Joins

Monday, February 20, 2017

Agenda

- Announcements

- Reading Quiz

- Joins Discussion

- 4 Practice Problems!

Announcements

- Lab 2: grades and comments will be released by end of week

- Next week: Lab 3

- Lab 3 Setup Guide will be out this weekend

Q1: A query's result table is a virtual table.

a) True

b) False

Q2: A query can have at most one join.

a) True

b) False

Q3: A join on two tables requires their column names to be identical.

a) True

b) False

Q4: Which is <u>not</u> a valid join type?

a) Inner join

b) Outer join

c) Self join

d) Group join

e) Cross join

Q5: Joins are expensive operations, especially when run over large tables.

a) True

b) False

Types of Joins

- **Inner join:**

    - Includes the records only when there is a match

- **Left outer join:**

    - Includes the left record(s) even when there is no match

- **Right outer join:**

    - Includes the right record(s) even when there is no match

- **Full outer join:**

    - Includes both the left and right records even when there is no match

Types of Joins

- **Inner joins:**
  -Includes only the matching records

- **Outer joins:**
  a) Left outer joins:
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empid	firstname	lastname	depid
1	Michael	Dell	5
2	Betty	Jennings	
3	Bill	Gates	5
4	Fran	Bilas	8

Employee

depid	name
5	Executive
6	Operations
7	Sales
8	Product

Department

```
SELECT e.empid, e.firstname, e.lastname, d.name
FROM Employee e INNER JOIN Department d
ON e.depid = d.depid;
```

```
 empid | firstname | lastname |   name
-------+-----------+----------+----------
     1 | Michael   | Dell     | Executive
     3 | Bill      | Gates    | Executive
     4 | Fran      | Bilas    | Product
(3 rows)
```

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Employee

depid	name
5	Executive
6	Operations
7	Sales
8	Product

Department

```
SELECT e.empid, e.firstname, e.lastname, d.name
FROM Employee e LEFT OUTER JOIN Department d
ON e.depid = d.depid;
```

```
empid | firstname | lastname |   name
------+-----------+----------+----------
    1 | Michael   | Dell     | Executive
    2 | Betty     | Jennings |
    3 | Bill      | Gates    | Executive
    4 | Fran      | Bilas    | Product
(4 rows)
```

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2	Betty	Jennings	
3	Bill	Gates	5
4	Fran	Bilas	8

Employee

depid	name
5	Executive
6	Operations
7	Sales
8	Product

Department

```
SELECT e.empid, e.firstname, e.lastname, d.name
FROM Employee e RIGHT OUTER JOIN Department d
ON e.depid = d.depid;
```

```
empid | firstname | lastname |    name
------+-----------+----------+-----------
    1 | Michael   | Dell     | Executive
    3 | Bill      | Gates    | Executive
    4 | Fran      | Bilas    | Product
      |           |          | Operations
      |           |          | Sales
(5 rows)
```

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2	Betty	Jennings	
3	Bill	Gates	5
4	Fran	Bilas	8

Employee

depid	name
5	Executive
6	Operations
7	Sales
8	Product

Department

```
SELECT e.empid, e.firstname, e.lastname, d.name
FROM Employee e FULL OUTER JOIN Department d
ON e.depid = d.depid;
```

```
 empid | firstname | lastname |    name
-------+-----------+----------+------------
     1 | Michael   | Dell     | Executive
     2 | Betty     | Jennings |
     3 | Bill      | Gates    | Executive
     4 | Fran      | Bilas    | Product
       |           |          | Operations
       |           |          | Sales
(6 rows)
```

Practice Problem 1:
Find all concerts playing in Austin or Houston or Dallas during the month of March

Notes:

- Use catgroup = 'Concerts'

- Use month = 'MAR'

- Return eventname, catname, venuecity, venuename, calcdate, starttime

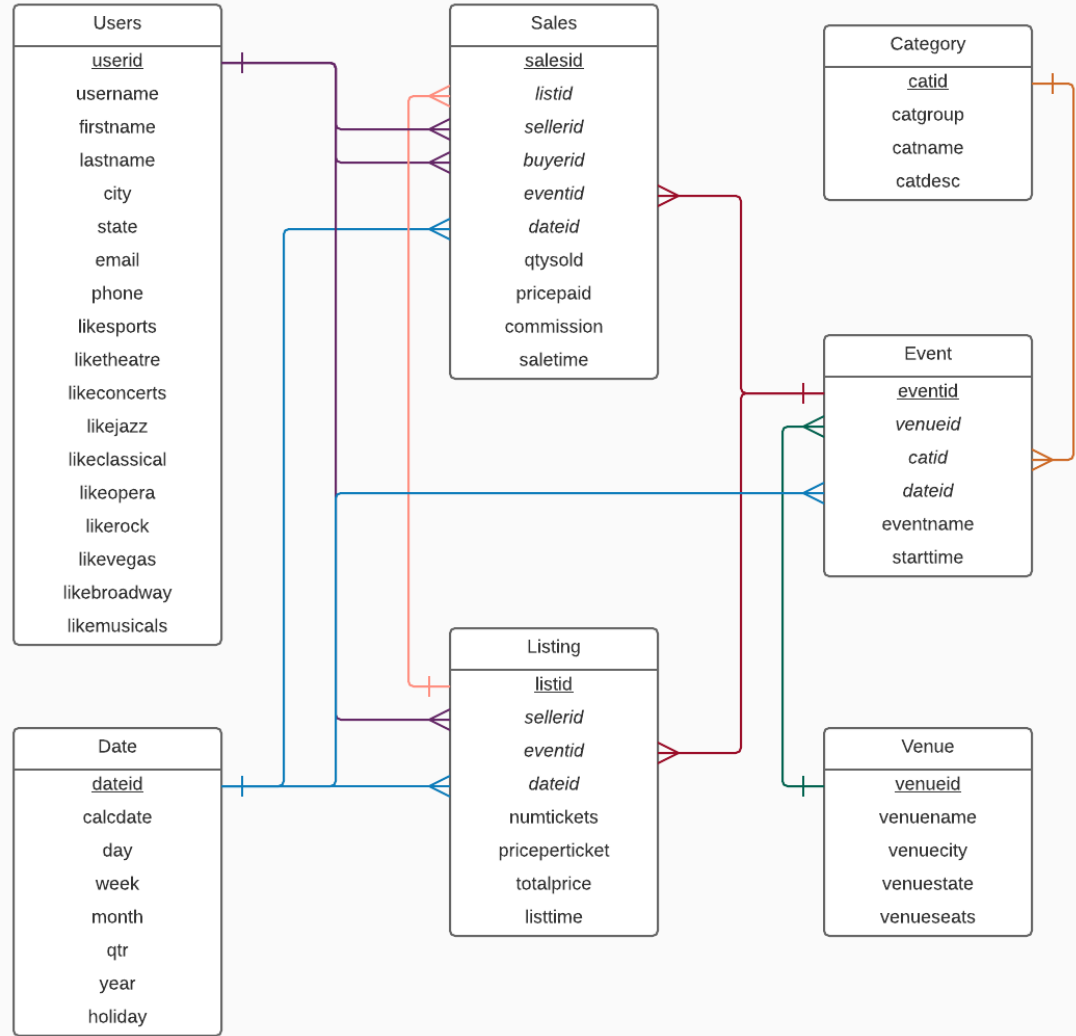- Sort results by calcdate, eventname, venuecity
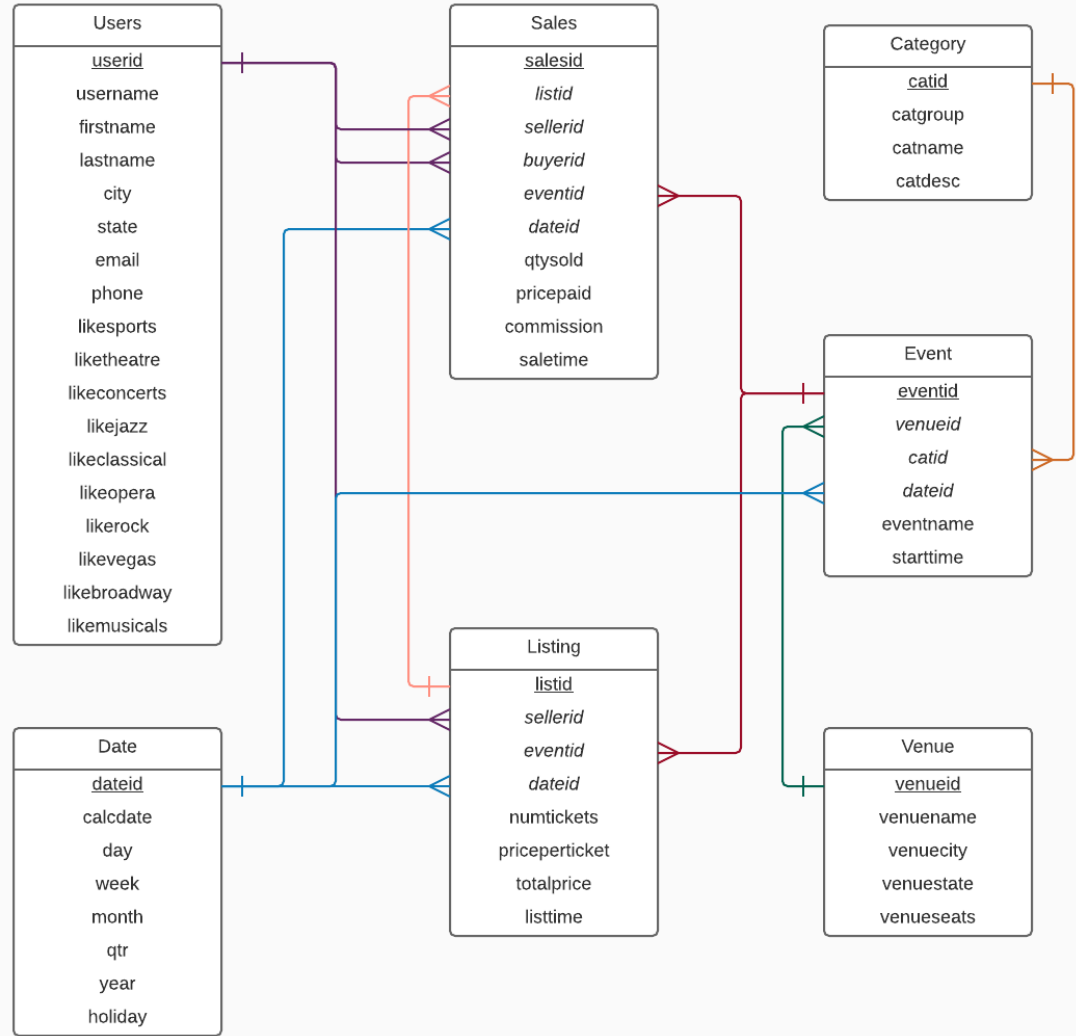
Practice Problem 1:
Find all concerts playing in Austin or Houston or Dallas during the month of March

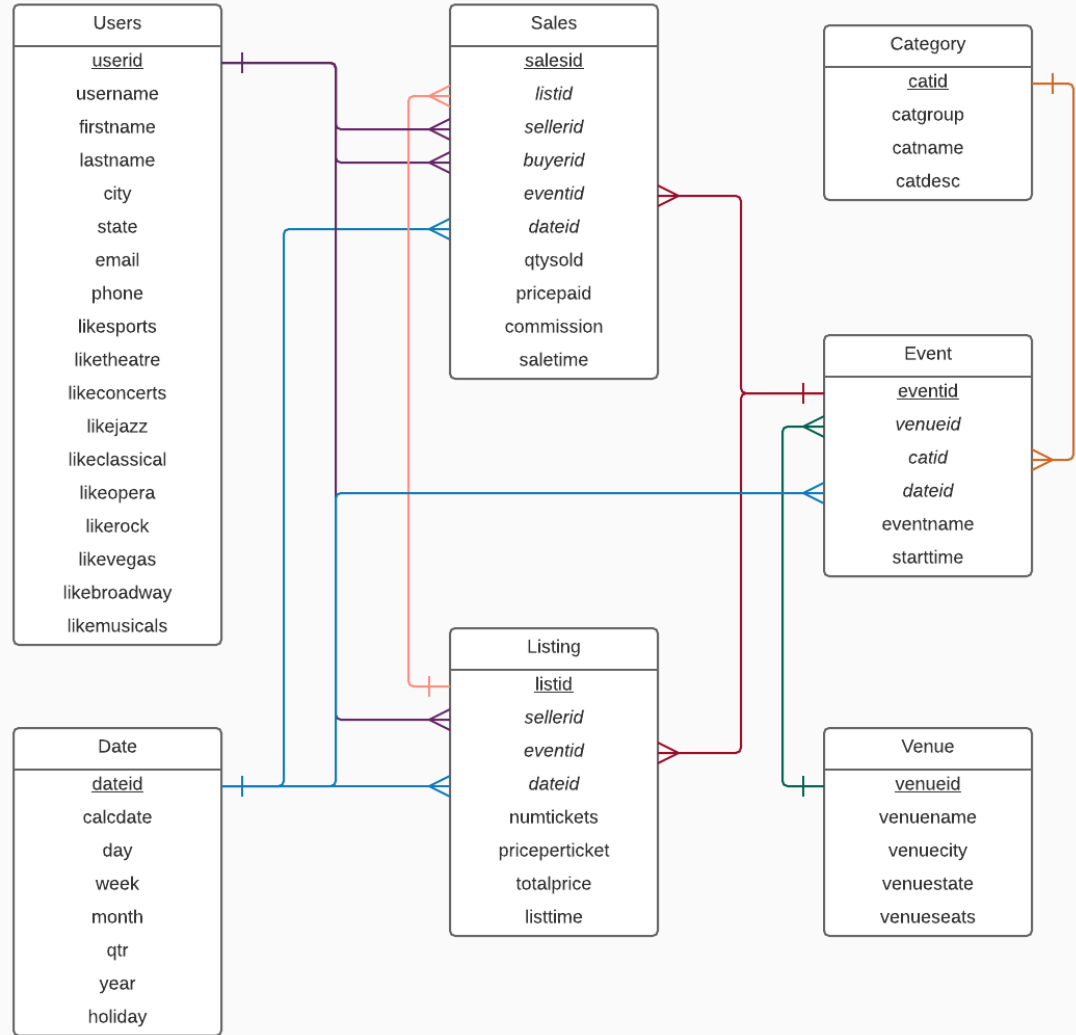Have many joins are needed to compute the answer?

a) 3

b) 2

c) 1

d) 0

Practice Problem 2:
Find all users in the database who have not bought any tickets

Notes:

- Return userid, firstname, lastname, email, city, state

- Sort by userid

Practice Problem 2:
Find all users in the database who have not bought any tickets

What kind of join is required to compute the answer?

a)   Inner join

b)   Outer join

c)   Self join

d)   No join
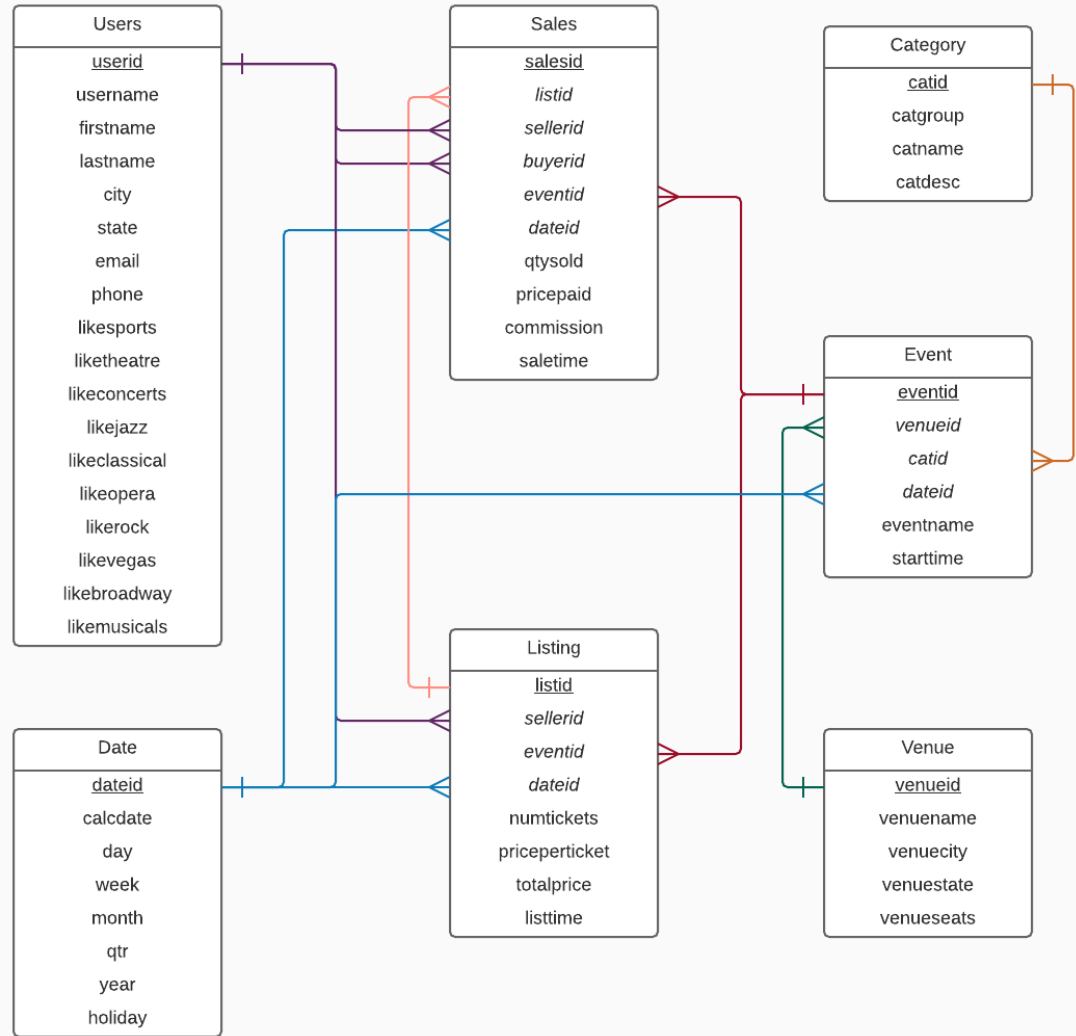
Practice Problem 3:
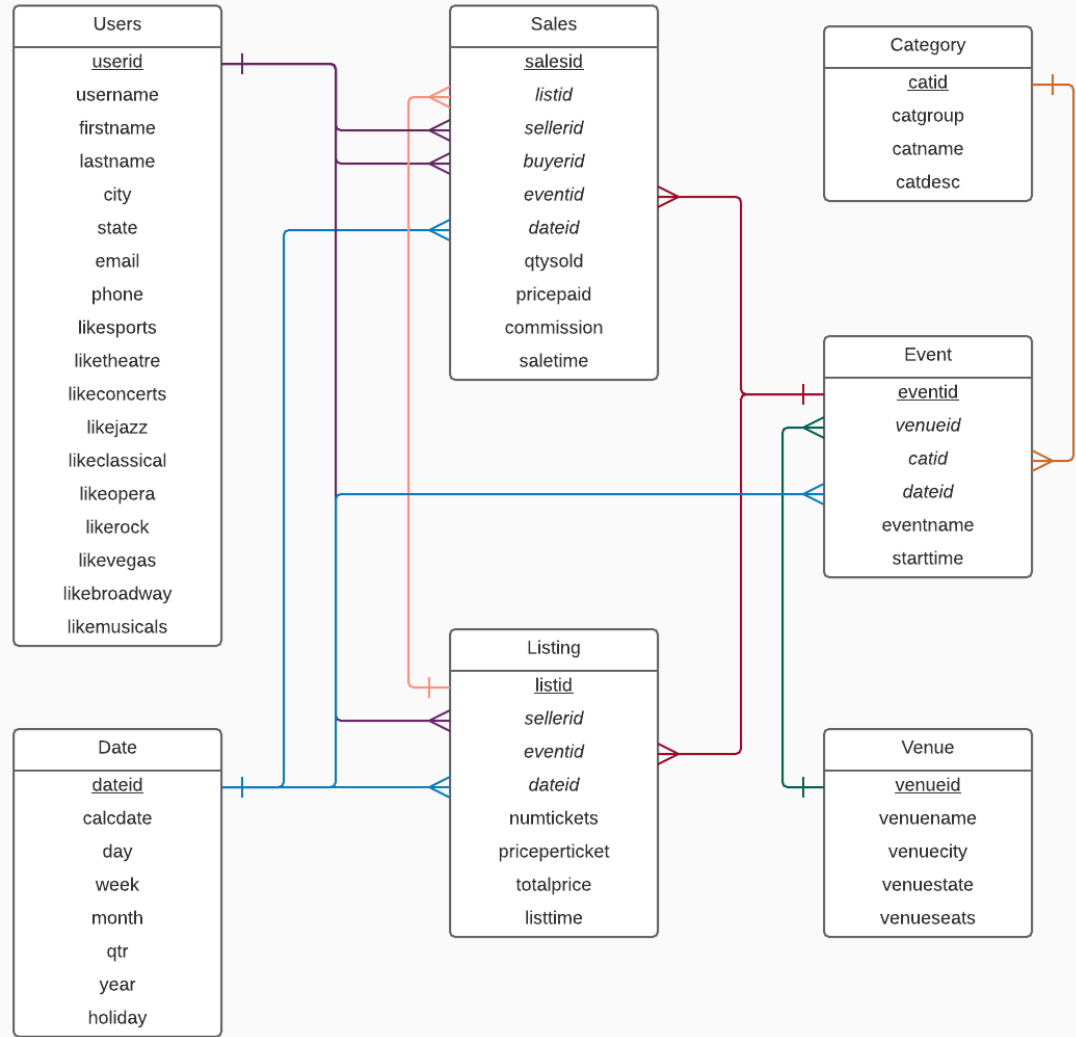Find all categories that are not associated with any events and all events that are missing a category

Notes:

- Return catid, catname, eventid, eventname

- Sort by catid, eventid
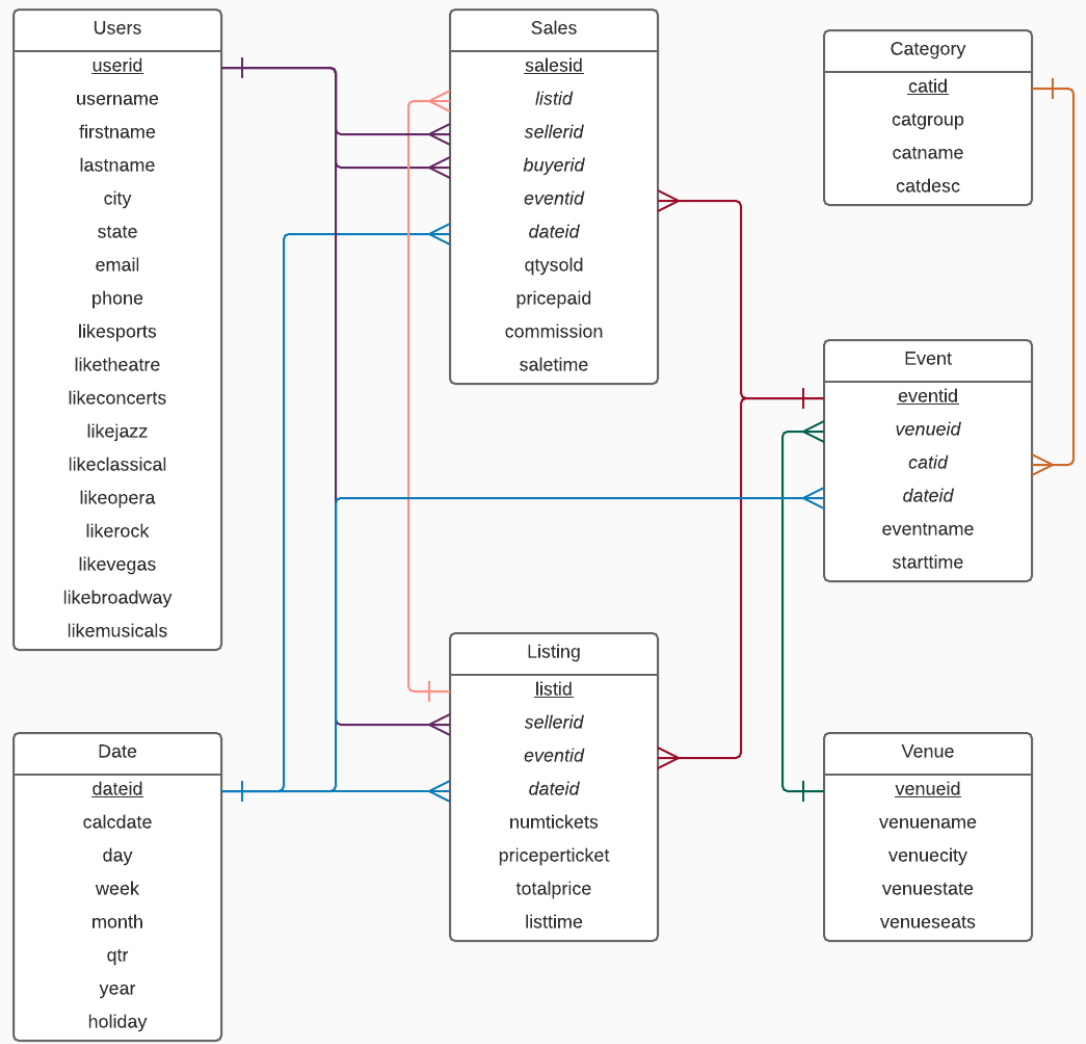
Practice Problem 3:
Find all categories that are not associated with any events and all events that are missing a category

How many nulls are in the query?

a) 0

b) 1

c) 2

d) 3

Self Joins

- **Inner joins:**
  -Includes only the matching records in the **same** table

- **Outer joins:**
  a) Left outer joins:
    - Includes the left record(s) even when there is no match
  b) Right outer join:
    - Includes the right record(s) even when there is no match
  c) Full outer join:
    - Includes both left and right records even when there is no match

empid	firstname	lastname	mngid
1	Michael	Dell	
2	Betty	Jennings	1
3	Bill	Gates	2
4	Fran	Bilas	1

Employee

```
SELECT e.empid, e.firstname, e.lastname, e.mngid, m.empid, m.firstname, m.lastname
FROM Employee e INNER JOIN Employee m
ON e.mngid = m.empid;
```

```
empid | firstname | lastname | mngid | empid | firstname | lastname
------+-----------+----------+-------+-------+-----------+----------
    2 | Betty     | Jennings |     1 |     1 | Michael   | Dell
    3 | Bill      | Gates    |     2 |     2 | Betty     | Jennings
    4 | Fran      | Bilas    |     1 |     1 | Michael   | Dell
(3 rows)
```

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empid	firstname	lastname	mngid
1	Michael	Dell	
2	Betty	Jennings	1
3	Bill	Gates	2
4	Fran	Bilas	1

Employee

```
SELECT e.empid, e.firstname, e.lastname, e.mngid, m.empid, m.firstname, m.lastname
FROM Employee e LEFT OUTER JOIN Employee m
ON e.mngid = m.empid;
```
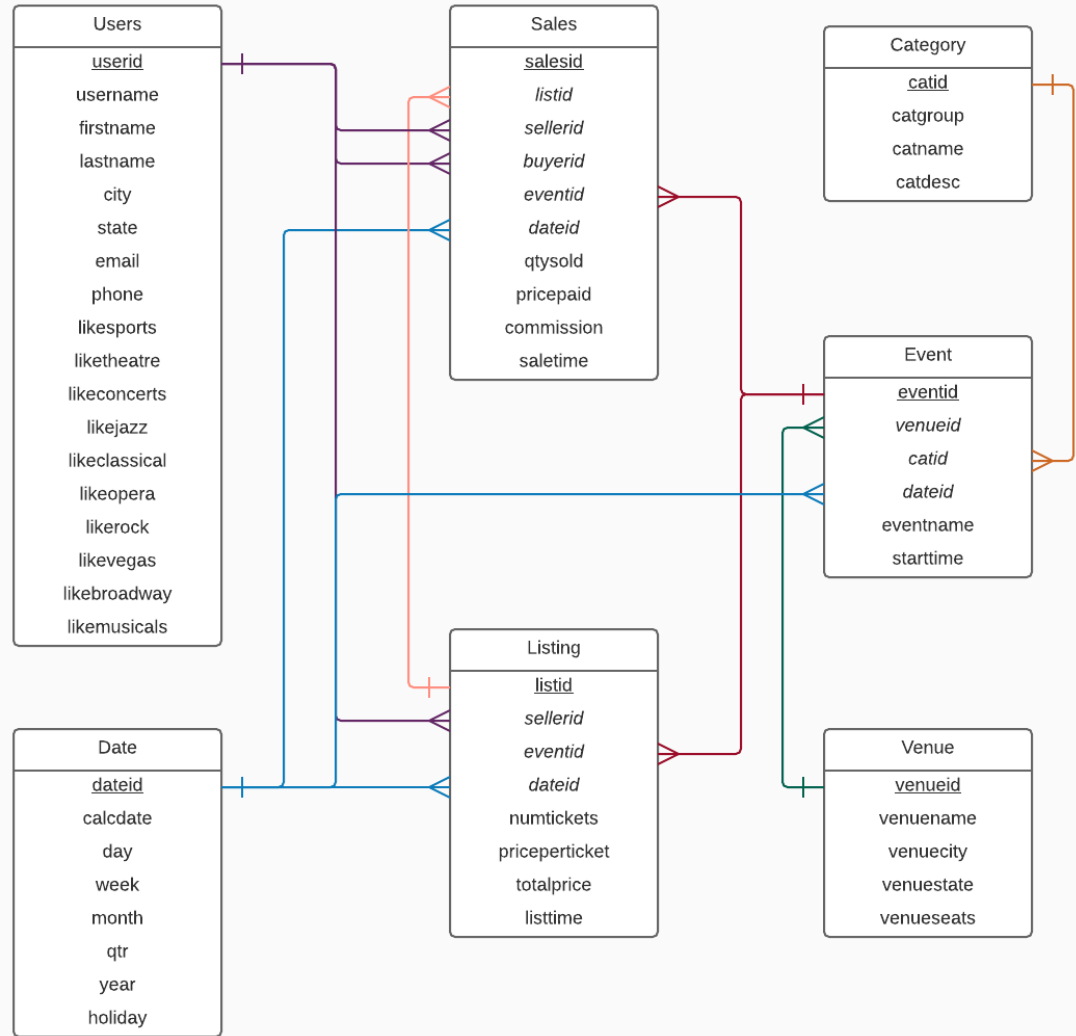
```
empid | firstname | lastname | mngid | empid | firstname | lastname
------+-----------+----------+-------+-------+-----------+----------
    1 | Michael   | Dell     |       |       |           |
    2 | Betty     | Jennings |     1 |     1 | Michael   | Dell
    3 | Bill      | Gates    |     2 |     2 | Betty     | Jennings
    4 | Fran      | Bilas    |     1 |     1 | Michael   | Dell
4 rows)
```
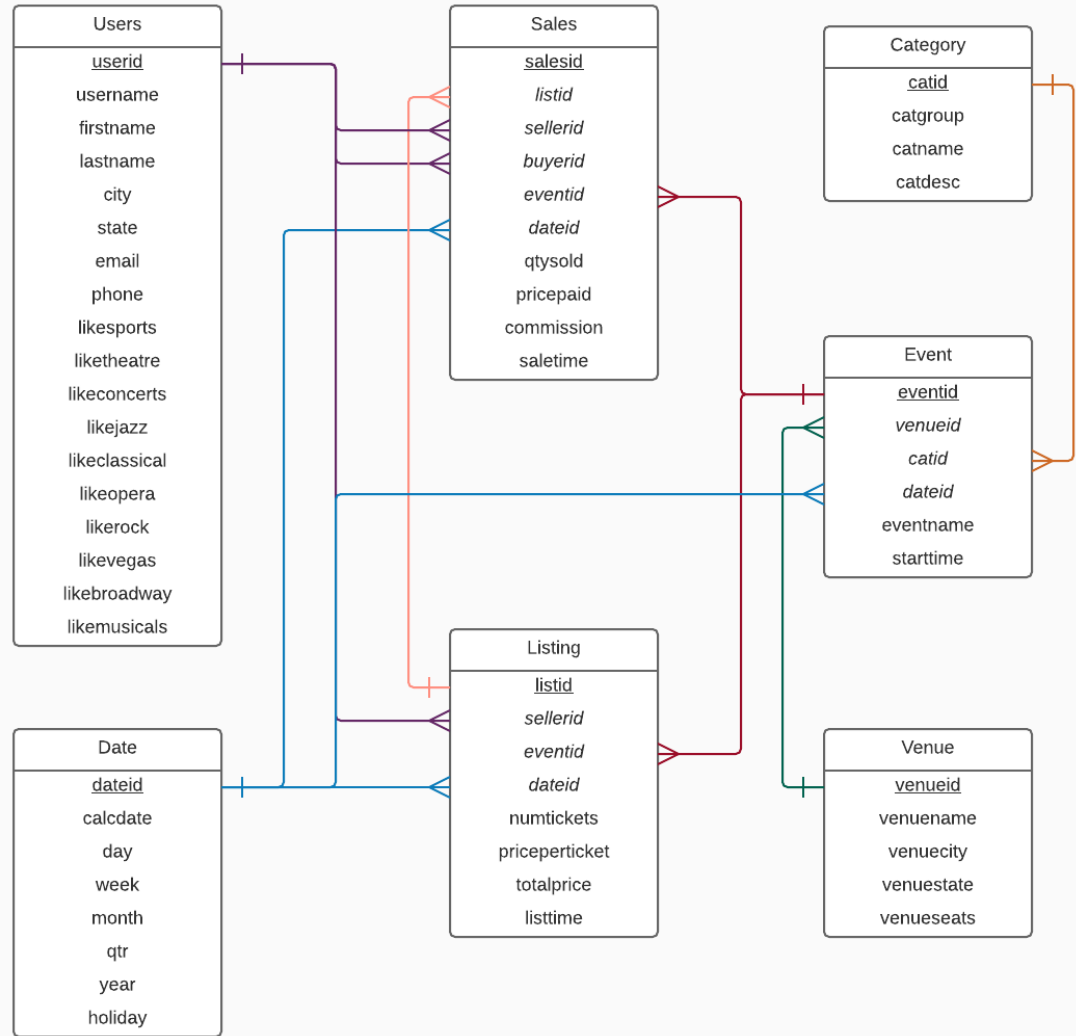
Practice Problem Solutions

Tickit dataset, DDL, copy commands and queries for practice problems:
https://github.com/cs327e-spring2017/snippets (look for filenames tickit_*)