

Intro to Relational Model

Elements of Databases

September 6, 2017

Announcements:

- Introducing new TAs
- Lowest 2 quizzes and participation scores will be dropped
- Create GitHub account
- Find partner and send email by Friday:
 - Team members full names, EIDs, GitHub usernames
 - Repo name
 - Use email subject line:
CS327E Team XYZ, where XYZ is your repo name
 - Send email to me and the 3 TAs, copy your partner on the email
- AWS educational account: <https://tinyurl.com/yd7xqbk2>

1) A relational database consists of a collection of:

a) Fields

b) Tables

c) Functions

d) Records

2) Every relation is a function.

a) True

b) False

3)DBMS stands for :

- a) Database Basic Management System
- b) Database Multiprogramming System
- c) Database Management System
- d) None of the above

4) A view is a virtual table.

a) True

b) False

5) Which of the following is **not** a tool for managing Postgres:

- a) psql
- b) pgAdmin
- c) phpPgAdmin
- d) MySQL Workbench

Basic Terminology:

- Relational model
- Relation / Entity / Table
- Field / Attribute / Column
- Row / Tuple / Record
- Cell / Value
- Primary key
- Composite primary key
- Foreign key
- Constraint
- Schema

Employee

| <u>empid</u> | firstname | lastname | state | depid |
|--------------|-----------|----------|-------|-------|
| 2 | Michael | Dell | TX | 5 |
| 23 | Betty | Jennings | PA | |
| 3 | Bill | Gates | WA | 5 |
| 5 | Kay | McNulty | PA | 8 |
| 6 | Jim | Gray | CA | 6 |
| 37 | Gordon | Moore | CA | 6 |

Common Data Types:

- CHAR, VARCHAR
- INTEGER
- NUMERIC
- SERIAL
- BOOLEAN
- DATE, TIMESTAMP
- TEXT, BLOB

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| <u>empid</u> | firstname | lastname | state | depid |
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Relationships:

- One-to-one (1:1)
- One-to-many (1:m)
- Many-to-many (m:n)
- Many-to-one (m:1)

Employee

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|--------------|-----------|----------|-------|-------|
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| 3 | Bill | Gates | WA | 5 |
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| 37 | Gordon | Moore | CA | 6 |

Department

| <u>depid</u> | deptname |
|--------------|-------------|
| 5 | Executive |
| 6 | Research |
| 7 | Sales |
| 8 | Engineering |

Practice Problem #1

What is the relationship between `Customer` and `Order`?

Customer

| <u>cust_id</u> | cust_name | cust_city |
|----------------|----------------|-------------|
| 1 | Paul Gore | Austin |
| 2 | Jerry Hargrove | Portland |
| 3 | Lara Wells | Houston |
| 6 | Kevin O'Connor | NYC |
| 7 | Brian Zender | San Antonio |

Order

| <u>order_id</u> | cust_id | order_date | amount |
|-----------------|---------|------------|--------|
| 1000 | 1 | 2017-08-01 | 5.00 |
| 1001 | 3 | 2017-08-01 | 5.00 |
| 1202 | 1 | 2017-09-01 | 3.00 |
| 203 | 2 | 2016-10-19 | 10.00 |
| 204 | 6 | 2016-10-20 | 100.00 |
| 205 | 7 | 2016-10-21 | 7.00 |
| 700 | 2 | 2016-10-22 | 25.00 |
| 705 | 1 | 2016-10-22 | 500.00 |

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| 205 | 7 | 2016-10-21 | 7.00 |
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| 705 | 1 | 2016-10-22 | 500.00 |

a) 1:m b) m:1 c) m:n d) 1:1

SQL

Data Manipulation Language (DML) statements

SELECT

INSERT / UPDATE / DELETE

Data Definition Language (DDL) statements

CREATE / ALTER / DROP

GRANT / REVOKE

SELECT Clause:

```
SELECT empid, lastname  
FROM Employee;
```

Employee

| <u>empid</u> | firstname | lastname | state | depid |
|--------------|-----------|----------|-------|-------|
| 2 | Michael | Dell | TX | 5 |
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| 6 | Jim | Gray | CA | 6 |
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SELECT Clause:

```
SELECT empid, lastname  
FROM Employee  
WHERE state = 'CA';
```

Employee

| <u>empid</u> | firstname | lastname | state | depid |
|--------------|-----------|----------|-------|-------|
| 2 | Michael | Dell | TX | 5 |
| 23 | Betty | Jennings | PA | |
| 3 | Bill | Gates | WA | 5 |
| 5 | Kay | McNulty | PA | 8 |
| 6 | Jim | Gray | CA | 6 |
| 37 | Gordon | Moore | CA | 6 |

SELECT Clause:

```
SELECT empid, lastname  
FROM Employee  
WHERE empid < 10;
```

Employee

| <u>empid</u> | firstname | lastname | state | depid |
|--------------|-----------|----------|-------|-------|
| 2 | Michael | Dell | TX | 5 |
| 23 | Betty | Jennings | PA | |
| 3 | Bill | Gates | WA | 5 |
| 5 | Kay | McNulty | PA | 8 |
| 6 | Jim | Gray | CA | 6 |
| 37 | Gordon | Moore | CA | 6 |

Practice Problem #2

SELECT Clause:

SELECT *

FROM Employee

WHERE depid < 5;

Employee

| <u>empid</u> | firstname | lastname | state | depid |
|--------------|-----------|----------|-------|-------|
| 2 | Michael | Dell | TX | 5 |
| 23 | Betty | Jennings | PA | |
| 3 | Bill | Gates | WA | 5 |
| 5 | Kay | McNulty | PA | 8 |
| 6 | Jim | Gray | CA | 6 |
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Practice Problem #2

SELECT Clause:

SELECT *

FROM Employee

WHERE depid < 5;

Employee

| <u>empid</u> | firstname | lastname | state | depid |
|--------------|-----------|----------|-------|-------|
| 2 | Michael | Dell | TX | 5 |
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How many rows are returned from the query?

- a) 2 b) 3 c) 1 d) 0

Practice Problem #2: Solution

SELECT Clause:

SELECT *

FROM Employee

WHERE depid < 5;

Employee

| <u>empid</u> | firstname | lastname | state | depid |
|--------------|-----------|----------|-------|-------|
|--------------|-----------|----------|-------|-------|

How many rows are returned from the query?

- a) 2 b) 3 c) 1 d) 0

SELECT Clause:
SELECT *
FROM Employee
WHERE depid IS NULL;

Employee

| <u>empid</u> | firstname | lastname | state | depid |
|--------------|-----------|----------|-------|-------|
| 2 | Michael | Dell | TX | 5 |
| 23 | Betty | Jennings | PA | |
| 3 | Bill | Gates | WA | 5 |
| 5 | Kay | McNulty | PA | 8 |
| 6 | Jim | Gray | CA | 6 |
| 37 | Gordon | Moore | CA | 6 |

Practice Problem #3

SELECT Clause:

SELECT *

FROM Employee

WHERE depid IS NOT NULL

AND (state = 'PA' OR state = 'TX');

Employee

| <u>empid</u> | firstname | lastname | state | depid |
|--------------|-----------|----------|-------|-------|
| 2 | Michael | Dell | TX | 5 |
| 23 | Betty | Jennings | PA | |
| 3 | Bill | Gates | WA | 5 |
| 5 | Kay | McNulty | PA | 8 |
| 6 | Jim | Gray | CA | 6 |
| 37 | Gordon | Moore | CA | 6 |

Practice Problem #3

SELECT Clause:

```
SELECT *  
FROM Employee  
WHERE depid IS NOT NULL  
AND (state = 'PA' OR state = 'TX');
```

Employee

| <u>empid</u> | firstname | lastname | state | depid |
|--------------|-----------|----------|-------|-------|
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| 6 | Jim | Gray | CA | 6 |
| 37 | Gordon | Moore | CA | 6 |

How many rows are returned from the query?

- a) 3 b) 2 c) 1 d) 5

Practice Problem #3: Solution

SELECT Clause:

SELECT *

FROM Employee

WHERE depid IS NOT NULL

AND (state = 'PA' OR state = 'TX');

Employee

| <u>empid</u> | firstname | lastname | state | depid |
|--------------|-----------|----------|-------|-------|
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How many rows are returned from the query?

- a) 3 b) 2 c) 1 d) 5