

CptS - 451 Introduction to Database Systems Spring 2019

Project Description

In your semester long CptS 451 course project you would develop a data search application for Yelp.com's business review data. The emphasis would be on the database infrastructure of the application.

Learner Objectives:

At the conclusion of this assignment you will gain experience in:

- ✓ Database modeling and design
- ✓ Populating the database with large datasets
- ✓ Querying large databases
- ✓ Optimizing query performance through indexes
- ✓ JSON parsing
- ✓ Database Application Development

Overview:

In 2013, Yelp.com has announced the “Yelp Dataset Challenge” and invited students to use this data in an innovative way and break ground in research. In your project you would query this dataset to extract useful information for local businesses and individual users.

The Yelp data is available in JSON format. The original Yelp dataset includes and **5.9M** reviews by **1.5M** users for **188K** businesses from United States, Canada, UK, and Germany. (<https://www.yelp.com/dataset>) In your project you will use a smaller dataset that your instructor created. This simplified dataset includes only **11,481** businesses, **192,999** users, and **416,490** reviews written for those businesses.

You will be given sample code (Python) to parse some of the Yelp JSON files (available on Blackboard). The Yelp JSON files that you will use in this project are available at the instructor’s website at:

http://www.eecs.wsu.edu/~arslanay/CptS451/project/yelp_dataset/Yelp-CptS451-2019.zip

(Note: Please make sure to use the dataset available on the above link, not the one from the Yelp.com website)

See Appendix-B for an overview of the Yelp Academic Dataset.

Requirements:

You will develop a target application which runs queries on the Yelp data and extracts useful information. The primary users for this application will be potential customers seeking for businesses.

Using this application the users can gather information about:

- the businesses in a particular state, city, and/or zipcode,
- the businesses that belong to certain categories,
- detailed information about a business,
- ratings and popularity of businesses,
- etc.

You may design your application either as a standalone or a web-based application.

A detailed description of the application and example screenshots are available in Appendix-A. In evaluating your work instructor’s primary focus will be primarily on how you design your database and how efficiently you

can search the database. However your GUI should provide the basic functionality for easy search of the business. Creativity is encouraged! Additional functionality will be considered for extra credit.

You will be given more detailed milestone descriptions when they are assigned.

Submission Instructions:

You will submit the deliverables for milestones on **Blackboard** (learn.wsu.edu). For each milestone you will create a .zip files that contains all deliverables for that milestone, name the .zip files as <yourteamname>_milestoneX.zip, and submit it to the corresponding milestone dropbox on Blackboard. Specific submission details for each milestone will be provided under milestone descriptions.

Project Milestones:

I. Milestone-0: (no submission required)

Download and install PostgreSQL Database Server. You may download the latest version from the link <https://www.postgresql.org/>

II. Milestone-1: (Deadline Feb 7, 2019 11:59pm)

1) Parse JSON Data:

Download the Yelp dataset from http://www.eecs.wsu.edu/~arslanay/CptS451/project/yelp_dataset/Yelp-CptS451-2019.zip. Look at each JSON file and understand what information the JSON objects provide. Pay attention to the data items in JSON objects that you will need for your application. The milestone-1 description will specify which data items you shouldn't parse in the *business*, *review*, *check-in*, *user* JSON objects.

Download the sample program from Blackboard (*Project/Sample JSON Parsing Code*). The sample code:

- reads JSON objects form a file and extracts certain key and value pairs from JSON objects, and
- writes the extracted data into a text file.

Please note that the sample code includes examples of extracting simple key values only. In a JSON object the key value can be an array or another JSON object (for example: categories and attributes), therefore you need to recursively parse those objects until you extract all data stored in JSON objects. You will write the code for parsing business, user, review, and checkin JSON objects.

- 2) i) Design a database schema that models the database for the described application scenario in Appendix-A and provide the ER diagram for your database design. Your database schema doesn't necessarily need to include all the data items provided in the JSON files. Your schema should be precise but yet complete. It should be designed in such a way that all queries/data retrievals on/from the database run efficiently and effectively. In Milestone2 you will revise your ER model.
ii) Translate your ER model into relations and produce DDL SQL statements for creating the corresponding tables in a relational DBMS. Note the constraints, including key constraints, referential integrity constraints, not NULL constraints, etc. needed for the relational schema to capture and enforce the semantics of your ER design.

3) Build a very simple database application:

Download the "Milestone1DB.csv" file from the link http://www.eecs.wsu.edu/~arslanay/CptS451/project/yelp_dataset/milestone1DB.csv. Create a database on PostgreSQL with name "milestone1DB" and create a table named "business". You will import the CSV

file into this table. Detailed instructions are available in Milestone-1 specification. (Note that the schema of this table should comply with the columns of the CSV file.)

Write a simple application (either web or standalone) which connects to the milestone1DB database and runs simple queries on the business table. The goal of this exercise is to get you started in database programming early on. In Milestone3 you will develop a larger application with all required features.

The instructor will provide a video which explains how to establish connectivity with PostgreSQL in C# using Npgsql. Instructor will provide the queries you need to run on your table (see Milestone 1 specification).

Milestone-1 Deliverables:

1. (25%) Source code for parsing all JSON data. Only submit your source code, not the data files.
2. (40%) The E-R diagram for your database design. To create your ER diagram, I suggest you to use Edraw Max (<https://www.edrawsoft.com/download-edrawmax.php>) . You may also use your favorite drawing tool (e.g., Visio, Word, PowerPoint). Should be submitted in .pdf format. Name this file “<your-team-name>_ER_v1.pdf”
3. (35%) Source code for your application. Only submit your source code, not the data files.
Create a zip archive “<your-team-name>_milestone1.zip” that includes your source code for JSON parsing and your sample application. Upload your milestone-1 submission on Blackboard until the deadline.

You will demonstrate your Milestone1 to the instructor and the TA.

III. Milestone-2: (Deadline TBA)

- 1) Revise your database schema (ER model and relations).
- 2) Populate your database with the Yelp data. Generate INSERT statements for your tables and run those to insert data into your DB. You will also write and additional scripts to update the information stored in your database.

Write triggers and assertions to ensure the validity and consistency of the information stored in your database. Details will be available in Milestone2 specification.

Milestone-2 Deliverables:

(Weights of the deliverables are TBA)

1. The revised E-R diagram. **Should be submitted in .pdf format.** Name this file “<your-team-name>_ER_v2.pdf”
2. SQL script file containing all SQL statements (i.e., CREATE TABLE statements, UPDATE statements, and TRIGGERS) . Name this file “<your-team-name>_SQL.sql”

Create a zip archive “<your-team-name>_milestone2.zip” that includes your ER diagram and SQL script files. Upload your milestone-2 submission on Blackboard until the deadline.

You will demonstrate your Milestone2 to the instructor and the TA.

IV. Milestone-3: (Deadline: TBA)

In this milestone you will implement an application (either web or standalone) where the users can search for information and statistic about local businesses. A detailed description of the application requirements is provided in Appendix-A.

Milestone-3 Deliverables:*(Weights of the deliverables are TBA.)*

1. The source code of your application. **Please only upload your source code, not your DB files.**

Create a zip archive “`<your-team-name>_milestone3.zip`” that includes your source code. Upload your milestone-3 submission on Blackboard until the deadline.

You will demonstrate your final project to the instructor and the TA. The demonstration schedule will be announced in mid-April.

References:

1. Yelp Dataset Challenge, <https://www.yelp.com/dataset>
2. Samples for users of the Yelp Academic Database, <https://github.com/Yelp/dataset-examples>
3. Yelp Challenge, University of Washington Student Paper 1
<http://courses.cs.washington.edu/courses/cse544/13sp/final-projects/p08-fants.pdf>
4. Yelp Challenge, University of Washington Student Paper 2,
<http://courses.cs.washington.edu/courses/cse544/13sp/final-projects/p10-michelmj.pdf>

Appendix-A

Application Specification

The primary users for this application will be potential customers seeking for businesses. Using this application the users can gather information about:

- the businesses in a particular state, city, and/or zipcode,
- the businesses that belong to certain categories,
- detailed information about businesses,
- ratings and popularity of businesses,
- the businesses that their friends visited and reviewed, etc.

You may design your application either as a standalone or a web-based application. Below you will find screenshots to help you visualize the required functionality.

The application will have 2 main windows:

A. **User Information:**

User can view his/her own information, his/her favorite businesses, the list of his/her own friends, the latest tips that each friend has provided, etc.

Use Case:

1. The user enters his name and chooses his/her own user id (among the users who has the same name). The system displays the following for the selected user:
 - user's profile information (including, his/her name, average stars, the date he/she joined yelp, number of fans, average stars, count of votes, and location (lat/long coordinates)).
 - user's favorite businesses (the name, avg star rating, city, zipcode, and address of each business). The user may remove a business from the favorites list.
 - user's friends (name and star rating of each friend and the date he/she yelps since)
 - the latest review that each of those friends posted (Note that this is different than the list of most recent reviews by friends. You need to return the latest review that each friend has posted.).

Note: The information about the favorite businesses and user's location (lat/long) are not part of the JSON data, but are collected and stored in the databases as the application is used. The user may mark a business as "a favorite" in the "Business Search" tab. The latitude and longitude coordinates are entered by the user in the "User" tab.

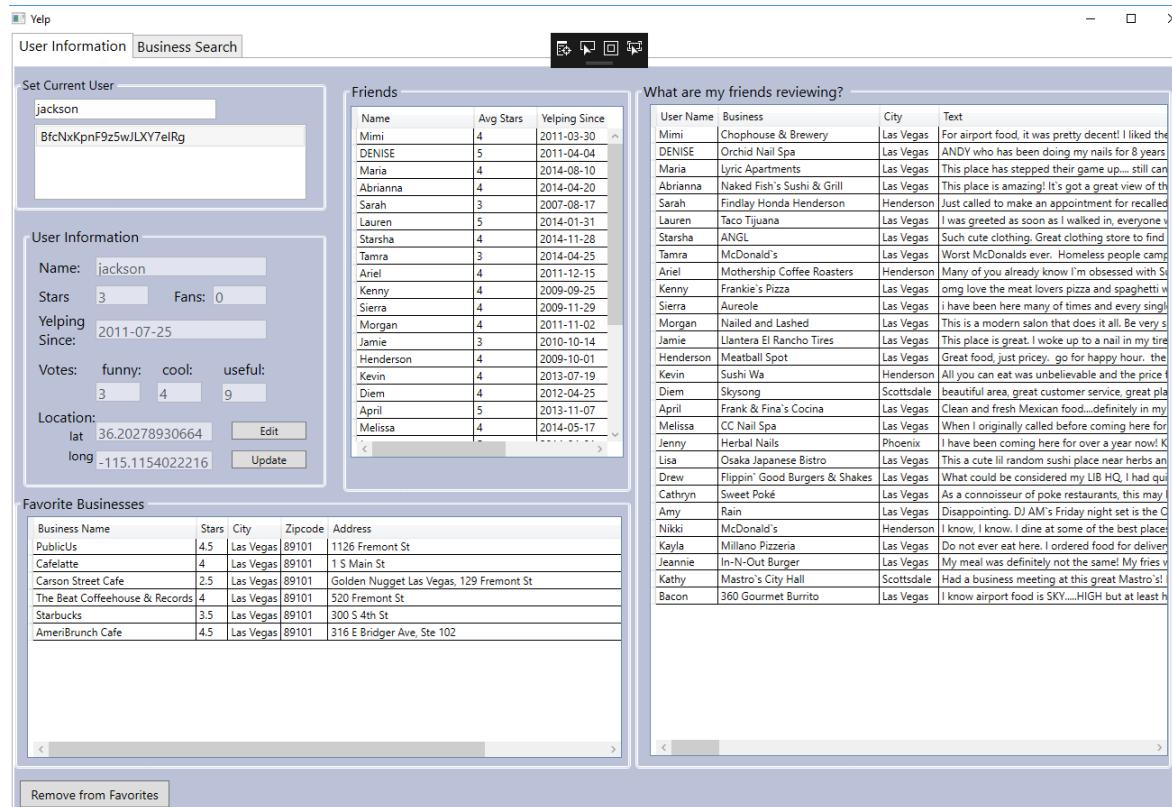


Figure 1 – User information window

B. Business Search:

Users can search for businesses which are within a certain state, city, and zip and which belong to the selected categories. The application allows users to display some statistics about the businesses in the search results and to retrieve various information about a selected business.

Use Cases:

- User selects a state, city, and zipcode. When search button is pressed, the businesses in that state/city/zipcode are displayed (see Figure-2). The following information is provided for each business returned in the search result.
 - Business name
 - Address, city, state
 - Distance to user's location // distance not in mile, currently not update in business table.
 - Business rating (stars)
 - # of reviews provided for the business
 - Average rating (stars) of the reviews provided for the business
 - Total number of check-ins

(Note: You should (i) query the review table to calculate the number of reviews and avg review rating and (ii) query the check-in table to calculate the number of check-ins for each business and (iii) update those attribute values in the business table.)

The screenshot shows the Yelp Business Search interface. On the left, there are filters for location (State: NV, City: Las Vegas, Zipcode: 89101), business category (American (New), American (Traditional), Arts & Entertainment, Bars, Beer, Breakfast & Brunch, Burgers, Cafes, Casinos, Cocktail Bars, Coffee & Tea, Convenience Stores, Criminal Defense Law), and search buttons (Add, Remove, Search Businesses). The main area displays a table of business results with columns: BusinessName, Address, City, State, Distance (miles), Stars, # of Reviews, Avg Review Rating, and Total Checkin. At the top right, it says "# of businesses 182". To the right of the table are several filter sections: Filter by Price (\$, \$\$, \$\$\$, \$\$\$\$), Filter by Attributes (Accepts Credit Cards, Takes Reservations, etc.), Filter by Meal (Breakfast, Brunch, Lunch, Dinner, Dessert, Late Night), and Sort Results By (Name (default)). Below the table, there's a "Selected Business" section for "Bay City Diner" with its address and a "Today: Opens / Closes" button. There are also buttons for "Check-In", "ShowCheckins", "AddtoFavorites", and "ShowReviews". A review text input field and a rating dropdown are also present.

Figure 2 – Searching for the businesses in a Las Vegas, NV, 89101

2. The user might refine the results by specifying one or more business categories. The search will return the businesses which belong to the ALL categories specified by the user (i.e., AND condition) Note that, the more categories are selected the more restrictive the search will be. (see Figures-3 and -4)

This screenshot shows the same interface as Figure 2, but with a specific category selected: "American (Traditional)". The "Business Category" dropdown now only shows "American (Traditional)". The search results table shows 22 businesses that fall under this category. The rest of the interface, including filters, sorting, and the selected business details for "Bay City Diner", remains the same as in Figure 2.

Figure 3 – Searching for the businesses with category ‘American (Traditional)’ in Las Vegas, NV, 89101.

The screenshot shows the Yelp Business Search interface. On the left, there are search filters for location (State: NV, City: Las Vegas, Zipcode: 89101), business category (Mexican, Music Venues, Nightlife, Performing Arts, Personal Injury Law, Pizza, Professional Services, Pubs, Restaurants, Sandwiches, Seafood, Steakhouses), and a selected category (American (Traditional)). The main area displays a table of search results for three businesses: Chart House, Hugo's Cellar, and Vic & Anthony's Ste. The results include columns for BusinessName, Address, City, State, Distance (miles), Stars, # of Reviews, Avg Review Rating, and Total Checkins. To the right, there are filters for price (">\$, \$\$, \$\$\$, \$\$\$\$), attributes (Accepts Credit Cards, Takes Reservations, Wheelchair Accessible, Outdoor Seating, Good for Kids, Good for Groups, Delivery, Take Out, Free Wi-Fi, Bike Parking), and meals (Breakfast, Brunch, Lunch, Dinner, Dessert, Late Night). Below the results, there is a section for the selected business 'Chart House' with its address, category (American (Traditional) Restaurants, Seafood, Steakhouses), operating hours (Today (Friday) Opens: 11:30 Closes: 23:30), and icons for Check-In, ShowCheckins, AddtoFavorites, and ShowReviews.

BusinessName	Address	City	State	Distance (miles)	Stars	# of Reviews	Avg Review Rating	Total Checkins
Chart House	129 East Fremont St	Las Vegas	NV	2.76	4	196	4.06	614
Hugo's Cellar	202 Fremont St	Las Vegas	NV	2.77	4.5	433	4.45	820
Vic & Anthony's Ste	129 E Fremont St	Las Vegas	NV	2.78	4.5	333	4.52	856

Figure 4 – Searching for the businesses with categories ‘American (Traditional)’, ‘Steakhouses’, and ‘Seafood’ in Las Vegas, NV, 89101

3. The user may also refine results by specifying various attributes including:
- Price range (1 to 4) (see RestaurantsPriceRange2 attribute)
 - Accepts credit cards (see BusinessAcceptsCreditCards attribute)
 - Takes reservations (see RestaurantsReservations attribute)
 - Wheelchair accessible (see WheelchairAccessible attribute)
 - Outdoor seating (see OutdoorSeating attribute)
 - Good for kids (see GoodForKids attribute)
 - Good for groups (see RestaurantsGoodForGroups attribute)
 - Delivery (see RestaurantsDelivery attribute)
 - Take out (see RestaurantsTakeOut attribute)
 - Wifi (free WiFi only) (see WiFi attribute)
 - Bike parking (see BikeParking attribute)
 - Meals (breakfast, brunch, lunch, dinner, desert, latenight attributes)

The screenshot shows the Yelp search interface with the following parameters:

- User Information:** Business Search
- Select Location:** State: NV, City: Las Vegas, Zipcode: 89101
- Business Category:** American (Traditional)
- SEARCH RESULTS:** # of businesses: 12
- Table:**| BusinessName | Address | City | State | Distance (miles) | Stars | # of Reviews | Avg Review Rating | Total Checkins |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cafe Cortez | 600 E Fremont St | Las Vegas | NV | 2.66 | 3.5 | 60 | 3.43 | 331 |
| Carson Street Cafe | Golden Nugget Las Vegas, 129 | Las Vegas | NV | 2.41 | 2.5 | 44 | 2.8 | 235 |
| Claim Jumper | 129 Fremont St | Las Vegas | NV | 2.84 | 3.5 | 131 | 3.49 | 381 |
| D Grill | 301 Fremont St | Las Vegas | NV | 2.76 | 3 | 100 | 2.96 | 419 |
| Dofia Maria Tamale | 910 Las Vegas Blvd S | Las Vegas | NV | 3.49 | 3.5 | 175 | 3.55 | 607 |
| Grotto Ristorante | 129 E Fremont St | Las Vegas | NV | 2.78 | 4 | 276 | 3.86 | 809 |
| Magnolia's Veranda | 202 E Fremont St | Las Vegas | NV | 2.75 | 3 | 129 | 3.2 | 562 |
| Pasta Pirate | 12 E Ogden Ave | Las Vegas | NV | 2.68 | 3.5 | 20 | 3.8 | 176 |
| S+O Restaurant | Downtown Grand, 206 N 3rd St | Las Vegas | NV | 2.59 | 3 | 100 | 3.17 | 415 |
| The Grille Inside Th | 200 S 3rd St | Las Vegas | NV | 2.83 | 3 | 28 | 3.18 | 76 |
| The Market | 611 Fremont St | Las Vegas | NV | 2.73 | 3.5 | 66 | 3.58 | 360 |
| The Perch | Downtown Container Park, 707 | Las Vegas | NV | 2.78 | 4 | 348 | 4.18 | 1471 |
- Filter by Price:** \$, \$\$ (checked), \$\$\$, \$\$\$\$
 - Accepts Credit Cards
 - Takes Reservations
 - Wheelchair Accessible
 - Outdoor Seating
 - Good for Kids (checked)
 - Good for Groups
 - Delivery
 - Take Out (checked)
 - Free Wi-Fi
 - Bike Parking
- Filter by Attributes:**
 - Breakfast
 - Brunch
 - Lunch
 - Dinner
 - Dessert
 - Late Night
- Sort Results By:** Name (default)
- Selected Business:** Cafe Cortez, American (Traditional) Cafes Restaurants, 600 E Fremont St, Las Vegas, NV
- Description:** Alcohol(full_bar); BikeParking; breakfast; BusinessAcceptsCreditCards; casual; Caters; garage; GoodForKids; HasTV; NoiseLevel(average); RestaurantsAttire(casual); RestaurantsGoodForGroups; RestaurantsPriceRange2(2); RestaurantsTableService; RestaurantsTakeOut; WiFi(free);
- Rating:** 3.43
- Add Review:** Add Review
- Friends who reviewed this business:**

User Name	Date	Text
Drew	2014-04-24	\$5 beer and a burger. Annnd scene. Seriously, that's a hell of a deal. Sure, you're going into a crappy, smokey, hole in the wall cafe where people are coming to
- Check-In:** Check-In
- ShowCheckins:** ShowCheckins
- AddtoFavorites:** AddtoFavorites
- ShowReviews:** ShowReviews

Figure 5 – Searching for the businesses with category ‘American (Traditional)’ in Las Vegas, NV, 89101 which has ‘price range 2’, accepts credit cards, is good for kids, and has takeout service.

The screenshot shows the Yelp search interface with the following parameters:

- User Information:** Business Search
- Select Location:** State: NV, City: Las Vegas, Zipcode: 89101
- Business Category:** American (Traditional)
- SEARCH RESULTS:** # of businesses: 7
- Table:**| BusinessName | Address | City | State | Distance (miles) | Stars | # of Reviews | Avg Review Rating | Total Checkins |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cafe Cortez | 600 E Fremont St | Las Vegas | NV | 2.66 | 3.5 | 60 | 3.43 | 331 |
| Claim Jumper | 129 Fremont St | Las Vegas | NV | 2.84 | 3.5 | 131 | 3.49 | 381 |
| D Grill | 301 Fremont St | Las Vegas | NV | 2.76 | 3 | 100 | 2.96 | 419 |
| Dofia Maria Tamale | 910 Las Vegas Blvd S | Las Vegas | NV | 3.49 | 3.5 | 175 | 3.55 | 607 |
| S+O Restaurant | Downtown Grand, 206 N 3rd St | Las Vegas | NV | 2.59 | 3 | 100 | 3.17 | 415 |
| The Market | 611 Fremont St | Las Vegas | NV | 2.73 | 3.5 | 66 | 3.58 | 360 |
| The Perch | Downtown Container Park, 707 | Las Vegas | NV | 2.78 | 4 | 348 | 4.18 | 1471 |
- Filter by Price:** \$, \$\$ (checked), \$\$\$, \$\$\$\$
 - Accepts Credit Cards
 - Takes Reservations
 - Wheelchair Accessible
 - Outdoor Seating
 - Good for Kids (checked)
 - Good for Groups
 - Delivery
 - Take Out (checked)
 - Free Wi-Fi (checked)
 - Bike Parking
- Filter by Attributes:**
 - Breakfast
 - Brunch
 - Lunch
 - Dinner
 - Dessert
 - Late Night
- Sort Results By:** Name (default)
- Selected Business:** Cafe Cortez, American (Traditional) Cafes Restaurants, 600 E Fremont St, Las Vegas, NV
- Description:** Alcohol(full_bar); BikeParking; breakfast; BusinessAcceptsCreditCards; casual; Caters; garage; GoodForKids; HasTV; NoiseLevel(average); RestaurantsAttire(casual); RestaurantsGoodForGroups; RestaurantsPriceRange2(2); RestaurantsTableService; RestaurantsTakeOut; WiFi(free);
- Rating:** 3.43
- Add Review:** Add Review
- Friends who reviewed this business:**

User Name	Date	Text
Drew	2014-04-24	\$5 beer and a burger. Annnd scene. Seriously, that's a hell of a deal. Sure, you're going into a crappy, smokey, hole in the wall cafe where people are coming to
- Check-In:** Check-In
- ShowCheckins:** ShowCheckins
- AddtoFavorites:** AddtoFavorites
- ShowReviews:** ShowReviews

Figure 6 – Searching for the businesses with category ‘American (Traditional)’ in Las Vegas, NV, 89101 which has ‘price range 2’, accepts credit cards, is good for kids, has takeout service, and has free Wi-fi. Compare this to Figure-5: adding an additional search attribute narrows down the results.

4. When the user selects a business in the search results the following is displayed at the bottom of the page:
- the name, address and, open/close times of the business for the current day of the week;
 - the categories of the business
 - that attributes of the business
 - the friends' reviews for this business (if there is any)

(see Figures 5, 6, and 7 for examples)

The screenshot shows the Yelp Business Search interface. On the left, there's a sidebar for 'User Information' with dropdowns for 'Select Location' (State: NV, City: Boulder City, Enterprise, Henderson, Las Vegas), 'Zipcode' (89101, 89102, 89103), and 'Business Category' (American (New), American (Traditional), Arts & Entertainment, Bars, Beer, Breakfast & Brunch, Burgers, Cafes, Casinos, Cocktail Bars, Coffee & Tea, Convenience Stores). Below these are 'Add' and 'Remove' buttons, and a 'Search Businesses' button.

The main area is titled 'SEARCH RESULTS' and shows a table of businesses. The table has columns: BusinessName, Address, City, State, Distance (miles), Stars, # of Reviews, Avg Review Rating, and Total Checkins. The first few rows are: AmeriBrunch Cafe, Carnitas y Tortas All, Dougie J's Cafe, Hash House A Go G, Market Street Cafe, and The Goodwich.

To the right of the table are several filter panels: 'Filter by Price' (\$, \$\$, \$\$\$, \$\$\$\$), 'Filter by Attributes' (Accepts Credit Cards, Takes Reservations, Wheelchair Accessible, Outdoor Seating, Good for Kids, Good for Groups, Delivery, Take Out, Free Wi-Fi, Bike Parking), 'Filter by Meal' (Breakfast, Brunch, Lunch, Dinner, Dessert, Late Night), and 'Sort Results By' (Name (default)).

A 'Selected Business' panel for 'The Goodwich' shows its details: 900 S Las Vegas Blvd, Ste 120, Las Vegas, NV. It lists categories: Breakfast & Brunch, Food, Restaurants, Sandwiches, Street Vendors. It also shows operating hours: Today (Friday) Opens: 10:30 Closes: 23:00. Below this is a review section with a text input for 'review text', a rating scale, and a 'Add Review' button. There are also 'Check-In' and 'ShowCheckins' buttons.

At the bottom, a 'Friends who reviewed this business' section shows a single review from 'Drew' dated 2014-03-20: 'Good times at the Goodwich! Simple concept here. Just three dudes making 'wiches out of a shack.'Nuff said... My order: Reuben... Well done! The perfect amount.'

Figure 7 – Searching for the businesses with category ‘Breakfast & Brunch’ in Las Vegas, NV, 89101, which accepts credit cards, is good for kids, and has takeout service. The details of the selected business (*The Goodwich*) and the review provided by the friends for this business are displayed.

5. The user may check-in to a selected business and or add it to his/her favorites businesses list.
- The number of check-ins for that business should be incremented automatically after the check-in.
 - When a business is marked as "favorite", it should be added to the favorite businesses list in the “User” tab.
6. The user may provide a review for the selected business and assign a rating. The new review should appear when the reviews for that business is displayed and the business's review rating should be updated. (Note: Assume the review is posted by the user selected in the ‘User Information’ tab) (See Figure-8)

BusinessName	Address	City	State	Distance (miles)	Stars	# of Reviews	Avg Review Rating	Total Checkins
AmeriBrunch Cafe	316 E Bridger Ave, Ste 102	Las Vegas	NV	2.69	4.5	35	4.49	72
Carnitas y Tortas Ah	640 N Eastern Ave	Las Vegas	NV	1.68	4.5	33	4.18	50
Dougie J's Cafe	603 S Las Vegas Blvd	Las Vegas	NV	3.18	4	63	4.29	121
Hash House A Go G	1 S Main St	Las Vegas	NV	2.77	3.5	471	3.84	2063
Market Street Cafe	12 E Ogden Ave	Las Vegas	NV	2.63	3.5	427	3.8	221
The Goodwich	900 S Las Vegas Blvd, Ste 120	Las Vegas	NV	3.46	4.5	349	4.69	1656

Figure 8 – After check-in, the check-in count is automatically updated (by a trigger). When a review is added, the number of reviews and avg review rating is being updated. (In the above example the avg rating value didn't change.)

7. The user may **sort** the results based on the following. In Figure-9 the business search results are sorted by number of check-ins (in descending order). All sorting should be done in the SQL query (you can't use the sorting features of the data-grid.)
 - m. **Business name (default sort order)**
 - n. **Highest rating (stars)**
 - o. **Most reviewed**
 - p. **Best review rating (highest avg review rating)**
 - q. **Most check-ins**
 - r. **Nearest**

The screenshot shows a Windows application window titled 'Yelp'. On the left, there are dropdown menus for 'User Information' and 'Business Search'. Under 'User Information', 'Select Location' dropdowns show 'State: NV' and 'City: Las Vegas'. Below these are dropdowns for 'Boulder City', 'Enterprise', 'Henderson', and 'Las Vegas'. A 'Zipcode' dropdown shows '89101', '89102', and '89103'. A 'Business Category' dropdown lists categories like 'American (New)', 'American (Traditional)', 'Arts & Entertainment', 'Bars', 'Beer', 'Breakfast & Brunch', 'Burgers', 'Cafes', 'Casinos', 'Cocktail Bars', 'Coffee & Tea', and 'Convenience Stores'. Buttons for 'Add' and 'Remove' are below this list, and a 'Search Businesses' button is at the bottom. In the center, a table titled 'SEARCH RESULTS' displays six businesses: Hash House A Go Go, The Goodwich, Market Street Cafe, Dougie J's Cafe, Ameribrunch Cafe, and Carnitas y Tortas Ah. The columns include BusinessName, Address, City, State, Distance (miles), Stars, # of Reviews, Avg Review Rating, and Total Checkins. To the right of the table are several filter panels: 'Filter by Price' (with '\$', '\$\$', '\$\$\$', and '\$\$\$\$' options), 'Filter by Attributes' (with checked boxes for 'Accepts Credit Cards', 'Good for Kids', and 'Take Out'), 'Filter by Meal' (with options for Breakfast, Brunch, Lunch, Dinner, Dessert, and Late Night), and a 'Sort Results By' dropdown menu where 'Most checkins' is selected. Below the table, 'Selected Business' information for 'The Goodwich' is shown, including its address '900 S Las Vegas Blvd, Ste 120, Las Vegas, NV'. A detailed description of the business follows, mentioning 'Alcohol:none; BikeParking: BusinessAcceptsCreditCards: casual; Caters: GoodForKids; hipster; lunch; NoiseLevel:average; OutdoorSeating: RestaurantsAttire(casual); RestaurantsGoodForGroups; RestaurantsPriceRange2(1); RestaurantsTakeOut WiFi (no);'. A review from 'Drew' dated '2014-03-20' is displayed: 'Good times at the Goodwich! Simple concept here. Just three dudes making 'wiches out of a shack. 'Nuff said. My order: Reuben... Well done! The perfect amount'. Below the review are buttons for 'Check-In', 'ShowCheckins', 'AddtoFavorites', and 'ShowReviews'.

Figure 9 – Business search results can be sorted by various values. In this figure, results are sorted by the number of check-ins (in descending order).

8. The user may select a certain business in the search results (by simply clicking on a business) and display various information about the business, including:
 - s. **Show Check-ins:** Your application should visualize the total number of check-ins for each day-of-the-week as a chart. Please see Figure-10 for an example.

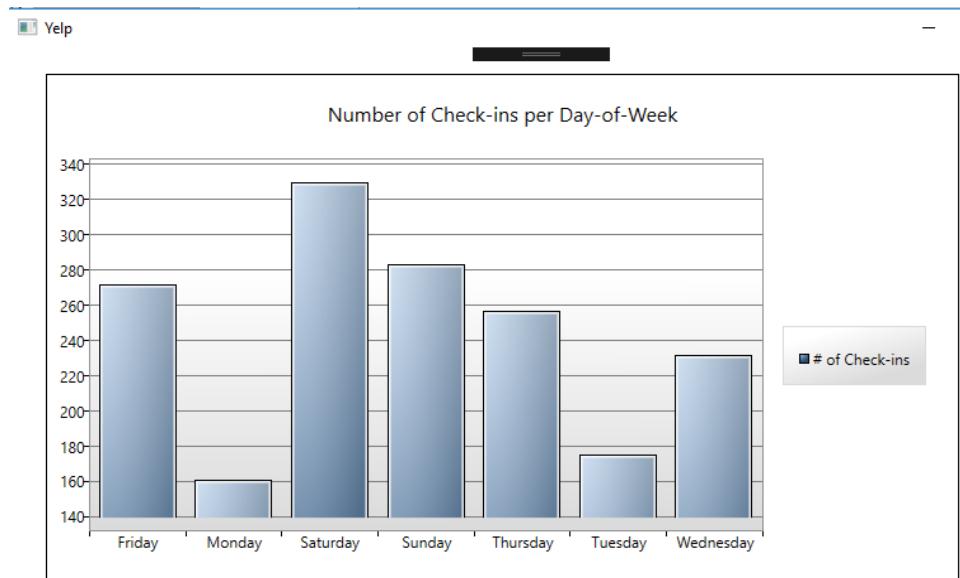


Figure 10 – Number of check-ins for the business ‘The Goodwich’

- t. **Show Reviews:** The reviews provided for the selected business. For each review, you should display the name of the user who provided the review, the date review is provided, the

rating(stars) for the review and the review text. You should display this information as a list (or table) (see Figures-11 and -12)

Date	User Name	Stars	Text	Funny	Useful	Cool
2015-03-29	John	5	They have the best PB and J you should it Monte Carlo style it's the bomb and the rest is great. Great service	0	0	0
2014-09-23	Ivan	5	Love a damn good sand which! And these guys do not fail. Texture. Flavor balance Freshness Quality ingredients Are all in there! The pate and le pig vert are so dank! Must try! Will be back!	0	0	0
2015-06-24	Dennis	5	Excellent sandwich an service. I was very impressed. Small little place that's big on great food and great customer service. Awesome!! Only outdoor seating	2	2	2
2017-07-07	Carrie	5	I love this place I have been going here for several months now .Very friendly I am always greeted when I walk in the door .Always Fresh sandwiches	0	0	0
2015-10-03	Daniel	5	Best sandwhiches in town. I was worried about the portions at first but i always leave full. I always look forward to working in this area.	0	0	0
2016-10-23	Karina	5	These are hands down the best sandwiches you'll ever have! Being that I work down the street, I've had the privilege of eating here at few times and I've never been disappointed! When you read the description for each sandwich, you might second guess the flavor combinations, but they're mad scientists in the kitchen because they make it work! The only downside are the prices. Since opening a restaurant, they've had to raise their prices. I don't feel the prices for the sides are worth the size amount. Regardless, if you stick to just a sandwich you won't be disappointed!	0	0	0
2015-09-03	Dietrich	5	What a nice little gem this place proved to be. Will, one of the employees was very knowledgeable and was very personable while I waited for my sandwich. I chose to go with "The Patty". It had ground beef and a wonderful slice of melted cheese which went together amazingly well. I can't wait to return to try one of the other great sounding sandwiches. My only complaint is that I wish it wasn't so expensive so I could have bought another one. They are moving to a traditional brick and mortar facility in a few months and I'm sure that will allow them to make sandwiches faster and have more seating room. This is a must stop spot on my list now every time I'm in Vegas.	0	0	0
2014-04-07	Eric	4	Who would have thought we could find a gem in a little shack outside a dive bar, let alone a second one after the first moved to a storefront. Well I am happy to say the Goodwich exceeds its predecessor at the location with a cutting edge menu and owners/staff who clearly enjoy their work. Try the "le pig" sandwich, or the chicken provolone sandwich, both are excellent. I also really enjoy their "patty" which has just enough kick to make you happy inside. I haven't tried their foie gras sandwich, mainly because they had served it all when I got there but it is next on my list. The menu itself is pretty interesting as the number next to the menu item is the	5	5	5

Figure 11 – The reviews for the business ‘The Goodwich’

Date	User Name	Stars	Text	Funny	Useful	Cool
2014-12-04	Jack	5	Goodwich rocks. Had the cuban-esque. Was the bomb. Texted my order in was ready when I arrived. Looking forward to trying more.	1	1	1
2019-01-04	jackson	5	Everything is awesome!!!!!!	0	0	0
2017-03-14	Jacqueline	5	I can't stay away. Everything I have ever had here is amazing. They even have free bicycle delivery for downtown!	0	0	0
2014-04-24	Jade	5	Wow... It's a good Sandwich: living up to the name.. For starts, I was like ok.. Location is whoa.. And stand is old.. But hey! BRING BACK THE RETRO! Got it! Up to date with iPads and iPods for registers! Boom! Sold on that: service was in my face! yes! YES! Love that! Made aware of the menu: had the reubinsh! Because I love CornBeef and Good stuff: I WAS IN HEAVEN! Eating it: like I died and could roll over and over in my sandwich goodness! Will be back: need to get Jalapeneies! next time! Man! Will be back maybe tonight! Lol: starting to go down the whole menu! Mmmmm! Yes and thank you!	1	1	1
2017-01-30	Jade	5	My man and I craving a good sandwich after a night of casino hopping. Yelped this really good find. We both had the turkey with chips and added the tomato soup. The restaurant was really cute and cozy. Felt like we were on a date lol. I think all together the total was around \$30. Not bad because its not your average deli type sandwich, its super gourmet. The chefs were so nice and friendly. We are definitely coming back.	0	0	0
2017-05-29	Jake	5	Had lunch here with the wife and it was absolutely delicious. Sandwiches were ooey gooey just as you would want a sandwich to be. Had the patty melt and it was a melt in your mouth delight. Wife had the eggplant sandwich and also loved it! Tried a few of the sides as well and they were also very tasty. Highly recommend the spot if you're in the area	0	0	0
2017-03-01	James	5	Their sandwiches were the bomb. El pig and sea smoke 2.0 are the sandwiches that I munched on. Am staying at one downtown casinos so they deliver for free!. It was fast service and driver was friendly. Check them out.	0	0	0
2014-04-28	Jana	5	Absolutely an AMAZING place to eat! Everything on the menu is so deliciously good, the staff is friendly, this is vegetarian friendly as well! We go here every time we go to Vegas!	0	0	0
2014-03-08	Janilynn	5	CHECK THIS PLACE OUT!!! Located at the former Viva Las Arepas stand. These guys really know their stuff. Friendly and knowledgeable who support local businesses/products (bon breads/artisanal foods). Their foie&...omg, definitely a must try. Rich, creamy, and indulgent. Date added extra crispy chicken skin and don't be afraid to try the same. They sometimes run out of it so get it when you can. The fluff&nutt monte cristo style on	1	1	1

Figure 12 – When we scroll down in the reviews list, the review we just added appears.

Please note that all data displayed on the GUI should be kept in the database and should be retrieved from it when needed. You are not allowed to create internal data structures to store data.

You may design your application either as a standalone or a web-based application.

Appendix-B

Yelp's Academic Dataset

Yelp has made available a dataset which contains user reviews for **188K** businesses from United States, Canada, UK, and Germany. The purpose was to provide a real-world data set to promote research in various areas of research. The dataset includes 6 types of data objects: *business*, *review*, *user*, *tip*, *check-in*, and *photos*. Every object contains a 'type' field, which tells whether it is a *business*, a *user*, or a *review*. *Business* objects contain basic information about local businesses. *Review* objects contain the details of the reviews by users for the businesses. *Review*'s *user_id* associates the reviews with the *user* objects. Similarly, *review*'s *business_id* associates each review with the *businesses*.

Detailed description of the data objects is available at:

<https://www.yelp.com/dataset/documentation/json>

In your project, you will only parse *business*, *user*, *review*, and *check-in objects*. **In the review objects, you don't need to parse/extract the 'elite' and 'compliments' information.**

Usage of this dataset is governed by the Academic Dataset Terms of Use.