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Title

Daily Catholic Quotes- Mobile app for simplified production of engaging graphics of quotes for social media

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Abstract

There are many social media accounts that just post quotes in order to motivate and inspire people. These accounts are exceedingly popular and one such account is Daily Catholic Quotes. Analysing the page allows us to see that all posts follow a set structure with only the quote and background being changed in each post. This means that with a well-designed application, this process can be automated so that when a quote is entered as text, an image post can be produced.

This project aims to create an Android application using Java to create an app that can convert a user entered quote into an image post that can be easily shared to social media platforms. In addition, the application also allows users to browse and like quotes that are already submitted by other users or added by the admins.

Through researching the importance of social media and quotes in the context of social media, I explain how the project has a valid real world use case. I also researched major software development methodologies to select the correct one for my project. I chose to use a hybrid model where I develop using the waterfall model at the beginning then move to a mix of agile and rapid application development models for the implementation.

After evaluating the project, I was able to create a useful application that meets the requirements that were requested. If I had more time, I could add more advanced features that were outside the project scope.

Acknowledgements

All praise and glory to God, through whom all things are possible.

Heartfelt thanks to all my friends and family who have endlessly supported me with their prayers, motivation, and love.

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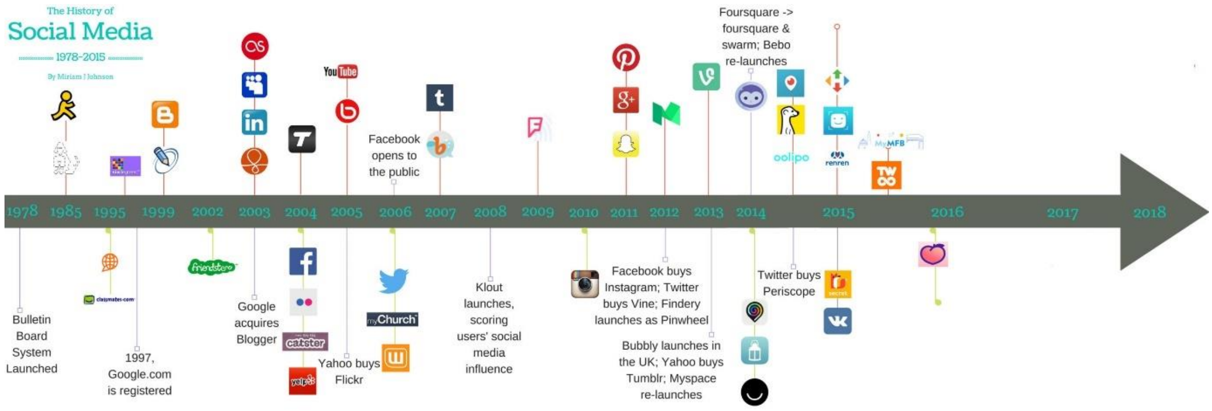
Introduction and Background

The current age of technology is advancing like never before. If we were to tell our ancestors that in years to come, humans would be communicating by tapping on pieces of glass, you can imagine the response. The life of internet, smartphones and social media feels ordinary to the current generation, but it is only when you step back and see the bigger picture that you get startled by the extreme development and change that we have gone through in the industry technology. With the introduction of the internet and social media the world has been more connected than ever before.

Social media

Social media has become somewhat of a replacement for much physical social interaction and only increases as time moves on. This has been enhanced by the effect of the Covid-19 global Pandemic in which people had to be isolated and socially distanced to prevent the spreading of disease. During the numerous lockdowns across the entire planet, socialising through the use of technology became the only option for many. Although the pandemic was a challenging time for many, where many individuals were faced with depression and anxiety, social media allowed them to be able to express themselves, seek help and even allowed themselves to get past their struggles. People used social media to share enjoyable videos, send their loved ones messages to show their love and shared motivational quotes to inspire others. In essence, society's major focal point for exchanging news, photographs, sentiments, and inspiration has become social media.


The History of
Social Media
1978-2015
By Miriam J Johnson
1978
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2015
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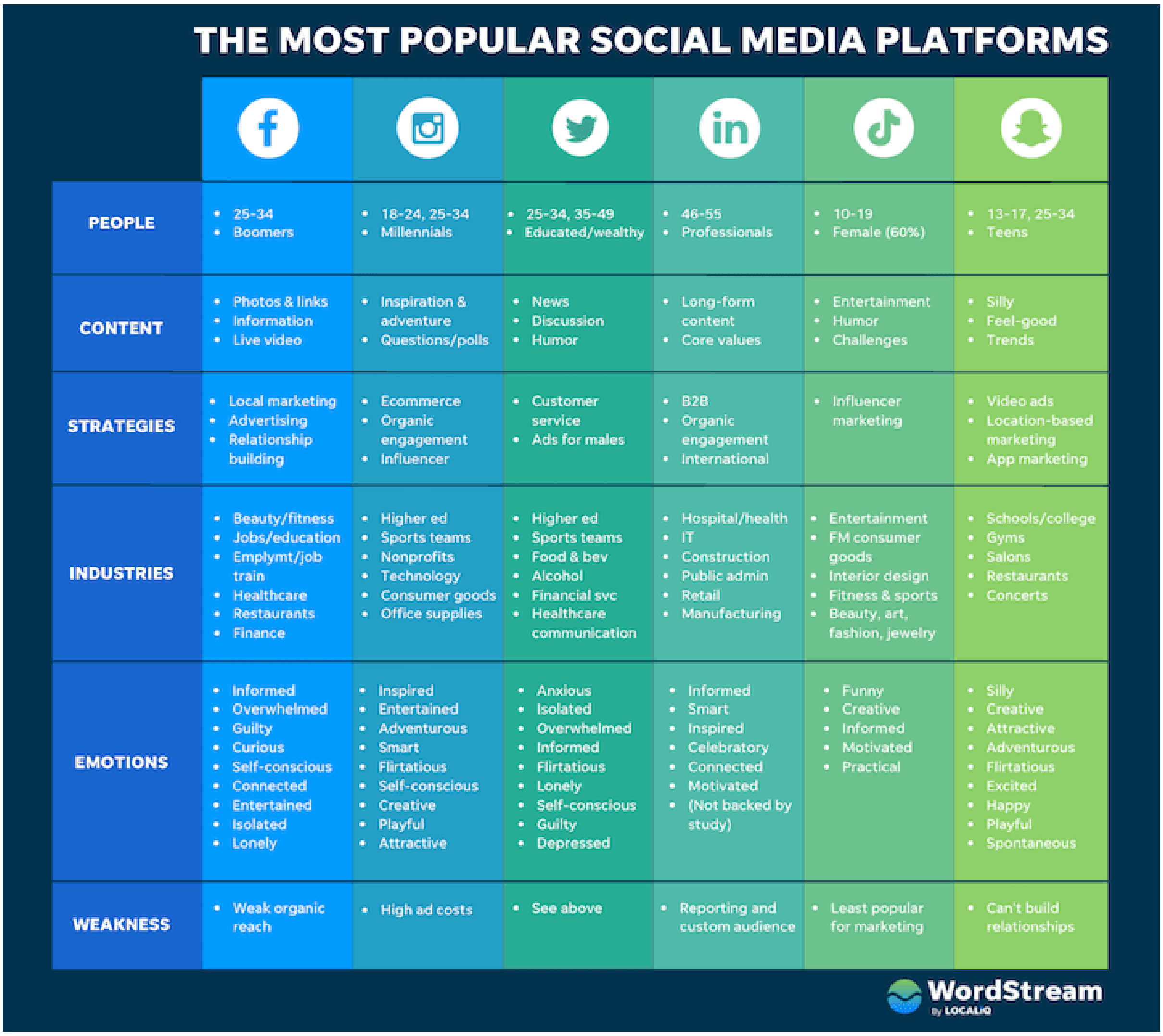
2017
2018
YouTube
Facebook opens to the public
Foursquare -> foursquare & swarm; Bebo re-launches
oolipo
renren
MyMFB
TW OO
Bulletin Board System Launched
classmates.com
1997, Google.com is registered
friendster
Google acquires Blogger
catster
yelp
Yahoo buys Flickr
myChurch
Klout launches, scoring users' social media influence
Facebook buys Instagram; Twitter buys Vine; Findery launches as Pinwheel
Bubbly launches in the UK; Yahoo buys Tumblr; Myspace re-launches
Twitter buys Periscope
secret

Figure 1: Timeline of social media (Miriam J Johnson, 2018)

A single social media post has the capacity to transform people's lives, open doors, create small enterprises, and spark movements! It has changed the way we communicated by putting a greater emphasis on visual material, increasing the value of and interest in graphic design and photography.

Due to the continued popularity of social media throughout the world, businesses' social networks are rapidly expanding in order to increase online interaction among their consumers. (Hallock, Roggeveen and Crittenden, 2019) It is not surprising that many individuals are now using social media as a way of gathering information which is then used to inform their decisions. This include making decisions on what products to buy but also on how to live their lives as a whole. (Casaló et. al., 2018)

The most popular names in social media are Instagram, Facebook, Twitter and TikTok. YouTube is extremely popular, but a lot of people do not use YouTube as a social media service but rather as a video streaming service as it was first designed. Let us look at each of these services and see what elements make each of these networks different.



THE MOST POPULAR SOCIAL MEDIA PLATFORMS

	f	📷	🐦	in	♪	👻
PEOPLE	• 25-34 • Boomers	• 18-24, 25-34 • Millennials	• 25-34, 35-49 • Educated/wealthy	• 46-55 • Professionals	• 10-19 • Female (60%)	• 13-17, 25-34 • Teens
CONTENT	• Photos & links • Information • Live video	• Inspiration & adventure • Questions/polls	• News • Discussion • Humor	• Long-form content • Core values	• Entertainment • Humor • Challenges	• Silly • Feel-good • Trends
STRATEGIES	• Local marketing • Advertising • Relationship building	• Ecommerce • Organic engagement • Influencer	• Customer service • Ads for males	• B2B • Organic engagement • International	• Influencer marketing	• Video ads • Location-based marketing • App marketing
INDUSTRIES	• Beauty/fitness • Jobs/education • Emplymt/job train • Healthcare • Restaurants • Finance	• Higher ed • Sports teams • Nonprofits • Technology • Consumer goods • Office supplies	• Higher ed • Sports teams • Food & bev • Alcohol • Financial svc • Healthcare communication	• Hospital/health • IT • Construction • Public admin • Retail • Manufacturing	• Entertainment • FM consumer goods • Interior design • Fitness & sports • Beauty, art, fashion, jewelry	• Schools/college • Gyms • Salons • Restaurants • Concerts
EMOTIONS	• Informed • Overwhelmed • Guilty • Curious • Self-conscious • Connected • Entertained • Isolated • Lonely	• Inspired • Entertained • Adventurous • Smart • Flirtatious • Self-conscious • Creative • Playful • Attractive	• Anxious • Isolated • Overwhelmed • Informed • Flirtatious • Lonely • Self-conscious • Guilty • Depressed	• Informed • Smart • Inspired • Celebratory • Connected • Motivated • (Not backed by study)	• Funny • Creative • Informed • Motivated • Practical	• Silly • Creative • Attractive • Adventurous • Flirtatious • Excited • Happy • Playful • Spontaneous
WEAKNESS	• Weak organic reach	• High ad costs	• See above	• Reporting and custom audience	• Least popular for marketing	• Can't build relationships

WordStream by LOCALiQ

Figure 2: A comparison of popular social media networks (WordStream, 2022)

Instagram has grown in popularity among teenagers and young adults, particularly in western counties but now throughout the world. Instagram use reduces with age but remains constant among men and women. Instagram primarily allows users to share photos and videos along with textual captions to tell the story. A post cannot be made without including an image or video which means that users are not able to share text only posts.

According to current figures, 74 percent of Facebook users in 2020 would be "high-income earners" (USD 75,000 per year), compared to 42 percent for Instagram. Furthermore, individuals aged sixty-five and older are the fastest-growing demographic on Facebook, whereas gen Xers have cut back on their usage (Aboulhosn, 2020). Facebook gives the user the most freedom in what type of post they are able to create. Users are encouraged to create posts with any combination of images, videos and text and are able to do any one exclusively also.

While Twitter's monthly active user statistics have been stable at approximately three hundred million for some time, a whopping 40% of those users log in many times each day, implying that if your audience utilises the network, they are likely to be quite engaged. This social networking site's popularity among tech-savvy users remains strong, and it is particularly active in business, marketing, and politics. Twitter has grown in popularity as a means of disseminating breaking news, digesting bite-sized material, and communicating with people in real time. Videos and photos stand out the most, but if you are tweeting about a popular event and are well timed, you can still reach a lot of people with a text only tweet. Twitter capped users to 140 characters which meant every tweet was focused and to the point. This meant maximum engagement for users as they got to their information immediately.

Tiktok is a social networking software that allows users to create and share engaging videos less than a minute in length interact with their online audience. TikTok has been one of the most popular mobile video apps since its introduction, with millions of users across the world. In June 2018, TikTok surpassed 150 million daily active users (five hundred million monthly active users) and was the most downloaded app in the world in the first quarter of 2018, with 45.8 million downloads (Omar et. al., 2020).

Quotes

When the internet first took off blogs, articles and written content was the norm but as it became more saturated and more people gained access to the internet space, it became more important for websites to need to keep users’ attention which appears to be decreasing constantly. This meant that social media became much more media focused and text became inferior as it was more difficult to keep a user engaged with long pieces of text. Currently social media is dominated with photos and videos through the vast popularity of services like Instagram, Snapchat, TikTok and YouTube.

Humans not only use sounds and gestures to communicate but they also use written text that can be interpreted by others to convey a message. Therefore, we are unable to see effective social media posts that do not use words at all. We have come to rely on words to provide a clear and effortless way of communicating with people who are not immediately nearby.

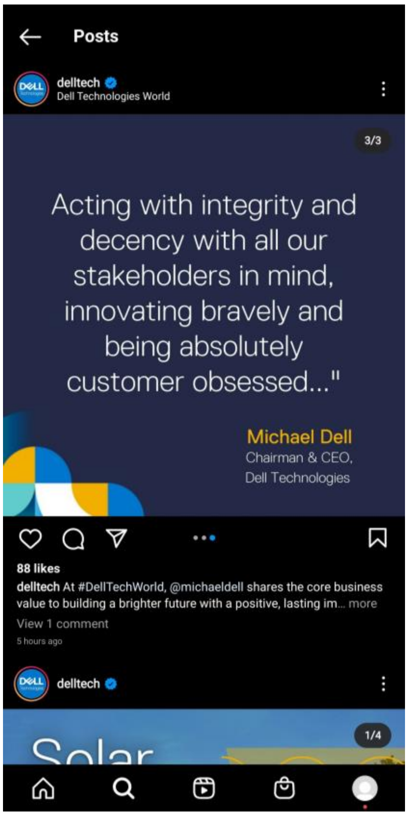
Since we have established that long pieces of text are less effective for social media, and that we do need some level of text to provide context, we come to the main subject matter which is quotes. So, what exactly is a quote?

A quote is when someone repeats a sentence, phrase, or section from a speech or document that they have previously stated or written (McArthur et. al., 2018). Quotes have been used throughout history, from gravestones to scientific journals. Quotations are used for a variety of reasons, including illuminating the meaning or supporting the opinions of the work being quoted, paying homage to the original work or author, making the user of the quotation appear well-read, and/or complying with copyright law. Quotations are frequently printed as a source of motivation and to elicit scholarly ideas from the reader (Finnegan, 2011).

Quotes in social media

So, if written texts are so important and social media requires very little amount of text for engagement, which means using quotations can be extremely effective, especially for platforms like Instagram and Twitter. Let us focus on Instagram as one of the most popular and widely used platforms with a wide spectrum of users.

Quotes have a place in every business profile. Whether it is to show a user feedback or to highlight marketing material to potential clients (Finnegan, 2011). In order to see how important quotes are to a business on Instagram, I took a look at a few technology companies and check if they use quotes on their profile.



Acting with integrity and decency with all our stakeholders in mind, innovating bravely and being absolutely customer obsessed..."

Michael Dell
Chairman & CEO,
Dell Technologies

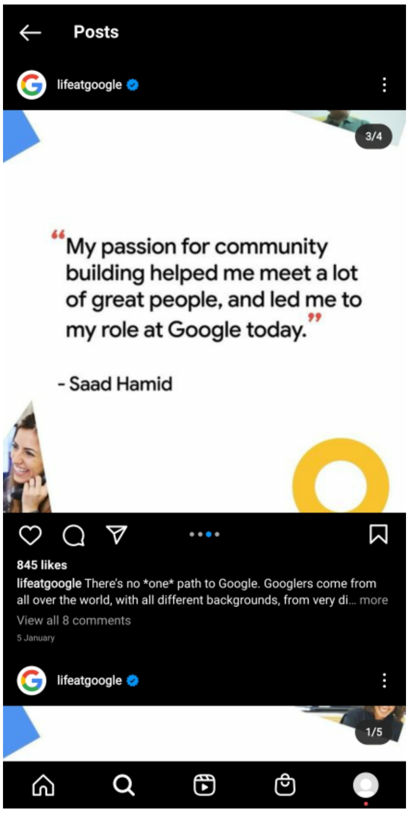
88 likes

delltech At #DellTechWorld, @michaeldell shares the core business value to building a brighter future with a positive, lasting im... more

View 1 comment

5 hours ago

Figure 3: A quote on the Dell Technologies Instagram page



"My passion for community building helped me meet a lot of great people, and led me to my role at Google today."

- Saad Hamid

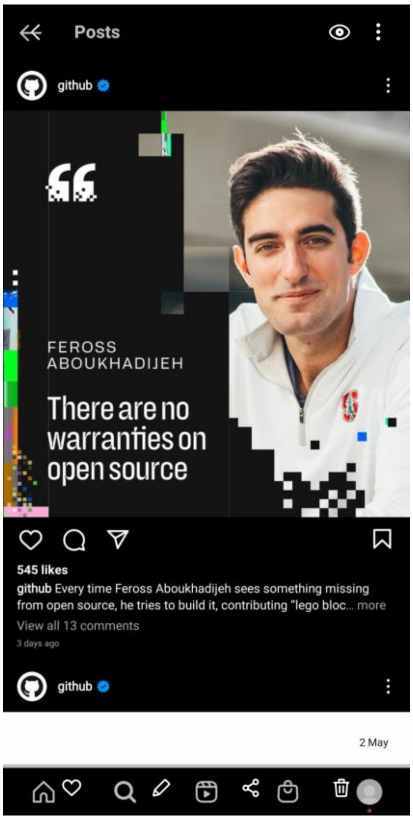
845 likes

lifeatgoogle There's no *one* path to Google. Googlers come from all over the world, with all different backgrounds, from very di... more

View all 8 comments

5 January

Figure 4: A quote on the Life at Google Instagram page



There are no warranties on open source

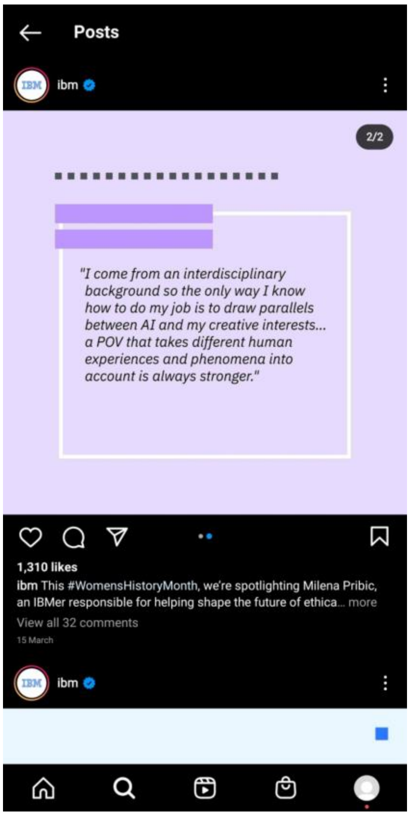
545 likes

github Every time Feross Aboukhadijeh sees something missing from open source, he tries to build it, contributing "lego bloc... more

View all 13 comments

3 days ago

Figure 5: A quote on the GitHub Instagram page



"I come from an interdisciplinary background so the only way I know how to do my job is to draw parallels between AI and my creative interests... a POV that takes different human experiences and phenomena into account is always stronger."

1,310 likes

ibm This #WomensHistoryMonth, we're spotlighting Milena Pribic, an IBMer responsible for helping shape the future of ethica... more

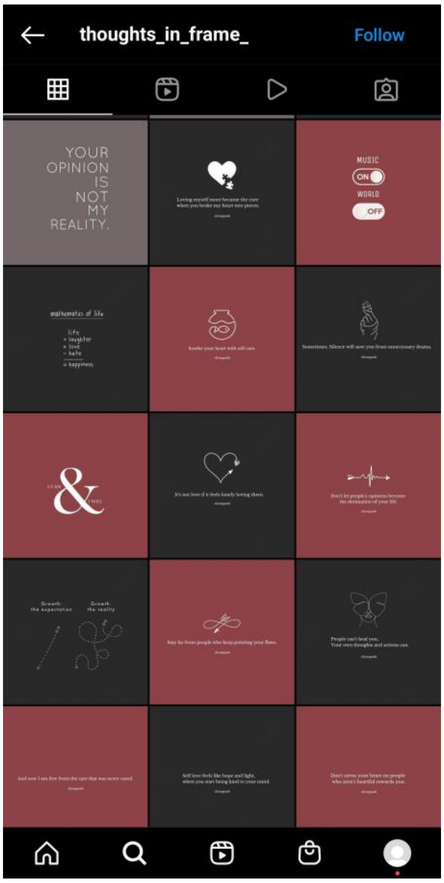
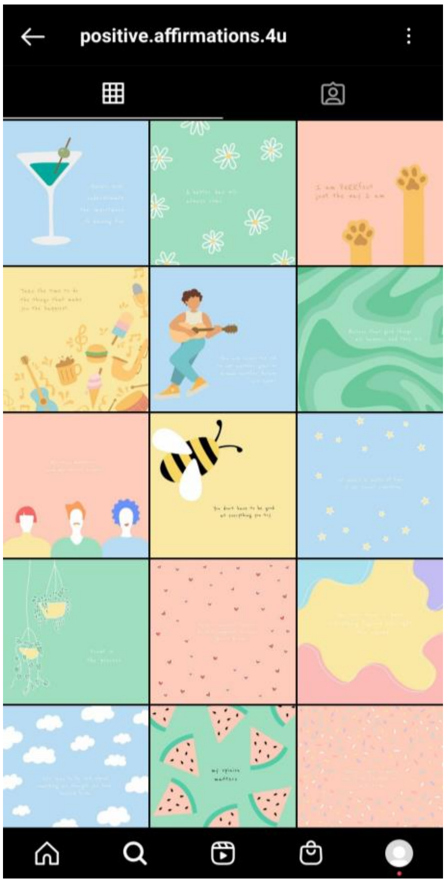
View all 32 comments

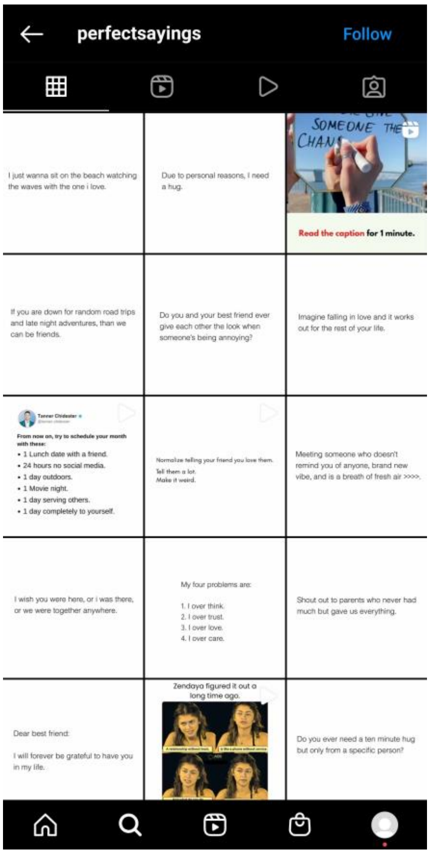
15 March

Figure 6: A quote on the IBM Instagram page

As you can see, there are quotes on most of these types of accounts. This shows the importance of quotes in the social media market.

There are also accounts on Instagram that only post quotes. This means that other users can simply subscribe to getting quotes in their feed by clicking the follow button. This is a useful strategy to gain followers as there is a great market for all types of quotes. Social media is often blamed as being a cause of depression and sadness due to the unreal perfection of a social media presence. However, there are also numerous pages that offer motivation, counselling, and inspiration to individuals to allow users to strive to be better and achieve their goals. Here are a few examples of quotes pages that are available on Instagram.

 thoughts_in_frame_ Follow YOUR OPINION IS NOT MY REALITY. MUSIC ON WORLD OFF mathematics of life life + laughter × love − hate = happiness & Growth: the expectation Growth: the reality *Figure 7: A quotes page that uses icons with plain coloured backgrounds*	 *Figure 8: A quotes page that uses simple colourful images/backgrounds*



I just wanna sit on the beach watching the waves with the one i love.

Due to personal reasons, I need a hug.

Read the caption for 1 minute.

If you are down for random road trips and late night adventures, than we can be friends.

Do you and your best friend ever give each other the look when someone's being annoying?

Imagine falling in love and it works out for the rest of your life.

Tanner Chidester

From now on, try to schedule your month with these:

- 1 Lunch date with a friend.
- 24 hours no social media.
- 1 day outdoors.
- 1 Movie night.
- 1 day serving others.
- 1 day completely to yourself.

Normalize telling your friend you love them.
Tell them a lot.
Make it weird.

Meeting someone who doesn't remind you of anyone, brand new vibe, and is a breath of fresh air >>>>.

I wish you were here, or i was there, or we were together anywhere.

My four problems are:

1. I over think.
2. I over trust.
3. I over love.
4. I over care.

Shout out to parents who never had much but gave us everything.

Dear best friend:

I will forever be grateful to have you in my life.

Zendaya figured it out a long time ago.

Do you ever need a ten minute hug but only from a specific person?

Figure 9: A quotes page that uses no background or colours

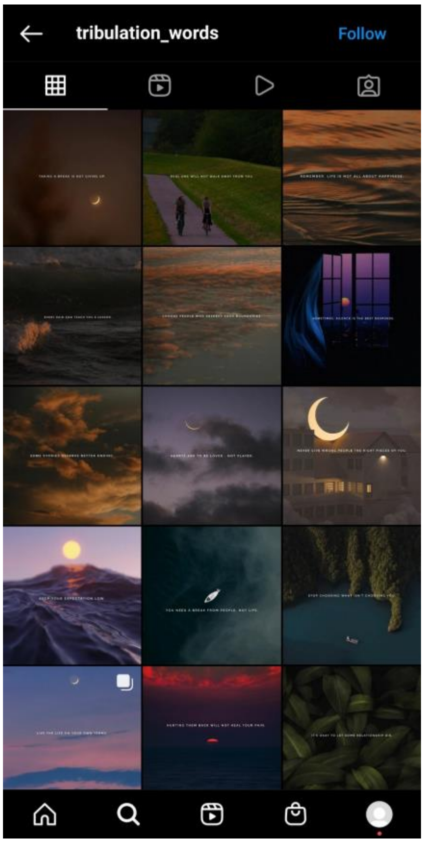
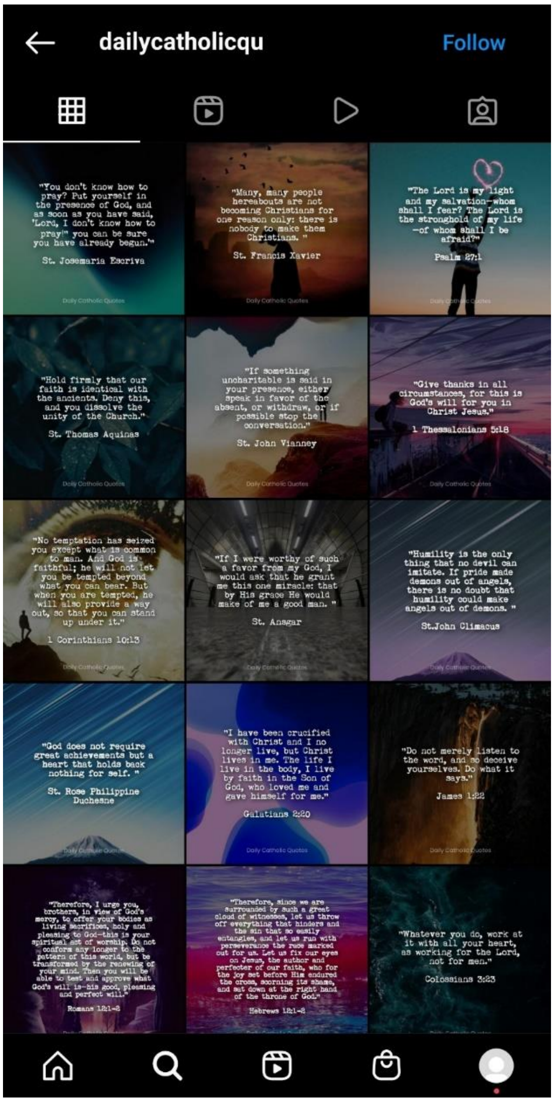


Figure 10: a quotes page that uses small text and images for background

Daily Catholic Quotes

One such page is Daily Catholic Quotes. They post quotes from Catholic Saints, People and Bible Verses. Daily catholic Quotes is a multi-platform social account that currently has around 2.5k page likes on Facebook, 2.5k followers on Instagram and around two hundred followers on Twitter. When I came across Daily Catholic Quotes, I noticed a constant structure to the design of each post. This made me think about the possibilities of being able to automate part of the design process so that these posts can be produced more efficiently.



"You don't know how to pray? Put yourself in the presence of God, and as soon as you have said, 'Lord, I don't know how to pray!" you can be sure you have already begun."

St. Josemaria Escriva

"Many, many people hereabouts are not becoming Christians for one reason only: there is nobody to make them Christians. "

St. Francis Xavier

"The Lord is my light and my salvation—whom shall I fear? The Lord is the stronghold of my life —of whom shall I be afraid?"

Psalm 27:1

"Hold firmly that our faith is identical with the ancients. Deny this, and you dissolve the unity of the Church."

St. Thomas Aquinas

"If something uncharitable is said in your presence, either speak in favor of the absent, or withdraw, or if possible stop the conversation."

St. John Vianney

"Give thanks in all circumstances, for this is God's will for you in Christ Jesus."

1 Thessalonians 5:18

"No temptation has seized you except what is common to man. And God is faithful; he will not let you be tempted beyond what you can bear. But when you are tempted, he will also provide a way out, so that you can stand up under it."

1 Corinthians 10:13

"If I were worthy of such a favor from my God, I would ask that he grant me this one miracle: that by His grace He would make of me a good man. "

St. Ansgar

"Humility is the only thing that no devil can imitate. If pride made demons out of angels, there is no doubt that humility could make angels out of demons. "

St.John Climacus

"God does not require great achievements but a heart that holds back nothing for self. "

St. Rose Philippine Duchesne

"I have been crucified with Christ and I no longer live, but Christ lives in me. The life I live in the body, I live by faith in the Son of God, who loved me and gave himself for me."

Galatians 2:20

"Do not merely listen to the word, and so deceive yourselves. Do what it says."

James 1:22

"Therefore, I urge you, brothers, in view of God's mercy, to offer your bodies as living sacrifices, holy and pleasing to God—this is your spiritual act of worship. Do not conform any longer to the pattern of this world, but be transformed by the renewing of your mind. Then you will be able to test and approve what God's will is—his good, pleasing and perfect will."

Romans 12:1-2

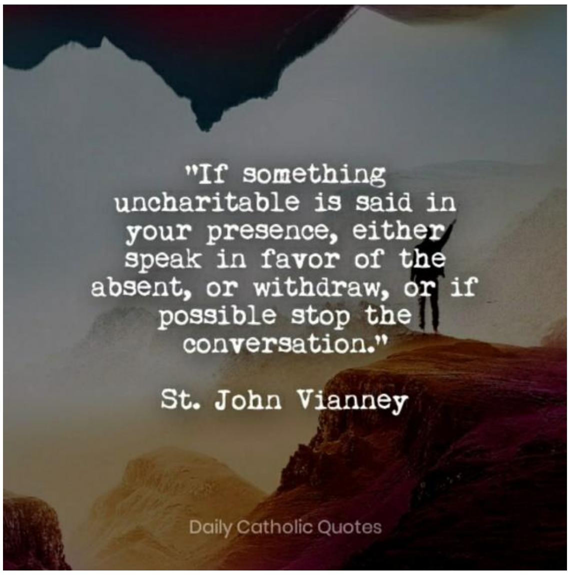
"Therefore, since we are surrounded by such a great cloud of witnesses, let us throw off everything that hinders and the sin that so easily entangles, and let us run with perseverance the race marked out for us. Let us fix our eyes on Jesus, the author and perfecter of our faith, who for the joy set before Him endured the cross, scorning its shame, and sat down at the right hand of the throne of God."

Hebrews 12:1-2

"Whatever you do, work at it with all your heart, as working for the Lord, not for men."

Colossians 3:23

Figure 11: Daily Catholic Quotes Instagram feed



"If something uncharitable is said in your presence, either speak in favor of the absent, or withdraw, or if possible stop the conversation."

St. John Vianney

Figure 12: An example post from Daily Catholic Quotes

From Figure 12 we can see that each post is built up using four elements. First you have the quote itself, next we see the author of that quote, then we also see the daily catholic quotes watermark at the bottom. Also, we can see that a vibrant background is used which has been darkened so that the text is easier to read.

The account is run by an individual who outsources the designing of the quotes due to their lack of graphic design experience. Since Each quote is based on a set structure, it would be possible to create an application that could aid the page to produce the images so that it can be easily shared to their accounts on each platform.

I am personally someone who loves quotes, and it is extremely useful in motivating and encouraging each of us. This has become especially prevalent in the Covid pandemic where depression is on the rise and there are fewer ways for people to be encouraged. If someone is going through a tough time and they see a quote that puts their suffering into a new perspective, it can allow them to keep going and achieve their goals.

Analysing the posts on this page, I concluded that there could be several changes that can be made from a graphical design thought process. Firstly, the font used is not very readable for older people or those with eyesight problems. Bold and strong fonts allow for pleasurable reading and makes the quote stand out in front of the background. Secondly, the backgrounds used do not add any value to the quote but seems like an afterthought. If the images were to link to the quote itself, it would make the post far more engaging. For example, a quote about love should have an image of love hearts rather than some trees. This engages the audience so that they are much more likely to interact with that post. This will be a fundamental part of my protype designs.

Project aim

The aim of this project will be developing a mobile application for Daily Catholic Quotes that simplifies the creation of graphics such that the admin of daily catholic quotes can easily share the image to their social media platforms. Since the admin has no previous experience of graphic design, the application should allow a remarkably simple user interface where the user provides minimum design influence, and the application takes care of the designing of the image. I will do this through research of technologies, design practices and client research so that the application achieves the goals it requires. Using requirements analysis and feasibility analysis, I will determine the features that will best accomplish the task at hand.

Before starting to do any research or designing it is important to plan my time and create a schedule of what I am going to do. I planned my time using a Gantt chart which is included in Appendix A.

Literature Review

This section will provide research into the project that will be developed, including an insight of the fundamentals of developing an application; before developing this piece of software, it is critical to review the project's overarching factors, which are mobile applications and user interface designs. As many social media accounts who do not have a large crew sometimes run their entire profile from a smartphone, I will use a mobile application as my approach. Since Daily Catholic Quotes use an android device for their management (as seen from twitter device information), it would be silly to develop an iOS solution. Therefore, I will develop an android application by looking at the tools for android development and learning the skills required to create a working solution.

Design

User interface design include user interaction with various devices such as displays, buttons, mice, and keyboards. According to Stone (2005), the goal of user interface design is to provide interfaces that are simple to use and comprehend. Stone adds that the interface should also fulfil the desires of end users for the system's planned procedures to be carried out (Stone, 2005). Users that utilise the web to execute certain tasks or procedures on a website are involved in user interface design for all modern applications. This is because applications were originated from web apps which used websites as a foundation. In accordance with Quiroz et al. (2007), designing user interface design for an interactive online application that is appealing, accessible, and simple to use is a difficult challenge.

As per Galitz (2002), user interface design is "a subset of the field of study known as human-computer interaction." He says that user interface design must be clear and simple for individuals to utilise. He goes on to say that effective interface design would ensure well-designed input and output methods that eliminate any questions and best suit the user's requirements, capabilities, and conditions (Galitz, 2002). Tan and Wei (2006) recommend using "icons, colours, graphics, and animations to increase the vividness" of an application. They believe that this will increase consumer happiness which encourages users to use the software again.

Flavian, Gurrea, and Ors (2009) encourage developers to adhere to basic design principles in order to provide a dependable, consistent appearance and experience while also making the software easy to use and navigate. According to Eroglu et al. (2001), visual signals such as layout and colour are essential design variables to achieve user success.

There are numerous methods for carrying out user interface design. One of the most typical approaches is to make rapid sketches using a pencil/pen and paper. Illustrations, according to Landay and Myers (1995), allow a designer to swiftly develop design concepts before they would be forgotten. They go on to say that "sketches are very simple and far less time demanding" to create. They also note out that drawing sketches on paper has always had the downside of being difficult to adapt if layouts need to be changed, as well as the designer frequently having to recreate fundamental components (Landay and Myers, 1995). According to Landay and Myers, digital drawings are a preferable option since they can be edited, duplicated, and have improved searchability and storage capabilities.

Technologies

Android

Android is a platform that is open source. It was developed by Google and is controlled by the Open Handset Alliance. It is intended to "accelerate mobile innovation." As a result, Android has dominated the world of mobile innovation. It is a free and open platform that distinguishes between hardware and software that runs on it. (Gargenta, 2011) As a result, many more devices are running the same programme. It also opens the door to a friendlier ecosystem for developers and users. Android is a whole software solution for mobile devices. Since its inception, the Android team has provided a development kit (tools and frameworks) to help developers create mobile apps as quickly and easily as feasible (Yevheniy Dzezhyts, 2013). Android id the most popular mobile platform in the world so selecting android development is an easy option for many developers. In addition to this, Java is the native programming language which is described as the world's most popular programming language. This means that many developers are likely to have the knowledge to easily adapt to android development. I have had some experience with Java through my time at university so using android is a suitable choice.

Integrated Development Environment (IDE)

To develop for android, it is essential that a useful integrated development environment (IDE) is selected. Since Android is primarily developed in Java or Kotlin, there are several great options to choose from. I have looked at the three most popular IDE to identify which one would be most suitable for me.

Android Studio IDE

Android Studio is an obvious choice for many as it is Google's official IDE for android development. This is beneficial due to the easy optimisation and integration with other google services which allows for a streamlined development approach. It is completely free and is widely used which means that there is plenty of support available if one were to need it. Since android studio is designed specifically for android development, there are many tools that are geared towards enhancing the android development experience. Other IDEs have a more diverse use case which means that although they provide android friendly tools, it is not specifically designed for only android development.

Android studio allows users to instantly emulate their software solution on their pc or you can plug in your android device to try running your application on your phone. The drawback of Android Studio is that it does not support cross-platform app development which means that if you were developing an app that operates on iOS and Android, you would need to use separate IDEs.

Eclipse IDE

Eclipse is often termed as the second most popular IDE in the world. The use of eclipse IDE for android development has been popular for a long time. This is to do with being the recommended development platform by Google. Eclipse is not only limited to android development. It is popular for development in PHP, JavaScript, Python, Ruby, C/C++ and many more. This means that applications that use a PHP based web service will suit the eclipse IDE. Although, google has discontinued support for the eclipse android plugin, in continues to be popular with users even today.

Due to the popularity of Eclipse IDE and the diverse nature of the software that can be utilised, Eclipse is an excellent choice for programmers. It has a large community and userbase which allows for plenty of support being available.

Visual Studio IDE

Although Microsoft's Visual Studio is not the most apparent choice for android development, it is not without merit. Visual studio is available in a variety of configurations (similar to eclipse), including one that includes Xamarin. In 2016, Microsoft purchased Xamarin, which gave developers the opportunity to write code for Android apps using the famous Visual Studio IDE. Visual Studio is the most widely used IDE, demonstrating its importance to many people throughout the world. Visual studio is similar to eclipse in terms of its popularity and ability to code in different languages for multiple platforms.

In summary, I think that visual studio and eclipse IDE may have the most advanced code line features and support available. They also have an immense amount of potential for spreading the android application to other platforms due to their cross-platform nature. Although these IDEs have much merit to their own, I do not feel that the advantages that they pose apply directly to the application I will be developing. I do not need to create an iOS-based app or a web service to accompany this app at this stage. Therefore, I will use android studio since it contains many android specific tools and is supported by Google.

Database tier

Every app will require a database to store its data. This is where all of the application's common data is kept, such as user account details, quotations, and, in certain circumstances, the content being served. Saving, updating, and deleting data are all possible using the database. The database is what enables the system to query data and use it to accomplish specified objectives. Databases are divided into two categories: relational and non-relational databases. Oracle, Microsoft SQL Server, MySQL, and PostgreSQL are some of the most used Relational databases, according to Foote (2016). MySQL was the most popular database in 2019, according to a Datafloq poll, followed by MongoDB (Datafloq, 2019).

I am familiar with a few database technologies such as MySQL and MongoDB which have been used for other modules. By using these technologies, I can develop code using my developed understanding so that I can develop easily and quickly.

Using MySQL is a desirable choice for using complex data and supports many programming languages. In addition to this, MySQL is open source and free although you will need to run it on a server which could cost money.

Firebase, a Google product, is an alternative to MySQL. Because Firebase has strong ties to Android, it may be more straightforward to integrate. Furthermore, because it is a NoSQL database, it is easier to construct than a standard SQL database. Firebase also has the advantage of being a real-time database with built-in cloud capability. This implies that users will always get the most recent version of the database, and the database will be able to scale to the extent of the data. This also implies that the database does not need to be hosted on a specific server or started when needed. Instead of using a table-based way to convey data, Firebase uses key-value pairs. Firebase has a free plan that allows an ample amount of usage for this project.

Summary

I will use android development using Android Studio IDE. Due to the easy integration and the cloud functionality of firebase Realtime databases I will use firebase in the database tier of my application.

Methodology

In this section I will outline the results concerning the most common development approaches utilised in the application development market today. To guarantee that the development of this project is organised and structured, the best possible approach for this project must be followed. A lack of an organised development strategy, according to Kwak & Stoddard (2004), might increase the chance of a project failing.

There are many development methodologies that I can use each with their own advantages and disadvantages.

Waterfall

Waterfall is one of the oldest and most widely used methodology especially for big corporate companies. Waterfall splits the development into five major stages: Requirements gathering, Design, Implementation, Testing & Maintenance. The name Waterfall comes from the fact that the method describes how in a waterfall, water travels down, with the water not being able to change direction and go back upwards. Similarly, in the waterfall process, once the development section is completed, and it is approved, it moves on to the next development phase. The fact that you have a clear list of requirements before the development stage begins is one advantage of employing waterfall. Waterfall is simple to construct since it follows a "linear model." Another advantage of waterfall technique is that "appropriate documentation is followed for each step," which means that everything is documented and examined thoroughly. (Balaji and Murugaiyan, 2012).

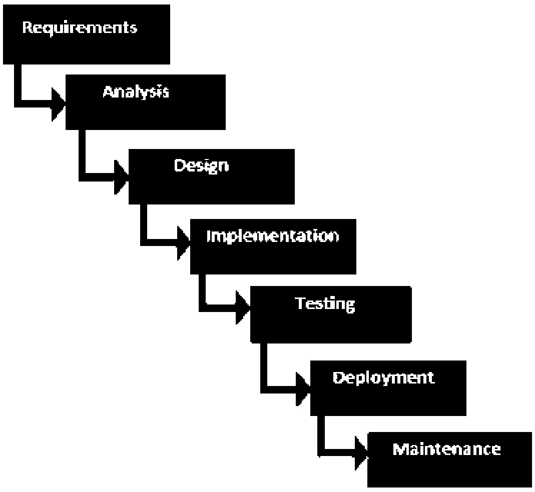


Figure 13: Waterfall lifecycle

The requirements gathering phase is the first in the waterfall development process, and it is here that all the requirements for the application development, no matter how complex, are analysed and recorded. At the conclusion of the requirement analysis step, the requirements document will be created, which will be classified in order to prioritise features.

The Design phase is the next step in the waterfall methodology. This phase is divided into two parts: logical and physical design. The technical design requirements, such as the required programming language, data layers, and services, are then known using the information acquired during the requirement analysis phase. A systems analyst can develop a physical design from the specifications of the hardware and software needs once the logical design is complete.

The development phase is the third phase in this approach, and it is here that the coding and programming begins. This is mostly a programmer's phase because most of the code is written from the prototype design and project requirements and specifications to implement the business logic.

After the development phase is completed, the model will proceed to the testing phase, where the application will be thoroughly inspected, and stress tested to ensure that it complies with quality guarantees and software testing. Acceptance

Testing is an excellent practise to include the customer in this phase since they will know exactly how the programme will be used (Gorditenko, 2014).

Following the testing phase, the Maintenance phase will commence, during which the programme will be given to the client and used.

Waterfall, according to Kannan, Jhajharia, and Verma (2014), looks at design in detail and captures mistakes before software is deployed, saving time and effort throughout development. Waterfall is appropriate for short projects, according to Kannan, Jhajharia, and Verma (2014). According to Mahalakshmi and Sundararajan (2013), waterfall is useless if the customer loves to alter their needs since waterfall demands the requirements to be fixed to complete the project successfully. Another problem of Waterfall is that customer input is only obtained at the end of the project, which means there is a chance it will be obsolete or simply not good enough for the client by the time it is completed.

Rapid application development

Rapid Application Development (RAD) is a 4-step methodology that prioritises speed of development. The main structure of the methodology is to create multiple iterations of a product which is analysed by the user. Then the developer implements the next part of the app, taking into consideration what the client says, and this process is repeated until a final product is produced. This means that when a user changes their requirements, it can easily be implemented into the methodology so that the final product ensures an application that matches the current user requirements. (Coleman and Verbruggen, 1998)

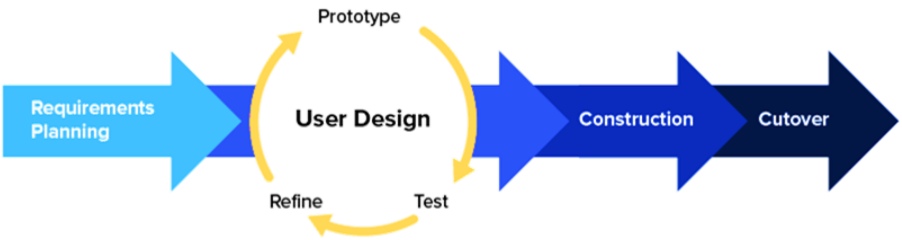


Figure 14: Rapid Application Development lifecycle

The first step is to define the requirements. Unlike other models, these requirements are not detailed requirements from the end user, but broader requirements that cover the main functionality.

The second step is to create a prototype with some features and functions. This is heavy on the programmer as they need to develop functions that the user may want without a concrete idea of what they require. The advantage to this is that the developer may create a solution that is more advanced and creative than the client first imagined. Once these prototypes are given to the client, they provide feedback along with testing.

The feedback and testing are used to refine the product for the next prototype. After a few cycles of this process, the final product will be ready. RAD is a useful methodology when you have a critical deadline and a small development team. RAD is a methodology that involves the user throughout the process rather than just at the beginning and end.

The advantages of RAD are that the product encourages customer feedback in a way that they feel involved in the development process. Also, it makes up for clients who have evolving requirements by producing multiple prototypes that are reviewed. In addition, the fact that a final product can be achieved earlier than with other models mean more productivity even with less team members and means reduced development time.

The disadvantages of RAD is that it requires extremely skilled programmers who have lots of experience to understand what features the client needs.

Agile software development

Agile is a software development technique that emphasises people, interaction, functioning software, customer collaboration, and change above procedures, tools, contracts, and planning (Awad, 2005). Agile methodology is a catch-all name for a collection of concepts and activities based on the Agile software development manifesto's ideals and principles.

These four assertions are the guiding principles of agile development. According to Balaji & Murugaiyan (2012), the term agile refers to the ability to move swiftly, and this is the key premise of agile. Because agile requires the development team to constantly review the development to ensure that the product in development is what the customer needs, and if it is not, the customer can let them know through these regular review meetings, there is more client involvement in the development process.

The solution is evaluated with the client after each iteration, and further functionality is added until the entire functionality is completed and the customer is pleased with the result (Kannan, Jhajharia and Verma, 2014). According to Kannan, Jhahjaria, and Verma (2014), in agile, "teams can start developing their software in chorus with the requirement gathering process," which "reduces the impact of analysis paralysis on progress" and allows them to jump right into implementation without waiting for the requirement analysis or design stage to finish.

The necessity of continuous communication and engagement between developers and stakeholders is prioritised over precise processes and technologies. This, according to Beck (2001), aids in acquiring a better grasp of what the consumer expects from the product. One of the most significant downsides of agile is that it necessitates frequent and high-quality customer contact. If the communication or quality of the data given by the customer is inadequate, it may have a detrimental impact on the project (Kannan, Jhajharia and Verma, 2014). Balaji and Murugaiyan (2012) argue that because documentation is undervalued, any new team members would be unable to grasp what is going on owing to a lack of documentation.

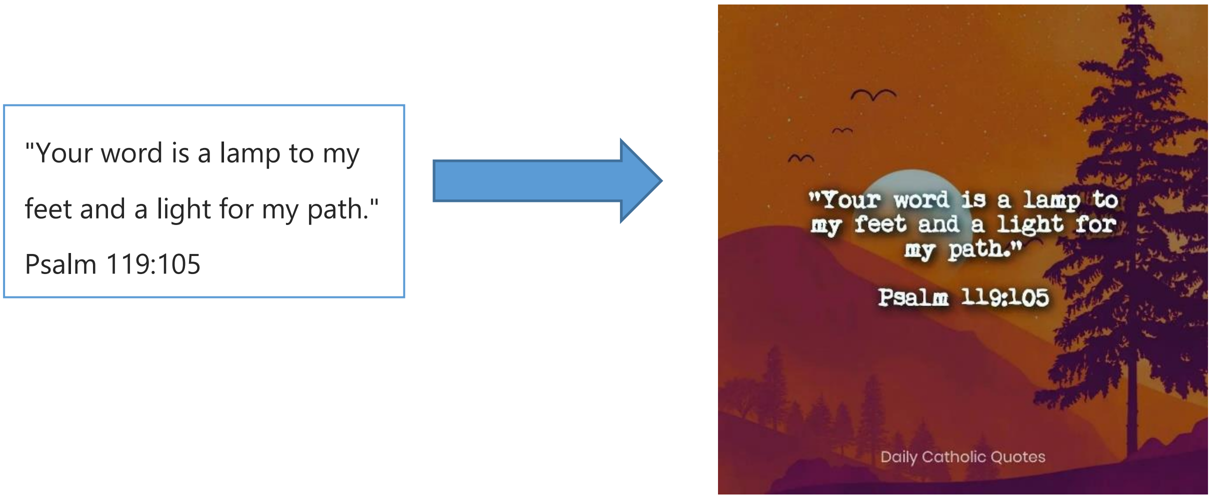
Summary

After careful consideration of each of these methodologies, I have decided to use a hybrid development approach. A waterfall approach has a clear easy to follow structure that allows for the easiest implementation. On the other hand, RAD is implementation heavy and uses broad requirements. Agile lies in the middle with a balance of iterative attitude while still following a set structure that aids the developer with planning and design. The waterfall approach will be employed throughout the first requirements collecting and design phase. This is to guarantee that a clear set of agreed needs is established early on, and waterfall approach ensures that requirements collecting, and documentation are finished prior to moving on to the implementation (development) stage. The waterfall technique is simple to follow and ensures that each step is completed before moving on to the next. This is critical because finishing the previous level establishes a solid foundation upon which you may successfully tackle the following stage. The waterfall methodology also guarantees that you thoroughly investigate the problem situation. This allows the developer to carefully design and construct the application in accordance with the specifications. After that I will use the design stage of the agile methodology which allows for a design before starting to develop the implementation. From then on, I will use the RAD methodology to create multiple prototypes that build on functionality through a test-driven approach.

Requirements Analysis

Client Study

An organisation by the name of Daily Catholic Quotes posts Saint quotes and Bible verses. Since only the content changes from post to post, I think it would be possible to create an app that would automate the process of making the quote into an image form.



"Your word is a lamp to my feet and a light for my path."

Psalm 119:105

Figure 15: An example image post created from text

This can be achieved through a mobile application which addresses two main functions:

- Allowing users to submit quotes to the system which are automatically converted to images that can be easily shared on social media. (See figure above)
- Allow users to browse, filter and share quotes that are in the database.

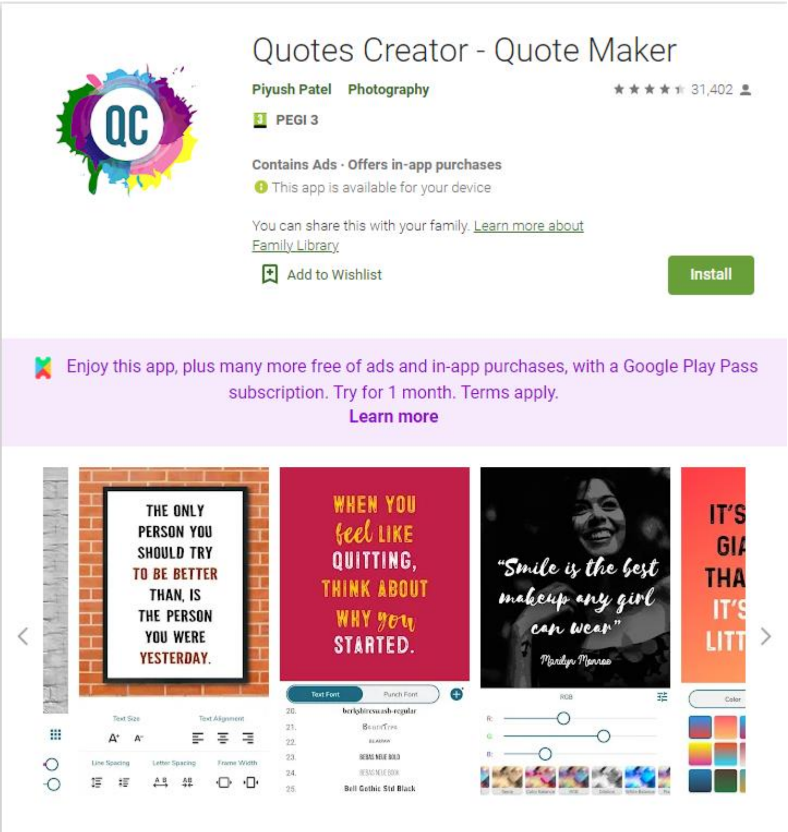
Other requirements will be developed in this stage by looking at existing solutions to find features that can be replicated in this project and through a feasibility study.

Competitive analysis

In this section I will look at existing solutions that allow users to produce quotes from images in the android platform. Since there are not any apps that convert the text straight to an image, I will look at apps that are used to create quote images.

1. Quotes Creator – Quote Maker

url: https://play.google.com/store/apps/details?id=com.ist.quotescreator



Quotes Creator - Quote Maker

Piyush Patel Photography

★★★★½ 31,402

PEGI 3

Contains Ads · Offers in-app purchases

This app is available for your device

You can share this with your family. Learn more about Family Library

Add to Wishlist

Install

Enjoy this app, plus many more free of ads and in-app purchases, with a Google Play Pass subscription. Try for 1 month. Terms apply.

Learn more

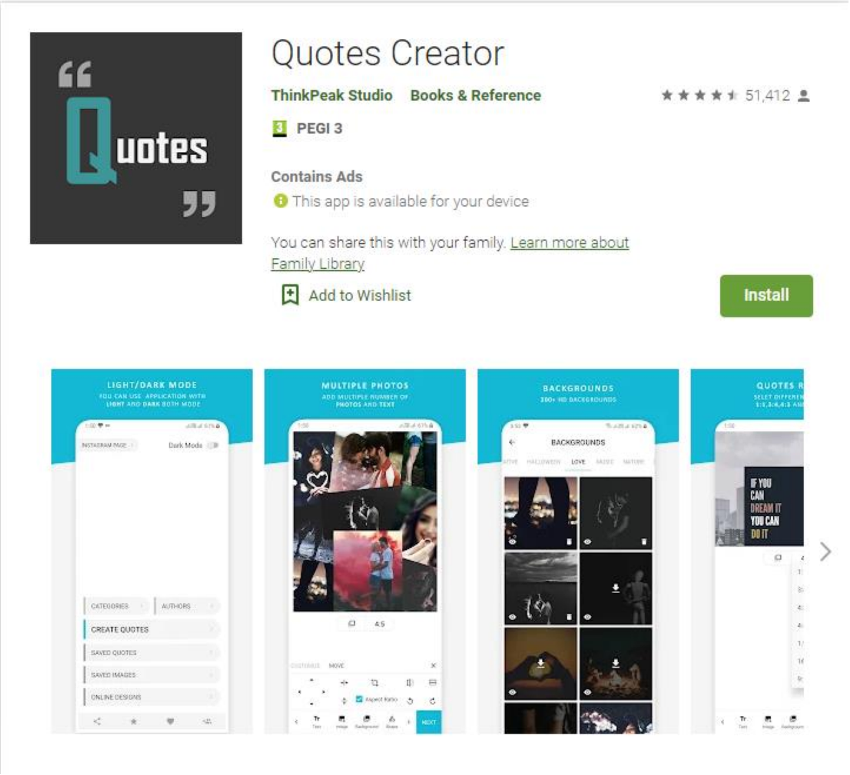
QC
THE ONLY PERSON YOU SHOULD TRY TO BE BETTER THAN, IS THE PERSON YOU WERE YESTERDAY.
Text Size
Text Alignment
Line Spacing
Letter Spacing
Frame Width
WHEN YOU feel LIKE QUITTING, THINK ABOUT WHY you STARTED.
Text Font
Punch Font
Bell Gothic Std Black
"Smile is the best makeup any girl can wear"
Marilyn Monroe
RGB
IT'S
GIA
THA
IT'S
LITT
Color

This application is exceedingly popular with more than 1M downloads on the google play store. The app works as a graphic design app which means that to produce a good image, it is essential to know about font design and colour combinations. The templates are helpful and truly diverse such that it caters for everyone.

There is an overwhelming amount of customisation which may not be useful for my project as my app should be able to be used by someone with no graphic design experience. The architecture and user interface make it simple to generate quotations quickly. Although you may add your own watermark to your photos, you must pay to remove the quote creator watermark.

2. Quotes Creator by ThinkPeak Studio

url: https://play.google.com/store/apps/details?id=com.thinkpeak.quotescreator



Quotes Creator

ThinkPeak Studio Books & Reference

51,412

PEGI 3

Contains Ads

This app is available for your device

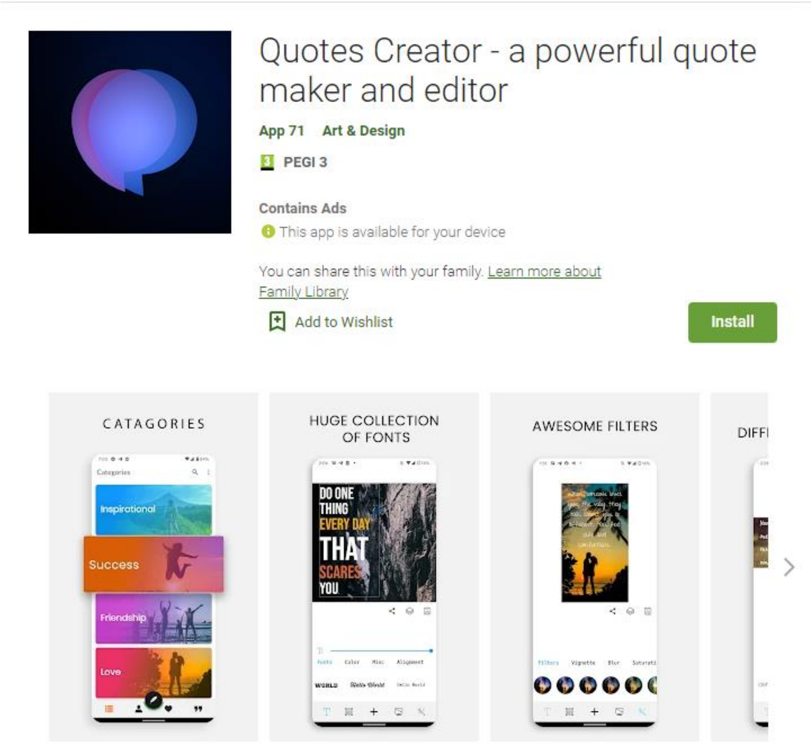
You can share this with your family. Learn more about Family Library

Quotes creator is also a popular app with over 1M+ installations. This app contains an easy-to-use interface with a well-structured organisation. There are a few extra features in this app such as the ability to save your favourite quotes and to browse through a collection of existing quotes. This is particularly useful when a user is looking for inspiration or when they are trying to find a good quote to share. The saved quotes feature is especially useful so that a user can store all the quotes that they like in one place on the application. There is also the functionality to add multiple photos and texts, but this has a limited effect when using for a quote post.

Here also we can see lots of options for customisation and creativity. In addition, there are backgrounds that you can choose from and download from a collection. You can quickly switch between quote categories to discover the perfect quotation. Another notable feature is the ability to share just the text or the image of the quote. This is handy for when you want to share the quote via SMS.

3. Quotes Creator by App 71

url: https://play.google.com/store/apps/details?id=com.diatomicsoft.quotescreator



Quotes Creator - a powerful quote maker and editor

App 71 Art & Design

PEGI 3

Contains Ads

This app is available for your device

You can share this with your family. Learn more about Family Library

This app is relatively less popular than the other two applications. It has 10,000+ installations and contains many neat features. I did notice some user experience design issues where it was difficult to read the names of fonts as they were overlapped on top of each other. Although there are many excellent features available, the design of the app is something that could be improved.

The features that I particularly liked on this app is the categorisation of quotes to make it easier to find a particular quote, the search function, and the ability to add filters to your designs.

Feasibility study

Before listing functional and non-functional requirements, it is important to make sure that the requirements are feasible. When embarking on a project, a feasibility study is required to determine whether the project is possible in the first place. A feasibility study considers not only the financial consequences of a project, but also technical feasibility, operational feasibility, potential dangers, and other factors that might prevent it from being completed (Shen et al., 2010). For the project to be worthwhile, the advantages of the proposed new system must outweigh the costs and other restrictions. It is pointless to take on this project if the deliverable is not useful to the client. To ensure that the project is useful to the customer, a feasibility study as well as commercial concerns must be examined.

Client considerations

When doing a feasibility assessment for a project, one of the most crucial factors to examine is the project's economic ramifications (Shen et al., 2010). Daily Catholic Quotes is the customer for this project, and the new suggested software should provide value to their business. A new app is required since the demand for this project is driven by higher engagement and lower costs of outsourcing quotation design. As a result, it can be determined that this software will only add to the organization's value.

The app's key economic consequence is that it helps the firm to grow and reach a larger audience, as well as provide additional opportunities to get new followers. The software allows users to participate in social media by allowing them to submit their own quotations for distribution on the platform. In the future, the app may offer the possibility to earn extra money through monetised adverts and sponsorship.

The expense of having an app is also a consideration. If the database must be hosted, the firm will have to pay for it, as well as have someone on staff to maintain the programme and deliver upgrades.

Risk Management

Risk	Severity	Likelihood	Action
Complexity Risk: Risk of the project being too complex and leading to delays and affect the scope of the project	3	2	Conduct a thorough feasibility check of the technologies required and ensure that it is manageable before starting

			the project and check with supervisor.
Not enough time: There is a risk of not getting enough time as anticipated	3	1	Plan well before starting and to plan and allocate enough time for each task appropriately
Losing the project files due to some error on the system	5	3	Have backup copies of the project available in case the main copy is damaged
Hacking of the database	4	2	Ensure that the database is secured appropriately to stop it from being attacked
Cross platform compatibility: This is when the functionality implemented is not compatible by some devices	4	2	This issue can be solved by making sure the system is compliant across all android devices
Lack of resources: Not having the technology required to develop the system	3	2	Need to plan well in advance and get hold of all the technologies and software needed in advance to ensure all resources are available
PC or system crashing	5	3	Ensure that the work is saved often and keep several back ups

Severity	Likelihood
1 – Very Low	1 – Very Low
2 – Low	2 – Low
3 – Medium	3 – Medium
4 – High	4 – High
5 – Very High	5 – Very High

Figure 16: Table analysing risks of the project

Requirements analysis

Initially, when I proposed to do this project at the end of January, my plan was to meet with the client to find requirements that the client would like. Then when I develop each prototype, I would be able to allow my client to provide feedback as they see fit. However, since I started the module late (end of January), I was unable to submit an ethical approval form in order to be protected by the university when contacting third parties. This meant that I had to change my approach into a more rapid approach where I need to think from the eyes of the client and determine which users would be useful and what features are not. This means that the final product may end up being slightly different opinions from the client than if they were involved in the development process. After careful consideration of the client, their operations, and research into how they can improve their service, I produced the following functional and non-functional requirements:

Functional Requirements

Functional requirements describe the functions of the applications. In this case it will be an android app for the conversion of quotes from text to posts and for adding user quotes to the system.

My final application should meet the following requirements:

- Must be an android app as android is the most popular smartphone operating system.
- Should work for any android smartphone.
- Allow a user to input a quote and an author into a database
- The database should be always up to date to serve users from across the world at the same time.
- The background must be able to be selected by the user
- The backgrounds should be related to the quote in some way.
- The user should not have to manually edit sizes, fonts, or colours.
- The user should be able to favourite the quotes that they like.
- The liked quotes should be able to be viewed separately
- There should be a daily quote functionality in which all users receive the same quote of the day.
- The app must be able to dynamically create posts from a collection of quotes stored in the database
- There must be a link to major social media profiles of Daily catholic quotes within the app.
- The app must categorise quotes so that users can find the quotes they want more easily.
- The app must allow users to browse all the quotes in the database including quotes that have been added by other users.
- If a related background cannot be found or is not selected by the user, the user should have the ability to select from a range of generic backgrounds to create the post.
- When a category is selected, every quote in the database that links to the category should be made visible to the user.
- The text within the quote should auto size so that part of the quote is not cut off.
- For each quote, there must be four options:
    - Like the quote
    - Save the quote to gallery
    - Copy the text from the quote
    - Share the quote to other apps. This can be the text or the image.
- When saving or sharing the image, a watermark should be added to show that the quote was created using this app.
- There must be appropriate user feedback and instructions so that the user may use the app effectively

Non-functional requirements

A non-functional requirement is a characteristic that governs how a system functions. Non-functional characteristics, as contrast to functional requirements, are not required for a system to work. Non-functional requirements cover how a system completes a job, while functional requirements address what a system accomplishes.

These are the non-functional requirements for my application:

- The backgrounds of a quote should be able to be changed with a single tap without the user needing to wait for an image to be downloaded.
- The app must be portable to any android smartphone such that the app works when a user upgrades a device
- The app must be compatible to other apps particularly social media and messaging apps which the user will use to share the quotes.
- The image backgrounds should not be stored locally on a user's phone as this will require users to have larger storage capacity in their device which cannot be guaranteed.
- The app must be highly available such that if there is internet access, the app must work with full capacity even when under intense load.
- The app should allow for quotes to be added in other languages so that certain user groups do not feel left out.
- Navigation should be easy with an effective user interface that is familiar to users through existing UI practices.
- Users should be able to determine what each icon means and how they are supposed to interact with the app.

Summary of requirements

Although these are the requirements that I have gathered from doing market research, looking at existing solutions and through recognising features that would help the client, these are just the initial requirements that I have developed. I may find extra requirements that I will need to add after creating some prototypes which I will add during the sprints.

I have also used a traffic light model to determine which requirements are essential, preferred, and optional. This allows me to prioritise the key features in the situation where I may run out of time.

Design

Before starting to develop code for my software, it is essential to develop designs that show how the app should be designed. This means that less decisions need to be taken while implementing and you can stick to developing what was first designed.

Before developing the code, I also looked at standard app development practices and user interface design. I realised that to maintain good usability standards, the app must have a clear and simple structure with a uniform look and feel. In order to allow the app to unite with the social media accounts of Daily Catholic Quotes, I have decided to base the colour scheme of the app on the profile icon that they use.

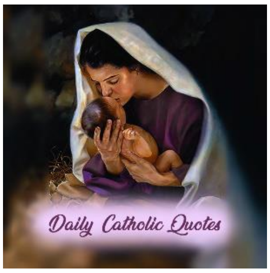


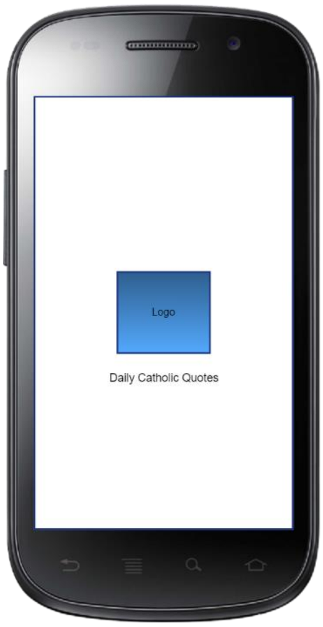
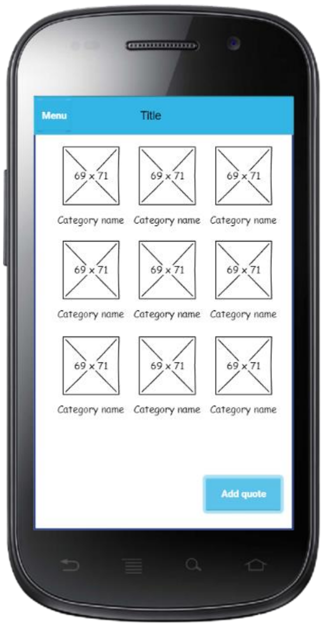
Figure 17: Daily Catholic Quotes profile icon

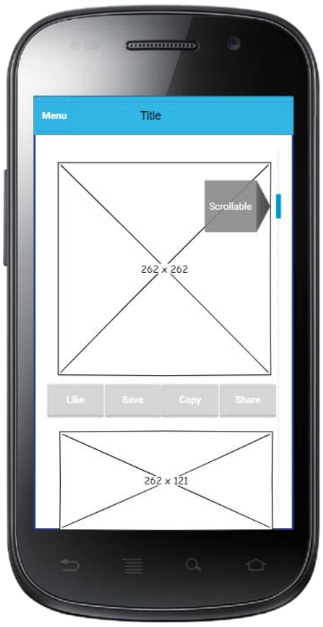
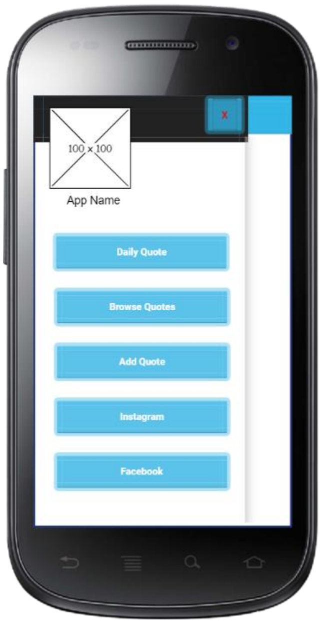
As you can see from the image, the primary colours of the organisation are purple and orange. I have modelled the app to use these colours so that users can experience a flow from the social media accounts to the app.

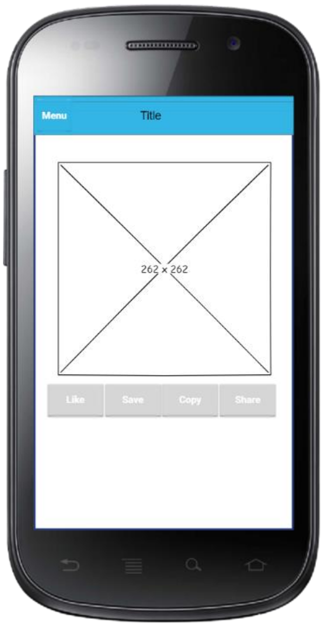
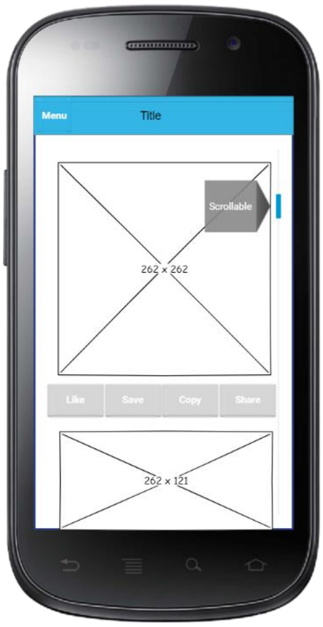
Application Layout/Wireframing

The success or failure of any software product is determined by the front end, or the component that users interact with. End users must be able to interact with the product and conduct the processes it is supposed to do; otherwise, the product will be considered worthless. As a result, while creating a system's user interface, it is critical to take meticulous considerations into account. It is critical for this app's end users to be able to complete operations as quickly and smoothly as possible while receiving just enough information. The user interface should not be overly complicated, but straightforward, and keep the user informed about what is going on at all times.

During the early phases of the design stage, low fidelity sketches using pencil and paper were utilised to design the interface. Low-fidelity drawings allow designers to create designs rapidly and update them as required. Later I selected the best drawings and converted them to wireframes to plan out where different elements of the app would be placed on each page. This allows me to easily transfer this into android studio views. The wireframes were created with Pencil 3.1.0, an open-source GUI wireframe design tool.

 *Figure 18: Wireframe of splash screen*	This is the first page that a user sees when the application is opened. A splash screen is popular among mobile applications as it adds a professional feel to the app. This page is very much optional for my application, but I have made a design for it anyway. I will only add this at the end if I have time so that I do not spend time working on this and end up not being able to work on key functionality. The page is quite simple with the name of the app and a logo.
 *Figure 19: Wireframe of categories page*	From the splash screen, we go to the categories page. This will display a list of categories that the user can select from. This will be done by showing the name of the category along with an icon to visually distinguish categories easily. Within the activity bar there will be a button to open the menu as well as the title of the page to allow users to see which page they are currently on. There will also be a floating button that takes the user to the add quote page. I have decided to add this because these two pages provide the main functionality of the program.

 Menu Title Scrollable 262 x 262 Like Save Copy Share 262 x 121 *Figure 20: Wireframe of Browsing of quotes*	When a category has been selected by the user, a list of all the quotes from that category will be generated. The users can scroll down to see more quotes. Under each quote there will be four buttons that the user can press to interact with the quote. These four buttons are: Like, Save, Copy and Share. Within the activity bar there will be a button to open the menu as well as the title of the page to allow users to see which page they are currently on.
 x 100 x 100 App Name Daily Quote Browse Quotes Add Quote Instagram Facebook *Figure 21: Wireframe of Main menu*	When the menu is opened, the users will be able to select which page they would like to go to. This includes a link to the quote of the day page, the browse quotes page, the add quotes page, and links to the daily catholic quotes Instagram and Facebook profiles. In addition, I have added an app logo and name at the top for a professional touch.

 *Figure 22: Wireframe of quote of the day page*	When a user selects the daily quote page, it opens the quote of the day page. This is used to display the quote of the day from the database which is changed each day. Under the quote there will be four buttons that the user can press to interact with the quote. These four buttons are: Like, Save, Copy and Share. Within the activity bar there will be a button to open the menu as well as the title of the page to allow users to see which page they are currently on.
 Menu Title Scrollable 262 x 262 Like Save Copy Share 262 x 121 *Figure 23: Wireframe of liked quotes page*	When a user selects liked quotes, a list of all the quotes that have been liked by the user will be shown. The users can scroll down to see more quotes. Under each quote there will be four buttons that the user can press to interact with the quote. These four buttons are: Like, Save, Copy and Share. Within the activity bar there will be a button to open the menu as well as the title of the page to allow users to see which page they are currently on.

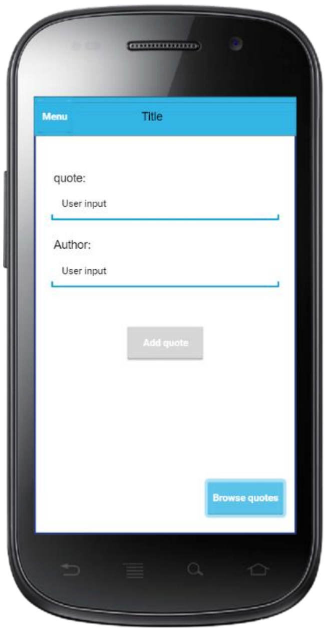
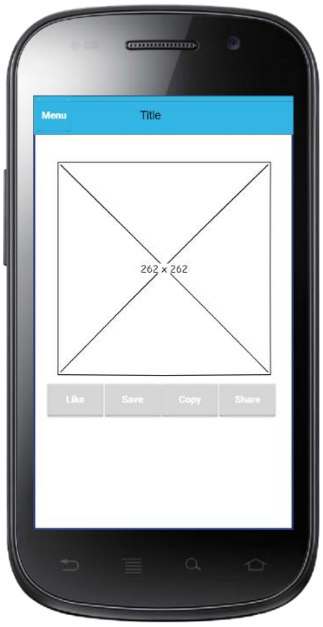
 Menu Title quote: User input Author: User input Add quote Browse quotes *Figure 24: Wireframe of Adding of quotes*	This is the add quote page. This is where the user types the quote and the author that they would like to add to the database. Within the activity bar there will be a button to open the menu as well as the title of the page to allow users to see which page they are currently on. There will also be a floating button that takes the user to the categories page. I have decided to add this because these two pages provide the main functionality of the program.
 *Figure 25: Wireframe of viewing of single quote*	When a user clicks the submit button on the add quote page, it opens the quote that they just added. This is used to display the quote so that they can quickly, like, save, copy, or share the image. Under the quote there will be four buttons that the user can press to interact with the quote. These four buttons are: Like, Save, Copy and Share. Within the activity bar there will be a button to open the menu as well as the title of the page to allow users to see which page they are currently on.

Figure 26: Table of wireframes with explanations

Application Flow

After explaining the purpose of each page, it was important to see how these pages interact with each other. This “sitemap” diagram shows how the app is structured and how the user moves from one page to another. With the use of a clear navigation structure, the sitemap allows you to see how each page is connected to the next. One advantage of building the sitemap is that you will already know which links and menu items need to be included on each page when you implement it.

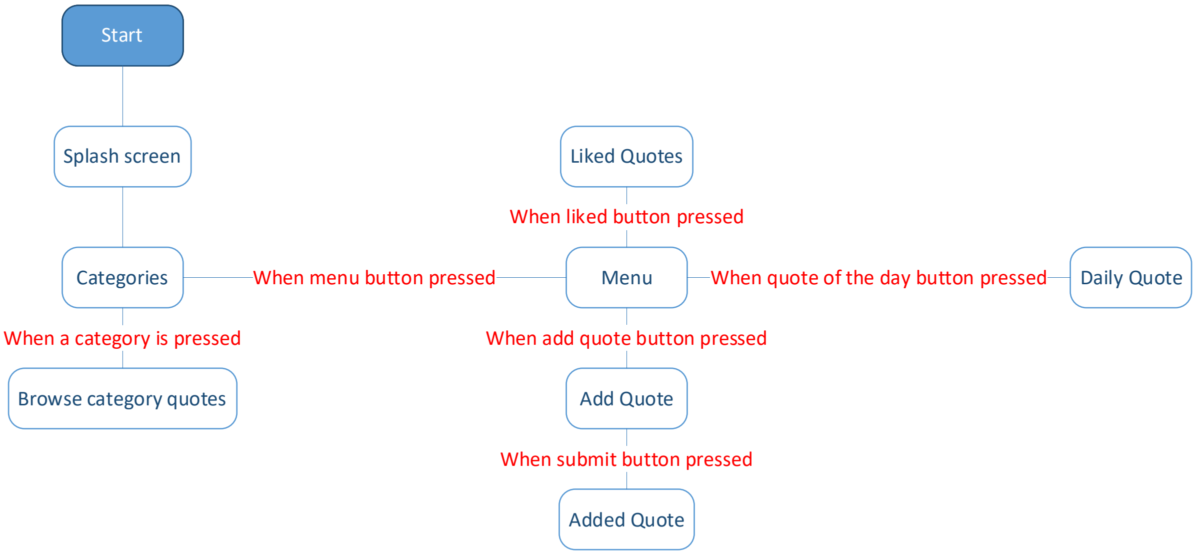

Start
Splash screen
Liked Quotes
When liked button pressed
Categories
When menu button pressed
Menu
When quote of the day button pressed
Daily Quote
When a category is pressed
When add quote button pressed
Browse category quotes
Add Quote
When submit button pressed
Added Quote

Figure 27: sitemap diagram showing how different pages are linked

Database Design

In this section, I plan and design the structure of the database that I will use. To be able to this, I will determine what data needs to be imported and exported from the application.

Since I will be using Firebase real-time database, I looked at the structure of databases in firebase. Firebase is a NoSQL database, and it is not a relational database either. This means that I will not need to normalise the database like I would need to do so for an SQL database. I will still need to make sure that the database is optimised so that I can make best use of the power of using firebase.

Each quote will need the following fields:

- quoteId (number)– a unique identifier of the quote.
- Quote(text)- the full quote itself.
- Author(text)- the person or source of the quote.
- Category(text)- contains the category that the quote belongs to.

I will also need a section for the categories. Each category will have:

- categoryName(text)- the name of the category
- thumbnail(text)- a link to the image of the icon that will be placed on the categories page

Next, I will need a section of the database for the quote of the day. This will contain the quote and author of that quote.

Implementation

Now that the planning and design stages were complete, I started to bring everything I had prepared to the development stage. For this stage I was using a mixture of Rapid application Development and Agile methodologies. This meant that I started coding the main functionality first. This was then reviewed and tested before starting another sprint where more features are added.

To get images dynamically, I used the Unsplash API which meant I did not need to store any images locally and could access the URLs for images using their API. The API was used to search for images related to the quote to provide a more engaging post.

Since parts of the application was implemented and then improved many times, I would need to repeat parts of the code. To maintain pleasurable reading of this paper, I have explained the key features that were developed in each sprint and what needed fixing during the next sprint. Then I will explain how the code works for each element of the application.

The full source code is available from the appendix in the further supplementary material section.

Sprint breakdown

The entire development stage was split into four sprints as follows:

Sprint 1

Main functionality developed:

- Populate database with quotes
- Create views for the browse quotes page
- Display all quotes from the database as text
- User added quotes stored in database
- Once text can be shown, made the text appealing and well formatted
- Added images as background

Problems to be fixed for next sprint:

- Images do not apply to the quote so need to use an API to get images depending on quote
- Quotes do not automatically resize to fit.
- Change layout of pages into tabs for browsing quotes and adding quotes

Sprint 2

Main functionality developed:

- Adding API integration for backgrounds
- Adding categories page
- Adding search term for user added quotes
- Fixing of size of text.
- Adding menu
- Added links to social media
- Adding quote of the day
- Changed app layout to tabs

Problems to be fixed for next sprint:

- API images are not perfect so need to add generic backgrounds that can be used if needed.

Sprint 3

Main functionality developed:

- Adding image saving functionality
- Adding image sharing functionality
- Adding copy text functionality
- Adding generic backgrounds

Problems to be fixed for next sprint:

- For user to share the text, they need to copy then share. This can be streamlined.
- Image saving resolution too low

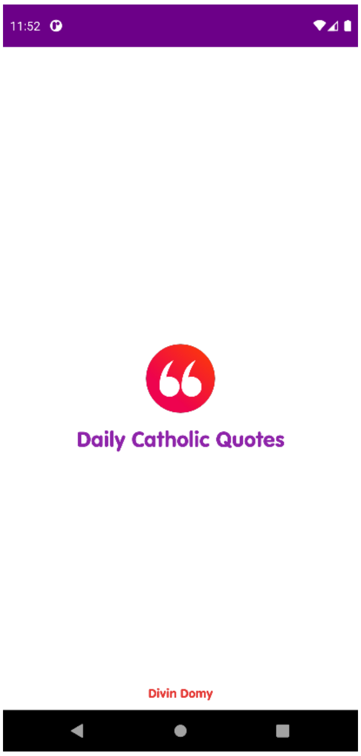
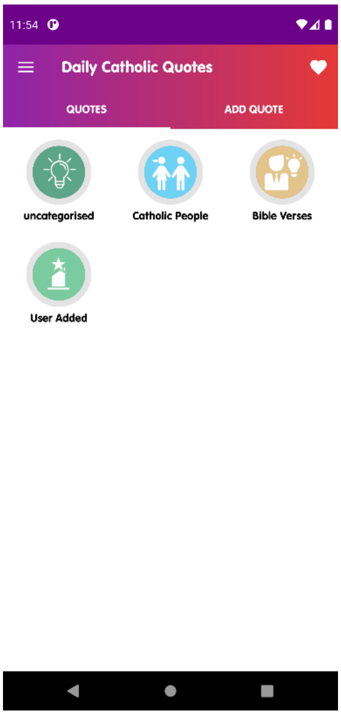
Sprint 4

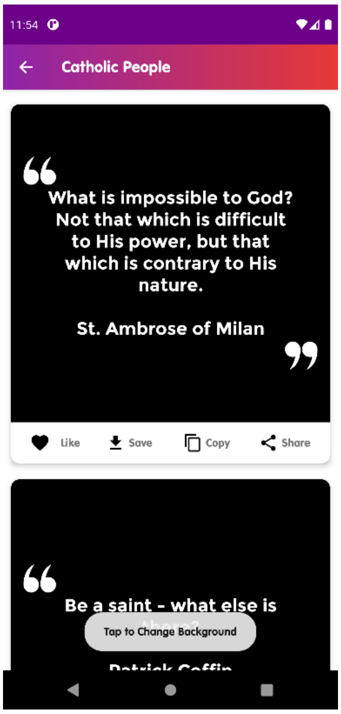
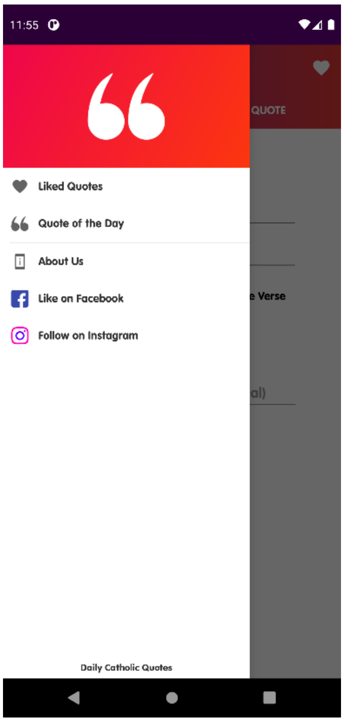
Main functionality developed:

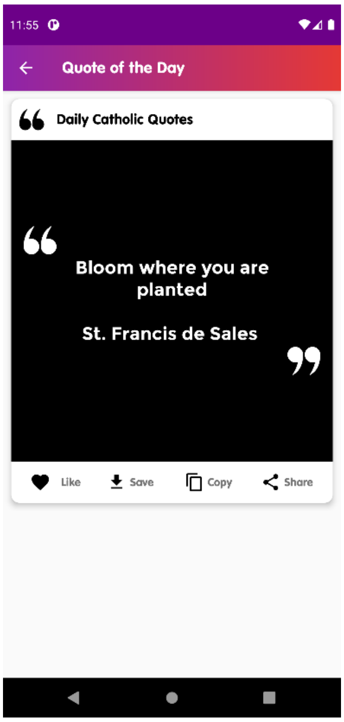
- Adding like functionality
- Adding view liked quotes page
- Adding option to share image or text
- Improved resolution of saved images
- Added about page
- Added quotation marks on image
- Added splash screen

App pages

Before starting to code features, the elements that will be used on each page need to be designed. Using the wireframes from the design stage and making slight changes, I came to this final design. The notable changes are the movement of floating buttons for the browsing and adding of quotes into a tab structure that can be accessed at the top of the screen. I have also added a delete button for the added quote so that if a mistake has been made, the quote can be removed by the user itself.

 *Figure 28: screenshot of splash screen page*	This became the final splash screen design. I did use the Daily catholic quotes profile picture, but it did not appear very professional, so I replaced it with an icon of a quotation mark. The colour scheme is inspired from the profile picture of Daily Catholic Quotes which gives a unified feel to the app.
 11:54 Daily Catholic Quotes QUOTES ADD QUOTE uncategorised Catholic People Bible Verses User Added *Figure 29: screenshot of categories page*	Here you can see the design of the categories page. The new tab structure enables users to quickly change to the add quotes page. I have also added a heart button in the top right-hand corner for easy access to all the liked quotes.

 11:54 Catholic People Like Save Copy Share Tap to Change Background What is impossible to God? Not that which is difficult to His power, but that which is contrary to His nature. St. Ambrose of Milan Be a saint - what else is there? Patrick Coffin *Figure 30: screenshot of browsing quotes page*	This is the view the user sees when browsing quotes. This screenshot shows quotes in the catholic people category. For a user to change the background of any quote, they can simply tap the quote. To make this functionality clear to the user, I have added a toast message at the bottom instructing the user. The quotes are displayed in a recycler view which means that users can keep swiping until the user reaches the end of the list.
 11:55 QUOTE Liked Quotes Quote of the Day About Us Like on Facebook Follow on Instagram e Verse al) Daily Catholic Quotes *Figure 31: screenshot of menu page*	This is the menu page. Here you can see the different pages that the user can visit. When a social media is selected, the browser is opened to the Daily Catholic Quotes page.



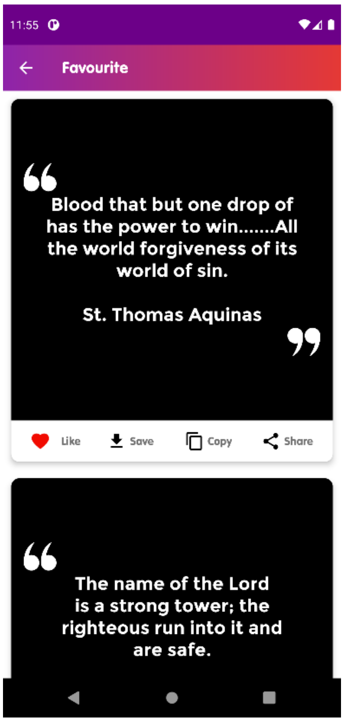
Bloom where you are planted

St. Francis de Sales

Figure 32: screenshot of quote of the day page

This is the quote of the day page. Again, the user can select the background of their choice from the API search by tapping.

The backgrounds list contains up to ten images of a search of the Unsplash API for the quote. In addition to this, there are twenty generic backgrounds in the list too. Users can cycle through all of the images by tapping the quote.



Blood that but one drop of has the power to win.......All the world forgiveness of its world of sin.

St. Thomas Aquinas

The name of the Lord is a strong tower; the righteous run into it and are safe.

Figure 33: screenshot of liked quotes page

This is the view the user sees when viewing liked quotes(favourites). A user's liked quotes is stored locally for easy access.

For a user to change the background of any quote, they can simply tap the quote. To make this functionality clear to the user, I have added a toast message at the bottom instructing the user. The quotes are displayed in a recycler view which means that users can keep swiping until the user reaches the end of the list. The backgrounds list contains up to ten images of a search of the Unsplash API for the quote. In addition to this, there are twenty generic backgrounds in the list too. Users can cycle through all the images by tapping the quote.

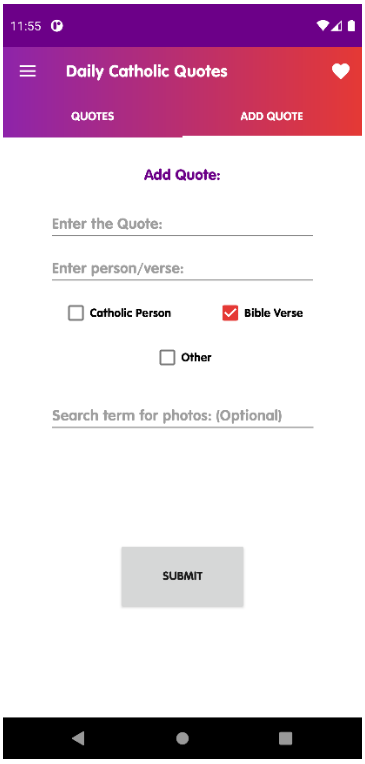
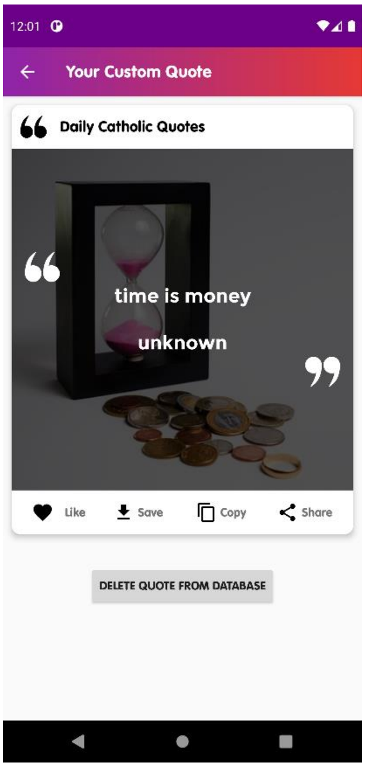
 11:55 Daily Catholic Quotes QUOTES ADD QUOTE Add Quote: Enter the Quote: Enter person/verse: □ Catholic Person ☑ Bible Verse □ Other Search term for photos: (Optional) SUBMIT *Figure 34: screenshot of add quote page*	This is the add quote page. Here the user enters the quote and source of the quote. The category is selected via a checkbox. Only one checkbox can be selected. Also, the quote and person are mandatory fields, but the search term is optional. The search term is only used to override the searching of the entire quote. For example, if the quote is about relationships but if the quote does not mention relationships, the API could show incorrect images. This is when you could add the search term of ‘relationships’ to get images that match the idea of the quote.
 12:01 Your Custom Quote Daily Catholic Quotes time is money unknown Like Save Copy Share DELETE QUOTE FROM DATABASE *Figure 35: screenshot of added quote page*	When a custom quote is added, the user is able to see their quote and share the quote. I have added a delete button so that obvious incorrect quotes can be removed from the database by the user themselves.

Figure 36: Table of application views and explanations

Code breakdown of main functionality

Android permissions

Permissions of an app must be added to the AndroidManifest.xml file for android applications.

```
<uses-permission android:name="android.permission.INTERNET" />
<uses-permission android:name="android.permission.WRITE_EXTERNAL_STORAGE" />
<uses-permission android:name="android.permission.READ_EXTERNAL_STORAGE" />
<uses-permission android:name="android.permission.ACCESS_NETWORK_STATE" />
```

The app uses four permissions to operate. It uses the access network state to identify whether it is connected to the internet. This allows for the app to notify the user that they do not have internet access. Then there are permissions to read and write to storage so that quotes can be saved to the phone's internal storage or to an external SD card.

Unsplash API

The Unsplash API provides one of the major features of the app. It searches Unsplash for the quote and stores the top ten results to an array called urlList.

This is done in a few steps:

1. App creates a http connection to the URL of the API.
2. The API returns multiple image sizes and formats. So, we need to filter the JSON file that is returned and cut out the URL of the image we need.
3. This URL is added to the array
4. If ten images have been added, then we break out of the code because we do not need any more.

```

    URL url = new URL("https", "api.Unsplash.com", "/search/photos?query=" +
params[0] + "&client_id=TWpsWTMSvOs4W7pH6J713NkqRh9jmXyZrIHrpmFpW-I");
    connection = (HttpURLConnection) url.openConnection();
    connection.connect();
    InputStream stream = connection.getInputStream();

    reader = new BufferedReader(new InputStreamReader(stream));

    StringBuffer buffer = new StringBuffer();
    String line = "";

    while ((line = reader.readLine()) != null) {
        buffer.append(line + "\n");
        data = data + line;
        //  Log.d("urls: ", "> " + line);   //here u ll get whole response......
:-)

    }

    if (!data.isEmpty()) {
        JSONObject jsonObject = new JSONObject((data));
        JSONArray json;
        json = jsonObject.getJSONArray("results");
        //     Log.d("json: ", "> " + json);
        //urlList.clear();
        for (int i = 0; i < json.length(); i++) {
            JSONObject urls = json.getJSONObject(i);
            JSONObject imageurls = urls.getJSONObject("urls");
            String image = imageurls.getString("small");

            urlList.add(image);
            if (i == 10) {
                break;
            }
        }
    }
```

Once the URLs are stored in the array, we need to add it to the generic images so that the user can switch between them. This goes in the on Click function of the quote so that every time the quote is tapped on, the next URL from the list will be loaded into the background.

```
public void onClick(View v) {

        int numOfImages = urlList.size();
        images = new String[numOfImages + 22];
        for (int i = 0; i < numOfImages; i++) {
            images[i] = urlList.get(i);
        }
        images[numOfImages + 1] =
"https://images.Unsplash.com/32/Mc8kW4x9Q3aRR3RkP5Im_IMG_4417.jpg?ixlib=rb-
1.2.1&ixid=MnwxMjA3fDB8MHxwaG90by1wYWdlfHx8fGVufDB8fHx8&auto=format&fit=crop&w=117
0&q=80";
        images[numOfImages + 2] = "https://images.Unsplash.com/photo-
1478760329108-5c3ed9d495a0?ixlib=rb-
```

```
1.2.1&ixid=MnwxMjA3fDB8MHxwaG90by1wYWdlfHx8fGVufDB8fHx8&auto=format&fit=crop&w=774&q=80";
        images[numOfImages + 3] = "https://images.Unsplash.com/photo-1531685250784-7569952593d2?ixlib=rb-1.2.1&ixid=MnwxMjA3fDB8MHxwaG90by1wYWdlfHx8fGVufDB8fHx8&auto=format&fit=crop&w=774&q=80";
        images[numOfImages + 4] = "https://images.Unsplash.com/photo-1531315630201-bb15abeb1653?ixlib=rb-1.2.1&ixid=MnwxMjA3fDB8MHxwaG90by1wYWdlfHx8fGVufDB8fHx8&auto=format&fit=crop&w=435&q=80";
        images[numOfImages + 5] = "https://images.Unsplash.com/photo-1528459801416-a9e53bbf4e17?ixlib=rb-1.2.1&ixid=MnwxMjA3fDB8MHxwaG90by1wYWdlfHx8fGVufDB8fHx8&auto=format&fit=crop&w=412&q=80";
        images[numOfImages + 6] = "https://images.Unsplash.com/photo-1522441815192-d9f04eb0615c?ixlib=rb-1.2.1&ixid=MnwxMjA3fDB8MHxwaG90by1wYWdlfHx8fGVufDB8fHx8&auto=format&fit=crop&w=327&q=80";
        images[numOfImages + 7] = "https://images.Unsplash.com/photo-1558591710-4b4a1ae0f04d?ixlib=rb-1.2.1&ixid=MnwxMjA3fDB8MHxwaG90by1wYWdlfHx8fGVufDB8fHx8&auto=format&fit=crop&w=387&q=80";
        images[numOfImages + 8] = "https://images.Unsplash.com/photo-1487147264018-f937fba0c817?ixlib=rb-1.2.1&ixid=MnwxMjA3fDB8MHxwaG90by1wYWdlfHx8fGVufDB8fHx8&auto=format&fit=crop&w=387&q=80";
        images[numOfImages + 9] = "https://images.Unsplash.com/photo-1476820865390-c52aeebb9891?ixlib=rb-1.2.1&ixid=MnwxMjA3fDB8MHxwaG90by1wYWdlfHx8fGVufDB8fHx8&auto=format&fit=crop&w=870&q=80";
        images[numOfImages + 10] = "https://images.Unsplash.com/photo-1516617442634-75371039cb3a?ixlib=rb-1.2.1&ixid=MnwxMjA3fDB8MHxwaG90by1wYWdlfHx8fGVufDB8fHx8&auto=format&fit=crop&w=387&q=80";
        images[numOfImages + 11] = "https://images.Unsplash.com/photo-1489549132488-d00b7eee80f1?ixlib=rb-1.2.1&ixid=MnwxMjA3fDB8MHxwaG90by1wYWdlfHx8fGVufDB8fHx8&auto=format&fit=crop&w=387&q=80";
        images[numOfImages + 12] = "https://images.Unsplash.com/photo-1497250681960-ef046c08a56e?ixlib=rb-1.2.1&ixid=MnwxMjA3fDB8MHxwaG90by1wYWdlfHx8fGVufDB8fHx8&auto=format&fit=crop&w=387&q=80";
        images[numOfImages + 13] = "https://images.Unsplash.com/photo-1436397543931-01c4a5162bdb?ixlib=rb-1.2.1&ixid=MnwxMjA3fDB8MHxwaG90by1wYWdlfHx8fGVufDB8fHx8&auto=format&fit=crop&w=580&q=80";
        images[numOfImages + 14] = "https://images.Unsplash.com/photo-1513366208864-87536b8bd7b4?ixlib=rb-1.2.1&ixid=MnwxMjA3fDB8MHxwaG90by1wYWdlfHx8fGVufDB8fHx8&auto=format&fit=crop&w=387&q=80";
        images[numOfImages + 15] = "https://images.Unsplash.com/photo-1507608158173-1dcec673a2e5?ixlib=rb-1.2.1&ixid=MnwxMjA3fDB8MHxwaG90by1wYWdlfHx8fGVufDB8fHx8&auto=format&fit=crop&w=1170&q=80";
        images[numOfImages + 16] = "https://images.Unsplash.com/photo-1519751138087-5bf79df62d5b?ixlib=rb-1.2.1&ixid=MnwxMjA3fDB8MHxwaG90by1wYWdlfHx8fGVufDB8fHx8&auto=format&fit=crop&w=1170&q=80";
        images[numOfImages + 17] = "https://images.Unsplash.com/photo-
```

```
1483232539664-d89822fb5d3e?ixlib=rb-
1.2.1&ixid=MnwxMjA3fDB8MHxwaG90by1wYWdlfHx8fGVufDB8fHx8&auto=format&fit=crop&w=464
&q=80";
        images[numOfImages + 18] = "https://images.Unsplash.com/photo-
1508615039623-a25605d2b022?ixlib=rb-
1.2.1&ixid=MnwxMjA3fDB8MHxwaG90by1wYWdlfHx8fGVufDB8fHx8&auto=format&fit=crop&w=117
0&q=80";
        images[numOfImages + 19] = "https://images.Unsplash.com/photo-
1487088678257-3a541e6e3922?ixlib=rb-
1.2.1&ixid=MnwxMjA3fDB8MHxwaG90by1wYWdlfHx8fGVufDB8fHx8&auto=format&fit=crop&w=774
&q=80";
        images[numOfImages + 20] = "https://images.Unsplash.com/photo-
1537420327992-d6e192287183?ixlib=rb-
1.2.1&ixid=MnwxMjA3fDB8MHxwaG90by1wYWdlfHx8fGVufDB8fHx8&auto=format&fit=crop&w=388
&q=80";
        images[numOfImages] = "https://images.Unsplash.com/photo-1458682625221-
3a45f8a844c7?ixlib=rb-
1.2.1&ixid=MnwxMjA3fDB8MHxwaG90by1wYWdlfHx8fGVufDB8fHx8&auto=format&fit=crop&w=774
&q=80";
        Glide.with(QuoteOfTheDayActivity.this).clear(imgview2);

Glide.with(QuoteOfTheDayActivity.this).load(images[imagesIndex]).into(imgview2);
        //relativeLayout.setBackgroundResource(images[imagesIndex]);
        ++imagesIndex;  // update index, so that next time it points to next
resource
        if (imagesIndex == images.length)
            imagesIndex = 0; // if we have reached at last index of array, simply
restart from beginning
    }
});
```

Firebase

Importing quotes from database

This is the instruction to make a reference to the database and access data.

```
quotes = FirebaseDatabase.getInstance("https://dailycatholicquotes-2ef12-default-
rtdb.europe-west1.firebasedatabase.app").getReference();
```

in the following code we import quotes from the database into the application as quote objects. These objects are then added to the favlist which contains all the quotes in the database

```
public void onDataChange(DataSnapshot dataSnapshot) {
    progressBar.setVisibility(View.GONE);
    if (dataSnapshot.exists()) {
        for (DataSnapshot wallpaperSnapshot : dataSnapshot.getChildren()) {
            if (!(wallpaperSnapshot.getKey().equals("categories"))) {
                Quote quote = wallpaperSnapshot.getValue(Quote.class);
                favList.add(quote);
            }
        }
```

```
                }
        adapter.notifyDataSetChanged();
    }
}

@Override
public void onCancelled(DatabaseError databaseError) {

}
```

Image saving

Saving an image was an exceedingly difficult part of the implementation. When the save button is pressed, the watermark is added, and the relative layout is converted to a bitmap canvas. Then a check on the android version is conducted. If the device is running newer than android O, we can use a newer approach of saving the image. Doing this check allows for better compatibility of the app with older smartphones. The image is saved as a jpg file and when it is saved, a toast notification is shown.

```
//when you press save button
ll_quote_save.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View v) {

        if (ContextCompat.checkSelfPermission(QuoteOfTheDayActivity.this,
                Manifest.permission.READ_EXTERNAL_STORAGE) ==
PackageManager.PERMISSION_GRANTED) {

            tv_quotes_watermark.setVisibility(View.VISIBLE);
            Bitmap bitmap = Bitmap.createBitmap(relativeLayout.getWidth(),
relativeLayout.getHeight(),
                    Bitmap.Config.ARGB_8888);
            Canvas canvas = new Canvas(bitmap);
            relativeLayout.draw(canvas);

            OutputStream fos;

            if (Build.VERSION.SDK_INT >= Build.VERSION_CODES.Q) {
                ContentResolver resolver = getContentResolver();
                ContentValues contentValues = new ContentValues();
                contentValues.put(MediaStore.MediaColumns.DISPLAY_NAME,
System.currentTimeMillis() + ".jpg");
                contentValues.put(MediaStore.MediaColumns.MIME_TYPE, "image/jpg");
                contentValues.put(MediaStore.MediaColumns.RELATIVE_PATH,
Environment.DIRECTORY_PICTURES);
                Uri imageUri =
resolver.insert(MediaStore.Images.Media.EXTERNAL_CONTENT_URI, contentValues);

                Toast.makeText(QuoteOfTheDayActivity.this, "File Saved",
Toast.LENGTH_SHORT).show();
                tv_save_quote.setText("Saved");
                iv_save_quote.setImageResource(R.drawable.ic_menu_check);
                try {
                    fos =
resolver.openOutputStream(Objects.requireNonNull(imageUri));
```

```
                    bitmap.compress(Bitmap.CompressFormat.JPEG, 100, fos);

                    fos.flush();
                    fos.close();


                } catch (FileNotFoundException e) {
                    e.printStackTrace();
                } catch (IOException e) {
                    e.printStackTrace();
                }
                tv_quotes_watermark.setVisibility(View.INVISIBLE);
            } else {

                FileOutputStream outputStream = null;

                File sdCard = Environment.getExternalStorageDirectory();

                File directory = new File(sdCard.getAbsolutePath() + "/Latest
Quotes");
                directory.mkdir();

                String filename = String.format("%d.jpg",
System.currentTimeMillis());

                File outFile = new File(directory, filename);

                Toast.makeText(QuoteOfTheDayActivity.this, "Saved",
Toast.LENGTH_SHORT).show();
                tv_save_quote.setText("Saved");
                iv_save_quote.setImageResource(R.drawable.ic_menu_check);


                try {
                    outputStream = new FileOutputStream(outFile);
                    bitmap.compress(Bitmap.CompressFormat.JPEG, 100,
outputStream);

                    outputStream.flush();
                    outputStream.close();

                    Intent intent = new
Intent(Intent.ACTION_MEDIA_SCANNER_SCAN_FILE);
                    intent.setData(Uri.fromFile(outFile));
                    sendBroadcast(intent);


                } catch (FileNotFoundException e) {
                    e.printStackTrace();
                } catch (IOException e) {
                    e.printStackTrace();
                }

                tv_quotes_watermark.setVisibility(View.INVISIBLE);

            }

        } else {
            //show permission popup
            requestStoragePermission();
        }

    }
});
```

Copy Quote to clipboard

Copying the text is great for a user who may want to add the quote to a document or into a text message. The app provides this functionality for every quote on the app. The text is copied to the phones clipboard and a toast message is shown to the user to alert the user of this.

```
//copy button
ll_copy_quote.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View v) {
        ClipboardManager clipboard = (ClipboardManager)
getSystemService(Context.CLIPBOARD_SERVICE);
        ClipData clip = ClipData.newPlainText("label", quotes + " -" +
quoteperson);
        assert clipboard != null;
        clipboard.setPrimaryClip(clip);
        Toast.makeText(QuoteOfTheDayActivity.this, "Quote Copied",
Toast.LENGTH_SHORT).show();
    }
});
```

Share button

In my initial requirements, I only needed to be able to share the image. But while developing, I understood that it was also important to be able to share the text too. To facilitate this, when the user clicks the share button, the user is asked whether they want to share the image or the text. Once a selection has been made a share popup is generated where the user chooses which app to share the quote to. When the share as image button is pressed, the watermark is added, and the relative layout is converted to a bitmap canvas to convert the quote to a jpg image file.

```
//When You Press Share Button
    ll_quote_share.setOnClickListener(new View.OnClickListener() {
        @Override
        public void onClick(View v) {
            popup();

        }
        private void popup() {
            PopupMenu popup = new PopupMenu(QuoteOfTheDayActivity.this,
ll_quote_share);
            popup.setOnMenuItemClickListener(new
PopupMenu.OnMenuItemClickListener() {
                @Override
                public boolean onMenuItemClick(MenuItem menuItem) {
                    switch (menuItem.getItemId()) {
                        case R.id.sub_text:
                            Intent shareIntent = new Intent(Intent.ACTION_SEND);
                            shareIntent.setType("text/plain");
                            shareIntent.putExtra(Intent.EXTRA_TEXT, quotes + "\n -
" + quoteperson);
                            shareIntent.putExtra(Intent.EXTRA_SUBJECT, "Daily
Catholic Quotes");
                            startActivity(Intent.createChooser(shareIntent, "Share
Quote"));
                            Toast.makeText(QuoteOfTheDayActivity.this, "Share as
Text", Toast.LENGTH_SHORT).show();
                            return true;
                        case R.id.sub_image:
                            tv_quotes_watermark.setVisibility(View.VISIBLE);
                            Bitmap =
Bitmap.createBitmap(relativeLayout.getWidth(), relativeLayout.getHeight(),
                                    Bitmap.Config.ARGB_8888);
                            Canvas = new Canvas(bitmap);
                            relativeLayout.draw(canvas);
                            Intent = new Intent(Intent.ACTION_SEND);
                            intent.setType("*/*");
                            intent.putExtra(Intent.EXTRA_STREAM,
getLocalBitmapUri(bitmap));
                            intent.putExtra(Intent.EXTRA_TEXT, quotes + "\n -" +
quoteperson);
                            startActivity(Intent.createChooser(intent, "Daily
Catholic Quotes"));
                            tv_quotes_watermark.setVisibility(View.INVISIBLE);
                            Toast.makeText(QuoteOfTheDayActivity.this, "Share as
Image", Toast.LENGTH_SHORT).show();

                            return true;
                    }
                    return false;
                }
            });
            popup.inflate(R.menu.menu_item);

            popup.show();
        }
    });
}
```

Adding quotes to the database

This is the code for submitting the values of the user form on the add quote page. This adds the quotes into the database but adds a field to show that this quote was added by a user rather than the admins of the app. This allows the quote to be added into the user added category on the categories page. I have opted to do this so that a user does not add improper quotes into the database which makes the admins appear to look like they made a mistake. Since the user added section is public it is important for admins to look through the database to delete inappropriate quotes in the case there are any that are added.

```
public void OnSubmit(View view) {
    String str_quote = quote.getText().toString();
    String str_person = person.getText().toString();
    String str_search = search.getText().toString();

    String category;
    if (cperson.isChecked()) {
        category = "1";
    } else if (verse.isChecked()) {
        category = "2";
    } else {
        category = "0";
    }
    SharedPreferences sharedPref = getContext().getSharedPreferences("search",
Context.MODE_PRIVATE);
    SharedPreferences.Editor editor = sharedPref.edit();
    editor.putString("searchterm", str_search);
    editor.apply();

    //Verifies that users have entered in all the required fields before
registering a quote
    if (checkEnteredData()) {
        DatabaseReference db =
FirebaseDatabase.getInstance("https://dailycatholicquotes-2ef12-default-
rtdb.europe-west1.firebasedatabase.app").getReference();
        db.addListenerForSingleValueEvent(new ValueEventListener() {
            @Override
            public void onDataChange(@NonNull DataSnapshot dataSnapshot) {

                SharedPreferences sharedPreferences =
getContext().getSharedPreferences("dbmax", Context.MODE_PRIVATE);
                SharedPreferences.Editor editor = sharedPreferences.edit();
                editor.putString("max",
String.valueOf(dataSnapshot.getChildrenCount()+1));
                editor.apply();
            }

            @Override
            public void onCancelled(@NonNull DatabaseError databaseError) {

            }
        });
        SharedPreferences = this.getActivity().getSharedPreferences("dbmax",
Context.MODE_PRIVATE);
        String no = sharedPreferences.getString("max", "5001");
        Quote quotetoadd = new Quote(no, str_quote, str_person, "User Added",
category);
                    db.child(no).setValue(quotetoadd);
        Toast.makeText(this.getActivity().getApplicationContext(), "Added to
Database", Toast.LENGTH_SHORT).show();
        startActivity(new Intent(getActivity(), NewQuoteActivity.class));

    } else {
        Toast.makeText(this.getActivity().getApplicationContext(), "Please make
sure you have filled all fields correctly", Toast.LENGTH_SHORT).show();
    }


}
```

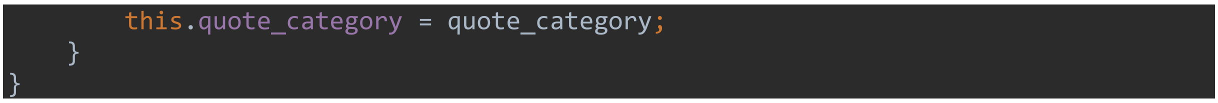
here the code ensures that the required fields have been selected to maintain data structure within the database.

```
//Verifies that users have entered all required fields
Boolean checkEnteredData() {
    noErrors = true;
    if (isEmpty(quote)) {
        noErrors = false;
        quote.setError("Quote is required!");
    }
    if (isEmpty(person)) {
        noErrors = false;
        person.setError("Person/verse is required!");
    }

    if (cperson.isChecked() == false && verse.isChecked() == false &&
other.isChecked() == false) {
        noErrors = false;
        cperson.setError("Select one!");
        verse.setError("Select one!");
        other.setError("Select one!");
    }
    return noErrors;
}
```

The Quote class

This is the class that is used to model quote objects into the system. This allows me to use an object-oriented approach to use the methods of the class to interact with each quote object.

```
public class Quote implements Serializable {

    @Exclude
    public String no;

    public String quote, person, url;

    @Exclude
    public String quote_category;

    @Exclude
    public boolean isFavourite = false;

    public Quote() {
    }

    public Quote(String no, String quote, String person, String url, String
quote_category) {
        this.no = no;
        this.quote = quote;
        this.person = person;
        this.url = url + "";
        this.quote_category = quote_category;
    }

    public String getNo() {
        return no;
    }

    public void setNo(String no) {
        this.no = no;
    }

    public String getQuote() {
        return quote;
    }

    public void setQuote(String quote) {
        this.quote = quote;
    }

    public String getPerson() {
        return person;
    }

    public void setPerson(String person) {
        this.person = person;
    }

    public String getUrl() {
        return url;
    }

    public void setUrl(String url) {
        this.url = url;
    }

    public String getQuote_category() {
        return quote_category;
    }

    public void setQuote_category(String quote_category) {
```



```
        this.quote_category = quote_category;
    }
}
```

Testing

Testing is an important part of the software development process. It is critical that the implemented solution be thoroughly tested to ensure that it is functioning as planned. An application should be "usable," "safe," "reliable," and "maintainable," according to Nabil, Mosad, and Hefny (2011). As a result, it is critical to double-check the product to ensure that all of these components are functioning properly. Testing frequently aids in the detection of mistakes produced during the implementation stage. Functional testing, usability testing, database testing, interface testing, and performance testing are just a handful of the types of testing accessible.

Since I was following a sprint-based methodology for development, I ran tests on my code after each sprint. Some of the functional tests would fail in these tests which were worked on in the next sprint. In order to avoid duplication, I will include my final testing results which were conducted after the fourth sprint in order to evaluate whether I achieved the requirements that were developed in the requirements engineering section.

Functional testing

Functional testing ensures that each and every function or specification of the solution works as expected and meets the requirements (Jorgensen, 2014). Each and every functionality is checked during functional testing. By providing adequate input, confirming the output, and comparing the outcome to the intended result, the system is assessed (Jorgensen, 2014). The goal of usability testing is to see how easy it is for the end user to utilise the system. Database and interface testing are both focused on those features, with database testing checking if all queries and data retrieved are proper, and interface testing checking aspects like navigation structure and layout.

It is usually advisable to do a variety of the above-mentioned tests, as each one focuses on a different component of the system. I picked functional testing since it examines each of the client's criteria and determines whether or not they have been satisfied. This is to guarantee that the solution generated adheres to the customer's specifications, as well as that the solution meets the demands of the client and its end users. The functional testing that was done is shown in the table below. All the essential criteria and functionality are organised in a table, which includes test cases, processes, expected outcomes, actual outcomes, and whether or not the test was passed.

The black box testing approach was used to test the application, which refers to the tester assessing the program's functioning based on requirements and specifications as identified in an earlier stage.

Test #	Test description	Process to execute	Expected Outcome	Actual Outcome	Passed?
1	Allow user to add a custom quote to the database	Navigate to the add quote page by tapping on the add quote tab Fill in the form with the quote and person along with the quote category	If the required fields are filled in, the added quote is displayed correctly.	The correct quote was displayed in the same way as any other quote. The user can then select the background and share. The expected outcome is achieved.	Yes
2	Allow user to enter an optional	Navigate to the add quote page by	Instead of displaying backgrounds	The quote was displayed with the	Yes

	search term that overrides the API search when adding a custom quote	tapping on the add quote tab Fill in the form with the quote and person along with the quote category. Enter a search term for the quote	based on the text in the quote, the search term should be used to find images.	search term being searched for using the Unsplash API in the expected manner.	
3	If all required details are not filled in correctly when adding a custom quote, the user should receive feedback on what they need to do	Navigate to the add quote page by tapping on the add quote tab Fill in the form without the quote, person, or the quote category	User should be notified that there are missing required fields in the form.	The missing fields are marked with a red marker and a toast message is produced to alert the user that they need to fill in all the required fields.	Yes
4	A user should only be able to select one category for each quote when	Navigate to the add quote page by tapping on the add quote tab	When a second category is selected the first category becomes unchecked	When a second category is selected the first category	Yes

	adding a custom quote	Attempt to choose two or three categories		becomes unchecked	
5	When a user adds a quote, they should be alerted that it has been added to the database	Navigate to the add quote page by tapping on the add quote tab Fill in the form with the quote and person along with the quote category	App shows a message that the quote was successfully added	A toast message is displayed saying that the quote was added to the database.	Yes
6	Once a quote has been added, the quote should be added to the database as a user added quote and therefore should be available in the user added category	Navigate to the add quote page by tapping on the add quote tab Fill in the form with the quote and person along with the quote category Navigate back to the categories page by	If the database is updated with the new data, the user will be able to find the quote they added, and any other user will be able to find it too.	The custom quote added by the user is visible in the user added category.	Yes

		tapping on the quotes tab Click user added category and find the quote that was added			
7	When a user adds a custom quote, and a mistake has been made, they should be able to delete the quote from the database	Navigate to the add quote page by tapping on the add quote tab Fill in the form with the quote and person along with the quote category Click the delete from database button	The deleted quote is no longer on the database and cannot be viewed from the user added category.	The removed quotation is no longer in the database and is no longer accessible through the user-added category.	Yes
8	The quote of the day is displayed	Open the menu by clicking the hamburger icon.	The current quote of the day is displayed from the database. This is the same as the quote that is	The quote of the day is correctly displayed from the database.	Yes

		click the quote of the day button.	marked in the database		
9	The users' favourite quotes can be viewed using the menu	Open the menu by clicking the hamburger icon. click the liked quotes button	The liked quotes page is opened with a list of all quotes that have been liked by the user visible.	The liked quotes page is opened with a list of all quotes that have been liked by the user visible.	Yes
10	The users' favourite quotes can be viewed using the heart shortcut	Click the heart icon on the top right-hand corner.	The liked quotes page is opened with a list of all quotes that have been liked by the user visible.	The liked quotes page is opened with a list of all quotes that have been liked by the user visible.	Yes
11	The Facebook page of daily catholic quotes can be accessed from the menu	Open the menu by clicking the hamburger icon. click the like on Facebook button	Opens the Facebook profile in the browser app	Displays the daily catholic quotes Facebook page in the default browser	Yes

12	The Instagram page of daily catholic quotes can be accessed from the menu	Open the menu by clicking the hamburger icon. click the follow-on Instagram button	Opens the Instagram profile in the browser app	Displays the daily catholic quotes Instagram page in the default browser	Yes
13	View the about us page	Open the menu by clicking the hamburger icon. click the about us button	Opens the about us page	Displays the about us page in a popup view that can be closed by the user.	Yes
14	Categories are displayed on the categories page	Visible after the splash screen.	All categories are visible as clickable icons	The four categories are loaded from the database with the correct icons and labels.	Yes
15	When a category is selected, the quotes in that category	Click a category, verify that the quotes that are shown are part of the chosen category.	Each category loads the correct quotes from the selected category.	When the bible verses category is selected the quotes in the database that are	Yes

	should be produced.	Repeat with other categories.		categorised as bible verses are displayed correctly. the same is the case with other categories	
16	When browsing a quote, a user can like the quote successfully.	Select a category. Click like button on a quote	Quote is liked by the user and user is given feedback that the quote has been liked.	Quote is added to the list of liked quotes and the heart icon turns red to show user that the like was successful. The quote is verified by opening the liked quotes page and ensuring that the liked quote is visible there	Yes
17	When browsing a quote, a	Select a category.	Quote is saved by the user and user is given	Quote is saved to the user's storage	Yes

	user can save the image successfully.	Click save button on a quote	feedback that the quote has been liked.	and the save icon turns to a tick to show user that the save was successful. A toast message is also displayed to alert the user that the image was saved. The quote can be verified by opening the gallery and ensuring that the saved quote is visible there	
18	When browsing a quote, a user can copy the quote successfully.	Select a category. Click copy button on a quote	Quote is copied to clipboard and user is given feedback that the quote has been copied.	Quote is copied to the user's clipboard and a toast message is displayed to alert the user that the quote was copied. The quote can	Yes

				be verified by opening the clipboard and ensuring that the copied quote is visible there	
19	When browsing a quote, a user can share the image successfully.	Select a category. Click share button on a quote Then select share image	Quote is able to be shared to supported apps and user is shown a share popup to select the desired destination	Quote is able to be shared to supported apps and user is shown a share popup to select the desired destination	Yes
20	When browsing a quote, a user can share the text successfully.	Select a category. Click share button on a quote Then select share text	Quote is able to be shared to supported apps and user is shown a share popup to select the desired destination	Quote is able to be shared to supported apps and user is shown a share popup to select the desired destination	Yes
21	The user can change the background of the quote.	Select a category.	Background is changed	Background is changed to image results of the quote then by	Yes

		Click a quote to change background		tapping more, the user can change to a generic background. A total of thirty backgrounds will be cycled through.	
22	When entering a longer quote, the text is resized to fit the image canvas	Navigate to the add quote page by tapping on the add quote tab Fill in the form with the quote and person along with the quote category	The text is shrunk to fit.	The text is resized to be as big as possible without overflowing the bounds of the canvas	Yes

Figure 37: Table of Test results

This testing process has allowed me to see that I have been able to make an application that meets all the requirements that were set on the application. Although this shows that the functional requirements were met, the non-functional requirements have not been well tested. A major reason for this is that I am unable to ask my client or a user to test the code to check whether the app was usable and easy to understand.

Evaluation

The final stage of the product development life cycle is evaluation. A good, complete evaluation might help you understand more about the product or solution you have created. The evaluation process includes gathering and analysing information about the program's functionality, user experience, and general usability. A well-developed testing strategy simplifies the evaluation process by allowing you to determine how effectively the system is operating in relation to the requirements while also identifying any critical issues that need to be addressed. All of these aspects contribute to a successful evaluation.

Even though functional testing was performed, it did not completely analyse the entire system. Instead, just the specified criteria were reviewed to guarantee the built software met the client's expectations. Another crucial factor to consider is the app's usability. At the end of the day, if the software is not useable by end users, it will not be used and hence will not offer value to the organisation.

Issues faced

Developing software for android was more difficult than I had first imagined. Although, I had worked with java before, I found the android development exceedingly difficult. Even though I was available to do research and learn the basics of android development through various online courses, I found it hard to apply my existing knowledge to the task at hand. Although these difficulties caused issues, I did not give up in trying to solve the issues with which I was faced. For example, there was a tie when I Just could not get the image to be saved onto a user’s phone. This caused a lot of tension but after trying several approaches of solving the problem, I was able to find a working solution.

Project summary

In conclusion, I would say that this project has been successful in meeting the requirements outlined at the beginning of the development process. In order to check if each requirement has been met, I have looked through each requirement which includes non-functional requirements to determine whether they were met or not.

Requirement	Done? (Y/N)
Must be an android app as android is the most popular smartphone operating system.	Y
Should work for any android smartphone.	Y
Allow a user to input a quote and an author into a database	Y
The database should be always up to date to serve users from across the world at the same time.	Y
The background must be able to be selected by the user	Y
The backgrounds should be related to the quote in some way.	Y
The user should not have to manually edit sizes, fonts, or colours.	Y
The user should be able to favourite the quotes that they like.	Y
The liked quotes should be able to be viewed separately	Y
There should be a daily quote functionality in which all users receive the same quote of the day.	Y
The app must be able to dynamically create posts from a collection of quotes stored in the database	Y
There must be a link to major social media profiles of Daily catholic quotes within the app.	Y

The app must categorise quotes so that users can find the quotes they want more easily.	Y
The app must allow users to browse all the quotes in the database including quotes that have been added by other users.	Y
If a related background cannot be found or is not selected by the user, the user should have the ability to select from a range of generic backgrounds to create the post.	Y
When a category is selected, every quote in the database that links to the category should be made visible to the user.	Y
The text within the quote should auto size so that part of the quote is not cut off.	Y
Like the quote	Y
Save the quote to gallery	Y
Copy the text from the quote	Y
Share the quote to other apps. This can be the text or the image.	Y
When saving or sharing the image, a watermark should be added to show that the quote was created using this app.	Y
There must be appropriate user feedback and instructions so that the user may use the app effectively	Y
Non-functional requirements:	

The backgrounds of a quote should be able to be changed with a single tap without the user needing to wait for an image to be downloaded.	Y
The app must be portable to any android smartphone such that the app works when a user upgrades a device	Y
The app must be compatible to other apps particularly social media and messaging apps which the user will use to share the quotes.	Y
The image backgrounds should not be stored locally on a user's phone as this will require users to have larger storage capacity in their device which cannot be guaranteed.	Y
The app must be highly available such that if there is internet access, the app must work with full capacity even when under intense load.	Y
The app should allow for quotes to be added in other languages so that certain user groups do not feel left out.	Y
Navigation should be easy with an effective user interface that is familiar to users through existing UI practices.	Y
Users should be able to determine what each icon means and how they are supposed to interact with the app.	Y

Figure 38: Table identifying whether requirements were met

Further work

There were more features that I would like to implement into the application. However, I did not work on these features as they were outside the scope of the initial requirements. Nevertheless, adding these features would make the application more feature rich and would provide more purpose to the client and the user. Some of the features that I would like to add in the future are:

- Allowing users to interact with other users through comments and public likes. This feature would turn the app into a social media network in itself for users who find catholic quotes interesting.
- Another feature is to add a login system and account features so that a user's name can be added to the watermark on posts. This makes the posts feel more special to each user and increases the chance of them sharing the quote with others.
- Another area of improvement is the admin side. Currently the admins can only manage the database through the firebase console. Although this system is very user friendly, it would be beneficial to develop an admin web panel for admins to manage users and quotes in the app.
- Although one of the requirements of the project was to remove any graphic design elements from the user, it would be a promising idea to introduce this feature for the people who want to use it.

Due to time constraints and a lack of expertise and experience in fulfilling these requirements, the specific requirements were not implemented. To implement these needs, further study and knowledge into these areas were indeed required.

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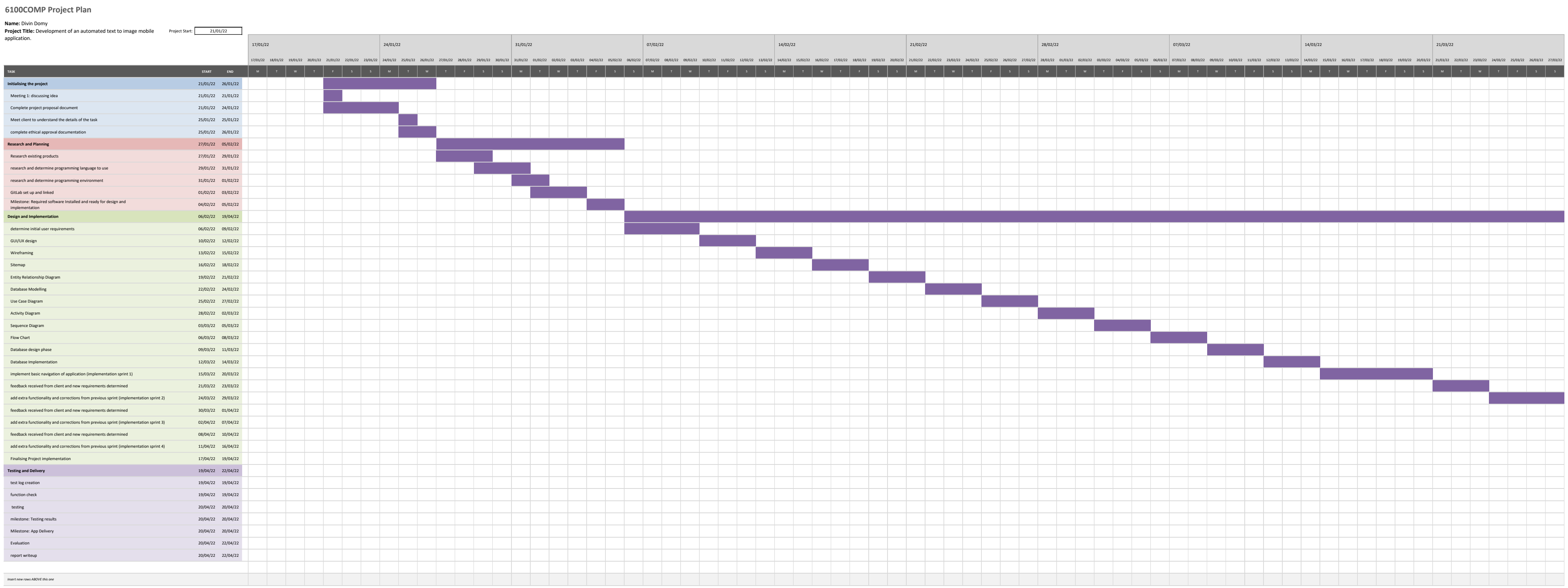
Appendix

A: Gantt Chart



6100COMP Project Plan

Name: Divin Domy
Project Title: Development of an automated text to image mobile application.

Project Start: 21/01/22

TASK	START	END
Initialising the project	21/01/22	26/01/22
Meeting 1: discussing idea	21/01/22	21/01/22
Complete project proposal document	21/01/22	24/01/22
Meet client to understand the details of the task	25/01/22	25/01/22
complete ethical approval documentation	25/01/22	26/01/22
Research and Planning	27/01/22	05/02/22
Research existing products	27/01/22	29/01/22
research and determine programming language to use	29/01/22	31/01/22
research and determine programming environment	31/01/22	01/02/22
GitLab set up and linked	01/02/22	03/02/22
Milestone: Required software Installed and ready for design and implementation	04/02/22	05/02/22
Design and Implementation	06/02/22	19/04/22
determine initial user requirements	06/02/22	09/02/22
GUI/UX design	10/02/22	12/02/22
Wireframing	13/02/22	15/02/22
Sitemap	16/02/22	18/02/22
Entity Relationship Diagram	19/02/22	21/02/22
Database Modelling	22/02/22	24/02/22
Use Case Diagram	25/02/22	27/02/22
Activity Diagram	28/02/22	02/03/22
Sequence Diagram	03/03/22	05/03/22
Flow Chart	06/03/22	08/03/22
Database design phase	09/03/22	11/03/22
Database Implementation	12/03/22	14/03/22
implement basic navigation of application (implementation sprint 1)	15/03/22	20/03/22
feedback received from client and new requirements determined	21/03/22	23/03/22
add extra functionality and corrections from previous sprint (implementation sprint 2)	24/03/22	29/03/22
feedback received from client and new requirements determined	30/03/22	01/04/22
add extra functionality and corrections from previous sprint (implementation sprint 3)	02/04/22	07/04/22
feedback received from client and new requirements determined	08/04/22	10/04/22
add extra functionality and corrections from previous sprint (implementation sprint 4)	11/04/22	16/04/22
Finalising Project implementation	17/04/22	19/04/22
Testing and Delivery	19/04/22	22/04/22
test log creation	19/04/22	19/04/22
function check	19/04/22	19/04/22
testing	20/04/22	20/04/22
milestone: Testing results	20/04/22	20/04/22
Milestone: App Delivery	20/04/22	20/04/22
Evaluation	20/04/22	22/04/22
report writeup	20/04/22	22/04/22
Insert new rows ABOVE this one		

Further Supplementary Material

Source code can be found from Final Year Project Source Code and my project presentation can be found from Project Presentation.

Use the password ‘825883’ to open.