무료 전자 책

배우기

MySQL

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#mysql

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1: MySQL

MySQL Oracle Corporation (RDBMS).

MySQL Linux , OS X Windows . C, C ++, Java, Lua, .Net, Perl, PHP, Python Ruby API .

MariaDB MySQL . MySQL .

1.0	1995-05-23
3.19	1996-12-01
3.20	1997-01-01
3.21	1998-10-01
3.22	1999-10-01
3.23	2001-01-22
4.0	2003-03-01
4.1	2004-10-01
5.0	2005-10-01
5.1	2008-11-27
5.5	2010-11-01
5.6	2013-02-01
5.7	2015-10-01

Examples

MySQL

```
CREATE DATABASE mydb;
```

:

OK, 1 (0.05)

---

mydb

```
USE mydb;
```

:

MySQL

```
CREATE TABLE mytable
(
  id              int unsigned NOT NULL auto_increment,
  username        varchar(100) NOT NULL,
  email           varchar(100) NOT NULL,
  PRIMARY KEY     (id)
);
```

CREATE TABLE mytable mytable .

id int unsigned NOT NULL auto_increment id . ID (id). MySQL , id (1).

:

OK, 0 (0.10)

MySQL

```
INSERT INTO mytable ( username, email )
VALUES ( "myuser", "myuser@example.com" );
```

:

OK, 1 (0.06)

varchar strings .

```
INSERT INTO mytable ( username, email )
VALUES ( 'username', 'username@example.com' );
```

MySQL

```
UPDATE mytable SET username="myuser" WHERE id=8
```

:

OK, 1 (0.06)

int . ' " .

MySQL

```
DELETE FROM mytable WHERE id=8
```

:

OK, 1 (0.06)

id 8 .

MySQL

```
SELECT * FROM mytable WHERE username = "myuser";
```

:

```
+----+----------+---------------------+
| id | username | email               |
+----+----------+---------------------+
|  1 | myuser   | myuser@example.com  |
+----+----------+---------------------+
```

1 (0.00)

```
SHOW databases;
```

:

```
+--------------------+
| Databases          |
+--------------------+
| information_schema|
| mydb               |
+--------------------+
```

2 (0.00)

"information_schema" " " .

```
SHOW tables;
```

:

```
+----------------+
| Tables_in_mydb |
```

```
+----------------+
| mytable        |
+----------------+
```

1 (0.00)

```
DESCRIBE databaseName.tableName;
```

:

```
DESCRIBE tableName;
```

:

```
+-----------+----------------+--------+---------+--------------------+-------+
| Field     | Type           | Null   | Key     | Default            | Extra |
+-----------+----------------+--------+---------+--------------------+-------+
| fieldname | fieldvaluetype | NO/YES | keytype | defaultfieldvalue |       |
+-----------+----------------+--------+---------+--------------------+-------+
```

`Extra` `auto_increment` .

`Key` . (PRI), (UNI) ...

n (0.00)

n .

/ . .

```
CREATE USER 'user'@'localhost' IDENTIFIED BY 'some_password';
```

.

```
CREATE USER 'user'@'%' IDENTIFIED BY 'some_password';
```

( ).

:

OK, 0 (0.00)

.

```
GRANT SELECT, INSERT, UPDATE ON databaseName.* TO 'userName'@'localhost';
```

( ).

```
GRANT ALL ON *.* TO 'userName'@'localhost' WITH GRANT OPTION;
```

. databaseName.* . databaseName.tableName .

WITH GRANT OPTION .

.

```
ALL
```

( ).

```
SELECT
INSERT
UPDATE
DELETE
CREATE
DROP
```

SQL . , table first name .

(back-tick) `` (delimiter) . :

```
CREATE TABLE `table`
(
   `first name` VARCHAR(30)
);
```

.

```
 SELECT `first name` FROM `table` WHERE `first name` LIKE 'a%';
```

.

```
SELECT * FROM information_schema.PROCESSLIST ORDER BY INFO DESC, TIME DESC;
```

.

```
SELECT ID, USER, HOST, DB, COMMAND,
TIME as time_seconds,
ROUND(TIME / 60, 2) as time_minutes,
ROUND(TIME / 60 / 60, 2) as time_hours,
STATE, INFO
FROM information_schema.PROCESSLIST ORDER BY INFO DESC, TIME DESC;
```

Stored Procedures .

```
SELECT * FROM information_schema.ROUTINES WHERE ROUTINE_DEFINITION LIKE '%word%';
```

MySQL : https://riptutorial.com/ko/mysql/topic/302/mysql-

2: ALTER TABLE

- ALTER [] TABLE tbl_name [**alter_specification** [, alter_specification] ...] [partition_options]

```
    alter_specification: table_options
      | ADD [COLUMN] col_name column_definition [FIRST | AFTER col_name ]
      | ADD [COLUMN] (col_name column_definition,...)
      | ADD {INDEX|KEY} [index_name] [index_type] (index_col_name,...) [index_option] ...
      | ADD [CONSTRAINT [symbol]] PRIMARY KEY [index_type] (index_col_name,...) [index_option]
...
      | ADD [CONSTRAINT [symbol]] UNIQUE [INDEX|KEY] [index_name] [index_type]
(index_col_name,...) [index_option] ...
      | ADD FULLTEXT [INDEX|KEY] [index_name] (index_col_name,...) [index_option] ...
      | ADD SPATIAL [INDEX|KEY] [index_name] (index_col_name,...) [index_option] ...
      | ADD [CONSTRAINT [symbol]] FOREIGN KEY [index_name] (index_col_name,...)
reference_definition
      | ALGORITHM [=] {DEFAULT|INPLACE|COPY}
      | ALTER [COLUMN] col_name {SET DEFAULT literal | DROP DEFAULT}
      | CHANGE [COLUMN] old_col_name new_col_name column_definition [FIRST|AFTER col_name]
      | LOCK [=] {DEFAULT|NONE|SHARED|EXCLUSIVE}
      | MODIFY [COLUMN] col_name column_definition [FIRST | AFTER col_name]
      | DROP [COLUMN] col_name
      | DROP PRIMARY KEY
      | DROP {INDEX|KEY} index_name
      | DROP FOREIGN KEY fk_symbol
      | DISABLE KEYS
      | ENABLE KEYS
      | RENAME [TO|AS] new_tbl_name
      | RENAME {INDEX|KEY} old_index_name TO new_index_name
      | ORDER BY col_name [, col_name] ...
      | CONVERT TO CHARACTER SET charset_name [COLLATE collation_name]
      | [DEFAULT] CHARACTER SET [=] charset_name [COLLATE [=] collation_name]
      | DISCARD TABLESPACE
      | IMPORT TABLESPACE
      | FORCE
      | {WITHOUT|WITH} VALIDATION
      | ADD PARTITION (partition_definition)
      | DROP PARTITION partition_names
      | DISCARD PARTITION {partition_names | ALL} TABLESPACE
      | IMPORT PARTITION {partition_names | ALL} TABLESPACE
      | TRUNCATE PARTITION {partition_names | ALL}
      | COALESCE PARTITION number
      | REORGANIZE PARTITION partition_names INTO (partition_definitions)
      | EXCHANGE PARTITION partition_name WITH TABLE tbl_name [{WITH|WITHOUT} VALIDATION]
      | ANALYZE PARTITION {partition_names | ALL}
      | CHECK PARTITION {partition_names | ALL}
      | OPTIMIZE PARTITION {partition_names | ALL}
      | REBUILD PARTITION {partition_names | ALL}
      | REPAIR PARTITION {partition_names | ALL}
      | REMOVE PARTITIONING
      | UPGRADE PARTITIONING
   index_col_name: col_name [(length)] [ASC | DESC]
   index_type: USING {BTREE | HASH}
   index_option: KEY_BLOCK_SIZE [=] value
      | index_type
      | WITH PARSER parser_name
      | COMMENT 'string'
```

`table_options: table_option [[,] table_option] ... (see` CREATE TABLE `options) table_options: table_option [[,] table_option] ... (see options)`

`partition_options: (see` CREATE TABLE `options) partition_options: (see options)`

: MySQL 5.7 / ... / ALTER TABLE / 14.1.8 ALTER TABLE

Examples

; ; file_per_table

, `t1` InnoDB , InnoDB .

```
ALTER TABLE t1 ENGINE = InnoDB;
```

InnoDB , , `OPTIMIZE TABLE` . .

`innodb_file_per_table` `t1` file_per_table .

TABLE ALTER COLUMN

```
CREATE DATABASE stackoverflow;

USE stackoverflow;

Create table stack(
    id_user int NOT NULL,
    username varchar(30) NOT NULL,
    password varchar(30) NOT NULL
);

ALTER TABLE stack ADD COLUMN submit date NOT NULL; -- add new column
ALTER TABLE stack DROP COLUMN submit; -- drop column
ALTER TABLE stack MODIFY submit DATETIME NOT NULL; -- modify type column
ALTER TABLE stack CHANGE submit submit_date DATETIME NOT NULL; -- change type and name of
column
ALTER TABLE stack ADD COLUMN mod_id INT NOT NULL AFTER id_user; -- add new column after
existing column
```

ALTER INDEX

.

```
ALTER TABLE TABLE_NAME ADD INDEX `index_name` (`column_name`)
```

( )

```
ALTER TABLE TABLE_NAME ADD INDEX `index_name` (`col1`,`col2`)
```

AUTO_INCREMENT .

, () . AUTO_INCREMENT MAX 100 . .

```
ALTER TABLE your_table_name AUTO_INCREMENT = 101;
```

```
ALTER TABLE fish_data.fish DROP PRIMARY KEY;
ALTER TABLE fish_data.fish MODIFY COLUMN fish_id DECIMAL(20,0) NOT NULL PRIMARY KEY;
```

.

db . db

```
users (
    firstname varchar(20),
    lastname varchar(20),
    age char(2)
)
```

age char int .

```
ALTER TABLE users CHANGE age age tinyint UNSIGNED NOT NULL;
```

.

```
ALTER TABLE table_name CHANGE column_name new_column_definition
```

MySQL

MySQL .

```
mysqladmin -uroot -p<password> create <new name>
mysqldump -uroot -p<password> --routines <old name> | mysql -uroot -pmypassword <new name>
mysqladmin -uroot -p<password> drop <old name>
```

:

1. .
2. `<old name>` , `<new name>` `<password>` (root .
3. (MySQL "bin" "y").

:

(). .

```
RENAME TABLE `<old db>`.`<name>` TO  `<new db>`.`<name>`;
```

.

```
SELECT CONCAT('RENAME TABLE old_db.', table_name, ' TO ',
```

```
                            'new_db.', table_name)
    FROM information_schema.TABLES
    WHERE table_schema = 'old_db';
```

. . MyISAM , InnoDB . "Data Dictionary" InnoDB , . InnoDB `PARTITION` (`DROPping`) "transportable tablespaces" . .

MySQL

MySQL (`<db1> <db2>`) .

```
mysqladmin -uroot -p<password> create swaptemp
mysqldump -uroot -p<password> --routines <db1> | mysql -uroot -p<password> swaptemp
mysqladmin -uroot -p<password> drop <db1>
mysqladmin -uroot -p<password> create <db1>
mysqldump -uroot -p<password> --routines <db2> | mysql -uroot -p<password> <db1>
mysqladmin -uroot -p<password> drop <db2>
mysqladmin -uroot -p<password> create <db2>
mysqldump -uroot -p<password> --routines swaptemp | mysql -uroot -p<password> <db2>
mysqladmin -uroot -p<password> drop swaptemp
```

:

1. .
2. `<db1>` , `<db2>` `<password>` (`root` .
3. (MySQL "bin" "y").

MySQL

.

```
RENAME TABLE `<old name>` TO `<new name>`;
```

.

```
ALTER TABLE `<old name>` RENAME TO `<new name>`;
```

`ALTER TABLE` .

:

1. `<old name>` `<new name>` . *:* , *dbname*.*tablename* *<old name>* / *<new name>* .
2. MySQL MySQL Workbench . *:* *ALTER* *DROP* *CREATE* *INSERT* .

MySQL

, " "(null ,) .

```
ALTER TABLE `<table name>` CHANGE `<old name>` `<new name>` <column definition>;
```

:

1. MySQL MySQL Workbench .
2. . `SHOW CREATE TABLE <table name>;` (`<table name>`).
3. *(:)* .
4. `<old name>` , `<new name>` `<column definition>` .

ALTER TABLE : https://riptutorial.com/ko/mysql/topic/2627/alter-table

3: Docker-Compose MySQL

Examples

docker mysql .

1. **- docker-compose.yml** .

: HOME_PATH PATH . .

```
version: '2'
services:
  cabin_db:
    image: mysql:latest
    volumes:
      - "./.mysql-data/db:/var/lib/mysql"
    restart: always
    ports:
      - 3306:3306
    environment:
      MYSQL_ROOT_PASSWORD: rootpw
      MYSQL_DATABASE: cabin
      MYSQL_USER: cabin
      MYSQL_PASSWORD: cabinpw
```

2. :

```
cd PATH_TO_DOCKER-COMPOSE.YML
docker-compose up -d
```

3.-

```
mysql -h 127.0.0.1 -u root -P 3306 -p rootpw
```

!!

4.-

```
docker-compose stop
```

Docker-Compose MySQL : https://riptutorial.com/ko/mysql/topic/4458/docker-compose-mysql--

4: ENUM

Examples

ENUM?

ENUM . . :

```
reply ENUM('yes', 'no')
gender ENUM('male', 'female', 'other', 'decline-to-state')
```

.

```
INSERT ... VALUES ('yes', 'female')
SELECT ... --> yes female
```

TINYINT

.

```
type ENUM('fish','mammal','bird')
```

```
type TINYINT UNSIGNED
```

...

```
CREATE TABLE AnimalTypes (
    type TINYINT UNSIGNED NOT NULL AUTO_INCREMENT,
    name VARCHAR(20) NOT NULL  COMMENT "('fish','mammal','bird')",
    PRIMARY KEY(type),
    INDEX(name)
) ENGINE=InnoDB
```

many-to-many .

, ENUM :

- ( ) INSERT : `type type`
- ( ) SELECT : JOIN (ENUM)
- ( ) : . ENUM ALTER TABLE .
- () (255) 1 .
- () : `TINYINT` . `ENUM` (SQL). `TINYINT` . / . (`FOREIGN KEYs` .)

VARCHAR

.

```
type ENUM('fish','mammal','bird')
```

```
type VARCHAR(20)  COMENT "fish, bird, etc"
```

.

, ENUM :

- () INSERT : .
- (?) INSERT .
- () SELECT : .
- ( ) .

```
ALTER TABLE tbl MODIFY COLUMN type ENUM('fish','mammal','bird','insect');
```

- MODIFY COLUMN NOT NULL . .
- 256 , ALTER . . (MySQL .)

NULL NOT NULL

NULL 'bad-value' Null Null +0 .

```
CREATE TABLE enum (
    e     ENUM('yes', 'no')   NOT NULL,
    enull ENUM('x', 'y', 'z')     NULL
        );
INSERT INTO enum (e, enull)
    VALUES
        ('yes', 'x'),
        ('no',  'y'),
        (NULL,  NULL),
        ('bad-value', 'bad-value');
Query OK, 4 rows affected, 3 warnings (0.00 sec)
Records: 4  Duplicates: 0  Warnings: 3

mysql>SHOW WARNINGS;
+---------+------+-------------------------------------------+
| Level   | Code | Message                                   |
+---------+------+-------------------------------------------+
| Warning | 1048 | Column 'e' cannot be null                 |
| Warning | 1265 | Data truncated for column 'e' at row 4    |
| Warning | 1265 | Data truncated for column 'enull' at row 4 |
+---------+------+-------------------------------------------+
3 rows in set (0.00 sec)
```

? "+0" .

```
mysql>SELECT e, e+0 FROM enum;
+-----+-----+
| e   | e+0 |
+-----+-----+
| yes |   1 |
| no  |   2 |
```

```
|      |   0 |  -- NULL
|      |   0 |  -- 'bad-value'
+------+-----+
4 rows in set (0.00 sec)

mysql>SELECT enull, enull+0 FROM enum;
+-------+---------+
| enull | enull+0 |
+-------+---------+
| x     |       1 |
| y     |       2 |
| NULL  |    NULL |
|       |       0 |  -- 'bad-value'
+-------+---------+
4 rows in set (0.00 sec)
```

ENUM : https://riptutorial.com/ko/mysql/topic/4425/enum

5: JSON

MySQL 5.7.8 , MySQL JSON (JavaScript Object Notation) JSON .
https://dev.mysql.com/doc/refman/5.7/en/json.html

MySQL 5.7.8 MySQL JSON . JSON JSON . .

Examples

JSON

```
CREATE TABLE table_name (
    id INT NOT NULL AUTO_INCREMENT,
    json_col JSON,
    PRIMARY KEY(id)
);
```

JSON

```
INSERT INTO
    table_name (json_col)
VALUES
    ('{"City": "Galle", "Description": "Best damn city in the world"}');
```

JSON . .

JSON .

json .

```
INSERT INTO myjson(dict)
VALUES('{"opening":"Sicilian","variations":["pelikan","dragon","najdorf"]}');
```

, . .

JSON

JSON . ? `variations` *scheveningen* .

```
UPDATE
    myjson
SET
    dict=JSON_ARRAY_APPEND(dict,'$.variations','scheveningen')
WHERE
    id = 2;
```

:

1. json `$.variations` . $ json . mysql json https://dev.mysql.com/doc/refman/5.7/en/json-path-syntax.html .
2. json .

```
SELECT * FROM myjson
```

```
+----+-------------------------------------------------------------------------------------------
-+
| id | dict
|
+---+--------------------------------------------------------------------------------------------
+
| 2  | {"opening": "Sicilian", "variations": ["pelikan", "dragon", "najdorf", "scheveningen"]}
|
+----+-------------------------------------------------------------------------------------------
-+
1 row in set (0.00 sec)
```

JSON

json MySQL JSON .

```
 SELECT CAST('[1,2,3]' as JSON) ;
 SELECT CAST('{"opening":"Sicilian","variations":["pelikan","dragon","najdorf"]}' as JSON);
```

Json

`JSON_OBJECT` JSON .

```
 SELECT JSON_OBJECT('key1',col1 , 'key2',col2 , 'key3','col3') as myobj;
```

`JSON_ARRAY` JSON .

```
 SELECT JSON_ARRAY(col1,col2,'col3') as myarray;
```

: myobj.key3 myarray [2] "col3".

JSON .

```
 SELECT JSON_OBJECT("opening","Sicilian",
"variations",JSON_ARRAY("pelikan","dragon","najdorf") ) as mymixed ;
```

JSON : https://riptutorial.com/ko/mysql/topic/2985/json

6: JSON

MySQL 5.7.8+ JSON . json .

`JSON_EXTRACT -> ->>` .

- JSON_EXTRACT (json_doc, [, ...])
- JSON_EXTRACT (json_doc, path)
- JSON_EXTRACT (json_doc, path1, path2)

json_doc	JSON

MySQL 5.7

-

  . .

- `NULL` :
  - argemunt NULL.

  NULL NULL .

Examples

JSON

JSON @myjson ( ).

```
SET @myjson = CAST('["A","B",{"id":1,"label":"C"}]' as JSON) ;
```

`SELECT` !

```
SELECT
  JSON_EXTRACT( @myjson , '$[1]' ) ,
  JSON_EXTRACT( @myjson , '$[*].label') ,
  JSON_EXTRACT( @myjson , '$[1].*' ) ,
  JSON_EXTRACT( @myjson , '$[2].*')
;
-- result values:
'\"B\"', '[\"C\"]', NULL, '[1, \"C\"]'
-- visually:
"B", ["C"], NULL, [1, "C"]
```

JSON

`->` `->>` `path` , `->>` UNQUOTED :

```
SELECT
  myjson_col->>'$[1]' , myjson_col->'$[1]' ,
  myjson_col->>'$[*].label' ,
  myjson_col->>'$[1].*' ,
  myjson_col->>'$[2].*'
FROM tablename ;
 -- visuall:
    B, "B" , ["C"], NULL, [1, "C"]
 --^^^ ^^^
```

`col->>path` `JSON_UNQUOTE(JSON_EXTRACT(col,path))` `JSON_UNQUOTE(JSON_EXTRACT(col,path))` .

-> , ->> EXPLAIN .

```
mysql> EXPLAIN SELECT c->>'$.name' AS name
    ->     FROM jemp WHERE g > 2\G
*************************** 1. row ***************************
           id: 1
  select_type: SIMPLE
        table: jemp
   partitions: NULL
         type: range
possible_keys: i
          key: i
      key_len: 5
          ref: NULL
         rows: 2
     filtered: 100.00
        Extra: Using where
1 row in set, 1 warning (0.00 sec)

mysql> SHOW WARNINGS\G
*************************** 1. row ***************************
  Level: Note
   Code: 1003
Message: /* select#1 */ select
json_unquote(json_extract(`jtest`.`jemp`.`c`,'$.name')) AS `name` from
`jtest`.`jemp` where (`jtest`.`jemp`.`g` > 2)
1 row in set (0.00 sec)
```

(+)

JSON : https://riptutorial.com/ko/mysql/topic/9042/json---

7: LOAD DATA INFILE

1. LOAD DATA [LOW_PRIORITY |] [] INFILE 'file_name'
2. INTO TABLE tbl_name
3. [CHARACTER SET charset]
4. [{FIELDS | COLUMNS} ['string'] [[OPTIONALLY] 'ENCLOSED BY'char ']]
5. [LINES [STARTING BY 'string'] [TERMINATED BY 'string']]
6. [IGNORE number {LINES | ROWS}]
7. [(col_name_or_user_var, ...)]
8. [SET col_name = expr, ...]

Examples

LOAD DATA INFILE

';' CSV .

```
1;max;male;manager;12-7-1985
2;jack;male;executive;21-8-1990
.
.
.
1000000;marta;female;accountant;15-6-1992
```

.

```
CREATE TABLE `employee` ( `id` INT NOT NULL ,
                          `name` VARCHAR NOT NULL,
                          `sex` VARCHAR NOT NULL ,
                          `designation` VARCHAR NOT NULL ,
                          `dob` VARCHAR NOT NULL   );
```

.

```
LOAD DATA INFILE 'path of the file/file_name.txt'
INTO TABLE employee
FIELDS TERMINATED BY ';' //specify the delimiter separating the values
LINES TERMINATED BY '\r\n'
(id,name,sex,designation,dob)
```

.

```
1;max;male;manager;17-Jan-1985
2;jack;male;executive;01-Feb-1992
.
.
.
1000000;marta;female;accountant;25-Apr-1993
```

dob .

```
LOAD DATA INFILE 'path of the file/file_name.txt'
INTO TABLE employee
FIELDS TERMINATED BY ';' //specify the delimiter separating the values
LINES TERMINATED BY '\r\n'
(id,name,sex,designation,@dob)
SET date = STR_TO_DATE(@date, '%d-%b-%Y');
```

LOAD DATA INFILE .

LOAD DATA INFILE .

CSV MySQL

CSV CSV MySQL .

```
load data infile '/tmp/file.csv'
into table my_table
fields terminated by ','
optionally enclosed by '"'
escaped by '"'
lines terminated by '\n'
ignore 1 lines; -- skip the header row
```

LOAD DATA INFILE . .

LOAD DATA LOCAL

. .

```
LOAD DATA LOCAL INFILE 'path of the file/file_name.txt'
INTO TABLE employee
```

LOAD DATA INFILE 'fname'REPLACE

replace

```
LOAD DATA INFILE 'path of the file/file_name.txt'
REPLACE INTO TABLE employee
```

LOAD DATA INFILE 'fname'

REPLACE . LOCAL . .

```
LOAD DATA INFILE 'path of the file/file_name.txt'
```

```
IGNORE INTO TABLE employee
```

. . .

```
INSERT INTO employee SELECT * FROM intermediary WHERE ...
```

```
SELECT a,b,c  INTO OUTFILE 'result.txt' FIELDS TERMINATED BY ',' OPTIONALLY ENCLOSED BY '"'
LINES TERMINATED BY '\n' FROM table;
```

```
LOAD DATA INFILE 'result.txt' INTO TABLE table;
```

LOAD DATA INFILE : https://riptutorial.com/ko/mysql/topic/2356/load-data-infile

8: MyISAM

, InnoDB MyISAM . : MyISAM .

InnoDB MyISAM : 2x3x .

InnoDB , MyISAM . XtraDB 5.6 InnoDB MyISAM " ".

InnoDB InnoDB MyISAM .

Examples

ENGINE = MyISAM

```
CREATE TABLE foo (
     ...
) ENGINE=MyISAM;
```

MyISAM : https://riptutorial.com/ko/mysql/topic/4710/myisam-

9: MyISAM InnoDB

Examples

```
ALTER TABLE foo ENGINE=InnoDB;
```

. . . .

.

```
SET @DB_NAME = DATABASE();

SELECT  CONCAT('ALTER TABLE `', table_name, '` ENGINE=InnoDB;') AS sql_statements
FROM    information_schema.tables
WHERE   table_schema = @DB_NAME
AND     `ENGINE` = 'MyISAM'
AND     `TABLE_TYPE` = 'BASE TABLE';
```

: `DATABASE()` , `NULL` `NULL` . mysql .

SQL `MyISAM` .

SQL .

MyISAM InnoDB : https://riptutorial.com/ko/mysql/topic/3135/myisam-innodb-

10: MySQL 5.7

MySQL 5.7 MySQL root root . `mysqld.log` . .

MySQL 5.7 .

Examples

?

:

- .
- SSL .
- validate_password .
- 'root'@ 'localhost' . .

"" .

```
shell> sudo grep 'temporary password' /var/log/mysqld.log
```

.

```
shell> mysql -uroot -p

mysql> ALTER USER 'root'@'localhost' IDENTIFIED BY 'MyNewPass5!';
```

: MySQL validate_password . , , 8 .

"/ var / run / mysqld '(UNIX)"

.

```
$ mysql -u root -p
```

:

1045 (28000) : 'root'@ 'localhost' (:)

.

```
$ systemctl status mysql.service
```

mysql.service - MySQL : /lib/systemd/system/mysql.service; , : en : : ( ) Thu 2017-06-08 14:31:33 IST; 38s

```
mysqld_safe --skip-grant-tables &
```

.

mysqld_safe UNIX '/ var / run / mysqld' .

```
$ systemctl stop  mysql.service
$ ps -eaf|grep mysql
$ mysqld_safe --skip-grant-tables &
```

:

```
$ mkdir -p /var/run/mysqld
$ chown mysql:mysql /var/run/mysqld
```

```
mysqld_safe --skip-grant-tables &
```

mysqld_safe / var / lib / mysql mysqld .

```
$ mysql -u root   .
```

: 5.7.18-0ubuntu0.16.04.1 (Ubuntu)

Copyright (c) 2000, 2017, Oracle / . .

Oracle Oracle Corporation / . .

'help; . '\ h' . '\ c' .

mysql>

:

```
mysql> use mysql
mysql> describe user;
```

-A

.

```
mysql> FLUSH PRIVILEGES;
mysql> SET PASSWORD FOR root@'localhost' = PASSWORD('newpwd');
```

mysql .

```
UPDATE mysql.user SET Password=PASSWORD('newpwd') WHERE User='root';
```

:

```
   USE mysql
   UPDATE user SET Password = PASSWORD('newpwd')
   WHERE Host = 'localhost' AND User = 'root';
```

```
USE mysql
UPDATE user SET Password = PASSWORD('newpwd')
WHERE Host = '%' AND User = 'root';`enter code here
```

mysql `quit` stop / start.

```
FLUSH PRIVILEGES;
sudo /etc/init.d/mysql stop
sudo /etc/init.d/mysql start
```

`mysql -u root -p '

mysql>

MySQL 5.7 : https://riptutorial.com/ko/mysql/topic/9563/mysql-5-7-------

11: MySQL LOCK TABLE

- LOCK table_name [|]; //
- UNLOCK TABLES; //

. . . , .

.

- .

- .

`WRITE LOCK` . `READ LOCK` `READ LOCK` `WRITE LOCK` .

InnoDB MySQL .

InnoDB , MySQL .

.

Examples

mysql

`ENGINE=MyISAM` `ENGINE=InnoDB` . InnoDB .

MySQL . . .

D . .

: `LOCK TABLES table_name READ|WRITE;`

.

( ) :

```
LOCK TABLES table_name READ;
```

( ) :

```
LOCK TABLES table_name WRITE;
```

.

```
SHOW OPEN TABLES;
```

/ .

```
UNLOCK TABLES;
```

:

```
LOCK TABLES products WRITE:
INSERT INTO products(id,product_name) SELECT id,old_product_name FROM old_products;
UNLOCK TABLES;
```

.

:

```
LOCK TABLES products READ:
INSERT INTO products(id,product_name) SELECT id,old_product_name FROM old_products;
UNLOCK TABLES;
```

.

InnoDB (), MySQL , (transaction) , read write .

.

`SELECT ... FOR UPDATE` .

1

```
START TRANSACTION;
SELECT ledgerAmount FROM accDetails WHERE id = 1 FOR UPDATE;
```

1 `SELECT ... FOR UPDATE` .

2

```
UPDATE accDetails SET ledgerAmount = ledgerAmount + 500 WHERE id=1;
```

connection 2 connection 1 `innodb_lock_wait_timeout` . 50 .

```
Error Code: 1205. Lock wait timeout exceeded; try restarting transaction
```

`SHOW ENGINE INNODB STATUS` .

```
---TRANSACTION 1973004, ACTIVE 7 sec updating
mysql tables in use 1, locked 1
LOCK WAIT 2 lock struct(s), heap size 360, 1 row lock(s)
MySQL thread id 4, OS thread handle 0x7f996beac700, query id 30 localhost root update
UPDATE accDetails SET ledgerAmount = ledgerAmount + 500 WHERE id=1
------- TRX HAS BEEN WAITING 7 SEC FOR THIS LOCK TO BE GRANTED:
```

2

```
UPDATE accDetails SET ledgerAmount = ledgerAmount + 250 WHERE id=2;
1 row(s) affected
```

2 .

1

```
UPDATE accDetails SET ledgerAmount = ledgerAmount + 750 WHERE id=1;
COMMIT;
1 row(s) affected
```

1 .

2

```
UPDATE accDetails SET ledgerAmount = ledgerAmount + 500 WHERE id=1;
1 row(s) affected
```

Connection Connection 1 Connection 2 .

MySQL LOCK TABLE : https://riptutorial.com/ko/mysql/topic/5233/mysql-lock-table

12: MySQL

Examples

```
mysqladmin -u root -p'old-password' password 'new-password'
```

.

```
mysqladmin -u[username] -p[password] drop [database]
```

.

SQL `DROP` (DROP) :

```
DROP DATABASE database_name
```

```
DROP SCHEMA database_name
```

RENAME &

```
RENAME TABLE t TO t_old, t_copy TO t;
```

RENAME TABLE .

Atomic Rename `DELETE` .

```
CREATE TABLE new LIKE real;
load `new` by whatever means - LOAD DATA, INSERT, whatever
RENAME TABLE real TO old, new TO real;
DROP TABLE old;
```

MySQL : https://riptutorial.com/ko/mysql/topic/2991/mysql-

13: MySQL

- column_name (s) FROM table1 UNION SELECT column_name (s) FROM table2;
- SELECT column_name (s) FROM table1 UNION column_name FROM table2;
- SELECT column_name (s) FROM table1 WHERE col_name = "XYZ"UNION column_name (s) FROM table2 WHERE col_name = "XYZ";

`UNION DISTINCT UNION` ; de-duplicating pass `UNION ALL` . `DISTINCT ALL` , `DISTINCT` .

Examples

UNION SELECT ( ) .

: ("Customers" "Suppliers" ( ))

```
SELECT City FROM Customers
UNION
SELECT City FROM Suppliers
ORDER BY City;
```

:

```
Number of Records: 10

City
------
Aachen
Albuquerque
Anchorage
Annecy
Barcelona
Barquisimeto
Bend
Bergamo
Berlin
Bern
```

ALL

UNION ALL "Customers" "Suppliers" ( ) .

:

```
SELECT City FROM Customers
UNION ALL
SELECT City FROM Suppliers
ORDER BY City;
```

:

```
Number of Records: 12

City
-------
Aachen
Albuquerque
Anchorage
Ann Arbor
Annecy
Barcelona
Barquisimeto
Bend
Bergamo
Berlin
Berlin
Bern
```

UNION ALL WHERE

UNION ALL "Customers" "Suppliers" . Here `Country="Germany"` where .

:

```
SELECT City, Country FROM Customers
WHERE Country='Germany'
UNION ALL
SELECT City, Country FROM Suppliers
WHERE Country='Germany'
ORDER BY City;
```

:

```
Number of Records: 14
```

MySQL : https://riptutorial.com/ko/mysql/topic/5376/mysql-

14: MySQL

- mysql [] [ ]

`-D --database=name`	
`--delimiter=str`	. . ';'.
`-e --execute='command'`	
`-h --host=name`	
`-p --password=name`	password *: `-p` .*
`-p` ()	.
`-P --port=#`	
`-s --silent`	. `\t`
`-ss`	like `-s` .
`-S --socket=path`	(Unix) (Windows)
`--skip-column-names`	
`-u --user=name`	
`-U --safe-updates --i-am-a-dummy`	`sql_safe_updates=ON` . `DELETE UPDATE` .
`-V --version`	.

Examples

MySQL :

```
mysql --user=username --password=pwd --host=hostname test_db
```

.

```
mysql -u username -p password -h hostname test_db
```

`password` MySQL . `password` ' '.

```
mysql -u=username -p -h=hostname test_db
```

--socket :

```
mysql --user=username --password=pwd --host=localhost --socket=/path/to/mysqld.sock test_db
```

socket . .

. .

```
$ mysql -uroot -proot test -e'select * from people'

+----+-------+--------+
| id | name  | gender |
+----+-------+--------+
|  1 | Kathy | f      |
|  2 | John  | m      |
+----+-------+--------+
```

--silent .

```
$ mysql -uroot -proot test -s -e'select * from people'

id      name    gender
1       Kathy   f
2       John    m
```

.

```
$ mysql -uroot -proot test -ss -e'select * from people'

1       Kathy   f
2       John    m
```

:

```
$ mysql -uroot -proot test < my_script.sql
```

```
$ mysql -uroot -proot test -e'source my_script.sql'
```

.

```
$ mysql -uroot -proot test < my_script.sql > out.txt

$ mysql -uroot -proot test -s -e'select * from people' > out.txt
```

MySQL : https://riptutorial.com/ko/mysql/topic/5619/mysql-

15: mysqldump

- mysqldump -u [username] -p [password] [ ] db_name> dumpFileName.sql ///
- mysqldump -u [username] -p [password] [ ] db_name [tbl_name1 tbl_name2 tbl_name2 ...]> dumpFileName.sql ///
- mysqldump -u [username] -p [password] [ ] --databases db_name1 db_name2 db_name3 ...> dumpFileName.sql ///
- mysqldump -u [username] -p [password] [ ] --all-databases> dumpFileName.sql /// MySQL

-	#
`-h` (`--host`)	(IP). `localhost` (`127.0.0.1`). : `-h localhost`
`-u` (`--user`)	MySQL
`-p` (`--password`)	MySQL . : `-p` . : `-pMyPassword`
-	#
`--add-drop-database`	`CREATE DATABASE` `DROP DATABASE` . .
`--add-drop-table`	`CREATE TABLE` `DROP TABLE` . .
`--no-create-db`	`CREATE DATABASE` . .
`-t` (`--no-create-info`)	`CREATE TABLE` . / .
`-d` (`--no-data`)	. `CREATE TABLE` . "" .
`-R` (- `--routines`)	/ .
`-K` (`--disable-keys`)	. MyISAM .

`mysqldump` MySQL SQL ( ). `mysqldump` .

- `DROP`
- `CREATE` .
- (, `--no-data`)
  - `LOCK`
  - `INSERT` .
- `UNLOCK TABLES`
- .
- `DROP`
- `CREATE`
- .

`CREATE`

DROP mysqldump .

Examples

.

```
mysqldump [options] db_name > filename.sql
```

.

```
mysqldump [options] --databases db_name1 db_name2 ... > filename.sql
mysqldump [options] --all-databases > filename.sql
```

.

```
mysqldump [options] db_name table_name... > filename.sql
```

.

```
mysqldump [options] db_name --ignore-table=tbl1 --ignore-table=tbl2 ... > filename.sql
```

.sql . .

```
> mysqldump -u username -p [other options]
Enter password:
```

(:) -p .

```
> mysqldump -u username -ppassword [other options]
```

/ .

.

```
> mysqldump --user=username --password=password [other options]
```

(.)

```
mysql [options] db_name < filename.sql
```

:

- db_name .
- filename.sql .
- .sql . .
- . filename.sql .

MySQL source .

```
source filename.sql
```

```
\. filename.sql
```

mysqldump

`--compress` `mysqldump` . :

```
mysqldump -h db.example.com -u username -p --compress dbname > dbname.sql
```

: db `--lock-tables=false` . db .

`gzip` .

```
mysqldump -h db.example.com -u username -p --compress dbname | gzip --stdout > dbname.sql.gz
```

gzipped mysqldump .

```
gunzip -c dbname.sql.gz | mysql dbname -u username -p
```

: `-c` stdout .

Amazon S3

MySql Amazon S3 . DB .

```
mysqldump -u root -p --host=localhost --opt --skip-lock-tables --single-transaction \
        --verbose --hex-blob --routines --triggers --all-databases |
    gzip -9 | s3cmd put - s3://s3-bucket/db-server-name.sql.gz
```

.

MySQL MySQL

.

1:

1.
2.
3.

```
mysqldump [options] > dump.sql
```

.

```
mysql [options] < dump.sql
```

2 :

.

```
mysqldump [options to connect to the source server] | mysql [options]
```

. 1 .

`mysqldump` `--routines` (`-R`) :

```
mysqldump -u username -p -R db_name > dump.sql
```

`--routines` `mysql.proc` .

mysqldump : https://riptutorial.com/ko/mysql/topic/604/mysqldump--

16: mysqlimport

--delete -D	.
--fields-optionally-enclosed-by	.
--fields-terminated-by	
--ignore -i	.
--lines-terminated-by	
--password -p	
--port -P	
--replace -r	.
--user -u	
--where -w	

mysqlimport .

Examples

employee.txt

1 \t Arthur Dent
2 \t
3 \t Zaphod Beeblebrox

```
$ mysql --user=user --password=password mycompany -e 'CREATE TABLE employee(id INT, name
VARCHAR(100), PRIMARY KEY (id))'

$ mysqlimport --user=user --password=password mycompany employee.txt
```

employee.txt

1 |
2 |
3 | Beeblebrox

```
$ mysqlimport --fields-terminated-by='|' mycompany employee.txt
```

.

```
$ mysqlimport --lines-terminated-by='\r\n' mycompany employee.txt
```

Employee

Yooden Vranx

employee.txt

1 \t Arthur Dent
2 \t
3 \t Zaphod Beeblebrox

--ignore .

```
$ mysqlimport --ignore mycompany employee.txt
```

1	
2	
	Yooden Vranx

--replace .

```
$ mysqlimport --replace mycompany employee.txt
```

1	
2	
	Zaphod Beeblebrox

```
$ mysqlimport --where="id>2" mycompany employee.txt
```

CSV

```
$ mysqlimport
    --fields-optionally-enclosed-by='"'
    --fields-terminated-by=,
    --lines-terminated-by="\r\n"
    mycompany employee.csv
```

mysqlimport : https://riptutorial.com/ko/mysql/topic/5215/mysqlimport

17: MySQL

Examples

MySQL .

1. where where . : - employee_id> 2000 user_id employee_id * atlot . .
2. . Ex : - Employee * . lakhs 20 limit Ex : - LIMIT 20 .
3. . Ex : - Employee * . . : - , .
4. where NULL . SELECT * FROM tbl_name where key_col NULL ; key_col .

InnoDB

1. InnoDB PRIMARY KEY ( ) . 2 . AUTO_INCREMENT .
2. CHAR VARCHAR NULL . CHAR (N) NULL N . I / O .

   COMPACT (InnoDB) utf8 sjis CHAR (N) N .
3. COMPRESSED . I / O . COMPRESSED COMPACT . : 2 : 1 buffer_pool .
4. OPTIMIZE TABLE . . . : OPTIMIZE TABLE . , . InnoDB B + Trees .

   OPTIMIZE TABLE . . . . @ . .

, C . .

- `= WHERE` . (: `INDEX(a,b,...) WHERE a=12 AND b='xyz' ...`)
- `IN` (); .
- "range"(: `x BETWEEN 3 AND 9` , `name LIKE 'J%'`) .
- `GROUP BY`
- `ORDER BY` . `ASC` `DESC` 8.0 .

:

- .
- .
- `WHERE` `GROUP BY` .
- `WHERE ORDER BY` .
- "" (: `DATE(x) = ... x`).
- " (: `text_col(99)`) . .

.

MySQL : https://riptutorial.com/ko/mysql/topic/5752/mysql--

18: PREPARE

- PREPARE stmt_name FROM preparable_stmt
- EXECUTE stmt_name [USING @var_name [, @var_name] ...]
- {DEALLOCATE | DROP} PREPARE stmt_name

Examples

PREPARE, EXECUTE DEALLOCATE PREPARE

PREPARE .

EXECUTE prepared statement .

DEALLOCATE PREPARE .

```
SET @s = 'SELECT SQRT(POW(?,2) + POW(?,2)) AS hypotenuse';
PREPARE stmt2 FROM @s;
SET @a = 6;
SET @b = 8;
EXECUTE stmt2 USING @a, @b;
```

:

```
+------------+
| hypotenuse |
+------------+
|         10 |
+------------+
```

,

```
DEALLOCATE PREPARE stmt2;
```

:

- `FROM @s FROM @s` @variables .
- Prepare (:) " .

(`CONCAT SELECT` . @variables DECLAREd -).

```
SET v_column_definition := CONCAT(
  v_column_name
  ,' ',v_column_type
  ,' ',v_column_options
);

SET @stmt := CONCAT('ALTER TABLE ADD COLUMN ', v_column_definition);
```

```
PREPARE stmt FROM @stmt;
EXECUTE stmt;
DEALLOCATE PREPARE stmt;
```

PREPARE : https://riptutorial.com/ko/mysql/topic/2603/prepare-

19: Prepared Statement Un-Pivot

Examples

BI / . .

, .

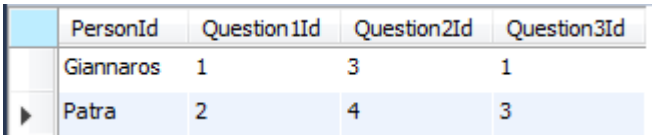
.

```
create table rawdata

(
 PersonId VARCHAR(255)
,Question1Id INT(11)
,Question2Id INT(11)
,Question3Id INT(11)
)
```

rawdata ETL . , .

rawdata .



PersonId	Question1Id	Question2Id	Question3Id
Giannaros	1	3	1
Patra	2	4	3

MYSQL unpivot UNION ALL .

```
create table unpivoteddata

(

 PersonId VARCHAR(255)
,QuestionId VARCHAR(255)
,QuestionValue INT(11)

);

INSERT INTO unpivoteddata SELECT PersonId, 'Question1Id' col, Question1Id
FROM rawdata
UNION ALL
SELECT PersonId, 'Question2Id' col, Question2Id
FROM rawdata
UNION ALL
SELECT PersonId, 'Question3Id' col, Question3Id
FROM rawdata;
```

QuestionId unpivot . . GROUP_CONCAT 'int' . GROUP_CONCAT SELECT .

```
set @temp2 = null;
```

```
SELECT GROUP_CONCAT(' SELECT ', 'PersonId',',','''',COLUMN_NAME,'''', ' col
',',',COLUMN_NAME,' FROM rawdata' separator ' UNION ALL' ) FROM     INFORMATION_SCHEMA.COLUMNS
WHERE table_name = 'rawdata' AND DATA_TYPE = 'Int' INTO     @temp2;

select @temp2;
```

.

```
DATA_TYPE = 'Int'
```

```
COLUMN_NAME LIKE 'Question%'
```

ETL .

:

```
set @temp3 = null;

select concat('INSERT INTO unpivoteddata',@temp2) INTO @temp3;

select @temp3;

prepare stmt FROM @temp3;
execute stmt;
deallocate prepare stmt;
```

unpivoteddata .

```
SELECT * FROM unpivoteddata
```

PersonId	QuestionId	QuestionValue
Giannaros	Question1Id	1
Patra	Question1Id	2
Giannaros	Question2Id	3
Patra	Question2Id	4
Giannaros	Question3Id	1
Patra	Question3Id	3

.

Prepared Statement Un-Pivot : https://riptutorial.com/ko/mysql/topic/6491/prepared-statement---un-pivot-

20: PS1

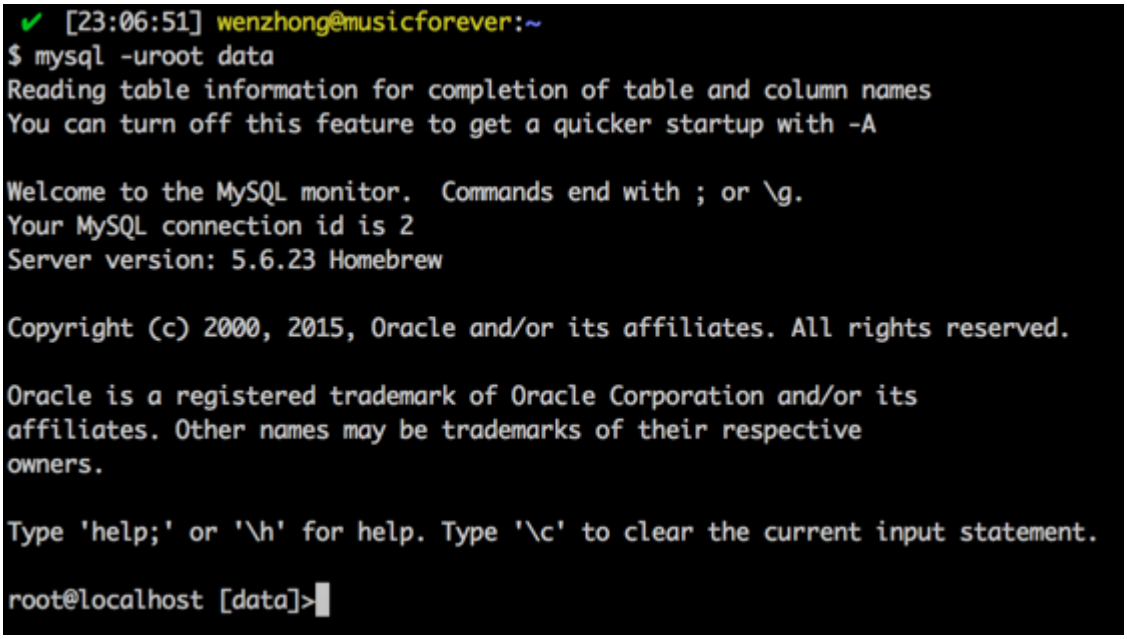
Examples

MySQL PS1

.bashrc .bash_profile .

```
export MYSQL_PS1="\u@\h [\d]>"
```

MySQL PROMPT @ [] .



MySQL PS1

`mysqld.cnf` :

```
[mysql]
prompt = '\u@\h [\d]> '
```

`.bashrc` .

PS1 : https://riptutorial.com/ko/mysql/topic/5795/ps1--

21: SSL

Examples

(MySQL `sudo` .)

CA SSL

OpenSSL .

```
apt-get -y install openssl
apt-get -y install libssl-dev
```

SSL .

```
mkdir /home/ubuntu/mysqlcerts
cd /home/ubuntu/mysqlcerts
```

CA ( ) ( ).

```
openssl genrsa 2048 > ca-key.pem
openssl req -new -x509 -nodes -days 3600 -key ca-key.pem -out ca.pem
```

. CA .

```
openssl req -newkey rsa:2048 -days 3600 -nodes -keyout server-key.pem -out server-req.pem
openssl rsa -in server-key.pem -out server-key.pem

openssl x509 -req -in server-req.pem -days 3600 -CA ca.pem -CAkey ca-key.pem -set_serial 01 -
out server-cert.pem
```

.

```
openssl req -newkey rsa:2048 -days 3600 -nodes -keyout client-key.pem -out client-req.pem
openssl rsa -in client-key.pem -out client-key.pem
openssl x509 -req -in client-req.pem -days 3600 -CA ca.pem -CAkey ca-key.pem -set_serial 01 -
out client-cert.pem
```

.

```
openssl verify -CAfile ca.pem server-cert.pem client-cert.pem
```

MySQL

MySQL . :

```
vim /etc/mysql/mysql.conf.d/mysqld.cnf
```

`[mysqld]` .

```
ssl-ca = /home/ubuntu/mysqlcerts/ca.pem
ssl-cert = /home/ubuntu/mysqlcerts/server-cert.pem
ssl-key = /home/ubuntu/mysqlcerts/server-key.pem
```

MySQL . :

```
service mysql restart
```

SSL

`ssl-ca` , `ssl-cert` `ssl-key` . , `cd /home/ubuntu/mysqlcerts` :

```
mysql --ssl-ca=ca.pem --ssl-cert=client-cert.pem --ssl-key=client-key.pem -h 127.0.0.1 -u
superman -p
```

.

```
superman@127.0.0.1 [None]> SHOW VARIABLES LIKE '%ssl%';
+---------------+-----------------------------------------+
| Variable_name | Value                                   |
+---------------+-----------------------------------------+
| have_openssl  | YES                                     |
| have_ssl      | YES                                     |
| ssl_ca        | /home/ubuntu/mysqlcerts/ca.pem          |
| ssl_capath    |                                         |
| ssl_cert      | /home/ubuntu/mysqlcerts/server-cert.pem |
| ssl_cipher    |                                         |
| ssl_crl       |                                         |
| ssl_crlpath   |                                         |
| ssl_key       | /home/ubuntu/mysqlcerts/server-key.pem  |
+---------------+-----------------------------------------+
```

.

```
superman@127.0.0.1 [None]> STATUS;
...
SSL:                    Cipher in use is DHE-RSA-AES256-SHA
...
```

SSL

`REQUIRE SSL` `GRANT` .

```
GRANT ALL PRIVILEGES ON *.* TO 'superman'@'127.0.0.1' IDENTIFIED BY 'pass' REQUIRE SSL;
```

```
FLUSH PRIVILEGES;
```

`superman` SSL .

. MySQL . .

```
vim /etc/mysql/mysql.conf.d/mysqld.cnf
```

`[client]` .

```
ssl-ca = /home/ubuntu/mysqlcerts/ca.pem
ssl-cert = /home/ubuntu/mysqlcerts/client-cert.pem
ssl-key = /home/ubuntu/mysqlcerts/client-key.pem
```

`superman` SSL .

```
mysql -h 127.0.0.1 -u superman -p
```

Python connect . :

```
import MySQLdb
ssl = {'cert': '/home/ubuntu/mysqlcerts/client-cert.pem', 'key':
'/home/ubuntu/mysqlcerts/client-key.pem'}
conn = MySQLdb.connect(host='127.0.0.1', user='superman', passwd='imsoawesome', ssl=ssl)
```

:

- https://www.percona.com/blog/2013/06/22/setting-up-mysql-ssl-and-secure-connections/
- https://lowendbox.com/blog/getting-started-with-mysql-over-ssl/
- http://xmodulo.com/enable-ssl-mysql-server-client.html
- https://ubuntuforums.org/showthread.php?t=1121458

CentOS7 / RHEL7

.

1. dbserver ( )
2. appclient ( )

FWIW, SELinux .

dbserver .

.

```
mkdir /root/certs/mysql/ && cd /root/certs/mysql/
```

```
openssl genrsa 2048 > ca-key.pem
openssl req -sha1 -new -x509 -nodes -days 3650 -key ca-key.pem > ca-cert.pem
openssl req -sha1 -newkey rsa:2048 -days 730 -nodes -keyout server-key.pem > server-req.pem
openssl rsa -in server-key.pem -out server-key.pem
openssl x509 -sha1 -req -in server-req.pem -days 730  -CA ca-cert.pem -CAkey ca-key.pem -
set_serial 01 > server-cert.pem
```

/ etc / pki / tls / certs / mysql /

CentOS RHEL ( ).

```
mkdir /etc/pki/tls/certs/mysql/
```

. mysql .

```
chown -R mysql:mysql /etc/pki/tls/certs/mysql
```

MySQL / MariaDB .

```
# vi /etc/my.cnf
# i
[mysqld]
bind-address=*
ssl-ca=/etc/pki/tls/certs/ca-cert.pem
ssl-cert=/etc/pki/tls/certs/server-cert.pem
ssl-key=/etc/pki/tls/certs/server-key.pem
# :wq
```

```
systemctl restart mariadb
```

appclient (IP 1.2.3.4) .

```
firewall-cmd --zone=drop --permanent --add-rich-rule 'rule family="ipv4" source
address="1.2.3.4" service name="mysql" accept'
# I force everything to the drop zone.  Season the above command to taste.
```

firewalld .

```
service firewalld restart
```

dbserver mysql .

```
mysql -uroot -p
```

. note GRANT SSL .

```
GRANT ALL PRIVILEGES ON *.* TO 'iamsecure'@'appclient' IDENTIFIED BY 'dingdingding' REQUIRE
SSL;
FLUSH PRIVILEGES;
# quit mysql
```

/ root / certs / mysql . cd.

```
openssl req -sha1 -newkey rsa:2048 -days 730 -nodes -keyout client-key.pem > client-req.pem
openssl rsa -in client-key.pem -out client-key.pem
openssl x509 -sha1 -req -in client-req.pem -days 730 -CA ca-cert.pem -CAkey ca-key.pem -
set_serial 01 > client-cert.pem
```

: . YMMV.

/ root / certs / mysql /.

CA :

```
cat server-cert.pem client-cert.pem > ca.pem
```

.

```
cat ca.pem
```

-

```
ssh appclient
```

.

```
mkdir /etc/pki/tls/certs/mysql/
```

(dbserver) appclient . scp .

```
scp dbserver
# copy files from dbserver to appclient
# exit scp
```

. mysql .

```
chown -R mysql:mysql /etc/pki/tls/certs/mysql
```

mysql .

```
/etc/pki/tls/certs/mysql/ca.pem
/etc/pki/tls/certs/mysql/client-cert.pem
/etc/pki/tls/certs/mysql/client-key.pem
```

`[client]` appclient MariaDB / MySQL .

```
vi /etc/my.cnf
# i
[client]
```

```
ssl-ca=/etc/pki/tls/certs/mysql/ca.pem
ssl-cert=/etc/pki/tls/certs/mysql/client-cert.pem
ssl-key=/etc/pki/tls/certs/mysql/client-key.pem
# :wq
```

appclient mariadb .

```
systemctl restart mariadb
```

: ssl TRUE

```
mysql --ssl --help
```

appclient mysql .

```
mysql -uroot -p
```

YES .

```
show variables LIKE '%ssl';
    have_openssl    YES
    have_ssl              YES
```

.

```
 have_openssl NO
```

mariadb.log :

SSL : '/etc/pki/tls/certs/mysql/client-cert.pem' .

client-cert.pem . / etc / pki / tls / certs / mysql / mysql .

```
chown -R mysql:mysql /etc/pki/tls/certs/mysql
```

mariadb .

.

---

appclient.

dbserver mysql .

```
mysql -h dbserver -u iamsecure -p
# enter password dingdingding (hopefully you changed that to something else)
```

.

SSL MariaDB / MySQL .

```
\s
```

. .

.

```
Connection id:        4
Current database:
Current user:        iamsecure@appclient
SSL:            Cipher in use is DHE-RSA-AES256-GCM-SHA384
Current pager:        stdout
Using outfile:        ''
Using delimiter:    ;
Server:            MariaDB
Server version:        5.X.X-MariaDB MariaDB Server
Protocol version:    10
Connection:        dbserver via TCP/IP
Server characterset:    latin1
Db     characterset:    latin1
Client characterset:    utf8
Conn.  characterset:    utf8
TCP port:        3306
Uptime:            42 min 13 sec
```

GRANT ' .

SSL .

RHEL7 CentOS7 . .

.

SSL : https://riptutorial.com/ko/mysql/topic/7563/ssl--

22:

`SELECT` .

- SELECT DISTINCT [expressions] FROM TableName [WHERE]; ///
- SELECT DISTINCT (a), b ... SELECT DISTINCT a, b .
- SELECT [| DISTINCT | DISTINCTROW] [HIGH_PRIORITY] [STRAIGHT_JOIN] [SQL_SMALL_RESULT | SQL_BIG_RESULT] [SQL_BUFFER_RESULT] [SQL_CACHE | SQL_NO_CACHE] [SQL_CALC_FOUND_ROWS] FROM [WHERE] [GROUP BY] [HAVING] [ORDER BY [ASC | DESC]] [LIMIT [offset_value] number_rows | LIMIT number_rows OFFSET offset_value] [_] [INTO [OUTFILE 'file_name' | DUMPFILE 'file_name'| @ variable1, @ variable2, ... @variable_n] [FOR UPDATE | LOCK IN SHARE MODE]; ///

MySQL `SELECT` MySQL .

Examples

```
CREATE TABLE stack(
    id INT,
    username VARCHAR(30) NOT NULL,
    password VARCHAR(30) NOT NULL
);

INSERT INTO stack (`id`, `username`, `password`) VALUES (1, 'Foo', 'hiddenGem');
INSERT INTO stack (`id`, `username`, `password`) VALUES (2, 'Baa', 'verySecret');
```

```
SELECT id FROM stack;
```

```
+------+
| id   |
+------+
|    1 |
|    2 |
+------+
```

(*)

```
SELECT * FROM stack;
```

```
+------+----------+----------+
| id   | username | password |
+------+----------+----------+
|    1 | admin    | admin    |
|    2 | stack    | stack    |
+------+----------+----------+
```

```
2 rows in set (0.00 sec)
```

.

```
SELECT stack.* FROM stack JOIN Overflow ON stack.id = Overflow.id;
```

`*` . (ADD / DROP /) . MySQL .

:

1. / `SELECT *` .
2. .
3. `SELECT *` -usage ?

:

1. . 200k VARBINARY . - `SELECT *` 10 2MB
2.
3. .
4. - (@vinodadhikary).
5. .
6. SELECT * .
7. ( )
8. `TEXT` .

WHERE SELECT

```
SELECT * FROM stack WHERE username = "admin" AND password = "admin";
```

```
+------+----------+----------+
| id   | username | password |
+------+----------+----------+
|    1 | admin    | admin    |
+------+----------+----------+
1 row in set (0.00 sec)
```

WHERE SELECT

`WHERE` `SELECT` . . ' '.

.

```
SELECT title FROM books WHERE author_id = (SELECT id FROM authors WHERE last_name = 'Bar' AND
first_name = 'Foo');
```

.

```
SELECT * FROM stack WHERE username IN (SELECT username FROM signups WHERE email IS NULL);
```

: .

(%)

```
CREATE TABLE stack
(  id int AUTO_INCREMENT PRIMARY KEY,
   username VARCHAR(100) NOT NULL
);

INSERT stack(username) VALUES
('admin'),('k admin'),('adm'),('a adm b'),('b XadmY c'), ('adm now'), ('not here');
```

"adm":

```
SELECT * FROM stack WHERE username LIKE "%adm%";
+----+-----------+
| id | username  |
+----+-----------+
|  1 | admin     |
|  2 | k admin   |
|  3 | adm       |
|  4 | a adm b   |
|  5 | b XadmY c |
|  6 | adm now   |
+----+-----------+
```

"adm" .

```
SELECT * FROM stack WHERE username LIKE "adm%";
+----+----------+
| id | username |
+----+----------+
|  1 | admin    |
|  3 | adm      |
|  6 | adm now  |
+----+----------+
```

"adm" :

```
SELECT * FROM stack WHERE username LIKE "%adm";
+----+----------+
| id | username |
+----+----------+
|  3 | adm      |
+----+----------+
```

LIKE % _ . ,

```
SELECT * FROM stack WHERE username LIKE "adm_n";
+----+----------+
| id | username |
+----+----------+
```

```
|  1 | admin    |
+----+----------+
```

`username`

- `LIKE 'adm'` `= 'adm'
- `LIKE 'adm% BETWEEN..AND..` ''. .
- `LIKE '%adm'` ( ) . . .
- `RLIKE` (`REGEXP`) `LIKE` .
- MySQL `FULLTEXT` , `FULLTEXT` `LIKE` .

(AS) SELECT

SQL . .

```
SELECT username AS val FROM stack;
SELECT username val FROM stack;
```

(: `AS` .)

```
+-------+
| val   |
+-------+
| admin |
| stack |
+-------+
2 rows in set (0.00 sec)
```

LIMIT SELECT

:

```
 SELECT *
   FROM Customers
  ORDER BY CustomerID
  LIMIT 3;
```

:

ID						
1	Futterkiste		Obere Str. 57		12209	
2	Ana Trujillo Emparedados y helados		Avda. 2222	DF	05021	
			Mataderos 2312	DF	05023	

`LIMIT` `ORDER BY` . .

:

```
 SELECT *
   FROM Customers
  ORDER BY CustomerID
  LIMIT 2,1;
```

:

LIMIT LIMIT offset,count . .

:

ID						
			Mataderos 2312	DF	05023	

:

LIMIT . .

DISTINCT SELECT

SELECT DISTINCT .

```
CREATE TABLE `car`
(   `car_id` INT UNSIGNED NOT NULL PRIMARY KEY,
    `name` VARCHAR(20),
    `price` DECIMAL(8,2)
);

INSERT INTO CAR (`car_id`, `name`, `price`) VALUES (1, 'Audi A1', '20000');
INSERT INTO CAR (`car_id`, `name`, `price`) VALUES (2, 'Audi A1', '15000');
INSERT INTO CAR (`car_id`, `name`, `price`) VALUES (3, 'Audi A2', '40000');
INSERT INTO CAR (`car_id`, `name`, `price`) VALUES (4, 'Audi A2', '40000');

SELECT DISTINCT `name`, `price` FROM CAR;
+---------+----------+
| name    | price    |
+---------+----------+
| Audi A1 | 20000.00 |
| Audi A1 | 15000.00 |
| Audi A2 | 40000.00 |
+---------+----------+
```

DISTINCT . SQL . , . "Audi A1".

MySQL DISTINCT ORDER BY .ONLY_FULL_GROUP_BY MySQL (GROUP BY MySQL) .

(_)

LIKE _ .

```
SELECT username FROM users WHERE users LIKE 'admin_';
```

```
+----------+
| username |
+----------+
| admin1   |
| admin2   |
| admin-   |
| adminA   |
+----------+
```

CASE IF

```
SELECT st.name,
       st.percentage,
       CASE WHEN st.percentage >= 35 THEN 'Pass' ELSE 'Fail' END AS `Remark`
FROM student AS st ;
```

```
+--------------------------------+
|   name   | percentage | Remark |
+--------------------------------+
|   Isha   |     67     |  Pass  |
|   Rucha  |     28     |  Fail  |
|   Het    |     35     |  Pass  |
|   Ansh   |     92     |  Pass  |
+--------------------------------+
```

IF

```
SELECT st.name,
       st.percentage,
       IF(st.percentage >= 35, 'Pass', 'Fail') AS `Remark`
FROM student AS st ;
```

```
IF(st.percentage >= 35, 'Pass', 'Fail')
```

, IF st.percentage> = 35 **TRUE** `'Pass'` **.** ELSE `'Fail'` .

BETWEEN " " .

```
+----+-----------+
| id | username  |
+----+-----------+
|  1 | admin     |
|  2 | root      |
|  3 | toor      |
|  4 | mysql     |
|  5 | thanks    |
|  6 | java      |
+----+-----------+
```

```
SELECT * FROM stack WHERE id >= 2 and id <= 5;
```

BETWEEN ()

```
SELECT * FROM stack WHERE id BETWEEN 2 and 5;
```

```
+----+-----------+
| id | username  |
+----+-----------+
|  2 | root      |
|  3 | toor      |
|  4 | mysql     |
|  5 | thanks    |
+----+-----------+
4 rows in set (0.00 sec)
```

BETWEEN >= <= , not > < .

NOT BETWEEN

NOT . :

```
SELECT * FROM stack WHERE id NOT BETWEEN 2 and 5;
```

```
+----+-----------+
| id | username  |
+----+-----------+
|  1 | admin     |
|  6 | java      |
+----+-----------+
2 rows in set (0.00 sec)
```

> < not >= <= , `WHERE id NOT BETWEEN 2 and 5` `WHERE (id < 2 OR id > 5)` `WHERE id NOT BETWEEN 2 and 5` .

`BETWEEN` , MySQL .

SELECT

```
SELECT ... WHERE dt >= '2017-02-01'
             AND dt  < '2017-02-01' + INTERVAL 1 MONTH
```

`BETWEEN 23:59:59` . .

- ( )
- `BETWEEN` '23 : 59 : 59' .
- `DATE` , `TIMESTAMP` , `DATETIME` `DATETIME(6)` .
- , .
- (`BETWEEN`).

: https://riptutorial.com/ko/mysql/topic/3307/

23:

.

-
- `my.cnf`
-

`mysqld --long-parameter-name=value --another-parameter` . `my.conf` . MySQL . .

(`-` (`_` . `=` . `K` , `M` , `G` kilo-, mega-, giga- . .

: `ON` `1` `OFF` `0` . .

`my.cnf` `[mysqld]` . (: mysql my.cnf .)

Examples

InnoDB

my.cnf . MySQL " .

.

```
innodb_buffer_pool_size
```

RAM 70 % (RAM 4GB VM). InnoDB ENGINE . InnoDB .

max_allowed_packet = 10M

M Mb, G Gb, K Kb

group_concat

`group_concat` `group` null . `group_concat_max_len` .

```
SET [GLOBAL | SESSION] group_concat_max_len = val;
```

`GLOBAL` `SESSION` .

InnoDB

InnoDB MySQL . InnoDB . `DROP` . SSD (SDD).

```
default_storage_engine = InnoDB
query_cache_type = 0
innodb_file_per_table = 1
innodb_flush_neighbors = 0
```

`innodb_thread_concurrency` (0) 4 . InnoDB .

```
innodb_thread_concurrency = 0
innodb_read_io_threads = 64
innodb_write_io_threads = 64
```

MySQL () capacity_max ( ) IOPS . HDD 200, IOPS SSD . IOPS . *MySQL* . .

```
innodb_io_capacity = 2500
innodb_io_capacity_max = 3000
```

RAM

MySQL RAM . 70-80 %, MySQL RAM . RAM RAM (,) .

```
innodb_buffer_pool_size = 10G
```

MySQL

`aes-128-ecb` ecb ECB ( ) . . .

```
block_encryption_mode = aes-256-cbc
```

: https://riptutorial.com/ko/mysql/topic/3134/--

24:

1. SELECT expression1, expression2, ... expression_n,
2. aggregate_function (expression)
3. FROM
4. []
5. GROUP BY expression1, expression2, ... expression_n;

expression1, expression2, ... expression_n	GROUP BY .
	SUM, COUNT, MIN, MAX AVG .
	. FROM .
	. .

MySQL GROUP BY SELECT .

ONLY_FULL_GROUP_BY . SELECT . (5.7.5 .) DBMS .

Examples

GROUP BY USING SUM

```
SELECT product, SUM(quantity) AS "Total quantity"
FROM order_details
GROUP BY product;
```

MIN

name , department salary .

```
SELECT department, MIN(salary) AS "Lowest salary"
FROM employees
GROUP BY department;
```

, . name . "groupwise max" .

GROUP BY USING COUNT

```
SELECT department, COUNT(*) AS "Man_Power"
FROM employees
GROUP BY department;
```

HAVING GROUP BY

```
SELECT department, COUNT(*) AS "Man_Power"
FROM employees
GROUP BY department
HAVING COUNT(*) >= 10;
```

GROUP BY ... HAVING SELECT ... WHERE .

HAVING "" HAVING HAVING Man_Power >= 10 .

MySQL . , Name(1):Score(*) Name(1):Score(*)

	A +
	-
	C +
	-
	-

```
SELECT Name, GROUP_CONCAT(Score ORDER BY Score desc SEPERATOR ' ') AS Grades
FROM   Grade
GROUP BY Name
```

:

```
+------+------------+
| Name | Grades     |
+------+------------+
| Adam | C+ B A- A+ |
| Bill | D-         |
| John | A-         |
+------+------------+
```

GROUP BY

```
+---------+------------+----------+-------+--------+
| orderid | customerid | customer | total | items  |
+---------+------------+----------+-------+--------+
|       1 |          1 | Bob      |  1300 |     10 |
|       2 |          3 | Fred     |   500 |      2 |
|       3 |          5 | Tess     |  2500 |      8 |
|       4 |          1 | Bob      |   300 |      6 |
|       5 |          2 | Carly    |   800 |      3 |
|       6 |          2 | Carly    |  1000 |     12 |
|       7 |          3 | Fred     |   100 |      1 |
|       8 |          5 | Tess     | 11500 |     50 |
```

```
|       9 |          4 | Jenny    |   200 |      2 |
|      10 |          1 | Bob      |   500 |     15 |
+---------+------------+----------+-------+--------+
```

-

WHERE .

: .

```
SELECT customer, COUNT(*) as orders
FROM orders
GROUP BY customer
ORDER BY customer
```

:

```
+----------+--------+
| customer | orders |
+----------+--------+
| Bob      |      3 |
| Carly    |      2 |
| Fred     |      2 |
| Jenny    |      1 |
| Tess     |      2 |
+----------+--------+
```

-

.

: .

```
SELECT customer, SUM(total) as sum_total, SUM(items) as sum_items
FROM orders
GROUP BY customer
ORDER BY customer
```

:

```
+----------+-----------+-----------+
| customer | sum_total | sum_items |
+----------+-----------+-----------+
| Bob      |      2100 |        31 |
| Carly    |      1800 |        15 |
| Fred     |       600 |         3 |
| Jenny    |       200 |         2 |
| Tess     |     14000 |        58 |
+----------+-----------+-----------+
```

- **AVG**

.

: .

```
SELECT customer, AVG(total) as avg_total
FROM orders
GROUP BY customer
ORDER BY customer
```

:

```
+----------+-----------+
| customer | avg_total |
+----------+-----------+
| Bob      |       700 |
| Carly    |       900 |
| Fred     |       300 |
| Jenny    |       200 |
| Tess     |      7000 |
+----------+-----------+
```

- **MAX**

.

: .

```
SELECT customer, MAX(total) as max_total
FROM orders
GROUP BY customer
ORDER BY customer
```

:

```
+----------+-----------+
| customer | max_total |
+----------+-----------+
| Bob      |      1300 |
| Carly    |      1000 |
| Fred     |       500 |
| Jenny    |       200 |
| Tess     |     11500 |
+----------+-----------+
```

- **MIN**

.

: .

```
SELECT customer, MIN(total) as min_total
FROM orders
GROUP BY customer
ORDER BY customer
```

:

```
+----------+-----------+
| customer | min_total |
+----------+-----------+
| Bob      |       300 |
| Carly    |       800 |
| Fred     |       100 |
| Jenny    |       200 |
| Tess     |      2500 |
+----------+-----------+
```

: https://riptutorial.com/ko/mysql/topic/3523/--

25:

1. INSERT [LOW_PRIORITY | | HIGH_PRIORITY] [] [INTO] tbl_name [(partition_name, ...)] [(col_name, ...)] {VALUES | VALUE} ({expr | DEFAULT}, ...), (...), ... [col_name = expr [, col_name = expr] ...]

2. INSERT [LOW_PRIORITY | | HIGH_PRIORITY] [IGNORE] [INTO] tbl_name [PARTITION (, ...)] SET col_name = {expr | DEFAULT}, ... [col_name = expr [, col_name = expr] ...]

3. INSERT [LOW_PRIORITY | HIGH_PRIORITY] [IGNORE] [INTO] tbl_name [PARTITION (partition_name, ...)] [(col_name, ...)] SELECT ... [col_name = expr [, col_name = expr] ...]

4. expr . col2 col1 .
   INSERT INTO tbl_name (col1, col2) VALUES (15, col1 * 2);

5. VALUES INSERT . . :
   INSERT INTO tbl_name (a, b, c) VALUES (1,2,3), (4,5,6), (7,8,9);

6. } -. .
   INSERT INTO tbl_name (a, b, c) VALUES (1,2,3,4,5,6,7,8,9);

7. INSERT ... SELECT
   INSERT [LOW_PRIORITY | HIGH_PRIORITY] [IGNORE] [INTO] tbl_name [PARTITION (partition_name, ...)] [(col_name, ...)] SELECT ... [col_name = expr, ...]

8. INSERT ... SELECT . :
   INSERT INTO tbl_temp2 (fld_id) SELECT tbl_temp1.fld_order_id FROM tbl_temp1 WHERE tbl_temp1.fld_order_id> 100;

INSERT

Examples

```
INSERT INTO `table_name` (`field_one`, `field_two`) VALUES ('value_one', 'value_two');
```

table_name , field_one field_two value_one value_two field_one field_two .

. .

INSERT

```
INSERT INTO `table_name`
    (`index_field`, `other_field_1`, `other_field_2`)
    VALUES
    ('index_value', 'insert_value', 'other_value')
    ON DUPLICATE KEY UPDATE
        `other_field_1` = 'update_value',
        `other_field_2` = VALUES(`other_field_2`);
```

table_name INSERT other_field_1 .

INSERT VALUES() . INSERT UPDATE . other_field_1 insert_value INSERT update_value UPDATE other_field_2 other_value .

IODKU (Insert on Duplicate Key Update) . . ( ) .

```
INSERT INTO `my_table` (`field_1`, `field_2`) VALUES
    ('data_1', 'data_2'),
    ('data_1', 'data_3'),
    ('data_4', 'data_5');
```

INSERT .

" . 100 10 .

. INSERT IGNORE .

.

```
SELECT * FROM `people`;
--- Produces:
+----+------+
| id | name |
+----+------+
|  1 | john |
|  2 | anna |
+----+------+


INSERT IGNORE INTO `people` (`id`, `name`) VALUES
    ('2', 'anna'), --- Without the IGNORE keyword, this record would produce an error
    ('3', 'mike');

SELECT * FROM `people`;
--- Produces:
+----+--------+
| id |  name  |
+----+--------+
|  1 |  john  |
|  2 |  anna  |
|  3 |  mike  |
+----+--------+
```

INSERT IGNORE , MySQL :

IGNORE . IGNORE . .

: - (:).

INSERT .

```
INSERT INTO `my_table` VALUES
        ('data_1', 'data_2'),
        ('data_1', 'data_3'),
        ('data_4', 'data_5');
```

INSERT SELECT ( )

SELECT .

```
INSERT INTO `tableA` (`field_one`, `field_two`)
   SELECT `tableB`.`field_one`, `tableB`.`field_two`
   FROM `tableB`
   WHERE `tableB`.clmn <> 'someValue'
   ORDER BY `tableB`.`sorting_clmn`;
```

```
SELECT * FROM  tableA tableB    tableB .

AUTO_INCREMENT  VALUES INSERT  .
```

, .

AUTO_INCREMENT + LAST_INSERT_ID () INSERT

`AUTO_INCREMENT PRIMARY KEY` . ID .

```
CREATE TABLE t (
    id SMALLINT UNSIGNED AUTO_INCREMENT NOT NULL,
    this ...,
    that ...,
    PRIMARY KEY(id) );

INSERT INTO t (this, that) VALUES (..., ...);
SELECT LAST_INSERT_ID() INTO @id;
INSERT INTO another_table (..., t_id, ...) VALUES (..., @id, ...);
```

`LAST_INSERT_ID()` ID .

API `LAST_INSERT_ID()` `SELECT @variable` MySQL . .

IODKU "" `AUTO_INCREMENT PRIMARY KEY UNIQUE` "duplicate key" . . INSERT `id` .

:

```
CREATE TABLE iodku (
    id INT AUTO_INCREMENT NOT NULL,
    name VARCHAR(99) NOT NULL,
    misc INT NOT NULL,
    PRIMARY KEY(id),
    UNIQUE(name)
) ENGINE=InnoDB;

INSERT INTO iodku (name, misc)
    VALUES
    ('Leslie', 123),
    ('Sally', 456);
Query OK, 2 rows affected (0.00 sec)
Records: 2  Duplicates: 0  Warnings: 0
+----+--------+------+
| id | name   | misc |
```

```
+----+--------+------+
|  1 | Leslie |  123 |
|  2 | Sally  |  456 |
+----+--------+------+
```

IODKU `id` "" `LAST_INSERT_ID()` :

```
INSERT INTO iodku (name, misc)
    VALUES
    ('Sally', 3333)            -- should update
    ON DUPLICATE KEY UPDATE    -- `name` will trigger "duplicate key"
    id = LAST_INSERT_ID(id),
    misc = VALUES(misc);
SELECT LAST_INSERT_ID();       -- picking up existing value
+------------------+
| LAST_INSERT_ID() |
+------------------+
|                2 |
+------------------+
```

IODKU "" `LAST_INSERT_ID()` `id` :

```
INSERT INTO iodku (name, misc)
    VALUES
    ('Dana', 789)          -- Should insert
    ON DUPLICATE KEY UPDATE
    id = LAST_INSERT_ID(id),
    misc = VALUES(misc);
SELECT LAST_INSERT_ID();   -- picking up new value
+------------------+
| LAST_INSERT_ID() |
+------------------+
|                3 |
+------------------+
```

:

```
SELECT * FROM iodku;
+----+--------+------+
| id | name   | misc |
+----+--------+------+
|  1 | Leslie |  123 |
|  2 | Sally  | 3333 |  -- IODKU changed this
|  3 | Dana   |  789 |  -- IODKU added this
+----+--------+------+
```

AUTO_INCREMENT ids

" ID . InnoDB ( ).

```
CREATE TABLE Burn (
    id SMALLINT UNSIGNED AUTO_INCREMENT NOT NULL,
    name VARCHAR(99) NOT NULL,
    PRIMARY KEY(id),
    UNIQUE(name)
```

```
        ) ENGINE=InnoDB;

INSERT IGNORE INTO Burn (name) VALUES ('first'), ('second');
SELECT LAST_INSERT_ID();          -- 1
SELECT * FROM Burn ORDER BY id;
  +----+--------+
  |  1 | first  |
  |  2 | second |
  +----+--------+

INSERT IGNORE INTO Burn (name) VALUES ('second');  -- dup 'IGNOREd', but id=3 is burned
SELECT LAST_INSERT_ID();          -- Still "1" -- can't trust in this situation
SELECT * FROM Burn ORDER BY id;
  +----+--------+
  |  1 | first  |
  |  2 | second |
  +----+--------+

INSERT IGNORE INTO Burn (name) VALUES ('third');
SELECT LAST_INSERT_ID();           -- now "4"
SELECT * FROM Burn ORDER BY id;    -- note that id=3 was skipped over
  +----+--------+
  |  1 | first  |
  |  2 | second |
  |  4 | third  |    -- notice that id=3 has been 'burned'
  +----+--------+
```

() : . auto_increment . ID .

. `MAX(id)` . id `DELETEs` ID .

`INSERT` (`DELETE` + `INSERT REPLACE`) ID . InnoDB, (!) `innodb_autoinc_lock_mode` .

`AUTO INCREMENT id` "" . `INT` .

: https://riptutorial.com/ko/mysql/topic/866/-

26:

Examples

()

```
Select Now();
```

.

```
Update `footable` set mydatefield = Now();
```

`mydatefield` (:

```
'2016-07-21 12:00:00'
```

```
NOW() + INTERVAL 1 DAY  -- This time tomorrow

CURDATE() - INTERVAL 4 DAY -- Midnight 4 mornings ago
```

3 ~ 10 mysql (180 ~ 600) :

```
SELECT qId,askDate,minuteDiff
FROM
(   SELECT qId,askDate,
    TIMESTAMPDIFF(MINUTE,askDate,now()) as minuteDiff
    FROM questions_mysql
) xDerived
WHERE minuteDiff BETWEEN 180 AND 600
ORDER BY qId DESC
LIMIT 50;

+----------+---------------------+------------+
| qId      | askDate             | minuteDiff |
+----------+---------------------+------------+
| 38546828 | 2016-07-23 22:06:50 |        182 |
| 38546733 | 2016-07-23 21:53:26 |        195 |
| 38546707 | 2016-07-23 21:48:46 |        200 |
| 38546687 | 2016-07-23 21:45:26 |        203 |
| ...      |                     |            |
+----------+---------------------+------------+
```

`TIMESTAMPDIFF()` MySQL .

MySQL `CURDATE() + 1` . . `CURDATE() + INTERVAL 1 DAY` .

`BETWEEN ... AND ...` . .

```
WHERE x >= '2016-02-25'
```

```
  AND x  < '2016-02-25' + INTERVAL 5 DAY
```

:

- BETWEEN ".
- 23:59:59 DATETIME .
- .
- x DATE , DATETIME TIMESTAMP .

SYSDATE (), NOW (), CURDATE ()

```
  SELECT SYSDATE();
```

'YYYY-MM-DD HH:MM:SS' YYYYMMDDHHMMSS . .

```
  SELECT NOW();
```

SYSDATE() .

```
  SELECT CURDATE();
```

'YYYY-MM-DD' YYYYMMDD . .

```
SELECT DATE('2003-12-31 01:02:03');
```

.

```
2003-12-31
```

DATETIME TIMESTAMP . WHERE . , 2016 9 1 .

.

```
 WHERE DATE(x) = '2016-09-01'   /* slow! */
```

DATE() . , MySQL x .

.

```
 WHERE x >= '2016-09-01'
   AND x <  '2016-09-01' + INTERVAL 1 DAY
```

x , (<) .

x . , x . DATE(x) = '2016-09-01 .

.

```
  WHERE x BETWEEN '2016-09-01' AND '2016-09-01' + INTERVAL 1 DAY  /*  wrong! */
```

x x 2016 9 2 . .

: https://riptutorial.com/ko/mysql/topic/1882/---

27:

- UNION DISTINCT - SELECT dedups
- UNION ALL - dedup ( )
- UNION - DISTINCT.
- SELECT ... UNION SELECT ... - OK `ORDER BY` .
- (SELECT ...) UNION (SELECT ...) ORDER BY ... - .

UNION CPU .

UNION * . * 5.7.3 / MariaDB 10.1 UNION tmp ( ).

Examples

SELECT UNION

`UNION` .

`authors editors` `UNION` .

```
select name, email, phone_number
from authors

union

select name, email, phone_number
from editors
```

`union` . `ALL` (: `UNION ALL` .

UNION .

```
( SELECT ... )
UNION
( SELECT ... )
ORDER BY
```

ORDER BY SELECT .

OFFSET

LIMIT UNION .

```
( SELECT ... ORDER BY x  LIMIT 10 )
UNION
( SELECT ... ORDER BY x  LIMIT 10 )
ORDER BY x  LIMIT 10
```

"10" SELECT 10 ORDER BY LIMIT .

10 4 .

```
( SELECT ... ORDER BY x  LIMIT 40 )
UNION
( SELECT ... ORDER BY x  LIMIT 40 )
ORDER BY x  LIMIT 30, 10
```

, SELECT 4 UNION OFFSET .

```
SELECT name, caption as title, year, pages FROM books
UNION
SELECT name, title, year, 0 as pages FROM movies
```

2 .

UNION ALL UNION

SELECT 1,22,44 UNION SELECT 2,33,55

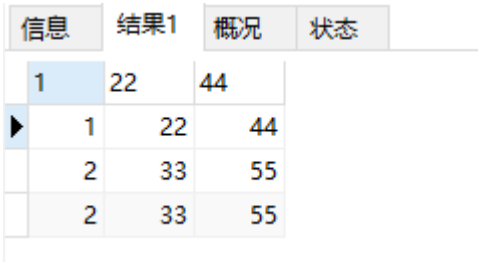
1	22	44
1	22	44
2	33	55

SELECT 1,22,44 UNION SELECT 2,33,55 UNION SELECT 2,33,55

.

UNION ALL

1,22,44 UNION SELECT 2,33,55 UNION ALL SELECT 2,33,55



1	22	44
1	22	44
2	33	55
2	33	55

MySQL

UNION ALL .

```
SELECT YEAR(date_time_column), MONTH(date_time_column), MIN(DATE(date_time_column)),
MAX(DATE(date_time_column)), COUNT(DISTINCT (ip)), COUNT(ip), (COUNT(ip) / COUNT(DISTINCT
(ip))) AS Ratio
FROM (
```

```
    (SELECT date_time_column, ip FROM server_log_1 WHERE state = 'action' AND log_id = 150)
UNION ALL
    (SELECT date_time_column, ip FROM server_log_2 WHERE state = 'action' AND log_id = 150)
UNION ALL
    (SELECT date_time_column, ip FROM server_log_3 WHERE state = 'action' AND log_id = 150)
UNION ALL
    (SELECT date_time_column, ip FROM server_log WHERE state = 'action' AND log_id = 150)
) AS table_all
GROUP BY YEAR(date_time_column), MONTH(date_time_column);
```

: https://riptutorial.com/ko/mysql/topic/3847/-

28:

- `AUTO_INCREMENT` id - PK "PK. .
- `MEDIUMINT` - `INTs` (⇒). .
- `UNSIGNED` - INT .
- `NOT NULL` - , ?
- `InnoDB` - `InnoDB` `PRIMARY KEY` MyISAM .
- `INDEX(y_id, x_id)` - `PRIMARY KEY` . . `UNIQUE` . `INSERTs` .
- `INDEX(y_id)` `x_id` . " .

. . .

`FOREIGN KEY` .

Examples

```
CREATE TABLE XtoY (
    # No surrogate id for this table
    x_id MEDIUMINT UNSIGNED NOT NULL,   -- For JOINing to one table
    y_id MEDIUMINT UNSIGNED NOT NULL,   -- For JOINing to the other table
    # Include other fields specific to the 'relation'
    PRIMARY KEY(x_id, y_id),            -- When starting with X
    INDEX      (y_id, x_id)             -- When starting with Y
) ENGINE=InnoDB;
```

( ).

: https://riptutorial.com/ko/mysql/topic/4857/---

29: UTF-8 .

Examples

(utf8) :

```
# -*- coding: utf-8 -*-
```

:

```
db = MySQLdb.connect(host=DB_HOST, user=DB_USER, passwd=DB_PASS, db=DB_NAME,
        charset="utf8mb4", use_unicode=True)
```

:

```
<meta charset="utf-8" />
<meta http-equiv="Content-Type" content="text/html; charset=utf-8" />
```

PHP

php.ini (PHP 5.6) :

```
default_charset UTF-8
```

:

```
header('Content-type: text/plain; charset=UTF-8');
```

MySQL :

```
(for mysql:)   Do not use the mysql_* API!
(for mysqli:)  $mysqli_obj->set_charset('utf8mb4');
(for PDO:)     $db = new PDO('dblib:host=host;dbname=db;charset=utf8', $user, $pwd);
```

.

,

```
<form accept-charset="UTF-8">
```

JSON `\uxxxx` `\uxxxx` .

```
$t = json_encode($s, JSON_UNESCAPED_UNICODE);
```

UTF-8 . : https://riptutorial.com/ko/mysql/topic/7332/----utf-8--

30:

Examples

/

```
select '123' * 2;
```

2 MySQL 123 .

:

246

. 0

```
select '123ABC' * 2
```

:

246

```
select 'ABC123' * 2
```

:

0

VARCHAR (255) - .

len

16 ASCII . CHARACTER SET ascii (latin1 ok).

```
UUID CHAR(36) CHARACTER SET ascii -- or pack into BINARY(16)
country_code CHAR(2) CHARACTER SET ascii
ip_address CHAR(39) CHARACTER SET ascii -- or pack into BINARY(16)
phone VARCHAR(20) CHARACTER SET ascii -- probably enough to handle extension
postal_code VARCHAR(20) CHARACTER SET ascii -- (not 'zip_code') (don't know the max

city VARCHAR(100) -- This Russian town needs 91:
    Poselok Uchebnogo Khozyaystva Srednego Professionalno-Tekhnicheskoye Uchilishche Nomer
Odin
country VARCHAR(50) -- probably enough
name VARCHAR(64) -- probably adequate; more than some government agencies allow
```

255 ? (255) .

- SELECT (, UNION , GROUP BY) RAM MEMORY . VARCHARs CHAR . VARCHAR(255) CHARACTER SET utf8mb4 1020 . .
- , InnoDB , , CREATE TABLE .

VARCHAR TEXT

*TEXT , CHAR VARCHAR :

- TINYTEXT .
- CHAR . . CHARACTER SET (: utf8mb4 4 /).
- CHAR , CHARACTER SET ascii .
- VARCHAR(n) n . TEXT . (?)
- *TEXT SELECTs .

AUTO_INCREMENT INT

AUTO_INCREMENT INT . UNSIGNED .

AUTO_INCREMENT ids " AUTO_INCREMENT ". . : INSERT IGNORE REPLACE . ID . InnoDB .

"FLOAT, DOUBLE, DECIMAL" "ENUM" . . " "(" "?) .

- INTs
- FLOAT, DOUBLE DECIMAL
- (CHAR, TEXT)
- BLOB
- DATETIME, TIMESTAMP
- ENUM SET
-
- JSON (MySQL 5.7.8)
- Money shoehorning

, .

-
- ()
- -MySQL ( )
- PRIMARY KEY
-
-

("" .)

()

MySQL .

```
INTEGER , INT , SMALLINT , TINYINT , MEDIUMINT , BIGINT
```

	DECIMAL , NUMERIC
	FLOAT , DOUBLE
	BIT

0.

	( )	( )	( )	( )
TINYINT	1	-2 7 -128	2 7 -1 127	2 8 -1 255
SMALLINT	2	-2 15 -32,768	2 15 -1 32,767	2 (16) -1 65,535
MEDIUMINT		-2 23 -8,388,608	2 23 -1 8,388,607	2 24 -1 16,777,215
INT	4	-2 31 -2,147,483,648	2 31 -1 2,147,483,647	2 32 -1 4,294,967,295
BIGINT	8	-2 63 - 9,223,372,036,854,775,808	2 63 -1 9,223,372,036,854,775,807	2 (64) -1 18,446,744,073,709,551,615

MySQL DECIMAL NUMERIC . .

2 . .

.

Scale .

```
salary DECIMAL(5,2)
```

5 precision 2 scale . -999.99 to 999.99

scale 0.

65 .

DECIMAL(M,N) M/2 .

FLOAT DOUBLE .

	4	23 / ~ 7	10 ^ + / - 38
	8	53 / ~ 16	10 ^ + / - 308

REAL FLOAT . DOUBLE PRECISION DOUBLE .

MySQL (M, D) . (M, D) M . D . . .

. FLOAT DOUBLE .

BIT . BIT(M) M 1 to 64 M

bit value .

```
b'111'      -> 7
b'10000000' -> 128
```

'shift' (1 << 7) (1 << 7) 128 (1 << 7) .

NDB BIT 4096.

CHAR (n)

CHAR(n) n . CHARACTER SET utf8mb4 , 4*n .

CHAR(n) CHARACTER SET ascii . (latin1 .)

```
country_code CHAR(2) CHARACTER SET ascii,
postal_code  CHAR(6) CHARACTER SET ascii,
uuid    CHAR(39) CHARACTER SET ascii,  -- more discussion elsewhere
```

DATE, DATETIME, TIMESTAMP, YEAR TIME

DATE . 'YYYY-MM-DD' '1000-01-01' '9999-12-31'.

DATETIME 'YYYY-MM-DD HH : MM : SS' . '1000-01-01 00:00:00' '9999-12-31 23:59:59'.

TIMESTAMP '1970-01-01 00:00:01'UTC '2038-01-19 03:14:07'UTC .

YEAR YEAR 1901 2155 .

TIME 'HH : MM : SS' '-838 : 59 : 59' '838 : 59 : 59' .

:

```
|-----------|--------------------|----------------------------------------|
| Data Type | Before MySQL 5.6.4 | as of MySQL 5.6.4                      |
|-----------|--------------------|----------------------------------------|
| YEAR      |      1 byte        |  1 byte                                |
```

```
| DATE      |      3 bytes       |  3 bytes                                |
| TIME      |      3 bytes       |  3 bytes + fractional seconds storage   |
| DATETIME  |      8 bytes       |  5 bytes + fractional seconds storage   |
| TIMESTAMP |      4 bytes       |  4 bytes + fractional seconds storage   |
|-----------|--------------------|-----------------------------------------|
```

(5.6.4) :

```
|------------------------------|------------------|
| Fractional Seconds Precision | Storage Required |
|------------------------------|------------------|
|              0               |      0 bytes     |
|              1,2             |      1 byte      |
|              3,4             |      2 byte      |
|              5,6             |      3 byte      |
|------------------------------|------------------|
```

MySQL DATE, DATETIME TIMESTAMP , .

: https://riptutorial.com/ko/mysql/topic/4137/-

31:

- CREATE {DATABASE | SCHEMA} [ ] db_name [create_specification] ///
- DROP {DATABASE | SCHEMA} [IF EXISTS] db_name ///

CREATE DATABASE	.
SCHEMA	`CREATE DATABASE` .
	.
create_specification	`create_specification CHARACTER SET COLLATE` ( ) .

Examples

,

DATABASE . SCHEMA .

```
CREATE DATABASE Baseball; -- creates a database named Baseball
```

1007 . .

```
CREATE DATABASE IF NOT EXISTS Baseball;
```

,

```
DROP DATABASE IF EXISTS Baseball; -- Drops a database if it exists, avoids Error 1008
DROP DATABASE xyz; -- If xyz does not exist, ERROR 1008 will occur
```

DDL `IF EXISTS` `IF EXISTS` .

CHARACTER SET . :

```
CREATE DATABASE Baseball CHARACTER SET utf8 COLLATE utf8_general_ci;

SHOW CREATE DATABASE Baseball;
+----------+-----------------------------------------------------------------+
| Database | Create Database                                                 |
+----------+-----------------------------------------------------------------+
| Baseball | CREATE DATABASE `Baseball` /*!40100 DEFAULT CHARACTER SET utf8 */ |
+----------+-----------------------------------------------------------------+
```

:

```
SHOW DATABASES;
```

```
+--------------------+
| Database           |
+--------------------+
| information_schema |
| ajax_stuff         |
| Baseball           |
+--------------------+
```

.

```
USE Baseball; -- set it as the current database
SELECT @@character_set_database as cset,@@collation_database as col;
+------+-----------------+
| cset | col             |
+------+-----------------+
| utf8 | utf8_general_ci |
+------+-----------------+
```

.

:

```
CREATE USER 'John123'@'%' IDENTIFIED BY 'OpenSesame';
```

John123 % . 'OpenSesame' .

:

```
CREATE USER 'John456'@'%' IDENTIFIED BY 'somePassword';
```

mysql .

```
SELECT user,host,password from mysql.user where user in ('John123','John456');
+---------+------+-------------------------------------------+
| user    | host | password                                  |
+---------+------+-------------------------------------------+
| John123 | %    | *E6531C342ED87 .....................      |
| John456 | %    | *B04E11FAAAE9A .....................      |
+---------+------+-------------------------------------------+
```

Baseball .

. John123 Baseball SELECT .

```
GRANT ALL ON Baseball.* TO 'John123'@'%';
GRANT SELECT ON Baseball.* TO 'John456'@'%';
```

.

```
SHOW GRANTS FOR 'John123'@'%';
+-----------------------------------------------------------------------------------------------
-----------+
```

```
| Grants for John123@%
|
+-----------------------------------------------------------------------------------------------
-----------+
| GRANT USAGE ON *.* TO 'John123'@'%' IDENTIFIED BY PASSWORD '*E6531C342ED87
.....................        |
| GRANT ALL PRIVILEGES ON `baseball`.* TO 'John123'@'%'
|
+-----------------------------------------------------------------------------------------------
-----------+

SHOW GRANTS FOR 'John456'@'%';
+-----------------------------------------------------------------------------------------------
-----------+
| Grants for John456@%
|
+-----------------------------------------------------------------------------------------------
-----------+
| GRANT USAGE ON *.* TO 'John456'@'%' IDENTIFIED BY PASSWORD '*B04E11FAAAE9A
.....................        |
| GRANT SELECT ON `baseball`.* TO 'John456'@'%'
|
+-----------------------------------------------------------------------------------------------
-----------+
```

GRANT USAGE . .

MyDatabase

. .

```
CREATE DATABASE my_db;
USE my_db;
CREATE TABLE some_table;
INSERT INTO some_table ...;
```

my_db.some_table .

MySQL . (SELECT), (INSERT / UPDATE / DELETE) . (.)

- mysql - GRANT .
- information_schema - ". .
- performance_schema - ?? [ ]
- ?? (MariaDB, Galera, TokuDB)

. .

```
mysql> CREATE DATABASE menagerie;
```

Unix SQL Menagerie, MENAGERIE . . (Windows . . .)

. . menagerie .

```
mysql> USE menagerie
Database changed
```

mysql . USE . mysql . . :

```
shell> mysql -h host -u user -p menagerie
Enter password: ********
```

: https://riptutorial.com/ko/mysql/topic/600/-

32:

- DROP TABLE table_name;
- DROP TABLE IF EXISTS table_name; -
- t1, t2, t3; -
- (DROP TEMPORARY TABLE t); - CREATE TEMPORARY TABLE DROP ...

	. DROP TABLE .
IF	. DROP TABLE .

Examples

.

:

tbl .

```
CREATE TABLE tbl(
    id INT NOT NULL AUTO_INCREMENT,
    title VARCHAR(100) NOT NULL,
    author VARCHAR(40) NOT NULL,
    submission_date DATE,
    PRIMARY KEY (id)
);
```

:

```
DROP TABLE tbl;
```

.

DROP TABLE Database.table_name

: https://riptutorial.com/ko/mysql/topic/4123/-

33:

Examples

- - - VARIABLE general_log
- - long_query_time - slow_query_log_file
- Binlog - - log_bin_basename
-
- - mysqld.err
- / - mysql.log ( ) - log_error
- InnoDB - iblog *

`basedir datadir .`

. .

(: .)

: Windows * nix . ( ).

Slow Query Log `long_query_time` . , 10 . .

```
SELECT @@long_query_time;
+-------------------+
| @@long_query_time |
+-------------------+
|         10.000000 |
+-------------------+
```

`my.cnf my.ini` GLOBAL . . 0 10 () . ?

- 10 .
- 2 .
- 0.5 .
- 0 ; .

. . .

```
SELECT @@slow_query_log; -- Is capture currently active? (1=On, 0=Off)
SELECT @@slow_query_log_file; -- filename for capture. Resides in datadir
SELECT @@datadir; -- to see current value of the location for capture file

SET GLOBAL slow_query_log=0; -- Turn Off
-- make a backup of the Slow Query Log capture file. Then delete it.
SET GLOBAL slow_query_log=1; -- Turn it back On (new empty file is created)
```

MySQL . Slow Query Log

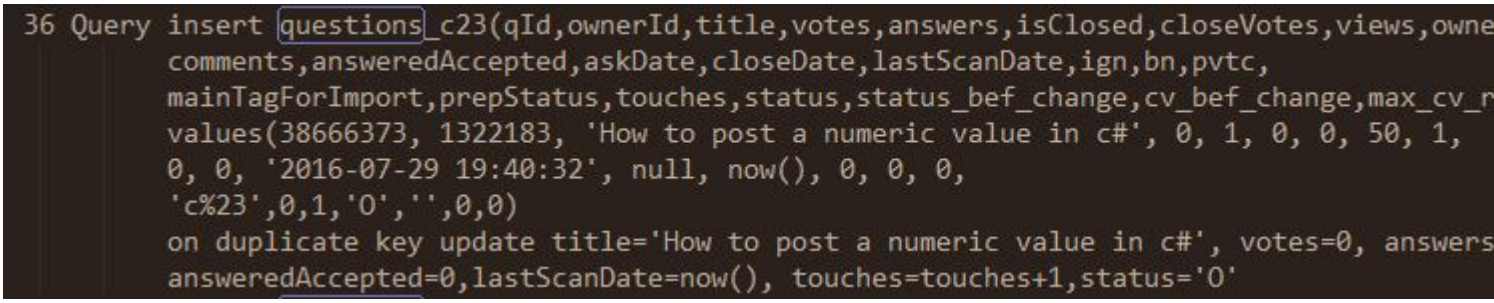
: slowlog / 5.6 (?) . .

" " .

```
long_query_time=...
turn on the slowlog
run for a few hours
turn off the slowlog (or raise the cutoff)
run pt-query-digest to find the 'worst' couple of queries.  Or mysqldumpslow -s t
```

, . ().

.



:

```
SELECT @@general_log; -- 1 = Capture is active; 0 = It is not.
```

.

```
SELECT @@general_log_file; -- Full path to capture file
```

`datadir` .

Windows :

```
+-----------------------------------------------------------+
| @@general_log_file                                        |
+-----------------------------------------------------------+
| C:\ProgramData\MySQL\MySQL Server 5.7\Data\GuySmiley.log |
+-----------------------------------------------------------+
```

Linux :

```
+-----------------------------------+
| @@general_log_file                |
+-----------------------------------+
| /var/lib/mysql/ip-ww-xx-yy-zz.log |
+-----------------------------------+
```

`general_log_file` GLOBAL `datadir` . .

`general_log_file` `datadir` `@@hostname` .log.

. / . . ( ). . .

.

```
/LogBackup/GeneralLog_20160802_1520_to_20160802_1815.log
```

.

Windows .

```
SELECT @@general_log; -- 0. Not being captured
SELECT @@general_log_file; -- C:\ProgramData\MySQL\MySQL Server 5.6\Data\GuySmiley.log
SELECT @@datadir; -- C:\ProgramData\MySQL\MySQL Server 5.7\Data\
SET GLOBAL general_log_file='GeneralLogBegin_20160803_1420.log'; -- datetime clue
SET GLOBAL general_log=1; -- Turns on actual log capture. File is created under `datadir`
SET GLOBAL general_log=0; -- Turn logging off
```

Linux . . .

.

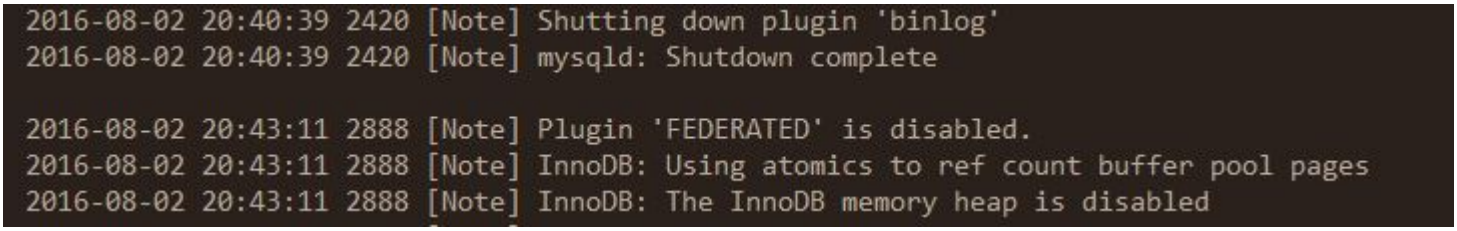
```
[mysqld]
general_log_file = /path/to/currentquery.log
general_log      = 1
```

`log_output FILE TABLE` . .

MySQL .

.

.



`log_error` .

`log_error` `datadir` `@@hostname` .err . `log_error` . cnf ini (" ") .

. . .

GLOBAL `log_warnings` . .

```
SELECT @@log_warnings; -- make a note of your prior setting
SET GLOBAL log_warnings=2; -- setting above 1 increases output (see server version)
```

`log_warnings` .

`cnf ini` .

```
[mysqld]
log_error        = /path/to/CurrentError.log
log_warnings     = 2
```

MySQL 5.7.2 3 GLOBAL `log_error_verbosity` ., 5.7.2 . `cnf ini` .

MySQL 5.7.2 :

```
[mysqld]
log_error           = /path/to/CurrentError.log
log_warnings        = 2
log_error_verbosity = 3
```

MySQL , `log_warnings error_log_verbosity` .

: https://riptutorial.com/ko/mysql/topic/5102/-

34:

Examples

```
CREATE TABLE foo ( ...
    name CHARACTER SET utf8mb4
    ... );
```

MySQL . .

```
SET NAMES utf8mb4;
```

(PHP, Python, Java, ...) `SET NAMES` .

: `SET NAMES utf8mb4` , `CHARACTER SET latin1` - utf8mb4 latin1 `INSERTing` `SELECTing` .

?

. (.) `SHOW COLLATION;` `SHOW COLLATION;` .

`CHARACTER SETs` 4 .

```
ascii -- basic 7-bit codes.
latin1 -- ascii, plus most characters needed for Western European languages.
utf8 -- the 1-, 2-, and 3-byte subset of utf8.  This excludes Emoji and some of Chinese.
utf8mb4 -- the full set of UTF8 characters, covering all current languages.
```

. utf8 utf8mb4 .

...

- utf8mb4 `TEXT` `VARCHAR` .
- 16 (UUID, MD5) (country_code, postal_code) ascii (latin1) .

utf8mb4 5.5.3 utf8 .

MySQL "UTF8" MySQL utf8mb4 MySQL utf8mb4 .

charset "case and accent insensitive" `_ci` `_ci` " " `_bin` .

"utf8mb4 5.20 `utf8mb4_unicode_520_ci` . `utf8mb4_polish_ci` .

`CHARACTER SET` `CHARSET` .

```
CREATE TABLE Address (
    `AddressID`    INTEGER NOT NULL PRIMARY KEY,
    `Street`       VARCHAR(80) CHARACTER SET ASCII,
    `City`         VARCHAR(80),
    `Country`      VARCHAR(80) DEFAULT "United States",
```

```
    `Active`      BOOLEAN DEFAULT 1,
) Engine=InnoDB default charset=UTF8;
```

City Country UTF8 UTF8 . Street ASCII .

.

: https://riptutorial.com/ko/mysql/topic/4569/---

35:

ASCII ()	.
()	2 .
BIT_LENGTH ()	
()	.
CHAR_LENGTH ()	.
CHARACTER_LENGTH ()	CHAR_LENGTH ()
()	
CONCAT_WS ()	
ELT ()	
EXPORT_SET ()	on unset off .
()	() .
FIND_IN_SET ()	2 .
()	.
FROM_BASE64 ()	64 .
()	16 .
()	.
INSTR ()	substring .
LCASE ()	LOWER ()
()	.
()	.
LOAD_FILE ()	
()	.
()	.

LPAD ()	.
LTRIM ()	
MAKE_SET ()	.
MID ()	.
NOT REGEXP	REGEXP
OCT ()	8 .
OCTET_LENGTH ()	LENGTH ()
ORD ()	.
()	LOCATE ()
()	SQL
REGEXP	
()	
()	
()	.
()	.
RLIKE	REGEXP
RPAD ()	
RTRIM ()	
SOUNDEX ()	soundex .
()	
STRCMP ()	
SUBSTR ()	.
SUBSTRING ()	.
SUBSTRING_INDEX ()	delimiter .
TO_BASE64 ()	base-64 .

()	
()	UPPER ()
UNHEX ()	16 .
()	
WEIGHT_STRING ()	.

Examples

```
SELECT FIND_IN_SET('b','a,b,c');
```

:

2

```
SELECT FIND_IN_SET('d','a,b,c');
```

:

0

STR_TO_DATE - .

my_date_field [] 07/25/2016 , STR_TO_DATE :

```
SELECT STR_TO_DATE(my_date_field, '%m/%d/%Y') FROM my_table;
```

WHERE .

LOWER () / LCASE ()

.

: LOWER (str)

```
LOWER('fOoBar') -- 'foobar'
LCASE('fOoBar') -- 'foobar'
```

()

.

: REPLACE (str, from_str, to_str)

```
REPLACE('foobarbaz', 'bar', 'BAR') -- 'fooBARbaz'
REPLACE('foobarbaz', 'zzz', 'ZZZ') -- 'foobarbaz'
```

SUBSTRING ()

SUBSTRING (equivalent : SUBSTR) .

: `SUBSTRING(str, start_position)`

```
SELECT SUBSTRING('foobarbaz', 4); -- 'barbaz'
SELECT SUBSTRING('foobarbaz' FROM 4); -- 'barbaz'

-- using negative indexing
SELECT SUBSTRING('foobarbaz', -6); -- 'barbaz'
SELECT SUBSTRING('foobarbaz' FROM -6); -- 'barbaz'
```

: `SUBSTRING(str, start_position, length)`

```
SELECT SUBSTRING('foobarbaz', 4, 3); -- 'bar'
SELECT SUBSTRING('foobarbaz', FROM 4 FOR 3); -- 'bar'

-- using negative indexing
SELECT SUBSTRING('foobarbaz', -6, 3); -- 'bar'
SELECT SUBSTRING('foobarbaz' FROM -6 FOR 3); -- 'bar'
```

UPPER () / UCASE ()

.

: UPPER (str)

```
UPPER('fOoBar') -- 'FOOBAR'
UCASE('fOoBar') -- 'FOOBAR'
```

()

. CHAR_LENGTH () .

: LENGTH (str)

```
LENGTH('foobar') -- 6
LENGTH('fööbar') -- 8 -- contrast with CHAR_LENGTH(...) = 6
```

CHAR_LENGTH ()

.

: CHAR_LENGTH (str)

```
CHAR_LENGTH('foobar') -- 6
```

```
CHAR_LENGTH('fööbar') -- 6 -- contrast with LENGTH(...) = 8
```

HEX (str)

16 . .

```
HEX('fööbar') -- 66F6F6626172 -- in "CHARACTER SET latin1" because "F6" is hex for ö
HEX('fööbar') -- 66C3B6C3B6626172  -- in "CHARACTER SET utf8 or utf8mb4" because "C3B6" is hex
for ö
```

: https://riptutorial.com/ko/mysql/topic/1399/-

36:

Examples

.

1. SET , , .

   EX : SET @var_string = 'my_var'; SET @var_num = '2'SET @var_date = '2015-07-20';

2. select . =

   EX : @var : = '123' ; (: (select, update ...) "=" SET = . "=" " = " " SET. ")

3. INTO SELECT .

   ( )

EX : SET @start_date = '2015-07-20'; SET @end_date = '2016-01-31';

```
#this gets the year month value to use as the partition names
SET @start_yearmonth = (SELECT EXTRACT(YEAR_MONTH FROM @start_date));
SET @end_yearmonth = (SELECT EXTRACT(YEAR_MONTH FROM @end_date));

#put the partitions into a variable
SELECT GROUP_CONCAT(partition_name)
FROM information_schema.partitions p
WHERE table_name = 'partitioned_table'
AND SUBSTRING_INDEX(partition_name,'P',-1) BETWEEN @start_yearmonth AND @end_yearmonth
INTO @partitions;

#put the query in a variable. You need to do this, because mysql did not recognize my variable
as a variable in that position. You need to concat the value of the variable together with the
rest of the query and then execute it as a stmt.
SET @query =
CONCAT('CREATE TABLE part_of_partitioned_table (PRIMARY KEY(id))
SELECT partitioned_table.*
FROM partitioned_table PARTITION(', @partitions,')
JOIN users u USING(user_id)
WHERE date(partitioned_table.date) BETWEEN ', @start_date,' AND ', @end_date);

#prepare the statement from @query
PREPARE stmt FROM @query;
#drop table
DROP TABLE IF EXISTS tech.part_of_partitioned_table;
#create table using statement
EXECUTE stmt;
```

Select

team_person .

```
+======+===========+
```

```
| team |    person |
+======+===========+
|   A  |      John |
+------+-----------+
|   B  |     Smith |
+------+-----------+
|   A  |    Walter |
+------+-----------+
|   A  |     Louis |
+------+-----------+
|   C  | Elizabeth |
+------+-----------+
|   B  |     Wayne |
+------+-----------+
```

```
CREATE TABLE team_person AS SELECT 'A' team, 'John' person
UNION ALL  SELECT 'B' team,  'Smith' person
UNION ALL  SELECT 'A' team,  'Walter' person
UNION ALL  SELECT 'A' team,  'Louis' person
UNION ALL  SELECT 'C' team,  'Elizabeth' person
UNION ALL  SELECT 'B' team,  'Wayne' person;
```

row_number team_person .

```
SELECT @row_no := @row_no+1 AS row_number, team, person
FROM team_person, (SELECT @row_no := 0) t;
```

```
SET @row_no := 0;
SELECT  @row_no := @row_no + 1 AS row_number, team, person
FROM team_person;
```

:

```
+============+======+===========+
| row_number | team |    person |
+============+======+===========+
|          1 |   A  |      John |
+------------+------+-----------+
|          2 |   B  |     Smith |
+------------+------+-----------+
|          3 |   A  |    Walter |
+------------+------+-----------+
|          4 |   A  |     Louis |
+------------+------+-----------+
|          5 |   C  | Elizabeth |
+------------+------+-----------+
|          6 |   B  |     Wayne |
+------------+------+-----------+
```

, team row_number

```
SELECT @row_no := IF(@prev_val = t.team, @row_no + 1, 1) AS row_number
   ,@prev_val := t.team AS team
   ,t.person
FROM team_person t,
```

```
  (SELECT @row_no := 0) x,
  (SELECT @prev_val := '') y
ORDER BY t.team ASC,t.person DESC;

+============+======+===========+
| row_number | team |    person |
+============+======+===========+
|          1 |   A  |    Walter |
+------------+------+-----------+
|          2 |   A  |     Louis |
+------------+------+-----------+
|          3 |   A  |      John |
+------------+------+-----------+
|          1 |   B  |     Wayne |
+------------+------+-----------+
|          2 |   B  |     Smith |
+------------+------+-----------+
|          1 |   C  | Elizabeth |
+------------+------+-----------+
```

: https://riptutorial.com/ko/mysql/topic/5013/-

37:

MySQL MySQL [] .

- MySQL

- MySQL .

MySQL . . , .

, .

Statement Based Replication (SBR) - SQL . SQL 2 . SQL .

Row Based Replication (RBR) - . , 2 . .

MBR ( ) . . .

5.7.7 MySQL . MySQL 5.7.7 .

Examples

-

2 MySQL . .

. .

. .

```
CREATE USER 'user_name'@'%' IDENTIFIED BY 'user_password';
GRANT REPLICATION SLAVE ON *.* TO 'user_name'@'%';
FLUSH PRIVILEGES;
```

Username Password `user_name` `user_password` .

`my.inf` (Linux my.cnf) . [mysqld] .

```
server-id = 1
log-bin = mysql-bin.log
binlog-do-db = your_database
```

MySQL ID .

MySQL . `log-bin = /home/mysql/logs/mysql-bin.log` . MySQL .

. `your_database` .

`skip-networking` MySQL ().

`my.inf` Slave . [mysqld] .

```
server-id = 2
master-host = master_ip_address
master-connect-retry = 60

master-user = user_name
master-password = user_password
replicate-do-db = your_database

relay-log = slave-relay.log
relay-log-index = slave-relay-log.index
```

MySQL ID . ID .

IP . IP .

.

.

.

`relay-log` `relay-log-index` .

`skip-networking` MySQL ()

. .

```
FLUSH TABLES WITH READ LOCK;
```

.

`mysqldump` .

```
mysqldump your_database -u root -p > D://Backup/backup.sql;
```

`your_database` `your_database` . `backup.sql` `backup.sql` .

.

```
CREATE DATABASE `your_database`;
```

MySQL .

```
mysql -u root -p your_database  <D://Backup/backup.sql
--->Change `your_database` and backup directory according to your setup
```

., .

```
SHOW MASTER STATUS;
```

.

```
+---------------------+----------+--------------------------------+------------------+
| File                | Position | Binlog_Do_DB                   | Binlog_Ignore_DB |
+---------------------+----------+--------------------------------+------------------+
| mysql-bin.000001    | 130      | your_database                  |                  |
+---------------------+----------+--------------------------------+------------------+
```

.

```
SLAVE STOP;
CHANGE MASTER TO MASTER_HOST='master_ip_address', MASTER_USER='user_name',
   MASTER_PASSWORD='user_password', MASTER_LOG_FILE='mysql-bin.000001', MASTER_LOG_POS=130;
SLAVE START;
```

. . MASTER_LOG_FILE MASTER_LOG_POS SHOW MASTER STATUS SHOW MASTER STATUS .

MASTER_HOST IP .

. .

```
SHOW SLAVE STATUS;
```

Master FLUSH TABLES WITH READ LOCK FLUSH TABLES WITH READ LOCK

```
UNLOCK TABLES;
```

. .

MySQL . . .

```
SET GLOBAL sql_slave_skip_counter = N;
```

N . . .

```
STOP SLAVE;
SET GLOBAL sql_slave_skip_counter=1;
START SLAVE;
```

. .

my.cnf ..

, .

```
1062 | Error 'Duplicate entry 'xyz' for key 1' on query
```

my.cnf my.cnf

```
slave-skip-errors = 1062
```

. .

```
slave-skip-errors=[err_code1,err_code2,...|all]

slave-skip-errors=1062,1053
slave-skip-errors=all
slave-skip-errors=ddl_exist_errors
```

: https://riptutorial.com/ko/mysql/topic/7218/

38:

Examples

(SUPER)

```
GRANT ... TO root@localhost ...
```

. SUPER , . SUPER .

.

```
GRANT ... ON dbname.* ...
```

dbname . .

```
GRANT SELECT ON dname.* ...    -- "read only"
GRANT ... ON dname.tblname ... -- "just one table"
```

" .

```
GRANT SELECT, CREATE TEMPORARY TABLE ON dname.* ...    -- "read only"
```

. . (.)

. SECURITY DEFINER " " ( ). SP . .

(user @ host)

"" IP . , .

```
GRANT SELECT ON db.* TO sam@'my.domain.com' IDENTIFIED BY 'foo';
```

: : .

```
localhost -- the same machine as mysqld
'my.domain.com' -- a specific domain; this involves a lookup
'11.22.33.44' -- a specific IP address
'192.168.1.%' -- wild card for trailing part of IP address.  (192.168.% and 10.% and 11.% are
"internal" ip addresses.)
```

localhost . root localhost . 0.0.0.1 ::1 .

: https://riptutorial.com/ko/mysql/topic/5131/--

39:

Examples

Linux MySQL

MySQL .

1 : MySQL .

- :
  `sudo /etc/init.d/mysql stop`
- CentOS, Fedora Red Hat Enterprise Linux :
  `sudo /etc/init.d/mysqld stop`

2 : MySQL .

```
sudo mysqld_safe --skip-grant-tables &
```

`mysqld_safe` ,

```
sudo mysqld --skip-grant-tables &
```

3 : MySQL .

```
mysql -u root
```

4 : .

5.7

```
FLUSH PRIVILEGES;
ALTER USER 'root'@'localhost' IDENTIFIED BY 'new_password';
FLUSH PRIVILEGES;
exit;
```

5.7

```
FLUSH PRIVILEGES;
SET PASSWORD FOR 'root'@'localhost' = PASSWORD('new_password');
FLUSH PRIVILEGES;
exit;
```

: `ALTER USER` MySQL 5.7.6 .

5 : MySQL .

- :
  `sudo /etc/init.d/mysql stop`

```
sudo /etc/init.d/mysql start
```

- CentOS, Fedora Red Hat Enterprise Linux :

```
sudo /etc/init.d/mysqld stop
sudo /etc/init.d/mysqld start
```

Windows MySQL

Windows .

1 : .

Perst `Crtl+R` Goto `Start Menu > Run` `cmd` Enter `Start Menu > Run`

2 : `MYSQL` .

```
C:\> cd C:\mysql\bin
```

3 : `mysql` .

```
C:\mysql\bin> mysql -u root mysql
```

4 : `root`

```
mysql> SET PASSWORD FOR root@localhost=PASSWORD('my_new_password');
```

1. MySQL (mysqld) / .
2. MySQL --skip-grant-tables : `mysqld_safe --skip-grant-tables &`
3. MySQL : `mysql -u root`
4. :

- (5.7.6) : `ALTER USER 'root'@'localhost' IDENTIFIED BY 'new-password';`
- (5.7.5 , MariaDB) : `SET PASSWORD FOR 'root'@'localhost' = PASSWORD('new-password'); flush privileges; quit;`

5. MySQL .

: .

: http://dev.mysql.com/doc/refman/5.7/en/resetting-permissions.html

: https://riptutorial.com/ko/mysql/topic/2761/-

40:

MySQL 64 IEEE 754 .

.

- `RAND()` . .

Examples

MySQL .

+		`SELECT 3+5;` -> 8 `SELECT 3.5+2.5;` -> 6.0 `SELECT 3.5+2;` -> 5.5
-		`SELECT 3-5;` -> -2
*		`SELECT 3 * 5;` -> 15
/		`SELECT 20 / 4;` -> 5 `SELECT 355 / 113;` -> 3.1416 `SELECT 10.0 / 0;` -> NULL
DIV		`SELECT 5 DIV 2;` -> 2
% MOD		`SELECT 7 % 3;` -> 1 `SELECT 15 MOD 4` -> 3 `SELECT 15 MOD -4` -> 3 `SELECT -15 MOD 4` -> -3 `SELECT -15 MOD -4` -> -3 `SELECT 3 MOD 2.5` -> 0.5

, MySQL `BIGINT` (64) . :

`select (1024 * 1024 * 1024 * 1024 *1024 * 1024) + 1` -> 1,152,921,504,606,846,977

`select (1024 * 1024 * 1024 * 1024 *1024 * 1024 * 1024` -> `BIGINT`

, MySQL 64 IEEE 754 . . .

`PI` 6 . `DOUBLE` .

```
SELECT PI();    -> 3.141593
```

(SIN, COS)

. IEEE 754 64 . ε (ε) . . .

DECIMAL 10 .

X .

```
SELECT SIN(PI()); -> 1.2246063538224e-16
```

X X .

```
SELECT COS(PI()); -> -1
```

X . 0 0 . ε .

```
SELECT TAN(PI());   -> -1.2246063538224e-16
```

( )

X -1 to 1 X .

```
SELECT ACOS(1);    -> 0
SELECT ACOS(1.01); -> NULL
```

( )

X -1 to 1 X .

```
SELECT ASIN(0.2); -> 0.20135792079033
```

( )

ATAN(x) .

```
SELECT ATAN(2); -> 1.1071487177941
```

ATAN2(X, Y) X Y . Y / X . . , X 0 t .

ATAN() ATAN2() .

```
 ATAN2(1,1);    -> 0.7853981633974483 (45 degrees)
 ATAN2(1,-1);   -> 2.356194490192345  (135 degrees)
 ATAN2(0, -1);  -> PI  (180 degrees)  don't try ATAN(-1 / 0)... it won't work
```

X .

```
SELECT COT(12); -> -1.5726734063977
```

```
SELECT RADIANS(90) -> 1.5707963267948966
SELECT SIN(RADIANS(90)) -> 1
SELECT DEGREES(1), DEGREES(PI()) -> 57.29577951308232, 180
```

(ROUND, FLOOR, CEIL)

10

(: DECIMAL): 5 *0* . 4 *0* .

```
SELECT ROUND(4.51) -> 5
SELECT ROUND(4.49) -> 4
SELECT ROUND(-4.51) -> -5
```

(: DOUBLE) : ROUND() C . ROUND() .

```
SELECT ROUND(45e-1) -> 4  -- The nearest even value is 4
SELECT ROUND(55e-1) -> 6  -- The nearest even value is 6
```

.

CEIL() CEILING() .

```
SELECT CEIL(1.23)    -> 2
SELECT CEILING(4.83) -> 5
```

FLOOR() .

```
SELECT FLOOR(1.99) -> 1
```

CEIL -infinity .

```
SELECT FLOOR(-1.01), CEIL(-1.01) -> -2 and -1
SELECT FLOOR(-1.99), CEIL(-1.99) -> -2 and -1
```

10 .

```
SELECT ROUND(1234.987, 2) -> 1234.99
SELECT ROUND(1234.987, -2) -> 1200
```

"5" .

(POW) .

x y POW() POWER() .

```
SELECT POW(2,2); => 4
SELECT POW(4,2); => 16
```

(SQRT)

SQRT() . NULL .

```
SELECT SQRT(16); -> 4
SELECT SQRT(-3); -> NULL
```

(RAND)

0 1   RAND()

.

```
SELECT i, RAND() FROM t;
```

.

	0
1	0.6191438870682
2	0.93845168309142
	0.83482678498591

a <= n <= b .

```
FLOOR(a + RAND() * (b - a + 1))
```

7 12 .

```
SELECT FLOOR(7 + (RAND() * 6));
```

.

```
SELECT * FROM tbl ORDER BY RAND();
```

.

MySQL . , MySQL MySQL .

(ABS, SIGN)

.

```
SELECT ABS(2);   -> 2
SELECT ABS(-46); -> 46
```

`sign` 0 .

-1	n <0	`SELECT SIGN(42);` -> 1
0	n = 0	`SELECT SIGN(0);` -> 0
1	n> 0	`SELECT SIGN(-3);` -> -1

```
SELECT SIGN(-423421); -> -1
```

: https://riptutorial.com/ko/mysql/topic/4516/

41:

MySQL :

```
SELECT User,Host FROM mysql.user;
```

Examples

MySQL

.

1 : `root MySQL root`

```
$ mysql -u root -p
```

2 : mysql .

```
mysql> CREATE USER 'my_new_user'@'localhost' IDENTIFIED BY 'test_password';
```

, , permissions permissions permissions :

```
mysql> GRANT ALL PRIVILEGES ON my_db.* TO 'my_new_user'@'localhost' identified by
'my_password';
```

.

```
mysql> CREATE USER 'my_new_user'@'localhost' IDENTIFIED BY 'test_password';
```

`PASSWORD()` `PASSWORD` .

```
mysql> select PASSWORD('test_password'); -- returns *4414E26EDED6D661B5386813EBBA95065DBC4728
mysql> CREATE USER 'my_new_user'@'localhost' IDENTIFIED BY PASSWORD
'*4414E26EDED6D661B5386813EBBA95065DBC4728';
```

.

```
grant all privileges on schema_name.* to 'new_user_name'@'%' identified by 'newpassword';
```

: .

```
rename user 'user'@'%' to 'new_name`@'%';
```

.

: https://riptutorial.com/ko/mysql/topic/3508/--

42:

- -

  CREATE INDEX *index_name* ON *table_name* (*column_name1* [, *column_name2* , ...])

- -

  TABLE_NAME INDEX_NAME (COLUMN_NAME1 [COLUMN_NAME2 ...]

- -

  DROP INDEX **index_name** ON **tbl_name** [_ | **lock_option**] ...

  algorithm_option : [=] {DEFAULT | INPLACE | COPY}

  lock_option : LOCK [=] {DEFAULT | NONE | SHARED | EXCLUSIVE}

MySQL .

, . (" "). 113-120, 231 354 . (, ,).

.

- "" 1-59, 61-290 292-400 . , , . (" ".)
- 10 . 10 5 . 5 . 10 . .
- - , , "L" .

Examples

```
-- Create an index for column 'name' in table 'my_table'
CREATE INDEX idx_name ON my_table(name);
```

. NULL (, NULL NULL)

```
-- Creates a unique index for column 'name' in table 'my_table'
CREATE UNIQUE INDEX idx_name ON my_table(name);
```

```
-- Drop an index for column 'name' in table 'my_table'
DROP INDEX idx_name ON my_table;
```

mystring mydatetime WHERE .

```
CREATE INDEX idx_mycol_myothercol ON my_table(mycol, myothercol)
```

: ! WHERE . mycol WHERE , myothercol mycol . .

: BTREE . , `DATETIME` `WHERE datecol > '2016-01-01 00:00:00'` `WHERE datecol > '2016-01-01 00:00:00'` . BTREE .

AUTO_INCREMENT

```
CREATE TABLE (
    id INT UNSIGNED NOT NULL AUTO_INCREMENT,
    ...
    PRIMARY KEY(id),
    ...  );
```

:

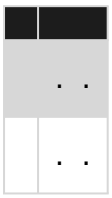
- 1 `INSERT` 1 `NULL` .
- ID ...
- ID ( ) .

:

- " `MAX(id)+1` ' '.
- ID ID ( ). *auto_increments* . .
- `auto_increment_offset` `auto_increment_increment` .
- `PRIMARY KEY` `INDEX(id)` . (.)
- `AUTO_INCREMENT` " `PARTITION` " . .
- "" . `INSERT IGNORE` (dup), `REPLACE` (`DELETE` + `INSERT`) . `ROLLBACK` ID .
- ID . id , InnoDB `COMMIT` .

: https://riptutorial.com/ko/mysql/topic/1748/--

43:



Examples

SHOW VARIABLES

(PHPMyAdmin) SQL MySQL CLI

```
SHOW VARIABLES;
```

.

:

```
SHOW SESSION VARIABLES;
```

:

```
SHOW GLOBAL VARIABLES;
```

SQL LIKE .

```
SHOW [GLOBAL | SESSION] VARIABLES LIKE 'max_join_size';
```

:

```
SHOW [GLOBAL | SESSION] VARIABLES LIKE '%size%';
```

WHERE SHOW .

```
SHOW [GLOBAL | SESSION] VARIABLES WHERE VALUE > 0;
```

SHOW

(PHPMyAdmin) SQL MySQL CLI .

```
SHOW STATUS;
```

. :

```
SHOW SESSION STATUS;
```

:

```
SHOW GLOBAL STATUS;
```

SQL LIKE .

```
SHOW [GLOBAL | SESSION] STATUS LIKE 'Key%';
```

Where :

```
SHOW [GLOBAL | SESSION] STATUS WHERE VALUE > 0;
```

GLOBAL SESSION GLOBAL SESSION .

: https://riptutorial.com/ko/mysql/topic/9924/-

44:

- SELECT DISTINCT GROUP BY .
- OFFSET . " ."
- WHERE (a, b) = (22,33) .
- UNION ALL DISTINCT - ALL DISTINCT .
- SELECT * . TEXT BLOB . tmp .
- GROUP BY ORDER BY .
- FORCE INDEX . , .

ORDER BY, LIKE, REGEXP . : .

.

Examples

, "".

"" . .

```
INDEX(last_name, first_name)
```

.

```
WHERE last_name = '...'
WHERE first_name = '...' AND last_name = '...'   -- (order in WHERE does not matter)
```

```
WHERE first_name = '...'   -- order in INDEX _does_ matter
WHERE last_name = '...' OR first_name = '...'   -- "OR" is a killer
```

.

`innodb_buffer_pool_size` RAM 70 % .

.

```
x IN ( SELECT ... )
```

`JOIN`

`OR` .

`WHERE DATE(x) = ...` `'.'`; `WHERE x = ...` `WHERE x = ...`

`WHERE LCASE(name1) = LCASE(name2)` .

`""` `OFFSET` `' '`.

`SELECT * ...` ( ).

Maria Deleva, Barranka, Batsu : . . / .

. / .

- InnoDB MyISAM .
- `PARTITIONing` . .
- `query_cache_size` 1 .
- `my.cnf` " . .
- `""`(: `INDEX(foo(20))`) .
- `OPTIMIZE TABLE` .(.)

.

```
WHERE a = 12  --> INDEX(a)
WHERE a > 12  --> INDEX(a)

WHERE a = 12 AND b > 78  --> INDEX(a,b) is more useful than INDEX(b,a)
WHERE a > 12 AND b > 78  --> INDEX(a) or INDEX(b); no way to handle both ranges

ORDER BY x  --> INDEX(x)
ORDER BY x, y  --> INDEX(x,y) in that order
ORDER BY x DESC, y ASC  --> No index helps - because of mixing ASC and DESC
```

.

. , .

```
WHERE DATE(dt) = '2000-01-01'
```

`INDEX(dt)` `INDEX(dt)` .

```
WHERE dt = '2000-01-01'  -- if `dt` is datatype `DATE`
```

`DATE` , `DATETIME` , `TIMESTAMP` `DATETIME(6)` ( ) .

```
WHERE dt >= '2000-01-01'
  AND dt  < '2000-01-01' + INTERVAL 1 DAY
```

`OR` .

```
WHERE a = 12 OR b = 78
```

INDEX(a,b) " " INDEX(a), INDEX(b) . .

```
WHERE x = 3 OR x = 5
```

```
WHERE x IN (3, 5)
```

x .

., """ " . . .

. : 1 . LEFT JOIN .

```
SELECT a, b, ( SELECT ... FROM t WHERE t.x = u.x ) AS c
    FROM u ...
SELECT a, b, ( SELECT MAX(x) ... ) AS c
    FROM u ...
SELECT a, b, ( SELECT x FROM t ORDER BY ... LIMIT 1 ) AS c
    FROM u ...
```

.

```
SELECT ...
    FROM ( SELECT ... ) AS a
    JOIN b ON ...
```

FROM-SELECT :

- 1 .
- ("1 row") (SELECT @n := 0) , @variable .
- JOIN (SELECT ...) . 5.6 CROSS JOIN . 5.6+ SELECT .

JOIN + GROUP BY

.

```
SELECT ...
    FROM a
    JOIN b  ON ...
    WHERE ...
    GROUP BY a.id
```

JOIN . GROUP BY a .

- . JOIN SELECT . GROUP BY .

: https://riptutorial.com/ko/mysql/topic/4292/-

45:

Examples

NULL

MySQL SQL `NULL` .

, . `NULL` .

```
CREATE TABLE example
(`applicant_id` INT, `company_name` VARCHAR(255), `end_date` DATE);

+--------------+-----------------+------------+
| applicant_id | company_name    | end_date   |
+--------------+-----------------+------------+
|            1 | Google          | NULL       |
|            1 | Initech         | 2013-01-31 |
|            2 | Woodworking.com | 2016-08-25 |
|            2 | NY Times        | 2013-11-10 |
|            3 | NFL.com         | 2014-04-13 |
+--------------+-----------------+------------+
```

`2016-01-01` . (`NULL`) . select .

```
SELECT * FROM example WHERE end_date > '2016-01-01';
```

`NULL` .

```
+--------------+-----------------+------------+
| applicant_id | company_name    | end_date   |
+--------------+-----------------+------------+
|            2 | Woodworking.com | 2016-08-25 |
+--------------+-----------------+------------+
```

MySQL <,>, = <> `TRUE FALSE NULL FALSE` . end_date `NULL` 2016-01-01 2016-01-01 .

IS NULL .

```
SELECT * FROM example WHERE end_date > '2016-01-01' OR end_date IS NULL;

+--------------+-----------------+------------+
| applicant_id | company_name    | end_date   |
+--------------+-----------------+------------+
|            1 | Google          | NULL       |
|            2 | Woodworking.com | 2016-08-25 |
+--------------+-----------------+------------+
```

`MAX() GROUP BY` NULL . ID , :

```
SELECT applicant_id, MAX(end_date) FROM example GROUP BY applicant_id;

+--------------+---------------+
| applicant_id | MAX(end_date) |
+--------------+---------------+
|            1 | 2013-01-31    |
|            2 | 2016-08-25    |
|            3 | 2014-04-13    |
+--------------+---------------+
```

NULL . CASE WHEN NULL .

```
 SELECT
    applicant_id,
    CASE WHEN MAX(end_date is null) = 1 THEN 'present' ELSE MAX(end_date) END
    max_date
FROM example
GROUP BY applicant_id;

+--------------+------------+
| applicant_id | max_date   |
+--------------+------------+
|            1 | present    |
|            2 | 2016-08-25 |
|            3 | 2014-04-13 |
+--------------+------------+
```

example .

```
SELECT
  data.applicant_id,
  data.company_name,
  data.max_date
FROM (
  SELECT
    *,
    CASE WHEN end_date is null THEN 'present' ELSE end_date END max_date
  FROM example
) data
INNER JOIN (
 SELECT
   applicant_id,
   CASE WHEN MAX(end_date is null) = 1 THEN 'present' ELSE MAX(end_date) END max_date
 FROM
   example
 GROUP BY applicant_id
) j
ON data.applicant_id = j.applicant_id AND data.max_date = j.max_date;

+--------------+-----------------+------------+
| applicant_id | company_name    | max_date   |
+--------------+-----------------+------------+
|            1 | Google          | present    |
|            2 | Woodworking.com | 2016-08-25 |
|            3 | NFL.com         | 2014-04-13 |
+--------------+-----------------+------------+
```

MySQL NULL .

: https://riptutorial.com/ko/mysql/topic/5866/------

46:

MySQL TIMESTAMP .

. VARCHAR (64) C . . , America/Edmonton . Asia/Kolkata Australia/NSW . WordPress.org .

, (Java, PHP) DBMS SQL

```
SET SESSION time_zone='(whatever tz string the user gave you)'
```

TIMESTAMP .

UTC . NOW () CURDATE () . , DATETIME DATE TIMESTAMP .

OS MySQL UTC . . MySQL , .

Examples

.

, , UTC NOW() .

```
SELECT NOW();
SET time_zone='Asia/Kolkata';
SELECT NOW();
SET time_zone='UTC';
SELECT NOW();
```

'DATE' 'DATETIME' .

DATE DATETIME ( ) MySQL . . CONVERT_TZ() . .

```
SELECT CONVERT_TZ(date_sold,'UTC','America/Los_Angeles') date_sold_local
  FROM sales
 WHERE state_sold = 'CA'
```

'TIMESTAMP`

. TIMESTAMP time_zone .

```
SET SESSION time_zone='America/Los_Angeles';
SELECT timestamp_sold
  FROM sales
 WHERE state_sold = 'CA'
```

? TIMESTAMP UNIX time_t . UNIX 1970-01-01 00:00:00 UTC .

`TIMESTAMP` . `DATE` `DATETIME` .

?

time_zone . .

```
SELECT @@time_zone
```

, MySQL `SYSTEM` OS .

(,) UTC .

```
CREATE TEMPORARY TABLE times (dt DATETIME, ts TIMESTAMP);
SET time_zone = 'UTC';
INSERT INTO times VALUES(NOW(), NOW());
SET time_zone = 'SYSTEM';
SELECT dt, ts, TIMESTAMPDIFF(MINUTE, dt, ts)offset FROM times;
DROP TEMPORARY TABLE times;
```

? . `DATETIME` `TIMESTAMP` UTC . time_zone UTC `INSERT` / .

SELECT time_zone server local time . `TIMESTAMP` UTC SELECT . `DATETIME` . `TIMESTAMPDIFF(MINUTE...)` .

time_zone ?

MySQL time_zone .

```
SELECT mysql.time_zone_name.name
```

Paul Eggert Internet Assigned Numbers Authority ZoneInfo . 600 .

(: , BSD , OS) . MySQL / .

Windows . ZoneInfo .

: https://riptutorial.com/ko/mysql/topic/7849/-

47:

Examples

NULL

- `end_date` , `rating`
- - : `middle_initial` ( )
- 0/0 - 0 0 .
- NULL ""( ) 0 ( ) .
- ?

NULL

- `IS NULL` / `IS NOT NULL` - `= NULL` .
- `x <=> y` "null-safe".

A `LEFT JOIN` `a` `b` .

```
SELECT ...
    FROM a
    LEFT JOIN b ON ...
    WHERE b.id IS NULL
```

: https://riptutorial.com/ko/mysql/topic/6757/

48:

Examples

`` .

Backticks " *MySQL* " . PHPmyAdmin " *MySQL* " .

" `group` " . .

```
SELECT student_name, AVG(test_score) FROM student GROUP BY group
```

.

```
SELECT student_name, AVG(test_score) FROM student GROUP BY `group`
```

---

backticks . `JOIN` .

```
SELECT `users`.`username`, `groups`.`group` FROM `users`
```

.

, querys :

```
select student_name, AVG(test_score) from student group by group
select `student_name`, AVG(`test_score`) from `student` group by `group`
```

MySQL . (R) . . .

: https://riptutorial.com/ko/mysql/topic/5208/-

49:

MySQL . (`) , . .

.

:

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- ASC
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-
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- CURRENT_DATE
-
- CURRENT_TIMESTAMP
-
-
-
-
- DAY_HOUR
- DAY_MICROSECOND
- DAY_MINUTE
- DAY_SECOND
- DEC
-

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- DESC
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- DIV
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- ELSEIF
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- FLOAT4
- FLOAT8
-
-
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-
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-
-
-
-
-
- HIGH_PRIORITY
- HOUR_MICROSECOND
- HOUR_MINUTE
- HOUR_SECOND
-
- IGNORE
-
-
- INFILE
-
- INOUT
-
-
- INT
- INT1
- INT2

- INT3
- INT4
- INT8
-
-
-
- IO_AFTER_GTIDS
- IO_BEFORE_GTIDS
- IS
- ITERATE
-
-
-
-
-
-
-
-
-
-
-
-
-
-
- LOCALTIMESTAMP
-
-
- LONGBLOB
- LONGTEXT
-
-
- MASTER_BIND
- MASTER_SSL_VERIFY_SERVER_CERT
-
- MAXVALUE
- MEDIUMBLOB
-
-
-
- MINUTE_MICROSECOND
- MINUTE_SECOND
-
-
-
-
- NO_WRITE_TO_BINLOG
-
-
-
-
- OPTIMIZER_COSTS
-
-
-

- READ_WRITE
- REGEXP
- RLIKE
- SECOND_MICROSECOND
- SMALLINT
- SPATIAL
- SQL
- SQLEXCEPTION
- SQLSTATE
- SQLWARNING
- SQL_BIG_RESULT
- SQL_CALC_FOUND_ROWS
- SQL_SMALL_RESULT
- SSL
- STRAIGHT_JOIN

- TINYBLOB
-
- TINYTEXT
-
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-
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-
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-
-
- UNSIGNED
-
-
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- UTC_DATE
- UTC_TIME
- UTC_TIMESTAMP
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-
- VARCHAR
- VARCHARACTER
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-
-
-
-
-
-
- XOR
- YEAR_MONTH
-
-
- OPTIMIZER_COSTS
-
-

Examples

`order`

```
select * from order
```

.

: 1064. SQL . MySQL 1 'order'

MySQL (`) .

```
select * from `order`
```

.

MySQL .

: https://riptutorial.com/ko/mysql/topic/1398/

50: 1055 : ONLY_FULL_GROUP_BY : GROUP BY ...

MySQL 1055 . . MySQL `GROUP BY` `GROUP BY` .

MySQL `GROUP BY` . . `GROUP BY` .

`GROUP BY` `SELECT * GROUP BY` . .

. https://dev.mysql.com/doc/refman/5.7/en/group-by-handling.html

MySQL . `ONLY_FULL_GROUP_BY` 5.7.5 `sql_mode` . . MySQL 5.7.14 .

1055 ?

1. SQL .
2. MySQL .
3. `sql_mode` `ONLY_FULL_GROUP_BY` .

`SET` .

```
SET  sql_mode =
'STRICT_TRANS_TABLES,NO_ZERO_IN_DATE,NO_ZERO_DATE,ERROR_FOR_DIVISION_BY_ZERO,NO_AUTO_CREATE_USER,NO_ENG
```

MySQL .

MySQL init `sql_mode= ONLY_FULL_GROUP_BY` .

Examples

GROUP BY

```
 SELECT item.item_id, item.name,     /* not SQL-92 */
        COUNT(*) number_of_uses
  FROM item
  JOIN uses ON item.item_id, uses.item_id
 GROUP BY item.item_id
```

`item` `uses` `uses` . SQL-92 .

? `GROUP BY` `SELECT` (`ORDER BY`) .

1. `GROUP BY`
2. `COUNT()` , `MIN()` .

`SELECT item.name item.name` , . MySQL 5.6 SQL `ONLY_FULL_GROUP_BY` .

GROUP BY SQL-92 .

```
SELECT item.item_id, item.name,
       COUNT(*) number_of_uses
  FROM item
  JOIN uses ON item.item_id, uses.item_id
 GROUP BY item.item_id, item.name
```

SQL-99 SELECT DBMS . item.name item.name item.item_id SQL-99. MySQL 5.7 . ONLY_FULL_GROUP_BY .

GROUP BY : Murphy 's Law

```
SELECT item.item_id, uses.category,   /* nonstandard */
       COUNT(*) number_of_uses
  FROM item
  JOIN uses ON item.item_id, uses.item_id
 GROUP BY item.item_id
```

item uses . uses.category .

ONLY_FULL_GROUP_BY MySQL . MySQL GROUP BY .

. uses JOIN ON MySQL category . ? . , . MySQL .

. . . . MySQL . MySQL . . . .

MySQL . 5.7 MySQL ONLY_FULL_GROUP_BY sql_mode . MySQL 1055 .

GROUP BY SELECT * .

SELECT * .

```
 SELECT item.*,     /* nonstandard */
        COUNT(*) number_of_uses
  FROM item
  JOIN uses ON item.item_id, uses.item_id
 GROUP BY item.item_id
```

ONLY_FULL_GROUP_BY .

item_id number_of_uses GROUP BY . . uses .

```
                          SELECT item_id, COUNT(*) number_of_uses
                            FROM  uses
                           GROUP BY item_id
```

item .

```
 SELECT item.*, usecount.number_of_uses
   FROM item
```

```
    JOIN (
                                SELECT item_id, COUNT(*) number_of_uses
                                  FROM  uses
                                 GROUP BY item_id
          ) usecount ON item.item_id = usecount.item_id
```

GROUP BY * .

: * . .

ANY_VALUE ()

```
SELECT item.item_id, ANY_VALUE(uses.tag) tag,
       COUNT(*) number_of_uses
 FROM item
 JOIN uses ON item.item_id, uses.item_id
GROUP BY item.item_id
```

item , uses uses .

ANY_VALUE() . count, sum maximum MySQL . 1055 .

ANY_VALUE() .

SURPRISE_ME() . GROUP BY . . MySQL . .

. . , RAM , , ( ) .

.

1055 : ONLY_FULL_GROUP_BY : GROUP BY ... : https://riptutorial.com/ko/mysql/topic/8245/-1055---only-full-group-by---group-by-------

51:

Examples

1064 :

```
select LastName, FirstName,
from Person
```

.

: 1064. SQL . MySQL 2 'from Person' .

MySQL "1064 " . , .

MySQL . MySQL `from Person` . `from Person` . MySQL `SELECT` .

`... near '...'` . . .

`... near ''` ; , . , MySQL . (' ") .

(stored routine) `DELIMITER` .

1064 . .

1064 .

1175 :

`KEY WHERE` .

.

```
SET SQL_SAFE_UPDATES = 0;
```

.

```
SET SQL_SAFE_UPDATES = 1;
```

1215 : .

(`FK`) .

```
CREATE TABLE `gtType` (
  `type` char(2) NOT NULL,
  `description` varchar(1000) NOT NULL,
  PRIMARY KEY (`type`)
) ENGINE=InnoDB;
```

```
CREATE TABLE `getTogethers` (
  `id` int(11) NOT NULL AUTO_INCREMENT,
  `type` char(2) NOT NULL,
  `eventDT` datetime NOT NULL,
  `location` varchar(1000) NOT NULL,
  PRIMARY KEY (`id`),
  KEY `fk_gt2type` (`type`), -- see Note1 below
  CONSTRAINT `gettogethers_ibfk_1` FOREIGN KEY (`type`) REFERENCES `gtType` (`type`)
) ENGINE=InnoDB;
```

1 : KEY FK . KEY ( ) . `someOther` .

.

```
CREATE TABLE `someOther` (
  `id` int(11) NOT NULL AUTO_INCREMENT,
  `someDT` datetime NOT NULL,
  PRIMARY KEY (`id`),
  CONSTRAINT `someOther_dt` FOREIGN KEY (`someDT`) REFERENCES `getTogethers` (`eventDT`)
) ENGINE=InnoDB;
```

: 1215. .

`getTogethers` `eventDT` . .

```
CREATE INDEX `gt_eventdt` ON getTogethers (`eventDT`);
```

`getTogethers` `someOther` .

MySQL FOREIGN KEY :

MySQL . . ( ).

. . . () .

InnoDB . .

( ) .

() .

```
SHOW CREATE TABLE someOther;
```

. .

- `INT` `INT UNSIGNED` .
- () KEYS ( ) .

1045 .

"GRANT" "root " .

1236 " "

`sync_binlog` OFF . binlog ( ) `CHANGE MASTER to POS=0` `CHANGE MASTER to POS=0` `CHANGE MASTER to POS=0` .

: binlog (`sync_binlog=OFF`). . binlog binlog .

I / O `sync_binlog=ON` .

(GTID ...?)

2002, 2003 .

3306 .

/

- ?
- "service firewalld stop" "systemctl disable firewalld"
- 3306
- `bind-address`
- check `skip-name-resolve`
- .

1067, 1292, 1366, 1411 - , , .

1067 `TIMESTAMP` . `TIMESTAMP defaults` . ( )

1292/1366 DOUBLE / Integer . . `VARCHAR` .

1292 DATETIME . 2 3 . `+00` .

1292 VARIABLE `SET VARIABLE` .

1292 LOAD DATA ". . .

1411 STR_TO_DATE ?

126, 127, 134, 144, 145

MySQL . MySQL . .

```
MySQL error code 126 = Index file is crashed
MySQL error code 127 = Record-file is crashed
MySQL error code 134 = Record was already deleted (or record file crashed)
MySQL error code 144 = Table is crashed and last repair failed
MySQL error code 145 = Table was marked as crashed and should be repaired
```

MySQL , , , , . . . MySQL .

`MyISAM  CHECK TABLE  REPAIR TABLE .`

InnoDB . .

```
CHECK TABLE <table name> ////To check the extent of database corruption
REPAIR TABLE <table name> ////To repair table
```

139

139 . :

- .
-
-

1366

. ... .

126, 1054, 1146, 1062, 24

( ) 4 50 % .

(, " .)

24 ( )

`open_files_limit` OS . `table_open_cache` .

.

- `DEALLOCATE PREPARE` .
- PARTITIONED innodb_file_per_table = ON. 50 ( ). (" " .)

OS . `ulimit /etc/security/limits.conf sysctl.conf` (kern.maxfiles & kern.maxfilesperproc) (OS) . `open_files_limit table_open_cache` .

5.6.8 `open_files_limit max_connections` .

1062 -

.

1. - `Error Code: 1062. Duplicate entry '12' for key 'PRIMARY'`

   . .

   `AUTO_INCREMENT` . `NULL` .

```
CREATE TABLE userDetails(
  userId INT(10) NOT NULL AUTO_INCREMENT,
  firstName VARCHAR(50),
  lastName VARCHAR(50),
  isActive INT(1) DEFAULT 0,
  PRIMARY KEY (userId) );

--->and now while inserting
INSERT INTO userDetails VALUES (NULL ,'John', 'Doe', 1);
```

2. - `Error Code: 1062. Duplicate entry 'A' for key 'code'`

.

`INSERT` `INSERT IGNORE` . , MySQL . `IGNORE` .

```
INSERT IGNORE INTO userDetails VALUES (NULL ,'John', 'Doe', 1);
```

: https://riptutorial.com/ko/mysql/topic/895/-

52:

Examples

MySQL SQL cron EVENT . . .

.

```
SHOW VARIABLES WHERE variable_name='event_scheduler';
+-----------------+-------+
| Variable_name   | Value |
+-----------------+-------+
| event_scheduler | OFF   |
+-----------------+-------+
```

. :

```
SET GLOBAL event_scheduler = ON;
```

```
create table theMessages
(   id INT AUTO_INCREMENT PRIMARY KEY,
    userId INT NOT NULL,
    message VARCHAR(255) NOT NULL,
    updateDt DATETIME NOT NULL,
    KEY(updateDt)
);

INSERT theMessages(userId,message,updateDt) VALUES (1,'message 123','2015-08-24 11:10:09');
INSERT theMessages(userId,message,updateDt) VALUES (7,'message 124','2015-08-29');
INSERT theMessages(userId,message,updateDt) VALUES (1,'message 125','2015-09-03 12:00:00');
INSERT theMessages(userId,message,updateDt) VALUES (1,'message 126','2015-09-03 14:00:00');
```

. 2 .

2 , 1 , 2 10

( ). INTERVAL .

```
DROP EVENT IF EXISTS `delete7DayOldMessages`;
DELIMITER $$
CREATE EVENT `delete7DayOldMessages`
  ON SCHEDULE EVERY 1 DAY STARTS '2015-09-01 00:00:00'
  ON COMPLETION PRESERVE
DO BEGIN
   DELETE FROM theMessages
   WHERE datediff(now(),updateDt)>6; -- not terribly exact, yesterday but <24hrs is still 1
day

  -- Other code here

END$$
```

```
DELIMITER ;
```

...

```
DROP EVENT IF EXISTS `Every_10_Minutes_Cleanup`;
DELIMITER $$
CREATE EVENT `Every_10_Minutes_Cleanup`
  ON SCHEDULE EVERY 10 MINUTE STARTS '2015-09-01 00:00:00'
  ON COMPLETION PRESERVE
DO BEGIN
   DELETE FROM theMessages
   WHERE TIMESTAMPDIFF(HOUR, updateDt, now())>168; -- messages over 1 week old (168 hours)

   -- Other code here
END$$
DELIMITER ;
```

( )

```
SHOW EVENTS FROM my_db_name; -- List all events by schema name (db name)
SHOW EVENTS;
SHOW EVENTS\G; -- <--------- I like this one from mysql> prompt

*************************** 1. row ***************************
                  Db: my_db_name
                Name: delete7DayOldMessages
             Definer: root@localhost
           Time zone: SYSTEM
                Type: RECURRING
          Execute at: NULL
      Interval value: 1
      Interval field: DAY
              Starts: 2015-09-01 00:00:00
                Ends: NULL
              Status: ENABLED
          Originator: 1
character_set_client: utf8
collation_connection: utf8_general_ci
  Database Collation: utf8_general_ci
*************************** 2. row ***************************
                  Db: my_db_name
                Name: Every_10_Minutes_Cleanup
             Definer: root@localhost
           Time zone: SYSTEM
                Type: RECURRING
          Execute at: NULL
      Interval value: 10
      Interval field: MINUTE
              Starts: 2015-09-01 00:00:00
                Ends: NULL
              Status: ENABLED
          Originator: 1
character_set_client: utf8
collation_connection: utf8_general_ci
  Database Collation: utf8_general_ci
2 rows in set (0.06 sec)
```

`DROP EVENT someEventName;` - .

`ON COMPLETION PRESERVE` - . .

. . . .

Manual Page .

:

```
quantity {YEAR | QUARTER | MONTH | DAY | HOUR | MINUTE |
          WEEK | SECOND | YEAR_MONTH | DAY_HOUR | DAY_MINUTE |
          DAY_SECOND | HOUR_MINUTE | HOUR_SECOND | MINUTE_SECOND}
```

. , DDL DML . MySQL .

: https://riptutorial.com/ko/mysql/topic/4319/

53:

(1 : M) . .

1 : M . , 1 : M " " " . " .

, 1 : M .

. EMP_ID . EMP_ID .

. EMPLOYEES MGR_ID . .

Examples

1 1 .

.

EMP_ID		LAST_NAME	MGR_ID
E01			M02
E02			M01
E03			M03
E04			M01

MGR_ID		LAST_NAME
M01		
M02		
M03		

```
SELECT e.emp_id , e.first_name , e.last_name FROM employees e INNER JOIN managers m ON m.mgr_id
= e.mgr_id WHERE m.mgr_id = 'M01' ;
```

:

EMP_ID		LAST_NAME
E02		
E04		

1 .

.

```
SELECT m.mgr_id , m.first_name , m.last_name FROM managers m INNER JOIN employees e ON e.mgr_id
= m.mgr_id WHERE e.emp_id = 'E03' ;
```

MGR_ID		LAST_NAME
M03		

.

: https://riptutorial.com/ko/mysql/topic/9600/-

54:

Examples

, HTTP

: . mySQL .

```
sudo systemctl stop mysql
```

mySQL .

```
sudo mysqld_safe --skip-grant-tables
```

:

```
mysql -u root
```

SQL .

```
select User, password,plugin FROM mysql.user ;
```

(null) :

```
update mysql.user set password=PASSWORD('mypassword'), plugin = NULL WHERE User = 'root';
exit;
```

mySQL :

```
sudo service mysql stop
sudo service mysql start
```

: https://riptutorial.com/ko/mysql/topic/9973/---

55:

Examples

. MySQL 3.23 .

. .

.

.

```
--->Basic temporary table creation
CREATE TEMPORARY TABLE tempTable1(
       id INT NOT NULL AUTO_INCREMENT,
       title VARCHAR(100) NOT NULL,
       PRIMARY KEY ( id )
    );

--->Temporary table creation from select query
CREATE TEMPORARY TABLE tempTable1
    SELECT ColumnName1,ColumnName2,... FROM table1;
```

.

```
CREATE TEMPORARY TABLE tempTable1
        ( PRIMARY KEY(ColumnName2) )
    SELECT ColumnName1,ColumnName2,... FROM table1;
```

`IF NOT EXISTS` *'table already exists'* . .

```
CREATE TEMPORARY TABLE IF NOT EXISTS tempTable1
    SELECT ColumnName1,ColumnName2,... FROM table1;
```

.

```
DROP TEMPORARY TABLE tempTable1

DROP TEMPORARY TABLE IF EXISTS tempTable1
```

`IF EXISTS` .

: https://riptutorial.com/ko/mysql/topic/5757/-

56: ( )

	.
	RETURN .

.

CALL .

.

Examples

() INT 12 .

```
DELIMITER ||
CREATE FUNCTION functionname()
RETURNS INT
BEGIN
    RETURN 12;
END;
||
DELIMITER ;
```

(DELIMITER ||) , ; ; CREATE .

CREATE FUNCTION ; (DELIMITER ;) .

:

```
SELECT functionname();
+----------------+
| functionname() |
+----------------+
|             12 |
+----------------+
```

( ) .

```
DELIMITER $$
CREATE FUNCTION add_2 ( my_arg INT )
  RETURNS INT
BEGIN
  RETURN (my_arg + 2);
END;
$$
DELIMITER ;
```

```
SELECT add_2(12);
+-----------+
| add_2(12) |
+-----------+
|        14 |
+-----------+
```

```
DELIMITER  . CREATE       \\ , ||      . $$ .
```

, . GUI . s . .

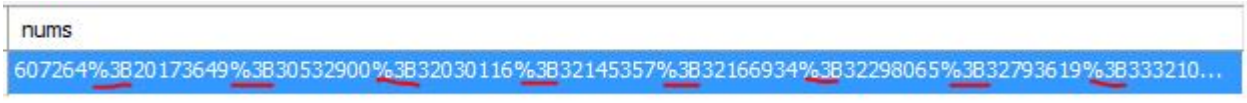
```
DROP PROCEDURE if exists displayNext100WithName;
DELIMITER $$
CREATE PROCEDURE displayNext100WithName
(    nStart int,
    tblName varchar(100)
)
BEGIN
    DECLARE thesql varchar(500); -- holds the constructed sql string to execute

    -- expands the sizing of the output buffer to accomodate the output (Max value is at least
4GB)
    SET session group_concat_max_len = 4096; -- prevents group_concat from barfing with error
1160 or whatever it is

    SET @thesql=CONCAT("select group_concat(qid order by qid SEPARATOR '%3B') as nums ","from
(    select qid from ");
    SET @thesql=CONCAT(@thesql,tblName," where qid>? order by qid limit 100 )xDerived");
    PREPARE stmt1 FROM @thesql; -- create a statement object from the construct sql string to
execute
    SET @p1 = nStart; -- transfers parameter passed into a User Variable compatible with the
below EXECUTE
    EXECUTE stmt1 USING @p1;

    DEALLOCATE PREPARE stmt1; -- deallocate the statement object when finished
END$$
DELIMITER ;
```

DELIMITER .

:

```
call displayNext100WithName(1,"questions_mysql");
```

%3B () :



IN, OUT, INOUT

```
DELIMITER $$

DROP PROCEDURE IF EXISTS sp_nested_loop$$
CREATE PROCEDURE sp_nested_loop(IN i INT, IN j INT, OUT x INT, OUT y INT, INOUT z INT)
BEGIN
```

```
    DECLARE a INTEGER DEFAULT 0;
    DECLARE b INTEGER DEFAULT 0;
    DECLARE c INTEGER DEFAULT 0;
    WHILE a < i DO
        WHILE b < j DO
            SET c = c + 1;
            SET b = b + 1;
        END WHILE;
        SET a = a + 1;
        SET b = 0;
    END WHILE;
    SET x = a, y = c;
    SET z = x + y + z;
END $$
DELIMITER ;
```

( ).

```
SET @z = 30;
call sp_nested_loop(10, 20, @x, @y, @z);
SELECT @x, @y, @z;
```

:

```
+------+------+------+
|  @x  |  @y  |  @z  |
+------+------+------+
|  10  |  200 |  240 |
+------+------+------+
```

IN . .

OUT . NULL .

INOUT .

: http://dev.mysql.com/doc/refman/5.7/en/create-procedure.html

. DECLARE SQL .

```
DECLARE student CURSOR FOR SELECT name FROM studend;
```

. .

:

```
CREATE TABLE product
(
  id   INT(10) UNSIGNED NOT NULL AUTO_INCREMENT PRIMARY KEY,
  type VARCHAR(50)      NOT NULL,
  name VARCHAR(255)     NOT NULL

);
CREATE TABLE product_type
```

```
(
  name VARCHAR(50) NOT NULL PRIMARY KEY
);
CREATE TABLE product_type_count
(
  type  VARCHAR(50)      NOT NULL PRIMARY KEY,
  count INT(10) UNSIGNED NOT NULL DEFAULT 0
);

INSERT INTO product_type (name) VALUES
  ('dress'),
  ('food');

INSERT INTO product (type, name) VALUES
  ('dress', 'T-shirt'),
  ('dress', 'Trousers'),
  ('food', 'Apple'),
  ('food', 'Tomatoes'),
  ('food', 'Meat');
```

.

```
DELIMITER //
DROP PROCEDURE IF EXISTS product_count;
CREATE PROCEDURE product_count()
  BEGIN
    DECLARE p_type VARCHAR(255);
    DECLARE p_count INT(10) UNSIGNED;
    DECLARE done INT DEFAULT 0;
    DECLARE product CURSOR FOR
      SELECT
        type,
        COUNT(*)
      FROM product
      GROUP BY type;
    DECLARE CONTINUE HANDLER FOR SQLSTATE '02000' SET done = 1;

    TRUNCATE product_type;

    OPEN product;

    REPEAT
      FETCH product
      INTO p_type, p_count;
      IF NOT done
      THEN
        INSERT INTO product_type_count
        SET
          type  = p_type,
          count = p_count;
      END IF;
    UNTIL done
    END REPEAT;

    CLOSE product;
  END //
DELIMITER ;
```

:

```
CALL product_count();
```

product_type_count .

```
type   | count
---------------
dress  |   2
food   |   3
```

CURSOR ,

```
INSERT INTO product_type_count
        (type, count)
    SELECT type, COUNT(*)
        FROM product
        GROUP BY type;
```

.

ResultSet

SELECT Stored Procedure . Perl, PHP CALL .

(!)

```
DELIMITER $$
CREATE
    DEFINER=`db_username`@`hostname_or_IP`
    FUNCTION `function_name`(optional_param data_type(length_if_applicable))
    RETURNS data_type
BEGIN
    /*
    SQL Statements goes here
    */
END$$
DELIMITER ;
```

RETURNS data_type MySQL .

( ) : https://riptutorial.com/ko/mysql/topic/1351/-------

57:

- CREATE VIEW view_name AS SELECT column_name (s) FROM table_name WHERE ; ///
- CREATE [REPLACE] [ALGORITHM = {UNDEFINED | | TEMPTABLE}] [DEFINER = { | CURRENT_USER}] [SQL (DEFINER | INVOKER}] view_name [( )] AS select_statement [WITH [| LOCAL] CHECK OPTION]; ///
- DROP VIEW [ ] [db_name.] view_name; ///

view_name	
SELECT	SQL . (fetch) SELECT .

. .

- `SELECT` . `SELECT` FROM .
- `SELECT` .

.

- . "Sales" "Sales" . .

. `VIEWs` . . "" . MySQL 5.7.6 Optimizer . `VIEW` .

Examples

CREATE VIEW. CREATE VIEW SELECT. . SELECT. C , SELECT . OR REPLACE DROP . CREATE VIEW DEFINER SUPER ( ).

.

. . .

:

db_name.view_name

```
mysql> CREATE VIEW test.v AS SELECT * FROM t;
```

- .

.

- SELECT
- .

- , UNION
- SELECT .

.

```
mysql> CREATE TABLE t (qty INT, price INT);
mysql> INSERT INTO t VALUES(3, 50);
mysql> CREATE VIEW v AS SELECT qty, price, qty*price AS value FROM t;
mysql> SELECT * FROM v;
+------+-------+-------+
| qty  | price | value |
+------+-------+-------+
|    3 |    50 |   150 |
+------+-------+-------+
```

- MySQL 5.7.7 SELECT FROM .
- SELECT .
- SELECT .
- SELECT. . .
- . .
  . . CHECK TABLE .
- TEMPORARY
  TEMPORARY .
- .
- SELECT 64 ( )
  256 .
- VIEW SELECT . .

.

```
CREATE VIEW myview AS
SELECT a.*, b.extra_data FROM main_table a
LEFT OUTER JOIN other_table b
ON a.id = b.id
```

MySQL . SELECT * FROM myview mysql LEFT JOIN .

.

VIEW

VIEW . UPDATE ., SELECT , UPDATE .

GROUP BY , UNION , HAVING , DISTINCT . .

- h .

```
CREATE VIEW few_rows_from_t1 AS SELECT * FROM t1 LIMIT 10;
DROP VIEW few_rows_from_t1;
```

- .

```
CREATE VIEW table_from_other_db AS SELECT x FROM db1.foo WHERE x IS NOT NULL;
DROP VIEW table_from_other_db;
```

: https://riptutorial.com/ko/mysql/topic/1489/

58:

MySQL FULLTEXT . .

FULLTEXT . . . MySQL .

FULLTEXT . WHERE column LIKE 'text%' .

FULLTEXT MyISAM . MySQL 5.6.4 InnoDB .

Examples

FULLTEXT

```
    SET @searchTerm= 'Database Programming';
 SELECT MATCH (Title) AGAINST (@searchTerm IN NATURAL LANGUAGE MODE) Score,
        ISBN, Author, Title
   FROM book
  WHERE MATCH (Title) AGAINST (@searchTerm IN NATURAL LANGUAGE MODE)
  ORDER BY MATCH (Title) AGAINST (@searchTerm IN NATURAL LANGUAGE MODE) DESC;
```

ISBN , 'Title' 'Author' book 'Database Programming' . .

Title .

```
ALTER TABLE book ADD FULLTEXT INDEX Fulltext_title_index (Title);
```

BOOLEAN

```
    SET @searchTerm= 'Database Programming -Java';
 SELECT MATCH (Title) AGAINST (@searchTerm IN BOOLEAN MODE) Score,
        ISBN, Author, Title
   FROM book
  WHERE MATCH (Title) AGAINST (@searchTerm IN BOOLEAN MODE)
  ORDER BY MATCH (Title) AGAINST (@searchTerm IN BOOLEAN MODE) DESC;
```

ISBN , Title Author book Title 'Database' 'Programming' 'Database' 'Java' .

.

```
ALTER TABLE book ADD FULLTEXT INDEX Fulltext_title_index (Title);
```

FULLTEXT

```
    SET @searchTerm= 'Date Database Programming';
 SELECT MATCH (Title, Author) AGAINST (@searchTerm IN NATURAL LANGUAGE MODE) Score,
        ISBN, Author, Title
   FROM book
```

```
  WHERE MATCH (Title, Author) AGAINST (@searchTerm IN NATURAL LANGUAGE MODE)
  ORDER BY MATCH (Title, Author) AGAINST (@searchTerm IN NATURAL LANGUAGE MODE) DESC;
```

`ISBN` , `Title` `Author` book 'Date Database Programming' . . CJ Date .

(: . FULLTEXT . .)

.

```
ALTER TABLE book ADD FULLTEXT INDEX Fulltext_title_author_index (Title, Author);
```

: https://riptutorial.com/ko/mysql/topic/8759/--

59:

.

Examples

REGEXP / RLIKE

`REGEXP` (, `RLIKE`) .

`employee` .

```
+-------------+-------------+-------------+--------------+----------+
| EMPLOYEE_ID | FIRST_NAME  | LAST_NAME   | PHONE_NUMBER | SALARY   |
+-------------+-------------+-------------+--------------+----------+
|         100 | Steven      | King        | 515.123.4567 | 24000.00 |
|         101 | Neena       | Kochhar     | 515.123.4568 | 17000.00 |
|         102 | Lex         | De Haan     | 515.123.4569 | 17000.00 |
|         103 | Alexander   | Hunold      | 590.423.4567 |  9000.00 |
|         104 | Bruce       | Ernst       | 590.423.4568 |  6000.00 |
|         105 | David       | Austin      | 590.423.4569 |  4800.00 |
|         106 | Valli       | Pataballa   | 590.423.4560 |  4800.00 |
|         107 | Diana       | Lorentz     | 590.423.5567 |  4200.00 |
|         108 | Nancy       | Greenberg   | 515.124.4569 | 12000.00 |
|         109 | Daniel      | Faviet      | 515.124.4169 |  9000.00 |
|         110 | John        | Chen        | 515.124.4269 |  8200.00 |
+-------------+-------------+-------------+--------------+----------+
```

^

`FIRST_NAME` () **N** .

```
SELECT * FROM employees WHERE FIRST_NAME REGEXP '^N'
-- Pattern start with----------------------------^
```

$ **

`PHONE_NUMBER` **4569** .

```
SELECT * FROM employees WHERE PHONE_NUMBER REGEXP '4569$'
-- Pattern end with-----------------------------------^
```

NOT REGEXP

`FIRST_NAME` ( ) **N** .

```
SELECT * FROM employees WHERE FIRST_NAME NOT REGEXP '^N'
```

```
-- Pattern does not start with---------------^
```

LAST_NAME FIRST_NAME a .

```
SELECT * FROM employees WHERE FIRST_NAME REGEXP 'a' AND LAST_NAME REGEXP 'in'
-- No ^ or $, pattern can be anywhere -------------------------------------^
```

[]

FIRST_NAME () **A B C** .

```
SELECT * FROM employees WHERE FIRST_NAME REGEXP '^[ABC]'
------------------------------------------------^^---^
```

|

FIRST_NAME () **A B C r , e i** .

```
SELECT * FROM employees WHERE FIRST_NAME REGEXP '^[ABC]|[rei]$'
-- ------------------------------------------------^^---^^^---^^
```

.

```
SELECT FIRST_NAME, FIRST_NAME REGEXP '^N' as matching FROM employees
```

FIRST_NAME REGEXP '^N' FIRST_NAME) ^N *1 0* .

:

```
SELECT
FIRST_NAME,
IF(FIRST_NAME REGEXP '^N', 'matches ^N', 'does not match ^N') as matching
FROM employees
```

.

```
SELECT
IF(FIRST_NAME REGEXP '^N', 'matches ^N', 'does not match ^N') as matching,
COUNT(*)
FROM employees
GROUP BY matching
```

: https://riptutorial.com/ko/mysql/topic/9444/-

60:

- `INNER OUTER` .
- MySQL `FULL` .
- "commajoin"(`FROM a,b WHERE ax=by` where `FROM a,b WHERE ax=by`) . `FROM a JOIN b ON ax=by` .
- by ax = = by b.
- AX = ON B JOIN `a b` , `NULLs` .

Examples

DB

```
CREATE TABLE `user` (
`id` smallint(5) unsigned NOT NULL AUTO_INCREMENT,
`name` varchar(30) NOT NULL,
`course` smallint(5) unsigned DEFAULT NULL,
PRIMARY KEY (`id`)
) ENGINE=InnoDB;

CREATE TABLE `course` (
`id` smallint(5) unsigned NOT NULL AUTO_INCREMENT,
`name` varchar(50) NOT NULL,
PRIMARY KEY (`id`)
) ENGINE=InnoDB;
```

InnoDB user.course course.id .

```
ALTER TABLE `user`
ADD CONSTRAINT `FK_course`
FOREIGN KEY (`course`) REFERENCES `course` (`id`)
ON UPDATE CASCADE;
```

( )

```
SELECT user.name, course.name
FROM `user`
INNER JOIN `course` on user.course = course.id;
```

(" ")

```
SELECT x, ...
    FROM ( SELECT y, ... FROM ... ) AS a
    JOIN tbl  ON tbl.x = a.y
    WHERE ...
```

`tbl JOIN` .

5.6 . .

```
SELECT ...
    FROM ( SELECT y, ... FROM ... ) AS a
    JOIN ( SELECT x, ... FROM ... ) AS b  ON b.x = a.y
    WHERE ...
```

5.6 . (.)

.

```
SELECT
        @n := @n + 1,
        ...
    FROM ( SELECT @n := 0 ) AS initialize
    JOIN the_real_table
    ORDER BY ...
```

(: `ON` `CROSS JOIN` (Cartesian), `the_real_table` n `the_real_table` .

-

.

```
SELECT c.CustomerName, o.OrderID
    FROM Customers AS c
    INNER JOIN Orders AS o
        ON c.CustomerID = o.CustomerID
    ORDER BY c.CustomerName, o.OrderID;
```

.

```
SELECT c.CustomerName, COUNT(*) AS 'Order Count'
    FROM Customers AS c
    INNER JOIN Orders AS o
        ON c.CustomerID = o.CustomerID
    GROUP BY c.CustomerID;
    ORDER BY c.CustomerName;
```

.

```
SELECT  c.CustomerName,
        ( SELECT COUNT(*) FROM Orders WHERE CustomerID = c.CustomerID ) AS 'Order Count'
    FROM Customers AS c
    ORDER BY c.CustomerName;
```

.

```
SELECT  c.CustomerName,
    FROM Customers AS c
    WHERE EXISTS ( SELECT * FROM Orders WHERE CustomerID = c.CustomerID )
    ORDER BY c.CustomerName;
```

MySQL `FULL OUTER JOIN` , .

```
-- ----------------------------
-- Table structure for `owners`
-- ----------------------------
DROP TABLE IF EXISTS `owners`;
CREATE TABLE `owners` (
`owner_id` int(11) NOT NULL AUTO_INCREMENT,
`owner` varchar(30) DEFAULT NULL,
PRIMARY KEY (`owner_id`)
) ENGINE=InnoDB AUTO_INCREMENT=10 DEFAULT CHARSET=latin1;

-- ----------------------------
-- Records of owners
-- ----------------------------
INSERT INTO `owners` VALUES ('1', 'Ben');
INSERT INTO `owners` VALUES ('2', 'Jim');
INSERT INTO `owners` VALUES ('3', 'Harry');
INSERT INTO `owners` VALUES ('6', 'John');
INSERT INTO `owners` VALUES ('9', 'Ellie');
-- ----------------------------
-- Table structure for `tools`
-- ----------------------------
DROP TABLE IF EXISTS `tools`;
CREATE TABLE `tools` (
`tool_id` int(11) NOT NULL AUTO_INCREMENT,
`tool` varchar(30) DEFAULT NULL,
`owner_id` int(11) DEFAULT NULL,
PRIMARY KEY (`tool_id`)
) ENGINE=InnoDB AUTO_INCREMENT=11 DEFAULT CHARSET=latin1;
-- ----------------------------
-- Records of tools
-- ----------------------------
INSERT INTO `tools` VALUES ('1', 'Hammer', '9');
INSERT INTO `tools` VALUES ('2', 'Pliers', '1');
INSERT INTO `tools` VALUES ('3', 'Knife', '1');
INSERT INTO `tools` VALUES ('4', 'Chisel', '2');
INSERT INTO `tools` VALUES ('5', 'Hacksaw', '1');
INSERT INTO `tools` VALUES ('6', 'Level', null);
INSERT INTO `tools` VALUES ('7', 'Wrench', null);
INSERT INTO `tools` VALUES ('8', 'Tape Measure', '9');
INSERT INTO `tools` VALUES ('9', 'Screwdriver', null);
INSERT INTO `tools` VALUES ('10', 'Clamp', null);
```

?

.

UNION . LEFT JOIN . .

RIGHT JOIN . . NULL NULL . owners.owner_id IS NULL WHERE .

UNION ALL .

```
SELECT `owners`.`owner`, tools.tool
FROM `owners`
LEFT JOIN `tools` ON `owners`.`owner_id` = `tools`.`owner_id`
UNION ALL
```

```
SELECT `owners`.`owner`, tools.tool
FROM `owners`
RIGHT JOIN `tools` ON `owners`.`owner_id` = `tools`.`owner_id`
WHERE `owners`.`owner_id` IS NULL;

+-------+--------------+
| owner | tool         |
+-------+--------------+
| Ben   | Pliers       |
| Ben   | Knife        |
| Ben   | Hacksaw      |
| Jim   | Chisel       |
| Harry | NULL         |
| John  | NULL         |
| Ellie | Hammer       |
| Ellie | Tape Measure |
| NULL  | Level        |
| NULL  | Wrench       |
| NULL  | Screwdriver  |
| NULL  | Clamp        |
+-------+--------------+
12 rows in set (0.00 sec)
```

3

.

- .
-
-

" "

		reg_date	
1		2016-08-08	....

""

1	
2	

"tags_meta"

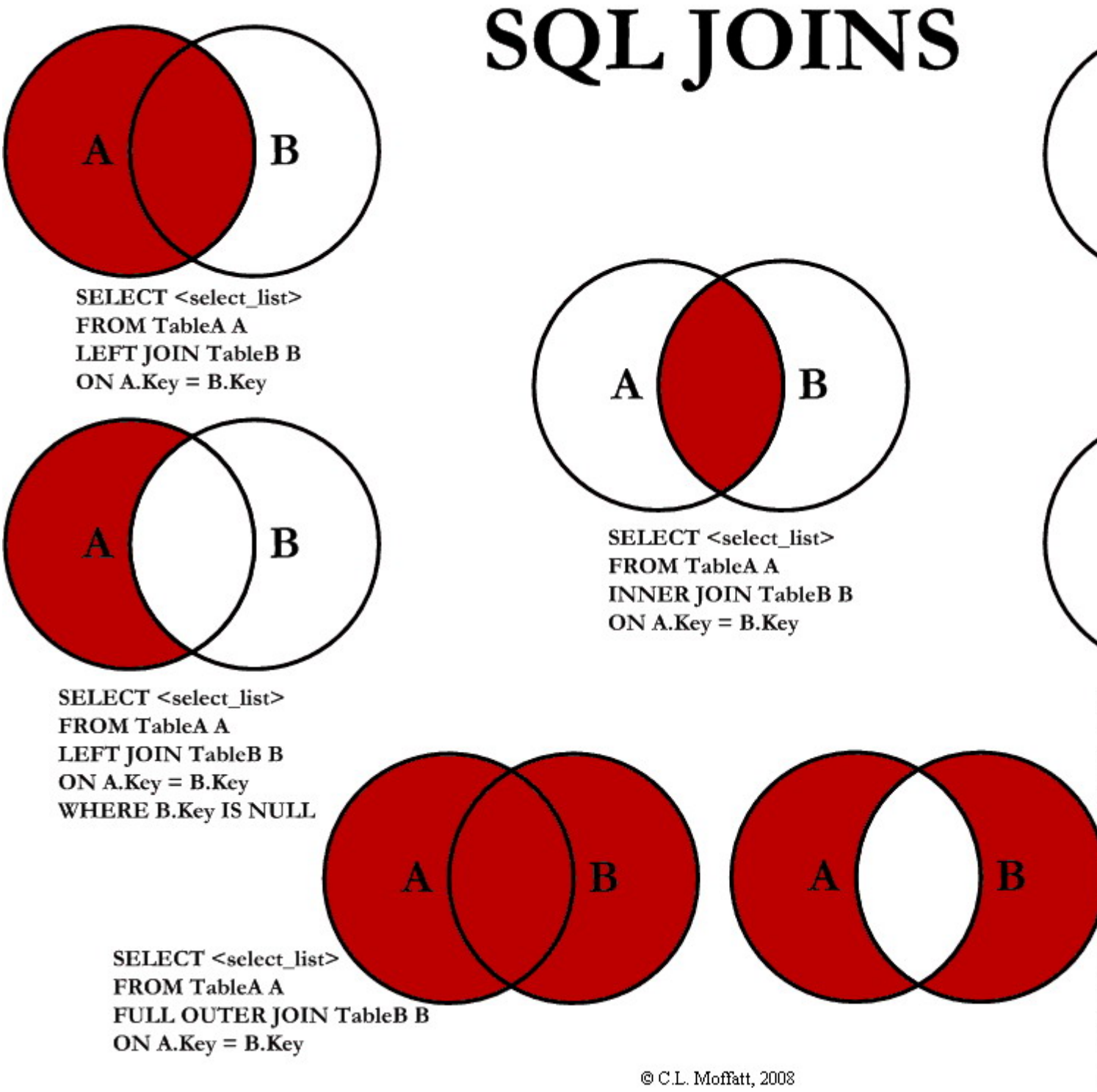
post_id	tag_id
1	2

```
SELECT videogame.id,
    videogame.title,
```

```
    videogame.reg_date,
    tags.name,
    tags_meta.post_id
FROM tags_meta
INNER JOIN videogame ON videogame.id = tags_meta.post_id
INNER JOIN tags ON tags.id = tags_meta.tag_id
WHERE tags.name = "elizabeth"
ORDER BY videogame.reg_date
```

"#elizabeth" .

, Venn MySQL `JOIN` .



: https://riptutorial.com/ko/mysql/topic/2736/

61: : id 3 .

Examples

3

```
CREATE TABLE Table1 (
    id INT UNSIGNED NOT NULL,
    created_on DATE NOT NULL,
    PRIMARY KEY (id)
)
CREATE TABLE Table2 (
    id INT UNSIGNED NOT NULL,
    personName VARCHAR(255) NOT NULL,
    PRIMARY KEY (id)
)
CREATE TABLE Table3 (
    id INT UNSIGNED NOT NULL,
    accountName VARCHAR(255) NOT NULL,
    PRIMARY KEY (id)
)
```

select ID .

```
SELECT
    t1.id AS table1Id,
    t2.id AS table2Id,
    t3.id AS table3Id
FROM Table1 t1
LEFT JOIN Table2 t2 ON t2.id = t1.id
LEFT JOIN Table3 t3 ON t3.id = t1.id
```

: id 3 . : https://riptutorial.com/ko/mysql/topic/9921/---id---3---

62:

Examples

SELECT .

```
SELECT ... FROM ... WHERE ... GROUP BY ... HAVING ...
    ORDER BY ...  -- goes here
    LIMIT ... OFFSET ...;

( SELECT ... ) UNION ( SELECT ... ) ORDER BY ...  -- for ordering the result of the UNION.

SELECT ... GROUP_CONCAT(DISTINCT x ORDER BY ... SEPARATOR ...) ...

ALTER TABLE ... ORDER BY ... -- probably useful only for MyISAM; not for InnoDB
```

ORDER BY x

x .

- NULLs NULLs .
- ASC (ASC)
- (VARCHAR) COLLATION .
- ENUMs .

```
ORDER BY x ASC  -- same as default
ORDER BY x DESC  -- highest to lowest
ORDER BY lastname, firstname  -- typical name sorting; using two columns
ORDER BY submit_date DESC  -- latest first
ORDER BY submit_date DESC, id ASC  -- latest first, but fully specifying order.
```

- ASC = ASCENDING , DESC = DESCENDING
- DESC NULLs .
- INDEX(x) , INDEX(lastname, firstname) , INDEX(submit_date) .

... ASC DESC . INDEX(submit_date DESC, id ASC) - " DESC " INDEX .

```
ORDER BY FIND_IN_SET(card_type, "MASTER-CARD,VISA,DISCOVER") -- sort 'MASTER-CARD' first.
ORDER BY x IS NULL, x  -- order by `x`, but put `NULLs` last.
```

```
SELECT * FROM some_table WHERE id IN (118, 17, 113, 23, 72)
ORDER BY FIELD(id, 118, 17, 113, 23, 72);
```

ID .

	...
118	...

	...
17	...
113	...
23	...
72	...

ID , .

: https://riptutorial.com/ko/mysql/topic/5469/

63:

- [LOW_PRIORITY] DELETE [QUICK] [] FROM table [WHERE] [ORDER BY expression [ASC | DESC]] [LIMIT number_rows]; ///

	LOW_PRIORITY
IGNORE	IGNORE .
	.
ORDER BY	ORDER BY .
	. number_rows .

Examples

Where

```
DELETE FROM `table_name` WHERE `field_one` = 'value_one'
```

field_one 'value_one' .

WHERE select > , < , <> LIKE .

: (WHERE, LIKE) . .

```
DELETE FROM table_name ;
```

. . WHERE DELETE .

LIMITing

```
DELETE FROM `table_name` WHERE `field_one` = 'value_one' LIMIT 1
```

'Where ' .

. .

MySQL DELETE JOIN . . :

```
create table people
(    id int primary key,
    name varchar(100) not null,
```

```
    gender char(1) not null
);
insert people (id,name,gender) values
(1,'Kathy','f'),(2,'John','m'),(3,'Paul','m'),(4,'Kim','f');

create table pets
(    id int auto_increment primary key,
    ownerId int not null,
    name varchar(100) not null,
    color varchar(100) not null
);
insert pets(ownerId,name,color) values
(1,'Rover','beige'),(2,'Bubbles','purple'),(3,'Spot','black and white'),
(1,'Rover2','white');
```

1			
2			
4			

	ownerId		
1	1		
2	2		
4	1	2	

```
DELETE p2
FROM pets p2
WHERE p2.ownerId in (
    SELECT p1.id
    FROM people p1
    WHERE p1.name = 'Paul');
```

:

```
DELETE p2    -- remove only rows from pets
FROM people p1
JOIN pets p2
ON p2.ownerId = p1.id
WHERE p1.name = 'Paul';
```

1 .

.

p1 p2 .

.

```
DELETE p1, p2     -- remove rows from both tables
FROM people p1
JOIN pets p2
ON p2.ownerId = p1.id
WHERE p1.name = 'Paul';
```

2 .

.
Paul People .

DELETE foreing . `pets`

```
ALTER TABLE pets ADD CONSTRAINT `fk_pets_2_people` FOREIGN KEY (ownerId) references people(id)
ON DELETE CASCADE;
```

`pets people` .

```
ERROR 1451 (23000): Cannot delete or update a parent row: a foreign key constraint fails
(`test`.`pets`, CONSTRAINT `pets_ibfk_1` FOREIGN KEY (`ownerId`) REFERENCES `people` (`id`))
```

`people InnoDB ON DELETE` .

```
DELETE FROM people
WHERE name = 'Paul';
```

2 .
Paul People .
.

.

```
SET foreign_key_checks = 0;
DELETE p1, p2 FROM people p1 JOIN pets p2 ON p2.ownerId = p1.id WHERE p1.name = 'Paul';
SET foreign_key_checks = 1;
```

```
DELETE FROM `myTable` WHERE `someColumn` = 'something'
```

`WHERE` .

DELETE TRUNCATE

```
TRUNCATE tableName;
```

`AUTO_INCREMENT` . `DELETE FROM tableName` . / .

SQL . (`innodb_file_per_table=OFF` .)

DELETE

MySQL .

```
-- remove only the employees
DELETE e
FROM Employees e JOIN Department d ON e.department_id = d.department_id
WHERE d.name = 'Sales'
```

```
-- remove employees and department
DELETE e, d
FROM Employees e JOIN Department d ON e.department_id = d.department_id
WHERE d.name = 'Sales'
```

```
-- remove from all tables (in this case same as previous)
DELETE
FROM Employees e JOIN Department d ON e.department_id = d.department_id
WHERE d.name = 'Sales'
```

: https://riptutorial.com/ko/mysql/topic/1487/

64:

MySQL 5.6.4 .

, `DATETIME(3)` , `TIMESTAMP(6)` * nix .

: http://dev.mysql.com/doc/refman/5.7/en/fractional-seconds.html

`NOW(3)` MySQL .

* 0.001 MySQL IEEE754 Sun .

Examples

```
SELECT NOW(3)
```

.

Javascript .

Javascript UNIX `time_t` `1970-01-01 00:00:00` UTC .

Javascript . (time_zone .)

```
 ROUND(UNIX_TIMESTAMP(NOW(3)) * 1000.0, 0)
```

`TIMESTAMP` UNIX_TIMESTAMP () Javascript .

```
  SELECT ROUND(UNIX_TIMESTAMP(column) * 1000.0, 0)
```

`DATETIME` Javascript .

.

```
CREATE TABLE times (
     dt DATETIME(3),
     ts TIMESTAMP(3)
 );
```

/ .

```
 INSERT INTO times VALUES (NOW(3), NOW(3));
```

`NOW()` .

```
 INSERT INTO times VALUES ('2015-01-01 16:34:00.123','2015-01-01 16:34:00.128');
```

.

`NOW(3)` `NOW()` .

/ .

`%f` DATE_FORMAT () .

```
SELECT DATE_FORMAT(NOW(3), '%Y-%m-%d %H:%i:%s.%f')
```

`2016-11-19 09:52:53.248000` . `NOW(3)` 0.

TIMESTAMP .

Javascript (: `1478960868932`) MySQL .

```
FROM_UNIXTIME(1478960868932 * 0.001)
```

Javascript MySQL . :

```
INSERT INTO table (col) VALUES (FROM_UNIXTIME(1478960868932 * 0.001))
```

(, .)

: https://riptutorial.com/ko/mysql/topic/7850/----

65:

- UPDATE [LOW_PRIORITY] [] tableName SET column1 = expression1, column2 = expression2, ... [WHERE]; //
- UPDATE [LOW_PRIORITY] [] tableName SET column1 = expression1, column2 = expression2, ... [WHERE] [ORDER BY [ASC | DESC]] [LIMIT _]; // order by limit
- UPDATE [LOW_PRIORITY] [] table1, table2, ... SET column1 = expression1, column2 = expression2, ... [WHERE]; //

Examples

```
UPDATE customers SET email='luke_smith@email.com' WHERE id=1
```

customers email luke_smith@email.com luke_smith@email.com id 1 . .

customers

id	firstname	lastname	email
1	Luke	Smith	luke@example.com
2	Anna	Carey	anna@example.com
3	Todd	Winters	todd@example.com

customers

id	firstname	lastname	email
1	Luke	Smith	luke_smith@email.com
2	Anna	Carey	anna@example.com
3	Todd	Winters	todd@example.com

```
UPDATE customers SET lastname='smith'
```

customers lastname . .

customers

id	firstname	lastname	email
1	Luke	Smith	luke@example.com
2	Anna	Carey	anna@example.com
3	Todd	Winters	todd@example.com

customers

id	firstname	lastname	email
1	Luke	Smith	luke@example.com
2	Anna	Smith	anna@example.com
3	Todd	Smith	todd@example.com

: UPDATE (WHERE) . . customers lastname (Smith) .

questions_mysql LOAD DATA INFILE CSV iwtQuestions ( ) . .

.

```
UPDATE questions_mysql q -- our real table for production
join iwtQuestions i -- imported worktable
ON i.qId = q.qId
SET q.closeVotes = i.closeVotes,
q.votes = i.votes,
q.answers = i.answers,
q.views = i.views;
```

q i . .

qId Stackoverflow ID . .

ORDER BY LIMIT

ORDER BY SQL , .

SQL LIMIT , . LIMIT .

ORDER BY LIMIT .

ORDER BY LIMIT MySQL UPDATE .

```
UPDATE [ LOW_PRIORITY ] [ IGNORE ]
tableName
SET column1 = expression1,
    column2 = expression2,
    ...
[WHERE conditions]
[ORDER BY expression [ ASC | DESC ]]
[LIMIT row_count];

---> Example
UPDATE employees SET isConfirmed=1 ORDER BY joiningDate LIMIT 10
```

joiningDate 10 .

UPDATE

UPDATE . .

UPDATE ORDER BY LIMIT .

UPDATE .

```
UPDATE [LOW_PRIORITY] [IGNORE]
table1, table2, ...
    SET column1 = expression1,
        column2 = expression2,
        ...
    [WHERE conditions]
```

, products salesOrders . . products . SQL .

```
UPDATE products, salesOrders
  SET salesOrders.Quantity = salesOrders.Quantity - 5,
      products.availableStock = products.availableStock + 5
WHERE products.productId = salesOrders.productId
  AND salesOrders.orderId = 100 AND salesOrders.productId = 20;
```

'5' salesOrders WHERE products .

.

```
UPDATE people
SET name =
  (CASE id WHEN 1 THEN 'Karl'
           WHEN 2 THEN 'Tom'
           WHEN 3 THEN 'Mary'
   END)
WHERE id IN (1,2,3);
```

. WHERE WHERE .

: https://riptutorial.com/ko/mysql/topic/2738/-

66: MySQL

-- SQL .

Examples

.

```
 # This comment continues to the end of line

-- This comment continues to the end of line

/* This is an in-line comment */

/*
This is a
multiple-line comment
*/
```

:

```
SELECT * FROM t1; -- this is comment

CREATE TABLE stack(
    /*id_user int,
    username varchar(30),
    password varchar(30)
    */
    id int
);
```

-- -- , .

```
#This comment works
/*This comment works.*/
--This comment does not.
```

```
CREATE TABLE menagerie.bird (
    bird_id INT NOT NULL AUTO_INCREMENT,
    species VARCHAR(300) DEFAULT NULL COMMENT 'You can include genus, but never subspecies.',
    INDEX idx_species (species) COMMENT 'We must search on species often.',
    PRIMARY KEY (bird_id)
) ENGINE=InnoDB COMMENT 'This table was inaugurated on February 10th.';
```

COMMENT = .( )

SHOW CREATE TABLE information_schema .

MySQL : https://riptutorial.com/ko/mysql/topic/2337/-mysql

67:

Examples

"MySQL "disambiguation ...

- NDB Cluster - . .
- Galera Percona XtraDB Galera PXC MariaDB. - MySQL . .

"" .

"clustered index" `PRIMARY KEY` .

: https://riptutorial.com/ko/mysql/topic/5130/

68:

- CREATE TABLE table_name (column_name1 data_type (size), column_name2 data_type (size), column_name3 data_type (size), ...); //
- CREATE TABLE table_name [ ] (column_name1 data_type (size), column_name2 data_type (size), column_name3 data_type (size), ...); //
- CREATE [TEMPORARY] TABLE table_name [ ] (column_name1 data_type (size), column_name2 data_type (size), column_name3 data_type (size), ...); //
- new_tbl [AS] SELECT * FROM orig_tbl; // SELECT

`CREATE TABLE ENGINE .`

```
CREATE TABLE table_name ( column_definitions ) ENGINE=engine;
```

.

- `InnoDB` : (5.5.5) Transition-safe (ACID) . , .
- `MyISAM` : (5.5.5) . .
- `Memory` : RAM .

.

Examples

`CREATE TABLE` MySQL .

```
CREATE TABLE Person (
    `PersonID`      INTEGER NOT NULL PRIMARY KEY,
    `LastName`      VARCHAR(80),
    `FirstName`     VARCHAR(80),
    `Address`       TEXT,
    `City`          VARCHAR(100)
) Engine=InnoDB;
```

.

1. : . `-chars . fieldname space-chars .
2. [Length] : `CHAR VARCHAR` .
3. `NULL` | `NOT NULL` : `NOT NULL` `NULL` .
4. .

`Engine=...` . (InnoDB MyISAM) .

`DEFAULT` .

```
CREATE TABLE Address (
    `AddressID`    INTEGER NOT NULL PRIMARY KEY,
    `Street`       VARCHAR(80),
    `City`         VARCHAR(80),
    `Country`      VARCHAR(80) DEFAULT "United States",
    `Active`       BOOLEAN DEFAULT 1,
) Engine=InnoDB;
```

Street NULL . Country "".

BLOB , TEXT , GEOMETRY JSON .

```
CREATE TABLE Person (
    PersonID      INT UNSIGNED NOT NULL,
    LastName      VARCHAR(66) NOT NULL,
    FirstName     VARCHAR(66),
    Address       VARCHAR(255),
    City          VARCHAR(66),
    PRIMARY KEY (PersonID)
);
```

NOT NULL . NOT NULL MySQL .

PRIMARY KEY PRIMARY KEY . InnoDB , InnoDB (MySQL).

" " AUTO_INCREMENT INT . 1 (1).

, .

TRUNCATE TABLE INT .

( )

PRIMARY KEY .

```
CREATE TABLE Person (
    PersonID      INT UNSIGNED NOT NULL PRIMARY KEY,
    LastName      VARCHAR(66) NOT NULL,
    FirstName     VARCHAR(66),
    Address       VARCHAR(255),
    City          VARCHAR(66)
);
```

.

. . PRIMARY KEY . PRIMARY KEY . :

```
CREATE TABLE invoice_line_items (
    LineNum       SMALLINT UNSIGNED NOT NULL,
    InvoiceNum    INT UNSIGNED NOT NULL,
    -- Other columns go here
```

```
    PRIMARY KEY (InvoiceNum, LineNum),
    FOREIGN KEY (InvoiceNum) REFERENCES -- references to an attribute of a table
);
```

.

, I / O . ( ). InnoDB, '2 ' PRIMARY KEY .

```
CREATE TABLE Account (
    AccountID     INT UNSIGNED NOT NULL,
    AccountNo     INT UNSIGNED NOT NULL,
    PersonID    INT UNSIGNED,
    PRIMARY KEY (AccountID),
    FOREIGN KEY (PersonID) REFERENCES Person (PersonID)
) ENGINE=InnoDB;
```

: (FK) . FK . FK . .

. FOREIGN KEY . . TEMPORARY .

. . . () .

: InnoDB (MyISAM MEMORY) . DB CREATE TABLE . (MySQL InnoDB .)

.

```
CREATE TABLE ClonedPersons LIKE Persons;
```

.

.

```
CREATE TABLE ClonedPersons SELECT * FROM Persons;
```

SELECT .

```
CREATE TABLE ModifiedPersons
SELECT PersonID, FirstName + LastName AS FullName FROM Persons
WHERE LastName IS NOT NULL;
```

SELECT . :

```
CREATE TABLE ModifiedPersons (PRIMARY KEY (PersonID))
SELECT PersonID, FirstName + LastName AS FullName FROM Persons
WHERE LastName IS NOT NULL;
```

SELECT

CREATE TABLE SELECT .

```
CREATE TABLE stack (
    id_user INT,
    username VARCHAR(30),
    password VARCHAR(30)
);
```

:

```
-- create a table from another table in the same database with all attributes
CREATE TABLE stack2 AS SELECT * FROM stack;

-- create a table from another table in the same database with some attributes
CREATE TABLE stack3 AS SELECT username, password FROM stack;
```

:

```
-- create a table from another table from another database with all attributes
CREATE TABLE stack2 AS SELECT * FROM second_db.stack;

-- create a table from another table from another database with some attributes
CREATE TABLE stack3 AS SELECT username, password FROM second_db.stack;
```

.

```
FROM NAME_DATABASE.name_table
```

.

```
SHOW CREATE TABLE child; -- Option 1

CREATE TABLE `child` (
  `id` int(11) NOT NULL AUTO_INCREMENT,
  `fullName` varchar(100) NOT NULL,
  `myParent` int(11) NOT NULL,
  PRIMARY KEY (`id`),
  KEY `mommy_daddy` (`myParent`),
  CONSTRAINT `mommy_daddy` FOREIGN KEY (`myParent`) REFERENCES `parent` (`id`)
      ON DELETE CASCADE ON UPDATE CASCADE
) ENGINE=InnoDB DEFAULT CHARSET=utf8;
```

mysql :

```
SHOW CREATE TABLE child \G
```

:

```
mysql> CREATE TABLE Tab1(id int, name varchar(30));
Query OK, 0 rows affected (0.03 sec)

mysql> DESCRIBE Tab1; -- Option 2

+-------+-------------+------+-----+---------+-------+
| Field | Type        | Null | Key | Default | Extra |
```

```
+-------+-------------+------+-----+---------+-------+
| id    | int(11)     | YES  |     | NULL    |       |
| name  | varchar(30) | YES  |     | NULL    |       |
+-------+-------------+------+-----+---------+-------+
```

DESCRIBE DESC .

DESCRIBE .

TIMESTAMP .

```
CREATE TABLE `TestLastUpdate` (
    `ID` INT NULL,
    `Name` VARCHAR(50) NULL,
    `Address` VARCHAR(50) NULL,
    `LastUpdate` TIMESTAMP NULL DEFAULT CURRENT_TIMESTAMP ON UPDATE CURRENT_TIMESTAMP
)
COMMENT='Last Update'
;
```

: https://riptutorial.com/ko/mysql/topic/795/-

69:

Examples

select, insert, update delete SQL .

, . .

. . SQL .

1.
2. .
3. .

.

ACID :

.

- **Atomicity :** . .
- **:** .
- **:** .
- **:** .

`START TRANSACTION` `BEGIN WORK` `START TRANSACTION` `COMMIT` `ROLLBACK` . SQL .

```
START TRANSACTION;
SET @transAmt = '500';
SELECT @availableAmt:=ledgerAmt FROM accTable WHERE customerId=1 FOR UPDATE;
UPDATE accTable SET ledgerAmt=ledgerAmt-@transAmt WHERE customerId=1;
UPDATE accTable SET ledgerAmt=ledgerAmt+@transAmt WHERE customerId=2;
COMMIT;
```

`START TRANSACTION` `COMMIT` `ROLLBACK` . .

`FOR UPDATE` .

.

- SQL `BEGIN WORK` `START TRANSACTION` .
- SQL .
- .
- , `COMMIT` . `ROLLBACK` .
- Galera / PXC `COMMIT` .

COMMIT, ROLLBACK AUTOCOMMIT

AUTOCOMMIT

MySQL . BEGIN START TRANSACTION UPDATE , DELETE INSERT .

AUTOCOMMIT *true* . .

```
--->To make autcommit false
SET AUTOCOMMIT=false;
--or
SET AUTOCOMMIT=0;

--->To make autcommit true
SET AUTOCOMMIT=true;
--or
SET AUTOCOMMIT=1;
```

AUTOCOMMIT

```
SELECT @@autocommit;
```

AUTOCOMMIT false , .

COMMIT . , .

.

1

```
--->Before making autocommit false one row added in a new table
mysql> INSERT INTO testTable VALUES (1);

--->Making autocommit = false
mysql> SET autocommit=0;

mysql> INSERT INTO testTable VALUES (2), (3);
mysql> SELECT * FROM testTable;
+-----+
| tId |
+-----+
|   1 |
|   2 |
|   3 |
+-----+
```

2

```
mysql> SELECT * FROM testTable;
+-----+
| tId |
+-----+
|   1 |
+-----+
---> Row inserted before autocommit=false only visible here
```

1

```
mysql> COMMIT;
--->Now COMMIT is executed in connection 1
mysql> SELECT * FROM testTable;
    +-----+
    | tId |
    +-----+
    |   1 |
    |   2 |
    |   3 |
    +-----+
```

2

```
mysql> SELECT * FROM testTable;
    +-----+
    | tId |
    +-----+
    |   1 |
    |   2 |
    |   3 |
    +-----+
--->Now all the three rows are visible here
```

ROLLBACK . .

```
--->Before making autocommit false one row added in a new table
mysql> INSERT INTO testTable VALUES (1);

--->Making autocommit = false
mysql> SET autocommit=0;

mysql> INSERT INTO testTable VALUES (2), (3);
mysql> SELECT * FROM testTable;
+-----+
| tId |
+-----+
|   1 |
|   2 |
|   3 |
+-----+
```

ROLLBACK

```
--->Rollback executed now
mysql> ROLLBACk;

mysql> SELECT * FROM testTable;
+-----+
| tId |
+-----+
|   1 |
+-----+
--->Rollback removed all rows which all are not committed
```

COMMIT ROLLBACK .

```
mysql> INSERT INTO testTable VALUES (2), (3);
mysql> SELECT * FROM testTable;
mysql> COMMIT;
+-----+
| tId |
+-----+
|   1 |
|   2 |
|   3 |
+-----+

--->Rollback executed now
mysql> ROLLBACk;

mysql> SELECT * FROM testTable;
+-----+
| tId |
+-----+
|   1 |
|   2 |
|   3 |
+-----+
--->Rollback not removed any rows
```

`AUTOCOMMIT` *true* `COMMIT` `ROLLBACK` .

JDBC

JDBC . MySQL JDBC .

MySQL JDBC .

JDBC .

```
Class.forName("com.mysql.jdbc.Driver");
Connection con = DriverManager.getConnection(DB_CONNECTION_URL,DB_USER,USER_PASSWORD);
--->Example for connection url "jdbc:mysql://localhost:3306/testDB");
```

: SQL . .

. .

```
jdbc:mysql://localhost:3306/testDB?useUnicode=true&amp;characterEncoding=utf8
```

.

`AUTOCOMMIT` *true* *false* .

```
con.setAutoCommit(false);
```

`setAutoCommit()` .

`START TRANSACTION` `BEGIN WORK` . `START TRANSACTION` `BEGIN WORK` `AUTOCOMMIT` *false* . .

. JDBC .

```
package jdbcTest;

import java.sql.Connection;
import java.sql.PreparedStatement;
import java.sql.SQLException;


public class accTrans {

    public static void doTransfer(double transAmount,int customerIdFrom,int customerIdTo) {

        Connection con = null;
        PreparedStatement pstmt = null;
        ResultSet rs = null;

        try {
            String DB_CONNECTION_URL =
"jdbc:mysql://localhost:3306/testDB?useUnicode=true&amp;characterEncoding=utf8";

            Class.forName("com.mysql.jdbc.Driver");
            con = DriverManager.getConnection(DB_CONNECTION_URL,DB_USER,USER_PASSWORD);

            --->set auto commit to false
            con.setAutoCommit(false);
            ---> or use con.START TRANSACTION / con.BEGIN WORK

            --->Start SQL Statements for transaction
            --->Checking availability of amount
            double availableAmt    = 0;
            pstmt = con.prepareStatement("SELECT ledgerAmt FROM accTable WHERE customerId=?
FOR UPDATE");
            pstmt.setInt(1, customerIdFrom);
            rs = pstmt.executeQuery();
            if(rs.next())
                availableAmt    = rs.getDouble(1);

            if(availableAmt >= transAmount)
            {
                ---> Do Transfer
                ---> taking amount from cutomerIdFrom
                pstmt = con.prepareStatement("UPDATE accTable SET ledgerAmt=ledgerAmt-? WHERE
customerId=?");
                pstmt.setDouble(1, transAmount);
                pstmt.setInt(2, customerIdFrom);
                pstmt.executeUpdate();

                ---> depositing amount in cutomerIdTo
                pstmt = con.prepareStatement("UPDATE accTable SET ledgerAmt=ledgerAmt+? WHERE
customerId=?");
                pstmt.setDouble(1, transAmount);
                pstmt.setInt(2, customerIdTo);
                pstmt.executeUpdate();

                con.commit();
            }
            --->If you performed any insert,update or delete operations before
            ----> this availability check, then include this else part
            /*else { --->Rollback the transaction if availability is less than required
                con.rollback();
```

```
            }*/

        } catch (SQLException ex) {
            ---> Rollback the transaction in case of any error
            con.rollback();
        } finally {
            try {
                if(rs != null)  rs.close();
                if(pstmt != null) pstmt.close();
                if(con != null) con.close();
            }
        }
    }

    public static void main(String[] args) {
        doTransfer(500, 1020, 1021);
        -->doTransfer(transAmount, customerIdFrom, customerIdTo);
    }
}
```

JDBC SQL SQL , .

: https://riptutorial.com/ko/mysql/topic/5771/

70:

- CREATE [DEFINER = { | CURRENT_USER}] TRIGGER trigger_name trigger_time trigger_event tbl_name [trigger_order] trigger_body
- trigger_time : {BEFORE | AFTER}
- trigger_event : {INSERT | | }
- trigger_order : {FOLLOWS | PRECEDES} other_trigger_name

DB .

FOR EACH ROW .

( ) . .

CREATE OR REPLACE MySQL .

MySQL .

```
DELIMITER $$

DROP TRIGGER IF EXISTS myTrigger;
$$
CREATE TRIGGER myTrigger
-- ...

$$
DELIMITER ;
```

. .

- CREATE .
- DROP CREATE . LOCK TABLES myTable WRITE; UNLOCK TABLES; UNLOCK TABLES; CREATE .

Examples

```
mysql> CREATE TABLE account (acct_num INT, amount DECIMAL(10,2));
Query OK, 0 rows affected (0.03 sec)
```

```
mysql> CREATE TRIGGER ins_sum BEFORE INSERT ON account
    -> FOR EACH ROW SET @sum = @sum + NEW.amount;
Query OK, 0 rows affected (0.06 sec)
```

CREATE TRIGGER. ins_sum . ,

(@sum) 0 INSERT .

```
mysql> SET @sum = 0;
mysql> INSERT INTO account VALUES(137,14.98),(141,1937.50),(97,-100.00);
mysql> SELECT @sum AS 'Total amount inserted';
+-----------------------+
| Total amount inserted |
+-----------------------+
| 1852.48               |
+-----------------------+
```

INSERT @sum 14.98 + 1937.50 - 100 1852.48.

```
mysql> DROP TRIGGER test.ins_sum;
```

h h .

.

- BEFORE ,
- AFTER .

.

- INSERT
- UPDATE
- DELETE

Before

```
DELIMITER $$

CREATE TRIGGER insert_date
    BEFORE INSERT ON stack
    FOR EACH ROW
BEGIN
        -- set the insert_date field in the request before the insert
    SET NEW.insert_date = NOW();
END;

$$
DELIMITER ;
```

```
DELIMITER $$

CREATE TRIGGER update_date
    BEFORE UPDATE ON stack
    FOR EACH ROW
BEGIN
        -- set the update_date field in the request before the update
```

```
    SET NEW.update_date = NOW();
END;

$$
DELIMITER ;
```

```
DELIMITER $$

CREATE TRIGGER deletion_date
    AFTER DELETE ON stack
    FOR EACH ROW
BEGIN
        -- add a log entry after a successful delete
    INSERT INTO log_action(stack_id, deleted_date) VALUES(OLD.id, NOW());
END;

$$
DELIMITER ;
```

: https://riptutorial.com/ko/mysql/topic/3069/

71:

- **RANGE** . .
- **LIST** . RANGE .
- **HASH** . C g . MySQL . `LINEAR HASH` .
- **KEY** . HASH , , MySQL . . MySQL . `LINEAR KEY` .

Examples

| | | | . `VALUES LESS THAN` . 1 - 20 20 .

```
CREATE TABLE employees (
    id INT NOT NULL,
    fname VARCHAR(30),
    lname VARCHAR(30),
    hired DATE NOT NULL DEFAULT '1970-01-01',
    separated DATE NOT NULL DEFAULT '9999-12-31',
    job_code INT NOT NULL,
    store_id INT NOT NULL
);
```

. `store_id` . `PARTITION BY RANGE` 4 .

```
ALTER TABLE employees PARTITION BY RANGE (store_id) (
    PARTITION p0 VALUES LESS THAN (6),
    PARTITION p1 VALUES LESS THAN (11),
    PARTITION p2 VALUES LESS THAN (16),
    PARTITION p3 VALUES LESS THAN MAXVALUE
);
```

`MAXVALUE` ( ).

MySQL .

LIST

. RANGE . .. `PARTITION BY LIST(expr)` . `expr` `VALUES IN (value_list)` . `value_list` a .

`CREATE TABLE` .

```
CREATE TABLE employees (
    id INT NOT NULL,
    fname VARCHAR(30),
    lname VARCHAR(30),
    hired DATE NOT NULL DEFAULT '1970-01-01',
    separated DATE NOT NULL DEFAULT '9999-12-31',
    job_code INT,
```

```
    store_id INT
);
```

4 20 .

	ID
	3, 5, 6, 9, 17
	1, 2, 10, 11, 19, 20
	4, 12, 13, 14, 18
	7, 8, 15, 16

```
ALTER TABLE employees PARTITION BY LIST(store_id) (
    PARTITION pNorth VALUES IN (3,5,6,9,17),
    PARTITION pEast VALUES IN (1,2,10,11,19,20),
    PARTITION pWest VALUES IN (4,12,13,14,18),
    PARTITION pCentral VALUES IN (7,8,15,16)
);
```

MySQL .

HASH . . MySQL , .

store_id 4 .

```
CREATE TABLE employees (
    id INT NOT NULL,
    fname VARCHAR(30),
    lname VARCHAR(30),
    hired DATE NOT NULL DEFAULT '1970-01-01',
    separated DATE NOT NULL DEFAULT '9999-12-31',
    job_code INT,
    store_id INT
)
PARTITION BY HASH(store_id)
PARTITIONS 4;
```

`PARTITIONS` 1.

MySQL .

: https://riptutorial.com/ko/mysql/topic/5128/

72:

MySQL `GROUP_CONCAT()` . `group_concat_max_len` .

```
set session group_concat_max_len = 1024 * 1024; -- This should be enough for most cases
```

Examples

MySQL . .

`tbl_values` .

1			10
2			20
			10

: `Name` `Value` . `Group` `Name` .

```
-- 1. Create an expression that builds the columns
set @sql = (
    select group_concat(distinct
        concat(
            "sum(case when `Group`='", Group, "' then `Value` end) as `", `Group`, "`"
        )
    )
    from tbl_values
);

-- 2. Complete the SQL instruction
set @sql = concat("select Name, ", @sql, " from tbl_values group by `Name`");

-- 3. Create a prepared statement
prepare stmt from @sql;

-- 4. Execute the prepared statement
execute stmt;
```

:

10		
	10	20

: .

```
deallocate prepare stmt;
```

SQL Fiddle

: https://riptutorial.com/ko/mysql/topic/3074/-

73:

- SELECT column_1 [, column_2]
  FROM table_1
  ORDER BY order_column
  LIMIT _ [OFFSET _]
- SELECT column_1 [, column_2]
  FROM table_1
  ORDER BY order_column
  LIMIT [row_offset,] row_count

"" " " " .

"" row ( )

Examples

users .

1	1
2	2
	3
4	4
5	User5

SELECT LIMIT (0) .

LIMIT

.

```
SELECT * FROM users ORDER BY id ASC LIMIT 2
```

1	1
2	2

0 .

ORDER BY ( ).

LIMIT

LIMIT :

- . . 0 x .
- ( ).

:

```
SELECT * FROM users ORDER BY id ASC LIMIT 2, 3
```

.

	3
4	4
5	User5

offset 0 LIMIT . .

```
SELECT * FROM users ORDER BY id ASC LIMIT 0, 2

SELECT * FROM users ORDER BY id ASC LIMIT 2
```

.

1	1
2	2

OFFSET :

LIMIT OFFSET .

```
SELECT * FROM users ORDER BY id ASC LIMIT 2 OFFSET 3
```

.

	3

4	4

.

- .
- .

: https://riptutorial.com/ko/mysql/topic/548/--

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