Database Systems Lab
Lab7: DDL

Structured query language (SQL)

SELECT	Data retrieval
INSERT UPDATE DELETE	Data manipulation language (DML)
CREATE ALTER DROP RENAME TRUNCATE	Data definition language (DDL)
COMMIT ROLLBACK SAVEPOINT	Transaction control
GRANT REVOKE	Data control language (DCL)

Create tables

```
CREATE TABLE dept
        (deptno    NUMBER(2),
         dname     VARCHAR2(14),
         loc       VARCHAR2(13),
         creation  DATE DEFAULT SYSDATE);
```

Data Type	Description
VARCHAR2(*size*)	Variable-length character data
CHAR(*size*)	Fixed-length character data
NUMBER(*p*,*s*)	Variable-length numeric data
DATE	Date and time values
LONG	Variable-length character data (up to 2 GB)

Naming Rules

- Table names and column names must begin with a letter and be 1–30 characters long.
- Names must contain only the characters A–Z, a–z, 0–9, _ (underscore), $, and # (legal characters, but their use is discouraged).
- Names must not duplicate the name of another object
- Names must not be an Oracle server–reserved word

Constraints

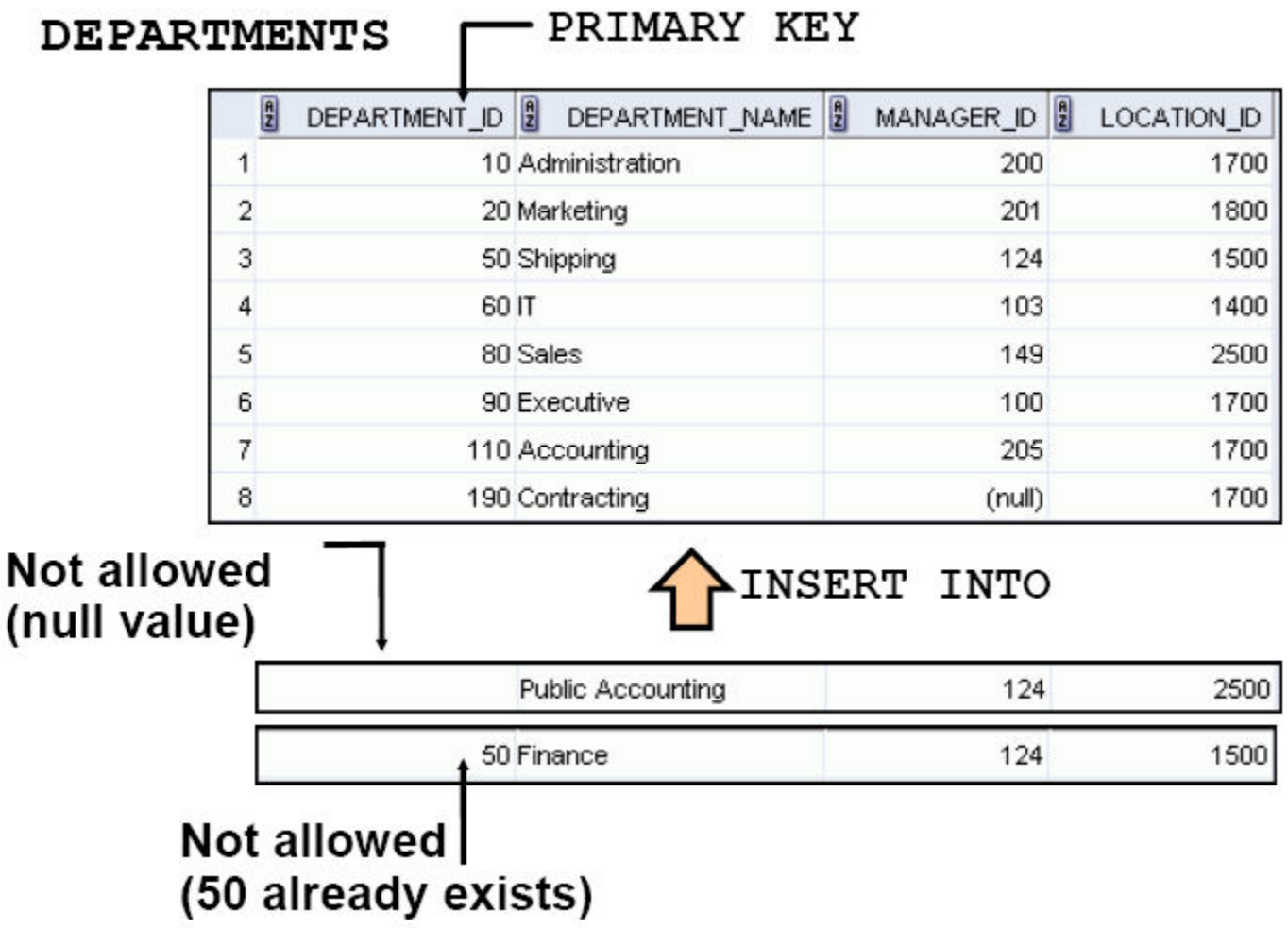
- NOT NULL
- UNIQUE
- PRIMARY KEY
- FOREIGN KEY
- CHECK

Not Null

```
, first_name      VARCHAR2(20)
, last_name       VARCHAR2(25)
    CONSTRAINT      emp_last_name_nn  NOT NULL
```

EMPLOYEE_ID	FIRST_NAME	LAST_NAME	EMAIL	HIRE_DATE	JOB_ID	COMMISSION_PCT
100	Steven	King	SKING	17-JUN-87	AD_PRES	(null)
101	Neena	Kochhar	NKOCHHAR	21-SEP-89	AD_VP	(null)
102	Lex	De Haan	LDEHAAN	13-JAN-93	AD_VP	(null)
103	Alexander	Hunold	AHUNOLD	03-JAN-90	IT_PROG	(null)
104	Bruce	Ernst	BERNST	21-MAY-91	IT_PROG	(null)
107	Diana	Lorentz	DLORENTZ	07-FEB-99	IT_PROG	(null)
124	Kevin	Mourgos	KMOURGOS	16-NOV-99	ST_MAN	(null)
141	Trenna	Rajs	TRAJS	17-OCT-95	ST_CLERK	(null)
142	Curtis	Davies	CDAVIES	29-JAN-97	ST_CLERK	(null)
143	Randall	Matos	RMATOS	15-MAR-98	ST_CLERK	(null)
144	Peter	Vargas	PVARGAS	09-JUL-98	ST_CLERK	(null)
149	Eleni	Zlotkey	EZLOTKEY	29-JAN-00	SA_MAN	0.2
174	Ellen	Abel	EABEL	11-MAY-96	SA_REP	0.3

Primary Key


DEPARTMENTS
PRIMARY KEY
DEPARTMENT_ID
DEPARTMENT_NAME
MANAGER_ID
LOCATION_ID
1 10 Administration 200 1700
2 20 Marketing 201 1800
3 50 Shipping 124 1500
4 60 IT 103 1400
5 80 Sales 149 2500
6 90 Executive 100 1700
7 110 Accounting 205 1700
8 190 Contracting (null) 1700
Not allowed
(null value)
INSERT INTO
Public Accounting 124 2500
50 Finance 124 1500
Not allowed
(50 already exists)

Primary Key

One column vs two columns

- Example of a column-level constraint:

```
CREATE TABLE employees(
  employee_id  NUMBER(6)
    CONSTRAINT emp_emp_id_pk PRIMARY KEY,
  first_name   VARCHAR2(20),
  ...);
```

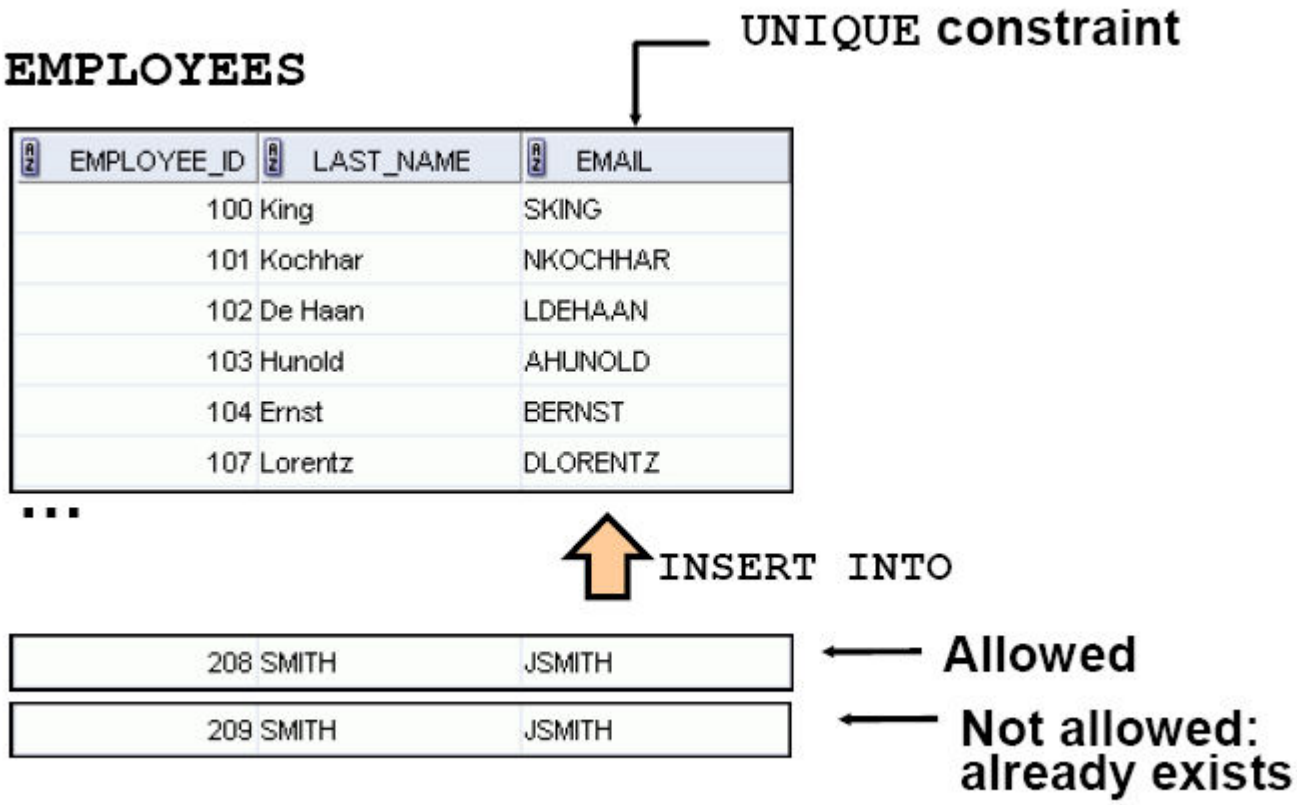
1

- Example of a table-level constraint:

```
CREATE TABLE employees(
  employee_id  NUMBER(6),
  first_name   VARCHAR2(20),
  ...
  job_id       VARCHAR2(10) NOT NULL,
  CONSTRAINT emp_emp_id_pk
    PRIMARY KEY (EMPLOYEE_ID));
```

2

Unique


UNIQUE constraint
EMPLOYEES
EMPLOYEE_ID
LAST_NAME
EMAIL
100 King SKING
101 Kochhar NKOCHHAR
102 De Haan LDEHAAN
103 Hunold AHUNOLD
104 Ernst BERNST
107 Lorentz DLORENTZ
...
INSERT INTO
208 SMITH JSMITH
Allowed
209 SMITH JSMITH
Not allowed: already exists

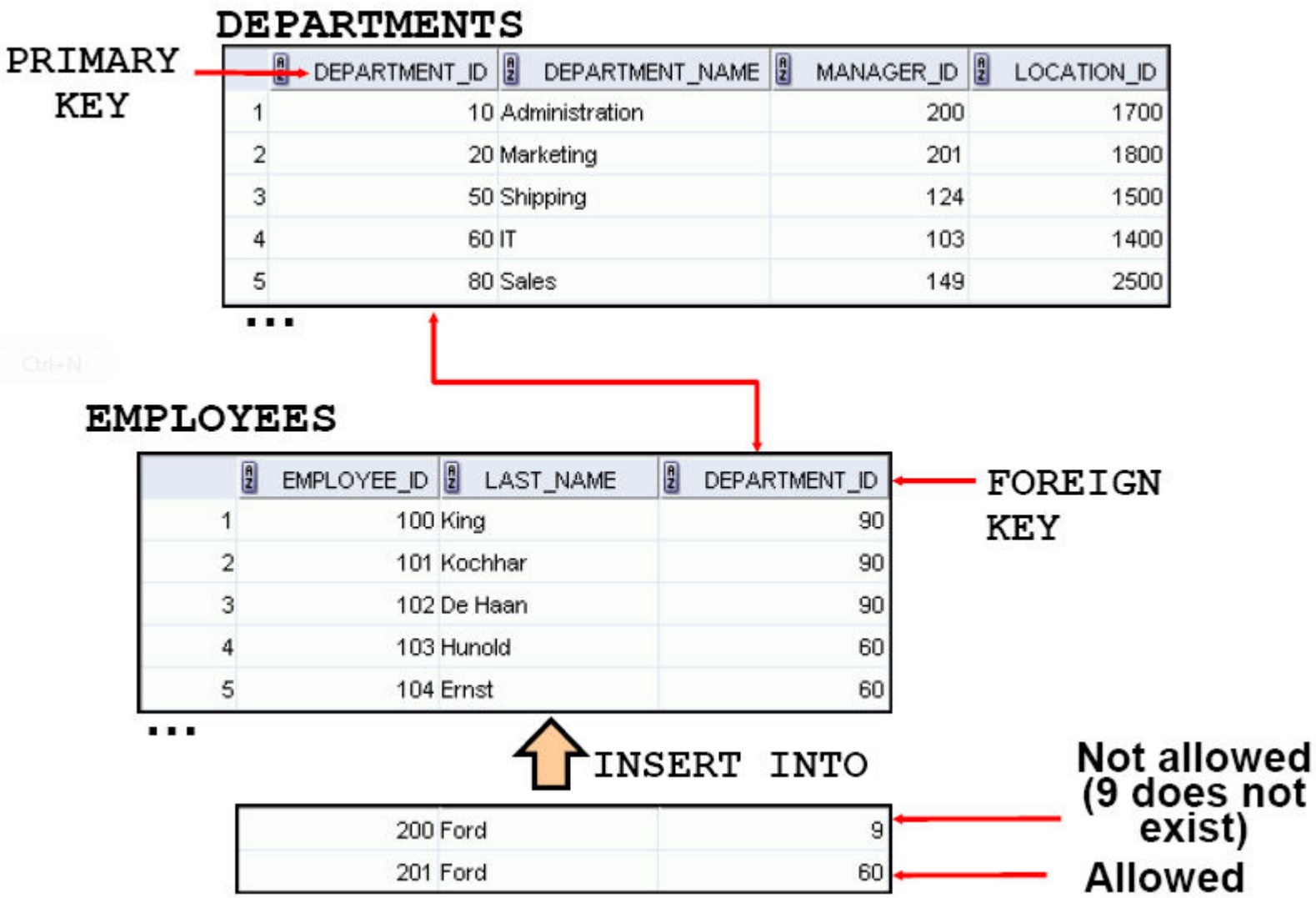
Unique

```
CREATE TABLE employees(
    employee_id       NUMBER(6),
    last_name         VARCHAR2(25) NOT NULL,
    email             VARCHAR2(25),
    salary            NUMBER(8,2),
    commission_pct    NUMBER(2,2),
    hire_date         DATE NOT NULL,
...
    CONSTRAINT emp_email_uk UNIQUE(email));
```

Check

```
..., salary   NUMBER(2)
     CONSTRAINT emp_salary_min
            CHECK (salary > 0),...
```

Foreign Key


DEPARTMENTS
PRIMARY KEY
DEPARTMENT_ID DEPARTMENT_NAME MANAGER_ID LOCATION_ID
1 10 Administration 200 1700
2 20 Marketing 201 1800
3 50 Shipping 124 1500
4 60 IT 103 1400
5 80 Sales 149 2500
...
EMPLOYEES
EMPLOYEE_ID LAST_NAME DEPARTMENT_ID
FOREIGN KEY
1 100 King 90
2 101 Kochhar 90
3 102 De Haan 90
4 103 Hunold 60
5 104 Ernst 60
...
INSERT INTO
200 Ford 9
Not allowed (9 does not exist)
201 Ford 60
Allowed

Foreign key

```
CREATE TABLE employees
(...
department_id NUMBER(4) CONSTRAINT emp_deptid_fk
REFERENCES departments(department_id),
...
)
```

On delete cascade / On delete set null

```
CREATE TABLE employees(
    employee_id       NUMBER(6),
    last_name         VARCHAR2(25) NOT NULL,
    email             VARCHAR2(25),
    salary            NUMBER(8,2),
    commission_pct    NUMBER(2,2),
    hire_date         DATE NOT NULL,
...
    department_id     NUMBER(4),
    CONSTRAINT emp_dept_fk FOREIGN KEY (department_id)
      REFERENCES departments(department_id),
    CONSTRAINT emp_email_uk UNIQUE(email));
```

```
CREATE TABLE employees
    ( employee_id    NUMBER(6)
      CONSTRAINT     emp_employee_id   PRIMARY KEY
    , first_name     VARCHAR2(20)
    , last_name      VARCHAR2(25)
      CONSTRAINT     emp_last_name_nn  NOT NULL
    , email          VARCHAR2(25)
      CONSTRAINT     emp_email_nn      NOT NULL
      CONSTRAINT     emp_email_uk      UNIQUE
    , phone_number   VARCHAR2(20)
    , hire_date      DATE
      CONSTRAINT     emp_hire_date_nn  NOT NULL
    , job_id         VARCHAR2(10)
      CONSTRAINT     emp_job_nn        NOT NULL
    , salary         NUMBER(8,2)
      CONSTRAINT     emp_salary_ck     CHECK (salary>0)
    , commission_pct NUMBER(2,2)
    , manager_id     NUMBER(6)
        CONSTRAINT emp_manager_fk REFERENCES
         employees (employee_id)
    , department_id  NUMBER(4)
      CONSTRAINT     emp_dept_fk       REFERENCES
        departments (department_id));
```

Constraints on FK

```
CONSTRAINT emp_manager_fk
FOREIGN KEY (manager_id)
REFERENCES employee(employee_id)
ON DELETE CASCADE;
```

Or

```
CONSTRAINT emp_manager_fk
FOREIGN KEY (manager_id)
REFERENCES employee(employee_id)
ON DELETE SET NULL;
```

Delete & Rename table

```
DROP TABLE dept80;
```

```
DROP TABLE dept80 succeeded.
```

```
SQL> RENAME dept TO department;
Table renamed.
```

Alter table

Use the `ALTER TABLE` statement to:

- Add a new column
- Modify an existing column definition
- Define a default value for the new column
- Drop a column
- Rename a column

ADD columm

- ALTER TABLE table_name
  ADD column_name column-definition;

- Example:

ALTER TABLE customers
  ADD customer_name varchar2(45);

- ALTER TABLE table_name
  ADD (column_1 column-definition,
        column_2 column-definition,
          …
        column_n column_definition);

Drop column

- ALTER TABLE table_name

DROP COLUMN column_name;

- Example

ALTER TABLE customers

DROP COLUMN customer_name;

Modify Column

- ALTER TABLE table_name

MODIFY column_name column_type;

- Example :

ALTER TABLE customers

MODIFY customer_name varchar2(100);

- ALTER TABLE table_name

RENAME COLUMN old_name TO new_name;

Create Primary Key Using ALTER TABLE statement

- ALTER TABLE table_name

ADD CONSTRAINT constraint_name PRIMARY KEY (column1, column2, ... column_n);

- Example

ALTER TABLE supplier

ADD CONSTRAINT supplier_pk PRIMARY KEY (supplier_id);

Drop Primary Key Using ALTER TABLE statement

- ALTER TABLE table_name
  DROP CONSTRAINT constraint_name;
- Example

ALTER TABLE supplier
DROP CONSTRAINT supplier_pk;

Create Foreign Key Using ALTER TABLE statement

- Example

```
ALTER TABLE products
ADD CONSTRAINT fk_supplier
FOREIGN KEY (supplier_id)
REFERENCES supplier(supplier_id)
ON DELETE SET NULL;
```

Metadata

- SELECT
  TABLE_NAME, OWNER
  FROM
  ALL_TABLES
  WHERE
  OWNER='user_name'

❖ Example:

```
SELECT TABLE_NAME, OWNER   FROM
ALL_TABLES    WHERE  OWNER='SCOTT'
```

If you forget the names of the constraints

```
SQL>  SELECT  constraint_name, constraint_type,
  2           search_condition
  3   FROM    user_constraints
  4   WHERE   table_name = 'EMP';
```

```
CONSTRAINT_NAME           C SEARCH_CONDITION
------------------------- - --------------------------
SYS_C00674                C EMPNO IS NOT NULL
SYS_C00675                C DEPTNO IS NOT NULL
EMP_EMPNO_PK              P
...
```

Create copy of an existing table

- CREATE TABLE new_name AS SELECT column1, column2, … FROM old_name;

- Example:

- CREATE TABLE book2 AS SELECT issbn as book_id, title FROM book;

- CREATE TABLE book2 AS SELECT * FROM book;