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# 

# Introduction

Done Retail Management System is a system created for the Shoprite/Checkers Group that tracks a product from the warehouse to the store shelf until it is finally sold at any Shoprite/Checkers store. Firstly, we will provide the initial project proposal and an updated version of the proposal. Secondly, we will name a few ways we could solve/create our system as proposed solutions and give background of the respective titles. We will then discuss our system, Done Retail, what we choose, our reasons and our progress. Lastly, we will give our final thoughts on the overall project.

# Project Description

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# Proposed Solutions

## Technology

### Ionic

“Ionic is a cross-platform Mobile App Development, a complete open-source SDK for hybrid mobile app development using web technologies like HTML, CSS and JavaScript ”Patro(2019).

A hybrid mobile app according to Patro,“is built using technologies typically used for the web. Hybrid apps are hosted inside native applications that allow them to access the device’s camera, pedometer and other functionalities, removing the need to develop for any specific device or operating systems. This basically means that you are creating a website wrapped up inside an app.”

### React Native

“React Native is an open-source mobile application framework created by Facebook. React Native is a framework developed by Facebook for creating native-style apps for iOS & Android under one common language, JavaScript.” Patro (2019).

Unlike hybrid apps, Patro further elaborates that “native apps are built especially for the platform they’re to be used on (iOS, Android etc). React Native allows a proportion of the code to be shared between platforms and empowers developers to create apps which feel less clunky and perform better than hybrid apps.”

### Android Studio

Android Studio is an integrated development environment (IDE) from Google that provides developers with tools needed to build applications for the Android OS platform. “The Android Studio IDE has a rich UI development environment with templates to give new developers a launching pad into Android development.

Android Studio is intended to be used by development teams as small as one person or as large as global teams. The Android Studio IDE can be linked to larger teams with GIT or similar version control services for larger teams. Mature Android developers will find tools that are necessary for large teams to deliver solutions rapidly to their customers. Android solutions can be developed using either Java or C++ in Android Studio. “ (Rouse, 2019)

## API and Web Service

The term “API” stands for Application Programming Interface. An API is an interface that can be used to program software that interacts with an existing application. Bush explains that “In practice, an API is “a set of functions and procedures” that allow you to access and build upon the data and functionality of an existing application”. APIs have been described as the glue holding the Internet together.”

Rouse then defined a web service “as a software system designed to support interoperable machine-to-machine interaction over a network, a network-based resource that fulfils a specific task. It has an interface described in a machine- processable format (specifically WSDL). Other systems interact with the Web service in a manner prescribed by its description using SOAP-messages, typically conveyed using HTTP with an XML serialization in conjunction with other Web-related standards.

APIs and web services are not mutually exclusive. In fact, one is a subset of the other: every web service is an API — since it exposes an application’s data and/or functionality — but not every API is a web service. This is because the definition of a web service is quite restrictive when it comes to implementation: Web services require a network. While APIs can be on- or offline, web services must use a network.”

### Firebase

Firebase is an API that lets developers easily sync and store data in real-time. Bush further elaborates that “developers can use the service to build their apps without having to manage servers or write server-side code. There are clients for Android, iOS and JavaScript (including bindings for Ember, React, Angular and Backbone). The API allows users to access the functionality of Firebase programmatically. The API supports standard CRUD operations on the data within the databases as well as querying of the data. Firebase uses Web Sockets to archive real-time communication between clients. Data can also be accessed over the Firebase REST API.” “Firebase Simple Login is an additional service that allows developers to authenticate users using only client-side code. Enable authentication via a number of third-party providers, anonymous login, or email / password authentication without having to manually store authentication credentials or run a server.” Bush (2019).

### Amazon Web Services

Rouse explained the Amazon API Gateway “is an Amazon Web Services (AWS) service offering that allows a developer to connect non-AWS applications to AWS back-end resources, such as servers or code. Amazon API Gateway allows an AWS customer to increase the overall utility of Amazon’s other cloud services. The service manages traffic, authorizes end users and monitors performance.

Amazon API Gateway provides security using access keys to control API access. The service interacts with Amazon Identity and Access Management and Amazon Cognito to authorize access to APIs. The service also supports AWS Signature Version 4 as an additional security option; this creates access keys for each API call. OAuth tokens can also be passed to running workloads as an alternative security measure.”

## GraphQL

GraphQL is described as a “a query language for APIs and a runtime for fulfilling those queries with your existing data. GraphQL provides a complete and understandable description of the data in your API, gives clients the power to ask for exactly what they need and nothing more, makes it easier to evolve APIs over time, and enables powerful developer tools.” Graphql (2019)

## Restful API

A RESTful API as described by Rouse is an” application program interface (API) that uses HTTP requests to GET, PUT, POST and DELETE data. It is based on representational state transfer (REST) technology, an architectural style and approach to communications often used in web services development.

A RESTful API breaks down a transaction to create a series of small modules. Each module addresses a particular underlying part of the transaction. This modularity provides developers with a lot of flexibility, but it can be challenging for developers to design from scratch. “(Rouse,2019).

## Database Management System

### MariaDB

“MariaDB Server is one of the most popular database servers in the world. It’s made by the original developers of MySQL and guaranteed to stay open source. MariaDB turns data into structured information in a wide array of applications, ranging from banking to websites. It is an enhanced, drop-in replacement for MySQL.

MariaDB is used because it is fast, scalable and robust, with a rich ecosystem of storage engines, plugins and many other tools make it very versatile for a wide variety of use cases. MariaDB is developed as open source software and as a relational database it provides an SQL interface for accessing data. The latest versions of MariaDB also include GIS and JSON features.” Rouse(2016)

### Firebase Database

The Firebase Real-time Database is a cloud-hosted NoSQL database that lets you store and sync data between your users in realtime. Cloud Firestore, explains one of its designers that “it enables you to store, sync and query app data at global scale. Cloud Firestore is a fully-managed NoSQL document database for mobile and web app development. It's designed to easily store and sync app data at global scale. It allows for iOS, Android, and Web SDKs with offline data access, real-time data synchronization and Node, Python, Go, and Java server SDKs.”

### SQL Azure

According to Rouse SQL Azure is “Microsoft’s cloud database service. Based on SQL Server database technology and built on Microsoft’s Windows Azure cloud computing platform, SQL Azure enables organisations to store relational data in the cloud and quickly scale the size of their databases up or down as business needs change. Data is hosted, managed and provisioned in Microsoft data centres. Organizations can build applications on-premises and move them to SQL Azure or build them on Windows Azure and keep the data in the cloud.”

## Amazon DynamoDB

DynamoDb is a fast and flexible NoSQL database service for any scale.

Amazon DynamoDB “is a key-value and document database that delivers single-digit millisecond performance at any scale. It's a fully managed, multi-region, multi-master, durable database with built-in security, backup and restore, and in-memory caching for internet-scale applications. DynamoDB can handle more than 10 trillion requests per day and can support peaks of more than 20 million requests per second.”

### Oracle Database

Oracle database (Oracle DB) is a relational database management system (RDBMS) from the Oracle Corporation. Techopedia explains that “Oracle DB is one of the most trusted and widely-used relational database engines.

The system is built around a relational database framework in which data objects may be directly accessed by users (or an application front end) through structured query language (SQL). Oracle is a fully scalable relational database architecture and is often used by global enterprises, which manage and process data across wide and local area networks. The Oracle database has its own network component to allow communications across networks.” Technopedia (2019).

## Collaborative Software

Collaborative software or groupware is application software designed to help people involved in a common task to achieve their goals. Technopedia explains that, “In terms of the level of interaction it allows, collaborative software may be divided into: real-time collaborative editing platforms that allow multiple users to engage in live, simultaneous and reversible editing of a single file (usually a document), and version control platforms, which allow separate users to make parallel edits to a file, while preserving every saved edit by every user as multiple files (that are variants of the original file).”

### GitKraken

According to the GitKraken Organisation, “Axosoft GitKraken is a cross-platform Git client with efficiency, elegance and reliability at the core. It was made for devs by devs.” Osbourn further elaborated that, “t is a client for working with the version control system git. So it will handle merging, pushing, branching. It is cross platform, Efficient – It is quick to learn and performant, Elegant – It feels nice to use, it has a style to it and is reliable- It works consistently and does what you would expect to happen.”

### Trello

Trello as defined by its designers is a “collaboration tool that organizes your projects into boards. In one glance, Trello tells you what's being worked on, who's working on what, and where something is in a process.”

They further explained that it “organizes projects visually, in units called "boards." Boards contain lists of items, and each item is represented by a "card." There are many features which allow these components to be customized according to a project's needs.”

### Bitrix24

Bitrix24 is a collaboration software with complete tools for management, collaboration, and communication. “It gives you a unified platform for your files, projects, messages, tasks, and contacts. Through the Activity Stream, everyone in your team can keep track of tasks and effectively work together to progress on the project.

Its main solutions include social network, tasks and projects, CRM, document management, file sharing, calendar and planning, sales team management, email, telephone, and HR management. It also has a mobile solution that works on your smartphone or tablet whether it’s Android, iPhone, or iPad. The Bitrix app marketplace is available to create your own apps or use your existing systems.” Rouse(2016).

### Github

GitHub is a web-based version-control and collaboration platform for software developers. Rouse argues that “it is used to store the source code for a project and track the complete history of all changes to that code. It allows developers to collaborate on a project more effectively by providing tools for managing possibly conflicting changes from multiple developers.

GitHub facilitates social coding by providing a web interface to the Git code repository and management tools for collaboration. GitHub can be thought of as a serious social networking site for software developers. Members can follow each other, rate each other's work, receive updates for specific projects and communicate publicly or privately.”

### Slack

Slack software is cloud-based collaboration software suite. Rouse explains that “slack features include direct-messaging capabilities, notifications and alerts, document sharing, group chat and search. Slack offers integration with many third-party services, including Google Drive and Dropbox, and it is especially popular with software developers and technology-driven companies because it supports source code snippets and retains formatting for a variety of programming languages. Slack also offers integration options for developer-oriented tools such as GitHub”.

# DONE Retail Management System

We spent half the semester trying to decide what works best for what we are trying to achieve for our app, and we kept changing our technologies as we kept finding better and more efficient. We are currently on DONE Retail Management System.

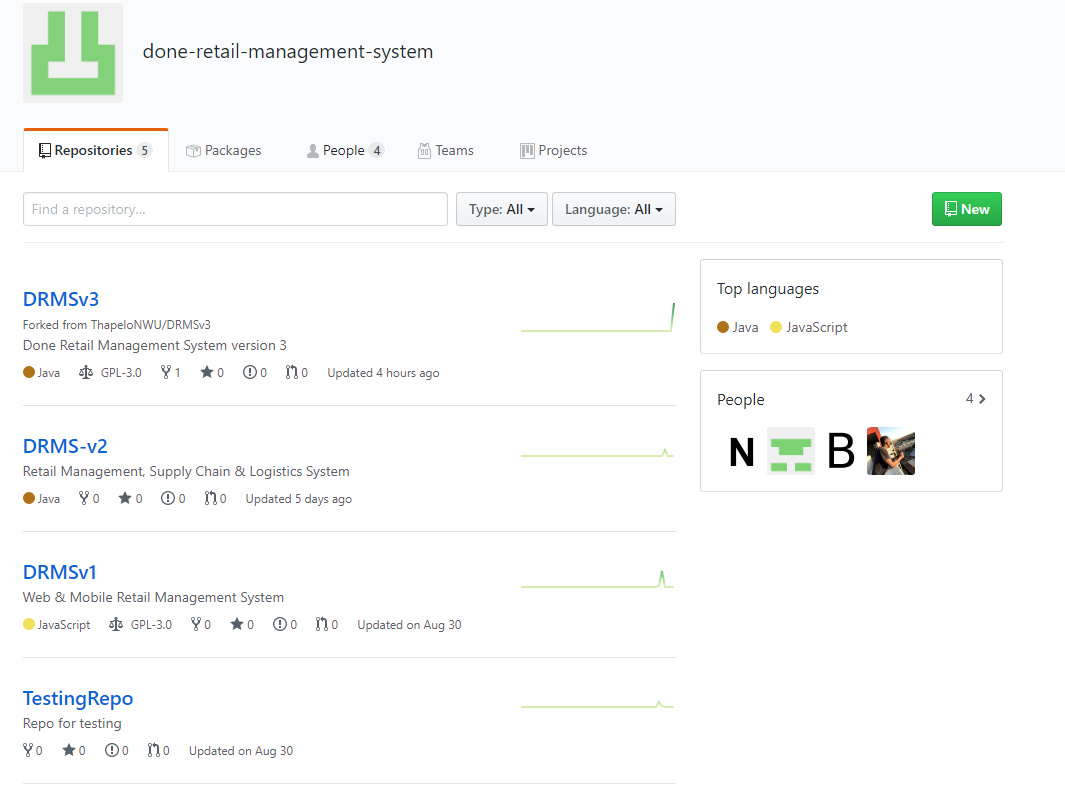


Figure 1: DRMS Repo

## Design

### Prototypes

## Technology

Initially, according to our initial project proposal, we wanted to use Ionic, but later realized that we don’t want a hybrid application, an app that runs on a web browser, also its 2019, such apps are slowly becoming extinct.

We came across react native, which creates native applications and also uses new technology. But due to time restrictions and mainly because it is still fairly new it doesn’t not have a lot of internet support(help), which was the downside especially since we had to learn as we go. We were also short on resources as the iOS platform needed a to be developed on a Mac.

### Android Studio

We went back to the drawing board to look for a technology that will follow our initial methodologies(DevOps) and produces a native application, at this point we were running behind schedule and needed to make a realistic choice.

We ended up using Android studio. There is support for all platforms of Android starting with Android 1.6 and later. The workflow for Android Studio is built around the concept of continuous integration. Continuous Integration allows for teams to test their code each and every time a developer checks in their work. Issues can be captured and reported to the team immediately. The only downside from our initial proposal is that this technology only developed for Android OS.

## API/Web Server

We realized that Android Studio works better with the Amazon Web Services, so we decided to use its API Gateway. We used the software development kit (SDK) to integrate with software that calls the APIs, including custom SDKs for mobile app and Web app development. Rouse explains that “We can monitor API calls on a metrics dashboard in Amazon API Gateway and can retrieve error, access and debug logs.

Amazon API Gateway provides security using access keys to control API access. The service interacts with Amazon Identity and Access Management and Amazon Cognito to authorize access to APIs. The service also supports AWS Signature Version 4 as an additional security option; this creates access keys for each API call. OAuth tokens can also be passed to running workloads as an alternative security measure.

The service also allows an AWS user to operate multiple versions of an API simultaneously, allowing a developer to build and deploy new APIs while existing applications use previous versions of the API.”

## Database

We used Azure SQL for our database. We stored and populated our data straight from the cloud.

(Sreen Shot)

## Collaborative Software

We used all the above mentioned Collaborative Software.

### GitKraken

We used GitKraken as our Git Client where we made commits, branches and merging. We used Glo Boards to help us to visualize and track tasks a Kanban view. (Screenshot)

### Bitrix24

We used Bitrix24 for all our management. From planning to creating tasks and assigning tasks, storing all documentation, checking task progress as well as tracking hours spent working on the project.

(Screenshot)

### Github

We used Github to store all our project source code, and to track the completion of the tasks as it clearly shows the insight on what has been happening on the repository.

(Screen Shot)

### Slack

We used Slack mainly for communicating with our Demi Xagarey Meyer as well as feedback and updates from Mr Henry Foulds what is expected from us.

## Progress Report

### Shelf Mangement

The Shelf Management is designed for the shelve packers, who primarily are responsible for making sure new goods replace purchased ones and that they are in the correct place. Their job includes, mapping out where each item is located in the store.

#### Program

The shelf management system is about 40% done as most of the pages duplicate themselves and serve roughly the same functionality.

* Dashboard

The Dashboard which is not complete, navigates through the shelf fragment and is in actuality supposed to have 3 Buttons: Shelf Management, In-Stock Management and Out-Of-Stock Management.

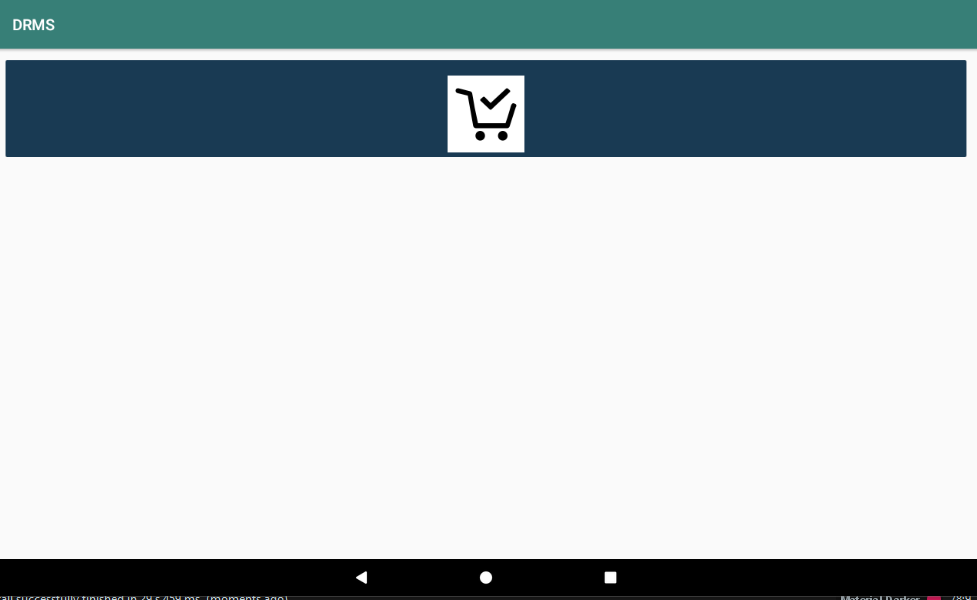


Figure 2:Current Shelf Dashboard

* In-Stock Management Activity

Clicking the In-Stock button navigates to the Activity which now displays the different Aisles/Categories of products that a packer can click on/ search for a product and view all the products that are currently still in Stock.

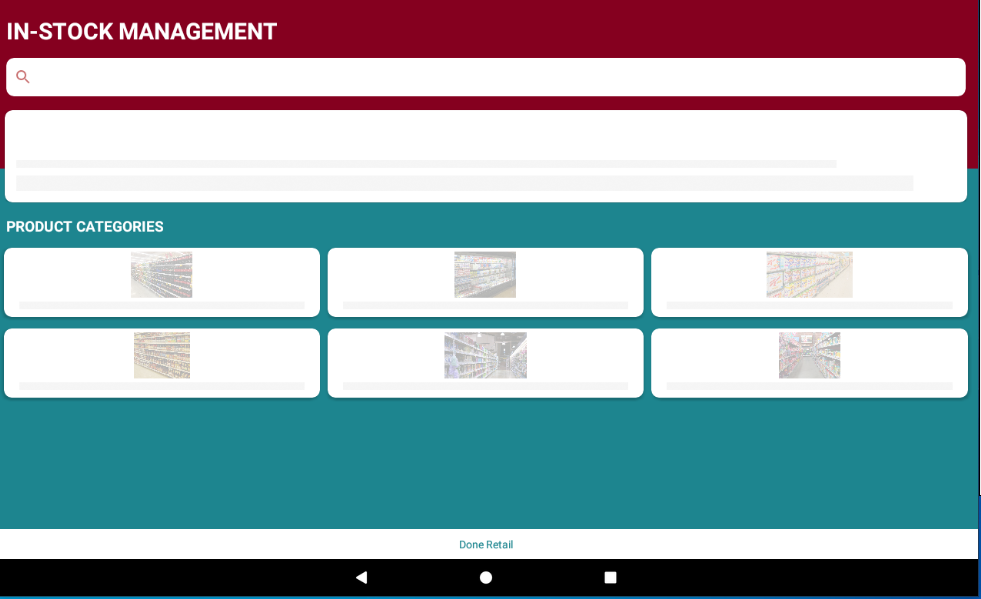


Figure 3: In-Stock Management

* Shelf Management Activity

Clicking the Shelf button navigates to the activity which displays the different Aisles/Categories of products that a packer can click on/search for a product and view all the products that are currently still on shelf and ready to be purchased. Packer can also view the products that might need to be restocked on shelves.

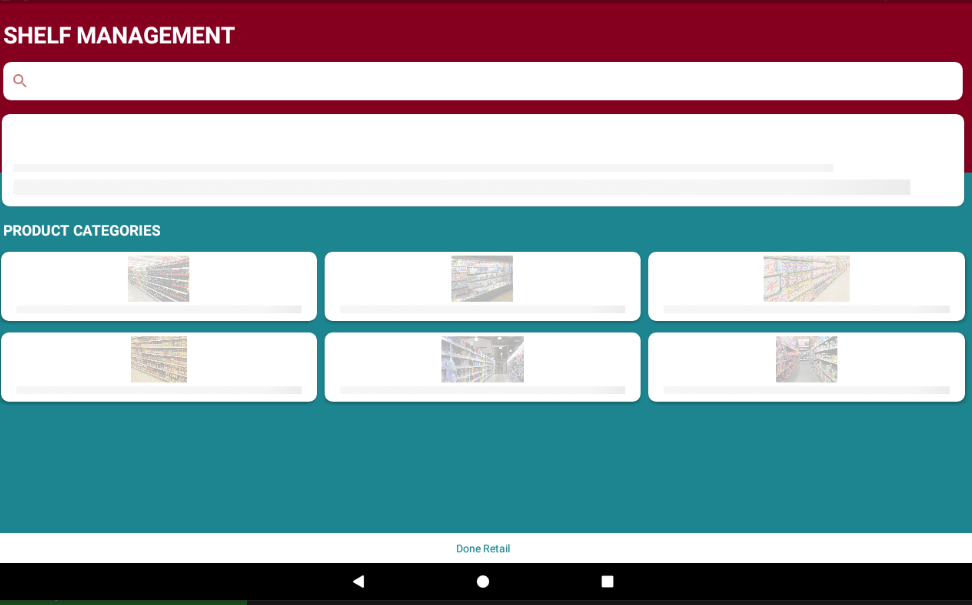


Figure 4: On Shelf Management

* Out – Of –Stock Management

Clicking the Out-Of-Stock button navigates to the page which displays the different aisles/categories of products that a packer can click on/search for a product and view all the products that are currently still out of stock, due to being purchased, or having an error. Possible errors include, the product expiring or damaged.

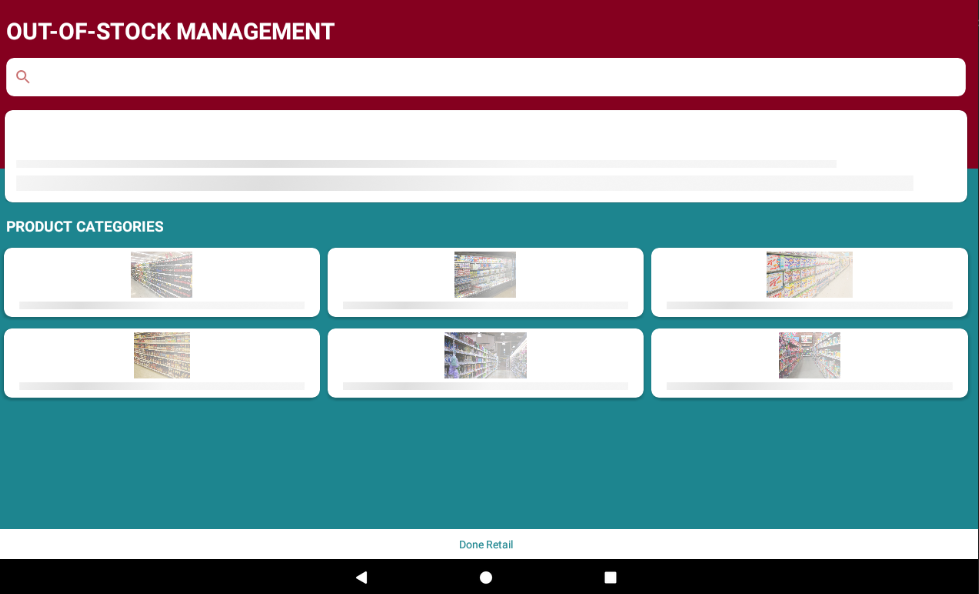


Figure 5: Out-Of-Stock Management

#### Source Code

The 3 above activities developed using a shimmer. “Shimmer is an Android library that provides an easy way to add a shimmer effect to any view in your Android app. It is useful as an unobtrusive loading indicator that was originally developed for Facebook Home.” (Rouse, 2019).

This was used as it has a nice, animated view to help enhance the appearance of the different categories /aisle and is a good UI especially since it designed for packers that are working long hours and expect easy to use technology. Most of this code is mainly from Haerul Muttaqin’s youtube channel.

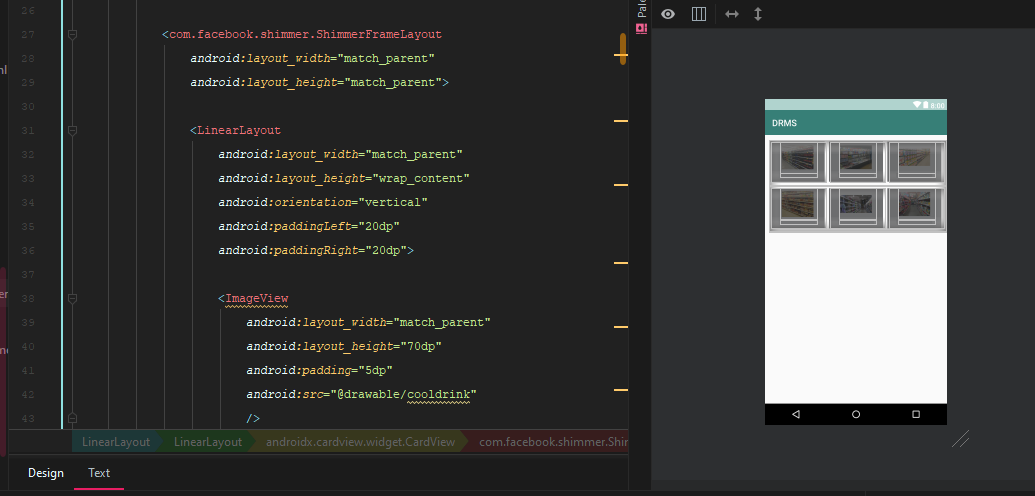


Figure 6: Source Code

#### Problems Encountered

During the design of the Shelf management, there were quite a few problems that were experienced:

1. Deciding on a layout that was fitting for people who work long hours and expect a simple application that will make their work quicker was a challenge that was at the end of phase 1 solved.
2. One the biggest problems that the team is facing is lack of resources, everything we do is at Lab 212 and that has restricted us in so many ways as we don’t always have access to the Lab.
3. Understanding how to use basic Android studio functions and being able to apply them on the application, and this limited the addition of functionality as most of the time was spent on trying to learn the technology.
4. The effects used on the shelf division are that of a higher API than that of the tablet that is which is where the application will be deployed on, this issue is not yet resolved.
5. A lot of merge conflicts especially from the shelf management side, but the conflicts were resolved.

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