CA400 FUNCTIONAL SPECIFICATION

Chirp – Audio Social Updates

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CA400 Functional Specification Contents

1. Introduction

1.1 Overview

The goal of this project is to provide a new medium for publishers, journalists or reporters and average Twitter users to interact with each other. By providing more context and richer storytelling, a stronger connection can be established between users.

A novel aspect of the project is that it will require little to no custom server infrastructure. We intend to do this by layering the application's transport and storage methods on top of existing platforms, namely Twitter and Google Drive.

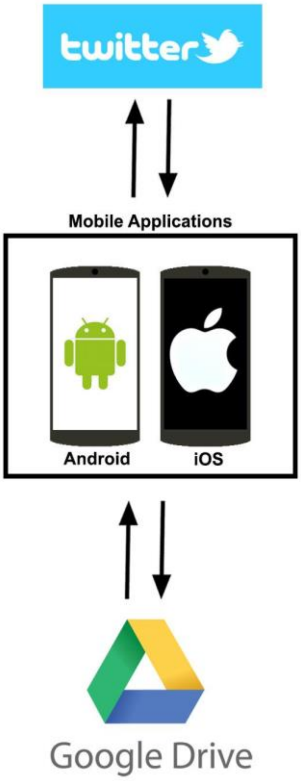
The project at its' core is a mobile application (for both iOS & Android) that allows a user to select specific Twitter profiles and for a set period listen to tweets posted by them in real time. The "content creator" user can make use of our application to record a Tweet, after which they can share a link to the recording with their followers. As soon as this Tweet appears in the original user's application feed the audio recording will be played in real time.

The application will be developed natively in both iOS (Swift) & Android (Java) to allow for a wider user base.

1.2 Working with Other Systems

The application will interact with 2 main outside systems.

- Google Drive
- Twitter



Twitter

The application will interact with the Twitter API in several ways. Provided the application has been granted access by a user to their Twitter account, it can be used to carry out any of the functions described in the below sections.

Google Drive

Google Drive will be used as the main storage for our application. We intend to use each user's Google Drive storage for both their own recordings (that will be shared with others via Tweet) and any recordings that they wish to listen to.

1.3 Business Context

The context of this application is that of an external application for a social media site such as Twitter. Rather than being a replacement for Twitter, this app will act as an addition to the users' Twitter experience. Users can open our app to listen to tweets from their favourite users on the topics they care about, in situations when they are unable to read tweets in the native Twitter app. Meanwhile, journalists or amateur commentators alike can use the voice recording aspect to add a richer context to their thoughts on the social media site. This can allow for an increase in the number of people that use their Twitter account and how long they use it for.

1.4 Key Assumptions

There are several key assumptions that we will be making during the project's timeline.

- It is assumed that the core way in which Twitter operates will not change during the development of the application(s).
- No PII (Personally Identifying Information) will be gathered by the application and will therefore not be a GDPR concern.
- It is generally assumed that a user will have an "adequate" amount of storage available in their Google Drive. Most specific instances where their storage is accessed (i.e. uploading a Tweet to be shared) will have explicit checks on the storage levels and will notify the user if there is inadequate storage available. However, in cases where this is not explicitly stated, the bolded is assumed.

1.5 Glossary

Tweet - *A post created and shared by users for the social media website Twitter.*

Hashtag - *A keyword or phrase used to describe a topic or a theme, which is immediately preceded by the pound sign (**#**).*

API - *An application program interface (**API**) is a set of routines, protocols, and tools for building software applications.*

PII - *Personally Identifying information, also known as personal information, Personal Data, or sensitive personal information (SPI), is any information relating to identifying a specific person.*

Swift - *Swift is a general-purpose, multi-paradigm, compiled programming language developed by Apple Inc. for iOS, iPadOS, macOS, watchOS, tvOS, Linux and z/OS.*

2. General Description

2.1 System Functions

Log in / Authorise with Twitter & Google Drive- Upon opening the application for the first time, the user will be prompted for permission to connect with the users' Twitter & Google Drive accounts. This is necessary as the application will be tweeting on behalf of the user containing a link to their recording at a later stage. The application will also be accessing the user's Google Drive storage at various points.

Record a Tweet using Device Microphone - The application will make use of the device's on-board microphone to record the tweet that the user wishes to share. This will also require permission and will likely be done at the same time as permission to connect to the users' Twitter account is granted.

Uploading of recording to Google Drive - After a user records a Tweet, the application will upload it as a .mp3 file to that user's Google Drive storage (like above, permission will be required). It will initially check if there is enough storage available before attempting to upload it. If there is insufficient storage available for the recording, the upload will fail, and the user will be sent an error message stating this.

Tweet out link to the recording - Provided the recording has been successfully uploaded to Google Drive, our application will Tweet out a link to that recording for other users to download and listen to.

"Go Live" Function - A user at any point can select to "Go Live". This simply means that for a set period any tweets posted by Y users (the group of users chosen in the next step) will be automatically played in real time for the user to listen to.

Select users to listen to - After selecting the "Go Live" function, the user will be presented with a list of Twitter accounts that they follow with a checkbox beside each. They can then go through the list and select each user that they would like to listen to. The user may also make use of a search function to look for a specific account provided they know that account's Twitter handle and are following them.

Select Time Frame or Duration to listen for - After the user has chosen which accounts they would like to listen to, they now select either a time frame to listen for (e.g. from 2pm - 4pm) or they can give a fixed amount of time after which they would like to stop listening (e.g. for the next 2 hours). This time frame or amount of time can be changed at any point while listening to tweets to give the user more flexibility while using the application.

Playing of audio recordings - The application will automatically download and play a recording when it detects that one of the selected users has tweeted out a link to a recording.

Replayability functionality - We want to add some sort of replay function to the application in case the user misses one of the tweets that was posted on their feed. This means that if a user does happen to miss one (or more) tweets they can simply click an icon on the specific tweet to listen to it again.

2.2 User Characteristics and Objectives

The typical user of our application is hard to pinpoint due to the very broad range of expected users. Due to there being very few requirements to use the application; a user simply needs a device with a steady internet connection, a suitable operating system and a Twitter account. This means that our user base will vary greatly in age, technical capability, location, personal interests and accessibility requirements. We hope to tackle a number of these challenges as best as we can.

Technical Knowledge

Our application needs to be simple and intuitive such that any technically inexperienced users have little to no issue using the application. Due to the sparse requirements for our application (mentioned above) it is extremely likely that our application would have a significant number of users who are not technically inclined and therefore it is an important consideration to make. Ultimately the user interface must be easy to use and understand and it should not confuse the end user. All steps that the user must take should be clearly explained to the user and it should be straight-forward to navigate.

Accessibility

Our application will need to conform to standard accessibility practices. Some examples of important accessibility design decisions could include high colour contrast, large enough text, large UI buttons, etc. This inclusion of accessibility features is important to limit the number of issues that users encounter while using our application and allow for as many users as possible to use our application.

2.3 Operational Scenarios

USE CASE 1	**User Login to Twitter and Google Drive**	
Goal in Context	Login and Authorize access to the user's Twitter & Google Drive accounts.	
Scope & Level	System, Core	
Preconditions	User has the app downloaded User has a Twitter account User has a Google Drive account	
Success End Condition	User successfully logs in to both Twitter & Google Drive, and grants permission to app to access both accounts	
Failed End Condition	User fails a login to either account or does not grant permission	
Primary **Secondary Actors**	User Twitter Google Drive	
Trigger	User opens the application and receives a login prompt	
Description	**Step**	**Action**
	1	User opens the application
	2	User is prompted to login and grant permission for the app to access the user's Twitter account
	3	User receives feedback that they have successfully completed the above step
	4	User is prompted to login and grant permission for the app to access the user's Google Drive account
	5	User receives feedback that they have successfully completed the above step
Extensions	**Step**	**Branching Action**

	2a	User fails the Twitter login process
	4a	User fails the Google Drive login process

USE CASE 2	**Begin Recording a Tweet**	
Goal in Context	User wants to begin recording a Tweet.	
Scope & Level	System	
Preconditions	User has the app downloaded User's device is capable of recording audio User has granted the app permission to access the device's microphone	
Success End Condition	User successfully recorded a Tweet	
Failed End Condition	User was unsuccessful in recording a Tweet	
Primary **Secondary Actors**	User User's device	
Trigger	User clicks "Record a Tweet" button	
Description	**Step**	**Action**
	1	User selects "Record a Tweet"
	2	User receives feedback that recording has begun
Extensions	**Step**	**Branching Action**
	2a	Error prevented recording from starting

USE CASE 3	**Finish Recording a Tweet**	
Goal in Context	User wants to finish recording a Tweet	
Scope & Level	System	
Preconditions	User has the app downloaded User's device is capable of recording audio User has granted the app permission to access the device's microphone User has begun recording a Tweet	
Success End Condition	User successfully finished recording a Tweet	
Failed End Condition	User was unsuccessful in finishing recording of a Tweet	
Primary **Secondary Actors**	User User's device	
Trigger	User clicks "Stop Recording" button	
Description	**Step**	**Action**
	1	User selects "Stop Recording"
	2	User receives feedback that recording has finished
Extensions	**Step**	**Branching Action**
	2a	Error prevented recording from finishing

USE CASE 4	**Delete a recorded Tweet**	
Goal in Context	User wants to delete a recorded Tweet	
Scope & Level	System	
Preconditions	User has the app downloaded User has successfully recorded a Tweet	
Success End Condition	User successfully deletes a recorded Tweet	
Failed End Condition	User is unsuccessful in deleting a recorded Tweet	
Primary **Secondary Actors**	User User's Device	
Trigger	User clicks "Delete Tweet" button	
Description	**Step**	**Action**
	1	User selects "Delete Tweet"
	2	User confirms action
	3	User receives feedback that the Tweet has been deleted
Extensions	**Step**	**Branching Action**
	2a	User does not confirm deletion of Tweet
	3a	Error prevented Tweet from being deleted

USE CASE 5	**Upload a Tweet**	
Goal in Context	User wants to upload a recorded Tweet to their Google Drive	
Scope & Level	System, Core	
Preconditions	User has the app downloaded User has successfully recorded a Tweet User has a Google Drive account	
Success End Condition	User has successfully uploaded a Tweet to their Google Drive	
Failed End Condition	User fails in uploading a Tweet to their Google Drive	
Primary **Secondary Actors**	User User's Device Google Drive	
Trigger	User clicks "Upload Tweet" button	
Description	**Step**	**Action**
	1	User selects "Upload Tweet"
	2	User receives feedback that the Tweet has been uploaded
Extensions	**Step**	**Branching Action**
	2a	Error prevented Tweet from being uploaded

USE CASE 6	Share a Tweet	
Goal in Context	User wants to share a recorded Tweet	
Scope & Level	System, Core	
Preconditions	User has the app downloaded User has granted permission to app to post on the user's Twitter page User has recorded a Tweet which has been successfully uploaded to Google Drive	
Success End Condition	User successfully shares a link to the recorded Tweet on Twitter	
Failed End Condition	User is unsuccessful in sharing a link to the recorded Tweet	
Primary **Secondary Actors**	User User's Device Google Drive Twitter	
Trigger	User clicks "Share a Tweet" button	
Description	**Step**	**Action**
	1	User selects "Share a Tweet"
	2	User may add optional extra text to Tweet
	3	User selects "Publish Tweet"
	4	User receives feedback that Tweet has been successfully shared on Twitter
Extensions	**Step**	**Branching Action**
	2a	User reaches the character limit of a Tweet
	4a	Error prevented Tweet from being shared

USE CASE 7	**Go Live & listen for Tweets**	
Goal in Context	User wants to go live and listen for Tweets	
Scope & Level	System, Core	
Preconditions	User has the app downloaded User has followed at least 1 Twitter account	
Success End Condition	User successfully goes live and has recorded Tweets played through their device in real time	
Failed End Condition	User was unsuccessful in going live	
Primary **Secondary Actors**	User User's Device Twitter Google Drive	
Trigger	User clicks "Go Live" button	
Description	**Step**	**Action**
	1	User selects "Go Live"
	2	User chooses which of their followed Twitter users to listen to using checkboxes beside each user
	3	User enters a time period or time frame to listen to Tweets for
	4	User receives feedback that they were successful
Extensions	**Step**	**Branching Action**
	2a	User does not choose any users to listen to
	3a	User enters an invalid time period or time frame
	4a	Error prevented the user from going live

<table>
<tr><td><b>USE CASE 8</b></td><td colspan="2"><b>Replay a Tweet</b></td></tr>
<tr><td><b>Goal in Context</b></td><td colspan="2">User wants to replay a recorded Tweet</td></tr>
<tr><td><b>Scope &amp; Level</b></td><td colspan="2">System, Core</td></tr>
<tr><td><b>Preconditions</b></td><td colspan="2">User has the app installed
User has gone live and had at least 1 Tweet played during that period</td></tr>
<tr><td><b>Success End Condition</b></td><td colspan="2">User successfully replayed a recorded Tweet</td></tr>
<tr><td><b>Failed End Condition</b></td><td colspan="2">User was unable to replay a recorded Tweet</td></tr>
<tr><td><b>Primary</b>
<b>Secondary Actors</b></td><td colspan="2">User
User’s Device</td></tr>
<tr><td><b>Trigger</b></td><td colspan="2">User clicks the “Replay” icon found beside each Tweet</td></tr>
<tr><td><b>Description</b></td><td><b>Step</b></td><td><b>Action</b></td></tr>
<tr><td></td><td>1</td><td>User selects “Replay Tweet”</td></tr>
<tr><td></td><td>2</td><td>User receives feedback in the form of the Tweet being replayed via the device speaker</td></tr>
<tr><td><b>Extensions</b></td><td><b>Step</b></td><td><b>Branching Action</b></td></tr>
<tr><td></td><td>2a</td><td>Error prevented Tweet from being replayed</td></tr>
</table>

2.4 Constraints

Technical Constraints

The application will be developed for the latest version of iOS and Android, which means that devices not capable of running these operating systems may be unable to run our application. Whether that be phones that use alternative operating systems such as Windows Phones, or older mobile devices that are no longer supported by the latest version of the operating systems (e.g. the iPhone 5C).

The device that is running the application must also have a steady connection to the Internet in order to upload and download recorded Tweets. Any disruption in this connection could lead to problems during upload/download processes that would cause harm to the user experience.

User Constraints

As described in section 2.2., due to the very broad range of users it will be important to ensure that we account for a range of accessibility issues wherever possible. Due to the nature of the application issues such as hearing impairment / loss may be difficult to tackle however we will do our best to make the app accessible to as many users as is practical.

Security Constraints

Our application will require permission to a few different features of a user's device. These permission requests will all need to be accepted by the user when they first launch the application. If the user chooses to decline some of the permission requests the application will not be able to carry out its function and will ultimately fail in some of the tasks it is designed to perform.

3. Functional Requirements

3.1 Authorise with Twitter & Google Drive

Description

When a user launches the application for the first time, they will be prompted to give permission for the application to use their Twitter & Google Drive accounts. This may also require the user to login to their account which is described in further detail below.

Criticality

This permission is vital as without it the user would be unable to share the link to their recorder Tweet via the application.

Technical Issues

It is important to ensure that a user trying to authorise a Twitter or Google Drive account is the actual owner of that account. We can ensure this by using the ***force_login*** parameter for the ***GET oauth/authorize*** method within the Twitter API for example. This simply forces the user to enter their login details in order to grant authorisation.

Dependencies with other requirements

N/A

3.2 "Go Live" Function

Description

At any point a user can select to "Go Live". This simply means that they wish to receive real time audio updates and will likely be a button on the application home page.

Criticality

This is an essential part of the application and without it there is very little for the user to do.

Technical Issues

The button itself simply needs to be big enough to account for any accessibility issues due to the wide range of users. Any technical concerns with this functionality will be covered in below requirements.

3.3 Select users to listen to

Description

After selecting the "Go Live" function the user will be presented with a list of Twitter users that they follow where they will then select which users, they would like to receive updates from.

Criticality

Without this function it would be impossible to determine which Tweets to share with which users and would cause serious problems. As such it is of vital importance to the successful development of the application.

Technical Issues

Issues may arise around the accessibility in displaying the list of followed users as it may prove to be a very large selection. They will likely be split into pages alphabetically and will either be a set amount per page, or it may vary depending on the size of the device being used. They checkboxes that will be used to select a user to listen to will also need to scale with the device display size as otherwise it could create problems for users if they are too small.

Dependencies with other requirements

This is dependent on requirement 1 & 2 as it will need to view the user's followed Twitter accounts, and directly follows on from the "Go Live" function being accessed.

3.4 Select time period to listen for

Description

The user will need to either specify a time range or a set amount of time that they wish to receive updates for.

Criticality

This requirement is vital as without it the user would receive updates indefinitely. This is obviously an issue as it's almost certainly not what the user wants, but also it could cause problems for the device's battery life if it were constantly playing recordings.

Technical Issues

The biggest issue that comes to mind could be around time ranges in different time zones. These time periods that the user selects would therefore need to be based on the user's local time rather than a set time period for all users.

Dependencies with other requirements

This function will be dependent on requirement 3 as it directly relates to it.

3.5 Automatically play Tweets in Real Time

Description

When the application detects that a link to a recording has been shared by a selected user, it must automatically download that Tweet and play it in real time for the user to hear.

Criticality

Being the core functionality of the application, this is incredibly important to implement correctly and execute to a high standard.

Technical Issues

Several things could be problematic during this step. If the user's internet connection is disrupted during the download of a Tweet, it will fail therefore it is important to make sure that the download takes place as soon as possible. It may also be necessary to add a cap on the length of the Tweets being shared to ensure that they can be shared quickly and efficiently to a wide range of users with a variety of internet speeds.

Dependencies with other requirements

This requirement is dependent on requirements 1 (Must have granted access to Google Drive) and requirements 2 through 4 as the user needs to be Live for a Tweet recording to be played.

3.6 Record a Tweet

Description

The user should be able to use their device's microphone to record a Tweet that will then be shared via the application.

Criticality

This is another very important feature of the application and is therefore crucial. Without this functionality there would be no Tweets for other users to listen to.

Technical Issues

The biggest issue will likely be around making sure that the user has granted the application permission to use the microphone located in the device. There could also be some potential issues with the quality of recordings. However, as this will likely be down to each individual user (Their location, background noise, age of device, distance from their mouth etc.), it is therefore not something we will be looking to tackle for the time being.

3.7 Upload a Tweet to Google Drive

Description

Once the Tweet has been recorded the user can either select to delete it and record a new Tweet or upload it to their personal Google Drive account. When the upload has been successful the application will supply the user with a written Tweet containing a link to the recording.

Criticality

This step is vital as it is the key point behind how the application stores and shares the recorded Tweets.

Technical Issues

Like the above requirements, if the application has not been granted permission to access a user's Google Drive it will be unable to perform this function.

There will likely need to be some sort of check on the available storage in the user's cloud storage. If there is insufficient space available, the upload process will fail, and the user will need to be informed.

Dependencies with other requirements

N/A

3.8 Share a Tweet

Description

The user should be able to share a recorded Tweet with his/her followers via the application. This will be in the form of a link to the recording in his/her Google Drive storage along with a custom hashtag to easily identify Tweets created using our application.

Criticality

For the application to be useful to users it is important that they can share a recorded Tweet in the first place. As such this is one of the most important functions to implement correctly.

Technical Issues

It will be important to make sure that the privacy setting of the recording allows for other users to listen to the Tweet. We can do this by having all recordings uploaded to a set folder that has the correct privacy settings, as all items within a folder will share the same settings.

Dependencies with other requirements

This is dependent on requirement 1 as in order to share the recording via Twitter the application will need authorisation.

3.9 Replay a Tweet

Description

The user should be able to replay a Tweet as many times as they wish during the "Go Live" period.

Criticality

Although this function is not vital to how the application will operate, it is a nice quality of life feature that we feel users will appreciate. Due to the nature of the application, the user will likely be busy and may miss a Tweet.

Technical Issues

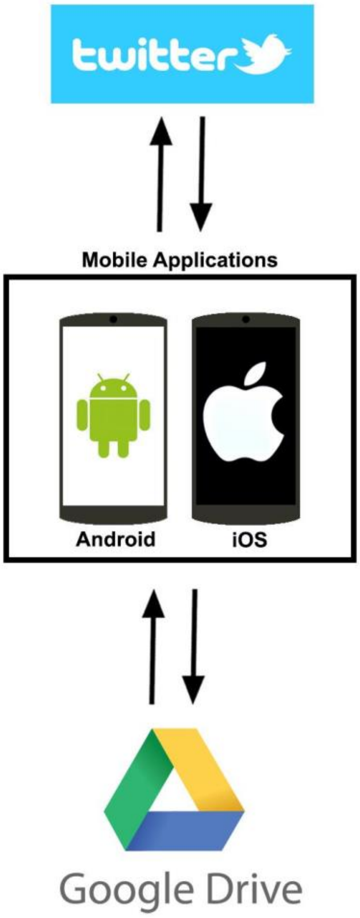
A key issue that we will need to consider is how long a Tweet can be replayed for, and for how long it will be stored in Google Drive so as not to use too much storage.

Dependencies with other requirements

This is dependent on requirement 2 because the user must have been live and had at least 1 Tweet played during that time period in order to be able to replay it.

4. System Architecture

4.1 General Architecture Diagram



4.2 Mobile Applications

The "Mobile Applications" component seen in the diagram above consists of the Android and iOS versions of our mobile application. Both applications will carry out the same functions, as well as having the same GUI. The implementation of each application may differ slightly due to constraints within the languages themselves, however we will attempt to develop them both in parallel wherever possible.

4.3 Relevant Tweet Detection

A key aspect of our project is to detect when a link to a recorded Tweet has been shared. This recording should only be downloaded and played if a user who is currently live is following the source account and has selected that account as one they wish to listen to.

One technique that we intend to make use of when performing the initial relevant Tweet detection is explicit pattern matching for a specific Hashtag that we intend to use. An example could be **#Chirp**. The idea behind this is that any Tweet that is shared via our application (i.e. all recorded Tweets) will contain a mandatory hashtag. In this case, it is **#Chirp.** In the case that all recorded Tweets contain the same Hashtag, it becomes far easier to narrow down the pool of possible Tweets that the user wants to hear.

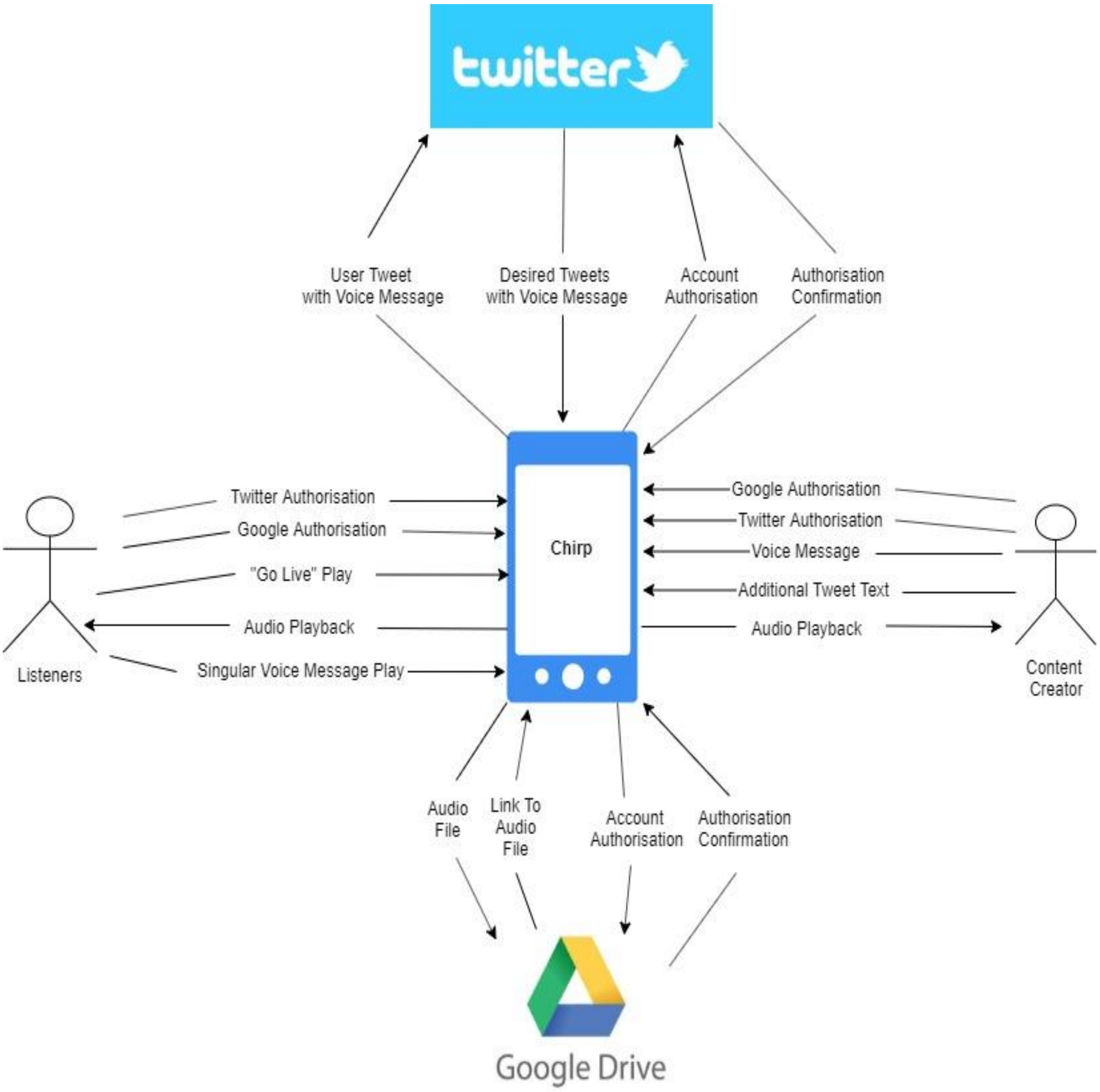
To avoid a case where a user is simply Tweeting about the application itself, without a link to a recorded Tweet, we could also specify that we only want to find Tweets containing the Hashtag and a link to a Google Drive file.

We feel that through the above described pattern matching we can drastically reduce the number of "false positive" Tweets that we may encounter.

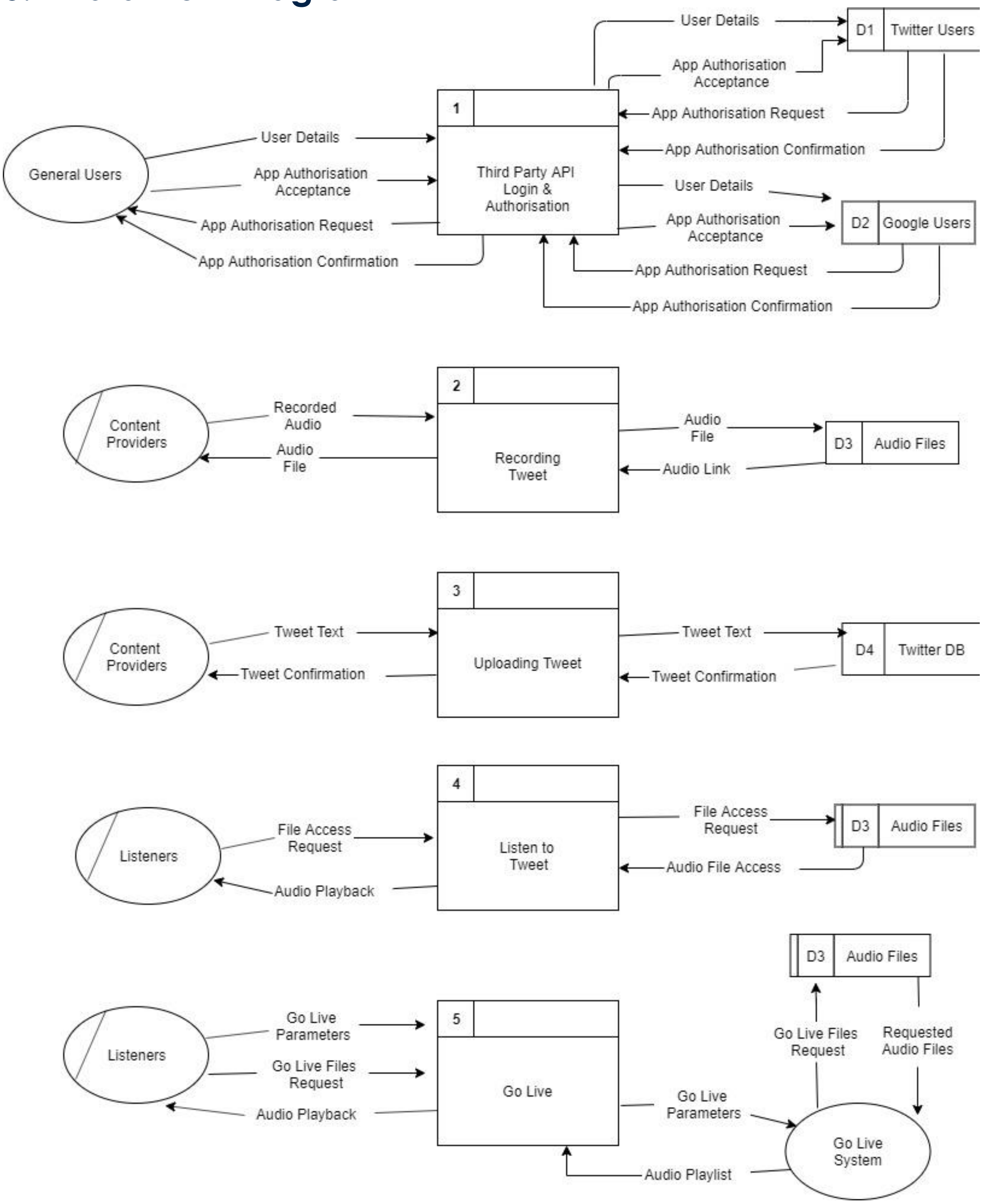
Rather than specifically searching for the above it may be possible to have some sort of alert system for the application's back-end that will be notified any time a relevant Tweet is posted by a user that is currently being listened to. This has not been fully explored however and will remain to be seen how practical it is during development.

5. High-Level Design

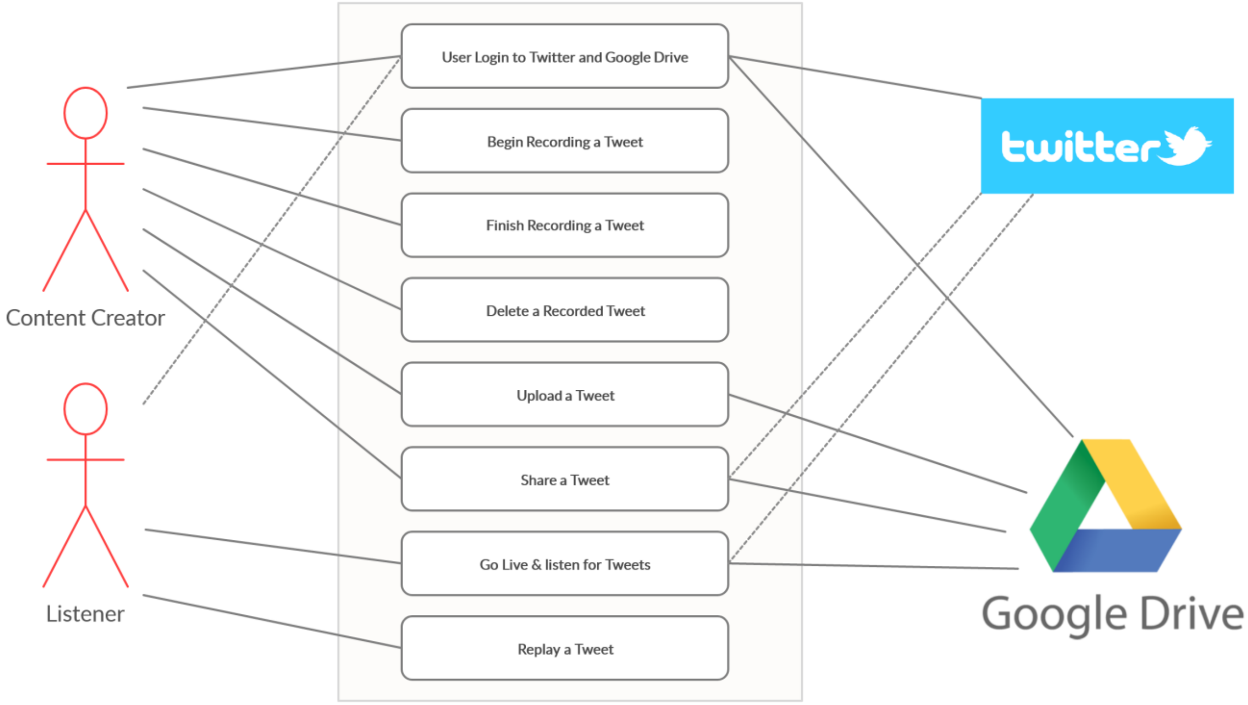
5.1 Context Diagram



5.2 Data Flow Diagram

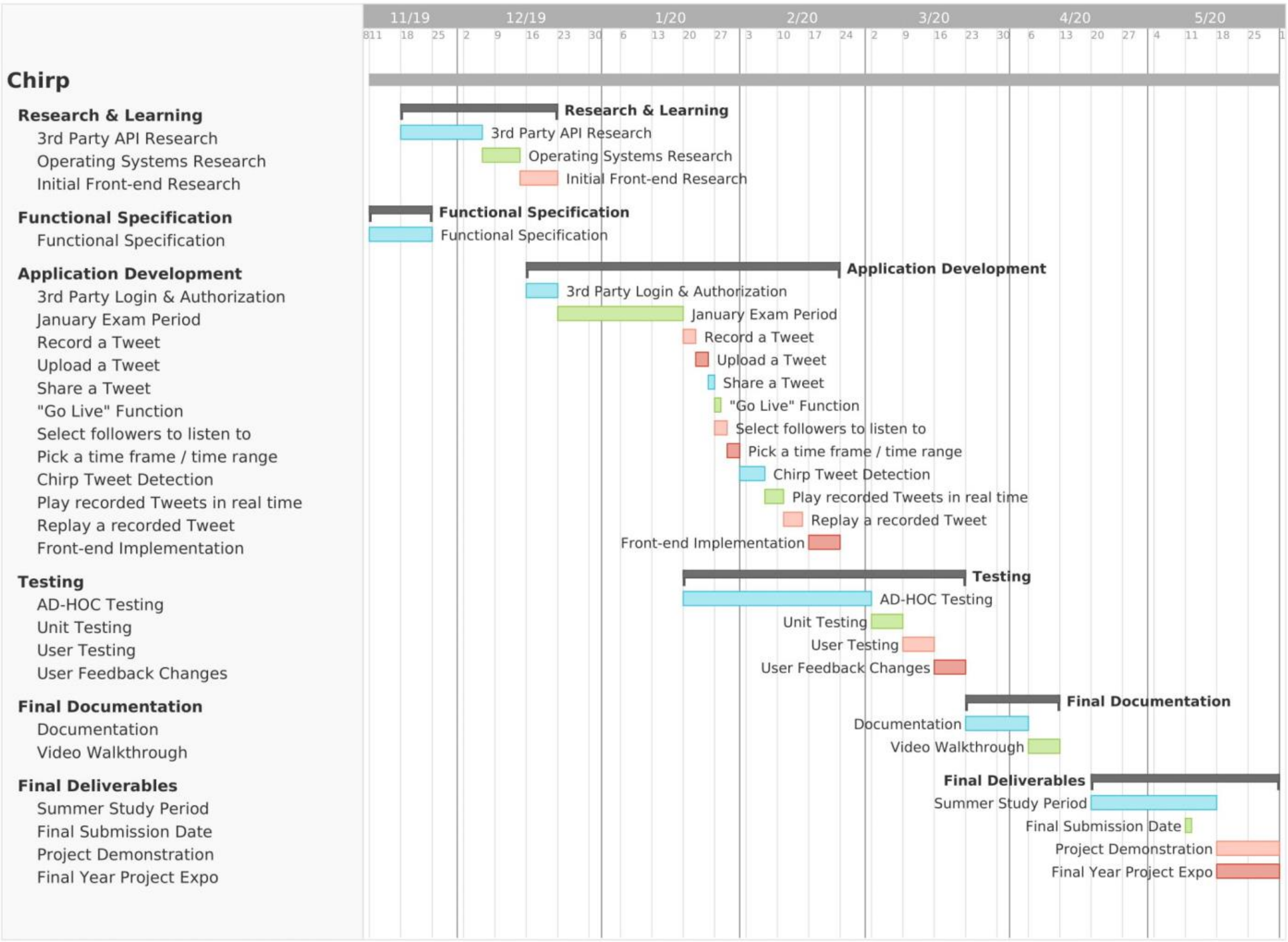


5.3 Use Case Diagram



6. Preliminary Schedule

6.1 GANTT Chart



The above diagram is intended to serve as a rough guideline to help us ensure that we finish all the project deliverables on time. We will likely be doing some things such as Research, Testing, Debugging, Refactoring throughout the overall development process in parallel with other tasks.

7. Appendices

Java

1. https://docs.oracle.com/en/java/
2. https://en.wikipedia.org/wiki/Java_(programming_language)

Swift

1. https://developer.apple.com/swift/
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General Research & Learning

1. https://developer.android.com/guide/topics/ui/accessibility
2. https://developer.twitter.com/en/docs
3. https://developers.google.com/drive
4. https://rapidapi.com/blog/how-to-use-the-twitter-api/