UT Bathroom Services
Technical Documentation

Last Updated: Dec 4, 2017

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Source Code: https://github.com/dChunGit/UT-Bathroom-Services

Overview:

The UT Bathroom Services (UTBS) app was created to help people locate quality restrooms and water fountains around campus. Our solution creates a central database populated by user reviews which enable us to provide quantifiable data to the consumer. Locations (Bathrooms or Water Fountains) are each ranked by proximity, cleanliness, user reviews, and other criteria including wifi quality, taste, or temperature. Users are able to view and filter available locations, add new reviews/locations, as well as tag their favorite places. The UTBS app will be the one-stop shop for users to find information about bathroom and water fountains on the UT campus.

Problem:

Everyone needs to use the restroom or refill their water bottle multiple times during the course of a day on the UT campus. When people find themselves in an area of campus in which they are unfamiliar and need to use the facilities, it can be hard to locate them without guidance. The time used to wander around a building looking for the facilities could have been used to study for tests or do homework, and students may not have the time to search for a bathroom, especially when walking to their next class. On the other hand, when people are not in a rush to get to their next class and have plenty of time, they may want to locate the restroom with the best Wifi or the least amount of noise so they can do their business in peace. Unfortunately. students will need to locate and use every single one on campus to determine the best restrooms at UT, which takes a sizable amount of time and effort that could be put towards studying.

Additionally, when a student needs to fill their water bottle, it can be hard to locate a water fountain or refill stations on campus. Some water bottle refill stations do not allow easy access for large containers or may produce warm water, which is not desirable in the hot Texas weather. As a result, some students or faculty members may resort to buying water bottles from the convenience store or vending machine, and this is an expensive choice in the long run with negative environmental impacts.

Our solution, an Android app, displays the location of bathrooms and water fountains on campus and provides ratings on the facilities that allow everyone at UT to easily locate facilities and get relief.

Specifications:

Minimum Android Version: 19 (KitKat)
Compile SDK Version: 27 (Oreo)
Permissions: ACCESS_FINE_LOCATION
Tested Platforms: 23 (Marshmallow), 24/25 (Nougat), 26 (Oreo)

Application Structure:

In this section, we will give a short explanation of the high level components and characteristics of the application while briefly discussing how each thread connects to others through their corresponding callbacks.

Activities: The main display controllers

- **SplashScreen**: Shows a loading screen while initializing Google Play Services.
- **Database**: Used for temporary data storage, specifically during configuration changes but can also be used for caching/storing the data.
- **MainActivity**: Shows tutorial if the app is running for the first time, sets up all the fragments to query the Firebase database and the location database, starts location updates. Controls the main view of the application including the map, markers for each location, map controls, and review data display.
- **Add**: Interface for adding a new review or a new location for either Bathrooms or Water Fountains. Handles user ratings and pushes to the Firebase database
- **Favorites**: Displays the user's list of marked favorites.
- **Reviews**: Displays a list of reviews the user has submitted to the UTBS database.
- **Search**: Allows the user to search through the ratings/reviews for both Bathrooms and Water Fountains to find one matching their standards.
- **About**: Contains quick information about the application, links to source code, libraries and their licenses, as well as a changelog.

Fragments: Secondary controllers not bound to an activity context

- **LocationFragment**: Binds and starts the location update service defined in the manifest and as LocationService. Using the *UpdateLocationListener* callback and the *LocationCallback* interface, this fragment receives regular, timed updates from the location service and sends it back to MainActivity to update map location. Retained across configuration change via the fragment manager.
- **UpdateFragment**: Starts a database query based on the parameters sent during initialization of the fragment. Receives database updates via the *DatabaseCallback* callback and sends the information to MainActivity through the *onUpdateListener* interface. Retained across configuration change via the fragment manager.
- **SearchFragment**: Starts an AsyncTask to search through all the ratings, filtering only ones matching sent parameters. The *SearchCallback* interface allows this fragment to communicate with MainActivity, sending back the search results to process the markers displayed on the map. Retained across configuration change via the fragment manager.

- **AboutFragment**: Populates the adapters for the layouts in the About activity, setting up all listeners and views to properly display the data.

Services: Runs in a background thread away from the main UI thread

- **LocationService**: Starts GoogleLocationServices to query using the Google location api as a service, delivering new location data on an interval. Location data is sent from the *LocationRequest* callback to LocationService via the *LocationUpdateListener* interface and sent back to MainActivity using the *LocationCallback* interface. Using a service allows for persistent, asynchronous updates.

Firebase: Stores location and review data for each bathroom/fountain in a cloud database

- **Bathroom**: Holds all the fields for a Bathroom location. Includes all the individual Ratings corresponding to the Bathroom location.
- **WaterFountain**: Holds all the fields for a Water Fountain location. Includes all the individual Ratings for the Water Fountain.
- **Rating**: Holds a single Rating for either Bathroom or a WaterFountain, including all the rated parameters and any comments attached to the review.
- **Building**: Holds a list of all the buildings currently belonging to UT according to https://facilitiesservices.utexas.edu/buildings/. Implemented here in the app to allow for updates if building information changes.

Database: DBFlow SQL database to store reviews and favorite locations

- **AppDatabase**: Holds the name and version for the SQL database of DBFlow
- **Favorite_Item**: Holds key identification elements for the current user's list of marked favorite Bathrooms/WaterFountains.
- **Rating_Item**: Holds a local reference to a rating submitted by the current user relative to the received ratings from the Firebase database.

Other:

- **SearchParams**: Holds search parameters used to send data to the SearchFragment.

Features:

There are multiple features in the UTBS app that help to provide the users the best experience possible. The search function allows users to search for facilities based on the qualities they desire, such as cleanliness and WiFi quality in the case of bathrooms and water temperature and if it is a bottle refill station in the case of water fountains. This narrows down the number of bathrooms or water fountains shown to the users, making the choice for them easier.

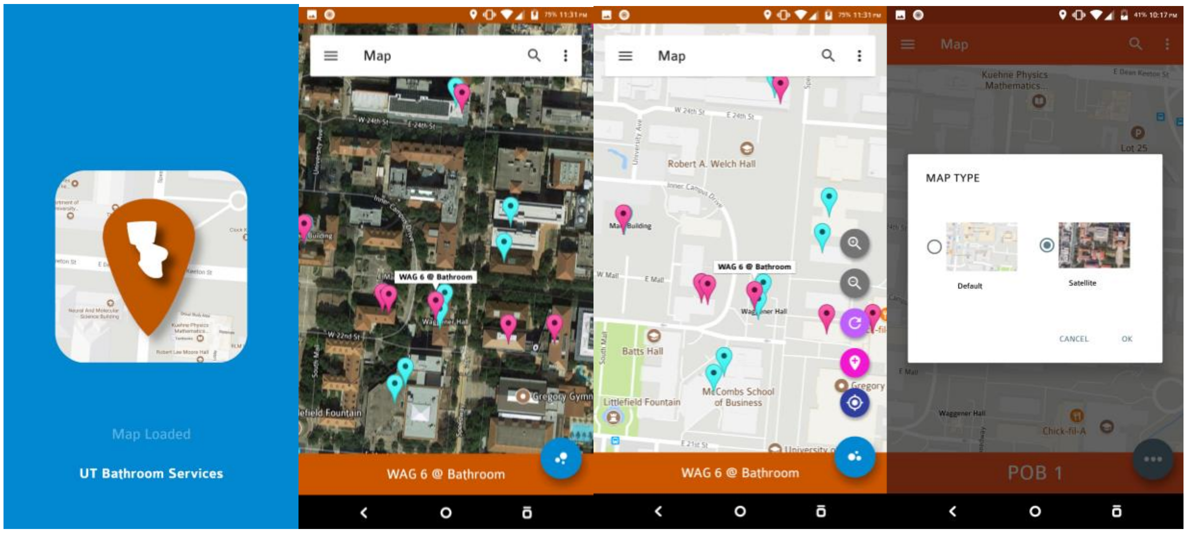
The Favorites page lets users to store their favorite bathrooms and water fountains that they have encountered on the UT campus, allowing to easily locate them again on the map and view others' reviews on the facility. The Reviews page allows users to view the reviews that they have previously written for various bathrooms and water fountains. If a user wishes to edit their review on a facility due to changes in quality, the user can quickly access their reviews from this page.

Example Use Cases:

One usage scenario is when a student is walking from one class to another with only 10 or 15 minutes between classes. In this short amount of time, the student will not have much time to both locate a restroom or water fountain and get to class promptly. If they do choose to look for one, they may end up late to their class and possibly miss out on homework turn-in or lose time on an exam. With our app, this scenario is greatly alleviated. Students can open up the app on their phone, and based on their current location, the app will display the nearest bathrooms, allowing them to quickly locate a bathroom and take care of their business in time for class.

Another usage scenario is when a student has plenty of time until their next class and wants to refill their water bottle with the coldest water available. The student can use the app to search feature to filter water fountains based on water temperature, and the app will display the locations of these water fountains on the map. Then, the student can walk to one of the water fountains and refill their water bottle with refreshing, cold water, and be on their way to their next class.

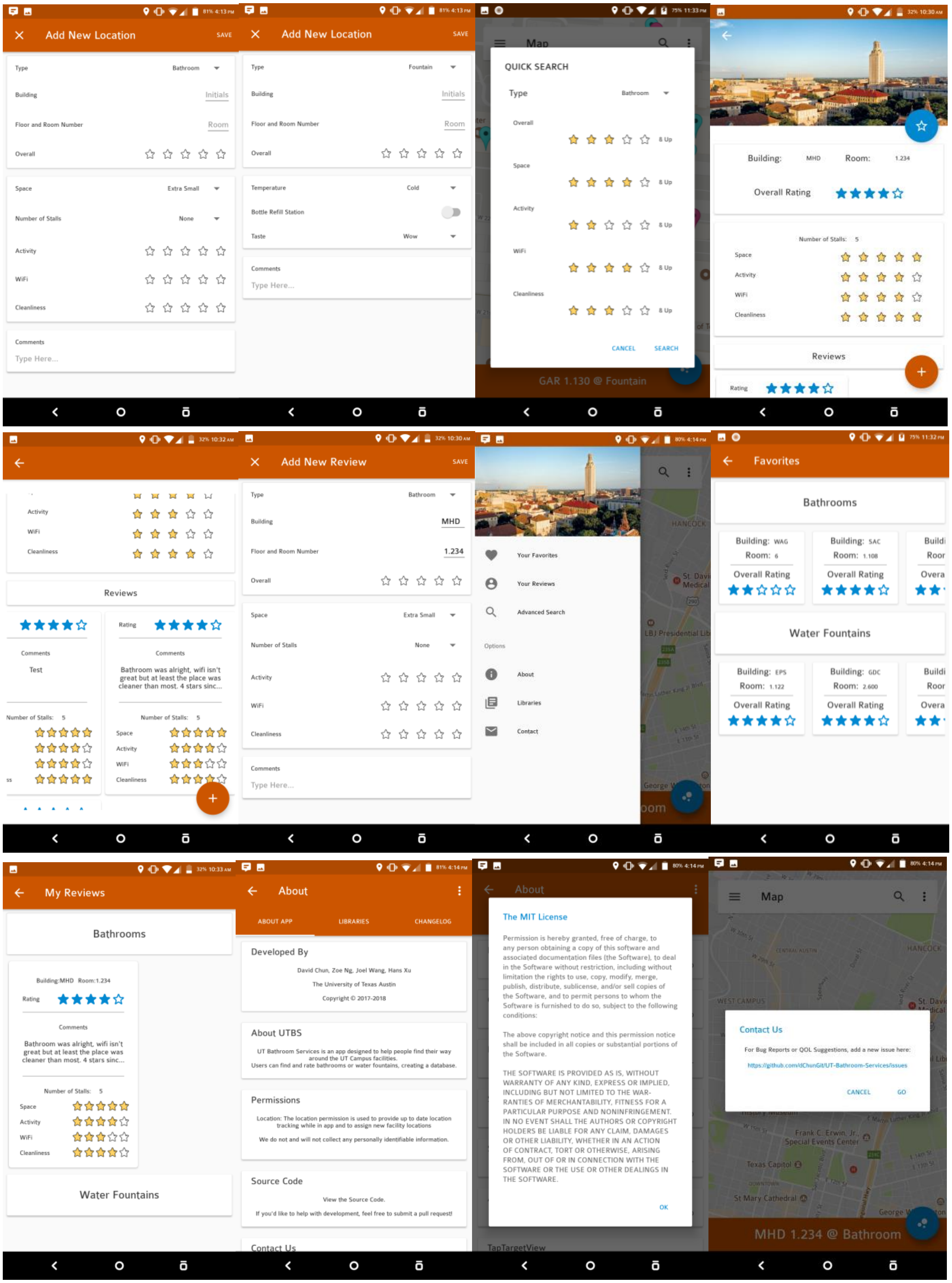
Screenshots:



MAP TYPE

○ Default ● Satellite

CANCEL OK



Add New Location SAVE

Type: Bathroom

Building: Initials

Floor and Room Number: Room

Overall

Space: Extra Small

Number of Stalls: None

Activity

WiFi

Cleanliness

Comments: Type Here...

Add New Location SAVE

Type: Fountain

Building: Initials

Floor and Room Number: Room

Overall

Temperature: Cold

Bottle Refill Station

Taste: Wow

Comments: Type Here...

Map

QUICK SEARCH

Type: Bathroom

Overall: 8 Up

Space: 8 Up

Activity: 8 Up

WiFi: 8 Up

Cleanliness: 8 Up

CANCEL SEARCH

GAR 1.130 @ Fountain

Building: MHD Room: 1.234

Overall Rating

Number of Stalls: 5

Space

Activity

WiFi

Cleanliness

Reviews

Rating

Activity

WiFi

Cleanliness

Reviews

Comments: Test

Number of Stalls: 5

Rating

Comments: Bathroom was alright, wifi isn't great but at least the place was cleaner than most. 4 stars sinc...

Number of Stalls: 5

Space

Activity

WiFi

Cleanliness

Add New Review SAVE

Type: Bathroom

Building: MHD

Floor and Room Number: 1.234

Overall

Space: Extra Small

Number of Stalls: None

Activity

WiFi

Cleanliness

Comments: Type Here...

Your Favorites

Your Reviews

Advanced Search

Options

About

Libraries

Contact

Favorites

Bathrooms

Building: WAG Room: 6 Overall Rating

Building: SAC Room: 1.108 Overall Rating

Water Fountains

Building: EPS Room: 1.122 Overall Rating

Building: GDC Room: 2.600 Overall Rating

My Reviews

Bathrooms

Building:MHD Room:1.234

Rating

Comments: Bathroom was alright, wifi isn't great but at least the place was cleaner than most. 4 stars sinc...

Number of Stalls: 5

Space

Activity

WiFi

Cleanliness

Water Fountains

About

ABOUT APP LIBRARIES CHANGELOG

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About UTBS

UT Bathroom Services is an app designed to help people find their way around the UT Campus facilities.

Users can find and rate bathrooms or water fountains, creating a database.

Permissions

Location: The location permission is used to provide up to date location tracking while in app and to assign new facility locations

We do not and will not collect any personally identifiable information.

Source Code

View the Source Code.

If you'd like to help with development, feel free to submit a pull request!

Contact Us

About

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OK

TapTargetView

Map

Contact Us

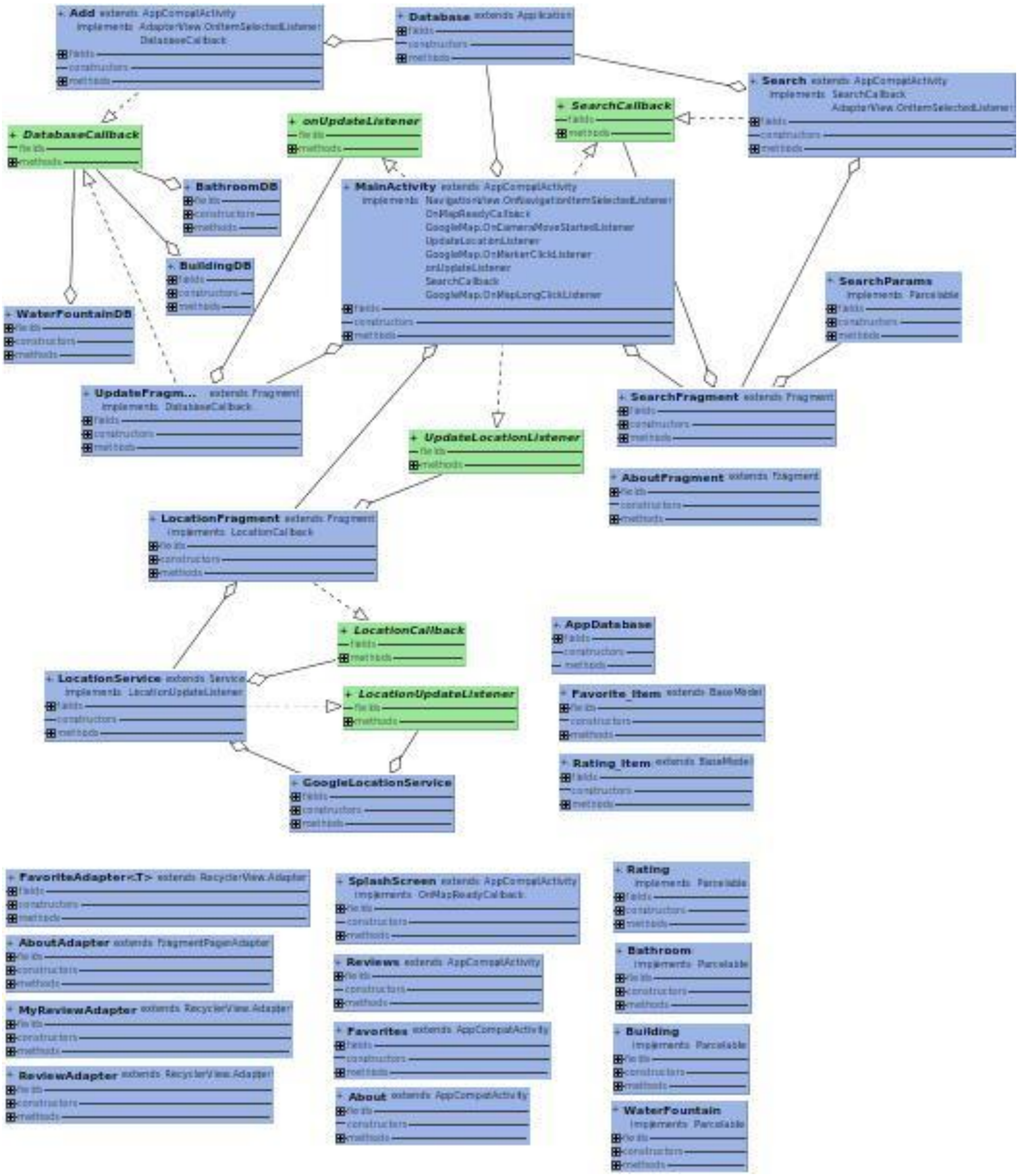
For Bug Reports or QOL Suggestions, add a new issue here:

https://github.com/dChunGit/UT-Bathroom-Services/issues

CANCEL GO

MHD 1.234 @ Bathroom

Diagrams:


+ Add extends AppCompatActivity implements AdapterView.OnItemSelectedListener DatabaseCallback
+ Database extends Application
+ Search extends AppCompatActivity implements SearchCallback AdapterView.OnItemSelectedListener
+ DatabaseCallback
+ onUpdateListener
+ SearchCallback
+ BathroomDB
+ BuildingDB
+ WaterFountainDB
+ MainActivity extends AppCompatActivity implements NavigationView.OnNavigationItemSelectedListener OnMapReadyCallback GoogleMap.OnCameraMoveStartedListener UpdateLocationListener GoogleMap.OnMarkerClickListener onUpdateListener SearchCallback GoogleMap.OnMapLongClickListener
+ SearchParams implements Parcelable
+ UpdateFragm... extends Fragment implements DatabaseCallback
+ SearchFragment extends Fragment
+ UpdateLocationListener
+ AboutFragment extends Fragment
+ LocationFragment extends Fragment implements LocationCallback
+ LocationCallback
+ AppDatabase
+ LocationService extends Service implements LocationUpdateListener
+ LocationUpdateListener
+ Favorite_Item extends BaseModel
+ Rating_Item extends BaseModel
+ GoogleLocationService
+ FavoriteAdapter<T> extends RecyclerView.Adapter
+ SplashScreen extends AppCompatActivity implements OnMapReadyCallback
+ Rating implements Parcelable
+ AboutAdapter extends FragmentPagerAdapter
+ Reviews extends AppCompatActivity
+ Bathroom implements Parcelable
+ MyReviewAdapter extends RecyclerView.Adapter
+ Favorites extends AppCompatActivity
+ Building implements Parcelable
+ ReviewAdapter extends RecyclerView.Adapter
+ About extends AppCompatActivity
+ WaterFountain implements Parcelable
fields
constructors
methods

Libraries and Licenses

Apache 2.0

- FloatingActionButton: 1.6.4
- Calligraphy: 2.3.0
- Simple Rating Bar: 0.1.5
- AVLoadingIndicatorView: 2.1.3
- TapTargetView: 1.10.0
- Google AppCompat/Design Library: 27.0.1
- Google Play Library: 11.6.2

- Firebase Firestore 11.6.2

MIT License

- Material Dialogs: 0.9.5.0
- Scale Rating Bar: 1.3.2
- EasingInterpolator: 1.0.0
- DBFlow: 4.1.2

Apache 2.0

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