



# Applied Databases

## Inserting, Updating, Deleting

HIGHER DIPLOMA IN DATA ANALYTICS



# INSERT



- ▶ CRUD (Create/Insert, Read, Update Delete)

<https://dev.mysql.com/doc/refman/8.0/en/insert.html>

- ▶ `INSERT INTO <table> VALUES (value1, value2, valueN);`
- ▶ `INSERT INTO <table> (column1, column2, column)  
VALUES (value1, value2, valueN);`



# INSERT

```
mysql> DESCRIBE person;
```

Field	Type	Null	Key	Default	Extra
personID	int(11)	NO	PRI	NULL	auto_increment
name	varchar(20)	NO		NULL	
age	int(11)	YES		NULL	
sex	enum('M','F')	YES		M	
isStudent	tinyint(1)	YES		0	

5 rows in set (0.00 sec)

```
mysql> INSERT INTO person VALUES(1, "John", 23, "M", 1);  
Query OK, 1 row affected (0.00 sec)
```

```
mysql> SELECT * FROM person;
```

personID	name	age	sex	isStudent
1	John	23	M	1

1 row in set (0.00 sec)



# INSERT



```
mysql> DESCRIBE person;
```

Field	Type	Null	Key	Default	Extra
personID	int(11)	NO	PRI	NULL	auto_increment
name	varchar(20)	NO		NULL	
age	int(11)	YES		NULL	
sex	enum('M','F')	YES		M	
isStudent	tinyint(1)	YES		0	

5 rows in set (0.00 sec)

```
mysql> INSERT INTO person (name, sex, age)
```

```
  -> VALUES ("Mary", "F", 30);
Query OK, 1 row affected (0.00 sec)
```

```
mysql> SELECT * FROM person;
```

personID	name	age	sex	isStudent
1	John	23	M	1
2	Mary	30	F	0

2 rows in set (0.00 sec)



# INSERT



```
mysql> DESCRIBE person;
```

Field	Type	Null	Key	Default	Extra
personID	int(11)	NO	PRI	NULL	auto_increment
name	varchar(20)	NO		NULL	
age	int(11)	YES		NULL	
sex	enum('M','F')	YES		M	
isStudent	tinyint(1)	YES		0	

5 rows in set (0.00 sec)

```
mysql> INSERT INTO person (name) VALUES ("Tom");
Query OK, 1 row affected (0.00 sec)
```

```
mysql> SELECT * from person WHERE name = "Tom";
```

personID	name	age	sex	isStudent
3	Tom	NULL	M	0

1 row in set (0.00 sec)



# INSERT



```
mysql> DESCRIBE person;
```

Field	Type	Null	Key	Default	Extra
personID	int(11)	NO	PRI	NULL	auto_increment
name	varchar(20)	NO		NULL	
age	int(11)	YES		NULL	
sex	enum('M','F')	YES		M	
isStudent	tinyint(1)	YES		0	

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

```
mysql> INSERT INTO person (age,sex,isStudent) VALUES (20,"F",0);
```

**ERROR 1364 (HY000): Field 'name' doesn't have a default value**

```
mysql> INSERT INTO person (name) VALUES ("");  
Query OK, 1 row affected (0.00 sec)
```

<https://dev.mysql.com/doc/refman/8.0/en/working-with-null.html>



# UPDATE



<https://dev.mysql.com/doc/refman/8.0/en/update.html>

- ▶ `UPDATE <table> SET column1 = value1, columnN, valueN;`
- ▶ `UPDATE <table> SET column1 = value1, columnN, valueN  
WHERE condition;`



# UPDATE



```
mysql> select * from person;
```

personID	name	age	sex	isStudent
1	John	23	M	1
2	Mary	30	F	0
3	Tom	NULL	M	0
5	Alan	18	M	1
6	Laura	17	F	1
7	Bob	18	M	0

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

```
mysql> UPDATE person
-> SET age = 23;
```

```
Query OK, 5 rows affected (0.00 sec)
Rows matched: 6  Changed: 5  Warnings: 0
```

```
mysql> select * from person;
```

personID	name	age	sex	isStudent
1	John	23	M	1
2	Mary	23	F	0
3	Tom	23	M	0
5	Alan	23	M	1
6	Laura	23	F	1
7	Bob	23	M	0

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





# UPDATE



```
mysql> select * from person;
```

personID	name	age	sex	isStudent
1	John	23	M	1
2	Mary	30	F	0
3	Tom	NULL	M	0
5	Alan	18	M	1
6	Laura	17	F	1
7	Bob	18	M	0

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

```
mysql> UPDATE person  
-> SET age = 23  
-> WHERE personID=3;
```

```
Query OK, 1 row affected (0.00 sec)  
Rows matched: 1  Changed: 1  Warnings: 0
```

```
mysql> select * from person;
```

personID	name	age	sex	isStudent
1	John	23	M	1
2	Mary	20	F	0
3	Tom	23	M	0
5	Alan	18	M	1
6	Laura	17	F	1
7	Bob	18	M	0

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



# UPDATE



```
mysql> select * from person;
```

personID	name	age	sex	isStudent
1	John	23	M	1
2	Mary	30	F	0
3	Tom	NULL	M	0
5	Alan	18	M	1
6	Laura	17	F	1
7	Bob	18	M	0

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

```
mysql> UPDATE person
-> SET age = age + 1;
```

```
Query OK, 5 rows affected (0.00 sec)
Rows matched: 6  Changed: 5  Warnings: 0
```

```
mysql> select * from person;
```

personID	name	age	sex	isStudent
1	John	24	M	1
2	Mary	31	F	0
3	Tom	NULL	M	0
5	Alan	19	M	1
6	Laura	18	F	1
7	Bob	19	M	0

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



# UPDATE



```
mysql> select * from person;
```

personID	name	age	sex	isStudent
1	John	23	M	1
2	Mary	30	F	0
3	Tom	NULL	M	0
5	Alan	18	M	1
6	Laura	17	F	1
7	Bob	18	M	0

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

```
mysql> UPDATE person
```

```
  -> set name = CONCAT(IF(sex="M", "Mr.", "Ms."), name);
```

```
Query OK, 6 rows affected (0.00 sec)
```

```
Rows matched: 6  Changed: 6  Warnings: 0
```

```
mysql> select * from person;
```

personID	name	age	sex	isStudent
1	Mr. John	23	M	1
2	Ms. Mary	30	F	0
3	Mr. Tom	NULL	M	0
5	Mr. Alan	18	M	1
6	Ms. Laura	17	F	1
7	Mr. Bob	18	M	0

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



# DELETE



<https://dev.mysql.com/doc/refman/8.0/en/delete.html>

- ▶ `DELETE FROM <table>;`
- ▶ `DELETE FROM <table>;`  
`WHERE condition;`



# DELETE



```
mysql> select * from person;
```

personID	name	age	sex	isStudent
1	John	23	M	1
2	Mary	30	F	0
3	Tom	NULL	M	0
5	Alan	18	M	1
6	Laura	17	F	1
7	Bob	18	M	0

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

```
mysql> DELETE FROM person;
Query OK, 6 rows affected (0.00 sec)
```

```
mysql> select * from person;
Empty set (0.00 sec)
```

```
mysql> describe person;
```

Field	Type	Null	Key	Default	Extra
personID	int(11)	NO	PRI	NULL	auto_increment
name	varchar(20)	NO		NULL	
age	int(11)	YES		NULL	
sex	enum('M','F')	YES		M	
isStudent	tinyint(1)	YES		0	

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



# DELETE



```
mysql> select * from person;
```

personID	name	age	sex	isStudent
1	John	23	M	1
2	Mary	30	F	0
3	Tom	NULL	M	0
5	Alan	18	M	1
6	Laura	17	F	1
7	Bob	18	M	0

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

```
mysql> DELETE from PERSON
```

```
-> WHERE personID = 6;
```

```
Query OK, 1 row affected (0.01 sec)
```

```
mysql> select * from person;
```

personID	name	age	sex	isStudent
1	John	23	M	1
2	Mary	30	F	0
3	Tom	NULL	M	0
5	Alan	18	M	1
7	Bob	18	M	0

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



# DELETE



```
mysql> select * from person;
```

personID	name	age	sex	isStudent
1	John	23	M	1
2	Mary	30	F	0
3	Tom	NULL	M	0
5	Alan	18	M	1
6	Laura	17	F	1
7	Bob	18	M	0

6 rows in set (0.00 sec)

```
mysql> select * from person;
```

personID	name	age	sex	isStudent
2	Mary	30	F	0
3	Tom	NULL	M	0
5	Alan	18	M	1
6	Laura	17	F	1
7	Bob	18	M	0

5 rows in set (0.00 sec)

```
mysql> SELECT * FROM person
-> WHERE sex = "M"
-> AND isStudent
-> AND age > 20;
```

personID	name	age	sex	isStudent
1	John	23	M	1

1 row in set (0.00 sec)

```
mysql> DELETE FROM person
-> WHERE sex = "M"
-> AND isStudent
-> AND age > 20;
```

Query OK, 1 row affected (0.00 sec)



# Foreign Keys



SHOW CREATE TABLE bus;

```
| bus | CREATE TABLE 'bus' (
  'reg' varchar(15) NOT NULL,
  'maxPassengers' int(11) DEFAULT NULL,
  'fuel' enum('Diesel','Petrol','Electric') DEFAULT 'Diesel',
  PRIMARY KEY ('reg')
) ENGINE=InnoDB DEFAULT CHARSET=latin1 |
```

mysql> select \* from bus;

reg	maxPassengers	fuel
12-G-1323	34	Petrol
161-D-1323	80	Diesel
162-D-3433	120	Electric
191-G-123	56	Diesel

4 rows in set (0.00 sec)

mysql> select \* from driver;

licenceNo	name	busReg
F2233	Alan	191-G-123
L23423	John	12-G-1323
X98983	Tom	161-D-1323

3 rows in set (0.00 sec)

SHOW CREATE TABLE driver;

```
| driver | CREATE TABLE 'driver' (
  'licenceNo' varchar(20) NOT NULL,
  'name' varchar(30) DEFAULT NULL,
  'busReg' varchar(15) DEFAULT NULL,
  PRIMARY KEY ('licenceNo'),
  KEY 'busReg' ('busReg'),
  CONSTRAINT 'driver_ibfk_1' FOREIGN KEY ('busReg') REFERENCES 'bus' ('reg')
) ENGINE=InnoDB DEFAULT CHARSET=latin1 |
```





# Foreign Keys - ON DELETE RESTRICT



SHOW CREATE TABLE bus;

```
| bus | CREATE TABLE 'bus' (
| 'reg' varchar(15) NOT NULL,
| 'maxPassengers' int(11) DEFAULT NULL,
| 'fuel' enum('Diesel','Petrol','Electric') DEFAULT 'Diesel',
| PRIMARY KEY ('reg')
| ) ENGINE=InnoDB DEFAULT CHARSET=latin1 |
```

mysql> select \* from bus;

reg	maxPassengers	fuel
12-G-1323	34	Petrol
161-D-1323	80	Diesel
162-D-3433	120	Electric
191-G-123	56	Diesel

4 rows in set (0.00 sec)

mysql> select \* from driver;

licenceNo	name	busReg
F2233	Alan	191-G-123
L23423	John	12-G-1323
X98983	Tom	161-D-1323

3 rows in set (0.00 sec)

SHOW CREATE TABLE driver;

```
| driver | CREATE TABLE 'driver' (
| 'licenceNo' varchar(20) NOT NULL,
| 'name' varchar(30) DEFAULT NULL,
| 'busReg' varchar(15) DEFAULT NULL,
| PRIMARY KEY ('licenceNo'),
| KEY 'busReg' ('busReg'),
| CONSTRAINT 'driver_ibfk_1' FOREIGN KEY ('busReg') REFERENCES 'bus' ('reg')
| ) ENGINE=InnoDB DEFAULT CHARSET=latin1 |
```

ON DELETE RESTRICT



# Foreign Keys - ON DELETE CASCADE



SHOW CREATE TABLE bus;

```

| bus | CREATE TABLE 'bus' (
| 'reg' varchar(15) NOT NULL,
| 'maxPassengers' int(11) DEFAULT NULL,
| 'fuel' enum('Diesel','Petrol','Electric') DEFAULT 'Diesel',
| PRIMARY KEY ('reg')
| ) ENGINE=InnoDB DEFAULT CHARSET=latin1 |

```

mysql> select \* from bus;

reg	maxPassengers	fuel
12-G-1323	34	Petrol
161-D-1323	80	Diesel
162-D-3433	120	Electric

3 rows in set (0.00 sec)  
4 rows in set (0.00 sec)

mysql> select \* from driver;

licenceNo	name	busReg
L23423	John	12-G-1323
X98983	Tom	161-D-1323

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

SHOW CREATE TABLE driver;

```

| driver | CREATE TABLE 'driver' (
| 'licenceNo' varchar(20) NOT NULL,
| 'name' varchar(30) DEFAULT NULL,
| 'busReg' varchar(15) DEFAULT NULL,
| PRIMARY KEY ('licenceNo'),
| KEY 'busReg' ('busReg'),
| CONSTRAINT 'driver_ibfk_1' FOREIGN KEY ('busReg') REFERENCES 'bus' ('reg')
| ) ENGINE=InnoDB DEFAULT CHARSET=latin1 |

```

ON DELETE CASCADE



# Foreign Keys - ON DELETE SET NULL



SHOW CREATE TABLE bus;

```

| bus | CREATE TABLE 'bus' (
  'reg' varchar(15) NOT NULL,
  'maxPassengers' int(11) DEFAULT NULL,
  'fuel' enum('Diesel','Petrol','Electric') DEFAULT 'Diesel',
  PRIMARY KEY ('reg')
) ENGINE=InnoDB DEFAULT CHARSET=latin1 |

```

mysql> select \* from bus;

reg	maxPassengers	fuel
12-G-1323	34	Petrol
161-D-1323	80	Diesel
162-D-3433	120	Electric

3 rows in set (0.00 sec)  
4 rows in set (0.00 sec)

mysql> select \* from driver;

licenceNo	name	busReg
F2233	Alan	NULL
L23423	John	12-G-1323
X98983	Tom	161-D-1323

3 rows in set (0.00 sec)

SHOW CREATE TABLE driver;

```

| driver | CREATE TABLE 'driver' (
  'licenceNo' varchar(20) NOT NULL,
  'name' varchar(30) DEFAULT NULL,
  'busReg' varchar(15) DEFAULT NULL,
  PRIMARY KEY ('licenceNo'),
  KEY 'busReg' ('busReg'),
  CONSTRAINT 'driver_ibfk_1' FOREIGN KEY ('busReg') REFERENCES 'bus' ('reg') ON DELETE SET NULL
) ENGINE=InnoDB DEFAULT CHARSET=latin1 |

```



# READ – SubQueries



```
show create table employees;
```

```
| employees | CREATE TABLE 'employees' (  
  emp_no int(11) NOT NULL,  
  birth_date date NOT NULL,  
  first_name varchar(14) NOT NULL,  
  last_name varchar(16) NOT NULL,  
  gender enum('M','F') NOT NULL,  
  hire_date date NOT NULL,  
  PRIMARY KEY ('emp_no')  
) ENGINE=InnoDB DEFAULT CHARSET=utf8 |
```

```
show create table salaries;
```

```
| salaries | CREATE TABLE 'salaries' (  
  emp_no int(11) NOT NULL,  
  salary int(11) NOT NULL,  
  from_date date NOT NULL,  
  to_date date NOT NULL,  
  PRIMARY KEY ('emp_no', 'from_date'),  
  KEY 'emp_no' ('emp_no'),  
  CONSTRAINT 'salaries_ibfk_1' FOREIGN KEY ('emp_no') REFERENCES 'employees' ('emp_no') ON DELETE  
  ASCADE  
) ENGINE=InnoDB DEFAULT CHARSET=utf8 |
```



# READ – SubQueries



```
mysql> SELECT e.emp_no, first_name, last_name
-> FROM employees e
-> INNER JOIN salaries s
-> ON e.emp_no = s.emp_no
-> WHERE s.salary BETWEEN 99000 AND 99999;
```

emp_no	first_name	last_name
10017	Cristinel	Bouloucos
10066	Kwee	Schusler
10100	Hironobu	Haraldson

3 rows in set (0.00 sec)

```
mysql> SELECT s.emp_no
-> FROM salaries s
-> WHERE s.salary BETWEEN 99000 AND 99999;
```

emp_no
10017
10066
10100

3 rows in set (0.00 sec)

```
mysql> SELECT e.emp_no, first_name, last_name
-> FROM employees e
-> WHERE e.emp_no IN (
-> SELECT s.emp_no
-> FROM salaries s
-> WHERE s.salary BETWEEN 99000 AND 99999
-> );
```

emp_no	first_name	last_name
10017	Cristinel	Bouloucos
10066	Kwee	Schusler
10100	Hironobu	Haraldson

3 rows in set (0.00 sec)

```
mysql> SELECT e.emp_no, first_name, last_name
-> FROM employees e
-> WHERE e.emp_no IN (
-> 10017, 10066, 10100
-> );
```

emp_no	first_name	last_name
10017	Cristinel	Bouloucos
10066	Kwee	Schusler
10100	Hironobu	Haraldson

3 rows in set (0.00 sec)



# READ – SubQueries



```
show create table employees;
```

```
| employees | CREATE TABLE 'employees' (  
  emp_no int(11) NOT NULL,  
  birth_date date NOT NULL,  
  first_name varchar(14) NOT NULL,  
  last_name varchar(16) NOT NULL,  
  gender enum('M','F') NOT NULL,  
  hire_date date NOT NULL,  
  PRIMARY KEY ('emp_no')  
) ENGINE=InnoDB DEFAULT CHARSET=utf8 |
```

```
show create table salaries;
```

```
| salaries | CREATE TABLE 'salaries' (  
  emp_no int(11) NOT NULL,  
  salary int(11) NOT NULL,  
  from_date date NOT NULL,  
  to_date date NOT NULL,  
  PRIMARY KEY ('emp_no', 'from_date'),  
  KEY 'emp_no' ('emp_no'),  
  CONSTRAINT 'salaries_ibfk_1' FOREIGN KEY ('emp_no') REFERENCES 'employees' ('emp_no') ON DELETE  
  ASCADE  
) ENGINE=InnoDB DEFAULT CHARSET=utf8 |
```



# READ – SubQueries



```
mysql> SELECT emp_no, first_name, last_name
-> FROM employees
-> WHERE emp_no IN (
->
->
-> 10068
->
->
-> );
```

emp_no	first_name	last_name
10068	Charlene	Brattka

1 row in set (0.00 sec)

```
mysql> SELECT MAX(salary)
-> FROM salaries;
+-----+
| MAX(salary) |
+-----+
| 113229 |
+-----+
1 row in set (0.00 sec)
```

```
mysql> SELECT emp_no
-> FROM salaries
-> WHERE salary = (
-> 113229
-> );
+-----+
| emp_no |
+-----+
| 10068 |
+-----+
1 row in set (0.00 sec)
```

