

DESIGN



Brand Name for Project: Kehu

Explanation of name: The brand name is derived from Chinese words 客户获取 (Kèhù huòqǔ) meaning customer acquisition. This matches with the objective of developing the application as it is built to help sales force improve their sales effectiveness by gaining greater insights on their customers.

Description of business functions and transactions:

Our product's general idea is to scour unique user-generated reviews and use SQL queries along with some R codes to provide business intelligence to sales team. Our product will use this sentiment analysis to deliver insight to business clients - it will be able to provide insight on a large amount of unique user reviews, such as sentiment analysis and competitor comparisons. It will identify competitors by matching a restaurant against other restaurants in the same category and in the nearby vicinity.

Restaurants will be interested in insights from human-generated reviews, which would normally be impossible to quantify objectively by hand, due to subjectivity and scale. Our product will also generate word networks from a restaurant's reviews. Restaurants will also be interested in frequently used words in their reviews, and we will be able to deliver these items so that our clients may know far more about plain-text reviews.

ER schema

Entities, Attributes and Primary Keys:

Category (**categoryId**, categoryName)

Business (**businessId**, businessName, neighborhood, isOpen, =stars)

BusinessLocation (**locationId**, geolocation (latitude, longitude), city, state, postalCode)

BusinessSuggestion (**suggestionId**, suggestionDate, suggestionText, numberOfLikes)

User (**userId**, userName, userSince, numberOfFans)

Relationships, Attributes, Degrees, Participating Entities and Constraints

Review: (reviewDate, reviewText, ratingStars, numberOfUseful, numberOfFunny, numberOfCool)

binary relationship

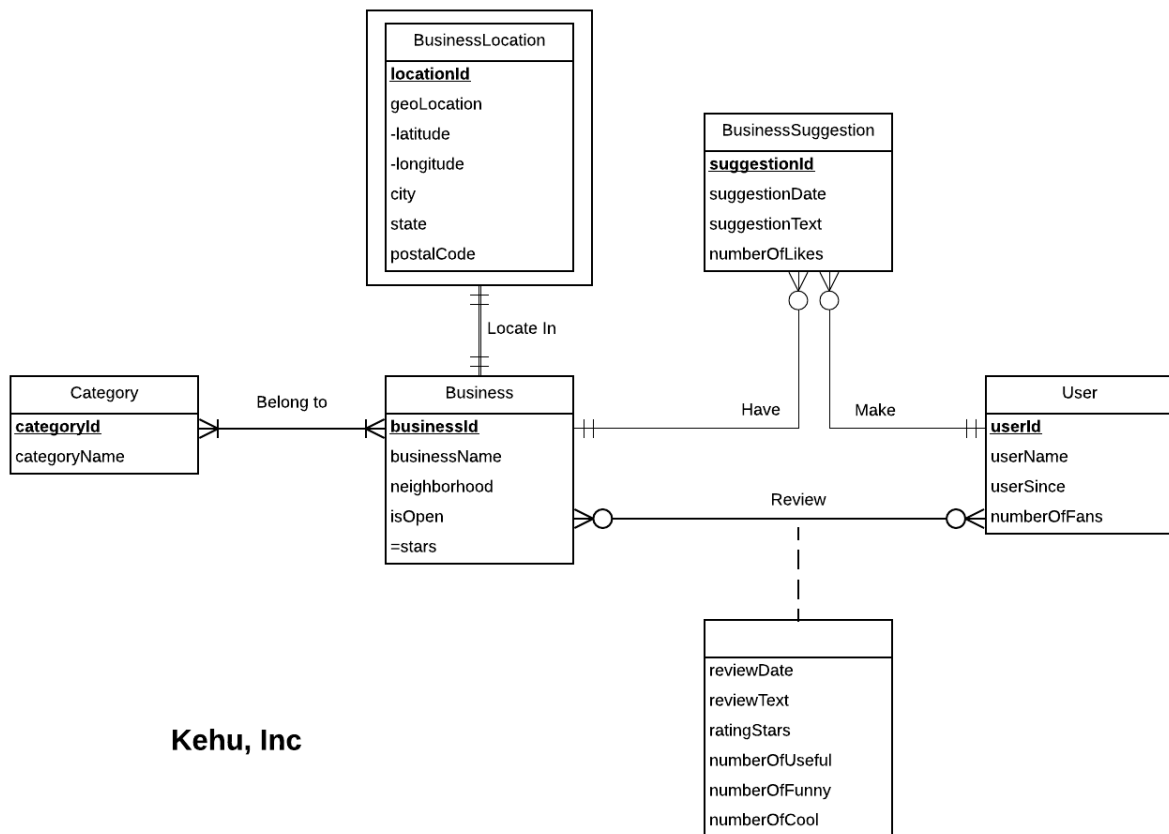
1 User to 0 or more Businesses

1 Business to 0 or more Users

Make: binary relationship

- 1 User to 0 or more Suggestions
- 1 Suggestion to 1 and only 1 User
- Have: binary relationship
- 1 Business to 0 or more Suggestions
- 1 Suggestion to 1 and only 1 Business
- Belong to: binary relationship
- 1 Business to 1 or more Categories
- 1 Category to 1 or more Business
- Locate In: binary relationship
- 1 Business to 1 and only 1 Location
- 1 Location to 1 and only 1 Business

ER Diagram



The business rules include:

Each business is described by a unique businessId; a business also has information such as a business name, the neighborhood, stars that customers have given to, and "isOpen", where 1 indicates current operation and 0 indicates closure. Each location is defined by a unique ID and correspond to a business. Each location has a geo location comprising of latitude and longitude and has address, city, state, and postal code that business exists in. Each user is described by a unique userId, a user name (first name only to protect privacy), account creation date, number of fans (other users who follow this user's profile). Each business has zero or more users who wrote reviews. A user can write zero or more reviews to business. Each review is described by a unique combination of one userId and one businessId; date, the actual review text, the rating the user assigned with the review, and the count of how many other users found the review "useful", "funny", and "cool". Each suggestion has a unique ID and related to one unique user, but a user can write no or many suggestions. Each suggestion is also for a unique business, but a business can have many suggestions related to it. Each suggestion has a suggestion date, suggestion text, and number of likes. Each category of a business is described by a unique category ID. Each category has a corresponding name. A category can have many businesses associated with it and a business can be associated with one or multiple categories.

PROPOSAL

CLIENT CHARACTERIZATION

Our client is a local medium-sized consulting firm, Pely, that normally provides business and sales consulting to local businesses. Pely is an analog to a Yelp-like service that is powered by crowd-sourced reviews and sells its platform to local businesses, who can increase their reach once they are on the platform. However, Pely currently does not have a product that is able to analyze the written text in reviews, and Pely would like to have this product to provide additional consulting solutions to local businesses and in turn increase its own sales and customer retention.

MISSION STATEMENT FOR THE CLIENT

To leverage user-generated data to develop analytical solutions that will allow clients to improve sales effectiveness.

MISSION OBJECTIVES FOR THE CLIENT

1. Find customer by name or category
2. Find out the top-rated restaurants/competitors near the customer
3. Find reviews of a customer and categorize customer reviews by Positive (Rating>2.9) and Negative (<2.01) and use the overall score to draw a pie chart
 - o Use R to build word network of customer's review
 - o Use R to build a predictive model and identify sentiment score for each sentence in a review by customers; use the score draw a pie chart
4. Find reviews of competitors
 - o Use R to build word network of competitors review
 - o Use R to build a predictive model and identify sentiment score for each sentence in a review by competitors; use the score draw a stack chart
5. Insert a new business detail
6. Delete a business from the database

CONVERTED ER MODEL INTO RELATIONAL SCHEMA AND IDENTIFICATION OF PRIMARY AND FOREIGN KEYS

Category (categoryId, categoryName)

BusinessCategory (categoryId, businessId)

Business (businessId, businessName, neighborhood, isOpen)

BusinessLocation (locationId, businessId, latitude, longitude, city, state, postalCode)

BusinessSuggestion (suggestionId, userId, businessId, suggestionDate, suggestionText, numberOfLikes)

User (userId, userName, userSince, numberOfFans)

Review (userId, businessId, reviewDate, reviewText, reviewRating, numberOfUseful, numberOfFunny, numberOfCool)

FUNCTIONAL DEPENDENCIES AND NORMALIZATION TO 3NF

categoryId → categoryName

categoryId, businessId →

businessId → businessName, neighborhood, isOpen

locationId → businessId, latitude, longitude, city, state, postalCode

suggestionId → userId, businessId, suggestionDate, suggestionText, numberOfLikes

userId → userName, userSince, numberOfFans

userId, businessId → reviewDate, reviewText, reviewRating, numberOfUseful, numberOfFunny, numberOfCool

Category (categoryId, categoryName) = 3NF

BusinessCategory (businessId, categoryId) = 3NF

Business (businessId, businessName, neighborhood, isOpen) = 3NF

BusinessLocation (locationId, businessId, latitude, longitude, city, state, postalCode) = 3NF

BusinessSuggestion (suggestionId, userId, businessId, suggestionDate, suggestionText, numberOfLikes) = 3NF

User (userId, userName, userSince, numberOfFans) = 3NF

Review (userId, businessId, reviewDate, reviewText, reviewRating, numberOfUseful, numberOfFunny, numberOfCool) = 3NF

BUSINESS RULES AND REFERENTIAL INTEGRITY ACTIONS

[R1] A business cannot be deleted once it is assigned to a category

[R2] When a business information is updated, the corresponding entry in the business category is also updated

[R3] A category cannot be deleted once it is assigned to a business

[R4] When a category information is updated, the corresponding information in business category is also updated

[R5] Once a user is deleted, corresponding information in suggestions are set null

[R6] When information related to user is updated, the corresponding suggestion is also updated

[R7] Once a business is deleted, the corresponding information in suggestions are set null

[R8] When information for a business is updated, the corresponding suggestion is also updated

[R9] A user cannot be deleted before its related reviews are deleted

[R10] Once a user information is updated, the corresponding information for reviews is also updated

[R11] A business cannot be deleted before its related reviews are deleted

[R12] Once a business information is updated, the corresponding information in reviews is also updated

[R13] A business cannot be deleted when its corresponding location is assigned

[R14] Once a business is updated, the corresponding business location is also updated

REFERENTIAL INTEGRITY

Relation	Foreign Key	Base Relation	Primary Key	Business Rule	Constraint: ON DELETE	Business Rule	Constraint: ON UPDATE
BusinessCategory	businessId	Business	businessId	R1	NO ACTION	R2	CASCADE
BusinessCategory	categoryId	Category	categoryId	R3	NO ACTION	R4	CASCADE
BusinessSuggestion	userId	User	userId	R5	NULL	R6	CASCADE
BusinessSuggestion	businessId	Business	businessId	R7	NULL	R8	CASCADE
Review	userId	User	userId	R9	NO ACTION	R10	CASCADE
Review	businessId	Business	businessId	R11	NO ACTION	R12	CASCADE
BusinessLocation	businessId	Business	businessId	R13	NO ACTION	R14	CASCADE

SAMPLE DATA

INSERT INTO P_Category VALUES

```
('Code1','Restaurant'),
('Code2','Mexican'),
('Code3','American'),
('Code4','Italian'),
('Code5','Chinese');
```

INSERT INTO P_Business VALUES

```
('5BjhQ_Tmm9ppK4UGrMr09g','Montreal Delicatessen & Family Restaurant', NULL,'1'),
('LrYSnxLKarkzeNHqq50r-A','Truscott Italian Bakery & Delicatessen', NULL,'1'),
('K8dYoXbGDWJr_vSlVwDN1A','Garam Masala','East Credit','1'),
('6Kp9W5ZvVn--6caQ73_QXg','Tsui Xiang Tsuen Restaurant', NULL,'1'),
('AYnFgzhlMLs4c3G-k-cA0A','DQ Grill & Chill Restaurant', NULL,'1'),
('T1U7Te9Ulv2Qqfzna4JuYA','Tuckers Marketplace Restaurant', NULL,'0'),
('FuO6d7IR1ee-3Bfo-gu1HQ','Imperial Buffet', 'Dixie','1'),
('7U23rwCmVWasFQ0cHRMYVw','China 8', 'Erin Mills','1'),
('7fSE99-qeIVXpkbNkheeHg','Wendys', NULL,'1'),
('ljuYsa-fVptTin3158qZHQ','Pizza Pizza', NULL,'1'),
('OQtldLhTbdyRRYSdA5rxRw','The Bier Markt', NULL,'1'),
('IxZoKGTQvsTFrahsYrPFKQ','Quik Chik', 'Mississauga Valley','1'),
('2WiuLnyR8UWXjYQKgKBjkg','Narulas', 'Hanlan','1'),
('V2_MoJphE47wyFazVF1cSQ','Pizza Pizza', 'Mississauga Valley','1'),
('S68q2ejdupCsFOPQ-oRDmQ','Taza Xpress', 'Erin Mills','1');
```

INSERT INTO P_BusinessLocation VALUES

```
('5BjhQ_Tmm9ppK4UGrMr09g00_1','5BjhQ_Tmm9ppK4UGrMr09g',43.623867,-79.5693346,'2055 Dundas Street E','Mississauga','ON','L4X 2V9'),
('LrYSnxLKarkzeNHqq50r-A00_2','LrYSnxLKarkzeNHqq50r-A',43.5125352,-79.6487929,'2425 Truscott Dr','Mississauga','ON','L5J 2B4'),
('K8dYoXbGDWJr_vSlVwDN1A00_3','K8dYoXbGDWJr_vSlVwDN1A',43.6137775,-79.6618675,'40 Bristol Rd E','Mississauga','ON','L4Z 3K8'),
```

('6Kp9W5ZvVn--6caQ73_QXg00_4','6Kp9W5ZvVn--6caQ73_QXg',43.598682,-79.595522,'888 Dundas Street E','Mississauga','ON','L4Y 2B8'),
 ('AYnFgzhlMLs4c3G-k-cA0A00_5','AYnFgzhlMLs4c3G-k-cA0A',43.583152,-79.6384179,'325 Central Parkway W','Mississauga','ON','L5B 3X9'),
 ('T1U7Te9Ulv2Qqfzna4JuYA00_6','T1U7Te9Ulv2Qqfzna4JuYA',43.6364658,-79.6214012,'5067 Dixie Rd','Mississauga','ON','L4W'),
 ('FuO6d7IR1ee-3Bfo-gu1HQ00_7','FuO6d7IR1ee-3Bfo-gu1HQ',43.6105822,-79.5878496,'3120 Dixie Road','Mississauga','ON','L4Y 2A6'),
 ('7U23rwCmVWasFQ0cHRMYVw00_8','7U23rwCmVWasFQ0cHRMYVw',43.5589212189,-79.742916216,'5602 Tenth Line W, Unit 110','Mississauga','ON','L5M 5S5'),
 ('7fSE99-qeIVXpkbNkheeHg00_9','7fSE99-qeIVXpkbNkheeHg',43.6265183219,-79.6788900945,'5961 Hurontario Street','Mississauga','ON','L4Z'),
 ('ljuYsa-fVptTin3158qZHQ00_10','ljuYsa-fVptTin3158qZHQ',43.570217,-79.566431,'707 Lakeshore Road E','Mississauga','ON','L5G 1J7'),
 ('OQtldLhTbdyRRYSdA5rxRw00_11','OQtldLhTbdyRRYSdA5rxRw',43.5939063956,-79.6382745355,'55 City Centre Dr','Mississauga','ON','L5B 1M3'),
 ('lxZoKGTQvsTFrahsYrPFKQ00_12','lxZoKGTQvsTFrahsYrPFKQ',43.587621,-79.626502,'3355 Hurontario Street, Unit 1-2','Mississauga','ON','L5A 4E7'),
 ('2WiuLnyR8UWXjYQKgKBjkg00_13','2WiuLnyR8UWXjYQKgKBjkg',43.66462,-79.65855,'6435 Dixie Road, Suite 10','Mississauga','ON','L5T'),
 ('V2_MoJpHE47wYFazVF1cSQ00_14','V2_MoJpHE47wYFazVF1cSQ',43.6079011,-79.6176517,'710 Burnhamthorpe Road E','Mississauga','ON','L4Y 2X3'),
 ('S68q2ejdupCsFOPQ-oRDmQ00_15','S68q2ejdupCsFOPQ-oRDmQ',43.551131,-79.715957,'2911 Eglinton Avenue W, Unit D3','Mississauga','ON','L5M 6J3');

INSERT INTO P_BusinessCategory VALUES

('5BjhQ_Tmm9ppK4UGrMr09g','Code1'),
 ('LrYSnxLKarkzeNHqq50r-A','Code1'),
 ('K8dYoXbGDWJr_vSlVwDN1A','Code1'),
 ('6Kp9W5ZvVn--6caQ73_QXg','Code1'),
 ('AYnFgzhlMLs4c3G-k-cA0A','Code1'),
 ('T1U7Te9Ulv2Qqfzna4JuYA','Code1'),
 ('FuO6d7IR1ee-3Bfo-gu1HQ','Code1'),
 ('7U23rwCmVWasFQ0cHRMYVw','Code1'),
 ('7fSE99-qeIVXpkbNkheeHg','Code1'),
 ('ljuYsa-fVptTin3158qZHQ','Code1'),
 ('OQtldLhTbdyRRYSdA5rxRw','Code1'),
 ('lxZoKGTQvsTFrahsYrPFKQ','Code1'),
 ('2WiuLnyR8UWXjYQKgKBjkg','Code1'),
 ('V2_MoJpHE47wYFazVF1cSQ','Code1'),
 ('S68q2ejdupCsFOPQ-oRDmQ','Code1');

INSERT INTO P_Users VALUES

('_nJ2WdJRAL4toJ24dag_Kw','Susan','2012-07-21','0'),
 ('i5jSTSpXJtvM-ExWRttglw','Evelina','2014-03-17','13'),
 ('JvmHGzonGPO2e62rQutnCW','Nectarine','2014-05-03','0'),

('pilly-tywbcso8SXU8F65QA','K','2011-11-11','0'),
('f_8DSt0eCSw9XFUObogI2A','Julc Flo','2015-01-17','0'),
('OzXnT854qYjPvub9jmkYVg','Elvina','2012-10-14','0'),
('VVE5dRCJ-_drwM_FczRbgA','Rich','2017-11-22','0'),
('w_QHopZen0ZnQ1TzCKiZvA','Jeniqua','2012-02-04','0'),
('keLUgI_4y60BkppiAsIk8Q','Hazel','2014-06-21','119'),
('_UbB79EVczWuOjWv0b6PIg','Jenny','2014-10-26','2'),
('AVVEFYHmFUa9oUhy2DIQFA','Andrea','2015-07-27','17'),
('hh3Pj12ytG5j6akFUg3CAA','Edwin','2009-09-24','13'),
('PRJMe-RgFnCEhy7tf3DmQ','Ellen','2013-10-03','12'),
('VHc1yqBhsE-l3JQFXuWydQ','Paul','2012-11-07','22'),
('SRA86Xyf9fbOAhICWttMLQ','Eva','2013-09-30','4');

INSERT INTO P_Review VALUES

('_nJ2WdJRAL4toJ24dag_Kw','5BjhQ_Tmm9ppK4UGrMr09g','2015-11-08','The food has always been consistently fantastic. Their sambhar is always rich and flavourful, the chutnies perfect and the dosas just divine. The restaurant can get packed so make sure you make a reservation or avoid going at peak hours.','5','4','0','1'),
('i5jSTSpXJtvM-ExWRttglw','5BjhQ_Tmm9ppK4UGrMr09g','2016-06-14','China Garden has been a post airport pick-up ritual with my family for the last 10 years. The food is just phenomenal and it is definitely the best hakka chinese spot in the GTA. The only downside is their unattractive seating which is why I did not give them a 5 star rating. If you are vegetarian and confused by the menu I have written my family tried and loved menu','4','2','0','0'),
('JvmHGzonGPO2e62rQutnCW','5BjhQ_Tmm9ppK4UGrMr09g','2013-08-22','Union is a pretty nice bar and grill in suburbia that is not named Moxies or Earls, although the decor of the place will certainly remind you of them.','4','5','4','4'),
('pilly-tywbcso8SXU8F65QA','LrYSnxLKarkzeNHqq50r-A','2011-02-16','I work in the area, and Bamiyan is a staple in my lunch rotation. It never fails to offer a good meal.','4','4','1','1'),
('f_8DSt0eCSw9XFUObogI2A','LrYSnxLKarkzeNHqq50r-A','2011-03-07','The owners of this little spot are brave souls, with Paramount, Bamiyan Kababa and Pita & Grill all within the vicinity of this restaurant, they are going to have some tough competition. This small shop located at the corner of Dixie and Eglinton serves up falafel, chicken and beef schwarmas and dinner plates. I think they also have chicken breast kebabs, but I can not be sure. It is a small menu and small shop, meant to be a quick grab and go.','2','2','0','0'),
('OzXnT854qYjPvub9jmkYVg','LrYSnxLKarkzeNHqq50r-A','2011-02-11','Busy, busy, busy. For lunch, this location is packed like a mall on Christmas eve, especially considering the location is fairly tucked away. With this amount of turnover, the food is fresh and pretty good.','3','8','1','4'),
('VVE5dRCJ-_drwM_FczRbgA','K8dYoXbGDWJr_vSlVwDN1A','2016-01-15','Food quality is awesome. Biryani is a must. They should try to expand and improve the ambience considering the rush.','4','0','0','0'),
('w_QHopZen0ZnQ1TzCKiZvA','K8dYoXbGDWJr_vSlVwDN1A','2016-12-22','We have been looking for other seafood places because really there is not enough selection so we heard of LA Boil. Like most I was surprised that everything came in plastic bags but that did not bother me surprising yes but I thought the plastic gloves and bibs wear a little weird especially for the places atmosphere but again whatever not a big deal. I found the food ok nothing special really. You get a lot of food for your money but the calamari was kinda slimy and the shrimp and crab was over killed with garlic almost to the point that it was

unediabale. I love garlic but the bottom of the bags were literally a pound of melted butter and a whole garlic. Pretty disappointing we will not be visiting again RL is still the better option','2','0','1','0'), ('keLUgL_4y60BkppiAslk8Q','K8dYoXbGDWJr_vSIVwDN1A','2016-12-21','We had our issues with delivery from this location before and i have sworn up and down to NEVER order Pizza Hut again but here we are. today we order 2 large pizza and 1 order of garlic bread and pizzas were pretty basic believe it or not !The email confirm received showed delivery to be expected by 650pm yes I know this is an estimate and after numerous calls to the store and being reassured the driver was on his way pizza finally arrived at 750pm 1 whole hour after the estimated time !! Needless to say we sent the driver away with our cold order and took the alternate to feed the STARVING children. HORRIBLE SERVICE I promise this time will definitely be the last time I swear !!!','1','0','0','0'), ('_UbB79EVczWuOjWv0b6PIg','K8dYoXbGDWJr_vSIVwDN1A','2016-03-23','The chips were lightly salted which went well with the smooth and creamy guac. However I do prefer my guac to have a bit more lime and good chunks of avocado to give it more texture. The chorizo was seasoned perfectly.','4','4','0','0');

INSERT INTO P_BusinessSuggestion VALUES

('sugg_1','5BjhQ_Tmm9ppK4UGrMr09g','_nJ2WdJRAL4toJ24dag_Kw','2012-11-24','Cool and entertaining bar staff.','0'), ('sugg_2','LrYSnxLKarkzeNHqq50r-A','_nJ2WdJRAL4toJ24dag_Kw','2014-07-23','Out of the way if you live in downtown Toronto but so worth the visit if you appreciated your raw cuisine.','0'), ('sugg_3','K8dYoXbGDWJr_vSIVwDN1A','JvmHGzonGPO2e62rQutnCw','2013-01-08','Nice chutney portions. I usually run our before my dosa is done but not so here!','0'), ('sugg_4','6Kp9W5ZvVn--6caQ73_QXg','pIly-tywbcso8SXU8F65QA','2013-01-30','Wednesday special : \$9.99 for large 3-topping pizza!','0'), ('sugg_5','AYnFgzhlMLs4c3G-k-cA0A','OzXnT854qYjPvub9jmkYVg','2011-10-07','It is 2:00 and the place is CRAZY packed!!!','0'), ('sugg_6','T1U7Te9UlV2Qqfzna4JuYA','VVE5dRCJ-_drwM_FczRbgA','2013-01-11','I only speak English so had a bit of difficulty communicating.','0'), ('sugg_7','FuO6d7IR1ee-3Bfo-gu1HQ','w_QHopZen0ZnQ1TzCKiZvA','2012-08-27','I think it is time to update my review considering I keep driving way out of the way to get food here! Love it!','0'), ('sugg_8','7U23rwCmVWasFQ0cHRMYVw','keLUgL_4y60BkppiAslk8Q','2012-11-15','Update : now closed on Mondays.','0'), ('sugg_9','7fSE99-qeIVXpkbNkheeHg','_UbB79EVczWuOjWv0b6PIg','2013-03-17','They have a sign on the door saying they are now open on Mondays','0'), ('sugg_10','ljuYsa-fVptTin3158qZHQ','PRJMe-RgFnCEhy7tf3DmQ','2013-07-03','They now accept credit cards!!!','0');

SQL VIEWS

```
CREATE VIEW Brief_BusinessDetails_V AS
SELECT p.businessId,p.businessName,c.categoryName
FROM P_Business p, P_BusinessCategory bc, P_Category c
WHERE p.businessId=bc.businessId AND bc.categoryId=c.categoryId AND (c.categoryName='Chinese' OR
c.categoryName='Italian' OR c.categoryName='Mexican' OR c.categoryName='American');
```

```
CREATE VIEW Business_Reviews_Details_V AS
SELECT p.businessId, p.businessName, r.reviewText, r.reviewDate,r.reviewRating
FROM P_Business p JOIN P_Review r ON p.businessId=r.businessId;
```

```
CREATE VIEW Competitor_Business_Details_V AS
SELECT *
FROM
(SELECT dd.businessId,
dd.businessName,dd.categoryName,dd.reviewText,cc.Average_Rating,dd.reviewRating, dd.longitude,
dd.latitude
FROM
(SELECT p.businessId, p.businessName,c.categoryName,r.reviewText,r.reviewRating, bl.longitude,
bl.latitude
FROM P_Business p JOIN P_Review r ON p.businessId=r.businessId JOIN P_BusinessCategory bc
ON p.businessId=bc.businessId JOIN P_Category c ON c.categoryId=bc.categoryId JOIN
P_BusinessLocation bl ON bl.businessId=p.businessId) dd
JOIN
(SELECT CAST(AVG(CAST(reviewRating AS decimal(6,5))) AS DECIMAL(6,5)) AS Average_Rating
,businessId
FROM P_Review GROUP BY businessId) cc
ON cc.businessId=dd.businessId) kk
WHERE kk.categoryName = 'Chinese' OR kk.categoryName = 'American' OR kk.categoryName = 'Mexican'
OR kk.categoryName = 'Italian';
```

```
CREATE VIEW Business_Competitor_Word_V AS
SELECT p.businessName,p.businessId, c.categoryName,r.reviewText
FROM P_Business p JOIN P_Review r ON p.businessId=r.businessId JOIN P_BusinessCategory bc ON
p.businessId=bc.businessId JOIN P_Category c ON c.categoryId=bc.categoryId
WHERE c.categoryName = 'Chinese' OR c.categoryName='Mexican' OR c.categoryName='Italian' OR
c.categoryName = 'American';
```

SQL EXAMPLES

1: Find customer by name or category

```
SELECT businessId, businessName, categoryName
FROM Brief_BusinessDetails_V
WHERE businessName LIKE '%Dragon%' AND categoryName='Chinese';
```

2: Find reviews of a customer in SQL and categorize customer reviews by Positive (Rating>2.9) and Negative (<2.01) and use the overall score to draw a pie chart

```
SELECT *, ROUND(((CAST(aa.Num_Positive AS DECIMAL(4,2))/(CAST(aa.Num_Positive AS
DECIMAL(4,2))+CAST(bb.Num_Negative AS DECIMAL(4,2))))*100, 2) AS Percent_Positive,
ROUND(((CAST(bb.Num_Negative AS DECIMAL(4,2))/(CAST(aa.Num_Positive AS
DECIMAL(4,2))+CAST(bb.Num_Negative AS DECIMAL(4,2))))*100, 2) AS Percent_Negative
FROM
(SELECT COUNT(*) AS Num_Positive, businessId
FROM Business_Reviews_Details_V
WHERE businessId='FJNzBAHuJbAiQCdhIdPQjA' AND reviewRating>2.9
GROUP BY businessId) aa
JOIN
(SELECT COUNT(*) AS Num_Negative, businessId
FROM Business_Reviews_Details_V
WHERE businessId='FJNzBAHuJbAiQCdhIdPQjA' AND reviewRating<2.01
GROUP BY businessId) bb
ON aa.businessId=bb.businessId;
```

2: Find out the top-rated restaurants/competitors near the customer distance<5 kms

```
SELECT *
FROM
(SELECT TOP 5 *
FROM
(SELECT businessId, AVG(pp.Average_Rating) AS Avg_Rating, AVG(pp.DISTANCE) AS Distance
FROM
(SELECT *, (111.111 *
DEGREES(ACOS(COS(RADIANS(llatitude))*COS(RADIANS(latitude))*COS(RADIANS(llongitude - longitude))+
SIN(RADIANS(llatitude))* SIN(RADIANS(latitude))))) AS DISTANCE
FROM
(SELECT *
FROM Competitor_Business_Details_V a
JOIN
(SELECT AVG(longitude) AS llongitude, AVG(latitude) AS llatitude
FROM Competitor_Business_Details_V
WHERE businessId='FJNzBAHuJbAiQCdhIdPQjA'
GROUP BY longitude, latitude) d
ON a.businessId=a.businessId) kk
```

```
WHERE kk.businessId=kk.businessId) pp  
GROUP BY businessId) qq  
ORDER BY qq.Avg_Rating DESC) ll  
WHERE ll.Distance<8;
```

3: SQL Query to download data in R and use it for further processing to build word network and predict sentiment scores

```
SELECT reviewText  
FROM Business_Reviews_Details_V  
WHERE businessId='FJNzBAHuJbAiQCdhIdPQjA'
```

4: Build word network of a customer's competitors to gain actionable insights and compare customer with competitors by sentiment score; in this section, SQL queries are only used to get table and that table is used further in R to build word network and conduct sentiment analysis using R package.

```
SELECT businessId, reviewText  
FROM Business_Competitor_Word_V  
WHERE categoryName='Chinese'
```

5: Insert a new business detail

```
INSERT INTO P_Business VALUES ('hfhtnryd', 'Healty Foods', 'Near Cafe', '1');
```

6: Delete a business from the database

```
DELETE FROM P_Business WHERE businessId='hfhtnryd';
```