CS 331
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Data Definition Language

SQL – structured query language
DDL (& DML)

DDL – specify the database schema
gives system catalog (set of tables in specified files) that integrate metadata

Create
Drop
Alter
DDL

- Structured query language (ANSI and ISO standard language, different vendors add their own proprietary extension)
- A high level declarative language allows DBA or user to describe and name the entities, attributes, and relationships required for the application, together with any associated integrity and security constrains.
- Use to define or modify a schema
- A set of tables stored in special files (system catalog) integrates the metadata

```
CREATE #OBJECT# OBJECT_NAME ( );
ALTER #OBJECT# OBJECT_NAME ADD/DROP;
DROP #OBJECT# OBJECT_NAME ;
TRUNCATE RENAME
```
CREATE TABLE table_name (  
colName1 dataType [NOT NULL] [UNIQUE] [DEFAULT value] [CHECK (condition)],  
colName2 ....  
[PRIMARY KEY(list)]  
[UNIQUE (list)]  
[FOREIGN KEY (list) REFERENCES parentTable(list)] [ON UPDATE action] [ON DELETE action]  
[CHECK (condition)]  
May give constraint name
Data Type

Top 5 data type used:
- **char** – fixed length
  - char(1)
- **varchar2** – variable length
  - varchar2(50) each character 1 byte
- **number / integer**
  - number (precision, scale)
  - max 38 precision
- **date**
  - DD-MON-YY
  - D 1 – 7
  - DAY Monday – Sunday
  - DD 1 – 31
  - MM 01 – 12 MON Abbreviation MONTH
  - HH HH24 MI SS
- **timestamp**
  - with precision in time and time zone
- **boolean** (no boolean in oracle)
Identifiers

- 128 characters (Oracle has a limit of 30)
- Start with letter, upper or lower letter (Oracle all upper case)
- May contain digits
- Can’t contain spaces
- Only special character underscore (\_)

table name max 30 char, must be capital schema – a logical of database
No auto-increment until Oracle 12c, use sequence instead

CREATE SEQUENCE CUSTOMER_SEQ
START WITH 10000
INCREMENT BY 1
MAXVALUE 90000
NOCACHE
NOCYCLE;

Check what tables is in current schema
Sample DDL

CREATE TABLE CLIENT(
    cid NUMBER(6) NOT NULL,
    cname VARCHAR2(25) NOT NULL,
    phone CHAR(13) NOT NULL,
    dob DATE,
    CONSTRAINT pk_client PRIMARY KEY (cid)
);

here pk as table constraint
or inline constraint
PRIMARY KEY (cid)
CONSTRAINT

Column constraints:
NOT NULL, UNIQUE, CHECK

Table constraints:
PRIMARY KEY
UNIQUE
FOREIGN KEY
CHECK
Integrity Constraints

NOT NULL
CHECK (CONDITION)
- ex: sex CHAR(1) NOT NULL CHECK (sex IN ('M', 'F'))

PRIMARY KEY

UNIQUE (alternate key)

FOREIGN KEY (ON UPDATE/ON DELETE subclause)
- CASCADE
- SET NULL
- SET DEFAULT
- NO ACTION (default for on delete)
constraint

convention names
ck_
uk_
pk_
fk_
Functions

CHAR_LENGTH('sample')
CAST(5.2E3 AS INTEGER)
CURRENT_User
LOWER/UPPER
TRIM(BOTH/LEADING/TRAILING ' ' FROM ...)
POSITION
SUBSTRING
CASE stype
  WHEN 'grad' THEN 1
  ELSE 0
END
ABS/EXP/MOD/SQRT/FLOOR/CEIL/ROUND
TRUNC(date, format)
TO_DATE(string, format)
SYSDATE + 2
INTERVAL
Change Table

ALTER TABLE table_name
[ADD [COLUMN] colName dataType [NOT NULL]
[UNIQE]
[DEFAULT value] [CHECK (condition)]]

[DROP [COLUMN] colName [RESTRICT/CASCADE]]

[ADD [CONSTRAINT] [consName] consDefinition]

[DROP [CONSTRAINT] consName [RESTRICT/CASCADE]]

[ALTER [COLUMN] colName SET DEFAULT value]

[ALTER [COLUMN] colName DROP DEFAULT]
Remove Table

DROP TABLE table_name [RESTRICT/CASCADE]
CREATE/REMOVE INDEX

CREATE [UNIQUE] INDEX indName ON tableName
(colName [ASC/DECS], ...);
DROP INDEX indName;
Conditions

= 
<> !=
> 
>= 
<
<=
in ( )
not
between ... and
is null
is not null
like
   % wild card, any string of any length,
includes empty, _ single char
regexp_like
Conditions

- `colName between v1 and v2` inclusive range
- `colName not between v1 and v2`
  - `< v0 or > n3`
- `colName in (v1, v2, v3, ..., vn)`
  - `in (subquery)`
  - `not in (...)`
- `like '5____'`
regexp

regexp_like (colName, pattern)
^ beg
$ end
* 0 or more
+ 1 or more
? 0 or 1
. any not null
| or
[] matching list
[^]non matching list
{m} m times
{m,} at least m times
{m,n} at least m, no more than n
\d digit
\D non digit
\s white space
\S non white space
Sample

CREATE TABLE DEPARTMENT
(DEPT_CODE CHAR(4) PRIMARY KEY,
DEPT_NAME VARCHAR2(50) NOT NULL UNIQUE);

CREATE TABLE MAJOR
(MJR_CODE NUMBER(3,0) PRIMARY KEY CHECK
(MJR_CODE BETWEEN 100 AND 300),
MJR_NAME VARCHAR2(50) NOT NULL UNIQUE,
);

ALTER TABLE MAJOR
ADD DEPT CHAR(4) NOT NULL REFERENCES DEPARTMENT;
Sample

CREATE TABLE STUDENT
(CUNY_ID CHAR(8) PRIMARY KEY,
F_NAME VARCHAR2(30) NOT NULL,
L_NAME VARCHAR2(30) NOT NULL,
PHONE CHAR(9),
EMAIL VARCHAR2(50),
ADDRESS1 VARCHAR2(100) NOT NULL,
ZIPCODE CHAR(5) NOT NULL,
STATE CHAR(2) NOT NULL,
GENDER CHAR NOT NULL CHECK (GENDER IN ('M', 'F')),
GPA NUMBER(2,1) NOT NULL CHECK (GPA BETWEEN 0 AND 4)
);
Sample

ALTER TABLE STUDENT
ADD PHONE CHAR(10) CHECK (REGEXP_LIKE
(PHONE,
   '^[0-9]*$'));

ALTER TABLE STUDENT
ADD EMAIL VARCHAR2(60)
CHECK (EMAIL LIKE
   '_%@_%._._._');