city	address	
1	2	Company B	Boston	123 2nd Street	
2	18	Company R	Boston	456 18th Street	

Result: 2 rows returned in 22ms
At line 1:
SELECT *
FROM (SELECT id, Company, city, address FROM customers ORDER BY Company)
WHERE city = "Boston"

Aggregate Functions

(AVG, MIN, MAX, COUNT, SUM)

DB Browser for SQLite - /Users/suen/Desktop/northwind.db

DB Browser for SQLite - /Users/suen/Desktop/northwind.db

New Database Open Database Write Changes Revert Changes Open Project Save Project Attach Database Close Database

Database Structure Browse Data Edit Pragmas Execute SQL

SQL 1 SQL 3

1 SELECT AVG(unitPrice) , productName FROM products

	AVG(unitPrice)	productName
1	28.8663636363636	Chai

Result: 1 rows returned in 18ms
At line 1:
SELECT AVG(unitPrice) , productName FROM products

UTF-8

DB Browser for SQLite - /Users/suen/Desktop/northwind.db

DB Browser for SQLite - /Users/suen/Desktop/northwind.db

New Database Open Database Write Changes Revert Changes Open Project Save Project Attach Database Close Database

Database Structure Browse Data Edit Pragmas Execute SQL

SQL 1 SQL 3

1 SELECT ROUND(AVG(unitPrice),2) as "Average Value", productName as "Product Name" FROM products

Average Value	Product Name
28.87	Chai

Result: 1 rows returned in 16ms
At line 1:
SELECT ROUND(AVG(unitPrice),2) as "Average Value", productName as "Product Name" FROM products

**Use of the “>”, “>=”, “<=”
clause.**

Database Structure | Browse Data | Edit Pragmas | Execute SQL

SQL 1 | SQL 2 | SQL 3 | SQL 4 | SQL 5 | SQL 6 | SQL 7 | SQL 8 | SQL 9 | SQL 10

1 SELECT * FROM product WHERE unitPrice > 50

	productID	productName	supplierID	categoryID	quantityPerUnit	unitPrice	unitsInStock	unitsOnOrder	reorderLevel	discontinued
1	9	Mishi Kobe Niku	4	6	18 500 g pkgs.	97.0	29	0	0	1
2	18	Carnarvon Tigers	7	8	16 kg pkg.	62.5	42	0	0	0
3	20	Sir Rodney's Marmalade	8	3	30 gift boxes	81.0	40	0	0	0
4	29	Thüringer Rostbratwurst	12	6	50 bags x30 sausgs	123.79	0	0	0	1
5	38	Côte de Blaye	18	1	12 75 cl bottles	263.5	17	0	15	0
6	51	Manjimup Dried Apples	24	7	50 -300 g pkgs.	53.0	20	0	10	0
7	59	Raclette Courdavault	28	4	5 kg pkg.	55.0	79	0	0	0

Result: 7 rows returned in 34ms

At line 1:

SELECT * FROM products WHERE unitPrice > 50

Use of the “BETWEEN” clause.

Database Structure | Browse Data | Edit Pragmas **Execute SQL**

X SQL 1 | X SQL 2 | X SQL 3 | X SQL 4 | X SQL 5 | X SQL 6 | X SQL 7 | X SQL 8 | X SQL 9 | X SQL 10 | X SQL 11

1 `SELECT * FROM products WHERE unitPrice BETWEEN 19 AND 20`

	productID	productName	supplierID	categoryID	quantityPerUnit	unitPrice	unitsInStock	unitsOnOrder	reorderLevel	discontinued
1	2	Chang	1	1	24 - 12 oz bottles	19	17	40	25	0
2	36	Inlagd Sill	17	8	24 - 250 g jars	19	112	0	20	0
3	44	Gula Malacca	20	2	20 - 2 kg bags	19.45	27	0	15	0
4	49	Maxilaku	23	3	24 - 50 g pkgs.	20	10	60	15	0
5	57	Ravioli Angelo	26	5	24 - 250 g pkgs.	19.5	36	0	20	0

Result: 5 rows returned in 22ms
At line 1:
`SELECT * FROM products WHERE unitPrice BETWEEN 19 AND 20`

Select of SELECT

Database Structure | Browse Data | Edit Pragmas | Execute SQL

SQL 1 | SQL 2 | SQL 3 | SQL 4 | SQL 5 | SQL 6 | SQL 7 | SQL 8 | SQL 9 | SQL 10 | SQL 11 | SQL 12

```
1 SELECT *
2 FROM (SELECT customerID, companyName, city, address FROM customers ORDER BY companyName)
3 WHERE city = "London"
```

	customerID	companyName	city	address
1	AROUT	Around the Horn	London	120 Hanover Sq.
2	BSBEV	Bs Beverages	London	Fauntleroy Circus
3	CONSH	Consolidated Holdings	London	Berkeley Gardens 12 Brewery
4	EASTC	Eastern Connection	London	35 King George
5	NORTS	North/South	London	South House 300 Queensbridge
6	SEVES	Seven Seas Imports	London	90 Wadhurst Rd.

Result: 6 rows returned in 26ms
At line 1:
SELECT *
FROM (SELECT customerID, companyName, city, address FROM customers ORDER BY companyName)
WHERE city = "London"

Aggregate Functions

(AVG, MIN, MAX, COUNT, SUM)

Retrieve Records by Aggregate/Statistic Functions

SELECT COUNT (field name)
FROM table name GROUP BY field name WHERE condition

SELECT SUM (field name)
FROM table name GROUP BY field name WHERE condition

SELECT AVG (field name)
FROM table name GROUP BY field name WHERE condition

SELECT MAX I MIN (field name)
FROM table name GROUP BY field name WHERE condition

Database Structure | Browse Data | Edit Pragmas | **Execute SQL**

SQL 1 | SQL 2 | SQL 3 | SQL 4 | SQL 5 | SQL 6 | SQL 7 | SQL 8 | SQL 9 | SQL 10 | SQL 11 | SQL 12 | **SQL 13** | SQL 14 | SQL 15

```
1 SELECT categoryId, COUNT(*) FROM products GROUP BY categoryId
```

	categoryId	COUNT(*)
1	1	12
2	2	12
3	3	13
4	4	10
5	8	12

Result: 5 rows returned in 20ms
At line 1:
-- SELECT categoryId, COUNT(*) FROM products GROUP BY categoryId HAVING COUNT(*) >= 10
SELECT categoryId, COUNT(*) FROM products GROUP BY categoryId HAVING COUNT(*) >= 10

Database Structure | Browse Data | Edit Pragmas | Execute SQL

SQL 1 | SQL 2 | SQL 3 | SQL 4 | SQL 5 | SQL 6 | SQL 7 | SQL 8 | SQL 9 | SQL 10 | SQL 11 | SQL 12 | SQL 13 | SQL 14 | SQL 15

1 | `SELECT categoryId, COUNT(*) FROM products GROUP BY categoryId HAVING COUNT(*) >= 10`

	categoryId	COUNT(*)
1	1	12
2	2	12
3	3	13
4	4	10
5	8	12

Result: 5 rows returned in 19ms
At line 1:
`SELECT categoryId, COUNT(*) FROM products GROUP BY categoryId HAVING COUNT(*) >= 10`

Database Structure | Browse Data | Edit Pragmas | Execute SQL



SQL 1 | SQL 2 | SQL 3 | SQL 4 | SQL 5 | SQL 6 | SQL 7 | SQL 8 | SQL 9 | SQL 10 | SQL 11 | SQL 12 | SQL 13 | SQL 14 | SQL 15

```
1 SELECT categoryId, ROUND(sum(unitsInStock),2) AS [Total Units in Stock] FROM products GROUP BY categoryId
2 --SELECT categoryId, ROUND(avg(unitsInStock),2) AS [AVG Units in Stock] FROM products GROUP BY categoryId
3 --SELECT categoryId, ROUND(max(unitPrice),2) AS [Max Price] FROM products GROUP BY categoryId
4 --SELECT categoryId, ROUND(min(unitPrice),2) AS [Min Price] FROM products GROUP BY categoryId
5
6
```

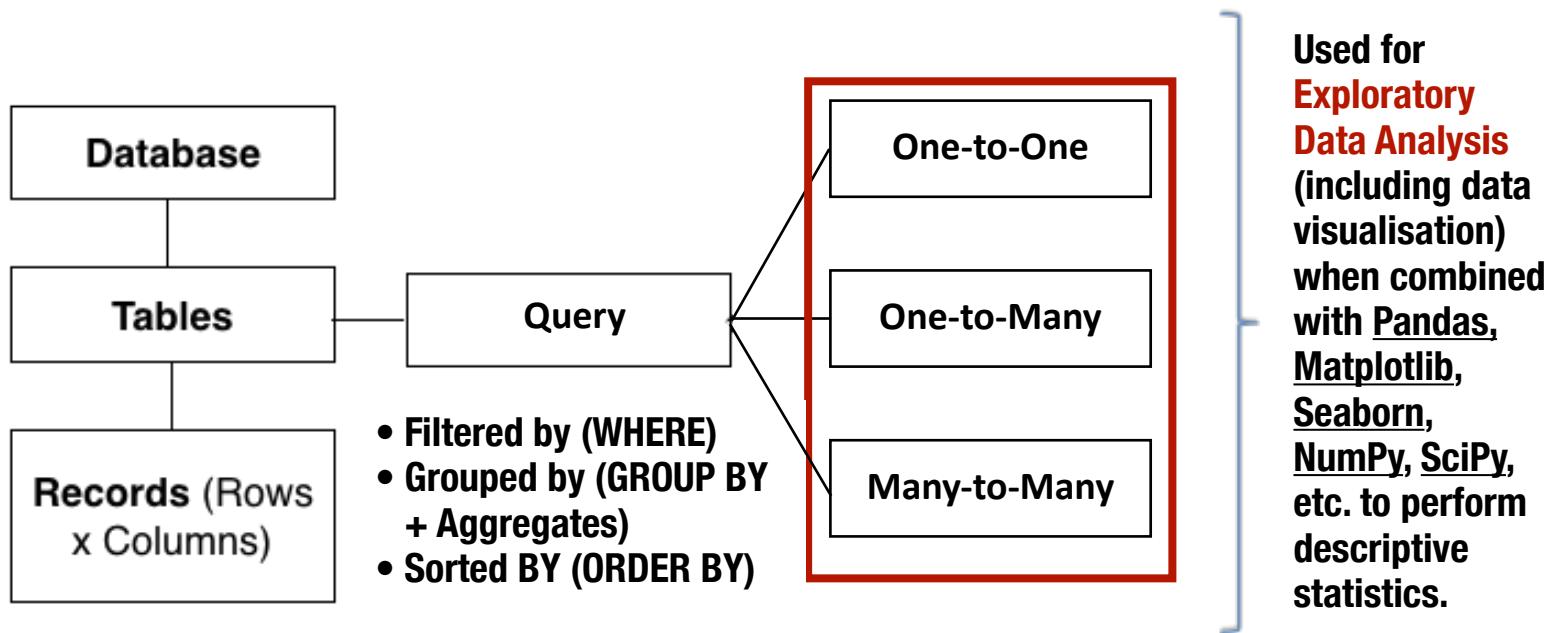
categoryId	Total Units in Stock
1	559.0
2	507.0
3	386.0
4	393.0
5	308.0
6	165.0
7	100.0

Result: 8 rows returned in 22ms

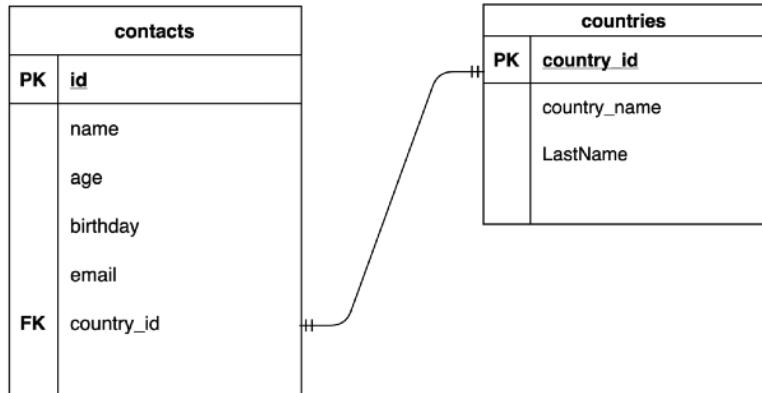
At line 1:

```
SELECT categoryId, ROUND(sum(unitsInStock),2) AS [Total Units in Stock] FROM products GROUP BY categoryId
--SELECT categoryId, ROUND(avg(unitPrice),2) AS [AVG Price] FROM products GROUP BY categoryId
--SELECT categoryId, ROUND(max(unitPrice),2) AS [Max Price] FROM products GROUP BY categoryId
```

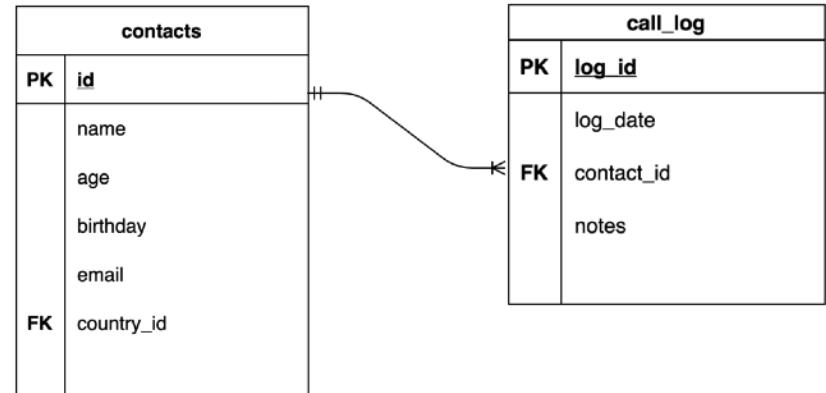
Relating Tables with “Join”



• One-to-One

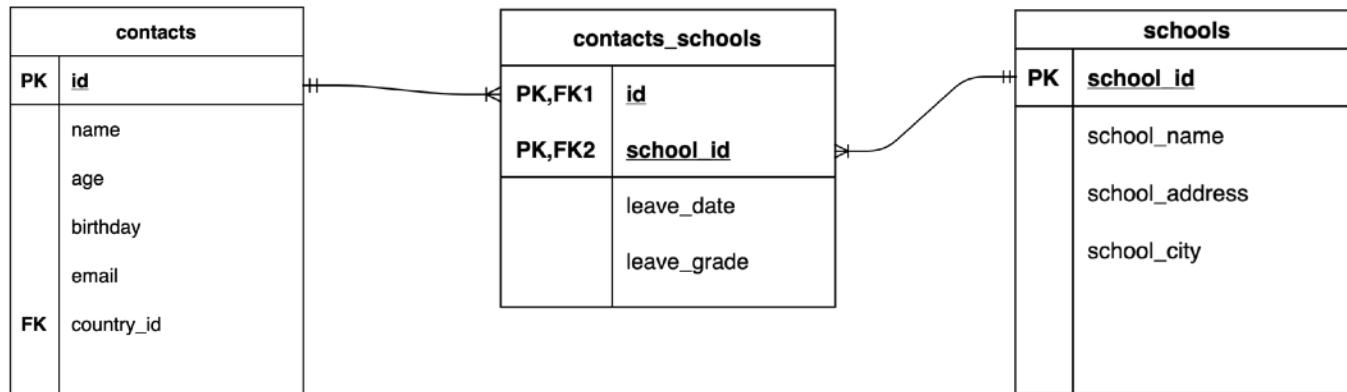


• One-to-Many



<https://app.diagrams.net/>

• Many-to-Many



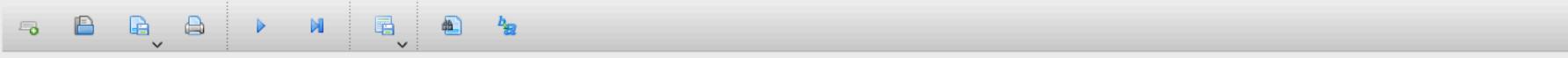
Retrieve Records Through SQL Join (e.g. inner, outer, left, right)

```
SELECT tableName1.fieldName1,tableName2.fieldName2,  
tableName1.fieldName3, tableName2,fieldName4  
FROM tableName1  
INNER JOIN tableName2 ON tableName1.fieldName =  
tableName2.fieldName;
```

Example:

```
SELECT Orders.OrderID, Customers.contactName, Customers.contactTitle,  
Customers.companyName, Orders.OrderDate  
FROM Orders  
INNER JOIN Customers ON Orders.CustomerID=Customers.CustomerID;
```

Database Structure | Browse Data | Edit Pragmas | Execute SQL



x SQL 1n2 | x SQL 3 | x SQL 4 | x SQL 5 | x SQL 6 | x SQL 7 | x SQL 8 | x SQL 9 | x SQL 10 | x SQL 11 | x SQL 12 | x SQL 13 | x SQL 14 | x SQL 15 | x SQL 16

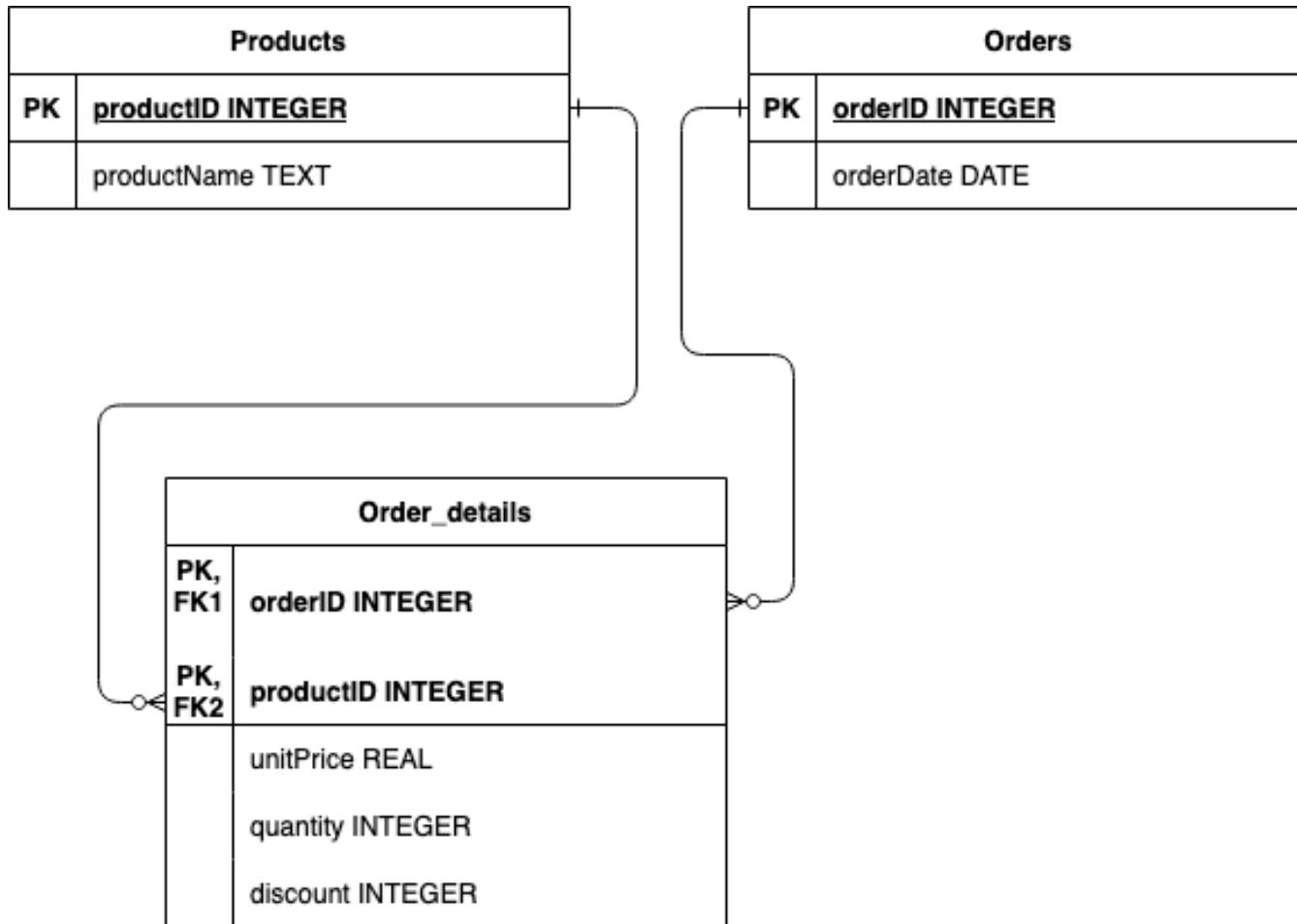
```
1  --SELECT * FROM Orders
2  --SELECT * FROM order_details
3  --SELECT * FROM products
4
5  --SELECT Orders.OrderID, Customers.contactName, Customers.contactTitle, Customers.companyName, Orders.OrderDate
6  --FROM Orders
7  --INNER JOIN Customers ON Orders.CustomerID=Customers.CustomerID;
8
9  SELECT Orders.OrderID, order_details.productID, products.productName, order_details.quantity, order_details.unitPrice
10 FROM orders
11 INNER JOIN order_details ON Orders.orderID = order_details.orderID
12 INNER JOIN products ON order_details.productID = products.productID
```

	orderID	productID	productName	quantity	unitPrice
1	10248	11	Queso Cabrales	12	14.0
2	10248	42	Singaporean Hokkien Fried Mee	10	9.8
3	10248	72	Mozzarella di Giovanni	5	34.8
4	10249	14	Tofu	9	18.6

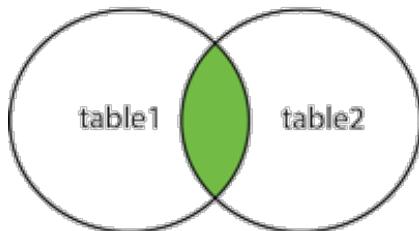
Result: 2155 rows returned in 194ms

At line 1:

```
--SELECT * FROM Orders
--SELECT * FROM order_details
--SELECT * FROM products
```

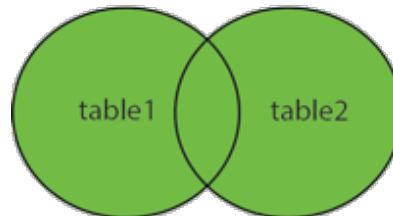


INNER JOIN



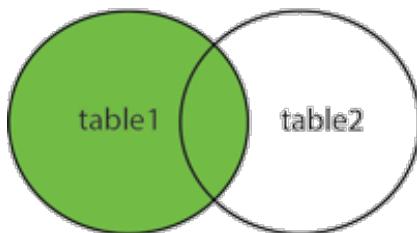
```
SELECT column_name(s)  
FROM table1  
INNER JOIN table2  
ON table1.column_name = table2.column_name;
```

FULL OUTER JOIN



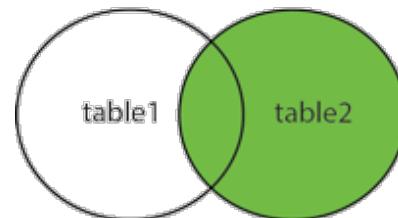
```
SELECT column_name(s)  
FROM table1  
FULL OUTER JOIN table2  
ON table1.column_name = table2.column_name  
WHERE condition;
```

LEFT JOIN



```
SELECT column_name(s)  
FROM table1  
LEFT JOIN table2  
ON table1.column_name = table2.column_name;
```

RIGHT JOIN



```
SELECT column_name(s)  
FROM table1  
RIGHT JOIN table2  
ON table1.column_name = table2.column_name;
```

Source: <https://www.w3schools.com/sql/>

Case Study: Use of the `WP_Posts` dataset

Create custom content type using Pods.



Pods – Custom Content Types and Fields

[Activate](#)[More Details](#)

Pods is a framework for creating, managing, and deploying customized content types and fields.

By [Pods Framework Team](#)

★★★★★ (321)

100,000+ Active
Installations

Last Updated: 1 week ago

✓ Compatible with your version of WordPress

11 0 + New Delete Cache Howdy, master

Dashboard Posts Media Pages Comments Custom CSS & JS Exhibitions Appearance Plugins

All (8) | Active (8) | Must-Use (1) | Drop-in (1) | Auto-updates Disabled (8)

Screen Options ▾ Help ▾

Search installed plugins...

Bulk actions ▾ Apply 8 items

<input type="checkbox"/> Plugin	Description	Automatic Updates
<input type="checkbox"/> Cache Cleaner - Scheduled Deactivate	Scheduled Cache Clean UP. Keep your Cache Folders Fresh. Version 1.0.7 By Lumiverse Dynamic View details	Enable auto-updates
<input type="checkbox"/> Classic Editor Deactivate Settings	Enables the WordPress classic editor and the old-style Edit Post screen with TinyMCE, Meta Boxes, etc. Supports the older plugins that extend this screen. Version 1.6 By WordPress Contributors View details	Enable auto-updates
<input type="checkbox"/> Easy Query Deactivate Settings Query Builder	A query builder plugin for WordPress. Version 2.0.4 By Darren Cooney View details	Enable auto-updates
<input type="checkbox"/> Pods - Custom Content Types and Fields Add-Ons Opt In Deactivate	Pods is a framework for creating, managing, and deploying customized content types and fields Version 2.7.26 By Pods Framework Team View details	Enable auto-updates
<input type="checkbox"/> Simple Custom CSS and JS Settings Deactivate	Easily add Custom CSS or JS to your website with an awesome editor. Version 3.34.1 By SilkyPress.com View details	Enable auto-updates
<input type="checkbox"/> Edit Pods Add New	Plugin for developers. Display in the admin bar, the name of the template (PHP file) for this page. Display with different colors if the template owns to the current theme, the theme parent, or a plugin. An option page allows to chose if every logged user can see the template file in the admin-bar, or just the administrators of the website. (with "administrator" role) Version 4.5.0 By Gilles Dumas View details	Enable auto-updates
<input type="checkbox"/> Components - Migrate Packages - Pod Pages - Pod Templates - Roles & Capabilities Settings ↳ Add-Ons Help	Manage your WP files. Version 6.9 By mnndpsingh287 View details	Enable auto-updates
	Description	Automatic Updates

Edit Pods Add New Components - Migrate Packages - Pod Pages - Pod Templates - Roles & Capabilities Settings ↳ Add-Ons Help

Add New Pod [« Back to Manage](#)

1 Create or Extend

2 Configure

Pods are content types that you can customize and define fields for based on your needs. You can choose to create a Custom Post Type, Custom Taxonomy, or Custom Settings Pages for site-specific data. You can also extend existing content types like WP Objects such as Post Types, Taxonomies, Users, or Comments.

Not sure what content type you should use? Check out our [Content Type Comparison](#) to help you decide.

Create New

Create entirely new content types using Post Types, Taxonomies, or Custom Settings Pages.

Extend Existing

Extend any existing content type within WordPress, including Post Types (Posts, Pages, etc), Taxonomies (Categories, Tags, etc), Media, Users, or Comments.

11 0 + New Delete Cache

Howdy, master

Dashboard Posts Media Pages Comments Custom CSS & JS Exhibitions Appearance Plugins Users Tools Settings

Add New Pod [« Back to Manage](#)

1 Create or Extend ✓ **2 Configure**

Creating a new Content Type allows you to control exactly what that content type does, how it acts like, the fields it has, and the way you manage it.

Create a New Content Type

Content Type [?](#)

Singular Label [?](#)

Plural Label [?](#)

[Advanced +](#)

[Start Over](#) [Next Step](#)

Pods Admin

Edit Pods

Add New

Components

- Migrate Packages

- Pod Pages

- Pod Templates

- Roles & Capabilities

Settings

↳ Add-Ons

Help



W 11 0 + New Delete Cache

Dashboard Posts Media Pages Comments Custom CSS & JS Exhibitions Appearance Plugins Users Tools Settings

Pods Admin

Edit Pods Add New Components

- Migrate Packages
- Pod Pages
- Pod Templates
- Roles & Capabilities

Settings

- ↳ Add-Ons

Help

Add New Pod [« Back to Manage](#)

1 Create or Extend ✓ 2 Configure

Creating a new Content Type allows you to control exactly what that content type does, how it acts like, the fields it has, and the way you manage it.

Create a New Content Type

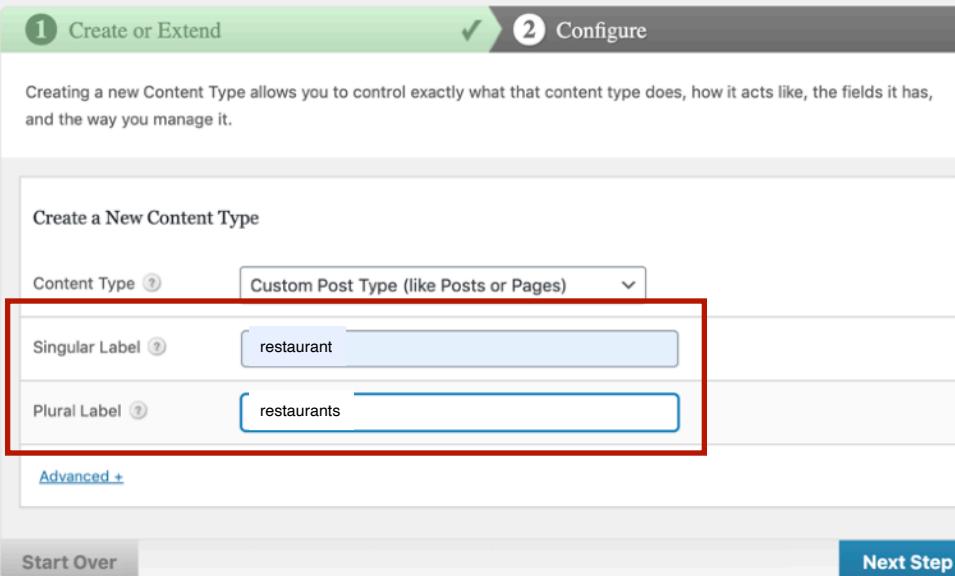
Content Type [?](#) Custom Post Type (like Posts or Pages) ▾

Singular Label [?](#) restaurant

Plural Label [?](#) restaurants

[Advanced +](#)

Start Over Next Step



11 0 + New Delete Cache Howdy, master

Dashboard Posts Media Pages Comments Custom CSS & JS Exhibitions restaurant Appearance Plugins Users Tools Settings Pods Admin

Edit Pod: **restaurant** Edit

Success! Pod created successfully.

Manage Fields Labels Admin UI Advanced Options Auto Template Options REST API

Manage Fields Add Field

No fields have been added yet

Add Field

Manage ([Back to Manage](#)) Delete Pod Save Pod

Edit Pods Add New Components - Migrate Packages - Pod Pages - Pod Templates - Roles & Capabilities Settings Help

Success! Pod created successfully.

Manage Fields Labels Admin UI Advanced Options Auto Template Options REST API

Manage Fields Add Field

New Field

Basic Additional Field Options Advanced REST API

Label chi_title Name chi_title Field Type Plain Text

Description

Field Type Plain Text

Options Required

Cancel Save Field

Manage (Back to Manage) Delete Pod Save Pod

Labels Admin UI Advanced Options Auto Template Options REST API

Add Field

Version 5.6

Howdy, master

W Posts Media Pages Comments Custom CSS & JS Exhibitions restaurant Appearance Plugins Users Tools Settings

Pods Admin Edit Pods Add New Components - Migrate Packages - Pod Pages - Pod Templates - Roles & Capabilities Settings Help

Success! Pod created successfully.

Manage Fields Labels Admin UI Advanced Options Auto Template Options REST API

Manage Fields Add Field

Label ⓘ	Name ⓘ	Field Type ⓘ
chi_title	chi_title	Plain Text
Label ⓘ	Name ⓘ	Field Type ⓘ

Add Field Manage (« Back to Manage) Delete Pod Save Pod

Howdy, master

Posts Media Pages Comments Custom CSS & JS Exhibitions restaurant Appearance Plugins Users Tools Settings

Pods Admin

Edit Pods

Add New Components

- Migrate Packages
- Pod Pages
- Pod Templates
- Roles & Capabilities

Settings

↳ Add-Ons

Help

Version 5.6

Success! Pod created successfully.

Manage Fields Labels Admin UI Advanced Options Auto Template Options REST API

Manage Fields Add Field

Label	Name	Field Type
chi_title	chi_title	Plain Text

New Field

Basic Additional Field Options Advanced REST API

Label pic1

Name

Description

Field Type

Options

Text

- Plain Text
- Website
- Phone
- E-mail
- Password

Paragraph

- Plain Paragraph Text
- WYSIWYG (Visual Editor)
- Code (Syntax Highlighting)

Date / Time

- Date / Time
- Date
- Time

Number

- Plain Number
- Currency

Relationships / Media

File / Image / Video

Embed

Relationship

Other

Yes / No

Color Picker

Add Field

Manage (« Back to Manage) Delete Pod Save Pod

Version 5.6

Howdy, master

Success! Pod created successfully.

Manage Fields Labels Admin UI Advanced Options Auto Template Options REST API

Manage Fields Add Field

Label	Name	Field Type
chi_title	chi_title	Plain Text

New Field

Basic Additional Field Options Advanced REST API

Label pic1

Name pic1

Description

Field Type File / Image / Video

Options Required

Cancel Save Field

Label Name Field Type Add Field

Manage ([Back to Manage](#))

Delete Pod Save Pod

WP Posts Media Pages Comments Custom CSS & JS Exhibitions restaurant Appearance Plugins Users Tools Settings

Pods Admin Edit Pods Add New Components - Migrate Packages - Pod Pages - Pod Templates - Roles & Capabilities Settings Help

eonsite.io/wp-admin/admin.php?page=pods&action=edit&id=107&do=create#save-field

Version 5.6

Success! Pod created successfully.

Manage Fields Labels Admin UI Advanced Options Auto Template Options REST API

Manage Fields Add Field

Manage (Back to Manage) Delete Pod Save Pod

Label	Name	Field Type
chi_title	chi_title	Plain Text
pic1	pic1	File / Image / Video

Add Field

Pods Admin Edit Pods Add New Components - Migrate Packages - Pod Pages - Pod Templates - Roles & Capabilities Settings Help

11 0 + New Delete Cache Howdy, master

Media Pages Comments Custom CSS & JS Exhibitions restaurant Appearance Plugins Users Tools Settings Pods Admin

Manage Fields Labels Admin UI Advanced Options Auto Template Options REST API

Manage (Back to Manage) Delete Pod Save Pod

Public

Publicly Queryable

Exclude from Search

User Capability ? post

Additional User Capabilities

Enable Archive Page

Hierarchical

Rewrite

Custom Rewrite Slug

Rewrite with Front

Rewrite Feeds

Rewrite Pages

Query Var

Exportable

Default Status Draft

Howdy, master

11 0 + New Delete Cache
Rewrite With Front

- Pod Templates
- Roles & Capabilities
Settings
↳ Add-Ons
Help

Rewrite Feeds
Rewrite Pages
Query Var
Exportable
Default Status Draft

Supports Title
 Editor
 Author
 Featured Image
 Excerpt
 Trackbacks
 Custom Fields
 Comments
 Revisions
 Page Attributes
 Post Formats

Advanced Supports

Built-in Taxonomies Categories (category) (category)
 Link Categories (link_category) (link_category)
 Tags (post_tag) (post_tag)

Manage ([« Back to Manage](#))
[Delete Pod](#) [Save Pod](#)



Howdy, master

New Delete Cache

Rewrite With Front

Rewrite Feeds

Rewrite Pages

Query Var

Exportable

Default Status Draft

Supports

Title

Editor

Author

Featured Image

Excerpt

Trackbacks

Custom Fields

Comments

Revisions

Page Attributes

Post Formats

Advanced Supports

Built-in Taxonomies

Categories (category) (category)

Link Categories (link_category) (link_category)

Tags (post_tag) (post_tag)

Manage ([« Back to Manage](#))

Delete Pod

Save Pod

Howdy, master

Manage Components

Category All Field Types Tools Integration Migration Advanced

Name	Category	Description
Advanced Content Types	Advanced	A content type that exists outside of the WordPress post and postmeta table and uses custom tables instead. You most likely don't need these and we strongly recommend that you use Custom Post Types or Custom Taxonomies instead. FOR ADVANCED USERS ONLY. Version 2.3 by Pods Framework Team
Advanced Relationships	Advanced	Add advanced relationship objects for relating to including Database Tables, Multisite Networks, Multisite Sites, Themes, Page Templates, Sidebars, Post Type Objects, and Taxonomy Objects Version 2.3 by Pods Framework Team
Builder Integration	Integration	Integration with the Builder theme / child themes from iThemes; Adds new modules to the Layout engine Version 1.0 by Pods Framework Team
Helpers	Advanced	A holdover from Pods 1.x for backwards compatibility purposes, you most likely don't need these and we recommend you use our WP filters and actions instead. Version 2.3 by Pods Framework Team
Markdown Syntax	Field Types	Integration with Markdown (http://michelf.com/projects/php-markdown/); Adds an option to enable Markdown syntax for Paragraph text fields. Version 1.0 by Pods Framework Team
Migrate: Import from the Custom Post Type UI plugin	Migration	Import Custom Post Types and Taxonomies from Custom Post Type UI (http://webdevstudios.com/plugin/custom-post-type-ui/) Version 1.0 by Pods Framework Team
Migrate: Packages	Migration	Import/Export your Pods, Fields, and other settings from any Pods site; Includes an API to Import/Export Packages via PHP Version 2.0 by Pods Framework Team
Pages	Advanced	Creates advanced URL structures using wildcards in order to enable the front-end display of Pods Advanced Content Types. Not recommended for use with other content types. Version 2.3 by Pods Framework Team
Roles and Capabilities	Tools	Create and Manage WordPress User Roles and Capabilities; Uses the 'Members' plugin filters for additional plugin integrations; Portions of code based on the 'Members' plugin by Justin Tadlock Version 1.0 by Pods Framework Team
Table Storage	Advanced	Enable a custom database table for your custom fields on Post Types, Media, Taxonomies, Users, and Comments. Version 2.3 by Pods Framework Team
Templates	Advanced	An easy to use templating engine for Pods. Use {@field_name} magic tags to output values, within your HTML markup. Version 2.3 by Pods Framework Team
Translate Pods Admin	I18n	Allow UI of Pods and fields to be translated. Version 0.2 by Pods Framework Team
Name	Category	Description

12 components

Make sure these options are enabled.



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Howdy, admin

Dashboard Import Manager Export Settings Addons Support

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- AIO WooCommerce Import Suit
- WPML Importer
- SEO Plugins Data Importer - RankMath, Yoast and All in One SEO
- Exporter with advanced filters

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Thank you for creating with WordPress.

Version 6.1.1

Howdy, admin

Dashboard Import Manager Export Settings Addons Support

[Documentation](#) [Sample CSV](#)

open_rice_jan15_2023_edited-.csv - 41.58 KB

New Item Existing Items

BACK CONTINUE

Powered by **Ultimate CSV Importer Free** Version 7.3

PostType

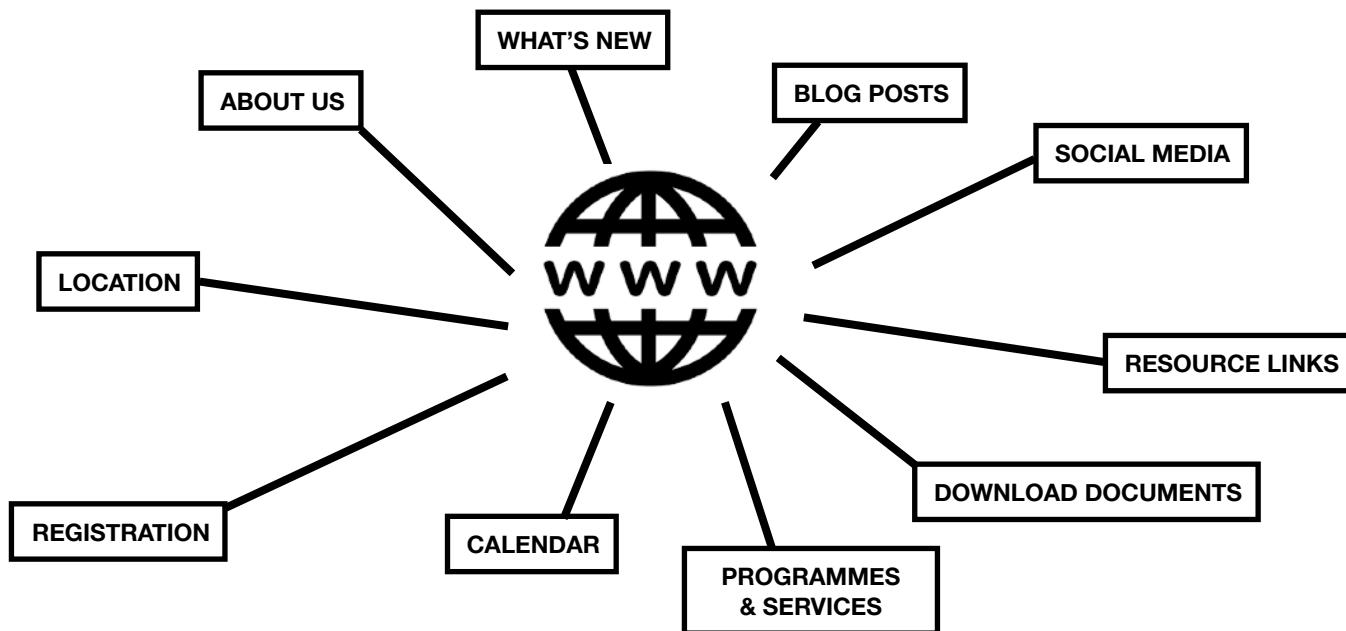
- Posts
- Pages
- Comments
- Images
- nav_menu_item
- wp_template
- wp_template_part
- wp_global_styles
- wp_navigation
- post_grid
- post_grid_layout
- post_grid_template
- kadence_lottie
- _pods_group
- restaurant**
- widgets
- Taxonomy
- category
- post_tag

Thank you for creating with [WordPress](#).

Version 6.1.1

From website to web application platform

Common Use of a Website





HUNGER NOT



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<https://www.aca.org.hk/tc/>



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Children in need would have an Amazing & Wonderful Christmas



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聖雅各福群會賽馬會社會服務大樓

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「第十五屆香港藝術發展獎」之「藝術推廣
獎」

聖雅各福群會藝想榮獲
「第十五屆香港藝術發展獎」之「藝術推廣
獎」.....[查看更多](#)

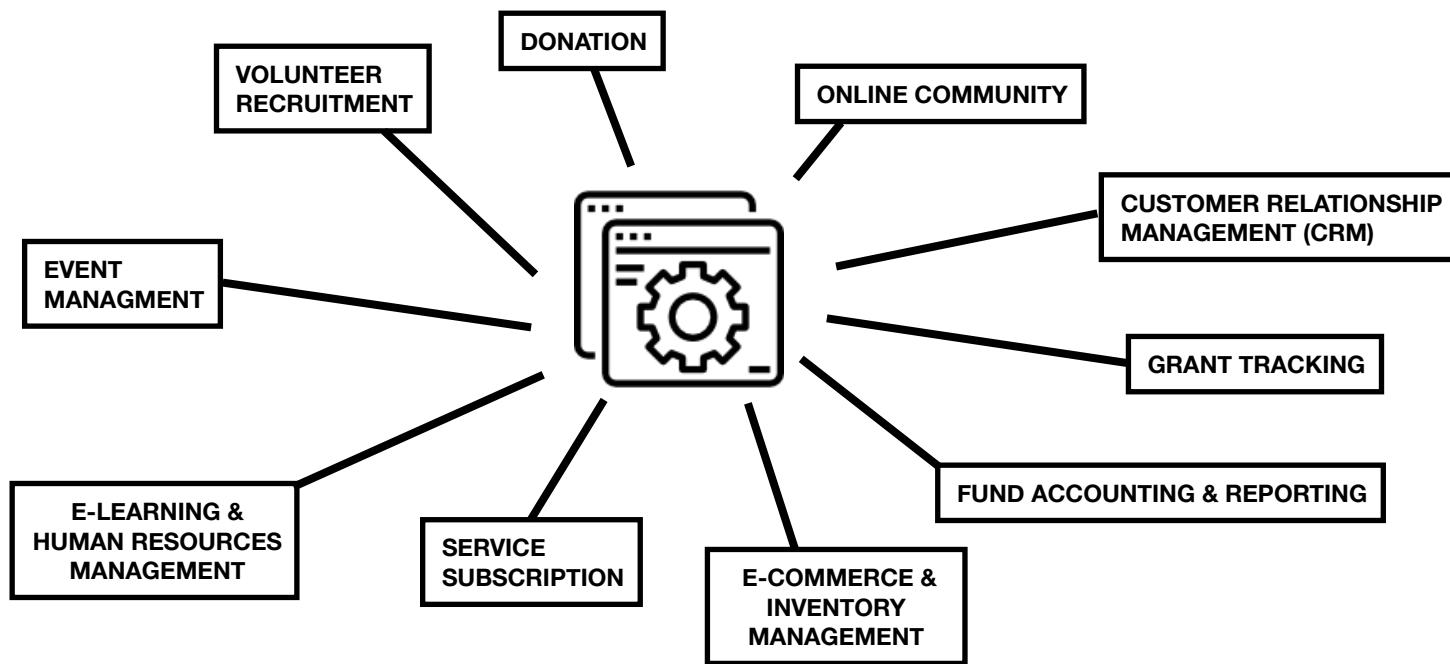


藍屋建築群榮獲聯合國教科文組織獎項

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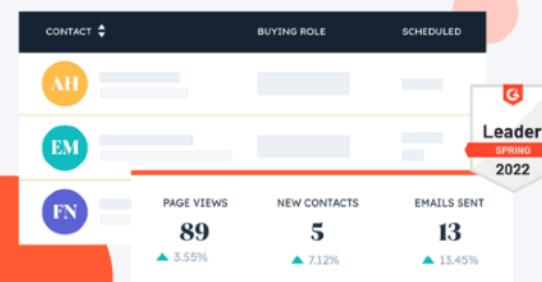
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Website



Web App

- Brand building
- Services introduction
- Organization background
- News and announcements
- Event calendar and picture gallery
- Simple form registration
- Document download
- Resource links

- Special purpose with a service focus and is cloud-based
- Member registration required
- Data intensive with constant update and security checked
- Workflow and task oriented with status tracking and reporting
- Involve monetary transaction and business model

Thank you for your time!