

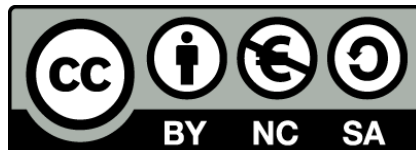


Πανεπιστήμιο Δυτικής Αττικής

Βάσεις Δεδομένων Μεταπτυχιακού Κύκλου Σπουδών (MSCICT101)

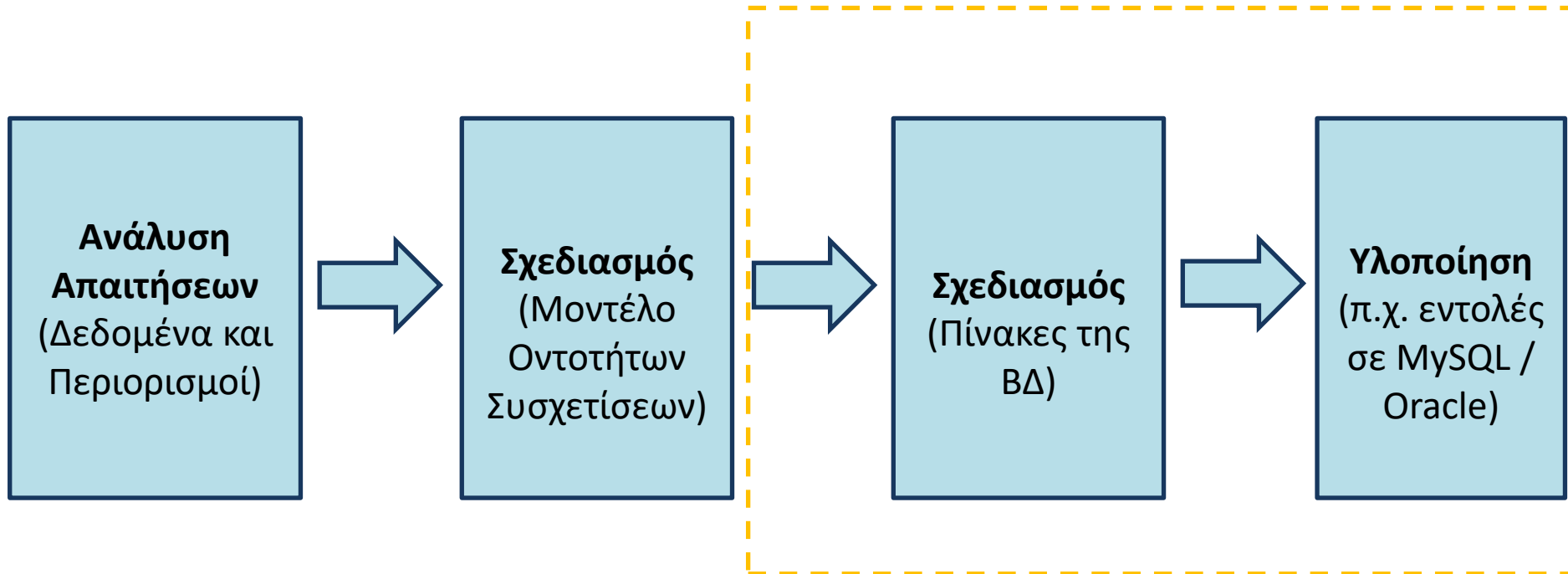
Ενότητα 3: Δημιουργία πινάκων από ER
Model, DDL, Primary/Foreign Keys

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Το περιεχόμενο του μαθήματος
διατίθεται με άδεια Creative
Commons εκτός και αν αναφέρεται
διαφορετικά

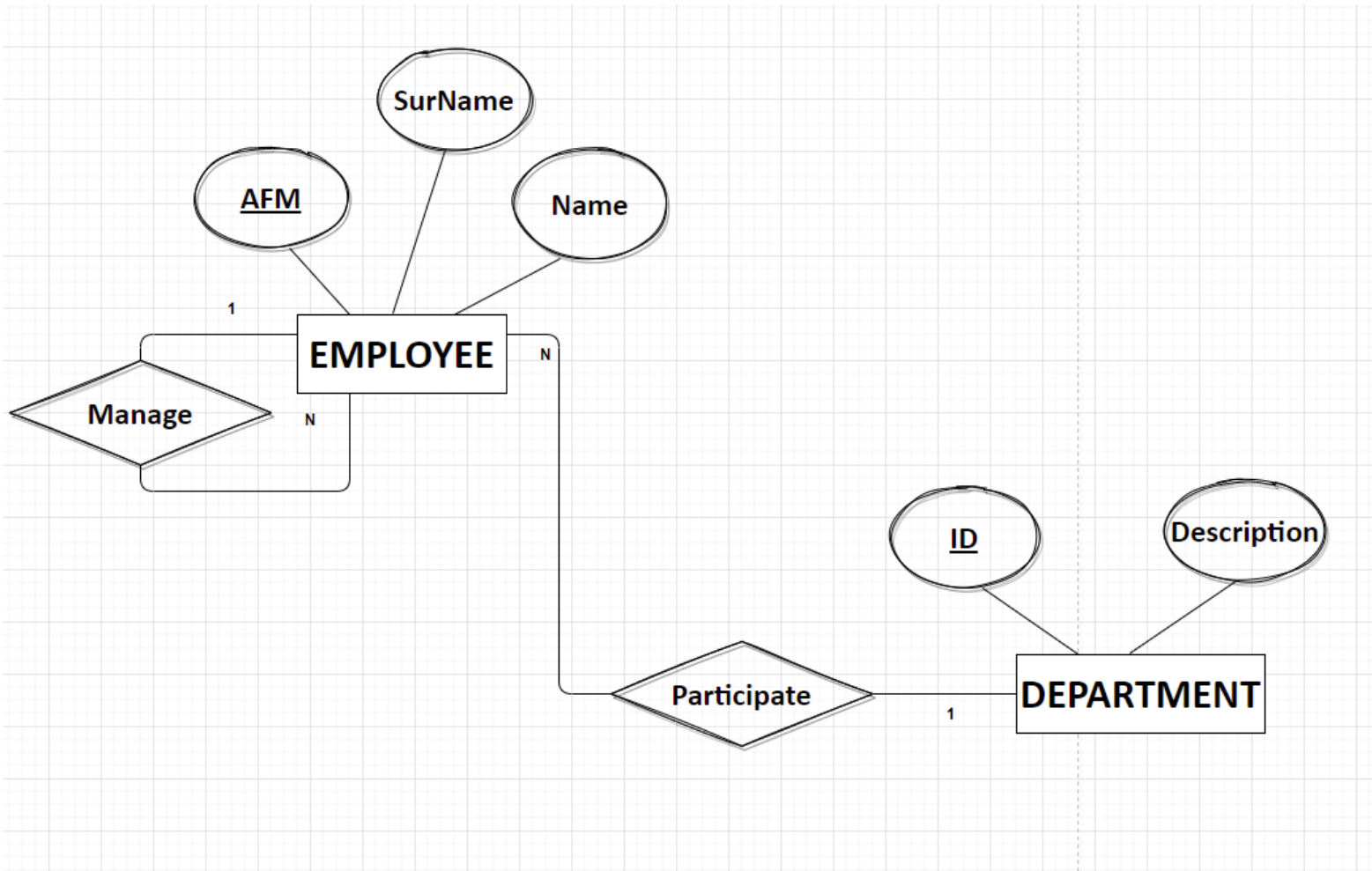
Μεθοδολογία



SQL Commands

- **DDL** is short name of Data Definition Language, which deals with database schemas and descriptions, of how the data should reside in the database.
- **DML** is short name of Data Manipulation Language which deals with data manipulation and includes most common SQL statements such SELECT, INSERT, UPDATE, DELETE, etc.,
- **DCL** is short name of Data Control Language which includes commands such as GRANT and mostly concerned with rights, permissions and other controls of the database system.
- **TCL** is short name of Transaction Control Language which deals with a transaction within a database.

ER Model



Παράδειγμα σχεσιακής βάσης δεδομένων προσωπικού εταιρείας

Deptno	Dname	Loc
10	ACCOUNTING	ATHENS
20	SALES	LONDON
30	RESEARCH	ATHENS
40	PAYROLL	LONDON

dept (πίνακας τμημάτων)

emp (πίνακας υπαλλήλων)

Empno	Ename	Job	Hiredate	Mgr	Sal	Comm	Dept no
10	CODD	ANALYST	1989-01-01	15	3000		10
15	ELMASRI	ANALYST	1995-05-02	15	1200	150	10
20	NAVATHE	SALESMAN	1977-07-07	20	2000		20
30	DATE	PROGRAMMER	2004-05-04	15	1800	200	10

Δημιουργία βάσεως δεδομένων σε γλώσσα SQL

Για να δημιουργηθεί το σχήμα της βάσης δεδομένων μπορούμε να χρησιμοποιήσουμε τις παρακάτω δηλώσεις (statements) σε γλώσσα SQL **(στο προϊόν MySQL)**:

```
CREATE DATABASE personnel;
```

```
USE personnel;
```

```
CREATE TABLE DEPT(DEPTNO INT NOT NULL,  
                   DNAME VARCHAR(14), LOC VARCHAR(14));
```

```
CREATE TABLE EMP(EMPNO INT NOT NULL,  
                  ENAME VARCHAR(10), JOB VARCHAR(25),  
                  HIREDATE DATE, MGR INT,  
                  SAL FLOAT(7,2), COMM FLOAT(7,2),  
                  DEPTNO INT);
```

Εισαγωγή στοιχείων σε γλώσσα SQL

```
INSERT INTO DEPT(DEPTNO, DNAME, LOC)
```

```
VALUES (10, 'ACCOUNTING', 'NEW YORK');
```

```
INSERT INTO EMP
```

```
VALUES (10, 'CODD', 'ANALYST', '1989/01/01', 15, 3000, NULL, 10);
```

```
SELECT * FROM EMP;
```

```
SELECT * FROM DEPT;
```

Διαγραφή πινάκων

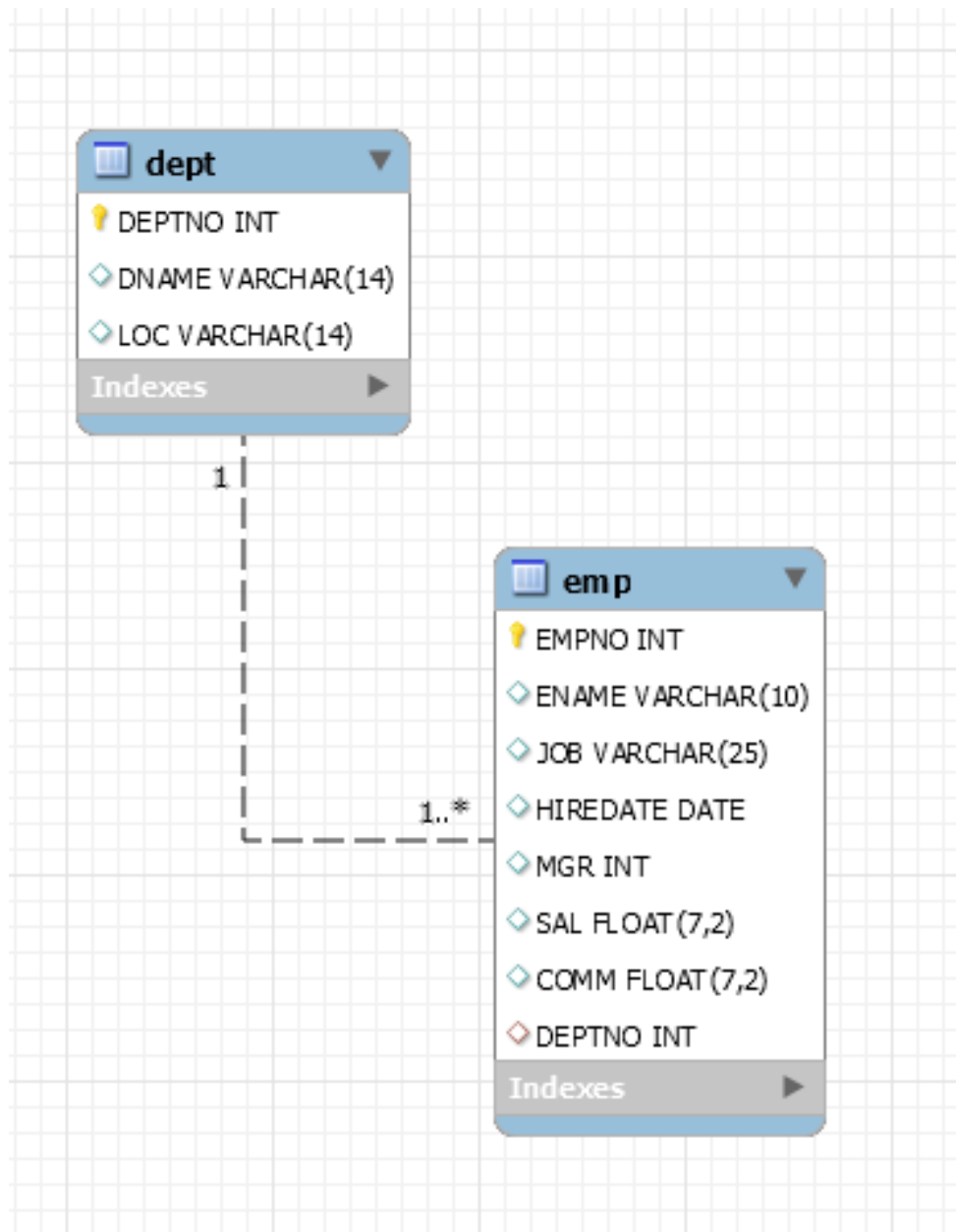
/* Δηλώσεις διαγραφής πινάκων */

```
DROP TABLE EMP;
```

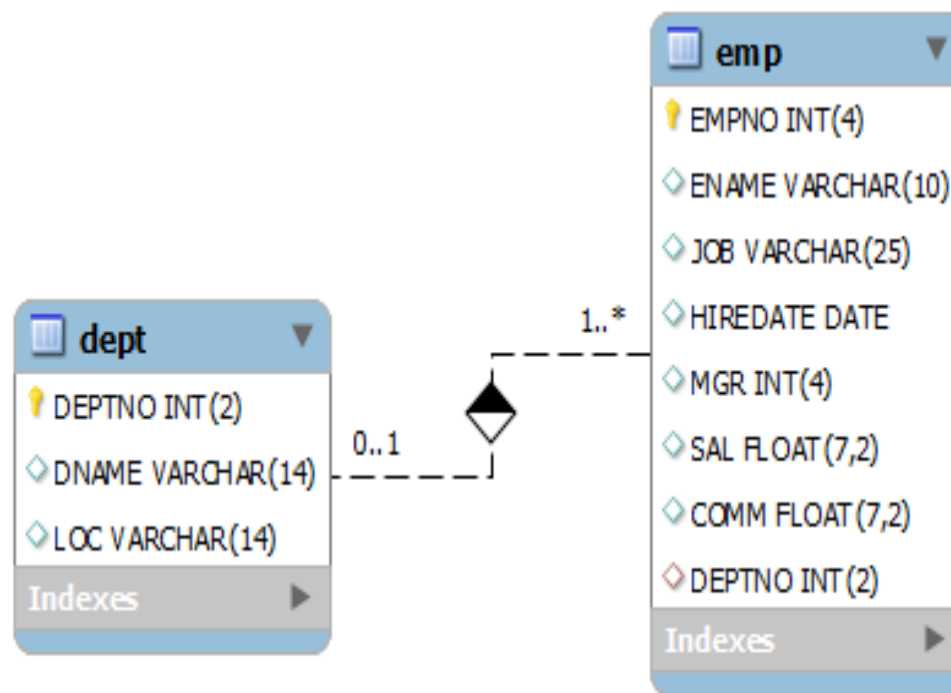
```
DROP TABLE DEPT;
```


Παράδειγμα του μοντέλου σε MySQL Workbench

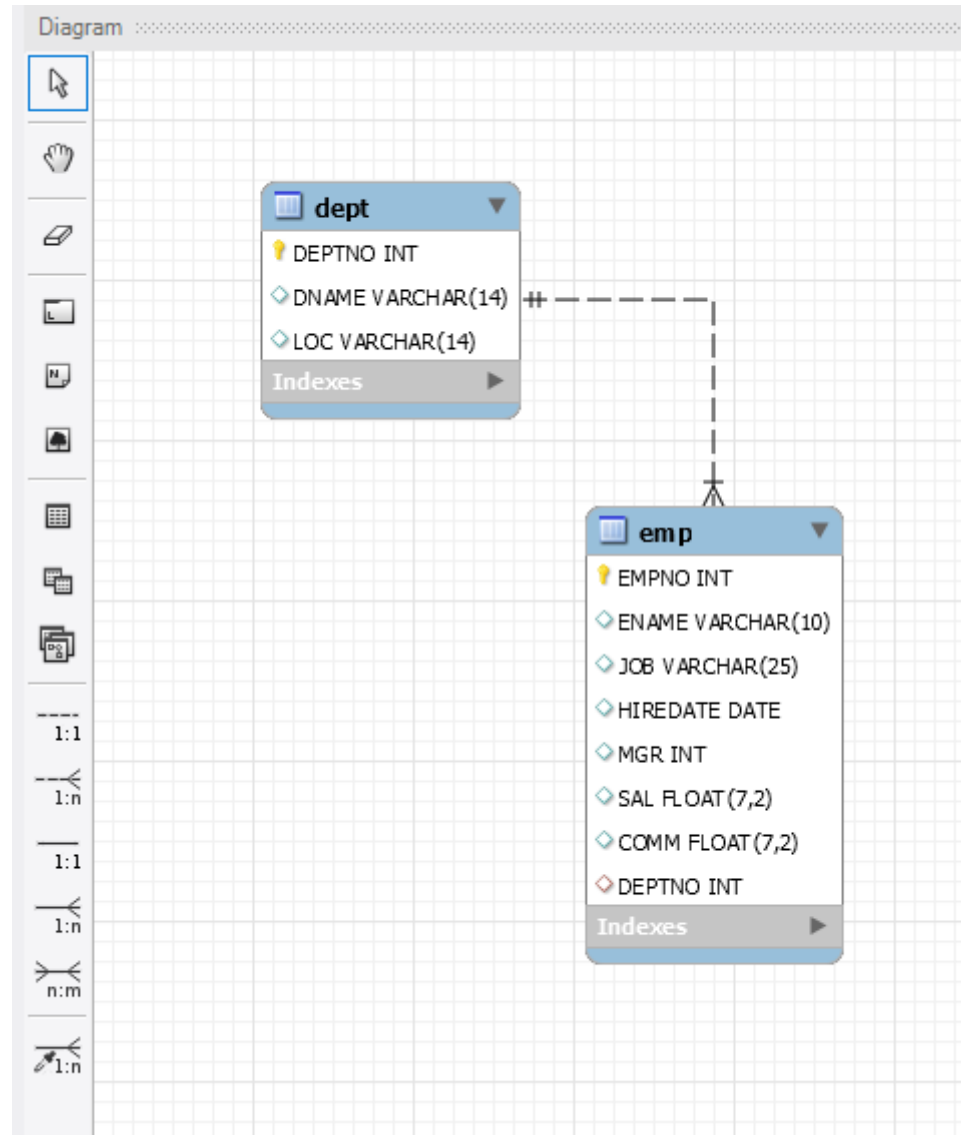
UML



Παράδειγμα σε MySQL Workbench: Classic



Παράδειγμα μοντέλου σε MySQL Workbench –Crow's foot



Κύριο ή πρωτεύον κλειδί
Primary key

Ξένο Κλειδί
Foreign key

**Προβλήματα ακεραιότητας της βάσης
δεδομένων.**

**Επίλυση προβλημάτων με ορισμό κύριων
και ξένων κλειδιών**

Παράδειγμα σχεσιακής βάσης δεδομένων προσωπικού εταιρείας

Deptno	Dname	Loc
10	ACCOUNTING	ATHENS
20	SALES	LONDON
30	RESEARCH	ATHENS
40	PAYROLL	LONDON

dept (πίνακας τμημάτων)

emp (πίνακας υπαλλήλων)

Empno	Ename	Job	Hiredate	Mgr	Sal	Comm	Dept no
10	CODD	ANALYST	1989-01-01	15	3000		10
15	ELMASRI	ANALYST	1995-05-02	15	1200	150	10
20	NAVATHE	SALESMAN	1977-07-07	20	2000		20
30	DATE	PROGRAMMER	2004-05-04	15	1800	200	10

Δημιουργούμε τους πίνακες χωρίς κύρια (primary key) και ξένα κλειδιά (foreign key)

```
DROP DATABASE IF EXISTS my_first_db;
```

```
CREATE DATABASE my_first_db;
```

```
USE my_first_db;
```

```
CREATE TABLE DEPT(DEPTNO INT NOT NULL, DNAME VARCHAR(14),  
LOC VARCHAR(14));
```

```
CREATE TABLE EMP(EMPNO INT NOT NULL,ENAME VARCHAR(10),  
JOB VARCHAR(25), HIREDATE DATE, MGR INT, SAL FLOAT(7,2),  
COMM FLOAT(7,2),DEPTNO INT);
```


Εισάγουμε γραμμές στους πίνακες με λάθη

```
INSERT INTO DEPT (DEPTNO, DNAME, LOC)
  VALUES (10, 'ACCOUNTING', 'ATHENS');
INSERT INTO DEPT (DEPTNO, DNAME, LOC)
  VALUES (10, 'ACCOUNTING', 'NEW YORK');
INSERT INTO DEPT(DEPTNO, DNAME, LOC)
  VALUES (30, 'SALES', 'CHICAGO');
INSERT INTO DEPT(DEPTNO, DNAME, LOC)
  VALUES (40, 'PAYROLL', 'LONDON');
INSERT INTO EMP
  VALUES (10,'CODD','ANALYST','1989/01/01', 15, 3000, NULL, 10);
INSERT INTO EMP
  VALUES(15,'ELMASRI','ANALYST','1995/05/02',15,1200, 150, 10);
INSERT INTO EMP
  VALUES(20,'NAVATHE','SALESMAN', '1997/07/07',20,2000,NULL,20);
INSERT INTO EMP
  VALUES(30,'DATE','PROGRAMMER','2004/05/04',15,1800,200, 10);
SELECT * FROM DEPT;
SELECT * FROM EMP;
```

Να τι βλέπουμε !

Deptno	Dname	Loc
10	ACCOUNTING	ATHENS
10	ACCOUNTING	NEW YORK
30	SALES	CHICAGO
40	PAYROLL	LONDON

dept (πίνακας τμημάτων)

emp (πίνακας υπαλλήλων)

Empno	Ename	Job	Hiredate	Mgr	Sal	Comm	Dept no
10	CODD	ANALYST	1989-01-01	15	3000		10
15	ELMASRI	ANALYST	1995-05-02	15	1200	150	10
20	NAVATHE	SALESMAN	1997-07-07	20	2000		20
30	DATE	PROGRAMMER	2004-05-04	15	1800	200	10

**Η διασφάλιση της ακεραιότητας της
βάσης δεδομένων με χρήση κύριων και
ξένων κλειδιών**

πίνακες με κύρια (primary key) και ξένα κλειδιά (foreign key)

```
DROP DATABASE IF EXISTS my_first_db;
```

```
CREATE DATABASE my_first_db;
```

```
USE my_first_db;
```

```
CREATE TABLE DEPT(DEPTNO INT(2) NOT NULL, DNAME VARCHAR(14),  
  LOC VARCHAR(14), PRIMARY KEY(DEPTNO));
```

```
CREATE TABLE EMP(EMPNO INT(4) NOT NULL,ENAME VARCHAR(10),  
  JOB VARCHAR(25), HIREDATE DATE, MGR INT(4), SAL FLOAT(7,2),  
  COMM FLOAT(7,2),DEPTNO INT(2),  
  PRIMARY KEY(EMPNO),  
  FOREIGN KEY(DEPTNO) REFERENCES DEPT(DEPTNO));
```

```

mysql>
mysql> USE my_first_db;
Database changed
mysql>
mysql> CREATE TABLE DEPT(DEPTNO INT(2) NOT NULL, DNAME VARCHAR(14),
->      LOC VARCHAR(14), PRIMARY KEY(DEPTNO));
Query OK, 0 rows affected, 1 warning (0.04 sec)

mysql>
mysql> CREATE TABLE EMP(EMPNO INT(4) NOT NULL,ENAME VARCHAR(10),
->      JOB VARCHAR(25), HIREDATE DATE, MGR INT(4), SAL FLOAT(7,2),
->      COMM FLOAT(7,2),DEPTNO INT(2),
->      PRIMARY KEY(EMPNO),
->      FOREIGN KEY(DEPTNO) REFERENCES DEPT(DEPTNO));
Query OK, 0 rows affected, 5 warnings (1.07 sec)

mysql>
mysql>          SHOW TABLES;
+-----+
| Tables_in_my_first_db |
+-----+
| dept                    |
| emp                     |
+-----+
2 rows in set (0.00 sec)

```

```

mysql>
mysql>
mysql> DESCRIBE emp;
+-----+-----+-----+-----+-----+-----+
| Field      | Type          | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| EMPNO      | int           | NO   | PRI | NULL    |       |
| ENAME      | varchar(10)   | YES  |     | NULL    |       |
| JOB        | varchar(25)   | YES  |     | NULL    |       |
| HIREDATE    | date          | YES  |     | NULL    |       |
| MGR        | int           | YES  |     | NULL    |       |
| SAL        | float(7,2)    | YES  |     | NULL    |       |
| COMM       | float(7,2)    | YES  |     | NULL    |       |
| DEPTNO     | int           | YES  | MUL | NULL    |       |
+-----+-----+-----+-----+-----+-----+
8 rows in set (0.01 sec)

mysql>                DESCRIBE dept;
+-----+-----+-----+-----+-----+-----+
| Field      | Type          | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| DEPTNO     | int           | NO   | PRI | NULL    |       |
| DNAME      | varchar(14)   | YES  |     | NULL    |       |
| LOC        | varchar(14)   | YES  |     | NULL    |       |
+-----+-----+-----+-----+-----+-----+
3 rows in set (0.00 sec)

```

Εισάγετε γραμμές στους πίνακες

```
INSERT INTO DEPT (DEPTNO, DNAME, LOC)
    VALUES (10, 'ACCOUNTING', 'NEW YORK');
INSERT INTO DEPT(DEPTNO, DNAME, LOC)
    VALUES (20, 'RESEARCH', 'DALLAS');
INSERT INTO DEPT(DEPTNO, DNAME, LOC)
    VALUES (30, 'SALES', 'CHICAGO');
INSERT INTO DEPT(DEPTNO, DNAME, LOC)
    VALUES (40, 'OPERATIONS', 'BOSTON');
INSERT INTO EMP
    VALUES (10,'CODD','ANALYST','1989/01/01', 15, 3000, NULL, 10);
INSERT INTO EMP
    VALUES(15,'ELMASRI','ANALYST','1995/05/02',15,1200, 150, 10);
INSERT INTO EMP
    VALUES(20,'NAVATHE','SALESMAN','1977/07/07',20,2000,NULL,20);
INSERT INTO EMP
    VALUES(30,'DATE','PROGRAMMER','2004/05/04',15,1800,200, 10);

SELECT * FROM DEPT;
SELECT * FROM EMP;
```

```
mysql> INSERT INTO DEPT (DEPTNO, DNAME, LOC)
      -> VALUES (10, 'ACCOUNTING', 'NEW YORK');
Query OK, 1 row affected (0.01 sec)

mysql> INSERT INTO DEPT(DEPTNO, DNAME, LOC)
      -> VALUES (20, 'RESEARCH', 'DALLAS');
Query OK, 1 row affected (0.01 sec)

mysql> INSERT INTO DEPT(DEPTNO, DNAME, LOC)
      -> VALUES (30, 'SALES', 'CHICAGO');
Query OK, 1 row affected (0.00 sec)

mysql> INSERT INTO DEPT(DEPTNO, DNAME, LOC)
      -> VALUES (40, 'OPERATIONS', 'BOSTON');
Query OK, 1 row affected (0.00 sec)

mysql> SELECT * FROM dept;
+-----+-----+-----+
| DEPTNO | DNAME          | LOC          |
+-----+-----+-----+
|      10 | ACCOUNTING     | NEW YORK    |
|      20 | RESEARCH       | DALLAS      |
|      30 | SALES          | CHICAGO     |
|      40 | OPERATIONS     | BOSTON      |
+-----+-----+-----+
4 rows in set (0.00 sec)
```



```
mysql>
mysql> INSERT INTO EMP
  -> VALUES (10, 'CODD', 'ANALYST', '1989/01/01', 15, 3000, NULL, 10);
Query OK, 1 row affected (0.01 sec)
```

```
mysql> INSERT INTO EMP
  -> VALUES(15, 'ELMASRI', 'ANALYST', '1995/05/02', 15, 1200, 150, 10);
Query OK, 1 row affected (0.01 sec)
```

```
mysql> INSERT INTO EMP
  -> VALUES(20, 'NAVATHE', 'SALESMAN', '1977/07/07', 20, 2000, NULL, 20);
Query OK, 1 row affected (0.00 sec)
```

```
mysql> INSERT INTO EMP
  -> VALUES(30, 'DATE', 'PROGRAMMER', '2004/05/04', 15, 1800, 200, 10);
Query OK, 1 row affected (0.00 sec)
```

```
mysql> SELECT * FROM emp;
```

EMPNO	ENAME	JOB	HIREDATE	MGR	SAL	COMM	DEPTNO
10	CODD	ANALYST	1989-01-01	15	3000.00	NULL	10
15	ELMASRI	ANALYST	1995-05-02	15	1200.00	150.00	10
20	NAVATHE	SALESMAN	1977-07-07	20	2000.00	NULL	20
30	DATE	PROGRAMMER	2004-05-04	15	1800.00	200.00	10

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

Τα προβλήματα λύθηκαν

Εισάγετε στοιχεία στους δύο πίνακες.

```
INSERT INTO DEPT(DEPTNO, DNAME, LOC)
```

```
VALUES (10, 'ACCOUNTING', 'NEW YORK');
```

```
INSERT INTO DEPT(DEPTNO, DNAME, LOC)
```

```
VALUES (10, 'SALES', 'CHICAGO');
```

```
INSERT INTO EMP
```

```
VALUES (10, 'CODD', 'ANALYST', '1989/01/01', 15, 3000, NULL, 10);
```

```
INSERT INTO EMP
```

```
VALUES(20,'NAVATHE','SALESMAN','1977/07/07',20,2000,NULL,20);
```

Δείτε τα στοιχεία των πινάκων της βάσης.

```
SELECT * FROM EMP;
```

```
SELECT * FROM DEPT;
```

```

mysql>
mysql> # Εισάγετε στοιχεία στους δύο πίνακες.
mysql> INSERT INTO DEPT(DEPTNO, DNAME, LOC)
  ->          VALUES (10, "ACCOUNTING", "NEW YORK");
ERROR 1062 (23000): Duplicate entry '10' for key 'dept.PRIMARY'
mysql> INSERT INTO DEPT(DEPTNO, DNAME, LOC)
  ->          VALUES (10, "SALES", "CHICAGO");
ERROR 1062 (23000): Duplicate entry '10' for key 'dept.PRIMARY'
mysql> INSERT INTO EMP
  ->          VALUES (10, 'CODD', 'ANALYST', '1989/01/01', 15, 3000, NULL, 10);
ERROR 1062 (23000): Duplicate entry '10' for key 'emp.PRIMARY'
mysql> INSERT INTO EMP
  ->          VALUES(20, 'NAVATHE', 'SALESMAN', '1977/07/07', 20, 2000, NULL, 20);
ERROR 1062 (23000): Duplicate entry '20' for key 'emp.PRIMARY'
mysql>
mysql>
mysql> # Δείτε τα στοιχεία των πινάκων της βάσης.
mysql> SELECT * FROM EMP;
+-----+-----+-----+-----+-----+-----+-----+-----+
| EMPNO | ENAME   | JOB           | HIREDATE   | MGR  | SAL      | COMM   | DEPTNO |
+-----+-----+-----+-----+-----+-----+-----+-----+
| 10    | CODD    | ANALYST      | 1989-01-01 | 15   | 3000.00  | NULL   | 10     |
| 15    | ELMASRI | ANALYST      | 1995-05-02 | 15   | 1200.00  | 150.00 | 10     |
| 20    | NAVATHE | SALESMAN     | 1977-07-07 | 20   | 2000.00  | NULL   | 20     |
| 30    | DATE    | PROGRAMMER   | 2004-05-04 | 15   | 1800.00  | 200.00 | 10     |
+-----+-----+-----+-----+-----+-----+-----+-----+
4 rows in set (0.00 sec)

mysql> SELECT * FROM DEPT;
+-----+-----+-----+
| DEPTNO | DNAME       | LOC       |
+-----+-----+-----+
| 10     | ACCOUNTING | NEW YORK  |
| 20     | RESEARCH   | DALLAS   |
| 30     | SALES      | CHICAGO  |
| 40     | OPERATIONS | BOSTON   |
+-----+-----+-----+
4 rows in set (0.00 sec)

```

Μία ακόμη δοκιμή

```
INSERT INTO EMP
```

```
VALUES (40, 'CODD', 'ANALYST', '1979/01/21', 15, 2500, NULL, 50);
```

```
INSERT INTO EMP
```

```
VALUES (40, 'CODD', 'ANALYST', '1979/01/21', 15, 2500, NULL, NULL);
```

```
SELECT * FROM emp;
```

```
mysql>
mysql>
mysql> INSERT INTO EMP
-> VALUES (40, "CODD", "ANALYST", "1979/01/21", 15, 2500, NULL, 50);
ERROR 1452 (23000): Cannot add or update a child row: a foreign key constraint fails (`my_first_db`.`emp`, CONSTRAINT `emp_ibfk_1` FOREIGN KEY (`DEPTNO`) REFERENCES `dept` (`DEPTNO`))
mysql> INSERT INTO EMP
-> VALUES (40, "CODD", "ANALYST", "1979/01/21", 15, 2500, NULL, NULL);
Query OK, 1 row affected (0.00 sec)

mysql> SELECT * FROM emp;
+-----+-----+-----+-----+-----+-----+-----+-----+
| EMPNO | ENAME  | JOB      | HIREDATE | MGR  | SAL      | COMM  | DEPTNO |
+-----+-----+-----+-----+-----+-----+-----+-----+
| 10    | CODD   | ANALYST  | 1989-01-01 | 15   | 3000.00  | NULL  | 10     |
| 15    | ELMASRI | ANALYST  | 1995-05-02 | 15   | 1200.00  | 150.00 | 10     |
| 20    | NAVATHE | SALESMAN | 1977-07-07 | 20   | 2000.00  | NULL  | 20     |
| 30    | DATE   | PROGRAMMER | 2004-05-04 | 15   | 1800.00  | 200.00 | 10     |
| 40    | CODD   | ANALYST  | 1979-01-21 | 15   | 2500.00  | NULL  | NULL   |
+-----+-----+-----+-----+-----+-----+-----+-----+
5 rows in set (0.00 sec)
```

ALTER TABLE

Η εντολή ALTER TABLE επιτρέπει

- Δημιουργία νέων στηλών
- Διαγραφή υπαρχόντων
- Αλλαγή στον τύπο δεδομένων
- Μετονομασία στηλών/πίνακα

ALTER TABLE όνομα πίνακα

- ADD new_column_name column_definition
- DROP COLUMN column_name;
- MODIFY column_name column_definition
- CHANGE COLUMN old_name new_name column_definition
- RENAME TO new_table_name;

ALTER TABLE

Δημιουργία

ALTER TABLE dept ADD COLUMN country Varchar(20);

Διαγραφή

ALTER TABLE dept DROP COLUMN country;

Αλλαγή στον τύπο δεδομένων

ALTER TABLE dept MODIFY country varchar(50) NULL;

Μετονομασία στήλης

ALTER TABLE dept CHANGE COLUMN country region varchar(20);

Μετονομασία πίνακα

ALTER TABLE dept RENAME TO department;

Ενημέρωση Εγγραφών

Η ενημέρωση των εγγραφών γίνεται με την εντολή update

UPDATE *table_name*

SET *column1 = value1, column2 = value2, ...*

WHERE *condition;*

Ενημέρωση Εγγραφών

Εστω ο πίνακας dept

```
select * from dept;
```

DEPTNO	DNAME	LOC
10	ACCOUNTING	NEW YORK
20	RESEARCH	DALLAS
30	SALES	CHICAGO
40	OPERATIONS	BOSTON
NULL	NULL	NULL

Update dept set LOC='ATHENS' where deptno=10;

DEPTNO	DNAME	LOC
10	ACCOUNTING	ATHENS
20	RESEARCH	DALLAS
30	SALES	CHICAGO
40	OPERATIONS	BOSTON
NULL	NULL	NULL

Διαγραφή Εγγραφών

Η διαγραφή των εγγραφών γίνεται με την εντολή update

```
DELETE FROM table_name  
WHERE condition;
```

Διαγραφή Εγγραφών

Εστω ο πίνακας dept

```
select * from dept;
```

DEPTNO	DNAME	LOC
10	ACCOUNTING	ATHENS
20	RESEARCH	DALLAS
30	SALES	CHICAGO
40	OPERATIONS	BOSTON
NULL	NULL	NULL

```
delete from dept where deptno=40;
```

	DEPTNO	DNAME	LOC
▶	10	ACCOUNTING	ATHENS
	20	RESEARCH	DALLAS
	30	SALES	CHICAGO
●	NULL	NULL	NULL

MySQL USERS

1. Δημιουργία Νέου Χρήστη

```
mysql> CREATE USER 'newuser'@'localhost' IDENTIFIED BY 'password';
```

2. Εκχώρηση Δικαιωμάτων

```
mysql> GRANT ALL PRIVILEGES ON * . * TO 'newuser'@'localhost';
```

3. Ολοκλήρωση Δικαιωμάτων

```
FLUSH PRIVILEGES;
```

MySQL USERS

Δικαιώματα (type_of_permission)

- ALL PRIVILEGES - full access
- CREATE- create new tables or databases
- DROP- drop tables or databases
- DELETE- delete rows from tables
- INSERT- insert rows into tables
- SELECT- SELECT queries
- UPDATE- update table rows
- GRANT OPTION- grant or remove other users' privileges

Εκχώρηση Δικαιωμάτων

```
mysql> GRANT type_of_permission ON database_name.table_name TO 'username'@'localhost';
```

Κατάργηση Δικαιωμάτων

```
mysql> REVOKE type_of_permission ON database_name.table_name TO 'username'@'localhost';
```

Προβολή Δικαιωμάτων

```
mysql> SHOW GRANTS FOR 'username'@'localhost';
```

Διαγραφή Χρήστη

```
mysql> DROP USER 'username'@'localhost';
```

Τέλος Ενότητας