MySQL Demo

Demo 1

Start session

```
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 124
Server version: 10.5.15-MariaDB-0+deb11u1 Debian 11

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

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

Create a database

```
MariaDB [(none)]> create database enrolment;
Query OK, 1 row affected (0.001 sec)
```

Need to be witihn the context of a database to create tables

```
MariaDB [(none)]> create table students(
    -> `rollno` text,
    -> `name` text,
    -> );
ERROR 1046 (3D000): No database selected
```

Switch to database `enrolment`

```
MariaDB [(none)]> use enrolment;
Database changed
```

Create a table with two columns, both of type text

```
MariaDB [enrolment]> create table students( `rollno` text, `name` text );
Query OK, 0 rows affected (0.096 sec)
```

Display metadata: list of tables, structure of a table

```
MariaDB [enrolment]> show tables;
+----------------------+
| Tables_in_enrolment |
+----------------------+
| students             |
+----------------------+
1 row in set (0.001 sec)

MariaDB [enrolment]> describe students;
+--------+------+------+-----+---------+-------+
| Field  | Type | Null | Key | Default | Extra |
+--------+------+------+-----+---------+-------+
| rollno | text | YES  |     | NULL    |       |
| name   | text | YES  |     | NULL    |       |
+--------+------+------+-----+---------+-------+
2 rows in set (0.004 sec)
```

Insert values into a table

Option 1: **Insert values in the order specified by the table, do not need to name columns**

```
MariaDB [enrolment]> insert into students values ('ABC001','Madhavan Mukund');
Query OK, 1 row affected (0.081 sec)
```

Option 2: **Specify column names, can be in any order;**

```
MariaDB [enrolment]> insert into students(name,rollno) values ('Sourish Das','DEF002');
Query OK, 1 row affected (0.002 sec)
```

Examine contents of table

```
MariaDB [enrolment]> select * from students;
+--------+-----------------+
| rollno | name            |
+--------+-----------------+
| ABC001 | Madhavan Mukund |
| DEF002 | Sourish Das     |
+--------+-----------------+
2 rows in set (0.004 sec)
```

Exit session

```
MariaDB [enrolment]> quit;
```

Demo 2

Switch to cmilibrary databse

```
MariaDB [(none)]> use cmilibrary;
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
```

Check metadata

```
MariaDB [cmilibrary]> show tables;
+-----------------------+
| Tables_in_cmilibrary |
+-----------------------+
| books                 |
| isbn                  |
| price                 |
+-----------------------+
3 rows in set (0.001 sec)

MariaDB [cmilibrary]> describe books;
+------------+------+------+-----+---------+-------+
| Field      | Type | Null | Key | Default | Extra |
+------------+------+------+-----+---------+-------+
| accno      | text | YES  |     | NULL    |       |
| author     | text | YES  |     | NULL    |       |
| title      | text | YES  |     | NULL    |       |
```

```
| publisher | text | YES  |     | NULL    |       |
| year      | text | YES  |     | NULL    |       |
+-----------+------+------+-----+---------+-------+
5 rows in set (0.002 sec)

MariaDB [cmilibrary]> describe isbn;
+-------+------+------+-----+---------+-------+
| Field | Type | Null | Key | Default | Extra |
+-------+------+------+-----+---------+-------+
| accno | text | YES  |     | NULL    |       |
| isbn  | text | YES  |     | NULL    |       |
+-------+------+------+-----+---------+-------+
2 rows in set (0.002 sec)

MariaDB [cmilibrary]> describe price;
+-------+---------+------+-----+---------+-------+
| Field | Type    | Null | Key | Default | Extra |
+-------+---------+------+-----+---------+-------+
| accno | text    | YES  |     | NULL    |       |
| cost  | int(11) | YES  |     | NULL    |       |
+-------+---------+------+-----+---------+-------+
2 rows in set (0.011 sec)
```

Select books that cost less than 350

```
MariaDB [cmilibrary]> select * from price where cost < 350;
+-----------+------+
| accno     | cost |
+-----------+------+
| 1998-0174 |  326 |
| 1998-0201 |  308 |
| 1998-0223 |  303 |
| 2000-0009 |  322 |
| 2000-0071 |  328 |
| 2000-0091 |  349 |
| 2000-0137 |  323 |
| 2000-0199 |  311 |
| 2000-0259 |  349 |
| 2000-0266 |  324 |
| 2001-0004 |  341 |
| 2002-0008 |  316 |
| 2002-0024 |  329 |
| 2002-0040 |  339 |
| 2002-0087 |  338 |
| 2003-0146 |  310 |
| 2004-0041 |  343 |
| 2005-0066 |  349 |
| 2000-G059 |  342 |
| 2002-G012 |  313 |
| 2004-G006 |  349 |
+-----------+------+
21 rows in set (0.009 sec)
```

What if we want the titles of the books?

- Select from cross product of tables, using `,`
- Produces all combinations of rows from `books` and `price` where `cost < 350`!

```
MariaDB [cmilibrary]> select title,cost from books,price where cost < 350;
```

```
+-----------------------------------------------------------------------------------------------------------
| title
+-----------------------------------------------------------------------------------------------------------
| An Introduction to Homological Algebra, Mathematics 85
| An Introduction to Homological Algebra, Mathematics 85
| An Introduction to Homological Algebra, Mathematics 85
...

| Morse Theory, Annals of Math. Studies 51
| Morse Theory, Annals of Math. Studies 51
| Morse Theory, Annals of Math. Studies 51
...

| Topics in Differential Topology, TRIM 34
| Topics in Differential Topology, TRIM 34
| Topics in Differential Topology, TRIM 34
+-----------------------------------------------------------------------------------------------------------
84630 rows in set (0.050 sec)
```

Need to match accno in on both sides

```
MariaDB [cmilibrary]> select title,cost from books,price where cost < 350 and books.accno = price.accno
+-----------------------------------------------------------------------------+------+
| title                                                                       | cost |
+-----------------------------------------------------------------------------+------+
| Representation Theory and Complex Geometry                                  |  326 |
| Representation Theory and Complex Geometry                                  |  326 |
| Algebraic Geometry Santa Cruz 1995 Proc. Symposia in Pure Math. 62, Part 1 |  308 |
| Algebraic Geometry Santa Cruz 1995 Proc. Symposia in Pure Math. 62, Part 1 |  308 |
| Algebraic Geometry Santa Cruz 1995 Proc. Symposia in Pure Math. 62, Part 1 |  308 |
| Issai Schur Gesammelte Abhandlungen I                                       |  303 |
| Issai Schur Gesammelte Abhandlungen I                                       |  303 |
| Issai Schur Gesammelte Abhandlungen I                                       |  303 |
| New Trends in Algebraic Geometry, LMS 264                                   |  322 |
| New Trends in Algebraic Geometry, LMS 264                                   |  322 |
| New Trends in Algebraic Geometry, LMS 264                                   |  322 |
| New Trends in Algebraic Geometry, LMS 264                                   |  322 |
| 4-Manifolds and Kirby Calculus                                              |  328 |
| 4-Manifolds and Kirby Calculus                                              |  328 |
| The Large, the Small and the Human Mind                                     |  349 |
| The Large, the Small and the Human Mind                                     |  349 |
| The Large, the Small and the Human Mind                                     |  349 |
| The Large, the Small and the Human Mind                                     |  349 |
| Algebraic Geometry                                                          |  323 |
| Lectures on Sieve Methods                                                   |  311 |
| Core Java, Vol.2                                                            |  349 |
| Core Java, Vol.2                                                            |  349 |
| An introduction to geometrical probability                                  |  324 |
| Polynomials Automorphisms and the Jacobian Conjecture                       |  341 |
| Aspects of Combinatorics and Combinatorial Number Theory                    |  316 |
| Computations in Algebraic Geometry with Macaulay 2                          |  329 |
| Computations in Algebraic Geometry with Macaulay 2                          |  329 |
| Computations in Algebraic Geometry with Macaulay 2                          |  329 |
| Number Theory                                                               |  339 |
| Collected Papers - Ernst Witt                                               |  338 |
| Deformations of Singularities, LNM 1811                                     |  310 |
| On Some Aspects of the Theory of Anosov Systems                             |  343 |
| Many Rational Points                                                        |  349 |
| Dispersion Relations and the Abstract Approach to Field Theory              |  342 |
| Numerical Methods for Scientists and Engineers                              |  313 |
```

```
| The Chauvenet Papers, Vol.2                                          |  349 |
| The Chauvenet Papers, Vol.2                                          |  349 |
+----------------------------------------------------------------------+------+
37 rows in set (0.042 sec)
```

In SQL, `natural join` checks equality of all columns with same name in both tables

```
MariaDB [cmilibrary]> select title,cost from books natural join price where cost < 350;
+----------------------------------------------------------------------+------+
| title                                                                | cost |
+----------------------------------------------------------------------+------+
| Representation Theory and Complex Geometry                           |  326 |
| Representation Theory and Complex Geometry                           |  326 |
| Algebraic Geometry Santa Cruz 1995 Proc. Symposia in Pure Math. 62, Part 1 |  308 |
| Algebraic Geometry Santa Cruz 1995 Proc. Symposia in Pure Math. 62, Part 1 |  308 |
| Algebraic Geometry Santa Cruz 1995 Proc. Symposia in Pure Math. 62, Part 1 |  308 |
| Issai Schur Gesammelte Abhandlungen I                                |  303 |
| Issai Schur Gesammelte Abhandlungen I                                |  303 |
| Issai Schur Gesammelte Abhandlungen I                                |  303 |
| New Trends in Algebraic Geometry, LMS 264                            |  322 |
| New Trends in Algebraic Geometry, LMS 264                            |  322 |
| New Trends in Algebraic Geometry, LMS 264                            |  322 |
| New Trends in Algebraic Geometry, LMS 264                            |  322 |
| 4-Manifolds and Kirby Calculus                                       |  328 |
| 4-Manifolds and Kirby Calculus                                       |  328 |
| The Large, the Small and the Human Mind                              |  349 |
| The Large, the Small and the Human Mind                              |  349 |
| The Large, the Small and the Human Mind                              |  349 |
| The Large, the Small and the Human Mind                              |  349 |
| Algebraic Geometry                                                   |  323 |
| Lectures on Sieve Methods                                            |  311 |
| Core Java, Vol.2                                                     |  349 |
| Core Java, Vol.2                                                     |  349 |
| An introduction to geometrical probability                           |  324 |
| Polynomials Automorphisms and the Jacobian Conjecture                |  341 |
| Aspects of Combinatorics and Combinatorial Number Theory             |  316 |
| Computations in Algebraic Geometry with Macaulay 2                   |  329 |
| Computations in Algebraic Geometry with Macaulay 2                   |  329 |
| Computations in Algebraic Geometry with Macaulay 2                   |  329 |
| Number Theory                                                        |  339 |
| Collected Papers - Ernst Witt                                        |  338 |
| Deformations of Singularities, LNM 1811                              |  310 |
| On Some Aspects of the Theory of Anosov Systems                      |  343 |
| Many Rational Points                                                 |  349 |
| Dispersion Relations and the Abstract Approach to Field Theory       |  342 |
| Numerical Methods for Scientists and Engineers                       |  313 |
| The Chauvenet Papers, Vol.2                                          |  349 |
| The Chauvenet Papers, Vol.2                                          |  349 |
+----------------------------------------------------------------------+------+
37 rows in set (0.027 sec)
```

What if we want the output to include `accno`?

- `accno` occurs in both tables
- Need to disambiguate which copy we want

```
MariaDB [cmilibrary]> select accno,title,cost from books,price where cost < 350 and books.accno = price
ERROR 1052 (23000): Column 'accno' in field list is ambiguous
```

```
MariaDB [cmilibrary]> select books.accno,title,cost from books,price where cost < 350 and books.accno =
+-----------+-------------------------------------------------------------------------------+------+
| accno     | title                                                                         | cost |
+-----------+-------------------------------------------------------------------------------+------+
| 1998-0174 | Representation Theory and Complex Geometry                                    |  326 |
| 1998-0174 | Representation Theory and Complex Geometry                                    |  326 |
| 1998-0201 | Algebraic Geometry Santa Cruz 1995 Proc. Symposia in Pure Math. 62, Part 1 |  308 |
| 1998-0201 | Algebraic Geometry Santa Cruz 1995 Proc. Symposia in Pure Math. 62, Part 1 |  308 |
| 1998-0201 | Algebraic Geometry Santa Cruz 1995 Proc. Symposia in Pure Math. 62, Part 1 |  308 |
| 1998-0223 | Issai Schur Gesammelte Abhandlungen I                                         |  303 |
| 1998-0223 | Issai Schur Gesammelte Abhandlungen I                                         |  303 |
| 1998-0223 | Issai Schur Gesammelte Abhandlungen I                                         |  303 |
| 2000-0009 | New Trends in Algebraic Geometry, LMS 264                                     |  322 |
| 2000-0009 | New Trends in Algebraic Geometry, LMS 264                                     |  322 |
| 2000-0009 | New Trends in Algebraic Geometry, LMS 264                                     |  322 |
| 2000-0009 | New Trends in Algebraic Geometry, LMS 264                                     |  322 |
| 2000-0071 | 4-Manifolds and Kirby Calculus                                                |  328 |
| 2000-0071 | 4-Manifolds and Kirby Calculus                                                |  328 |
| 2000-0091 | The Large, the Small and the Human Mind                                       |  349 |
| 2000-0091 | The Large, the Small and the Human Mind                                       |  349 |
| 2000-0091 | The Large, the Small and the Human Mind                                       |  349 |
| 2000-0091 | The Large, the Small and the Human Mind                                       |  349 |
| 2000-0137 | Algebraic Geometry                                                            |  323 |
| 2000-0199 | Lectures on Sieve Methods                                                     |  311 |
| 2000-0259 | Core Java, Vol.2                                                              |  349 |
| 2000-0259 | Core Java, Vol.2                                                              |  349 |
| 2000-0266 | An introduction to geometrical probability                                    |  324 |
| 2001-0004 | Polynomials Automorphisms and the Jacobian Conjecture                         |  341 |
| 2002-0008 | Aspects of Combinatorics and Combinatorial Number Theory                      |  316 |
| 2002-0024 | Computations in Algebraic Geometry with Macaulay 2                            |  329 |
| 2002-0024 | Computations in Algebraic Geometry with Macaulay 2                            |  329 |
| 2002-0024 | Computations in Algebraic Geometry with Macaulay 2                            |  329 |
| 2002-0040 | Number Theory                                                                 |  339 |
| 2002-0087 | Collected Papers - Ernst Witt                                                 |  338 |
| 2003-0146 | Deformations of Singularities, LNM 1811                                       |  310 |
| 2004-0041 | On Some Aspects of the Theory of Anosov Systems                               |  343 |
| 2005-0066 | Many Rational Points                                                          |  349 |
| 2000-G059 | Dispersion Relations and the Abstract Approach to Field Theory                |  342 |
| 2002-G012 | Numerical Methods for Scientists and Engineers                                |  313 |
| 2004-G006 | The Chauvenet Papers, Vol.2                                                   |  349 |
| 2004-G006 | The Chauvenet Papers, Vol.2                                                   |  349 |
+-----------+-------------------------------------------------------------------------------+------+
37 rows in set (0.051 sec)
```

If we use `natural join`, no need to disambiguate

- If a column name appears on both sides, it **must** have the same value
- Does not matter which one we ask for

```
MariaDB [cmilibrary]> select accno,title,cost from books natural join price where cost < 350;
+-----------+-------------------------------------------------------------------------------+------+
| accno     | title                                                                         | cost |
+-----------+-------------------------------------------------------------------------------+------+
| 1998-0174 | Representation Theory and Complex Geometry                                    |  326 |
| 1998-0174 | Representation Theory and Complex Geometry                                    |  326 |
| 1998-0201 | Algebraic Geometry Santa Cruz 1995 Proc. Symposia in Pure Math. 62, Part 1 |  308 |
| 1998-0201 | Algebraic Geometry Santa Cruz 1995 Proc. Symposia in Pure Math. 62, Part 1 |  308 |
| 1998-0201 | Algebraic Geometry Santa Cruz 1995 Proc. Symposia in Pure Math. 62, Part 1 |  308 |
| 1998-0223 | Issai Schur Gesammelte Abhandlungen I                                         |  303 |
| 1998-0223 | Issai Schur Gesammelte Abhandlungen I                                         |  303 |
```

```
| 1998-0223 | Issai Schur Gesammelte Abhandlungen I                                  |  303 |
| 2000-0009 | New Trends in Algebraic Geometry, LMS 264                              |  322 |
| 2000-0009 | New Trends in Algebraic Geometry, LMS 264                              |  322 |
| 2000-0009 | New Trends in Algebraic Geometry, LMS 264                              |  322 |
| 2000-0009 | New Trends in Algebraic Geometry, LMS 264                              |  322 |
| 2000-0071 | 4-Manifolds and Kirby Calculus                                         |  328 |
| 2000-0071 | 4-Manifolds and Kirby Calculus                                         |  328 |
| 2000-0091 | The Large, the Small and the Human Mind                                |  349 |
| 2000-0091 | The Large, the Small and the Human Mind                                |  349 |
| 2000-0091 | The Large, the Small and the Human Mind                                |  349 |
| 2000-0091 | The Large, the Small and the Human Mind                                |  349 |
| 2000-0137 | Algebraic Geometry                                                     |  323 |
| 2000-0199 | Lectures on Sieve Methods                                              |  311 |
| 2000-0259 | Core Java, Vol.2                                                       |  349 |
| 2000-0259 | Core Java, Vol.2                                                       |  349 |
| 2000-0266 | An introduction to geometrical probability                             |  324 |
| 2001-0004 | Polynomials Automorphisms and the Jacobian Conjecture                  |  341 |
| 2002-0008 | Aspects of Combinatorics and Combinatorial Number Theory               |  316 |
| 2002-0024 | Computations in Algebraic Geometry with Macaulay 2                     |  329 |
| 2002-0024 | Computations in Algebraic Geometry with Macaulay 2                     |  329 |
| 2002-0024 | Computations in Algebraic Geometry with Macaulay 2                     |  329 |
| 2002-0040 | Number Theory                                                          |  339 |
| 2002-0087 | Collected Papers - Ernst Witt                                          |  338 |
| 2003-0146 | Deformations of Singularities, LNM 1811                                |  310 |
| 2004-0041 | On Some Aspects of the Theory of Anosov Systems                        |  343 |
| 2005-0066 | Many Rational Points                                                   |  349 |
| 2000-G059 | Dispersion Relations and the Abstract Approach to Field Theory         |  342 |
| 2002-G012 | Numerical Methods for Scientists and Engineers                         |  313 |
| 2004-G006 | The Chauvenet Papers, Vol.2                                            |  349 |
| 2004-G006 | The Chauvenet Papers, Vol.2                                            |  349 |
+-----------+-------------------------------------------------------------------+------+
37 rows in set (0.027 sec)
```

Notice that SQL output is a list, with duplicates, not a set

- Use `distinct` to remove duplicates
- This requires additional computation, expensive, use only when absolutely necessary

```
MariaDB [cmilibrary]> select distinct accno,title,cost from books natural join price where cost < 350;
+-----------+-------------------------------------------------------------------+------+
| accno     | title                                                             | cost |
+-----------+-------------------------------------------------------------------+------+
| 1998-0174 | Representation Theory and Complex Geometry                        |  326 |
| 1998-0201 | Algebraic Geometry Santa Cruz 1995 Proc. Symposia in Pure Math. 62, Part 1 |  308 |
| 1998-0223 | Issai Schur Gesammelte Abhandlungen I                             |  303 |
| 2000-0009 | New Trends in Algebraic Geometry, LMS 264                         |  322 |
| 2000-0071 | 4-Manifolds and Kirby Calculus                                    |  328 |
| 2000-0091 | The Large, the Small and the Human Mind                           |  349 |
| 2000-0137 | Algebraic Geometry                                                |  323 |
| 2000-0199 | Lectures on Sieve Methods                                         |  311 |
| 2000-0259 | Core Java, Vol.2                                                  |  349 |
| 2000-0266 | An introduction to geometrical probability                        |  324 |
| 2001-0004 | Polynomials Automorphisms and the Jacobian Conjecture             |  341 |
| 2002-0008 | Aspects of Combinatorics and Combinatorial Number Theory          |  316 |
| 2002-0024 | Computations in Algebraic Geometry with Macaulay 2                |  329 |
| 2002-0040 | Number Theory                                                     |  339 |
| 2002-0087 | Collected Papers - Ernst Witt                                     |  338 |
| 2003-0146 | Deformations of Singularities, LNM 1811                           |  310 |
| 2004-0041 | On Some Aspects of the Theory of Anosov Systems                   |  343 |
| 2005-0066 | Many Rational Points                                              |  349 |
```

```
| 2000-G059 | Dispersion Relations and the Abstract Approach to Field Theory            |  342 |
| 2002-G012 | Numerical Methods for Scientists and Engineers                            |  313 |
| 2004-G006 | The Chauvenet Papers, Vol.2                                               |  349 |
+-----------+-------------------------------------------------------------------------+------+
21 rows in set (0.051 sec)
```

String equality is case insensitive

```
MariaDB [cmilibrary]> select * from books where author = 'Serge Lang';
+-----------+------------+-------------------------------------------+-----------------+------+
| accno     | author     | title                                     | publisher       | year |
+-----------+------------+-------------------------------------------+-----------------+------+
| 1998-0204 | SERGE LANG | Complex Analysis                          | Springer-Verlag | 1993 |
| 1998-0208 | SERGE LANG | Undergraduate Analysis                    | Springer-Verlag | 1997 |
| 2000-0023 | SERGE LANG | Complex Multiplication                    | Springer        | 1983 |
| 2002-0085 | SERGE LANG | Collected Papers, 1952-1970, Vol.1        | Springer        | 2000 |
| 2002-0086 | SERGE LANG | Collected Papers 1971-1977, Vol.2         | Springer        | 2000 |
| 2002-0097 | SERGE LANG | Introduction to Diophantine Approximations | Springer        | 1995 |
| 2002-G033 | SERGE LANG | Abelian Varieties                         | Springer        | 1983 |
+-----------+------------+-------------------------------------------+-----------------+------+
7 rows in set (0.317 sec)
```

Can match patterns

- `%` matches an arbitrary string, could be empty
- `%hopcroft%` is any string containing `hopcroft`
- Use `like` instead of `=`

```
MariaDB [cmilibrary]> select * from books where author like '%hopcroft%';
+-----------+------------------+-------------------------------------------------------------+---------
| accno     | author           | title                                                       | publishe
+-----------+------------------+-------------------------------------------------------------+---------
| 1998-0051 | J.E.HOPCROFT     | Data Structures and Algorithms                              | Addison-
| 2002-0088 | JOHN E. HOPCROFT | Introduction to Automata Theory, Languages, and Computation | Pearson
| 2001-G026 | JOHN E. HOPCROFT | The Design and Analysis of Computer Algorithms              | Addison
+-----------+------------------+-------------------------------------------------------------+---------
3 rows in set (0.010 sec)
```

Find co-authors of Hopcroft

- Need to take cross product of `books` with `books`, check that the `accno` matches, first author is `Hopcroft` and second author is not `Hopcroft`
- Have to rename the tables to disambiguate the columns, using `as`
- Note, we cannot use a `natural join` because this would also force `author` to be equal on both sides

```
MariaDB [cmilibrary]> select b2.author from books as b1, books as b2 where b1.accno = b2.accno and b1.a
+-------------------+
| author            |
+-------------------+
| A.V.AHO           |
| J.D.ULLMAN        |
| RAJEEV MOTWANI    |
| JEFFREY D. ULLMAN |
| ALFRED V. AHO     |
| JEFFREY D. ULLMAN |
+-------------------+
6 rows in set (0.015 sec)
```

Extract `accno` and `title` for the books co-authored by `Hopcroft`

```
MariaDB [cmilibrary]> select b2.accno,b2.title,b2.author from books as b1, books as b2 where b1.accno =
+-----------+-------------------------------------------------------------+--------------------+
| accno     | title                                                       | author             |
+-----------+-------------------------------------------------------------+--------------------+
| 1998-0051 | Data Structures and Algorithms                              | A.V.AHO            |
| 1998-0051 | Data Structures and Algorithms                              | J.D.ULLMAN         |
| 2002-0088 | Introduction to Automata Theory, Languages, and Computation | RAJEEV MOTWANI     |
| 2002-0088 | Introduction to Automata Theory, Languages, and Computation | JEFFREY D. ULLMAN  |
| 2001-G026 | The Design and Analysis of Computer Algorithms              | ALFRED V. AHO      |
| 2001-G026 | The Design and Analysis of Computer Algorithms              | JEFFREY D. ULLMAN  |
+-----------+-------------------------------------------------------------+--------------------+
6 rows in set (0.101 sec)
```

If we drop the second author column, we get duplicate rows

```
MariaDB [cmilibrary]> select b2.accno,b2.title from books as b1, books as b2 where b1.accno = b2.accno
+-----------+-------------------------------------------------------------+
| accno     | title                                                       |
+-----------+-------------------------------------------------------------+
| 1998-0051 | Data Structures and Algorithms                              |
| 1998-0051 | Data Structures and Algorithms                              |
| 2002-0088 | Introduction to Automata Theory, Languages, and Computation |
| 2002-0088 | Introduction to Automata Theory, Languages, and Computation |
| 2001-G026 | The Design and Analysis of Computer Algorithms              |
| 2001-G026 | The Design and Analysis of Computer Algorithms              |
+-----------+-------------------------------------------------------------+
6 rows in set (0.020 sec)
```

Again, use `distinct` to eliminate duplicates

```
MariaDB [cmilibrary]> select distinct b2.accno,b2.title from books as b1, books as b2 where b1.accno =
+-----------+-------------------------------------------------------------+
| accno     | title                                                       |
+-----------+-------------------------------------------------------------+
| 1998-0051 | Data Structures and Algorithms                              |
| 2002-0088 | Introduction to Automata Theory, Languages, and Computation |
| 2001-G026 | The Design and Analysis of Computer Algorithms              |
+-----------+-------------------------------------------------------------+
3 rows in set (0.011 sec)

MariaDB [cmilibrary]> quit;
```