Lab 8: SQL Programming

Anjali Pare

EECS 348: Software Engineering

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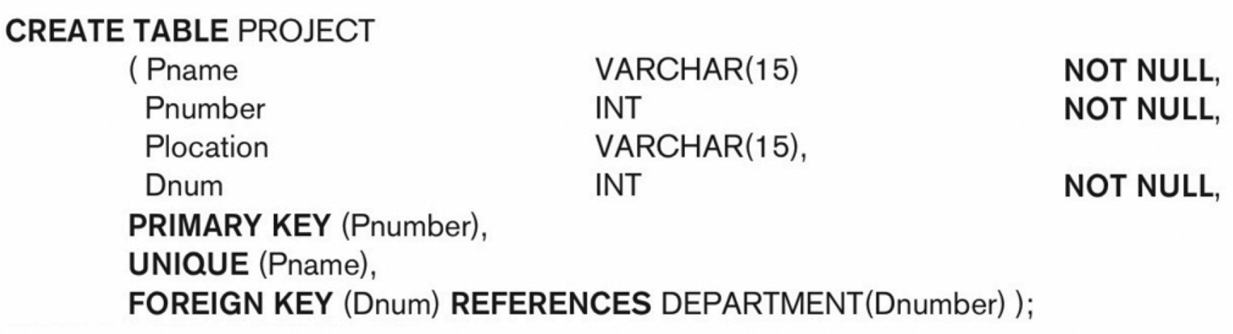
MySQL

- MySQL is a database language that allows you to create and populate tables that you can then query in strategic ways
- Basic hierarchy of a database
  - Database
  - Table
- Queries end in a semicolon

CREATE TABLE

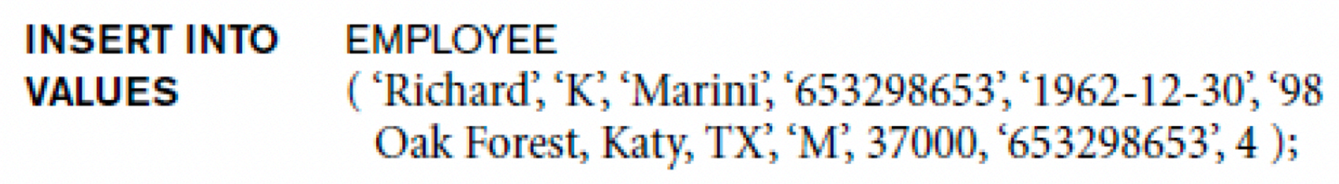
- Basic data types
  - Numeric: INTEGER, INT, REAL, FLOAT
  - Character string (fixed length): CHAR (n)
  - Varying length: VARCHAR (n)
  - BOOLEAN
  - DATE



```
CREATE TABLE PROJECT
        ( Pname                 VARCHAR(15)           NOT NULL,
          Pnumber               INT                   NOT NULL,
          Plocation             VARCHAR(15),
          Dnum                  INT                   NOT NULL,
        PRIMARY KEY (Pnumber),
        UNIQUE (Pname),
        FOREIGN KEY (Dnum) REFERENCES DEPARTMENT(Dnumber) );
```

INSERT

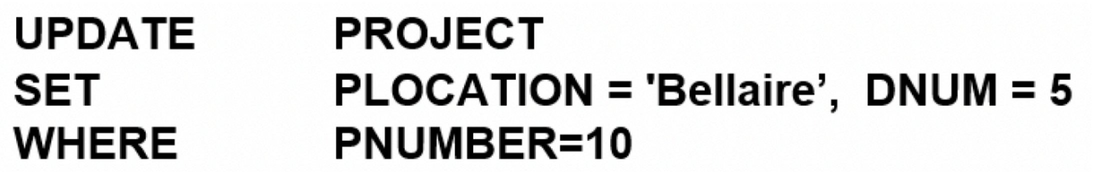
- INSERT inserts a tuple (row) in a relation (table)
- Attribute values should be listed in the same order as were specified in the **CREATE TABLE** command
- For example



```
INSERT INTO    EMPLOYEE
VALUES         ( ‘Richard’, ‘K’, ‘Marini’, ‘653298653’, ‘1962-12-30’, ‘98
                 Oak Forest, Katy, TX’, ‘M’, 37000, ‘653298653’, 4 );
```

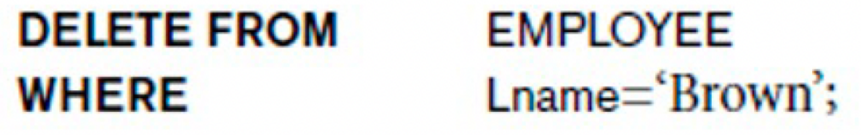
UPDATE and DELETE

- Update: Used to modify attribute values of one or more selected tuples



```
UPDATE      PROJECT
SET         PLOCATION = 'Bellaire', DNUM = 5
WHERE       PNUMBER=10
```

- Delete: Removes tuples from a relation



```
DELETE FROM     EMPLOYEE
WHERE           Lname='Brown';
```

Basic queries – SFW statement

SELECT <list of column expressions>

FROM <list of tables and join operations>

WHERE <row conditions connected by logical operators>

ORDER BY <list of sorting specifications>

- For example - Name of students under 25
  - SELECT name FROM Student WHERE age < 25;

LIKE operator

- LIKE operator with meta characters

  %: wildcard matches 0 or more characters

  _ matches any single character

- For example
  - Embedded match: CrsDesc LIKE '%DATA%'

Ordering the output

- Records are not ordered by default
- Basic syntax
  - SELECT …

    FROM …

    WHERE

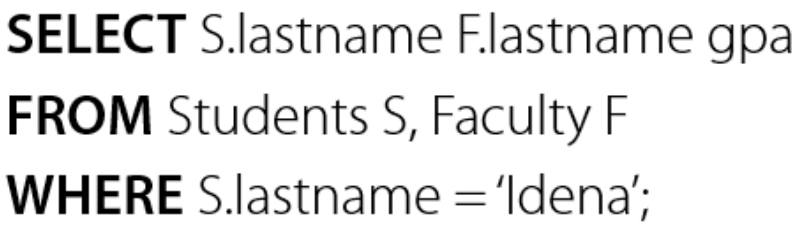
    ORDER BY *output_column* [ASC| DESC], …;
- ASC= ascending, DESC= descending

Removing Duplicates

- To remove duplicates from the query answers use, SELECT DISTINCT
- For Example
  - SELECT DISTINCT age FROM Student

Referencing Attributes

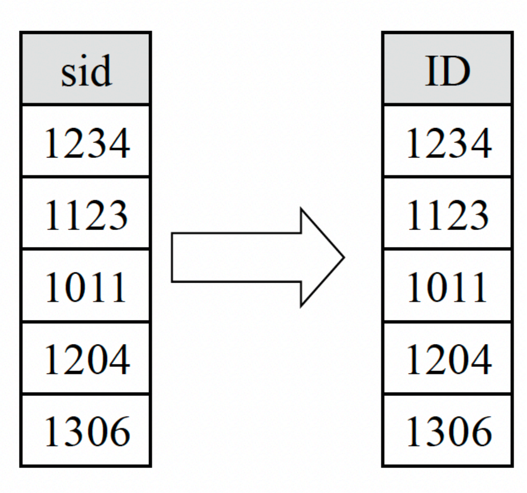
- In general, attributes are referenced as R.A where R is a tuple variable and A is an attribute
- When there is no ambiguity, the tuple variable may be deleted



```
SELECT S.lastname F.lastname gpa
FROM Students S, Faculty F
WHERE S.lastname = 'Idena';
```

AS operator

- Change column name/headers
  - SELECT sid AS ID FROM Student
- “AS” is optional



sid
1234
1123
1011
1204
1306

ID
1234
1123
1011
1204
1306

UNION

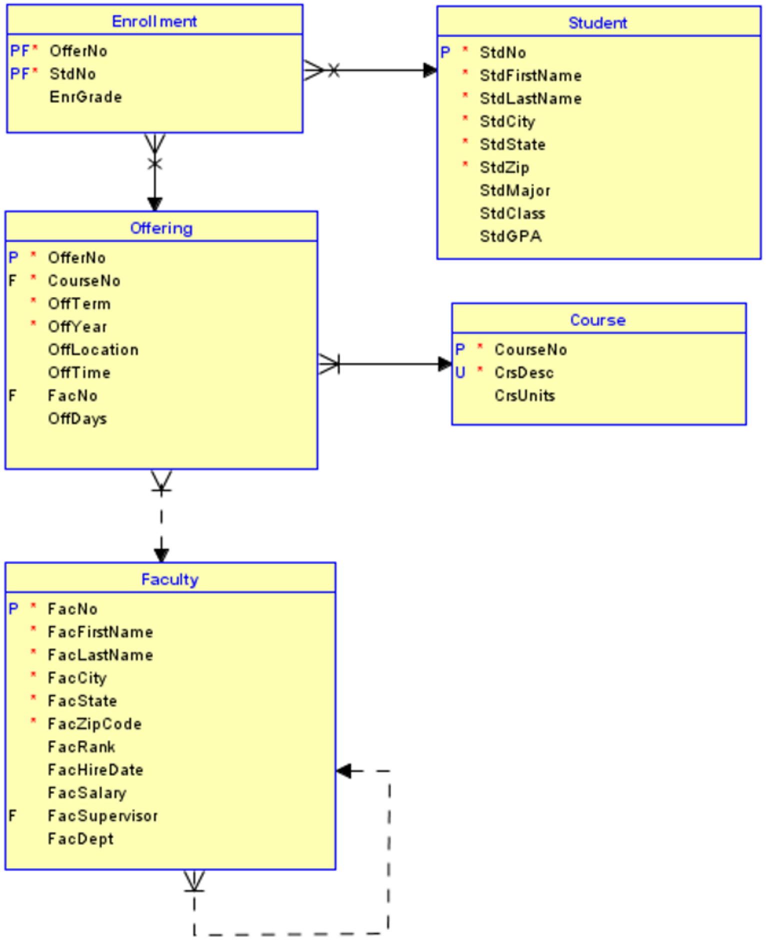
- Strong requirement
  - Same number of columns
  - Each corresponding column is compatible
  - Positional correspondence
- Apply to similar tables by removing columns first
- (<subquery>) UNION (<subquery>)

EECS MySQL server

- As an EECS student, you are granted access to an EECS MySQL server
- You can view your username and password under the Assignments section in the SQL Programming Credentials
- To access the server, input the following
  - **mysql -h mysql.eecs.ku.edu -u username -p**

Lab 8

- Use the University Database provided for this lab
  - – ER diagram
- The structure of the database is as follows



Enrollment
PF * OfferNo
PF * StdNo
EnrGrade

Student
P * StdNo
* StdFirstName
* StdLastName
* StdCity
* StdState
* StdZip
StdMajor
StdClass
StdGPA

Offering
P * OfferNo
F * CourseNo
* OffTerm
* OffYear
OffLocation
OffTime
F FacNo
OffDays

Course
P * CourseNo
U * CrsDesc
CrsUnits

Faculty
P * FacNo
* FacFirstName
* FacLastName
* FacCity
* FacState
* FacZipCode
FacRank
FacHireDate
FacSalary
F FacSupervisor
FacDept

Lab 8

- Form each query and generate its output and place on a page
- Do the same for all queries
- Combine all in one PDF
- Submit the file to Canvas
- Read and understand the grading rubric