Limerick Institute of Technology

Limerick Street Art Map App

Software Report

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Abstract

The aim of this project was to investigate use of the web application, mobile application together by developing an application which made use of the functionality of the application to the Limerick street art. Also, the technologies used in this project is asp.net core MySQL database for the admin side crud and the third-party API google map and I have used the razor, MVC for the ASP.NET core.

Acknowledgements

I would like to thank you my supervisor Dr Carol Rainforest. Howe gives me the opportunity to undertake the project. Her constant support and guidance were an invaluable resource throughout the project. I would like to thank my friends and classmates for all their support they have given me during this project.

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Chapter 1 Introduction

1.1 Street Art

Street Art enhances unity among the people of a community. It brings attention to the social, political, and cultural issues. The messages are not hidden. Street Art is different than other art because it is for the public, gallery art can also be public but people who are really interested in it go to see the particular art. For Street art, people in the city can view the art while passing through the city.

It is important to promote Street Art. That is why I have developed the App called Limerick Street Art, an interactive map of Limerick City where people can share their interest of their artwork. This Street Art map is going to encourage and help people to find some Limerick street art. In this mobile App, each small section of the city and the different locations show some amazing artwork to explore. I got the idea from existing world street art applications. In my App, I add some new features like GPS coordination, add and delete the image from the map so people can share and like the other people comment. This chapter will outline the purpose, motivation, behind the project, an overview of the project itself and target audience.

1.2 Purpose

The main purpose of this project is to create Limerick street art map for promoting the artwork to the people. For this project I have investigated React Native framework and appropriate open source Google API to create the viewpoint map. To do this investigation. I came across and developed the Android and iOS application which used the technologies that I mention React Native and Google API to create the limerick street art map. The graphical user interface of the application should look attractive to the user to attract them. The app should provide the pleasant experience and a provide feeling of completeness after using this application. The application should be highly accessible regardless of the user, whether the user is new or experienced,

the app will be good for both users. The key to this app is simplicity and have few new features to use.

1.3 Motivation

For my research I got the inspiration from the cork street art in the Facebook page. Also, my main motive to develop this kind of mobile app to promote the Limerick street art to the people and get more attention to it. Also, I saw some street arts in the Limerick city centre, which give me the aspiration to pick up this kind of subject where I can gain more knowledge and understand it from insider's perspective. The project which I choose will help me to get deeper understanding of the relationships between individuals' art and a public space. As walking in the Limerick

city, I saw one art that, I can't decide if the eyeball ice cream cone or the hello kitty tattoo is favourite thing about this piece, but I would say it is definitely eye catching. The work of artists Smug it was commissioned for the Make a move Festival and has been captured by many people in the city.

1.4 Project overview

In this app I will give functionality to capture the picture and share it to the social network where GPS coordinator will give the exact location and the time when this picture clicked and shared include the location of the picture or the arts which created in the street wall. Also as the authorisation point of view some people may have objection to create the art in the local property where they can send the authentication to the local city council to approve the art which have been created in the local property. Many of the interesting and exciting features of street art follow from this consensual method of production these works are subject to alteration and destruction and hence street artists accept the resulting ephemerality of their work, these works are often illegal. Street artists have a strong incentive to remain anonymous to the public at large and to the relevant authorities to avoid getting caught. They neither have an implicit interest in being known within the street art community, recognized by the public at large and neither known nor recognized by police and other authorities who might legally act against them. In this respect being a street artist involves a delicate balancing act between remaining anonymous and unknown to authorities but established oneself within the street art community and public at large by having one's work recognized and associated with one's.

As Street art and graffiti stands today for highly productive branding tool that used by ad agencies and marketing executives in a bid to target the youthful ((Maric, 2014). Such as huge branded companies like Coca – cola Sprite, Reebok all those industries are being asked to integrate street art into their packaging designs (Butss, 2014). Even though companies using the medium of walls for their marketing campaigns. The main goal is to create a full working mobile application with React Native, complete with a working backend server using ASP.Net Core. This project focusses on the front-end side the API is just assumed to work flawlessly the way it is described.

I chose React Native because it is gaining more popularity and it is backed up by Facebook, one of the biggest players in tech industry.

With this project, I am trying to answer the following questions:

What is the react Native and how does it work

How to develop a crass platform mobile application with React Native?

1.5 1.4 Target audience

While developing any kind of mobile application first thing which comes in mind that who are the target audience for the app. For this mobile app target audience are the people who interested in Street art and graffiti and who really want to promote and share it to the other people. Also, this app does not have any restriction for any group of people and age, gender etc. All the audience welcomed to use this app and share their knowledge through it.

Chapter 2 Literature review

2.1 Research

The objective of the research is to investigate the Technology that I will be using for this app, testing framework for back-end code as well as C# language. In the last few years there have been several studies that have explored the problematic of connecting stories and maps in web or mobile applications. In (Nicola Maiellaro, 2014) Maiellaro and Nicola look at four case studies of geographical information systems (GIS) for cultural Art available on the web. They argue that in all the cases it was not easy to distinguish the categories and types (subcategories) of the Points of Interest (POI) because they have the same shape and confusing icons and colours.

They maintain that there should be a unique shape and colour for each category and a unique icon for each type; icons should be intuitive so that their meaning is easily understood. They also say that there should be other ways to access the POIs and not only by navigation and search. They propose a solution where the map has several interface elements: a menu on the left with several function icons; a sidebar on the right with a search box and a list of the categories and types that can be enabled/disabled; a pop up box that is displayed by clicking on a POI and shows the multimedia content associated to it; a slide that filters the POIs relative to the time they were built. Maiellaro preferred a solution implemented as a web application (Montenegro, 2016) instead that as a native app because it was cheaper, platform independent and not dependant on proprietary stores for distribution.

Montenegro proposes an implementation of an "Augmented Cultural Heritage" where mobile devices are used to enrich the experience of places with audio testimonies. Their solution is applied to the area of Montenegro, in Tuscany, Italy and used as audio from the "Anna Buonomini" archive; therefore the audio is not made on purpose for the app, but is what they call an "Intangible Cultural Heritage" so making it available to a wider audience. The implementation is a mobile app that uses GPS to retrieve the position of the users and notifies the users when they are approaching a place that has an audio associated to it. To give an impression of reality the volume of the audio increases when the users go nearer to the places; this behaviour is realised by putting a Bluetooth beacon in the places of interest; the Bluetooth of the mobile device detects the distance from the beacon based on the intensity of the signal. A solution that uses "inconsistent maps", i.e. maps that are not in scale and emphasise some areas or buildings, is presented by Lu in ((Lu, 2013). They claim that inconsistent maps are easier to understand because they highlight the element of interest to the users; however, on these kinds of maps it is difficult to locate the user position because they are not in scale. Lu implementation utilises inconsistent maps on which are featured "event points" and "line events", that connect the points, and together they are used to tell a story. The user's current position is displayed on the map by

an algorithm that considers the coordinated given by the GPS on the device and the coordinates of the two nearest event points

2.2 History of Street Art

This research was initiated by my interest in Street art maps. As I began my research into the project of Street art maps, the idea came to me to explain the street art as a form of visual art created in a public area, usually prohibited artwork performed outside the background of traditional art venues. Street art gained popularity during the graffiti art booms in the early 1980s,. Even today it continues to be used on a large scale inside city centres and towns in various techniques and categories to convey messages. Therefore, a different culture has appeared in many cities since the late 1990s. Also, street art placement of unassigned artwork has appeared in public places. Different people can understand it differently; some people can see it as a form of activities. On the other hand, some people may see it as an illogical response to display the street art in people places, simulating formal understanding of crime, law, culture, and art. In addition, street art is inspired by the ancient inscriptions. Sometimes it has become a big issue because most of the people do not agree whether it is crime or art. Street artist have been blamed for vandalism, indignity, and intention to ruin property, illegal intrusion and against social rules. In modern times the use and application of street art has changed. Nowadays street art is a promotional tool which is used to change the meaning of the landscape elements that dominate current cities, fostering social inclusion in the city.

Street art becomes popular in the 1970s and 1980s, but it has more of a following in the 21st century. Also, lots of people believe the explosion of technology such as mobile devices and Internet lead this form of art into success. Artist can use street art to speak to other kinds of people. They can give a useful message to the people through their arts in the street walls. Street art can completely vary in style and meaning. Just like other art forms it is used to express feelings, emotions or send an important message. Street artists use the inspiration from many sources such as web sites, digital media, famous classic art pieces and world problems. Street art is a form of art that has many other terms or variations. The term urban art, guerrilla art and post-graffiti are common and represent a more inspired form of street art rather than vandalism.

2.3 Asp.NET Core history

ASP.NET core is the web framework from Microsoft. Because it has been redesigned from the scratch to become a fast and flexible to work on all the modern technologies and different (tutorialsteacher, 2020) platforms. ASP.NET core framework it can be used for web development with .NET. ASP.NET has been used for development web application for many years. Since it launched first version of the ASP.NET core after that this framework went through to evolutionary change and finally realised ASP.NET core 1.0 to the market. Also, the ASP.NET core consists of modular components and it very flexible while constructing to the solution. ASP.NET core framework we can used to build various types of application for instance mobile application, desktop, web application cloud, machine learning game etc. ASP.NET core has the features that required to run a basic .NET core app. It has other features which provide NuGet packages, that we could add it in application if we needed.

2.4 Why ASP.NET Core

The reason for using the ASP.NET core framework is that it has some limitations to use this framework. For instance, it only runs on the window platform, also according to project requirement you can use different .NET APIs for appropriate devices that you are going to use in your project. In addition, we could say that .NET framework (tutorialsteacher, 2020) is a machine wide framework if any kind of changes made to it affect all application that using the dependency on it. Nowadays its common to have an application that runs across devices or a backend on the web server and front end on windows desktop web browser, or in mobile apps for that there is need of the single framework that works everywhere. That is why considering this Microsoft created .net core which has the main goal to make framework open source cross platform that can be used in a wide vertical from the data centre to touch based devices.

2.5 Technology

In the technical research I came a across many technologies, where my main research was to find an open source map API and the appropriate programming language for my mobile app. In my research where I found the different map API for example OpenStreetMap, Google map API under this API there are sub type of the API.

2.5.1 Open Street Map:

This is a free wiki world map, and open volunteer driven initiative to collaboratively a map of the world and release the map data under a free and open license. There is many different API around the OpenStreetMap in the ecosystem, but my main concern is to download the data in API or create the raw data on it. In the Open Street Map is provides read and write operations on the raw map data of the Open Street Map database. It is primarily for Open Street Map editing software and although any developers can create a new editor tool this is not a small undertaking and should be carried out with careful consultation with the OpenStreetMap community. Based on free OpenStreetMap data, it is possible to create beautiful accurate and fast maps with native vector rendering and live customizable styling directly on a mobile device. One advantage of using the Open street map API is the map tiles can be easily displayed in custom native mobile applications on Android or an IOS or any other platforms. To work on it, developers can load the map tiles online from a tile server of a choice or implement offline maps in the app displaying the maps from download or bundled tile extracts

One most important reason to use the Map API is that I must decide which map is suitable for the integrating on the react native app on android and iOS

I did my research on Integrating Google maps into React Native App on Android. In this post they clearly show the step by step integration of the Google Maps into React Native App. **Invalid source specified.**.

2.5.2 Leaflet VS Open Layers maps API

Leaflet is same as an open source JavaScript library for mobile interactive maps. It is developed by Vladimir of Map Box with a team of dedicated contribution. In this library has a 30 KB of zipped JS code also it has all the features which all the developers need for the online maps. On the other hand, there is an open Layers map API which has high performance feature packed library with all mapping. Leaflet and open Layers can be define as mapping API's tools with some of the features offered by Leaflet are following. (community, 2019)

Tile layers, drag panning with inertia, Scroll wheel zooms

Also, Open Layers provides some features which are the following.

Tiles layers- It pull tiles from OSM, Bing Map Box other many source.

It is a very light weight than leaflet.

2.5.3 React Native:

React Native is a JavaScript framework which helps to develop real and exciting mobile application on iOS and Android platform. Also, react based on Facebook JavaScript library for building user interface. In the other word it targets the mobile platform rather targeting the web browser (Eisenman, 2020).

However, it provides an easy and convenient environment for mobile while using the debugging tools. As we know there are different type of React Native tools which play a most important role in accelerating the speed of the app development. As React is designed to encourage the reusability of components that developer can creates. React use the JavaScript, as we that it is a flexible and powerful programming language to develop the large scale of applications.

In the React each component works separately from one another, which allowing for minimal and efficient changes to the DOM. As Facebook developed one another feature for React is the use of JSX, an alternative to standard JavaScript syntax when creating components. JSX similar like HTML and HTML5, which making it is readable to software developers who are familiar with those coding languages.

As we know that React has been gaining the more popularity in software development because of its flexibility and reusability that makes it for the ideal to creating a newer software project.

Since 2015 React Native become more beneficial for developers or a team who are on a budget as the application can support both major platforms with the same code base. (Kociecki, 2017) writes that in his latest React Native project, the development time took 33% less than if they had been developing iOS and Android separately. Also, development of a React Native application does not require the native developers who have a higher salary on average.

2.5.3.1 Why Native React:

The fact of choosing to react native to develop mobile application is that it allows perform complex tasks in a simple code. This framework uses the UI library created by Facebook to make more straightforward code for implementing and executing React JS. Also, in the react native mobile app had reloaded feature. It allows us to operate on real time code changes and make corrections while the app is loading. The foundation level programming uses the same code for both OSs. It is like deploying the same app to all types of the mobile operating system. Also, it makes easy to be recompiling the app.

2.5.3.2 React js:

React JS is a JavaScript library for building a fast and interactive user interface. Typically, it is used for web development, as we could say that it has changed the way that we think about the front-end development. React.js has grasped the interest of the open source community and it is here to stay. However, at its core React is **a** library framework for the programming language JavaScript, which is used in web development.

2.6 Android studio

I am using the Android studio IDE for this project to support application development within Android operating system. Android studio has an intuitive rich feature and official integrated development environment (IDE) for the application development. This is a based on the IntelliJ IDEA, java integrated development environment for the software code editing and development tools. Also, Android studio uses a Gradle built system, emulator, code templates, and GitHub integration. (Margaret Rouse, 2018)Every project in Android studio has more process with source code and resource file. Such as Android app modules, Library modules and Google App modules all these process are in Android studio, which makes easier and more productive to use Android App (Clifton Craig, 205). If it comes to use any technology or a tool the first things which comes in mind is that what is the advantage of these tools & technology that we are going to use in the project. Here are some advantages of the Android studio. The main advantage of using the Android studio is that it has a technology platform with its own ecosystem of tools to support it. After the Android studio next most important tool would be in the Android ecosystem. The most important features of the Android studio are the following:

- Navigation Editor
- Android Cradle plugin updates
- IntelliJ IDEA 2018.2.2 changes

2.7 GPS

GPS is Global positioning system which is based on satellite navigation system made up of approximately 24 satellites. GPS works in any weather conditions, in anywhere of the world. The Department of Defence in US originally put the satellites into orbit for military use, but they were made available for all civilian use in the 1980s.

2.8 Global Navigation Satellite System

Global Navigation Satellite system involve the signals from the US governmental GPS, the European Galileo, also Russian Glonass and the Chinese Compass, Indian IRNSS (Choudhary, 2019). At the present only GPS and Glonass are operating, but when using the side by side signals increased but they not yet proved their strength. The possibility gains when several satellites are that we could see more satellite at the once, and which give us better GDOP and better accuracy in turn result**.**

2.9 React Native Map view:

This is a one of the React Native component libraries that offers map components for Android and IOS is React native map view. In this component have a lot to do customize the map style that can be able to change map view position and tracking the region or location and make the points of interest clickable on Google maps. Also, we can enable zooming in to specified markers or coordinates. GPS system to fetch the location and give you nice street view, also it has location search functionality.

Chapter 3 Design and Implementation

In this chapter I will outline the design choices and how I implemented the web application first I will talk about the development of the application itself and then I will discuss about the each steps and techniques that I used in different part of this project.

3.1 ASP.NET CORE framework

The development of this application is done by using the asp.net core framework for development. As we know ASP.NET Core is a cross platform, high performance, and open source framework for building modern internet connected apps with ASP.NT Core. I have chosen ASP.NET Core to develop the web application of the Limerick Street art because it has a lot of benefits to use the ASP.NET core. First, it has a testability for the architect and razor pages make coding style easier and more productive. While developing this application I am using the MVC design pattern for the layout the page. Mostly in the big application or small application that combine a model view controller UI layer with other design patterns in the application such as data access patterns and messaging patterns, all those go together to build the full application. Also, the ideas behind the MVC is that it has the separate layer and the component called the view that is only responsible for rendering the user account interface either it is HTML or desktop application. The view called to the model and that model contains all the data that the view needs to display. In a web application the view might not have any code associated with it at all. Below is the diagram of the MVC where the model does not know anything about the HTTP request or the controller it just responsible for hold the information about the user account and its user.

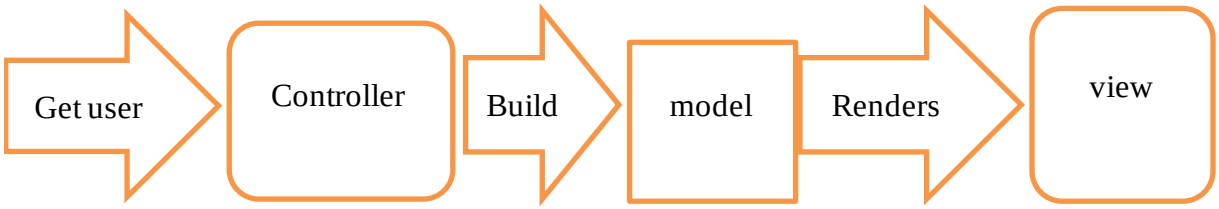


Figure 1 MVC model

3.2 Language

As I am using the ASP.NET core framework for this project so for that I am using the C# programming language, the code the functions for the sketch in the application is written in the C# language. Because C# is an object-oriented programming language used with XML based in asp.net core platform and designed for improving productivity in the development of web application.

3.3 JavaScript

As a view page I have a been using the JavaScript to render the page and invoke JavaScript functions from asp.net core methods and methods from the JavaScript functions. This type of scenarios called JavaScript interop.

Login user

```
public class Login : Controller
	{
		private readonly UserAccountRepository userAccountRepository;

		public Login(IConfiguration configuration)
		{
			var databaseClass = new DatabaseClass
			{
				ConnectionString =
configuration.GetConnectionString("LocalDatabase"),
			};
			userAccountRepository = new
UserAccountRepositoryClass(databaseClass);
		}
		public ActionResult LoggedIn()
		{
			return View();
		}

		public ActionResult Index()
		{
			return View();
		}


		[HttpPost]
		public ActionResult Index(LoginModel model)
		{
			if (ModelState.IsValid)
			{
				var userAccount =
userAccountRepository.GetUserAccountByCredentials(model.Username, model.Password);

				if (userAccount != null)
				{
					if (userAccount.Active)
						return
RedirectToAction(nameof(StreetArtController.Index), "StreetArt");
					else
					{
						ModelState.AddModelError("", "Your Account
has been locked.  Please contact an Administrator");
					}
				}
				else
				{
```

3.4 Dependency injection

Dependency injection is the object that another object requires. For instance, in asp.net core project has a dependency injection, below is the base class which will used in other class just called the name space for the base class.

```
namespace LimerickStreetArt
{
	using System;
	/// <summary>
	/// User Account
	/// </summary>
	public class UserAccount
	{
		public int Id { get; set; }
		public String Username
		{
			get;
			set;
		}
		public String Email
		{
			get;
			set;
		}
		public String Password { get; set; }
		public bool Active
		{
			get;
			set;
		}
		public DateTime DateOfBirth
		{
			get;
			set;
		}
		public int AccessLevel
		{
			get;
			set;
		}
	}
}
```

3.5 Google Maps API

To use the Google maps in the Android application and the web application a Google maps API was installed through the command line by entering the following commands and using npm to install react native leaflet for the application and in the web application I have used the asp.net core code to configure the Google Map API the code snippet is example of the web application API.

```
@foreach (var item in Model)
            {
                <text>createMarker("@item.Title", { lat: @item.GpsLatitude, lng:
@item.GpsLongitude});</text>
            }
        }

<h1>ArtMap</h1>
    <div id="map"></div>
    <script
src="https://maps.googleapis.com/maps/api/js?key=AIzaSyA0kZEl_6sDWjt38LvlJZL5ld_EUgihq
do&callback=initMap" async defer></script>
```

Figure 2 Google Map Api for Web Application

Figure 3Code Insert Example

```
      <intent-filter>
        <action android:name="android.intent.action.MAIN" />
        <category android:name="android.intent.category.LAUNCHER" />
      </intent-filter>
    </activity>
    <activity android:name="com.facebook.react.devsupport.DevSettingsActivity" />
    <meta-data
   android:name="com.google.android.geo.API_KEY"
   android:value="AIzaSyAphGWimZgmeRb9XyNU9kUKnS_1_P5eKpE"/>
  </application>

</manifest>
```

Under the google map to change it to the open street map

App.js > ...

```
import React, { Component } from 'react';
import L from 'leaflet';
import './App.css';
import { Map, TileLayer, Marker, Popup} from 'react-leaflet';
import { Platform, StyleSheet, Text, View } from 'react-native';
import { Dimensions } from 'react-native';
import MapView from 'react-native-open-street-map';
```

Figure 4Open Street map

3.6 Testing

Software testing, we could describe as an activity to check whether the we are getting the actual results that are matching the expected results or also we have to make sure that software system is defect free or error free. In the software world or any kind of product have been made by the organization that should be meet to the right testing, after that any product can be released to launch to the market. Also, it is involving to execution of a software component or system component to check out on or more properties of interest. Software testing can help to identify errors, gaps, or missing requirements in against to the actual requirements. It could be don either manual or automating testing.

3.7 Unit Testing

In this web application I'm doing the unit testing to test the controller and its base class where I have street art repository controller to test each and every functionality for instance in this class I do have the crud functionality where I need to check the my MySQL database is inserting updating and create the right instance of the data. And other controller user account repository controller which is used for the create new user and delete the user this controller will handle by the admin who has the authority to handle the user account database. Following are the running test case of the street art controller and user account controller

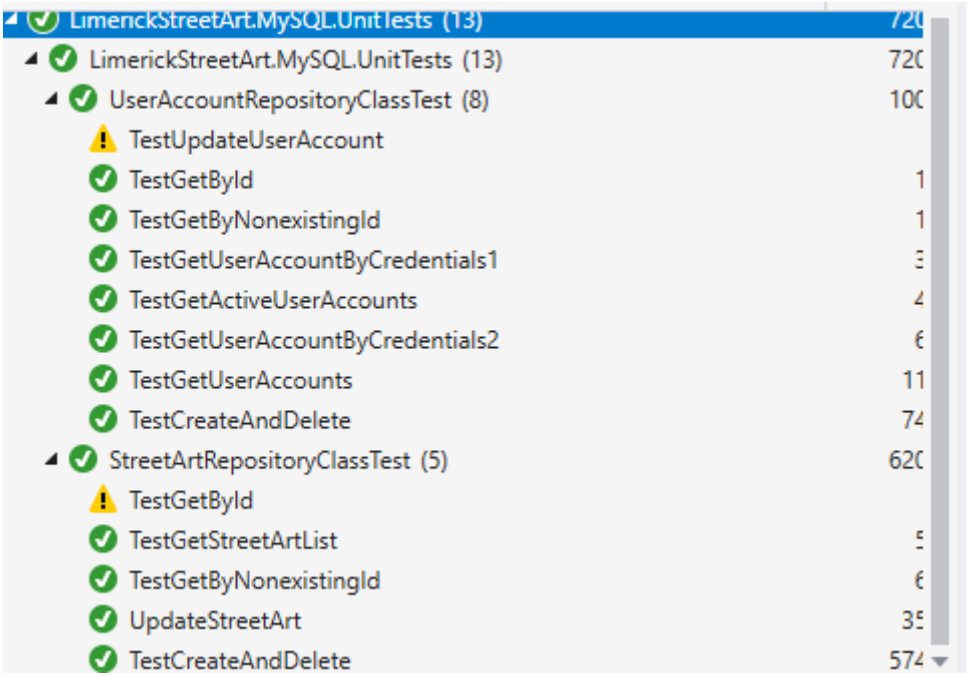


Figure 5 Unit Testing

Chapter 4 Software Report

The focus of this chapter is to identify and explain the methodology used during the development of this mobile application. Also, it will outline the functionality that requirements of the project along with all the tools and technologies that were apply during the implementation phase. The context of the social sharing application being developed for this project is related to performance and acting. The project focus is to create social art sharing application for both secure and useable, so users do not worry about their privacy being misused and they can enjoy the interesting artwork sharing to the people.

During the research phase conversation proceeding regarding Android and iOS architecture and its security, and some article with studies carried out regarding Android application and it is reviewed.

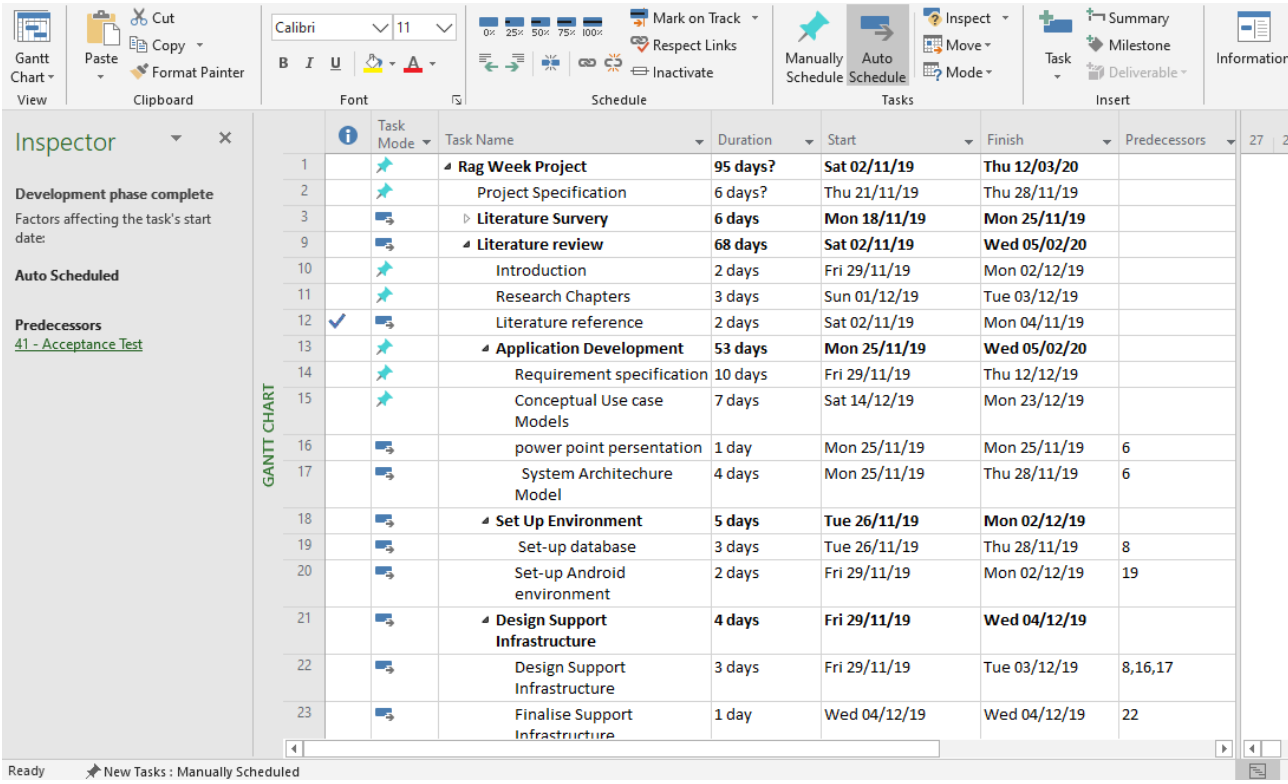
An important aspect of the research is connection security of the application and as well as usability of the application by introduction of API.As we know that now a day's mobile application development is growing in popularity every year, but with its popularity grows the higher demand for that product and higher demand means less time to do it. That means while development of the application or a system there might be changes to have a vulnerability that can be used against user. So here I have been discussing about the application should be reviewed as a security point of view before beginning the application.

4.1 Development Process

4.1.1 Agile

To support in development of the application in agile methodology was adopted. The aim of developing within the agile methodology is to set iterations or sprints, usually a short period of time, in that an aspect of the application is implemented and ready for release at the end of the sprint. Developing the project in agile methodology it breaks the project into separate areas, for instance web service, the core of the reactive native application, which consisted of the graphical user interface and the input and output of data. The status of the project is reviewed weekly with in meeting a supervisor which helps in identifying the any issues that may have arises during the development in previous week. Because identifying them in early of the stage, that could be easy to fix them at this stage and avoid a major problem later in the development process.

Also, agile incremental and iteration approach makes it ideal for project development where change of requirement might occur and agile is best suited to adapt to these changes. Big project with this functionality level requires ability to revise certain aspects of design requirements or it can implement during development process. This can be result of expectations becoming higher from the end users in relation to the flexible inclusion development of application. At starting of each week user stories were picked to develop during specific weekly sprint to develop and implement. Once implemented feature were shown to test user to test and receive feedback at the end. Suggestion made by test user were considered and implemented into application during the next print week.



	Task Mode	Task Name	Duration	Start	Finish	Predecessors
1		**Rag Week Project**	**95 days?**	**Sat 02/11/19**	**Thu 12/03/20**	
2		Project Specification	6 days?	Thu 21/11/19	Thu 28/11/19	
3		**Literature Survery**	**6 days**	**Mon 18/11/19**	**Mon 25/11/19**	
9		**Literature review**	**68 days**	**Sat 02/11/19**	**Wed 05/02/20**	
10		Introduction	2 days	Fri 29/11/19	Mon 02/12/19	
11		Research Chapters	3 days	Sun 01/12/19	Tue 03/12/19	
12		Literature reference	2 days	Sat 02/11/19	Mon 04/11/19	
13		**Application Development**	**53 days**	**Mon 25/11/19**	**Wed 05/02/20**	
14		Requirement specification	10 days	Fri 29/11/19	Thu 12/12/19	
15		Conceptual Use case Models	7 days	Sat 14/12/19	Mon 23/12/19	
16		power point persentation	1 day	Mon 25/11/19	Mon 25/11/19	6
17		System Architechure Model	4 days	Mon 25/11/19	Thu 28/11/19	6
18		**Set Up Environment**	**5 days**	**Tue 26/11/19**	**Mon 02/12/19**	
19		Set-up database	3 days	Tue 26/11/19	Thu 28/11/19	8
20		Set-up Android environment	2 days	Fri 29/11/19	Mon 02/12/19	19
21		**Design Support Infrastructure**	**4 days**	**Fri 29/11/19**	**Wed 04/12/19**	
22		Design Support Infrastructure	3 days	Fri 29/11/19	Tue 03/12/19	8,16,17
23		Finalise Support Infrastructure	1 day	Wed 04/12/19	Wed 04/12/19	22

Gantt Chart Figure 6

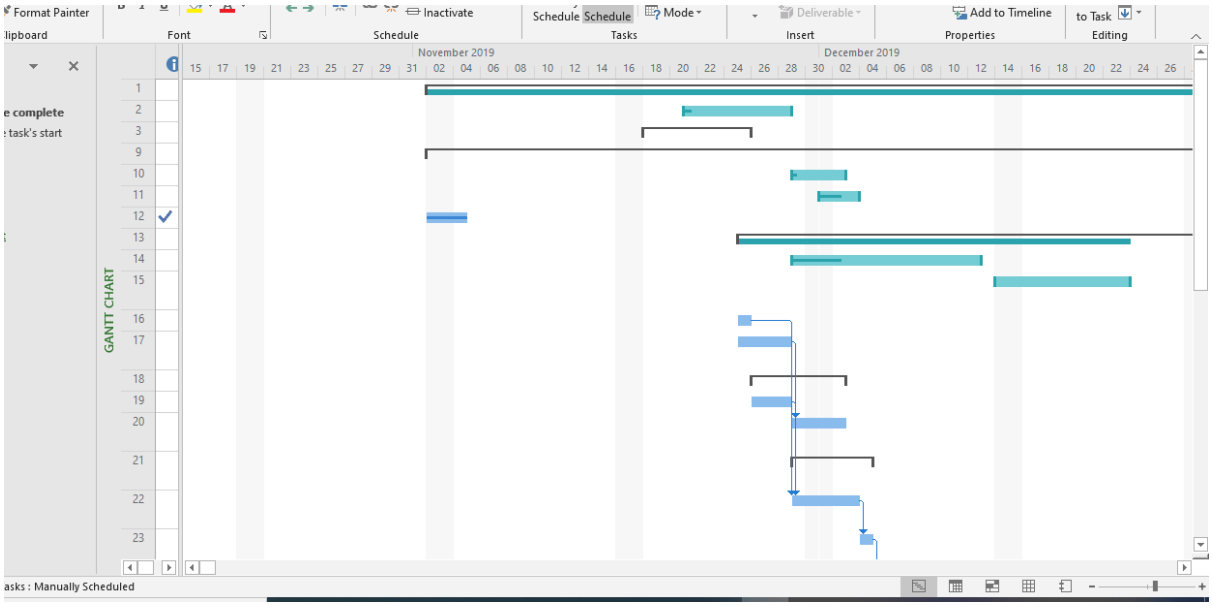


Figure 7

4.1.2 Project Management Software

Mostly in industry, software packages such as TFS and JIRA are used to track the tasks that need to be undertaken to complete a sprint and after that release a new version of the software. Team foundation server is flexible tool when it comes to strategies around Team project creation. Because of it evolve three key concepts of any organization and utilize the software development in its day to day work. For instance, project, product, and organization unit, in the TFS each of these areas is very important to planning the project set up. For instance, in your organization have a multiple project which have no interrelations when it comes to code sharing, it may be beneficial to create different team project collection.

4.2 Source code repository

Git was use during the project for version control. The author created branch repositories on GitHub, for the managing the code and keep as backup of the software developed and the ability roll back to the changes for that git repository is important.

4.3 Analysis & Requirements:

The analysis requirement is an important phase in the development process. The Analysis requirements determine the features and functionality that will be developed to successfully complete the application. During the process, the main sources where mostly focused on to determine functionality requirements. One of them was to analysis and review functionality of other existing application on the internet and play store.

4.4 Functional Requirement

Register: The app will have a registration feature where the user will be required to enter a valid email address and password. These details will then be saved with google.

Login: Users will be required to log in to use the application. They must enter their email address and password. These details are then authenticated against the database and the user is directed to the homepage.

Admin: In this application only has one person who can maintain this application every users of this application does not have the authority to delete update the photos in the map. Only the admin has required following functionalities:

Ability to add the new picture

Ability to delete the picture

Ability to create the user account

Ability to disable the user account.

Ability to take a picture

4.5 Non- Functional Requirements

During the development where there is a functionality to describe the application on other hand there are few non-functional requirements were considered. Non-functional specify how certain system are being used.

4.6 User of the system

The user of the system is the people who are interesting to the using and sharing their interest to street art. In this app people can add the photos to the map and or just visit in this app to see the street arts. The home screen rotates through a few street arts images that probably available in the featured images. Clicking on the featured images leads to more details about the arts, also it will provide the more information on the location of the piece of art. As it is a social sharing app people can give stars than we come to know how many starts it has received. As you switch to a map view an update button to update the app and images a new tab and there would be a artists tab. Map view defaults to a map of Limerick city and its streets, with black pins representing the location of the arts works. Also, if you are tapping on the pin it will displays a thumbnail view of the art which will take a few minutes to load the images.

4.7 System Design

Software beginning point is system design. System process defines all architecture modules, interface, components, and data, once done requirements gathered in process of requirement extract can be satisfied. During the process it was decided which components where required for system to be implemented and all requirements should be met. Component which were decided upon MySQL database, mobile application. Mobile application needs to be able to communication with the database, but mobile application does not able to direct communicate to the database. Mobile application needs to be depending on some component to retrieve data to the database. The logic of the application will be able to perform an action like add delete and update the database. This mobile application will be deployed on the android and iOS.

Chapter 5 Database Requirement

In this section, I will give a detail about the database that required essential in implementing the above features.

5.1 SQLite

This application will make use of SQLite Open Helper feature to store user's account data plans. These plans will be saved to a table named "user". The user plan class is done in the form like notes where users will also be able to delete from the database.

5.2 MySQL Database:

Having extensive MySQL database meant implementation was vital task as it needed to be developed before any work could be started on the mobile application. Once all tables for all fields in them were defined it was just case of adding tables to newly created database in phpMyAdmin. Performing such detailed design of the MySQL database during the design phase meant that implementation of the database was relatively minor task. With all tables defined data types for all fields for all records also defined it was simply a case of creating the table using phpMyAdmin. Development of database locally gave advantage when developing it as it was easy to make any change to tables when developing mobile application. All-important data had to be populated into a table before it counts have been exported to server. Using the phpMyAdmin one can export database to dump file with .SQL extension with all table and data counted it. This functionality is mostly used to create back-ups for database, but you can set up database on different server. This SQL dump file once executed then it will populate database with the same information as original one has. During the development database was first created and implementation of the My PHP Admin and then using export method.

5.3 Database setup

To configure SQLite to interact with the mobile application a project needs to be added in the SQLite database console or in a repository. First thing we need to download the SQLite from here

https://www.sqlite.org/download.html

After completing the download, we need to write the simple interface code to execute the SQLite here is the code for the db. Below is the code for dependency of this project.

```
<Project Sdk="Microsoft.NET.Sdk">

  <PropertyGroup>
    <TargetFramework>netcoreapp3.1</TargetFramework>
  </PropertyGroup>

  <ItemGroup>
    <PackageReference Include="System.Data.SQLite.Core" Version="1.0.112" />
  </ItemGroup>

  <ItemGroup>
    <ProjectReference Include="..\LimerickStreetArt\LimerickStreetArt.csproj" />
  </ItemGroup>

</Project>
```

Figure 8 Adding the SQLite for Street art

5.4 ER Diagram

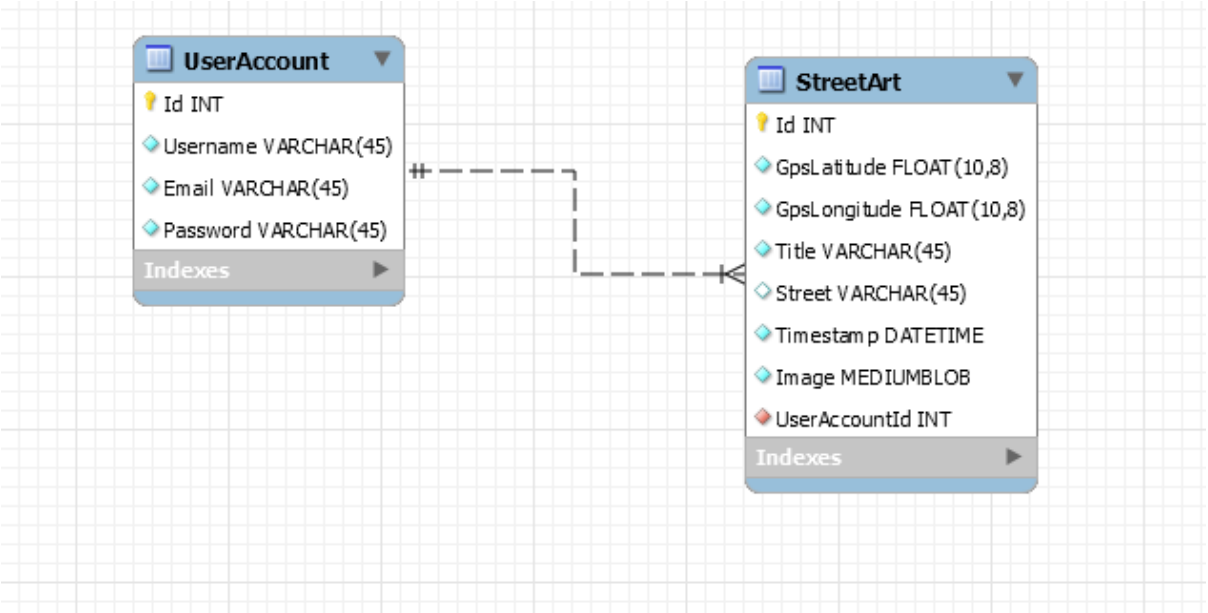


Figure 9 Class diagram

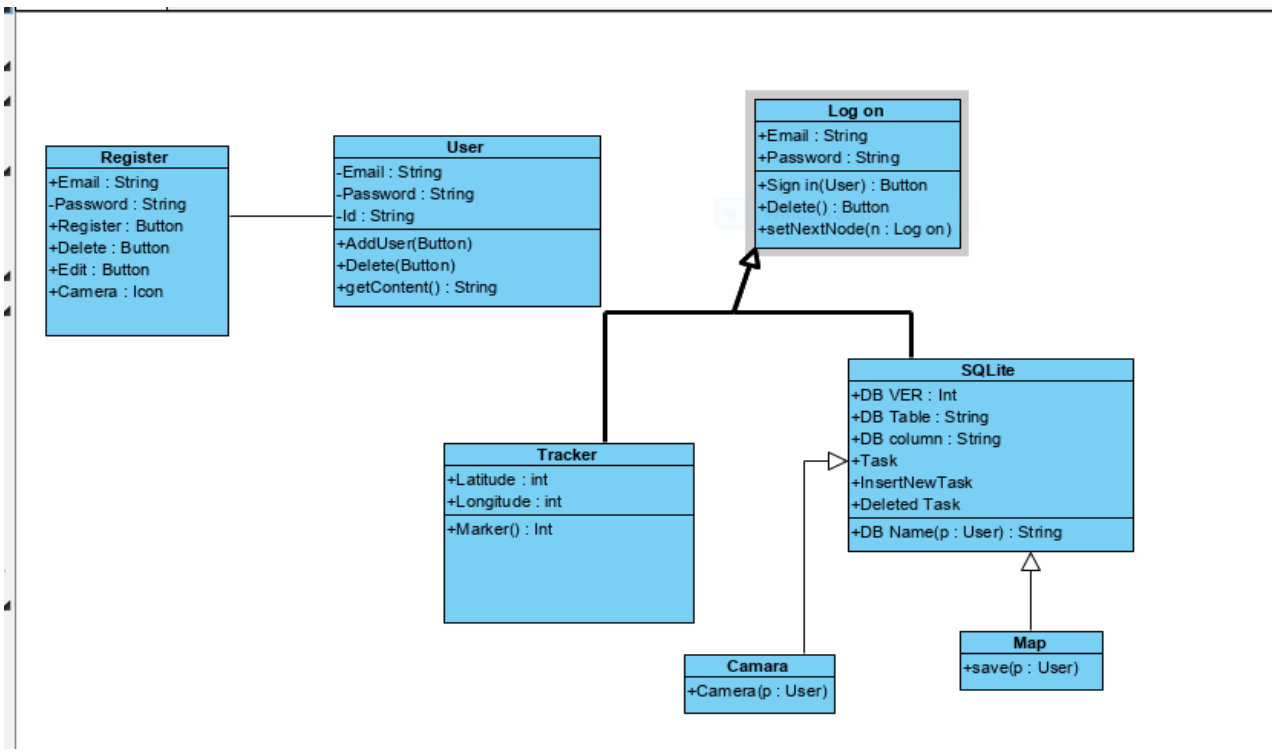
5.5 Architecture

5.6 Design Patterns

5.7 Architecture Design

This part of project is decided to explanation of the process that were carried out during design. There are few main components which play a major role. Android application that it is communicating with back end web application server and then backend which is sending and retrieving data from database.

The app was developed to be based solely around the user's Street Art, so all the features in it are based around this. The app was built in android studio and each page of it was designed following the same theme. Each feature has an individual class which can be accessed from the homepage. Through customizing my colors.xml file I was able to create a colour scheme which is present throughout every page of the app. Using different layouts and layout components I was able to design each page as I saw fit. I developed an ad hoc model to study interactions and different concepts during the design process. I looked at all the different components and the relationships between them which ultimately laid the foundation for the overall design of my application. The apps design allows the user to traverse through the various pages easily.



5.7.1.1 4.3.3.2 Configuration

First Step in the development process is to configure the react native, because before doing anything we need to install few things to set up the environment for React Native we need to install node js and npm.

Step1: Install create react native app.

After installing the Node js and NPM successfully on your computer you can now proceeding the installation of the create react native app blow is the code snipped for creation the native app.

```
C:\Users\Ruchi Devi>npm install -g create-react-native-app
```

Figure 10 Create React native APP

After creating an app, we need to create the project, browse through required folder, and create a new react native project as shown below.

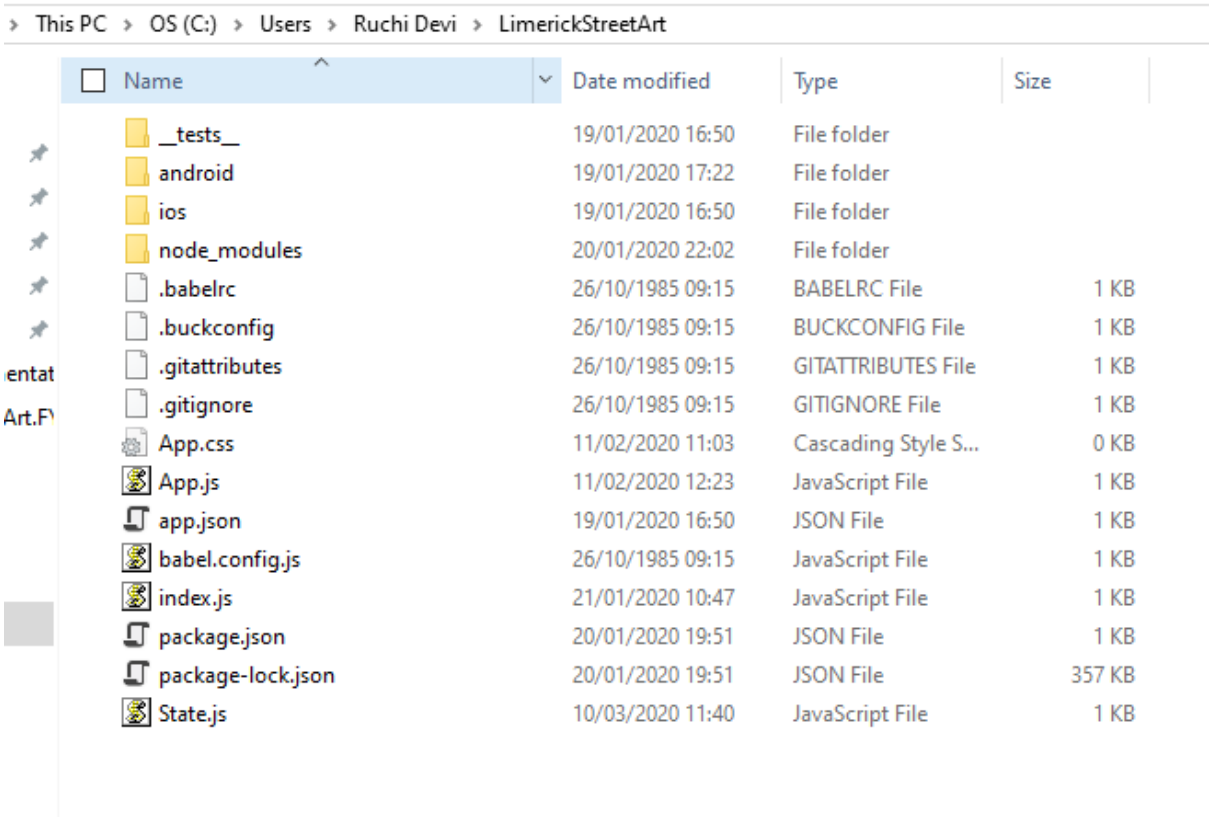


Figure 11 Browse folder for the app

Step 4

Install react native CLI blow is the command for it.

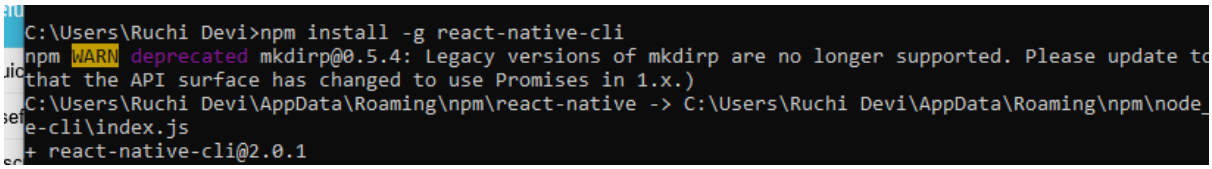


Figure 12

After installing everything for react native then we need to move on to install the lasted JDK and install the android SDK.

5.7.1.2 Configure your SDK

Open the android SDK manager on the window and make sure that you have the built tool version 3.5 or more. Below is the screenshot for android SDK setup.

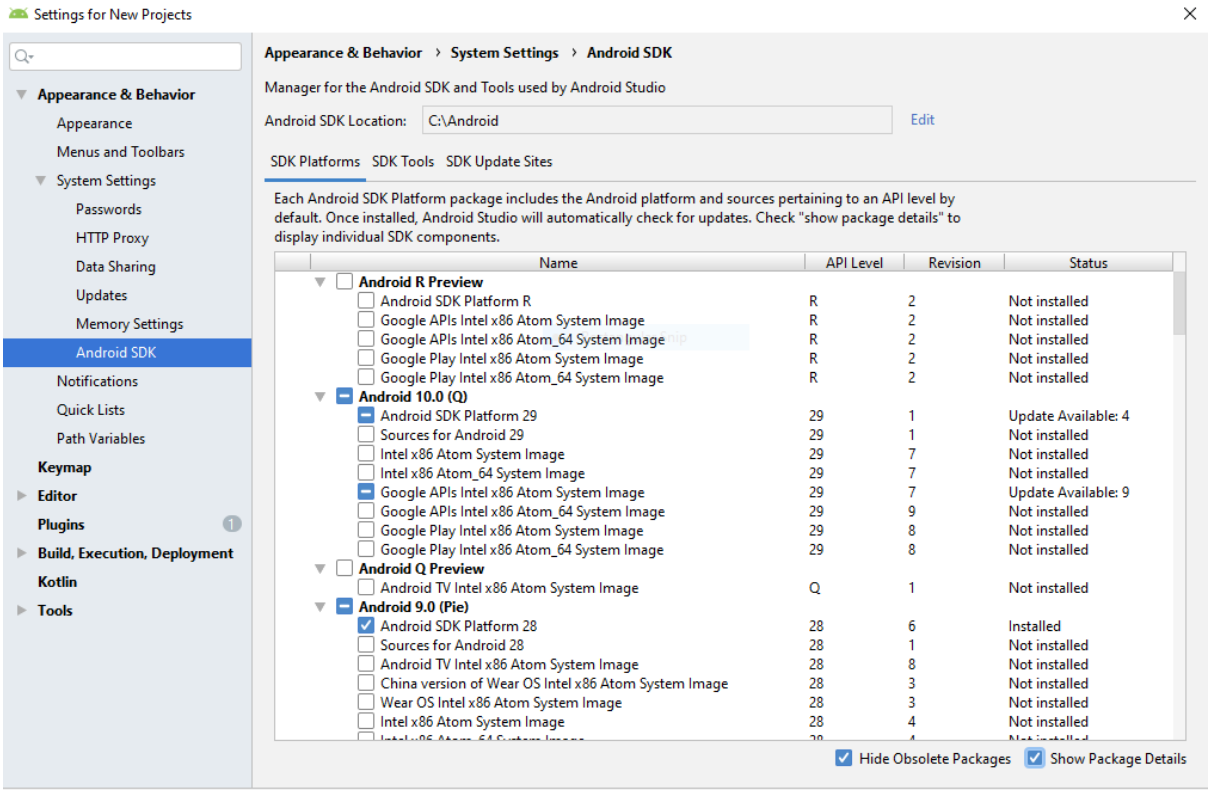


Figure 13

Second thing we need to create the android virtual device AVD and choose the device hardware that you need.

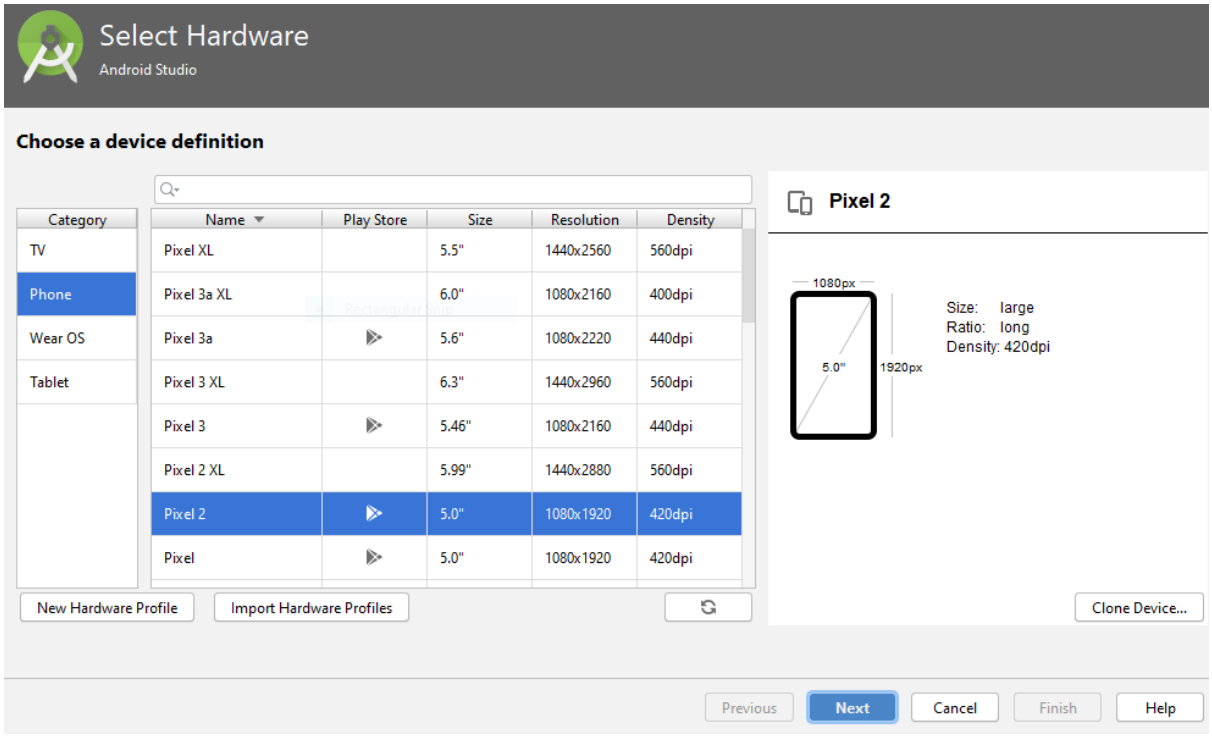


Figure 14

5.8 Requirements implementation

Once all decision regarding design were made, it was time to working on implementation of the application. Before implementation process can begin decision regarding what development tools to use for each system component needed to be made. Integrated development environments (IDE)

5.9 Software Tools

- MySQL Workbench
- Visual Studio 2019

5.10 Development Environments

This application consists of web application, mobile application MySQL database and SQLite database. Each of these components require different tool for its development.

For development of mobile application Android Studio has been used. Android Studio is official IDE for Android development it is based on IntelliJ IDEA.

5.11 Tools & Technologies Used

Platform specific tools to be installed for the application to run on an Android or iOS device. As Android was used for this project, Android tools were download and installed.

Firstly, java development kit (JDK) was downloaded and installed. After that download Android Studio which is an IDE for android app development. Which provided tools for building apps on every type of Android device and it can be downloaded from

- https://developer.andrid.com/studio/index.html

Once we installed Android Studio, and the important packages for the targeted API level were installed in Android Studio > Tools > SDK. Android development kit contains the tools that enable the creation, building and packaging of android applications. For this project Android 7.0 is the android version used.

5.11.1 Node. Js

Node is a runtime environment which allows you to write JavaScript on the server side. Node js often used to build developer tools, for example CLI that is the tool used for developing application.

- https://nodejs.org/en/

5.11.1.1 Node Package manager (npm)

npm is the package manager for node. Which use for installing version package and resolving their different types of dependencies. It also uses to installed different modules which needed for the development of the Android application. It allows the installation sharing and packaging of node modules' is automatically installed when node .js is downloaded.

5.11.1.2 Visual Studio Code

Visual Studio code was the chosen IDE to write the code for react native application. It comes with built in support for JavaScript, TypeScript, and node js, that required the development of the android application.

- https://code.visualstudio.com/

5.11.1.3 Visual Studio

Visual Studio was the chosen to write the backend code for the application. Where I am using the .net core for this project. Visual Studio is an integrated development environment from Microsoft. It is used to develop computer program and web apps, web services also mobile apps. Below is the project structure and repository of this project.

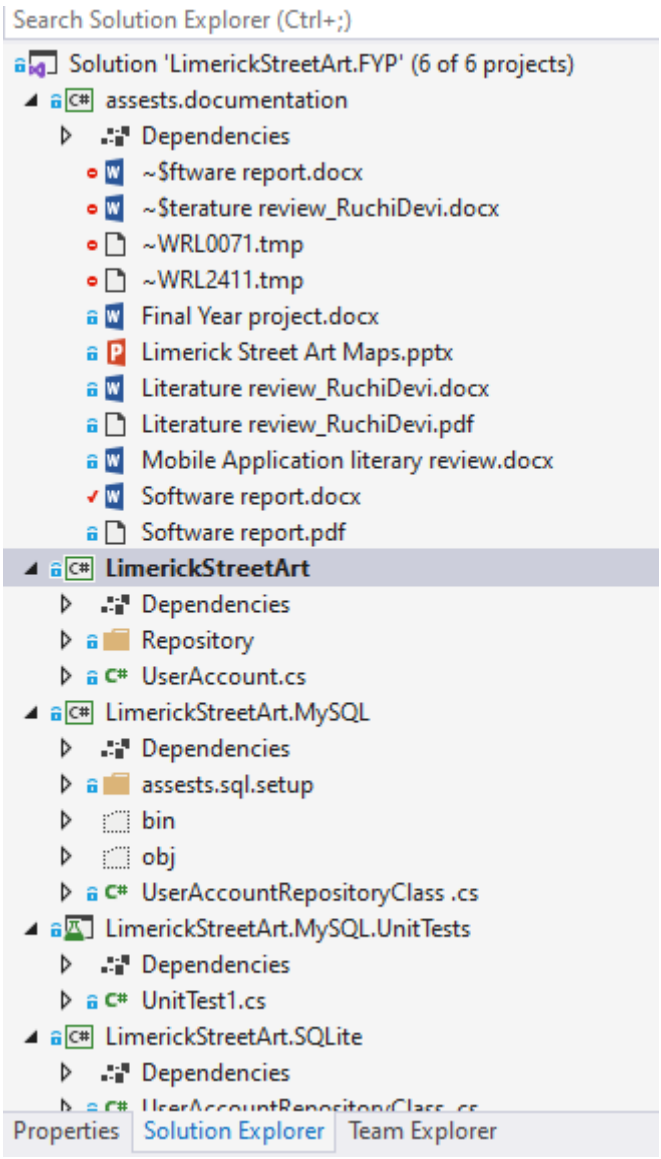


Figure 15Visual Studio Solution

Chapter 6 Conclusion

To summarize this project there are several different technologies required to create this application. Even though it was not for too long around, the Android operating system continues to grow more and more every year. With use of Android I have implemented various methods for this application were described. To start off the application activities which are the actual inner working of the application.

The overall result of this project is that there is in fact a working Android application that uses Google map API and camera to take pictures and add these pictures to the map. Also, I have created web application for this project same functionality I have add to the web application such as add and delete the pictures from the map and search the artwork over the city.

From this project I was able to learn about the C#, React native and asp.net core. As I have mention before, it is quite new technology for me because I have not work on those technology before,

6.1 Future work

There are several ways where this application might be improved simultaneous. In this section I will discuss about some of the features for the application that are not yet started but could be implemented in the future development. As start of the project I had a plan to develop the mobile application that has a camera and functionality to add the picture direct on the map.

6.2 GPS

At start of the project I had been looking into using the mobile application that has a location in relation to Art pictures on the street where they can get the location of the picture while adding it the map. The reason for this feature not being used as part of this project is that GPS coordination not accessible to the public as it is web application. But in the mobile application there should be the functionality to used it.

6.3 Conclusion

In this section there are some features that could be done in a future development of the application. The features are both ideas that can be originally hoped to implementation as part of the project from the starting and the ideas that current setup of the project.

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