Computer Science Large Practical Design Document
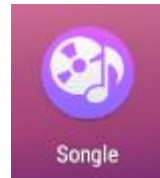
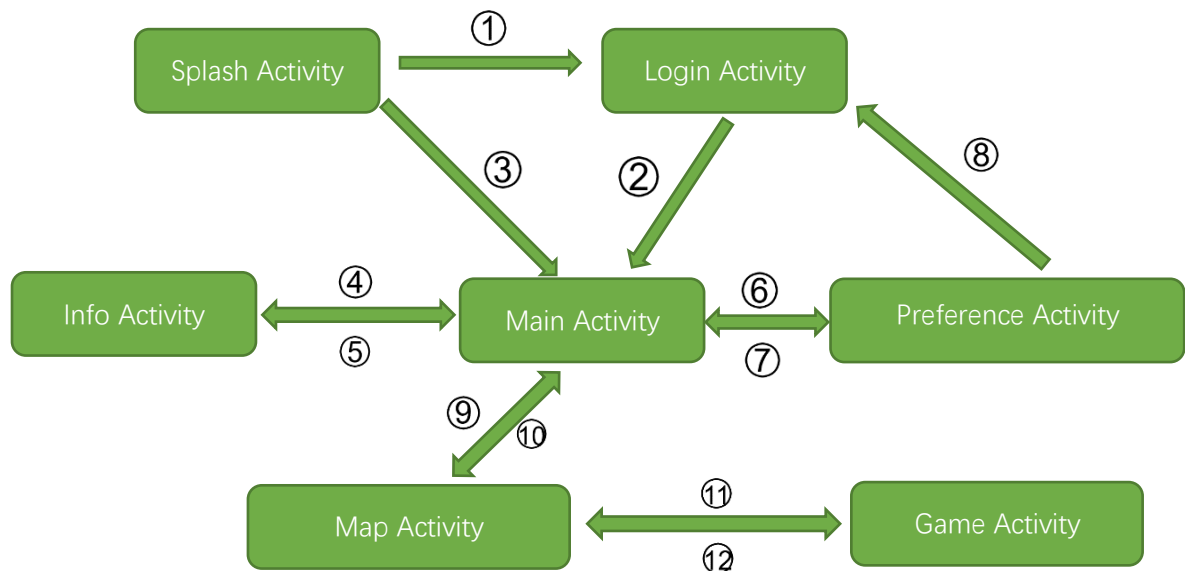## 1. Software Architecture

1.1 Activities

In the game *Songle*, there are 7 major activities:
Splash Activity, Login Activity, Main Activity, Map Activity, Game Activity, Info Activity and Preference Activity.
The application starts with the *Splash Activity*

Icon of Songle ↑

1.Splash Activity → Login Activity: When the user is not logged in
2.Login Activity → Main Activity: When the user successfully logged in
3.Splash Activity → Main Activity: When the user logged
4.Main Activity → Info Activity: When the user chooses to check player statistics
5.Info Activity → Main Activity: Back button pressed
6.Main Activity → Preference Activity: When user open Setting
7.Preference Activity → Main Activity: Back button pressed
8.Preference Activity → Login Activity: When user logged out
9.Main Activity → Map Activity: When the user presses the Start game button
10.Map Activity → Main Activity: Back button pressed
11.Map Activity → Game Activity: When the user presses the " √ " button
12.Game Activity → Map Activity: Back button pressed

1.2 Activities Details

1.2.1 Splash Activity

Splash activity is the loading activity showing up every time when the game starts. This activity will last for 3 seconds. In this 3 seconds, the app will check: if the device has Internet access. If not, the app will pop up a toast and be offline. If the Internet is available, the app will check if the local data are the latest. It will try to fetch the newest song list, words map and the lyric. Also, the app will check if it has necessary permissions like Location permission, reading and writing file permission, etc. (The runtime request of permissions like ACCESS_FINE_LOCATION will popup when the app is started at the first time). Check the player login status. Did the player logged in before or not? This will decide whether go to the Login Activity.
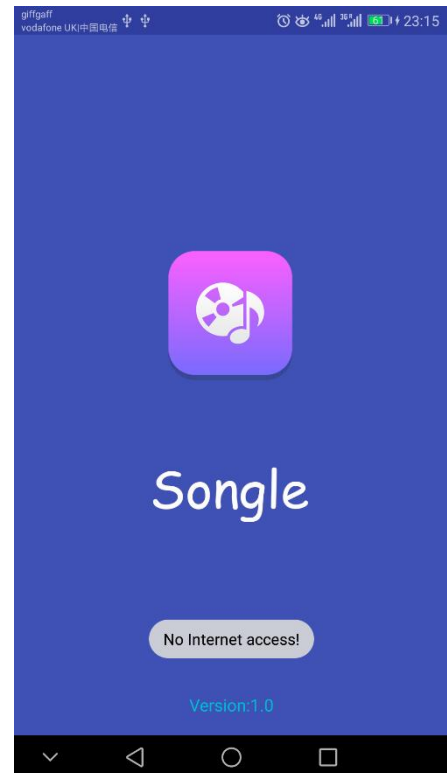
1.2.2 Login Activity

When Splash Activity finds out the login status is false, it will jump to the Login Activity. There are two ways to Login: login as a guest player, or login with Facebook account. Login in with Facebook account means the player profile photo and the user name will be automatically loaded.
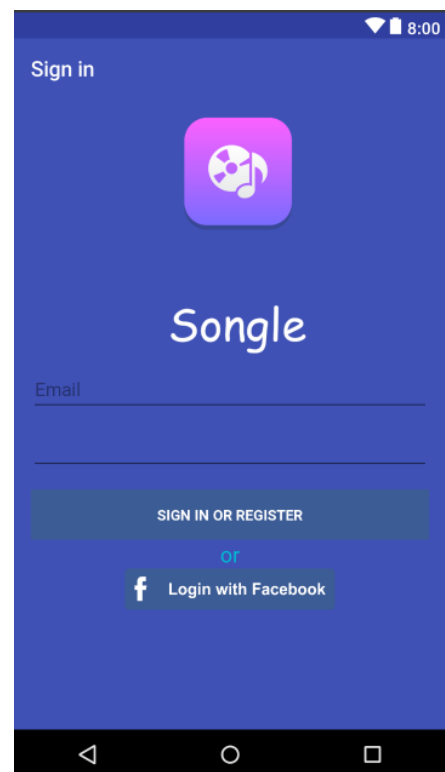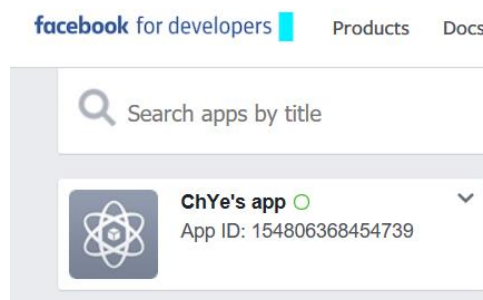
1.2.3 Main Activity

The Main activity is the major activity the user interacts with the app. At the top of the activity is the greeting message and will change according to time. The mid part will show the game achievement system: it will give the player the aim of next achievement. The button at the bottom is the start game button leading to Map Activity.

The drawer in the left will automatically load the profile picture and the profile name when the game is logged in via Facebook account. Six menu items can be chosen. The share button will generate a message and allow players to send this message to friends to recommend this game.
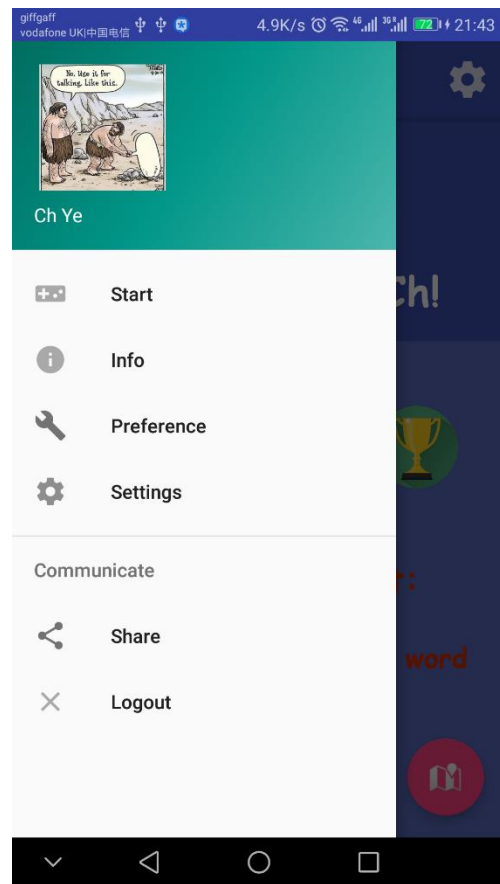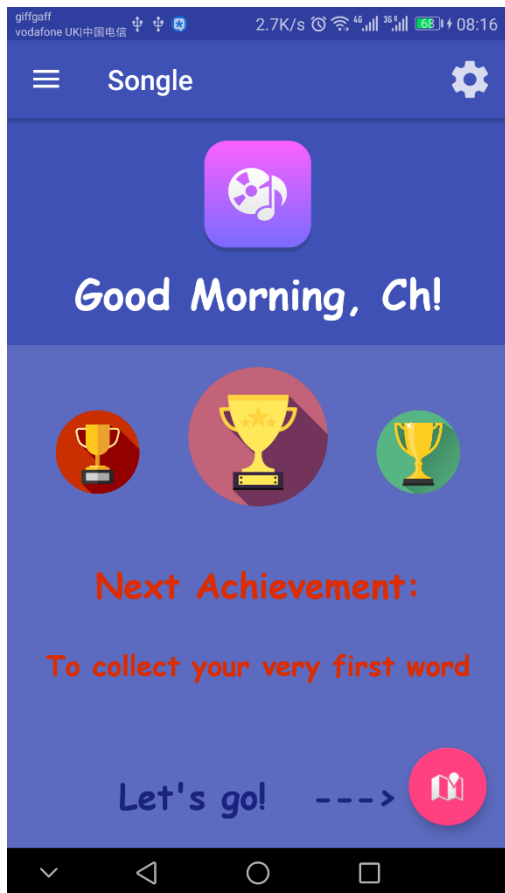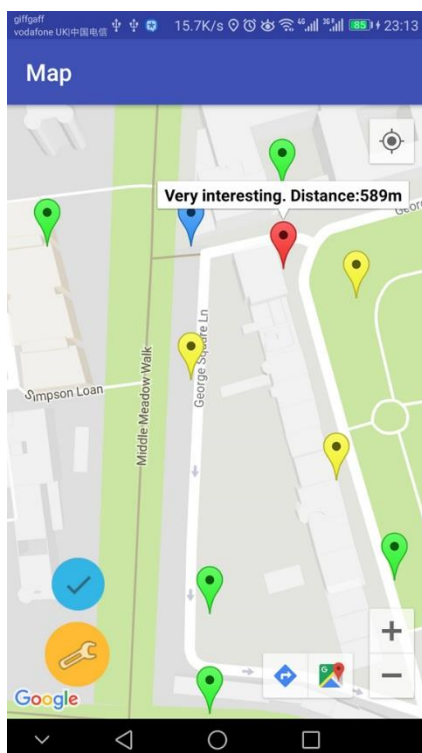

1.2.4 Map Activity

Map activity is the activity shows the location of the words to be collected. In the map, words classified as very interesting, interesting, not boring and boring, marked as red, blue, yellow and green pins. When click on the pin, the word classification and the distance to the player will pop up.

User can set map preference by clicking the spanner button on the bottom. Options including map types (normal map or a hybrid satellite map), word classification (show all the words or words better than boring/not boring/interesting). The ◆ button can give navigation suggestions to a specific point.

The blue "√" button is for going to the Game Activity. Player can click it when he or she has an idea about the song name or just want to have a look at the words collected.

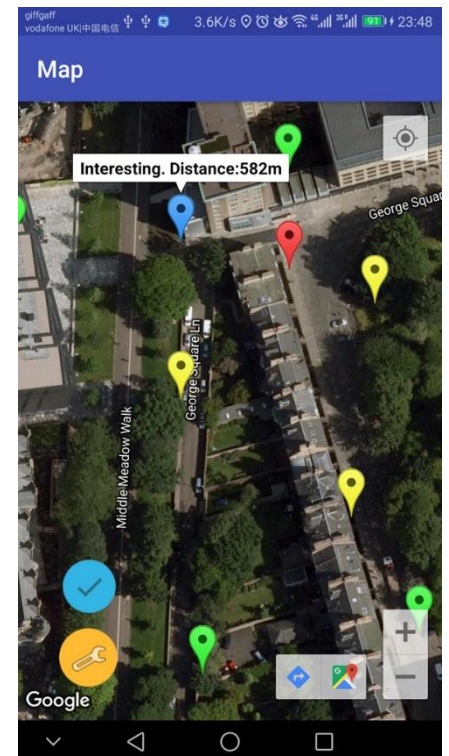Picture 1 is the normal map with all the words. Picture 2 is a normal map with only interesting and very interesting words displayed. Picture 3 is hybrid satellite map.
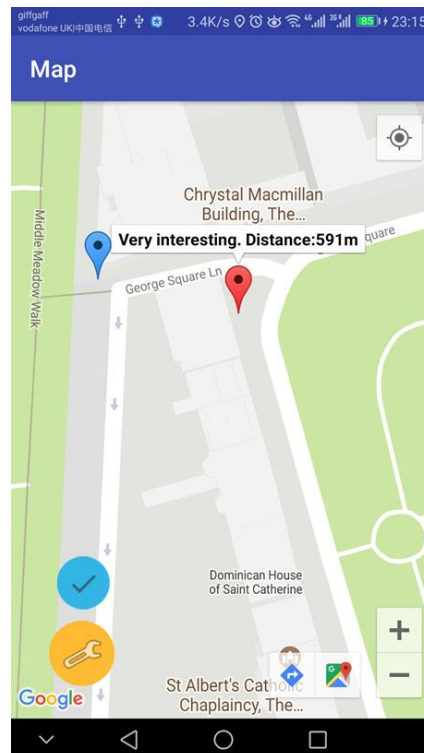


| picture 1 | picture 2 | picture 3 |

1.2.5 Game Activity

Game activity is the activity for the user to guess the name of the song. When the "√" button in map activity is clicked, the Game activity will show up. In this activity, player can

review the words collected (either in the order of the time collected or the order in the song. This depends on the difficult level of the game). Press back button and return to the map activity when the words are not enough to come up with the song name. An Edit Text box will be provided to enter the song name. When the answer is correct, the app will give a congratulation page and choose either to watch the MV on YouTube or go back to the Main Activity. If the answer was incorrect for several attempts, the app might give a hint (like how many letters in the name. This depends on the game difficult). The user can click "I give up" and back to main activity, start with another song. (The front of the tittle will be changed into style of comic.ttf in onCreate function)
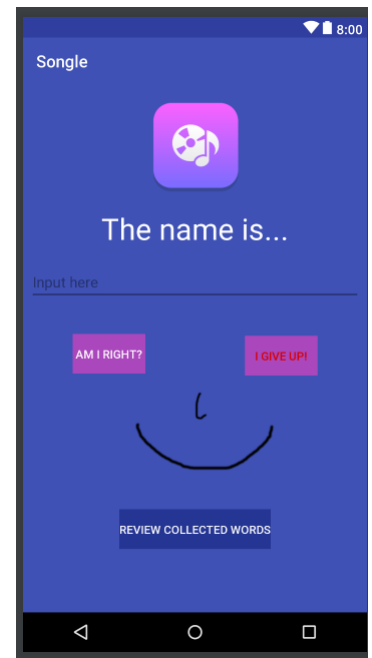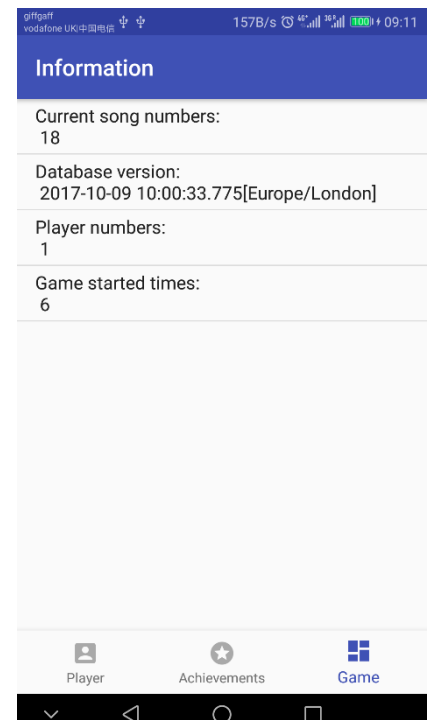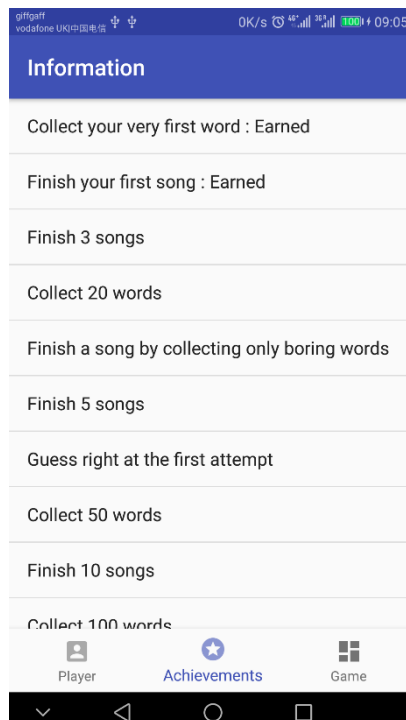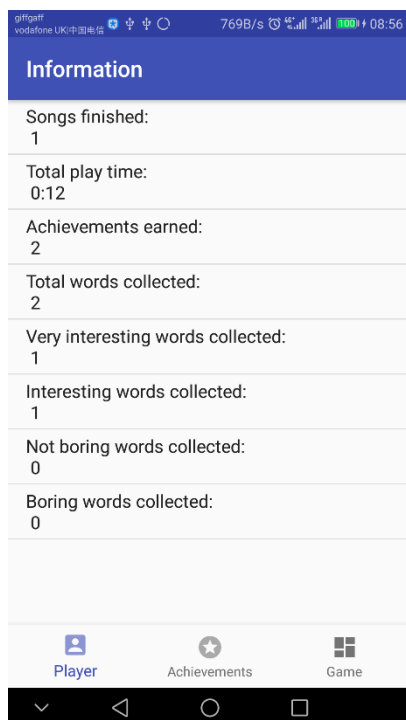
1.2.6 Info Activity

Player can launch the Info Activity by clicking the Info button in the drawer.

The info activity contains three fragments: Player info, Achievements and Game info.

Each of part will provide some information about the game. Player can see the game statistics, achievements to be earned and the database version.

1.2.7 Preference Activity

The Preference Activity allows player to customize the game.
Options including:

- Map style → Normal map or hybrid satellite map
- Words filter → Show only 25/50/75/100% of the words or very interesting & interesting words only
- Words classification → Mark different type of words with different color or all the words are equal
- Hint switch → Whether hint will be shown in the guessing part
- Review word list mode → words in the order of collection time or the order in the song. This will change the difficulty greatly
- Song setting → User can choose a specific song to start (finished or not finished) or start with a random song
- Video switch → Whether show the video on YouTube after finishing a song
- Logout → Log out the current account

1.2.8 Bonus features included in the activities

1. Facebook login & share (Login and Main activity)

   By linking with a Facebook account, player can get his name and profile photo synchronized. The share button will allow the user to share the game with friends.

2. Game difficulty (Game, map and setting activity)

   Player can adjust the difficulty by different settings.
   - Words order: the words collected will be shown in the order of collection orders or the place appears in the song. Image the player collect word "of", "silhouette" and "little" in the lyric "I see a little silhouette of a man". It will display as "of" "silhouette" "little" in the first style and "little silhouette of" in the second style, which will make the game much easier.

   - Words classification: classify words or all the words are equal (User won't know the word types, so they need to walk more to get enough words).

   - Hint: Different levels of hints when guessing the song name; (no hint, number of letters in the song name, first letter of the song name,)

   - Timer: To increase difficulty, player can set a "timer". After a specific time (for example 1 minute), a random collected word will be set as uncollected and not shown in the collected list. Thus, the player need to collect words fast and figure out the song name before all the words vanish.

3.Achievement System & player statistics (Main and info activity)

- Achievement system: Game is designed with achievement system. A list of pre-set achievements from easy to harder is given. Every time the user starts the game, the main activity will give the next to-be-earned achievements.

- Player statistics and game information: in the Info activity, player life time data (song history, game timer, achievements numbers and word history) and some app information (song database number, data version player numbers and game times) will be given.

4.Game assists (map activity and game activity)

Some of assisting functions are designed to give the player a better experience:
- Different map style: normal or satellite map style
- Map assists: show distance when a specific point is selected and give navigation suggestions
- Game pause: when player quits a game, the game data (like the list of words collected) will not be lost. Data will be loaded when the game starts again
- Night mode: reduce screen lightness at night

1.3   Other details

• The word will be considered collected in a specific range (10m). When the word is collected, a toast will show up and display the word. After that the mark on the map will be invisible and the word will be automatically added to the list

• If a player wants to play an identified song again, all needs to do is go to the preference session and set the song choosing setting option to the song prefered.

• When the user "give up" a song, he can go back to this any time and the word already collected will not lose

• The lyric and song files are downloaded to the local device, so they can still be shown in the map fragment when there is no data connection. However, Google doesn't allow downloading or caching Google Maps for offline use as they stated in the website, we need to use OpenStreetMaps for offline map, which will consume a lot of space and storage. Offline location is quite inaccurate, which will lead to a very bad game experience (Many map marks are very close to each other. Player may "collect two words in the same time"). Since 4G connection is stable and WIFI is covered around the central campus, I decide not to add offline game support specially. But still, game statistics, map marks and other contents are accessible when offline.