12 SQL

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1

Find the name of merchants in NV state with loyal customers (visited by at least 1 customer 5 times or more)

MySQL - 694 rows

```sql
SELECT b.business_id, b.name
FROM business b
JOIN (
    SELECT business_id, COUNT(DISTINCT user_id) AS user_count
    FROM visit
    GROUP BY business_id, user_id
    HAVING COUNT(user_id) >= 5
) v ON b.business_id = v.business_id
WHERE b.state = 'NV'
GROUP BY b.business_id, b.name
HAVING COUNT(DISTINCT v.user_count) >= 1;
```

```
+--------------------+--------------------------+-----+
|business_id         |name                      |state|
+--------------------+--------------------------+-----+
|_0-6uHKoz1tWsKC2bFzlpg|UFC GYM Reno              |NV   |
```

```
|_3uzefAEsn4bkCO0M6lG6g|Angel Pet Sitting            |NV    |
|_8zIpeRbMVwwyuUngyuemA|Cafe De Manila              |NV    |
|_E0WPHfJEYmwOUCAj-Jq1A|Western Village Inn and Casino|NV  |
|_FDkzPehuIZFHTuDcrJ73g|Ricks Total Car Care        |NV    |
|_HFJ9JkjqTaQwOmvkRoIKg|David's Bridal              |NV    |
|_KlEMZvay1c9xYctKFtN-w|999 Pho                     |NV    |
|_Mbw_orl5EdXJP1XzklQvA|Mimi's Cafe                 |NV    |
|_NozEKb4y0jkC08DWU8ywA|Golden Flower Vietnamese    |NV    |
|_t5JZRB6-bvtX2XsLMidAg|Asian Wok                   |NV    |
+---------------------+----------------------------+-----+
```

Mongdb - 694 rows

```
db.visit.aggregate([
    {
        $group: {
            _id: { user_id: "$user_id", business_id: "$business_id" },
            visit_count: { $sum: 1 }
        }
    },
    {
        $match: {
            visit_count: { $gte: 5 }
        }
    },
    {
        $group: {
            _id: "$_id.business_id",
            user_count: { $sum: 1 }
        }
    },
    {
        $match: {
            user_count: { $gte: 1 }
        }
    },
    {
        $lookup: {
            from: "business",
            localField: "_id",
            foreignField: "_id",
            as: "business_info"
        }
    }
```

```
        },
        {
            $unwind: "$business_info"
        },
        {
            $match: {
                "business_info.state": "NV"
            }
        },
        {
            $project: {
                _id: "$business_info._id",
                name: "$business_info.name"
            }
        }
    ]);
```

<details>

```
+--------------------+------------------------+
|_id                 |name                    |
+--------------------+------------------------+
|snyvZnLnTpBfyLh2-fWOqQ|Nugget Event Center   |
|-e1BUAOBk9RAu89c6uTyGA|Texas Roadhouse       |
|CpIlMk0H7mEBW4SedI5LSQ|A Bakery Built for Two|
|UNkOa6syMXonsoTErl2BIg|Costco Wholesale      |
|E1s2QgsWgt13lGEIA_n9VQ|Raley's               |
|0GsYSmfpsUpnTnxYbH045A|Jimboy's Tacos        |
|MptP4Zxq3ZLbeGB4cY772A|Peg's Glorified Ham & Eggs |
|cN2w2eM2BUQ_uJ1CaRKcAQ|Casale's Halfway Club |
|3ucn3_cDf1WV0DsFgoTfyQ|Carolina Kitchen & Barbeque|
|jFn5pbJySxsPk0kaZfw5ig|Taco Bell             |
+--------------------+------------------------+
```

</details>

2

Find out the category of merchants with the largest number as well as all the merchant with 5 stars under this category.

MySQL - 1553 rows

```sql
WITH CategoryCounts AS (
    SELECT
        c.category,
        b.business_id,
        b.name,
        COUNT(b.business_id) OVER (PARTITION BY c.category) AS business_count
    FROM
        business_category c
    LEFT JOIN
        business b ON c.business_id = b.business_id
)
SELECT
    category,
    business_id,
    name
FROM
    CategoryCounts
```

```sql
WHERE
    business_count = (
        SELECT
            MAX(business_count)
        FROM
            CategoryCounts
    )
    AND business_id IN(
        SELECT business_id
          FROM business
          WHERE stars = 5
    );
```

```
+-----------+--------------------+----------------------+
|category   |business_id         |name                  |
+-----------+--------------------+----------------------+
|Restaurants|__4gkf_0UJW78rkRzFm6Gw|Cafe Baladi         |
|Restaurants|_58WfMGlrmnPossd2Gps6g|Black Radish Grocer |
|Restaurants|_7X0f9VLowKqH-wtrWwTuw|CD Roma's           |
|Restaurants|_8QkK3WwGxNnn54Q1VTTcA|Leneghan's Crusader Inn|
|Restaurants|_aKr7POnacW_VizRKBpCiA|Blues City Deli     |
|Restaurants|_dyh3uCE6E4TimbtFiB-ag|10 & 10 Enoteca     |
|Restaurants|_e9NcunDgXR1dp1XbP2Mbg|Shineworthy Tea     |
|Restaurants|_EWIAcznqBcCLon_MBf47Q|The Wagamama        |
|Restaurants|_FUE9ZOqNTiDmgP2LGPGdw|Dolores             |
|Restaurants|_heLm-iFJJbw4ZAH_Z1iLQ|Peter James BYOB    |
+-----------+--------------------+----------------------+
```

MongoDB - 1553 rows

```
db.business.aggregate([
    {
        $unwind: "$categories"
    },
    {
        $group: {
            _id: "$categories",
            business_count: { $sum: 1 },
            businesses: {
```

```
            $push: {
                business_id: "$_id",
                name: "$name",
                stars: "$stars"
            }
        }
    }
},
{
    $sort: { "business_count": -1 }
},
{
    $limit: 1
},
{
    $unwind: "$businesses"
},
{
    $match: {
        "businesses.stars": 5
    }
},
{
    $project: {
        _id: 0,
        category: "$_id",
        business_id: "$businesses.business_id",
        name: "$businesses.name"
    }
}
])
```



```
+---------------------+----------+------------------------+
|business_id          |category  |name                    |
+---------------------+----------+------------------------+
|ABxoFuzZy5mqQ8C5FJJajQ|Restaurants|Core de Roma            |
|cVBxfMC4lp3DnocjYA3FHQ|Restaurants|Paws The Cat Cafe       |
|RK6-cJ9hj53RzOlCBmpT-g|Restaurants|Impasto                 |
|tSFXJ0GFl5iUdy021YgWLw|Restaurants|The Mad Griddle         |
|1dSKEitDDgIkaApe6UNMSA|Restaurants|The Pepper Pott         |
|Rz0KfP7YAZV_yQE8uIB0fg|Restaurants|El Sabor Boricua        |
|adATTqggIQX5xxLDISkFTw|Restaurants|Just Churros            |
```

```
|mYbEGFsRcA0tfUNSYcBJMA|Restaurants|Golden River Restaurant  |
|yX-eHIG--H3geTNWZ2Q6SA|Restaurants|Crush Gourmet Raspados    |
|_Oksx3ALgKLRVxeAR8l_qA|Restaurants|V-Trap Kitchen and Lounge|
+----------------------+-----------+-------------------------+
```


3.

Find out which stores in city: Santa Barbara with a star rating greater than 3.5 have an average star rating greater than the merchant's star rating in reviews after January 1, 2020 at 0:00 pm.

MySQL - 376 rows

```sql
SELECT
    b.name,
    b.address as address,
    b.city,
    b.state,
    b.stars AS stars,
    AVG(r.stars) AS avg_stars
FROM
    business b
```

```sql
JOIN
    review r ON r.business_id = b.business_id
WHERE
    r.date > '2020-01-01T00:00:00'
GROUP BY
    b.business_id, b.stars,b.city
HAVING
    AVG(r.stars) > b.stars
AND
    b.city = 'Santa Barbara'
AND
    b.stars > 4;
```

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```
+--------------------------+--------------------------+-------------+-----
+-----+---------+
|name                      |address                   |city
|state|stars|avg_stars|
+--------------------------+--------------------------+-------------+-----
+-----+---------+
|Laplace Wine Bar & Shop   |205 Santa Barbara St, Unit B|Santa Barbara|CA
|4.5  |4.6667   |
|Dave's Dogs Grill         |149 S Turnpike Rd         |Santa Barbara|CA
|4.5  |4.5251   |
|Wine + Beer               |38 W Victoria St, Shop 113 |Santa Barbara|CA
|4.5  |4.5500   |
|Cloud Climbers Jeep Tours |null                      |Santa Barbara|CA
|4.5  |4.6846   |
|Lara's Auto Repair        |619 E Gutierrez St, Ste D  |Santa Barbara|CA
|4.5  |4.5682   |
|UCSB Faculty Club Guest Rooms|552 University Rd       |Santa Barbara|CA
|4.5  |4.6667   |
|Isabella Gourmet Foods    |602 Anacapa St            |Santa Barbara|CA
|4.5  |4.7059   |
|Alameda Park              |1400 Santa Barbara St     |Santa Barbara|CA
|4.5  |4.6212   |
|Above All Aviation        |1503 Cook Pl              |Santa Barbara|CA
|4.5  |4.9000   |
|Apna Indian Kitchen       |718 State St              |Santa Barbara|CA
|4.5  |4.6118   |
+--------------------------+--------------------------+-------------+-----
+-----+---------+
```

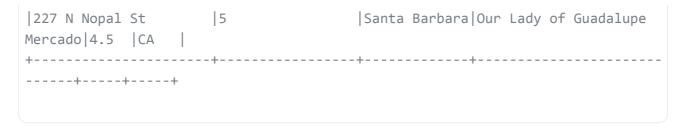**MongoDB - 376 rows**

```
db.business.createIndex({ stars: 1, city: 1 });
db.review.createIndex({ business_id: 1 });
db.business.aggregate([
  {
    $match: {
      city: 'Santa Barbara',
      stars: { $gt: 4 },
    },
  },
  {
    $lookup: {
      from: 'review',
      localField: '_id',
      foreignField: 'business_id',
      as: 'reviews',
    },
  },
  {
    $addFields: {
      filteredReviews: {
        $filter: {
          input: '$reviews',
          as: 'review',
          cond: {
            $gt: ['$$review.date', new Date('2020-01-01T00:00:00')],
          },
        },
      },
    },
  },
  {
      $addFields:{
            avgBusinessStars: {
          $avg: '$filteredReviews.stars',
        },
      }
  },
  {
    $match: {
      $expr: {
        $gt: ["$avgBusinessStars", "$stars"],
```
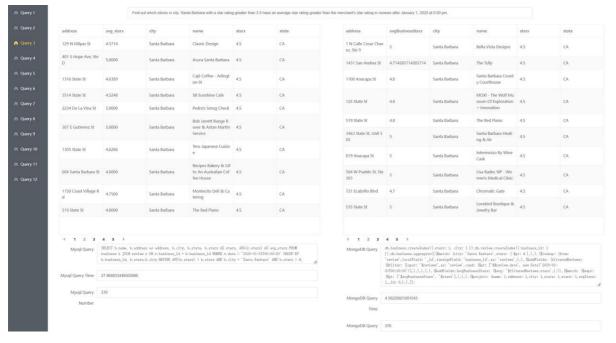
```
      },
    },
  },
  {
    $project: {
      name: 1,
      address: 1,
      city: 1,
      state: 1,
      stars: 1,
      avgBusinessStars: 1,
//      filteredReviews: 1,
      _id: 0,
    },
  },
]);
```

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```
+--------------------+---------------+------------+---------------------
------+-----+-----+
|address             |avgBusinessStars|city        |name
     |stars|state|
+--------------------+---------------+------------+---------------------
------+-----+-----+
|825 Cacique St      |4.7            |Santa Barbara|Iron Horse Auto Body
     |4.5  |CA   |
|San Marcos Pass Rd  |5              |Santa Barbara|Los Padres National
Forest  |4.5  |CA   |
|712 Nopalitos Way   |4.555555555555555|Santa Barbara|Granny's Garage
     |4.5  |CA   |
|4133 San Martin Way |5              |Santa Barbara|Dodo Limo &
Transportation   |4.5  |CA   |
|120 Santa Barbara St|4.8            |Santa Barbara|Topa Topa Brewing
Company    |4.5  |CA   |
|1298 Las Positas Rd |4.6            |Santa Barbara|Elings Park
     |4.5  |CA   |
|900 N Milpas St, Ste B|5            |Santa Barbara|Slanging Ink
     |4.5  |CA   |
|1103 State St       |5              |Santa Barbara|Hempwise
     |4.5  |CA   |
|22 Anacapa St       |5              |Santa Barbara|Muller Aquatic Center
     |4.5  |CA   |
```

```
|227 N Nopal St          |5                        |Santa Barbara|Our Lady of Guadalupe
Mercado|4.5   |CA    |
+---------------------+---------------+------------+----------------------
------+-----+-----+
```


4

Find out who John's friends are. Find the people who go shopping more often than him.

MySQL - 4650 rows


```sql
select A.friend_name, A.friendVisitCount
from (SELECT
#      u.user_id                        AS user_id,
#        u.name                         AS user_name,
      COUNT(DISTINCT v1.business_id) AS johnVisitCount,
#        f.friend_id,
      u2.name                          AS friend_name,
      COUNT(DISTINCT v2.business_id) AS friendVisitCount
FROM user u
        JOIN
    friend f ON u.user_id = f.user_id
        JOIN
```

```
        user u2 ON f.friend_id = u2.user_id
            JOIN
        visit v1 ON v1.user_id = u.user_id
            JOIN
        business_category bc1 ON bc1.business_id = v1.business_id
            JOIN
        visit v2 ON v2.user_id = f.friend_id
            JOIN
        business_category bc2 ON bc2.business_id = v2.business_id
WHERE u.name = 'John'
  AND bc1.category = 'Shopping'
  AND bc2.category = 'Shopping'
GROUP BY u.user_id, u.name, f.friend_id, u2.name
HAVING johnVisitCount < friendVisitCount) as A;
```

```
+--------------------+---------+-------------+--------------------+-------
----+---------------+
|user_id             |user_name|johnVisitCount|friend_id
|friend_name|friendVisitCount|
+--------------------+---------+-------------+--------------------+-------
----+---------------+
|_5MB3xn7UyBJ1zV9IwAREw|John     |1            |3cMHSBbJdHuazh8XN8qJPA|A
     |4              |
|_5MB3xn7UyBJ1zV9IwAREw|John     |1            |QWKPQiqH_o_ARgpldmB1CQ|Anne
     |4              |
|_5MB3xn7UyBJ1zV9IwAREw|John     |1            |z_hxX-PtqyNtiM9aKaeBTQ|Nasha
     |3              |
|_ahCp1VkqBjAGm1a0IXb9w|John     |1            |TYwQtORbORzcX22xdYBx1g|Brian
     |39             |
|_dHP6IeEGKXCTxXHjmovzQ|John     |2            |4BUDG3wEofTByb125aFcXQ|Amber
     |15             |
|_dHP6IeEGKXCTxXHjmovzQ|John     |2            |5kODeaS7wZRtbUm6uWIyGA|Torri
     |6              |
|_dHP6IeEGKXCTxXHjmovzQ|John     |2            |6Jrx4sEzyYLz4XWAMVokgw|Ian
     |30             |
|_dHP6IeEGKXCTxXHjmovzQ|John     |2
|A9cXP_K95FRor1qxuUEu2g|Richard   |75               |
|_dHP6IeEGKXCTxXHjmovzQ|John     |2            |AVyU4MC9ucdgCFRaLNpePQ|Sarah
     |41             |
|_dHP6IeEGKXCTxXHjmovzQ|John     |2            |mOchgrEMUw3O4wyFxIMAJg|Shelly
     |5              |
```

```
+--------------------+---------+------------+-------------------+-------
----+--------------+
```

MongoDB - 4650 rows

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```
db.business.createIndex({ business_id: 1 });
db.user.createIndex({ friends: 1 });
db.visit.createIndex({ user_id: 1 });
db.visit.createIndex({ business_id: 1 });
db.user.createIndex({ name: 1 });

db.user.aggregate([
    { $match: { name: "John" } },
    {
        $lookup: {
            from: "visit",
            localField: "_id",
            foreignField: "user_id",
            as: "userVisit",
        },
    },
    {
        $lookup:{
            from: "business",
            localField: "userVisit.business_id",
            foreignField: "_id",
            as: "businessUser",
        }
    },
    {
        $match: {
         businessUser: {
            $elemMatch: {
                categories: "Shopping"
            }
          }
        }
    },

    { $addFields: { userShoppingCount: { $size: "$businessUser" } } },
    { $unwind: "$friends" },
    {
        $lookup: {
```

```
                from: "visit",
                localField: "friends",
                foreignField: "user_id",
                as: "userFriendVisit",
            },
        },
    },
    ///beginbeginbegin
        {
        $lookup:{
            from: "business",
            localField: "userFriendVisit.business_id",
            foreignField: "_id",
            as: "businessUserFriend",
        }
    },

    {
        $match: {
         businessUserFriend: {
            $elemMatch: {
                categories: "Shopping"
            }
          }
        }
    },

    { $addFields: { userFriendShoppingCount: { $size: "$businessUserFriend" }
} },
    /////////eneneeenenenenend
    { $lookup: { from: "user", localField: "friends", foreignField: "_id", as:
"friendInfo" } },
    { $unwind: "$friendInfo" },
  {
      $match: {
        $expr: {
          $gt: ["$userFriendShoppingCount", "$userShoppingCount"]
        }
      }
  },
  {
      $project: {
          _id: 0,
          user_name: "$friendInfo.name", //
//        yelping_since: "$yelping_since", //
          review_count: "$review_count"
```

```
        }
    }
]);
```



```
+------------+---------+
|review_count|user_name|
+------------+---------+
|2           |caylee   |
|2           |Jasmin   |
|2           |Victoria |
|2           |Yuri     |
|2           |Samantha |
|2           |Phil     |
|2           |Samson   |
|13          |Matt     |
|1           |Bryan    |
|1           |Susan    |
+------------+---------+
```


5

The "Influence Score" is generated from the sum of the 11 attributes of the user's COMPLIMENT plus 100 times the user's ELITE number of years, listing the 20 users with the highest scores.

MySQL - 20 rows

```sql
SELECT user_id, (compliment_hot + compliment_more + compliment_profile +
compliment_cute + compliment_list + compliment_note + compliment_plain +
compliment_cool + compliment_funny + compliment_writer + compliment_photos +
100 * elite_count) AS influence_score
FROM compliment
NATURAL JOIN
     (SELECT user_id, COUNT(elite_year) AS elite_count
      FROM user
      LEFT JOIN
       user_elite
      USING (user_id)
      GROUP BY user_id) AS A
ORDER BY influence_score DESC
LIMIT 20;
```

```
+----------------------+---------------+
|user_id               |influence_score|
+----------------------+---------------+
|___6aix-XvFcQz3GauAPpw|0              |
|___9Jl-8aF7z58JdTWlyjw|1              |
|___aO4EhZULBsJPvJ4rMhA|0              |
|___DjEwDb9e7Ny-NOiezZw|0              |
|___hQj63mwgFDhehNwv3ZQ|1              |
|___I9ZYdYGkZ6dMYxwJEIQ|37             |
|___Pul-lcE0y9hjAer8GrQ|0              |
|___tX0MgAQYPaWssEjSxKw|0              |
|__--6h87PZrkaT0SAuQc-w|0              |
|__-2EyiraNzLPrq6o1QDIA|0              |
+----------------------+---------------+
```

MongoDB - 20 rows

```
db.user.aggregate([
  {
    $addFields: {
      influence_score: {
        $sum: [
          "$compliment_hot",
          "$compliment_more",
          "$compliment_profile",
          "$compliment_cute",
          "$compliment_list",
          "$compliment_note",
          "$compliment_plain",
          "$compliment_cool",
          "$compliment_funny",
          "$compliment_writer",
          "$compliment_photos",
          {$multiply: [{$size: "$elite"}, 100]}
        ]
      }
    }
  },
  {
    $project: {
      _id: 1,
      influence_score: 1
    }
  },
  {
    $sort:{
      influence_score: -1
    }
  },
  {
    $limit: 20
  }
]);
```

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```
+--------------------+--------------+
|_id                 |influence_score|
+--------------------+--------------+
|qVc8ODYU5SZjKXVBgXdI7w|2973         |
|j14WgRoU_-2ZE1aw1dXrJg|22031        |
```

```
|2WnXYQFK0hXEoTxPtV2zvg|1085          |
|SZDeASXq7o05mMNLshsdIA|436           |
|hA5lMy-EnncsH4JoR-hFGQ|104           |
|q_QQ5kBBwlCcbL1s4NVK3g|16607         |
|cxuxXkcihfCbqt5Byrup8Q|101           |
|E9kcWJdJUHuTKfQurPljwA|156           |
|lO1iq-f75hnPNZkTy3Zerg|126           |
|AUi8MPWJ0mLkMfwbui27lg|113           |
+----------------------+--------------+
```


6

Find all the businesses that had more check-in numbers in 2020 than in 2019.

MySQL - 17289 rows

```sql
SELECT business_id, name
FROM business
WHERE business_id IN (SELECT B.business_id
            FROM (SELECT business_id, COUNT(date) AS cnt
                FROM checkin
                WHERE YEAR(date) = 2019
                GROUP BY business_id) AS A
            RIGHT JOIN
```

```sql
            (SELECT business_id, COUNT(date) AS cnt
             FROM checkin
             WHERE YEAR(date) = 2020
             GROUP BY business_id) AS B
         ON A.business_id = B.business_id
         WHERE A.cnt IS NULL OR A.cnt < B.cnt);
```

```
+--------------------+------------------------------------+
|business_id         |name                                |
+--------------------+------------------------------------+
|__YGMQexDIqJKtYynxh5gg|Lou                               |
|_-8TAMmIbDGkZCXAqSkFMg|Slack's Hoagie Shack              |
|_-ag9LGrOJkJW3bXmtAv-w|Walgreens                         |
|_-XYJgVGrNMtn_S6nPm-GQ|Vinnie's Italian Beef and Gyros   |
|_04zRVBKs7Cqsc3TWf-KRg|Muva's Kitchen                    |
|_07RALXKTwFO1hooTQ57gg|Allen's Kennel                    |
|_0RfzLMX2eou1E24i1Vr2g|A Foam & Fabric Place             |
|_0RHG6h4-GKMTg7NCyYOKQ|Woof Gang Bakery & Grooming Carrollwood|
|_0yC3ZPvPu_bV-zzSYtBdQ|Planet Beach - Kenner             |
|_10m_xRpfqqnj9jvUUIqjA|Applebee's Grill + Bar            |
+--------------------+------------------------------------+
```

MongoDB - 17289 rows

```
db.business.aggregate([
  {
    $addFields: {
      count_2019: {
        $size: {
          $filter: {

            input: { $ifNull: ["$checkin_date", [ ]] },

            as: "date",
            cond: { $eq: [{ $year: "$$date" }, 2019] }
          }
        }
      },
      count_2020: {
```

```
        $size: {
          $filter: {

            input: { $ifNull: ["$checkin_date", [ ]] },

            as: "date",
            cond: { $eq: [{ $year: "$$date" }, 2020] }
          }
        }
      }
    }
  },
  {
    $match: {
      $expr: {
        $gt: ["$count_2020", "$count_2019"]
      }
    }
  },
  {
    $project: {
      name: 1
    }
  }
])
```

```
+--------------------+-------------------------------+
|_id                 |name                           |
+--------------------+-------------------------------+
|MTSW4McQd7CbVtyjqoe9mw|St Honore Pastries           |
|mWMc6_wTdE0EUBKIGXDVfA|Perkiomen Valley Brewery     |
|CF33F8-E6oudUQ46HnavjQ|Sonic Drive-In               |
|bBDDEgkFA1Otx9Lfe7BZUQ|Sonic Drive-In               |
|mGFsPRHdE6SMV1gYQ6GzgQ|T-Mobile                     |
|ljxNT9p0y7YMPx0fcNBGig|Tony's Restaurant & 3rd Street Cafe|
|0qNpTGTcqPwOLi2hADx4Xw|Charlie's Market             |
|8rb-3VYXE37IZix4yOdskw|Sharky's Sports Bar & Grill  |
|mFTaYsRDyeFaY2NDLfSaAA|River City Games             |
|-ZXYcCyDjj1QimnJyGtYtg|Gilley's Antique Mall        |
+--------------------+-------------------------------+
```

7

Select those merchants with an average rating higher than 4 star from 2023-01-01 to now in 'Santa Barbara'

MySQL - 153 rows

```sql
select b.business_id, b.name, avg(r.stars) as avg_rating
from business b
        join review r
            on b.business_id = r.business_id
where r.date > '2023-01-01 00:00:00'
  and b.city = 'Santa Barbara'
group by b.business_id, b.name
having avg_rating > 4
order by avg_rating desc;
```

```
+--------------------+-----------------------------------+----------+
|business_id         |name                               |avg_rating|
+--------------------+-----------------------------------+----------+
|_L0DNfnS5VFGv-V1WcMdmA|Hugo's Auto Detailing            |5.0000    |
|13UbOVDFdxloxaient5XWA|Jump On The School Bus           |5.0000    |
```

```
|1hphQunRLjBTCgZ-SP7IaQ|HouseMaster                          |5.0000    |
|1NQ2tjNj3qQt1sXXSGSsiA|Members Only Barber Shop             |5.0000    |
|1vj7ACAQgZHCY6vzo2xBdg|Lighthouse Skateshop                 |5.0000    |
|3jwfajUa1Vt8x3F8E9ZVaw|Top Notch Driving School             |5.0000    |
|3ZqShggSayVJ_OJ0DXpvHA|Porsche Santa Barbara                |5.0000    |
|425FOxIzHPcOB0niWc6-1w|Spudnuts Donuts                      |5.0000    |
|4eBoPWRT7t8Sot-dwl3N-Q|Lisa Rader, NP - Women's Medical Clinic|5.0000    |
|6iu-7O6DFVz3e6sUIwF9nA|Exquisite Auto Body & Detail         |5.0000    |
+----------------------+-------------------------------------+----------+
```

MongoDB - 153 rows
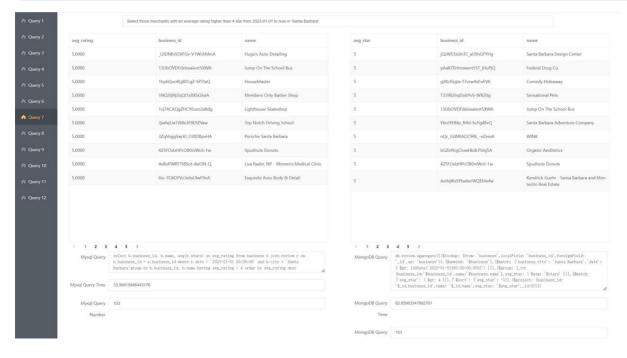
```
db.review.aggregate(
    [
        {
            $lookup: {
                from: "business",
                localField: "business_id",
                foreignField: "_id",
                as: "business"
            }
        },
        {
            $unwind: "$business"
        },
        {
            $match: {
                "business.city": "Santa Barbara",
                "date": { $gt: ISODate("2023-01-01T00:00:00.000Z") }
            }
        },
        {
            $group: {
                _id:{business_id:"$business_id",name:"$business.name"},
                avg_star: { $avg: "$stars" }
            }
        },
        {
            $match: {
                "avg_star": { $gt: 4 }
            }
        },
        {
```

```
            $sort: {
                avg_star: -1
            }
        },
        {
            $project: {
                business_id: "$_id.business_id",
                name: "$_id.name",
                avg_star: "$avg_star",
                _id:0
            }
        }
    ]
)
```


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```
+--------+--------------------+-------------------------------------------
----+
|avg_star|business_id         |name
     |
+--------+--------------------+-------------------------------------------
----+
|5       |xcUh0dC329iPNybY479X7w|NV Glam Studio
     |
|5       |YP7dUMVSmUE8xt-QH6M1aA|SeaVees
     |
|5       |bxDk3YLoMOTdmmf_4AN_4g|Pacific Crest Hotel Santa Barbara
     |
|5       |Jb1MlURq6ItKZ244tyoirA|Jessie Sessions - Berkshire Hathaway Santa
Barbara|
|5       |ZPWJAgvdHREomrUJ8tIh2Q|The Granada Theatre
     |
|5       |9izBQhYFyrTzInLjZYvO_A|CalCoast Glass Tinting, Inc
     |
|5       |1NQ2tjNj3qQt1sXXSGSsiA|Members Only Barber Shop
     |
|5       |LHzWEwFemndC1q1UTi8Itw|Santa Barbara PC Mechanic
     |
|5       |dPt9QgLAIuI2a-CKdv5cSA|Santa Barbara Humane
     |
|5       |HNxw1d9P3_jwx9d215bfEw|Fiesta jumps
     |
```

```
+---------+---------------------+---------------------------------------------------------------
----+
```


8

Search review data to find all reviews that mention "excellent service" and display essential details about the merchant.

MySQL - 23857 rows

```sql
select b.business_id, b.name, r.text
from business b
        join review r
            on b.business_id = r.business_id
where r.text like '%excellent service%';
```

```
+--------------------+------------------------+--------------------------
-------------------------------------------------------------------------
-------------------------------------------------------------------------
-------------------------------------------------------------------------
----------------------------
```

business_id	name	text
ifzM8bHOO9rHCh1VCMq_JQ	St Petersburg Dental Center	Dr. Crawford is wonderful! I had a really horrible experience at Apple dental on my first filling. They did it without numbing the area. And it hurt!!!!Dr. Crawford did my first real legit filling when I was 17 and he was caring, thorough, and professional. I felt zero pain!I am back here with him because my insurance is welcomed here and I still have excellent service here. I chipped my tooth and I received prompt and great service! I love Maggie as my dental hygienist as well. I have gone to her for several years and she does not take short cuts.
ifzM8bHOO9rHCh1VCMq_JQ	St Petersburg Dental Center	Dr. Crawford is wonderful! I had a really horrible experience at Apple dental on my first filling. They did it without numbing the area. And it hurt!!!!Dr. Crawford did my first real legit filling when I was 17 and he was caring, thorough, and professional. I felt zero pain!I am back here with him because my insurance is welcomed here and I still have excellent service here. I chipped my tooth and I received prompt and great service! I love Maggie as my dental hygienist as well. I have gone to her for several years and she does not take short cuts.
_bwVnlSMdFTdwskc7WMQOQ	Metairie Cleaners	I honestly wish I had more clothes to clean because when I came here I felt like family. My cleaners closed due to covid so I had to find a new cleaners. I did a google search and decided to give this place a try. I am so glad I did because Peggy welcomed me

with open arms. She was so friendly and cracking jokes, I felt like I was with family. All the staff are friendly. I have visited twice and had a few blazers cleaned and a coat. Super reasonable with pricing as well. They are open till 5 or 530 and will bring clothes out to the car to you if you being extra careful. Try this place and make a new friend while getting excellent service!|
|_bwVnlSMdFTdwskc7WMQOQ|Metairie Cleaners |I honestly wish I had more clothes to clean because when I came here I felt like family. My cleaners closed due to covid so I had to find a new cleaners. I did a google search and decided to give this place a try. I am so glad I did because Peggy welcomed me with open arms. She was so friendly and cracking jokes, I felt like I was with family. All the staff are friendly. I have visited twice and had a few blazers cleaned and a coat. Super reasonable with pricing as well. They are open till 5 or 530 and will bring clothes out to the car to you if you being extra careful. Try this place and make a new friend while getting excellent service!|
|g2KcfGgIa-T7vrwAsFoEVA|Comedy Hideaway |Attended the Special Preview show on Friday and was blown away! The best comedy show in SB is finally back!! The comics were all hilarious and had my friends and I laughing til we cried & cheeks sore! Can't wait to come back. This new location is a gem with great food and drinks and excellent service!

 |
|g2KcfGgIa-T7vrwAsFoEVA|Comedy Hideaway |Attended the Special Preview show on Friday and was blown away! The best comedy show in SB is finally back!! The comics were all hilarious and had my friends and I laughing til we cried & cheeks sore! Can't wait to come back. This new location is a gem with great food and drinks and excellent service!

 |
|g2KcfGgIa-T7vrwAsFoEVA|Comedy Hideaway |Attended the Special Preview show on Friday and was blown away! The best comedy show in SB is finally back!! The comics were all hilarious and had my friends and I laughing til we cried & cheeks sore! Can't wait to come back. This new location is a gem with great food and drinks and excellent service!

 |

```
|g2KcfGgIa-T7vrwAsFoEVA|Comedy Hideaway          |Attended the Special
Preview show on Friday and was blown away! The best comedy show in SB is
finally back!! The comics were all hilarious and had my friends and I laughing
til we cried & cheeks sore!  Can't wait to come back. This new location is a
gem with great food and drinks and excellent service!



 |
|CJNKR_FQ4BOiJqcTtZlkoA|Kinzels Flower Shop       |My family has ordered
flowers multiple times and we've always gotten excellent service and quality.
I want to especially mention how kind they were just recently for my
Grandmother's birthday. Once they heard she was turning 103, they send her
their own separate bouquet of roses. Above and beyond!



    |
|CJNKR_FQ4BOiJqcTtZlkoA|Kinzels Flower Shop       |My family has ordered
flowers multiple times and we've always gotten excellent service and quality.
I want to especially mention how kind they were just recently for my
Grandmother's birthday. Once they heard she was turning 103, they send her
their own separate bouquet of roses. Above and beyond!



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```

MongoDB - 23857 rows

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```
db.review.aggregate(
    [
        {
            $lookup: {
                from: "business",
                localField: "business_id",
                foreignField: "_id",
                as: "business"
            }
        },
        {
            $unwind: "$business"
        },
        {

            $match: {
                text: { $regex: "excellent service"}
            }
        },
        {

            $project: {
                _id: 0,
                business_id: '$business_id',
                name: "$business.name",
                text: '$text'
            }
        }
    ]
)
```

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```
+--------------------+------------------------+------------------------
------------------------------------------------------------------------
------------------------------------------------------------------------
------------------------------------------------------------------------
------------------------------------------------------------------------
------------------------------------------------------------------------
------------------------------------------------------------------------
------------------------------------------------------------------------
----------------------------------------------------------------+
|business_id          |name                   |text
```

```
                                                                        |
+--------------------+---------------------------+------------------------
------------------------------------------------------------------------
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------------------------------------------------------------------------
------------------------------------------------------------------+
```

|ifzM8bHOO9rHCh1VCMq_JQ|St Petersburg Dental Center|Dr. Crawford is wonderful! I had a really horrible experience at Apple dental on my first filling. They did it without numbing the area. And it hurt!!!!Dr. Crawford did my first real legit filling when I was 17 and he was caring, thorough, and professional. I felt zero pain!I am back here with him because my insurance is welcomed here and I still have excellent service here. I chipped my tooth and I received prompt and great service! I love Maggie as my dental hygienist as well. I have gone to her for several years and she does not take short cuts.
                                                                        |

|_bwVnlSMdFTdwskc7WMQOQ|Metairie Cleaners |I honestly wish I had more clothes to clean because when I came here I felt like family. My cleaners closed due to covid so I had to find a new cleaners. I did a google search and decided to give this place a try. I am so glad I did because Peggy welcomed me with open arms. She was so friendly and cracking jokes, I felt like I was with family. All the staff are friendly. I have visited twice and had a few blazers cleaned and a coat. Super reasonable with pricing as well. They are open till 5 or 530 and will bring clothes out to the car to you if you being extra careful. Try this place and make a new friend while getting excellent service!|

with open arms. She was so friendly and cracking jokes, I felt like I was with family. All the staff are friendly. I have visited twice and had a few blazers cleaned and a coat. Super reasonable with pricing as well. They are open till 5 or 530 and will bring clothes out to the car to you if you being extra careful. Try this place and make a new friend while getting excellent service!|
|g2KcfGgIa-T7vrwAsFoEVA|Comedy Hideaway |Attended the Special Preview show on Friday and was blown away! The best comedy show in SB is finally back!! The comics were all hilarious and had my friends and I laughing til we cried & cheeks sore! Can't wait to come back. This new location is a gem with great food and drinks and excellent service!

 |
|g2KcfGgIa-T7vrwAsFoEVA|Comedy Hideaway |Attended the Special Preview show on Friday and was blown away! The best comedy show in SB is finally back!! The comics were all hilarious and had my friends and I laughing til we cried & cheeks sore! Can't wait to come back. This new location is a gem with great food and drinks and excellent service!

 |
|g2KcfGgIa-T7vrwAsFoEVA|Comedy Hideaway |Attended the Special Preview show on Friday and was blown away! The best comedy show in SB is finally back!! The comics were all hilarious and had my friends and I laughing til we cried & cheeks sore! Can't wait to come back. This new location is a gem with great food and drinks and excellent service!

 |
|g2KcfGgIa-T7vrwAsFoEVA|Comedy Hideaway |Attended the Special Preview show on Friday and was blown away! The best comedy show in SB is finally back!! The comics were all hilarious and had my friends and I laughing til we cried & cheeks sore! Can't wait to come back. This new location is a gem with great food and drinks and excellent service!

 |

```
|CJNKR_FQ4BOiJqcTtZlkoA|Kinzels Flower Shop        |My family has ordered
flowers multiple times and we've always gotten excellent service and quality.
I want to especially mention how kind they were just recently for my
Grandmother's birthday. Once they heard she was turning 103, they send her
their own separate bouquet of roses. Above and beyond!



       |
|CJNKR_FQ4BOiJqcTtZlkoA|Kinzels Flower Shop        |My family has ordered
flowers multiple times and we've always gotten excellent service and quality.
I want to especially mention how kind they were just recently for my
Grandmother's birthday. Once they heard she was turning 103, they send her
their own separate bouquet of roses. Above and beyond!



       |
+---------------------+---------------------------+--------------------------
----------------------------------------------------------------------------
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--------------------------------------------------------------+
```

9

Analyze which city has the most 5-star merchants and return the number.

MySQL - 1 rows

```
select b.city, count(b.business_id) as num_5_star
from business b
where b.stars = 5
group by b.city
order by num_5_star desc
limit 1;
```

```
+------------+----------+
|city        |num_5_star|
+------------+----------+
|Philadelphia|1512      |
+------------+----------+
```

MongoDB - 1 rows

```
db.business.aggregate(
    [
        {
            $match: {
                "stars": 5
            }
        },
        {
            $group: {
                _id: "$city",
                count: { $sum: 1 }
            }
        },
        {
            $sort: {
                count: -1
            }
        },
        {
            $limit: 1
        }
    ]
)
```

```
+------------+-----+
|_id         |count|
+------------+-----+
|Philadelphia|1512 |
+------------+-----+
```

10

Providing User-Item Matrix for Collaborative Filtering Algorithms.

MySQL - 1652rows

```sql
SELECT
    u.user_id,
    b.business_id,
    r.stars
FROM
    business b
JOIN
    review r ON b.business_id = r.business_id
JOIN
    user u ON r.user_id = u.user_id
WHERE
    b.city = 'Whitestown';
```

```
+---------------------+---------------------+-----+
|user_id              |business_id          |stars|
+---------------------+---------------------+-----+
```

```
|CyqWfxMfn4uzKiz0BKqgYw|_UqsraH5n4ygauI_iF43Zg|1      |
|hm6BsEPCiRa0dfizcTKhAw|_UqsraH5n4ygauI_iF43Zg|5      |
|BgW5IPsJCiFs2sV79e42mQ|_UqsraH5n4ygauI_iF43Zg|5      |
|SKVSbJM42kuQXyQbEK8ubg|_UqsraH5n4ygauI_iF43Zg|1      |
|E3pF0M3g8zdoeSQnRVCLyw|_UqsraH5n4ygauI_iF43Zg|1      |
|0qSVgroj0vJYmNVvdHDPQA|_UqsraH5n4ygauI_iF43Zg|1      |
|rCd-OqGVWU5FsP9ONdh7Bw|_UqsraH5n4ygauI_iF43Zg|1      |
|wdUtEtzu8DPg4xt-SYqOYg|_UqsraH5n4ygauI_iF43Zg|4      |
|XJYsEbOzieHG5VCUpp7Q1A|_UqsraH5n4ygauI_iF43Zg|1      |
|vGP_zo7Q7lsVLJhJKw1J3A|_UqsraH5n4ygauI_iF43Zg|1      |
+--------------------+--------------------+-----+
```

MongoDB - 1652 rows

```
db.business.aggregate([
    {
        $match: {
            city: "Whitestown"
        }
    },
    {
        $lookup: {
            from: "review",
            localField: "_id",
            foreignField: "business_id",
            as: "review_info"
        }
    },
    {
        $unwind: "$review_info"
    },
    {
        $lookup: {
            from: "user",
            localField: "review_info.user_id",
            foreignField: "_id",
            as: "user_info"
        }
    },
    {
        $unwind: "$user_info"
    },
```

```
{
    $project: {
        _id: 0,
        user_id: "$user_info._id", // 确保这里引用的是users集合中的用户ID
        business_id: "$_id", // businesses集合的ID应该直接从当前文档中获取
        stars: "$review_info.stars" // 星级应从reviews集合获取
    }
}
])
```

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```
+--------------------+-----+--------------------+
|business_id         |stars|user_id             |
+--------------------+-----+--------------------+
|Agh0Z_PACmbdEpLyjvuwZg|1    |JN38O40k9ee7Tj8vKIt9ig|
|Agh0Z_PACmbdEpLyjvuwZg|1    |yQTmWwGiMkqelTXWeOHohg|
|Agh0Z_PACmbdEpLyjvuwZg|5    |p1H4RuBwbAsI4rZHEOqPPw|
|Agh0Z_PACmbdEpLyjvuwZg|3    |lyKon9t3--01lk0XSrMbmQ|
|Agh0Z_PACmbdEpLyjvuwZg|2    |yIpMuEiKAUDyN2aOwQNu5g|
|Agh0Z_PACmbdEpLyjvuwZg|4    |HyU35rUgH_SxsIb0CwTdww|
|Agh0Z_PACmbdEpLyjvuwZg|5    |hUjGOCINjRf04bbAe1Nmjw|
|Agh0Z_PACmbdEpLyjvuwZg|1    |VcaT3yi09dDxO6xihMQOiA|
|Agh0Z_PACmbdEpLyjvuwZg|2    |5_I6qbrEps-4CjLK-oigWg|
|Agh0Z_PACmbdEpLyjvuwZg|2    |74Y-QDXPItDndxM1KyCE6Q|
+--------------------+-----+--------------------+
```

	Query 1	Providing User-Item Matrix for Collaborative Filtering Algorithms.

Providing User-Item Matrix for Collaborative Filtering Algorithms.

business_id	stars	user_id		business_id	stars	user_id
_UqsraH5n4ygaul_iF43Zg	1	CyqWfxMfn4uzKiz0BKqgYw		4HVnEE3MwfBUmdVK_P4oWA	5	vOSUm6Ku6xKudHgR9WFScw
_UqsraH5n4ygaul_iF43Zg	5	hm6BsEPCiRa0dfizcTKhAw		4HVnEE3MwfBUmdVK_P4oWA	4	khVdBEDNlH0N8SuGgmzpvw
_UqsraH5n4ygaul_iF43Zg	5	BgW5IPsJCiFs2sV79e42mQ		4HVnEE3MwfBUmdVK_P4oWA	2	QWClVZjTDlkxB4VlcHumnA
_UqsraH5n4ygaul_iF43Zg	1	SKVSbJM42kuQXyQbEK8ubg		4HVnEE3MwfBUmdVK_P4oWA	4	384TgcDKklgxu4_KPulh5Q
_UqsraH5n4ygaul_iF43Zg	1	E3pF0M3g8zdoeSQnRVCLyw		4HVnEE3MwfBUmdVK_P4oWA	3	ec-Z7VOATcpi-F7H40C2oQ
_UqsraH5n4ygaul_iF43Zg	1	0qSVgroj0vJYmNVvdHDPQA		4HVnEE3MwfBUmdVK_P4oWA	5	oFG7Jvql_ZpKeYhRLtrNYw
_UqsraH5n4ygaul_iF43Zg	1	rCd-OqGVWU5FsP9ONdh7Bw		4HVnEE3MwfBUmdVK_P4oWA	1	-Csu_P0IEMM0gJmmmfjgeA
_UqsraH5n4ygaul_iF43Zg	4	wdUtEtzu8DPg4xt-SYqOYg		4HVnEE3MwfBUmdVK_P4oWA	1	6eF-vV3wwAj4RFKX_6qX9w
_UqsraH5n4ygaul_iF43Zg	1	XJYsEbOzieHG5VCUpp7Q1A		4HVnEE3MwfBUmdVK_P4oWA	1	v0EtIoFH-pQf4A8iSAr3Lg
_UqsraH5n4ygaul_iF43Zg	1	vGP_zo7Q7lsVLJhJKw1J3A		4HVnEE3MwfBUmdVK_P4oWA	4	DwTuHbQiAzmCKdf_fSmOsw

< 1 2 3 4 5 >   < 1 2 3 4 5 >

Mysql Query	SELECT u.user_id, b.business_id, r.stars FROM business b JOIN review r ON b.business_id = r.business_id JOIN user u ON r.user_id = u.user_id WHERE b.city =
Mysql Query Time	0.43399739265441895
Mysql Query Number	1652

MongoDB Query	db.business.aggregate([{$match: {city: 'Whitestown'}}, {$lookup: {from: 'review', localField: '_id', foreignField: 'business_id', as: 'review_info'}}, {$unwind: '$review_info'}, {$lookup: {from: 'user', localField: 'review_info.user_id', foreignField: '_id', as: 'user_info'}}, {$unwind: '$user_info'}, {$project: {_id: 0, user_id: '$user_info._id', business_id: '$_id', stars:
MongoDB Query Time	1.0159971714019775
MongoDB Query	1652

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11

Count the average star ratings for each category and the number of merchants (open doors) in each category in each city and select the category with the highest number of merchants and average star ratings in the city.

MySQL - 340 rows

```sql
SELECT city, category, averageStars, businessCount
FROM (SELECT b.city,
             c.category,
             AVG(b.stars)
                 AS averageStars,
             COUNT(*)
                 AS businessCount,
             ROW_NUMBER() OVER (PARTITION BY b.city ORDER BY COUNT(*) DESC,
AVG(b.stars) DESC) AS rowNum
      FROM business as b
               JOIN
           business_category as c ON b.business_id = c.business_id
      WHERE b.is_open = 1
      GROUP BY b.city, c.category) AS ranked_categories
WHERE businessCount > 10
  and rowNum = 1;
```

```
+------------+----------+------------------+-------------+
|city        |category  |averageStars      |businessCount|
+------------+----------+------------------+-------------+
|Abington    |Restaurants|3.4838709677419355|31          |
|Affton      |Restaurants|3.35714285714857  |14          |
|Alton       |Restaurants|3.4126984126984126|63          |
|Ambler      |Restaurants|3.7346938775510203|49          |
|Antioch     |Restaurants|3.1333333333333333|75          |
|Apollo Beach|Restaurants|3.4464285714285716|28          |
|Ardmore     |Restaurants|3.7971014492753623|69          |
|Arnold      |Restaurants|3.0945945945945947|74          |
|Ashland City|Restaurants|3.3947368421052633|19          |
```

```
|Aston          |Restaurants|3.5657894736842106|38             |
+------------+-----------+-----------------+------------+
```

MongoDB - 340 rows

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```
db.business.aggregate([
  {
    $match: {
      is_open: 1
    }
  },
  {
    $unwind: "$categories"
  },
  {
    $group: {
      _id: { city: "$city", category: "$categories" },
      averageStars: { $avg: "$stars" },
      businessCount: { $sum: 1 }
    }
  },
  {
    $match: {
      businessCount: { $gt: 10 }
    }
  },
  {
    $sort: { "businessCount": -1 }
  },
  {
    $group: {
      _id: "$_id.city",
      topCategory: { $first: "$_id.category" },
      averageStars: { $first: "$averageStars" },
      businessCount: { $first: "$businessCount" }
    }
  },
  {
    $project: {
      _id: 0,
      city: "$_id",
      category: "$topCategory",
```

```
      averageStars: 1,
      businessCount: 1
    }
  }
]);
```



```
+------------------+-------------+-------------+-------------+
|averageStars      |businessCount|category     |city         |
+------------------+-------------+-------------+-------------+
|3.357142857142857 |56           |Restaurants  |Goodlettsville|
|3.6481481481481484|54           |Restaurants  |Collegeville |
|3.529850746268657 |134          |Restaurants  |Lutz         |
|3.8333333333333335|15           |Restaurants  |Haddon Heights|
|3.6818181818181817|11           |Restaurants  |Joelton      |
|3.0294117647058822|17           |Restaurants  |West Berlin  |
|3.4537444933920707|227          |Restaurants  |Brandon      |
|3.6875            |16           |Restaurants  |Skippack     |
|3.710227272727273 |176          |Restaurants  |Carmel       |
|4.225             |20           |Home Services|Land O Lakes |
+------------------+-------------+-------------+-------------+
```


12

Use MongoDB's geospatial indexing capabilities to find the highest-rated merchants within 5 kilometers of Tucson's downtown location. (Latitude: 32.25346° N Longitude: 110.91179° W)

MySQL - 2370 rows

```sql
SELECT b.name, b.address, b.city, b.postal_code, b.stars
FROM business as b
WHERE b.city = 'Tucson'
AND b.stars > 4
AND b.is_open = 1
AND (
  6371 * acos(
    cos(radians(32.25346)) * cos(radians(latitude))
    * cos(radians(longitude) - radians(-110.91179))
    + sin(radians(32.25346)) * sin(radians(latitude))
  )
) <= 50 -- 距离限制为50公里
ORDER BY stars DESC;
```

```
+----------------------------+------------------------+------+-----------
+-----+
|name                        |address                 |city
|postal_code|stars|
+----------------------------+------------------------+------+-----------
+-----+
|Heart of the Horse          |10519 E Tanque Verde    |Tucson|85749
|5    |
|Desert Moon Window Cleaning |null                    |Tucson|85730
|5    |
|Eleven Café                 |33 N Stone Ave, Ste 150 |Tucson|85701
|5    |
|Trinity Diamonds            |6070 N Oracle Rd        |Tucson|85704
|5    |
|RavenHearse Classic Family Haunt|6541 E Tanque Verde |Tucson|85715
|5    |
|The Mobile Bistro           |160 S Scott Ave         |Tucson|85701
|5    |
|Brooklyn Bedding            |7865 E Broadway Blvd, #175|Tucson|85710
|5    |
```

```
|Asymmetry Bodywork Therapies    |null                    |Tucson|85716
|5    |
|Umbrella Roofing                |1804 S Euclid Ave       |Tucson|85713
|5    |
|Mark & Larry's Auto Service     |5460 E. 5th St.         |Tucson|85711
|5    |
+--------------------------------+------------------------+------+----------
+-----+
```

MongoDB - 2365 rows

```
db.business.find().forEach(function(doc) {
  db. business.updateOne(
    { _id: doc._id },
    {
      $set: {
        location: {
          type: "Point",
          coordinates: [doc.longitude, doc.latitude]
        }
      }
    }
  );
});

db.business.createIndex({ "location": "2dsphere" })
```

```
db.business.find({
  city: "Tucson",
  stars: { $gt: 4 },
  is_open: 1,
  location: {
    $geoWithin: {
      $centerSphere: [[-110.91179, 32.25346], 50 / 6378.1]
    }
  }
}, {
  name: 1,
  address: 1,
  city: 1,
```

```
  postal_code: 1,
  stars: 1,
  _id: 0
}).sort({ stars: -1 });
```

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```
+-------------------+------+--------------------------------+-----------+---
--+
|address            |city  |name
|postal_code|stars|
+-------------------+------+--------------------------------+-----------+---
--+
|9698 W Tucson-Ajo Hwy|Tucson|Volare Helicopters              |85735      |5
  |
|6030 S Camino Verde  |Tucson|Camino Verde Pet Resort         |85757      |5
  |
|3841 S Frieda Pl     |Tucson|Serenity Massage of Tucson      |85735      |5
  |
|7800 W Old Ajo Hwy   |Tucson|Tucson Trap & Skeet Club        |85735      |5
  |
|3045 S. Kinney Rd    |Tucson|Tucson Mountain Motors          |85713      |5
  |
|2801 S Kinney Rd     |Tucson|Tucson Mineral and Gem World    |85735      |5
  |
|2727 S Kinney Rd     |Tucson|Cat Mountain Lodge & Roadside Inn|85735     |5
  |
|Gates Pass Rd        |Tucson|Gates Pass                      |85743      |5
  |
|9030 W Delfina Dr    |Tucson|Sunsets Painting                |85735      |5
  |
|11155 W Calle Pima   |Tucson|Casa Tierra Adobe               |85743      |5
  |
+-------------------+------+--------------------------------+-----------+---
--+
```

Use MongoDB's geospatial indexing capabilities to find the highest-rated merchants within 5 kilometers of Tucson's downtown location. (Latitude: 32.25346° N Longitude: 110.91179° W)

address	city	name	postal_code	stars
10519 E Tanque Verde	Tucson	Heart of the Horse	85749	5
	Tucson	Desert Moon Window Cleaning	85730	5
33 N Stone Ave, Ste 150	Tucson	Eleven Café	85701	5
6070 N Oracle Rd	Tucson	Trinity Diamonds	85704	5
6541 E Tanque Verde	Tucson	RavenHearse Classic Family Haunt	85715	5
160 S Scott Ave	Tucson	The Mobile Bistro	85701	5
7865 E Broadway Blvd, #175	Tucson	Brooklyn Bedding	85710	5
	Tucson	Asymmetry Bodywork Therapies	85716	5
1804 S Euclid Ave	Tucson	Umbrella Roofing	85713	5
5460 E. 5th St.	Tucson	Mark & Larry's Auto Service	85711	5

address	city	name	postal_code	stars
7802 E Escalante Rd	Tucson	David Oase, CPA	85730	5
8616 E Broadway Blvd	Tucson	Iora Primary Care	85710	5
	Tucson	Tucson Ghost Tour	85730	5
	Tucson	Apache Towing	85745	5
245 E Congress, Ste 135	Tucson	FIT Boutique Studio	85701	5
1299 W Speedway Blvd	Tucson	El Rio Barber Stylist	85745	5
3851 S Country Club Rd	Tucson	Simonsen Generator Service	85714	5
5294 N Casa Grande Hwy, Ste 110	Tucson	Leon's Exhaust Works	85743	5
43 S 6th Ave	Tucson	Flash in the Past	85701	5
2550 East River Rd	Tucson	OR LOCKSMITH	85718	5

< 1 2 3 4 5 >

Mysql Query
```
SELECT b.name, b.address, b.city, b.postal_code, b.stars FROM business as b WHERE b.city =
'Tucson' AND b.stars > 4 AND b.is_open = 1 AND (6371 * acos(cos(radians(32.25346)) *
cos(radians(latitude)) * cos(radians(longitude) - radians(-110.91179)) + sin(radians(32.25346))
* sin(radians(latitude)))) <= 50 ORDER BY stars DESC;
```

Mysql Query Time 0.10199880599975586

Mysql Query Number 2370

< 1 2 3 4 5 >

MongoDB Query
```
db.business.find().forEach(function(doc) {db. business.updateOne({ _id: doc._id }, {$set:
{location: {type: 'Point',coordinates: [doc.longitude,
doc.latitude]}}});});db.business.createIndex({'location': '2dsphere'
});db.business.find({city: 'Tucson',stars: { $gt: 4 },is_open: 1,location: {$geoWithin:
{$centerSphere: [[-110.91179, 32.25346], 50 / 6378.1]}}}, {name: 1, address: 1, city:
```

MongoDB Query Time 0.054997920989990234

MongoDB Query Number 2365