

# Database Management Systems

SQL (I)

# SQL

- Structured Query Language
- Three Components
  - Data Manipulation Language
  - Data Definition Language
  - Data Control Language
- Case Insensitive Language
  - Except in literal strings (denoted by single quotation marks)
    - Except some database systems can overwrite this exception

# SQL Data Types

- Character Strings — CHAR(n), VARCHAR(n)
- Integers — INTEGER, INTEGER(n)
- Floating-point Numbers — NUMBER, NUMBER(p,s), FLOAT(p), DECIMAL, REAL
- Dates — DATE, TIMESTAMP
- Unstructured Large Objects (up to 4 GB) — BLOB(size), CLOB(size)

# Create Table

- Simplest form:

```
CREATE TABLE table_name (  
    column_name_1 data_type_1,  
    column_name_2 data_type_2,  
    ...  
    column_name_n data_type_n,  
    constraint_specifications  
);
```

# Constraints

- Default Values
- Not Null
- Primary Key
- Unique
- Foreign Key
- General Check Constraints

# Adding Constraints

- on a single attribute
  - not null
  - primary key
  - references table\_name - - foreign key
  - check (age>0 AND age<120)
  - check (gender in ('F', 'M'))
- on a tuple as a whole
  - check (gender = 'F' OR name not like 'Ms.%')
  - Primary key (col\_1, col\_2)
  - Foreign key (col\_1, col\_2) references table\_name
- Name constraints
  - Constraint consName Constraint\_specification

# Modifying Schema

- drop table statement to delete a table (and all its data)  
DROP TABLE table\_name;
- alter table  
ALTER TABLE table\_name  
    ADD col\_name data\_type;  
ALTER TABLE table\_name  
    DROP col\_name;  
ALTER TABLE table\_name  
    MODIFY col\_name col\_description;
- Named constraints can be dropped and added using alter table statement.  
ALTER TABLE table\_name  
    ADD constraint\_name constraint\_description;  
ALTER TABLE table\_name  
    DROP constraint\_name;

# Example

```
CREATE TABLE Employees (  
    Eid integer primary key CHECK (Eid > 0),  
    username varchar(8) Not Null unique,  
    LastName varchar(80) NOT NULL,  
    FirstName varchar(80),  
    Address varchar(255),  
    City varchar(25) DEFAULT 'Nanaimo',  
    ReportTo integer,  
    -- ReportTo integer References Employees,  
    Salary number(7, 2),  
    Commission_pct number(2, 2),  
    -- CONSTRAINT pk_EID PRIMARY KEY (Eid),  
    Foreign Key (ReportTo) References Employees,  
    Constraint check_sal CHECK (Salary * Commission_pct <= 50)  
);
```



# Modify Database Content

- Insert one tuple:  
INSERT INTO table\_name [(column1, column2, ... )]  
VALUES (expression1, expression2, ... );
- Insert multiple tuples:  
INSERT INTO table\_name [(column1, column2, ... )]  
SELECT expression1, expression2, ...  
FROM source\_table\_name  
[WHERE conditions];
- Delete  
Delete From table\_name  
[WHERE conditions];
- Update  
Update table\_name  
set column = new\_value  
[WHERE conditions];