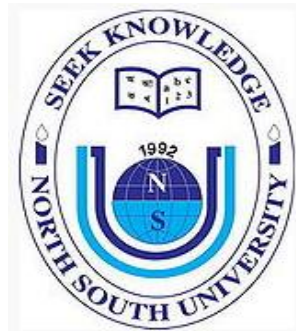


Senior Design Project Report

CSE/EEE/ETE 499B

Android Application for Scheduling Social Media Post



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ELECTRICAL AND COMPUTER ENGINEERING

NORTH SOUTH UNIVERSITY

[SUMMER 2021]

Agreement Form

We take great pleasure in submitting our senior design project report on “*Android Application for Scheduling Social Media Posts*”. This report is prepared as a requirement of the Capstone Design Project CSE/EEE/ETE 499 A & B which is a two semester long senior design course. This course involves multidisciplinary teams of students who build and test custom designed systems, components or engineering processes. We would like to request you to accept this report as a partial fulfillment of Bachelor of Science degree under Electrical and Computer Engineering Department of North South University.

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Android Application for Scheduling Social Media Post

With the development of IT technology and information processing technology, Internet usage is rapidly increasing, and various smart devices appear. Accordingly, modern people can obtain the information they want regardless of place and time. Smartphones are used in daily life, such as leisure activities. Social Media involvement in our lives has increased daily, and maintaining this social media life has become more complex. Sometimes we might have to post our content remotely even when we are away from our workspace, or we might have to post something at a specific time, but we might be busy at that time. So, these issues bring to our solution the social media scheduler application where people can schedule their social media posts and post from multiple platforms from one hub. In this project, we designed and implemented a schedule management application that is helpful in the effective management of social media sites. It is expected that the application of this paper, which is different from other schedule management apps and has improved usability, will be helpful in the efficient management of various social media sites at the same time.

Link to our GitHub Repository: <https://github.com/NSU-SP21-CSE499-18/Group-03>

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Social media is part and parcel of our daily life nowadays. With the development of information and communication science and technology, the use of the internet is rapidly increasing, and various smart devices have appeared. The quality of life is also improving along with changes in the expansion of daily life into cyberspace [1]. Social media, in a sense, is controlling our personal and professional lives. It is expressing our ideas and posting unique content. But it is not an easy task to come up with a unique idea every day or remember to post it later.

Moreover, ideas come suddenly and are hard to recognize as an idea grows with thoughts. So, people often forget them. Modern people are familiar with the digital environment and often use mobile phone SMS, mobile messenger, and schedule management applications for simple expressions of intention or personal appointments. Not so long ago, people usually followed the traditional ways of writing their ideas in notebooks. Later, software like notepad makes it easier but not so efficient. But in recent times, the scheduling system has been made easier with improved efficiency for posts in social media.

Social media used to be the way of expressing oneself, but now, it's a medium for business. Additionally, there are a handful of applications and social media that one needs to maintain regularly. In particular, various schedule management services are used to organize and remember tasks or to-dos suitable for one's role. Planner, One Day, Naver Calendar, Google Calendar, Apple Calendar, and various scheduler apps are used for simple schedule management and time management.

An application that appoints or schedules posts or tweets for social media is commonly known as Social Media Scheduler. It is a mobile application for users for everyday use. It can run in both iOS and Android operating systems. We try to extend it comprising posts, likes, comments, views etc. It will enable ordinary people to make their life easier and pave the way for various businesses to grow more. It can open a new dimension in the era of customer service-based business where the whole industry is built on customers' satisfaction. Marketplace and social media will be more accessible for the customers following the seller's trending posts, creating a more competitive environment for the e-commerce business. Altogether, the social media scheduler application can make a huge impact both in our daily lives and the socio-economic development of a country.

1.2 Purpose

Our primary target is to reach ordinary people motivating them to use our application for increasing their productivity. We will build our application as a user-friendly system for expressing their ideas on popular social media. It will eventually result in the community development of thoughts and ideas to help society establish a futuristic tribe. In addition to this, we will also try to enable the business user to analyze the market, predicting the posts, likes, comments, reviews that the customers follow. Hence, all people can use social media remotely. They can easily maintain their social media accounts from one hub and post on the roam. Personal profile management will be much easier for everyday people following an easy use of every social media application. Lastly, our project aims to provide a solution to our target audience and that we plan to launch an android application.

1.3 Audience

Firstly, we will include pages and groups in different social media to use our application to maintain their pages and groups. There are many agencies and NGOs for various purposes like Hajj agencies, banks, business agencies, organizations, garments, fashion houses, rural development etc. Maintaining a social media account in a different format is a must for every agency to communicate more frequently and efficiently with the users. It extends the scope of the organization and creates a positive impact on the peoples' perspective. Many e-commerce-based businesses are being conducted using these types of social media. Our application can be a great help for those who are starting new. Again, our application can be helpful to large groups too for maintenance, keeping the irrelevant posts or community rules violating comments away. Even if our audience is not so vast, but it can be extended with time.

1.4 Possible Features

Our program is a firebase-based application. The application will have several features like sign in, sign up and registration. Upon appropriate registration, the user can verify the information and log in to individual accounts in specific social media. Users can also provide images of respective accounts or holders and maintain their profiles as per need. Using this registered profile, users can

log in to Facebook, Twitter, Instagram etc. Users can create a post with text input or image or both. It will be a post as per the individual social media rules. For example, Facebook posts can contain texts, links, images, animation etc. The page will be updated in real-time following every comment and reaction. These posts can be scheduled in the profile for a specific time according to the chosen time zone. Thus, posting content will be automated. Moreover, users can also create stories both on Instagram and Facebook. They can be edited as they are on Facebook or Instagram. Users can also add a location to the post and feelings tagging emoticons. Lastly, user can update the scheduled time if one wants to change it.

1.5 Motivations

Many business organizations or start-up companies are conducting their business and connecting with the customer through social media. These social media interactions create considerable revenue increasing sales and providing better customer service. So, they need to keep their social media accounts up to date, posting any recent notices or news. Let's say McDonald's' wants to post about their breakfast special at 6 am, acknowledging the available items from 7 to 10 am. But the things are insured and depend on the supply. So, they need to schedule a post for that time with a tentative menu of items. They can later edit the post confirming the final menu at the end without posting the final draft.

Again, a fashion designing company may want to announce their spring collection before regular posting of their new designs every alternate day. They can post their plans one by one at each day scheduling via an app. It has a natural effect on people, as Kanurai et al. [2] researched.

A prevalent example of today's world is handling different social media accounts like Instagram or Twitter by celebrities or fans. To boost a page or an account or a fan account, posting regularly informing the exact details is a must. Collier [3] explained the scenario providing the example of Instagram. It provides a great advertisement to the celebrity and even to the accountholders. If a page or account makes at least three posts per day, the account will become more engaging and active. The algorithm of social media will promote that account automatically on their discover page. Therefore, the urge to support all these ventures motivates us to build a simple, easy-to-use yet efficient mobile application to schedule social media posts.

1.6 Objectives

This project aims to build a mobile application that can connect with different social media and schedule posts. The followings are the objectives of this project:

- Reviewing the development of a mobile application
- Build an app that is supported both in iOS and Android
- Learn the usage of APIs
- Saving all necessary data and monitoring
- A system with no trust issue
- An easy-to-use system that can deliver real-time information
- Build the APK file supported for different versions
- Hands-on experience to design a real-life application
- Provide a business solution to the business organization

1.7 Organization of Project Report

In chapter 2, we describe the existing system and its different features. The advantages and disadvantages of similar existing applications will also be discussed. The different types of schedulers and their purposes are discussed.

Chapter 3 will explain the system design and methodologies in detail. In this chapter, we will discuss the whole process of developing our post scheduler application. The software engineering methodologies and step by step organization of the project are discussed. The algorithms we use to build the app are explained, and necessary flowcharts are provided to explain the whole thing quickly, making it more understandable. The requirements like hardware and software and project overview interfaces are also being discussed in this section.

Chapter 4 will provide a comprehensive analysis of the output of our application. We have tested our app in different modules and explain the results in this section. We have discussed the type of testing is needed to develop any mobile application. The issues and shortcomings are also being discussed in this section.

Chapter 5 will finally conclude the report discussing some prospects and research of our project.

1.8 Conclusion

Post Scheduler Application is gaining popularity gradually with an increasing number of social media nowadays. Social media has become the fastest way to reach ordinary people and customers without any significant investment in advertising. So, it is cost-efficient for business organizations. But it is hard to manage so many social media at the same time and keep updated the page and information. Services need to be provided on all social media. Hence, comes the necessity of post scheduler software. Organizations can post at a certain time on different social media at the same time or separately. It can enable a better business strategy of being available to the customer 24/7. Eventually, it will increase the brand value and help the business in many other prospects. In this report, we will explain the process of making a post scheduler mobile application that can significantly impact our personal and professional lives.

CHAPTER 2

EXISTING SYSTEMS

2.1 Introduction

There are a considerable number of social media sites that people regularly follow these days. They are Facebook, Twitter, Instagram, Linked In, TikTok, Reddit, Snapchat and Quora. So, covering all of the social media sites for our scheduling is near impossible. Hence, we select some of the most popular sites in our country after a thorough research to support with our application that will allow us to test our application considering the privacy and available API. Different social media sites have their characteristics based on their purpose and methods of posting. Some of them can only post a message, or some can post only images or video clips, and some can do both simultaneously.

With this increasing number of social media sites comes the necessity of managing all of these efficiently and smoothly. Keeping up to date on all required sites is quite a difficult job. The post scheduler app can be a handful. There are some researches, and real-world applications and software are in action.

In this section, we will explain the background of a post scheduler application and different types of it. We will also put forward some state-of-the-art reviews to clear the concept of the post scheduler app and its prospect.

2.2 What is Social Media Scheduler

A social media scheduler is an application or a digital tool to write posts or add images and schedule a specific time to publish them on the respective social media site [4]. One can prepare all types of content supported by the individual social media like texts, images, videos or links with this application. Many schedulers can also provide exceptional services to the business organizations to connect multiple brand pages supporting them to manage their company or clients in a single place. Many of them want to have a team of social media managers to run their connections. But this can prove costly for a start-up or new business. Social media schedulers can play a significant role in this regard. They operate the social account efficiently using this scheduling tool. It also provides an ample opportunity to post as many as the audience want and push more content. Different audiences expect posts at their preferable time, and social media schedulers can enable the chance to show relevant posts to the appropriate audience at a proper time.

2.3 Types of Social Media Scheduler

There are different types of schedulers for various purposes. There are schedulers for jobs, tuitions, events, medicines, calendars etc. But most of them are notification-based schedulers. Social media schedulers are one step ahead, with the authentication process and access to the respective accounts for posting contents [5].

Table 01 shows features in different popular social media sites.

Social Media	Post	Image	Video	Caption	Character Limit	Stories
Facebook	✓	✓	✓	✓	63,206	✓
Twitter	✓	✓	✓	✓	280	✗
Instagram	✓	✓	✓	✓	2200	✓
LinkedIn	✓	✓	✓	✓	1300	✓
TikTok	✓	✗	✓	✓	100	✓
Reddit	✓	✓	✓	✓	40,000	✗
Snapchat	✗	✓	✓	✗	✗	✓
Quora	✓	✓	✓	✓	40,000	✗

Table 01: Features of different social media sites

2.4 Existing System

Many post schedulers in action can be considered as the potential market competitors against our project. They are: Buffer, eClincher, Facebook Business suit, Hootsuite, Sendible, Sprout Social, Social Pilot, Combin Free Instagram Scheduler etc. [6]

2.4.1 Buffer

Buffer is a social media tool that can manage many accounts simultaneously with pricing. Using Buffer, one can connect with Facebook, Instagram, Twitter and LinkedIn. It has cloud storage to store the contents. Anything, including texts and images, can be posted using Buffer. It also provides an insight into the contents scheduled in a dedicated analytic section.

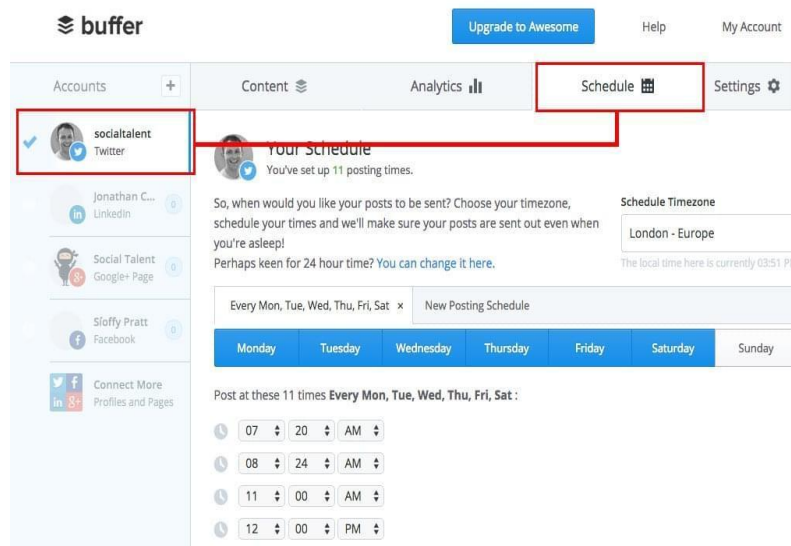


Figure 01: Buffer Scheduler

2.4.2 eClincher

eClincher is an app that is built especially for business organizations. It provides an intuitive yet powerful solution to increase the brand's reach, reputation, and growth. Popular features include suggested content & free media assets, live inbox to interact across all channels/message types, post-editing, scheduler & visual calendar, post-boost, monitoring with live feeds, smart queues & auto-posting, analytics & reports, team collaboration & workflows, mobile app.

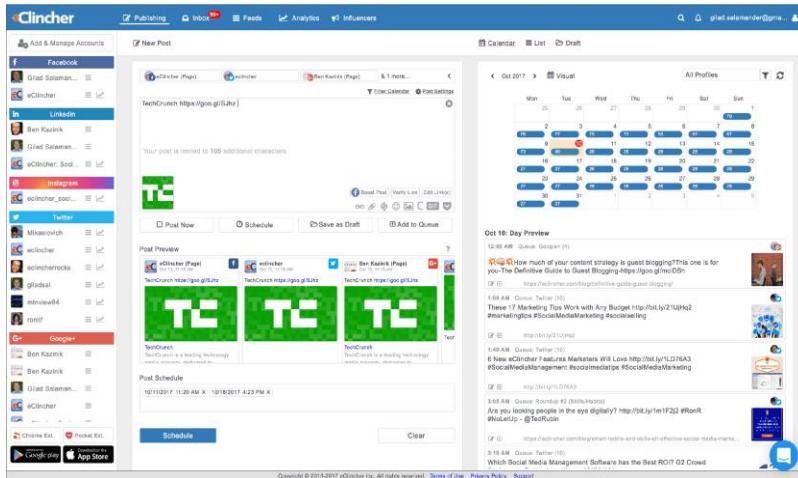


Figure 02: eClincher

2.4.3 Facebook Business Suite

Facebook provides a suitable API to develop apps like post scheduler. Its very own Facebook Business Suite is a perfect solution for those who conduct business through Facebook. It is the official application tool to manage Facebook pages and Instagram pages for business purposes. It provides different features like view activity and business, creates posts stories, ads, schedule posts etc. It stores the scheduled content in its server and publishes it at the scheduled time. It also provides a preview of the planned post.

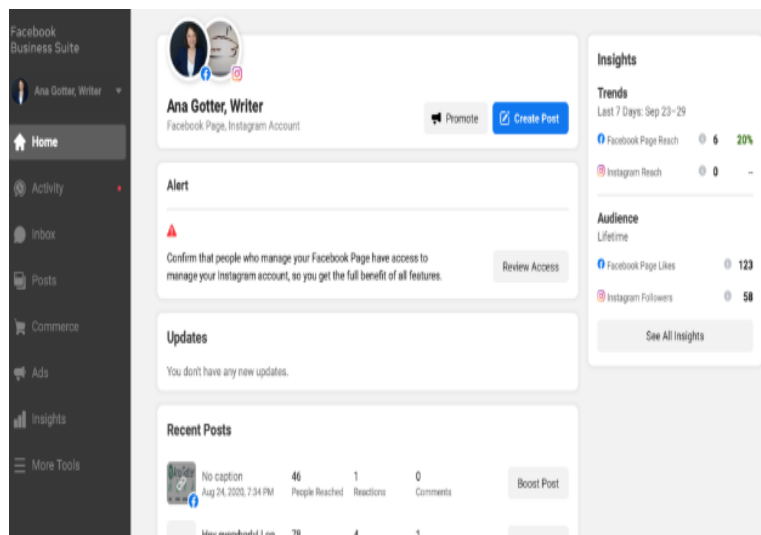


Figure 03: Facebook business suite

2.4.4 Hootsuite

Hootsuite is another practical application for managing social media network channels. Often referred to as a social media management system or tool, it enables you to view multiple streams at once and monitor what customers are saying. You can post updates, read responses, schedule messages, view statistics, and much more. Many international brands—including Coca-Cola and Sony Music—utilize this time-saving approach to social media marketing. With Hootsuite, you can post updates, review responses, and connect with your customer base on over thirty-five popular social networks. Including Twitter, Facebook (includes Profiles, Events, Groups, and Fan Pages), LinkedIn (includes Profiles, Pages, and Groups), Google+, Foursquare, WordPress blogs, and several other platforms via third-party apps.

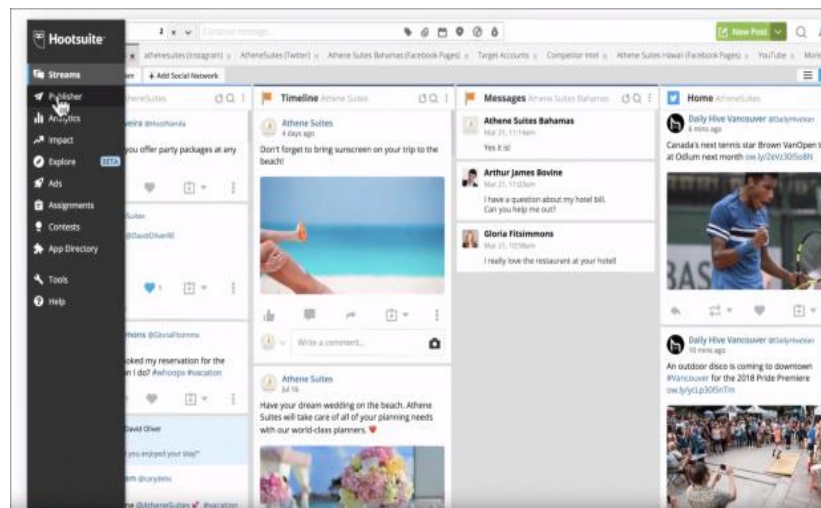


Figure 04: Hootsuite scheduler

2.4.5 Sendible

Sendible is another scheduler app with lots of features set to manage and amplify brands. It allows to schedule posts individually following a queue or in bulk. It extends its scope to adding relevant captions, hashtags, emojis in its suggestion. Announcing a campaign on all the social media sites is a unique business strategy followed by many brands nowadays, and Sendible does the work perfectly. Moreover, it provides its calendar to schedule posts and move one date to another just with a swipe if needed. There are many more features that make it one of the most popular scheduler apps in 2021.

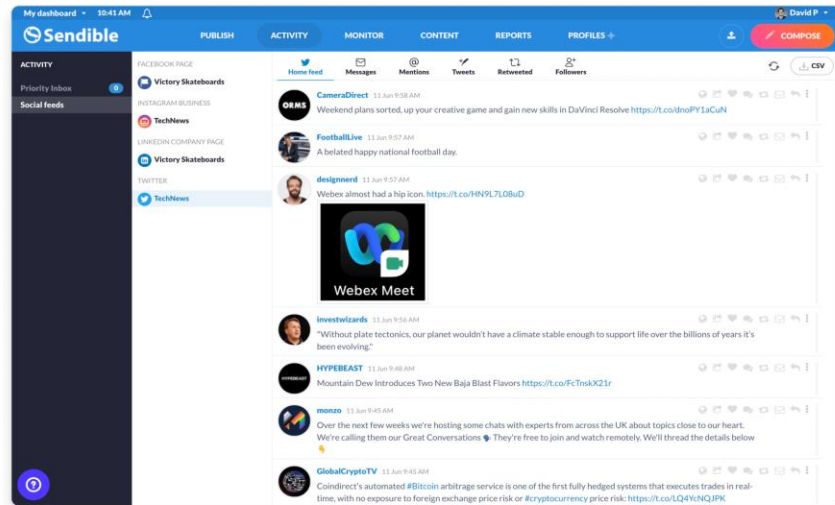


Figure 05: Sendible Scheduler

2.4.6 Agorapulse

Agorapulse is a very flexible, easy-to-use scheduler application with features more than needed. It has excellent scheduling functionality with publishing options to publish once, schedule again, or program reposts. It also provides the scope to organize a campaign by uploading image posts or links in the RSS feed and then publish in bulk.

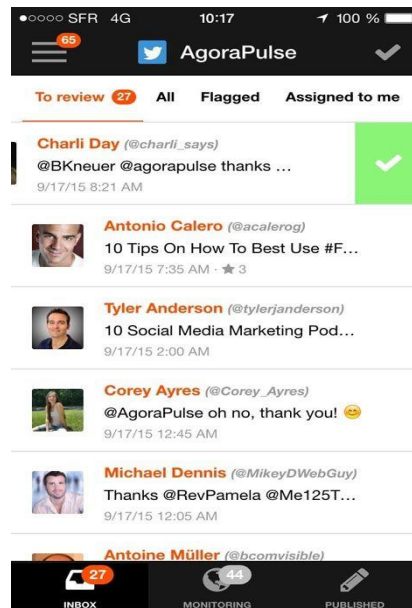


Figure 06: Agorapulse Scheduler

2.4.7 Sprout Social

Sprout Social offers robust social customer service solutions for leading agencies and brands, including Hyatt, Ogilvy, Leo Burnett, Evernote, and Microsoft. Sprout enables brands to simplify social monitoring, listening, customer service, engagement, and much more. Sprout supports Facebook, Twitter, Instagram, LinkedIn, and Google+ & integrates with Bitly, Google Analytics, Zendesk, Feedly & UserVoice.

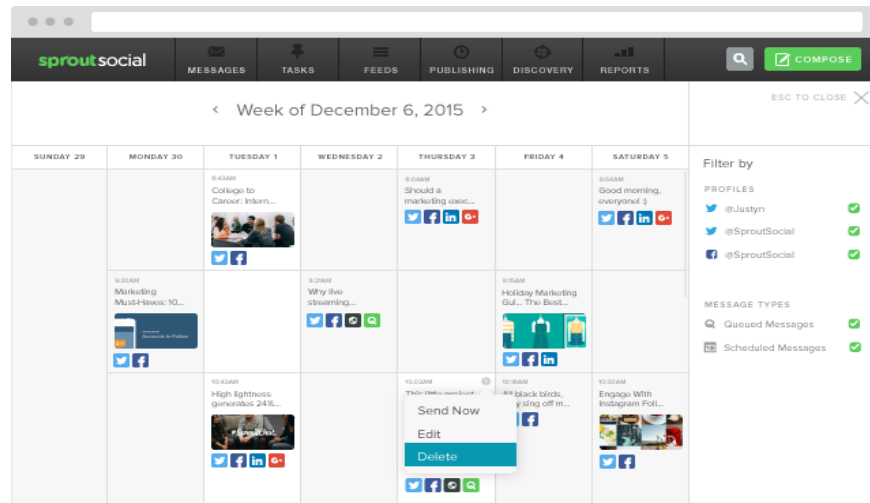


Figure 07: Sprout Social

2.4.8 Social Pilot

SocialPilot is a social media scheduling and marketing platform developed specifically for agencies and social media professionals. Used by over 40,000 agencies and social media teams, SocialPilot is designed to help users enhance the efficiency of their online marketing strategies and efforts and save time and money. Moderately priced and appropriately integrated, SocialPilot is meant to be accessible for businesses of all scales and industries. A complimentary starter package for three connected profiles you could use to examine the features and confirm SocialPilot is an intelligent choice for your business.

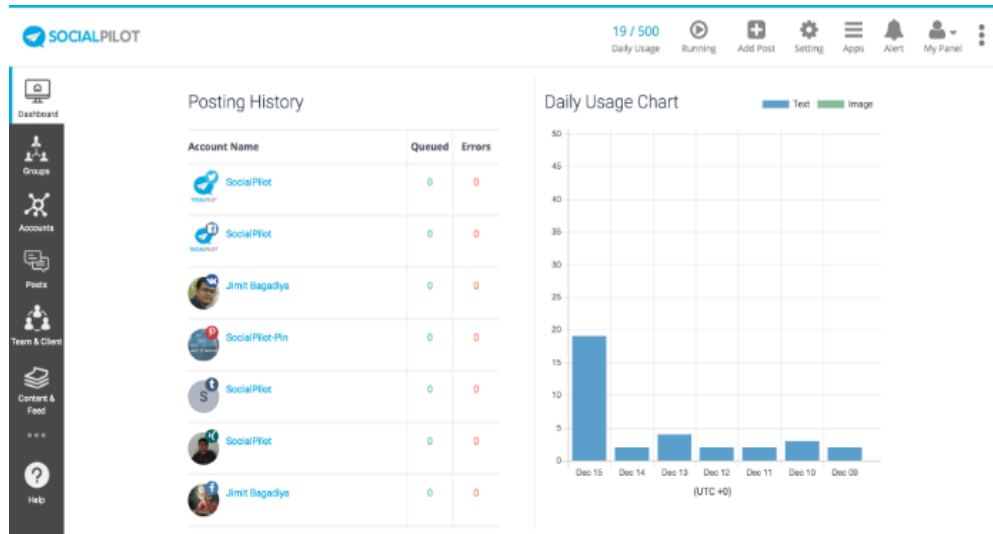


Figure 08: Social Pilot

2.4.9 Combin Free Instagram Scheduler

Combin's goal is to provide efficient Instagram marketing solutions. It doesn't have any mobile version. It only offers a desktop version. The application has to be running in the background to post on Instagram. It doesn't support any other platform and media.

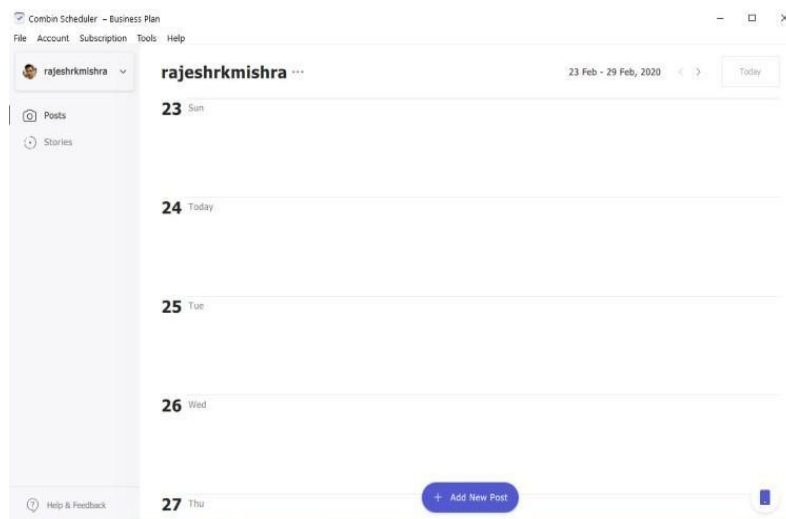


Figure 09: Combin Scheduler

2.4.10 TweetDeck

TweetDeck is a post scheduler app to manage Twitter accounts only. It is integrated into the Twitter interface and allows. It allows to tweet messages immediately or schedule them for later. Posts including images, videos, and GIFs can also be maintained with this app.



Figure 10: TweetDeck

Table 02 shows features and availability of different social media post scheduler applications.

Application	Scheduling	Analytics	Moderation	Collaboration	Content Curation	Bulk Scheduling	Cost of 5 user	Free Version
SocialPilot	✓	✓	✓	✓	✓	✓	50/m	✗
Hootsuite	✓	✓	✓	✓	✓	✗	599/m	✓
Buffer	✓	✓	✗	✓	✗	✗	99/m	✓
Sendible	✓	✓	✓	✓	✓	✓	199/m	✗
AgoraPulse	✓	✓	✓	✓	✗	✗	199/m	✗
Sprout Social	✓	✓	✓	✓	✓	✓	149/m	✗
CoSchedule	✓	✓	✗	✓	✗	✗	400/m	✗

Zoho Social	✓	✓	✓	✓	✗	✓	200/m	✗
eClicher	✓	✓	✓	✓	✓	✓	219/m	✗
MavSocial	✓	✓	✓	✓	✓	✓	199/m	✗
MeetEdgar	✓	✓	✗	✗	✗	✓	49/m	✗
SmartQueue	✓	✓	✗	✗	✓	✓	79.99/m	✗

Table 02: Features of different post schedulers

2.5 Advantages of Social Media Post Scheduler

Social media post scheduler helps us in several ways that we cannot even realize. It increases productivity and efficiency [7]. Some of the essential benefits are:

- **Time Management:** Scheduling upcoming posts for the future helps to plan working hours and daily tasks.
- **Vast Reach:** For any business, it is a must to reach the customer. Post scheduler enables one to get them even when they are offline!
- **Efficient Management:** Social media post scheduler helps organizations maintain a handful of social sites simultaneously. Multiple platform management increases productivity.
- **Increase Concentration:** Pre-scheduling posts decreased the burden of works proportionately, helping to increase focus in day-to-day results.
- **24/7 Presence:** The impression of any business will increase when the customer gets service as soon as they ask. This consistent presence can help significantly in the company's potential growth.

2.6 Disadvantages of Social Media Post Scheduler

There is nothing without issues that brings benefits in our life. Social media post scheduler also has some drawbacks. Some of the most crucial disadvantages are:

- Social Media without being “Social’: The scheduling app makes the whole process fully automated, making it a robot that only follows some instructions while publishing any content. It just makes social media a little less ‘social’.
- Slow Response: Some schedulers are slow in response, lagging behind necessary updates.
- Unwanted Appearance: Let’s say an unimaginable tragic event takes place, and many have suffered. But the posts regarding happy times are scheduled and published as it was. And it can be frustrating, making an image issue and a loss in business.

2.7 Conclusion

This section has discussed the background of social media post scheduler and some of its existing systems. We have learnt that these post schedulers have different characteristics based on the differences of social media sites. The current systems that we have discussed are high in quality but not without shortcomings. There are still chances of improvement and provide better support. We have also discussed how social media post scheduler eases our lives with its significant advantages, especially in the business field. But there are some disadvantages too that make a complete dependency on these types of applications very unlikely. Hence, proper use of applications and more advancements is needed to improve the user experience personally and professionally.

CHAPTER 3

PROPOSED METHODOLOGY

3.1 Introduction

The proposed architecture shows the great process for the social media scheduler. There are different types of schedulers like job scheduler, tuition scheduler, food menu scheduler, medicine scheduler and many more. This app will give a fantastic service to content writers who will undoubtedly write content on social media. Our proposed methodology is all about social media scheduler. A user can schedule a social media post by selecting a specific time and date, Facebook post with image, Instagram post with image, and Facebook and Instagram posts with pictures could be scheduled or post in real-time. These features are also for Reddit, Twitter, Linked In and many social media, which we showed in a single interface.

If a user needs to make, schedules like these posts or content should use a business page. Without a business page, our system will not work correctly due to the API. This type of scheduler technology can work as a reference point that makes the scheduling process more fluent. Eventually, this reference point facilitates users' work and enables faster and better performance anytime and anywhere. There are some differences between traditional content posting in social media and social media scheduler. This type of scheduler follows some specific criteria and security measures that are very different from other social media platforms. But everyday necessities like creating a post with an image on Facebook, Instagram, Twitter, Reddit etc., are saved and maintained for further works. Suppose a person has a business page in Facebook and in Instagram which are connected virtually. In that case, the user can post anytime from anywhere on social media through the social media scheduler. Sometimes users can post something with an image URL through this app on Facebook and Instagram. Then the same content will be published on the different pages, which is an excellent feature of our proposed methodology.

In this chapter, we will discuss the detail of the social media scheduler. We will also present a detailed discussion on our engineered scheduler with a step-by-step design methodology.

3.2 Proposed System Methodology

In this section, we will explain our proposed android application in detail. This is a conceptual framework and a demo implementation that can be further used in several social media schedulers.

3.2.1 Conceptual framework for the proposed system

We used MVVM architecture for our application framework. This is a Model-View-ViewModel architecture.

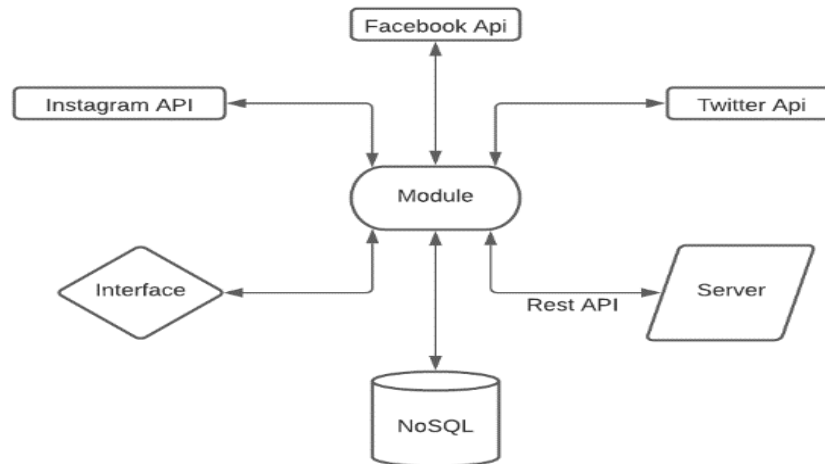


Figure 11: Architectural Pattern

Each component has a tight coupling between themselves, which is not suitable for the architectural pattern in practical. The MVVM architecture removed this tight coupling between each element, which makes our project more efficient.

In MVVM architecture, there are three main layers which are Model, ViewModel and View. In Android applications, many business logics are bounded as data. The business logic contains local data, session data, remote data source, model classes, repositories, etc. The layer 'Model' represents these data.

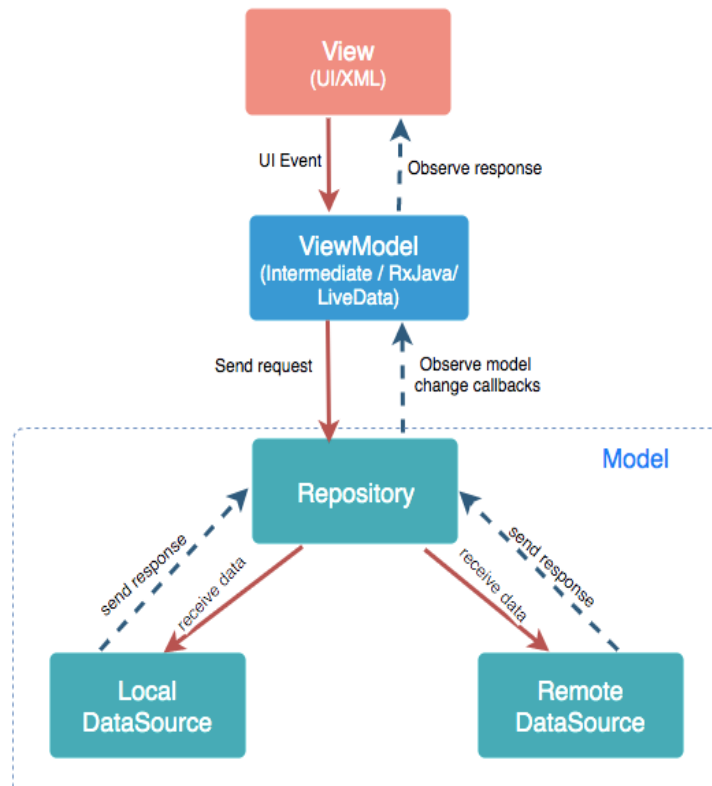


Figure 12: MVVM Architecture

The layer ‘View’ contains the XML files. View represents the front end of any project. Users only can see the View model as UI and can interact with this. So users create a particular action by clicking a button or by filling an input field. That action will call the ViewModel and ViewModel response through the Model. In this case, ViewModel works as a third party. ViewModel checks some queries like the user registered or not, logged in user or not etc. If these conditions create successful results, then ViewModel calls business logic which is Model. Then Model will do its operations according to the users’ actions.

In our system, we go through some following steps before content can be published on our social media platform. In this case, for better understanding, we give an example for the Facebook platform.

3.2.2 Facebook:

Before integrating with the post scheduling or posting in social media and before Facebook login, we must ensure some technologies which will find Facebook developer option. First, we need a Facebook graph application programming interface to done the project appropriately. Without graph API, our system will not work rather it will show an error page. First, you need to go to this link, “<https://developers.facebook.com/>” through a user’s Facebook account. Then user follows the on-screen direction to be registered in the system.

Then we have to go to the link “<https://developers.facebook.com/tools/explorer/>” and click on the generate access token. Then it will automatically give a lengthy page access token which is necessary for the project. This is how we register our app on Facebook, and our app can be completely ready for Facebook integration.

After that, we set up our project environment in android studio. After that, we inject Facebook SDK into our app through the Kotlin programming language. Then we implement an authentication system in Facebook and check whether the user is logged in to Facebook through the Facebook SDK initialization. If the user access token is saved in the session storage or local storage, the user is logged in. Otherwise, no user data will be found if session storage and local storage become empty.

Then we get a user access token by fetching a Facebook user access token. Furthermore, the user access token will be needed for getting the page access token. Through the page access token, anything can be posted in social media. This logic works like this way if Facebook page access token that we sometimes get earlier has been stored in the session or local storage, the user can write something on the page. Those written values will be set on the state. If state data is published on social media, it will show a toast message according to the action. This is how our system works.

3.2.3 Instagram

Similar things happen when we publish the same thing on different platforms, both Facebook and Instagram. For Instagram, we need to create an Instagram business account and connect the

Facebook page to the created Instagram business account. After that, we need to set up Instagram Graph API. So, the basic things are done this way. To publish a post on Facebook and Instagram in real time, you need to follow some basic things similar to the Facebook post publishing.

First, we need to log in with a Facebook account. Then get the page access token through the user access token. Then create a media object container with an image and a caption for the Instagram account. Then generated media object container ID publish the media object on social media through the Instagram post ID.

3.3 Flow Diagram for the proposed system

Here is the method we followed to implement sharing a post to Facebook with Graph API. Step by step functionality discussed in the previous section.

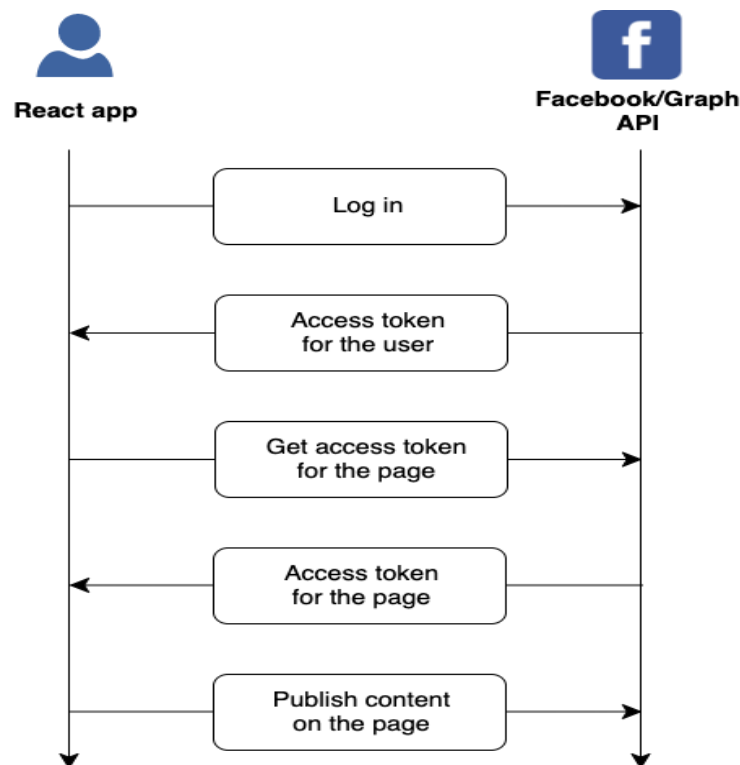


Figure 13: Make a post in Facebook with Graph API

Here is the method we followed to implement sharing a post on Instagram with Graph API. Step by step functionality discussed in the previous section.

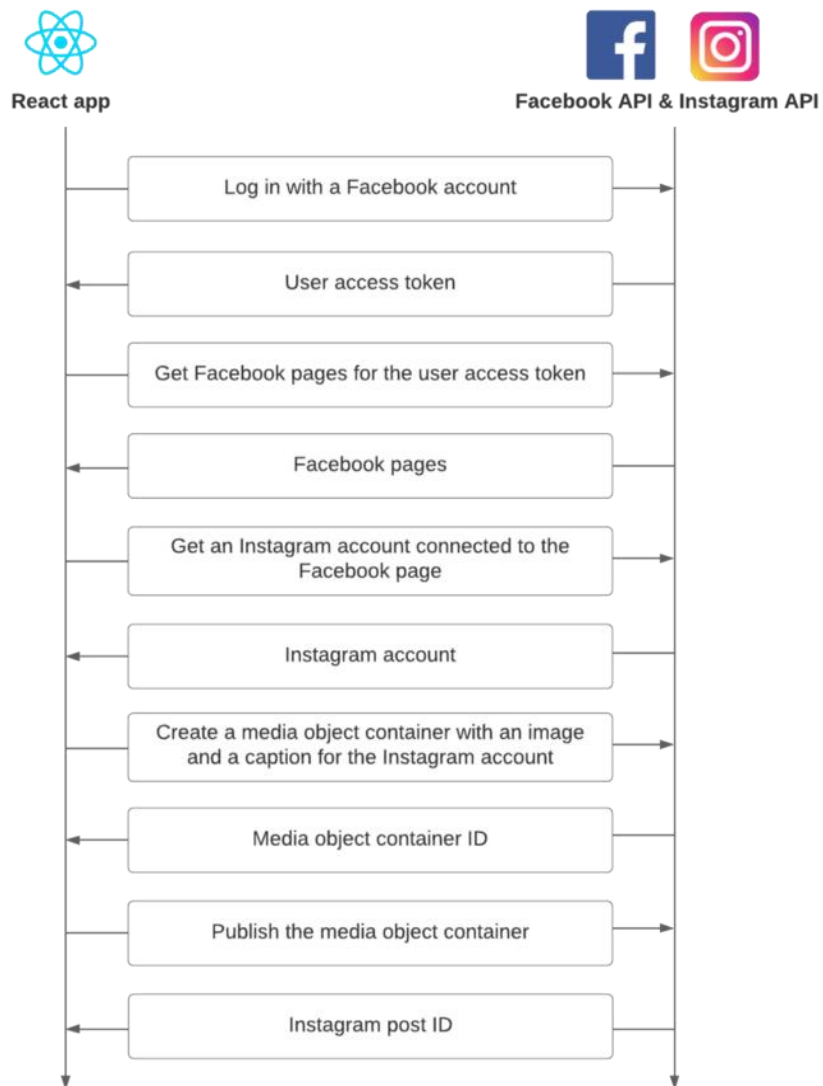


Figure 14: Make a post in Instagram with Graph API

3.4 Authorization

At the first View of our app, we wanted to show a login and logout page where the users authentic themselves. This process was made through the firebase authentication system. In our main system, a user needs to authorize himself via a user access token. This user token is only for Facebook or Instagram, or any other platform. But we need some data to see how many users are there who use our app certainly. So, to get this data, we use a firebase authentication system. Simple email and password system implemented. Furthermore, in this method, we can give support

to our particular customer if the user faces any problem afterwards. This authorization system made our system more secure and free from complications or difficulty.

3.5 Facebook Business Suite

Facebook business suite is an application that manages the Facebook business and Instagram as well. It is an official application of Facebook. Every version like web, iOS and Android are available. It gives extraordinary support, which has Facebook or Instagram page. It views your business at a glance, showed the view activity, fluently manages inbox, admin or moderator can create posts and stories, access commerce manager, create ads for particular customers, view insights, schedule posts, and access more tools. Besides, it shows the data of your past activity in a graphical format, which is needed to grow a business.

3.6 Interface

Software interfaces are the messages or languages that communicate with each other and to the hardware. In this social media app, there are lots of interfaces. Among them, user interface, hardware interface, software interface and communication interface are essential. We will go through in details below:

3.6.1 User Interface

As we said earlier, in MVVM architecture, the view layer is the phase that interacts with users. Every application needs some access points. In these access points, users interact with designs. A user creates an action using the View, and this user interface calls the ViewModel to complete the activity.

UI just focusing on the looks or styles of software. UI designer gives the design of the software interface using some software like Figma. From Figma, the frontend engineer implements the design through the XML code. Design must be easy to use, eye-catching and pleasurable.

3.6.2 Software Interface

A software interface is an operating system in which the programs will run. Every system or OS will not support our application. Our application is only made for android users. So that only those smartphones in which the Android operating system is running can run our software. iOS operating system will not support because Apple has locked down the firmware of the iOS hardware, software drivers, kernel, and many more technologies.

3.6.3 Communication Interface

The communication interface is the internet. So we need to be connected by LAN/WAN network when we initiate the post.

In our application, we have to need to get access to the Facebook or Instagram graph API. This API's request method is sometimes HTTP, GET, POST, PUT, sometimes DELETE, sometimes PATCH. Besides getting access token of the user and page, the internet communicates with the software interface. Otherwise, these operations will not pass successfully. So communication interface is a must for our system. There are many other interfaces. A hardware interface is essential. This interface is common for every software. For our application, a smartphone with the android operating system acts as a hardware interface.

3.7 Essential Parts and Devices








Kotlin		Kotlin was used to develop the whole application and backend design
XML		XML was used to frontend design
Firebase		Firebase was used to create and manage the database.
Android Studio		Android studio is the environment where we develop our app.
Photoshop		Photoshop was used to design the graphical user interface of activities. (Backgrounds, images, and icons)
Draw.io		Draw.io was used to draw the different diagrams of the design part of the project.
Visual Studio Code		Visual Studio was used to modify the code for the application.

Table 03: Development Components

3.8 Implementation Process

In this section, we will discuss the execution of the theoretical process we have explained before. We will discuss necessary algorithms to implement essential functions effectively and efficiently for the user to establish confidence in the new system.

3.8.1 Share Post in Instagram Process:

Algorithm 01: Publish content in instagram Process

Output: Instagram posting.

Input: Facebook User Access Token, Facebook Page ID, Instagram Account ID

```
constant getFacebookPages = ( ) => {  
    return Facebook User Access Token ;  
}  
  
constant getInstagramAccountID = (Facebook Page ID ) => {  
    return Instagram Account ID ;  
}  
  
constant createMediaObject = (Instagram Account ID ) => {  
    return Media Object ID ;  
}  
  
constant publishMediaObject = (Instagram Account ID, Media Object ID ) => {  
    return Media Files ;  
}
```

Table 04: Share Instagram Post Functions

3.8.2 Facebook Authorization Algorithm

Algorithm 02: Check Authorization Algorithm

Output: User is logged in to Facebook.

Input: Facebook SDK, Facebook User Access Token

```
if ( FB SDK Initialization == True )  
    if ( FB User Access Token == True )  
        return Successfully Logged In  
    else wrong credential  
else undefined  
end
```

Table 05: Facebook Authorization Algorithm

3.8.3 Function for initializing the Facebook SDK

Algorithm 03: Initializing the Facebook SDK

Output: Function that will use for the app.

Input: Facebook App ID

```
export default function initFacebookSDK ( ) {  
    return new Promise (( resolve )) => {  
        Facebook App ID = "particular ID"  
    }  
    resolve ( ) ;  
};  
  
/* Now Load Facebook SDK Script */
```

Table 06: Function for initializing the Facebook SDK

3.9 Advantages of Proposed System

Lots of benefits we found in our proposed system. A person cannot give all his time to be active in social media to run a business. But they can be involved through our application without being physically available. You don't need to worry about the internet while you are scheduling a post through our application. This system captures the schedule through graph API and publishes automatically the captured content which was planned before without internet connectivity. It's a great advantage for the users. In the modern world, we have problems with social media. Social media distract us from works. User's don't need to open social media to post content. Rather, users can publish content by using our social media. It will reduce the distraction from work. With our proposed system, you can schedule posts to publish content outside of working hours and holidays. Though your workstation or office may not be open but social media is active all time. One of the great advantages of our system is, users can use multiple accounts from one place. Users can post content on social media. These media can be Facebook, Twitter, Instagram, Reddit, Tumblr etc. Users don't need to put the content for the different places. They can publish the content for multiple platforms at a time.

3.10 Conclusion

In this chapter, we have discussed our proposed conceptual solution for the social media schedule in detail. The system overview and flow diagrams are the basis of the entire project. It explains the scope of the project in short. The algorithms are easily understandable and make it easier to implement the functions. We have also discussed some crucial points that should be considered for implementing a social media-based project. Essential tools and devices which are used for implementation have also been pointed out. We discuss the different interfaces like software interface, user interface, communication interface and hardware interface. MVVM architectural pattern is used for our project. What our View is, Model and ViewModel is, everything has been discussed in this chapter. Moreover, the authorization system is very important for our project, which is also pointed out in this chapter.

CHAPTER 4

RESULT ANALYSIS

4.1 Introduction

In this chapter, we will show the output of our project and present a detailed evaluation. We will follow some engineering standards. We will consider these standards based on risk and cost management. Moreover, our testing and results will also be outlined. Our project aims for a better key management solution for an android operating system based social media scheduler. Our system scheduler enables anyone to schedule any social media content. We have used Kotlin programming language, making it easy for the user to use and harder to hack.

4.2 Financial Plan and Costs

An interface for android based schedule system reduces the cost of using and maintain a scheduling system significantly. The traditional schedule system has many works that need much longer times. That means more jobs involves more pages. While the pages reloaded, it will generate extra costs in terms of time, space and money. But, our system can complete these tasks within a short time. Our designed system is much faster than other conventional systems considering schedule approval and database update duration. Again, implementing social media scheduler for multiple platforms found that this scheduler performs better in mitigating some trust issues. Therefore, it is a great invention for a business environment.

Again, in some cases, there is no need to buy extra APIs except graph API. Besides, there is no need to invest much in hosting. Because database works are very limited in this project. On the other hand, the play store service gives some space for hosting the app, which is enough for our hosting space.

4.3 Feasibility Study

The feasibility study phase is critical because it is the one that helps the software engineer to see the opposing sides of his project, and it allows him to refine the software process. The feasibility study can make any project a successful one if it is done perfectly. For our social media schedule application, we have found these accordingly.

4.3.1 Product Feasibility

The system that will be developed will help the client achieve their objectives. Which are expanding their business and open up to the online market. This will be achieved thanks to the mobile application that will easily access the user's features and communicate with the social media platform. The mobile application will allow the users to schedule content. Then, the application can exploit the modular architecture of enabling systems using easily scalable components, which increases availability.

4.3.2 Technical and Operational Feasibility

For this project, we will be using Kotlin & XML for the mobile application using Android Studio as it is the official IDE for android applications' development.

We will be using Firebase as a database engine for the backend, as it is known for its high reliability, full-featured, and self-contained. More than that, it is the most suitable database engine to use with an android application.

4.3.3 Social & Market Feasibility

Since almost everybody is using smartphones, we believe that a mobile application will be of great benefit. Moreover, this can be converted to any social media-based market like job scheduler, tutor scheduler, medicine scheduler, etc. Hence, it has the potential to create a significant impact on the social service with huge demand.

4.4 Privacy

Privacy is a common thing in our daily life. Everyone has their secret things which are not good to reveal. Our app has no access to the privacy system though it contains a very secured privacy system. Maybe our application cannot manage the user's privacy system, but the privacy and terms are managed heavily through social media itself. Our API calls the particular platform in which the user wants to work. If the user logged in through social media, that social media will maintain the user's privacy. Because we get permission to access the page through the page access token and user access token. Social media platform gives the tokens, that's why we integrate with them. This is how privacy is maintained in our application. But if a user from our application complains

to us, someone gets access to their page through the social media tokens; how will we solve that? We used the login logout system through Firebase while opening the app to get rid of this situation. So that no one can be able to access the user's access token.

Moreover, privacy in social media lifelike media privacy, location privacy, and search privacy need to be maintained. We don't allow anyone to see our activity or history. We implemented these features in a very well manner. Hence, it provides every privacy technology can provide to its user [2].

4.5 Security

In modern technology, maximum developers use Firebase to implement an android application. During the implementation period, they make an opening interface. Between the opening interface and home screen, they authenticate the user. So they display a login logout interface in which users authenticate themselves by providing appropriate credentials. Similarly, we did the same thing for implementation. So, users need to be registered on our platform, and we will provide an option for changing their password if someone forgets. It ensures their security in the system. A high-security system makes our app more flexible and trustworthy.

The application has concrete security that restricts cyberattacks. A common cyberattack weapon is a DDoS attack. Almost every hacker uses this system to attack a system. Our user uses this application for their business purposes. So it must need to be provide extra security and privacy systems. So, we don't get much risk to do this. That's why we use graph API, which fetches data from social media through the user access token and page access token. That's is why there is nothing in our hands in the depth of security purposes. But it should constantly be improving for future threats as 100% security can never be promised by any technology.

4.6 Testing and Output

We have used Kotlin, XML languages for our frontend and backend development. In some cases, we use Firebase to portray the database. Every time the system is launched, it checks the database and imports data to connect. Any user who has not registered cannot use the scheduler and don't have access to the database.

4.6.1 User Access Token

It is the first user interface of our application. Facebook connected means; this graph API found the appropriate user access token. That's why it shows the Facebook-connected button. Instagram and Twitter are not connected. If they are also connected, the button also indicates that Instagram is connected and Twitter is connected.

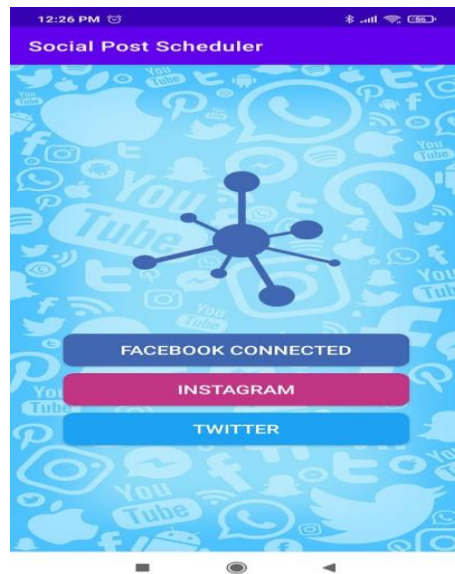


Figure 15: Facebook Connected Page

4.6.2 Facebook Post Scheduling

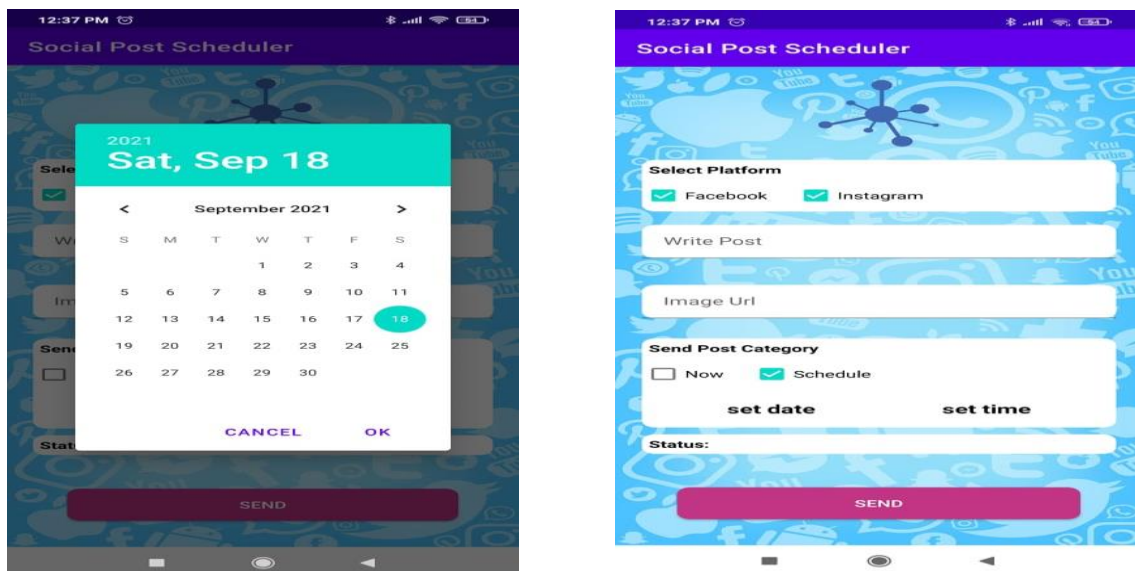


Figure 16: Set Facebook Post Scheduler

This is the critical part of our system. Users select the platform to publish their content and write the post with the respective image URL. Then the user selects the schedule category and can pick a date with time from a calendar. After clicking the send button, the scheduling system will be set and publish the content on time.

4.6.3 Successfully Posted on Instagram

These figures just showed the output of our mission. When the content is posted on the page's timeline, then the scheduler sends a toast message. This toast message passes the output that the content was posted successfully or not. Then if users go to the Instagram page, they can see the post on their timeline.

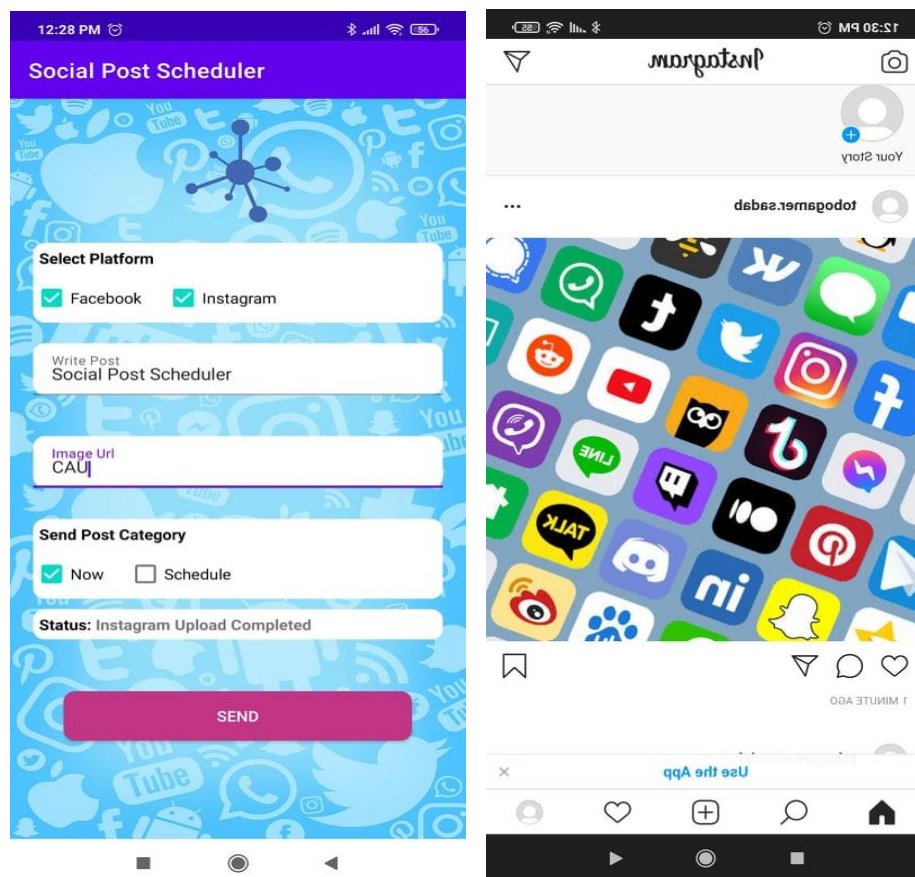


Figure 17: Publish Content Successfully

4.7 Problem Faced and Solutions

During the development period of the application, we faced several problems. There were also issues with designs which we solved by the use of StackOverflow and YouTube. Following are some issues and solutions of social media schedulers:

Issues Regarding Facebook Posting: Normal Facebook users cannot publish content from their personal Facebook account. But they can post on Facebook business pages. For Instagram, the same output will be shown. Users cannot post in a regular Instagram account.

Issues Regarding Reddit: We tried to implement the Reddit authentication with the Reddit OAuth2 system. Due to some reasons, our API couldn't successfully fetch. So that, we were unable to execute the Reddit platform in our application.

Issues Regarding Twitter: We also tried to integrate the Twitter login API into our android application. For integrating Twitter API, first, we use the consumer key. Consumer key is one kind of API key, and another one is Consumer Secret. Consumer Secret is also an API secret. These secret keys can be generated from the official site of Twitter. After implementing the system, suddenly, our app was crashed. Further, we found the exact solution: Twitter just banned our API keys for use in the third-party application, which is not verified.

4.8 Work Break Down Structure

To build a good project, we need to put great importance on task scheduling. Otherwise, it is hard to make thorough progress.

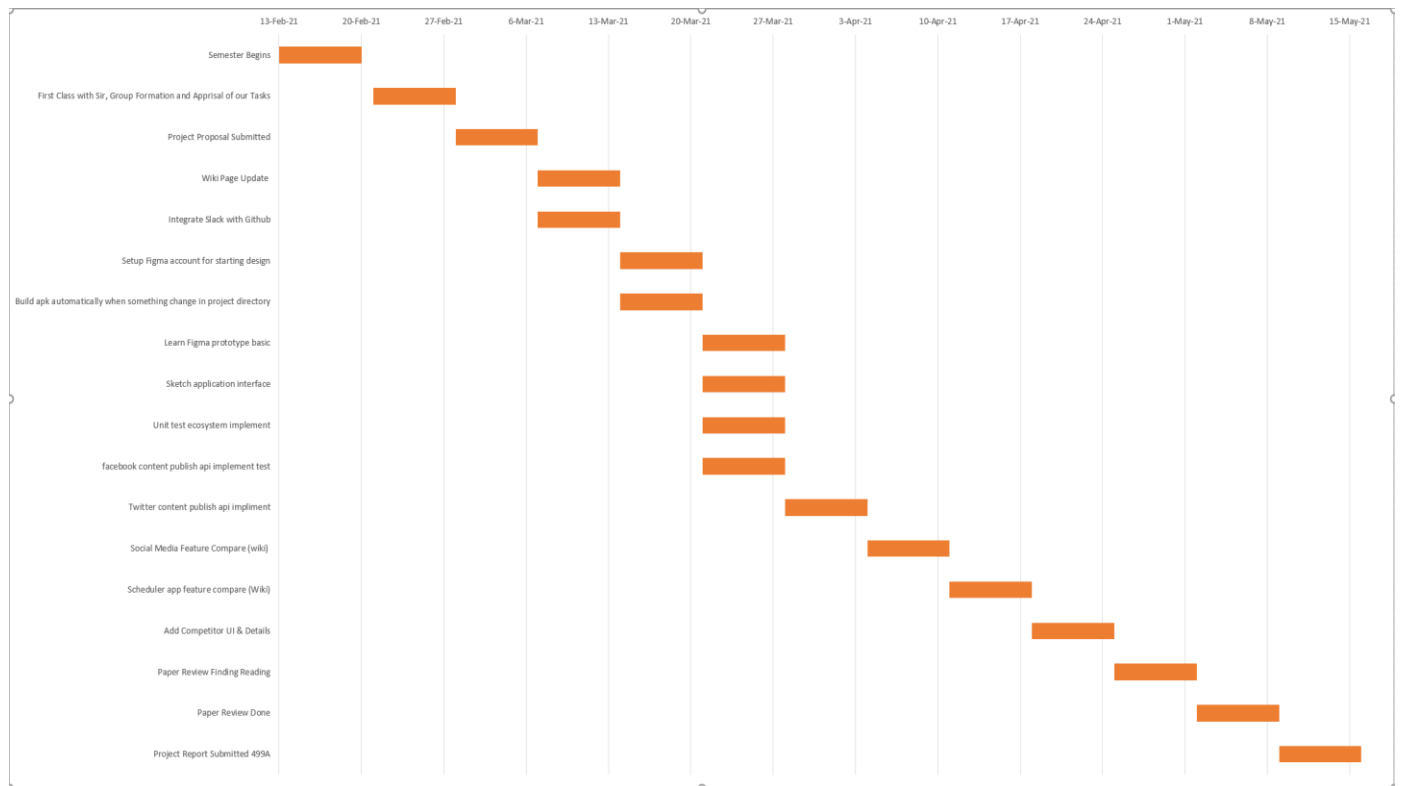


Figure 18: Gantt Chart for CSE499A

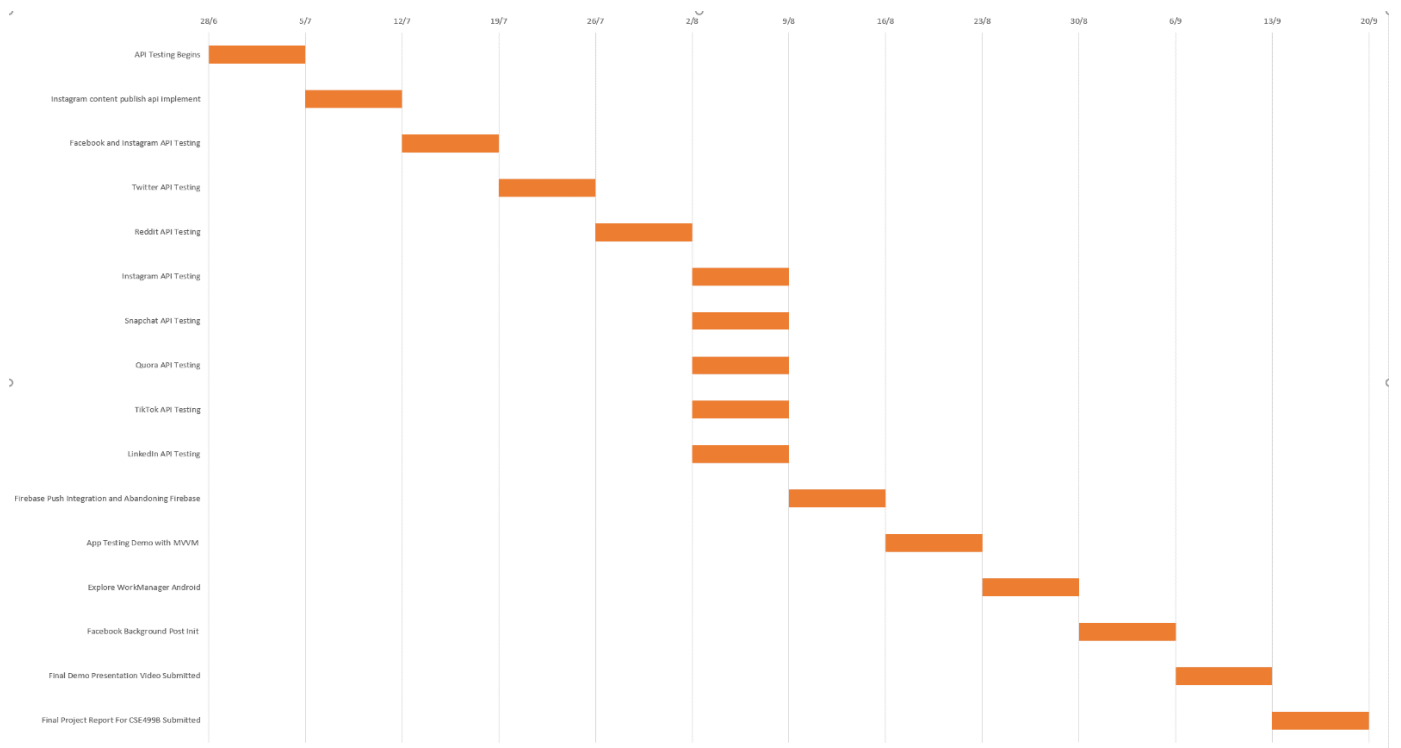


Figure 19: Gantt Chart for CSE499B

CHAPTER 5

CONCLUSION

5.1 Introduction

Researching for this application, we have discovered many metrics and ways of understanding social media that were unknown to us before.

As socially inclined creatures, human beings have embraced technology that connects us with others. Every year, there is an increasing number of people signing up for and using social media. While there weren't even a billion people using social media back in 2010, the number exceeded more than 2 billion within just five years. In 2019, around 2.77 billion people were using social media. And, with smartphones and internet connectivity becoming cheaper and easier to access, we should expect to see these numbers grow even higher. By 2021, more than 3 billion people will be using social media. This means that marketers have enormous potential to reach a massive and engaged audience on social media. And that's not just limited to the popular social media sites like Facebook, Twitter, and Instagram. [8]

When Pew Research Center began tracking social media adoption in 2005, just 5% of American adults used at least one of these platforms. By 2011, that share had risen to half of all Americans, and today 72% of the public uses some type of social media. [9] Users spend more than 20% of their time online on social media sites. Facebook alone has a worldwide market penetration rate of over 12% of the entire online population; in North America, it is 50%. These rates are snowballing, with Facebook alone gaining 170 million new users between the first quarter of 2011 and 2012, increasing 25%. Facebook mobile use is growing even more quickly, at a 67% annual clip, as of Summer 2013. In 2019, the platform had over 330 million monthly active users. Facebook is currently the largest social media site in the world. With 2.6 billion monthly active users as of 2020, it's safe to say that nearly every social media user is on Facebook.

On the other hand, Instagram is one of the fastest-growing social networking platforms. While it is primarily app-based, users can also access their feed through the website version. In June 2018, it finally reached 1 billion monthly active users. Instagram is a highly visual platform where users share videos and images. You can also use Instagram Stories and Live features. It is prevalent among the younger generations. According to Statista, 32% of users are aged between 18 and 24, and 33% are aged between 25 and 34. [10] On the other hand, Twitter doesn't have as many users as other top social media sites; it does have a highly engaged user base. Twitter users send out at least 500 million tweets per day on average.

In an article written by Fan and Gordon [11], they had discussed the growth in use and engagement of social media over the years and how corporations interact with them. In the mid-2000s, corporations would only monitor their customer's feedback on their respective websites. Over the years, they had figured out that monitoring is not enough. If you want to grow your brand, you have to interact with your customers directly. The brand can later verify that through account analytics.

5.2 Challenges

Many works have been done before to meet the challenges that can arise in this type of application. Still, some shortcomings need to be mitigated.

- ❖ To handle different social media at a time is a big task considering the amount of data. Processing this massive amount of data is a big challenge to improve efficiency.
- ❖ It is also vital to ensure the security of this data. Most of the schedulers save the post in its cloud server from where it is posted later. During this time, hackers may try to manipulate the post or change it. Hence, security and privacy to this database management is a big challenge.
- ❖ These scheduler apps need many permissions to access individuals' social media account. During these permissions, the user provides crucial personal data to the scheduler app. Protecting these data from wrong hands and a clear statement of how the scheduler apps will use them are significant challenges.
- ❖ Another big challenge is synchronizing an app in all operating system types irrespective of characteristics and behaviour.

5.3 Future Research

The social media post scheduler has improved a lot. But there is still a vast scope to improve and initiate new features. There are a lot of post scheduler applications for Android. But for iOS and web development platforms, there needs a lot more improvement. We have also implemented our app for Android and iOS. A website for our app will enhance productivity. It also needs some more features like post-editing options. Image editing and filter adding are some nice have features. Connecting our app with Firebase can make a considerable improvement. It can provide valuable

services like counting likes, views and comments. Finally, our post scheduling application can be used for business purposes and ordinary people user-level experiences with some more modifications.

5.4 Conclusion

In this project, we have tried to make an application that will enable users to schedule posts to publish at an appropriate time across Facebook and Instagram. What we have done in this project has been done before. Many services like this exist like Hootsuite, Sprout Social, Buffer, and so on. [12] None of them is entirely free, apart from some exceptions like Combin and Crowdfire. And the idea of having a completely free social media scheduler has been done before. Like what Osman et al. did with their app Odoo.[13] Also, the exciting effort to use Twitter as an e-learning tool through a Twitter Scheduler. [14]. That is what we have tried to do here. A free tool to schedule your content across Facebook, Instagram, and Twitter. With plans to expand support to other platforms like Pinterest, LinkedIn, Tiktok, and so on. Initially, we plan to release the app with a new financial incentive, but down the line, we have some plans to monetize it through advertisement spaces while keeping to our original promise of keeping the app free. After all, the idea of Fee or Free [15] will cross any app developer's mind.

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