Fall 025

Software Requirements Specification

TRULABEL

PRJ566NCC

Fall 2025

https://github.com/Ahj1n/PRJ566-TrueLabel

Executive Summary

Background

Growing awareness of ethical consumerism and the importance of supporting Canadian-made goods inspired this project. Many consumers are concerned about issues like animal testing, exploitative labor, and unsustainable practices but lack quick, reliable tools to check this information while shopping. Although company and product data exist across databases and APIs, this information is scattered, difficult to interpret, and often overshadowed by advertisements when searched online. TruLabel bridges this gap by centralizing, summarizing, and presenting this data in a consumer-friendly format.

Description

TruLabel will provide users with:

- Barcode/QR scanning to identify products instantly.
- Aggregated company background, ethical track record, and product origin.
- A simplified ethical rating score for at-a-glance decision making.
- Integration with APIs for up-to-date reporting and news coverage.
- A clean, user-friendly interface optimized for use in stores.

The app will operate on a **B2C model** with a one-time purchase or subscription option (first few daily scans free, then subscription for unlimited access).

Company Value Add

TruLabel positions itself as a unique solution by combining product scanning with ethical reporting. Unlike Google searches or niche platforms, TruLabel provides concise, cross-industry, and unbiased summaries backed by credible sources. This creates a competitive advantage by filling a gap in the growing ethical consumerism market while offering a scalable platform that can expand into global databases and industries.

End-User Value Add

For consumers, TruLabel offers:

- Quick, reliable ethical ratings at the point of purchase.
- Transparency about company practices and product origins.
- Confidence that their purchases align with their values.
- A streamlined experience compared to manually searching online.
- This results in more informed shopping decisions, increased trust in products, and stronger support for ethical and local businesses.

Scope

What is Included

- Mobile app (Android/iOS) with barcode/QR scanning capability.
- Backend database aggregating product and company data.

- Ethical rating algorithm with transparent methodology.
- API integrations with product/brand databases and news feeds.
- User interface optimized for in-store scanning and quick decision-making.

What is Not Included

- Direct online shopping or payment processing.
- Personalized health/product recommendations.
- Integration with wearable devices or IoT systems (initial phase).

Justification

The project addresses a strong demand for transparency and ethical consumerism. It leverages existing databases and APIs while offering innovation in how this information is presented. Given its unique approach and technical scope, TruLabel requires a multi-semester development effort to design, build, and refine the system.

Table of Contents

Section 1

1.1 Document Authors

- Aaron Klem, Project Manager
- Furqan Khurrum, Lead Developer
- Kai Williams, Backend/Database Specialist
- Marcos Ian Araujo, UI/UX Designer
- Franz Balite, Research & Quality Assurance

1.2 Document Revision History

WEEK	DATE	Revisions
1	Sept 18th 2025	• Executive Summary, 1.1, 1.2,1.3,1.4,1.5
2	Sept 21st 2025	• Section 2.1
3	Sep 28th	• Section 2.2-2.5
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4		•
5		•
6		•
7		•
8		•
9		•
11		•
12		•
13		•
14		•

1.3 Document Purpose

The purpose of this document is to define and communicate the scope, objectives, and structure of the TruLabel mobile application project. It provides a clear reference for the development team, faculty advisors, and stakeholders, outlining the app's vision, requirements, and intended deliverables. This ensures shared understanding and alignment throughout the project lifecycle.

1.4 Audience

This document is intended for multiple audiences:

- **Project Team Members** – for task alignment, technical guidance, and collaboration.
- **Faculty Advisors and Evaluators** – for reviewing methodology, feasibility, and progress.
- **Potential Stakeholders/End Users** – to understand TruLabel's goals, scope, and consumer value.

By addressing these audiences, the document ensures effective communication, accountability, and alignment between all parties involved.

1.5 Group Agreement

Group – 04

TruLabel – Ethical Consumer Product Scanner

Project Time Frame

September 14th, 2025 – December 4th, 2027

Team Members

Aaron Klem – Project Manager
Furqan Khurrum – Lead Developer
Kai Williams – Backend/Database Specialist
Marcos Ian Araujo – UI/UX Designer
Franz Balite – Research & Quality Assurance

Team Functions & Roles

- Aaron Klem (Project Manager): Oversees coordination, deadlines, and deliverables.
- Furqan Khurrum (Lead Developer): Responsible for core application development and integration.
- Kai Williams (Backend/Database Specialist): Manages database, API integrations, and server logic.
- Marcos Ian Araujo (UI/UX Designer): Designs user-friendly, accessible mobile interfaces.
- Franz Balite (Research & QA): Gathers ethical data, validates sources, ensures app reliability.

Team Meetings

To stay aligned and maintain steady progress, we will hold two regular weekly meetings:

- **Task Planning** – Thursdays, 9:50 AM to 11:35 AM
  Discuss upcoming tasks, assign responsibilities, and set short-term goals.
- **Progress Check-In** – Wednesdays, 12:30 PM to 3:00 PM
  Review task progress, address blockers, and adjust priorities as needed.

These meetings will be brief and focused (15–30 minutes), with flexibility to adapt based on project needs.

Team Communication & Problem-Solving

We agree to maintain open, respectful, and timely communication. Any issues—technical, interpersonal, or scheduling-related—will be brought up promptly and addressed collaboratively.

Team Commitment

The undersigned members agree to work together on the project until the end of the PRJ666 next Semester. They recognize that as a team and individually they are equally responsible for the quality of all deliverables.

Name	Date	Signature
Aaron Klem	18th September 2025	**AK**
Marcos Ian Araujo	18th September 2025	**MIA**
Kai williams	18th September 2025	**KW**
Franz Balite	18th September 2025	**FB**
Furqan Khurrum	18th September 2025	**FK**

Section 2

2.1 Project Proposal

2.1.1 Project Background

Consumers are increasingly conscious about ethical concerns in supply chains, such as animal testing, harmful ingredients, labor practices, and sustainability. In Canada, there is also a strong cultural push toward supporting locally made products. However, consumers lack a streamlined, reliable tool that quickly provides product origins, company practices, and ethical ratings at the point of purchase.

2.1.2 Problem Statement

- Problem: Shoppers often want to know if a company engages in ethical or sustainable practices, but current methods (e.g., Googling brands) are slow, ad-heavy, and unreliable.
- Opportunity: A mobile app that instantly provides brand histories, ethical ratings, and origin data by scanning a barcode or QR code.
- Who Experiences It: Everyday consumers shopping at grocery stores, retail outlets, or online.
- Why It Matters: Empowering users with unbiased, easily accessible information helps them make values-driven decisions while shopping.

2.1.2.1 Similar Products

Barcode Lookup

Api for a public database of products, pages contain manufacturer name, code, and some basic product information. Specialized for online stores and bulk look ups.

Scanbot SDK

An dev-kit that specializes in image recognition and implementation of phone-camera scanners. Has a Full GitHub of documentation and sells license keys.

Scandit

An SDK for developing apps that connect to private or public databases to show information. It itself does not categorize or manipulate the information; merely reads a valid code and makes a call to the linked database.

International Organization for Standardization (ISO)

International body responsible for managing several of the more common standards of Barcode. They do not provide any services to the public for scanning barcodes. They work with business to ensure products barcode's meet set standards.

Table A – Feature Comparison

Feature	TruLabel	Barcode Lookup	Scanbot SDK	Scandit	ISO
Scans Barcodes	✓	✓	✓	✓	X
Database of Product Data	✓	✓	✓	X	X
Conforms to Product Standard	✓	X	X	X	✓
Informs User of Product	✓	✓	✓	X	✓
Mobile App	✓	✓	✓	✓	X
Ethical Rating System	✓	X	X	X	X
Open Documentation	✓	X	✓	X	✓
Usable by Public	✓	X			

Section 2.1.2.2. Impacts

The problem of what to buy plagues every conscientious consumer. In today's vast global economic market it's easy to be overwhelmed. Supply chains criss-cross the world, keeping track of what goes where and who is selling what is full time job. The lesson of voting with the dollar; of forming an identity with the products one buys and where they spend their cash. In the digital age the call for boycotts and questions of quality, ethics, and reputation abound. Customers have questions and the information exists; albeit buried in technical digests and logistical reports.

> You are what you eat; but you support what you buy.

Currently other solutions fail to solve the problem for the consumer. They are focused on businesses for inventory tracking or for industrial applications. A couple offer services related; the ability to write reviews or to fetch via the code. However they often just scratch the surface on information; presenting landing pages that are empty or fail to have follow up information.

2.1.3 Product Vision

TruLabel will be a **B2C mobile application** that enables users to scan a product's barcode/QR code and instantly view:

- Manufacturer information
- Country of origin
- Ethical and sustainability ratings
- Links to credible sources and news updates

By providing an **at-a-glance ethical score** with deeper supporting data, TruLabel will make ethical consumerism simple, quick, and accessible.

2.2 Stakeholders and Users

2.2.1 Internal Stakeholders:

- **Development Team -** The five-member team responsible for designing, developing, testing, and maintaining the TruLabel application.
- **Project Manager (Aaron Klem)** - Oversees project coordination, timeline management, and stakeholder communication.
- **Lead Developer (Furqan Khurrum)** - Manages technical architecture decisions and core development processes.
- **Backend/Database Specialist (Kai Williams)** - Responsible for data infrastructure and API integrations.
- **UI/UX Designer (Marcos Ian Araujo)** - Ensures user-centered design and optimal user experience.

- **Research & QA Specialist (Franz Balite)** - Validates data sources, conducts testing, and ensures application reliability.

2.2.2 External Stakeholders:

- **Ethical Consumers/Primary Users** - Individuals who prioritize sustainable, ethical, and locally made products and want quick access to product information while shopping.
- **Casual Shoppers/Secondary Users** - General consumers who occasionally want to verify product origins or company practices.
- **Canadian Consumers** - Specific focus on users interested in supporting Canadian-made products and local businesses.
- **Retail Partners** - Potential future partners including grocery stores, retail chains, and online marketplaces.
- **Data Providers** - External APIs, databases, and news sources that supply product and company information.
- **Aligned nongovernmental organisations** – International Organizations that share similar ethical goals and offer certification. Such as Fairtrade International's Fairtrade (*What is Fairtrade*), Global Ecolabeling Network's, Ecolabel (*What is Ecolabelling*), and Carbon Trust's Carbon Reduction Label (*Carbon footprint labelling*)
- **Regulatory Bodies** - Organizations that may influence data accuracy requirements and consumer protection standards such as the Standards Council of Canada (*Standards Council of Canada)*.
- **Investors/Funding Sources** - Potential future stakeholders interested in the B2C subscription model.
- **Competing Apps/Services** - Indirect stakeholders that may influence market positioning and feature development.

2.3 Project Scope

The TruLabel project aims to deliver a mobile application that empowers consumers to instantly evaluate the ethical and origin credentials of products in-store, while clearly defining the boundaries of its first-phase deliverables to ensure development remains focused on building a reliable, consumer-friendly product that provides ethical transparency at the point of purchase.

2.3.1 included Features:

- **Mobile Application Development** - Native Android and iOS applications with barcode/QR code scanning capabilities
- **Product Recognition System** - Real-time barcode/QR scanning using device camera
- **Ethical Rating Algorithm** - Transparent methodology for scoring companies and products based on ethical criteria
- **Database Development** - Centralized database aggregating product information, company data, and ethical assessments

- **API Integration Layer** - Connections to external product databases, news feeds, and company information sources
- **User Interface Design** - Intuitive, mobile-optimized interface for in-store scanning and quick decision-making
- **Business Model Implementation** - B2C monetization with free daily scans and subscription options
- **Data Aggregation System** - Collection and synthesis of information from multiple credible sources

2.3.2 Technical Components

- Backend server infrastructure
- Database design and management
- Mobile app development (Android/iOS)
- API development and third-party integrations
- Basic user account management
- Rating algorithm development and testing

2.3.3 Out of Scope (Phase 1 Exclusions)

- **E-commerce Integration –** No direct online shopping, payment processing, or transaction handling
- **Personalized Recommendations –** No health-based or personalized product suggestions
- **Wearable Intergration -** No connection to smartwatches, fitness trackers, or other IoT devices
- **Social Features** - No user reviews, social sharing, or community features
- **Advanced Analytics** - No complex user behavior tracking or advanced analytics dashboard
- **Global Market Coverage** - Initial focus on Canadian/North American products and companies
- **Real-time Chat Support** - No customer service chat or support ticket system
- **Inventory Management** - No stock tracking or availability checking
- **Price Comparison** - No pricing information or cost analysis features

2.4 System Risks

Lack of Data – TruLabel depends on APIs and public databases, but not every product or company may have available information. A scanned product might return incomplete results, frustrating users. To reduce this, TruLabel must prioritize integration with the largest databases first and display disclaimers or fallback messages when data is missing.

Lack of Partnership – Without cooperation from retailers or product certifiers, TruLabel may struggle to access reliable or detailed product records. This limits coverage and could create gaps in the ethical rating system. Partnerships will need to be actively sought through pilot programs or business agreements, especially with Canadian retailers for early adoption.

Lack of Adoption – Users may hesitate to download and consistently use the app if they don't see clear value, or if they perceive it as "extra effort" while shopping. Without user adoption, the app risks

stagnation despite working features. Strong marketing, seamless UI/UX, and offering free daily scans will be essential to drive adoption.

Discreditation by Companies – Brands that receive low ethical ratings might challenge or discredit TruLabel, accusing it of bias or misinformation. This creates reputational and legal risks. In Canada, companies could pursue action under defamation libel of C-46 (*Criminal Code,* Government of Canada, 2019) if they believe statements harm their reputation, or under C-34 (*Competition Act,* Government of Canada, 2019) if claims are considered false or misleading representations. The Consumer Packaging and Labelling Act (*Consumer Packaging and Labelling Act,* Government of Canada, 2019) also sets strict rules around product-related information being accurate and not deceptive. To mitigate this, TruLabel must publish transparent scoring methods, cite credible third-party sources for all claims, and allow users to drill down into the evidence behind ratings. Additionally, disclaimers clarifying that TruLabel aggregates and summarizes existing data—not generating original investigations—will help reduce liability.

Signal/Roaming Issues; Offline Data/Online – Barcode scanning in stores with poor signal or for users with roaming restrictions could prevent real-time lookups. Without offline support, the app risks being unusable in those contexts. TruLabel can mitigate this by caching previously scanned products and offering partial offline functionality until connectivity is restored.

2.5 Operating Environment

Trulabel will be used by customers in retail settings such as supermarkets and department stores. A Conscientious consumer who wants to ensure they support companies and organizations with ethical mindsets, accomplished by using the app to scan barcodes to learn more about products to help them make buying decisions.

2.5.1 Target Platforms

- **Android** – Minimum Android 8.0+ (API level 26), optimized for Android 12+
- **IOS –** Minimum iOS 13.0, optimized for iOS 15+
- **Device requirement:** smartphones with rear-facing autofocus camera.

2.5.2 Hardware Requirements

- **Minimum:** 5MP autofocus camera, 3GB RAM (Android) / 2GB RAM (iOS), 100MB storage, quad-core CPU, 3G internet.
- **Recommended:** 8MP+ camera with flash, 4GB+ RAM, 1GB+ free storage, 4G/5G connectivity.

2.5.3 Software Dependencies

- Barcode Libraries
- API Services
- News Intergration
- Cloud hosting
- Database: PostgreSQL or MongoDB
- Analytics

functional and non-functional requirements gathering process:

We selected interviewees representing key user and stakeholder categories relevant to TruLabels scope:

Persona 1 – The Ethical Shopper (Conscientious Consumer)

- Age: 28
- Occupation: Student/Young Professional
- Motivation: Wants transparency on animal testing, sustainability, and labor ethics.
- Pain Points: Time-consuming to research each brand; distrusts advertising.
- Goal: Instantly know if a product aligns with personal ethics before purchase.

Persona 2 – The Average Shopper (Casual User)

- Age: 35
- Occupation: Working parent
- Motivation: Convenience and curiosity.
- Pain Points: Doesn't want to spend extra time or money for "research apps."
- Goal: Occasionally check brands or products for recalls or scandals.

Persona 3 – The Verifier (Regulatory/NGO Representative)

- Age: 40+
- Occupation: Certification officer or NGO staff.
- Motivation: Promote transparency and uphold certification standards.
- Pain Points: Misinformation or misuse of accreditation data.
- Goal: Ensure the app communicates ethical data accurately.

Interview Questions & Answers:

Who are you/ what is your id

Persona 1 – The Ethical Shopper (Conscientious Consumer)

Would you use/ do you see value in an app that shows product data?

Yes I think it would be helpful! Especially when considering new products or even in case of buyouts. I spend a lot of time and effort researching the brands I buy. Having an app that helps me ***quickly and easily*** see unbiased product information would be incredible!

What are you looking for in the product? What drew you to it?

For me it needs to be ***fast, reliable***, nice to use. I don't want another step to collecting or tagging brands for research. Something that ***helps me by reporting*** and collecting facts would help me support who I want to.

Where did you hear about the product?

Word of mouth in similar circles or through forms. A handful of early adopters pushed for it saving them time.

When/ how often would you see yourself using the product?

Constantly. Checking and double checking ay new brands or products I come across

Why does it appeal to you? Are there any features you would like to see added?

It appeals to my morals and ethics and simplifies what I was already doing, ***saving me time***. As for features it already does most of what I want it too. It could be nice to have wish lists or updates on particular brands or products, or maybe notices of recalls? But I would hate for it to become ***too bloated*** with extra information that doesn't actually help me.

How would you be affected/using the product?

It would become a daily tool to understand things around me and help achieve my ethical goals. Something to use to screen products or potentially share with family and friends to help them do the same.

Who are you/ what is your id

Persona 2 – The Average Shopper (Casual User)

Would you use/ do you see value in an app that shows product data?

My spouse heard of it through social media and wanted to try it out for a week. We felt it couldn't hurt to know more about what we were buying. We mostly stuck with it due to finding it ***simple***; just ***point and click*** at a barcode to get a bevy of information. It was interesting just to scan stuff in our cupboards.

What are you looking for in the product? What drew you to it?

It's easy and quick to look something up, faster than going to the product website or searching for reviews online. We've been saved a few times by trying to find an alternative product and having the app direct us to something similar but with more ethical sourcing.

Where did you hear about the product?

Word of mouth or a viral post. I was hesitant to spend extra time and/or money but was convinced by other's points.

When would you see yourself using the product?

If it doesn't convert me into a contentious consumer then rarely, maybe in the face of a recall or scandal. I would not be pulling it out often. It's something I use on the off occasion that I feel like trying something new.

Why does it appeal to you? Are there any features you would like to see added?

It gives me answers to questions and facts about what I'm buying. Having recommendations would be nice.

How would you be affected/using the product?

Using it once or twice on newer products.

Who are you/ what is your id

Persona 3 – The Verifier (Regulatory/NGO Representative)

Would you use/ do you see value in an app that shows product data?

We see value in the app in its ability to give your average consumer more information to make decisions. It is ***simple, tested by some of our teams' children*** and easy to use. It gives quick, ***easily digestible facts*** that keep customers in the know.

What are you looking for in the product? What drew you to it?

That it is ***accurate*** and not discrediting products. Does it accurately convene information and support the mission. If it ***promotes and helps*** the goals of the organisation, there is potential for sponsorship. We invest a lot of time and energy to maintain the standards by which our partners are accredited, we will not support anything that diminishes that effort. Thankfully the app showcases things rather than buries them.

Where did you hear about the product?

Reports from clients as well as they contacted us.

When would you see yourself using the product?

Not at all, though it may be recommended if it proves trustworthy and accurate. Perhaps on products we have certified to confirm information,

Why does it appeal to you? Are there any features you would like to see added?

It partly aligns with mission statements we set out to uphold. It would be nice to see a search function that recommends based on Complient products, that way our partners could be seen over competitors who don't have the same standards.

How would you be affected/using the product?

More engagement ***brings attention*** to our name and who/what we preside over. Questions about validity or calls for arbitration

When would you see yourself using the product?

Why does it appeal to you? Are there any features you would like to see added?

It helps spread the message and mission statement our organization is founded upon.

How would you be affected/using the product?

Highlights

Keyword List

Using the above questions, we collected the following key words and phrases that we felt captured the essence of what the app should be.

- **Fast**, **reliable**, **accurate**
- **Simple**, **easy to use**, **clean design**
- **Ethical rating**, **transparent sources**, **trustworthy**
- **Offline accessibility**, **quick lookup**, **non-intrusive**

- **Not bloated**, **clear value**, **helpful**, **saves time**

2.6 Functional Requirements (Concrete)

To achieve the goals of the project the following functions are required:

- App should allow users to **scan product barcodes/QR codes** using their camera.
- The backend shall **aggregate product and company information** from external APIs and the internal database.
- The system shall **calculate and display an ethical rating score** using a defined algorithm and criteria.
- App shall provide **real-time updates** from **verified news** and **databases**.
- App shall **display credible sources or certification links** for transparency.
- App shall offer replacement suggestions that fulfil qualities the customer is looking for.
- The application shall support a B2C model: a limited number of free scans per day and subscription for unlimited access.

2.7 Nonfunctional Requirements (abstract)

Through our questionnaires we learned that the most of our users want something that is easy to use. The app is a time saver for them, so they don't want to fight through menus or deal with pop-ups that aren't helpful. However, all these answers were contingent on the information the app provided being accurate, reliable, and trustworthy. To fully capture the statement, we came up with the following priority flow.

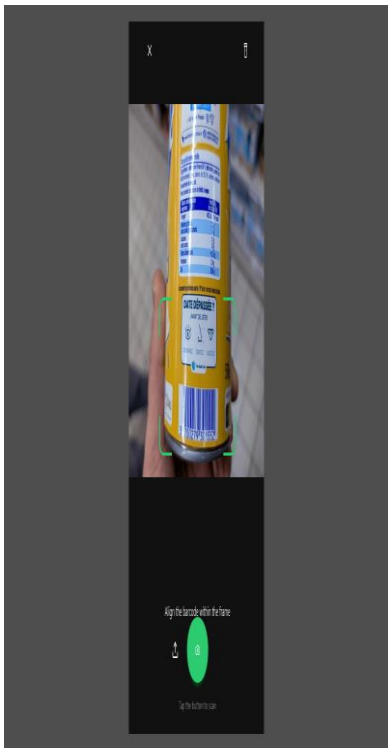
Reliable> Maintainable > Usability

Our users are coming to us to give them trustworthy answers, we need to be able to adapt to changes and updates in information, which places the app's maintainability and the ability to make edits to our database as a high priority. However, the users also wanted the information quickly, to satisfy this we plan to make the databases use local versions. Since the users will be doing so in grocery stores, which can have spotty data coverage, we ensure that every time the user scans a product they get as accurate an answer as we can give them. Our final priority is usability. Our customers want something clean, simple, and easy to give them the answers to their questions

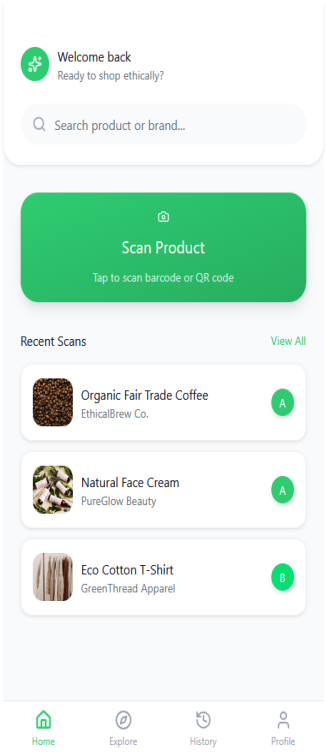
Other nonfunctional requirements such as security and efficiency are still important to us; however, they take a backseat. Security is not a focus as we are handling no sensitive data besides maybe user profiles; nothing payment based. Likewise, efficiency is always important, but most of our needs are met with list sorting and search indexes.

2.8 UI/UX Interface Mock-ups

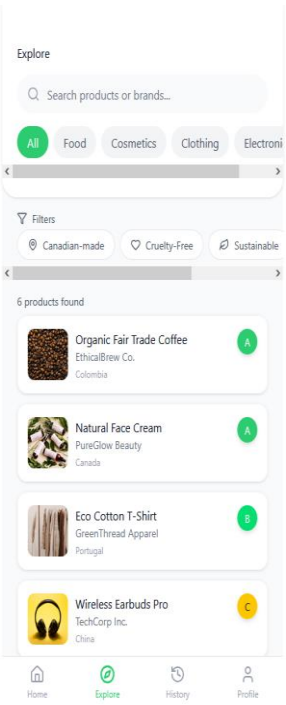
Scan/ camera Ui



Landing Page

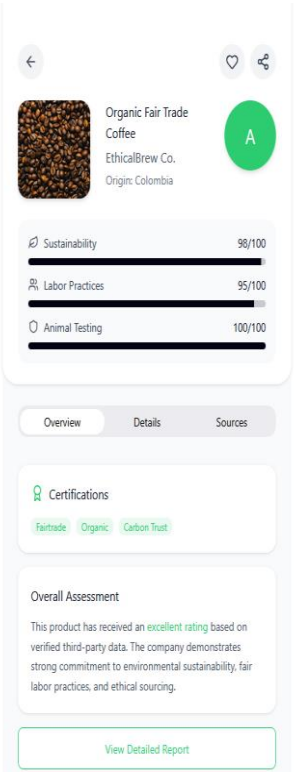


Product Search

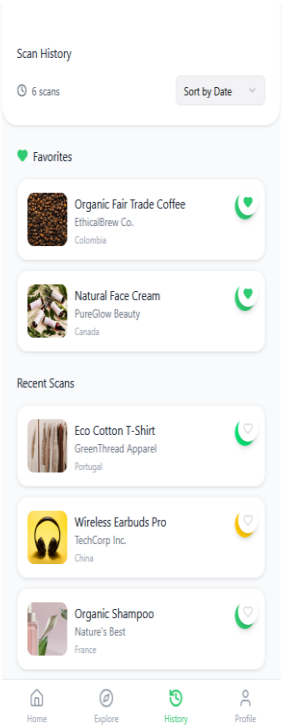


Detailed product screen

Product Overview



Scan History



Section 3

3.1 Data Flow Diagrams

3.2 User Stories and related Use Case Scenarios

Use Case Name	Scan item	Id	1	Priority	essential
Triggering Event	User selects option from menu	Level	Sea		
Brief Description	User aligns a product with camera, the barcode is scanned and information is presented.				
Actors	User				
Preconditions	User has a product to scan				
Post Conditions	Product data is fetched, saved to user history				
Relationships	Generalization: Product Search				
Basic Path	1	User selects item to scan, aligning it with markers			
	2	App scans barcode			
	3	Barcode is read Execute use case #3 S1, Product Search (barcode)			
	4	Execute use case #4S2, Manage User Data (Add Product to history) passing product id.			
	5	App displays product information			
	6	App prompts user for selection If new product, go to step 1 If product details, go to Sub-Flow s1 If cancel, end flow			
	7	App exits to menu			
Sub-Flows	S1	Detailed Product View			
		1. Execute use case #2S1, Manage product data (Detailed product view) passing product id.			
Alternative Paths		2a. Invalid barcode 2b. unlisted barcode S1b. product view returns null S2b. unable to save empty object a) App can't read data b) Incomplete database			
Business Rules		B1: barcode legible B2: database integrity			
Non-Functional Requirements		Search efficiency			
Exception Conditions	User aborts				

Use Case Name	Manage product data	Id	2	Priority	High
Triggering Event	App calls for data to be displayed/ manipulated	Level	Kite		

Brief Description	A context container for functions managing the display of product data.	
Actors	User	
Preconditions	User interacts with product data requesting additional information	
Post Conditions	Data is modified and saved to the database	
Relation	Association: User Include: manage user data (favorite product)	
Basic Path	1	User interacts with App, prompting data advanced data display
	2	1. If scenario calls for product information System calls sub flow S1 If scenario calls for list of products, System calls sub flow S2 If user requests to write a review, System calls sub flow S3
	3	Return to calling interaction
Sub-Flows	S1	Detailed product view
		1. Assess known parameters 2. If barcode is known Execute use case #3S1 passing product barcode If only name is known Execute use case #3S2 passing product name 3. Display product details
	S2	Product List View
		1. Execute use case #3S3 passing appropriate filter 2. Display product list
	S3	Write review
		1. User requests to write review of product 2. System seeks confirmation 3. Opens review dialog 4. User fills out fields 5. Prompts confirmation 6. Persists review to database, associating user account
Alternative Paths	1a user requests invalid data S1a there are no known parameters S3a review is blank a. Data is invalid	

Business Rules	B3: inputs cannot be blank
Non-Functional Requirements	Menus and inputs are useable Invalid data and bad inputs are caught and explained to user
Exception Conditions	User aborts

Use Case Name	Product Search	Id	3	Priority	Essential
Triggering Event	User action requires Product Data	Level		Sea	
Brief Description	An organizational level to ensure data integrity by displaying a clear list of products				
Actors	User				
Preconditions	User preforms an action that requires product data				
Post Conditions	Data is fetched to be displayed by system				
Relation					
Basic Path	1	User interaction prompts search			
	2	Parameters are determined and validated			
	3	If barcode is known Execute use case #3S1 passing product barcode parameter If only name is known Execute use case #3S2 passing name parameter If a filter is required Execute use case #3S2 passing search restrictions			
	4	Product data is returned to calling function			
Sub-Flows	S1	Search by barcode			
		1.Search products database by barcode 2.Return data			
	S2	Search by name			

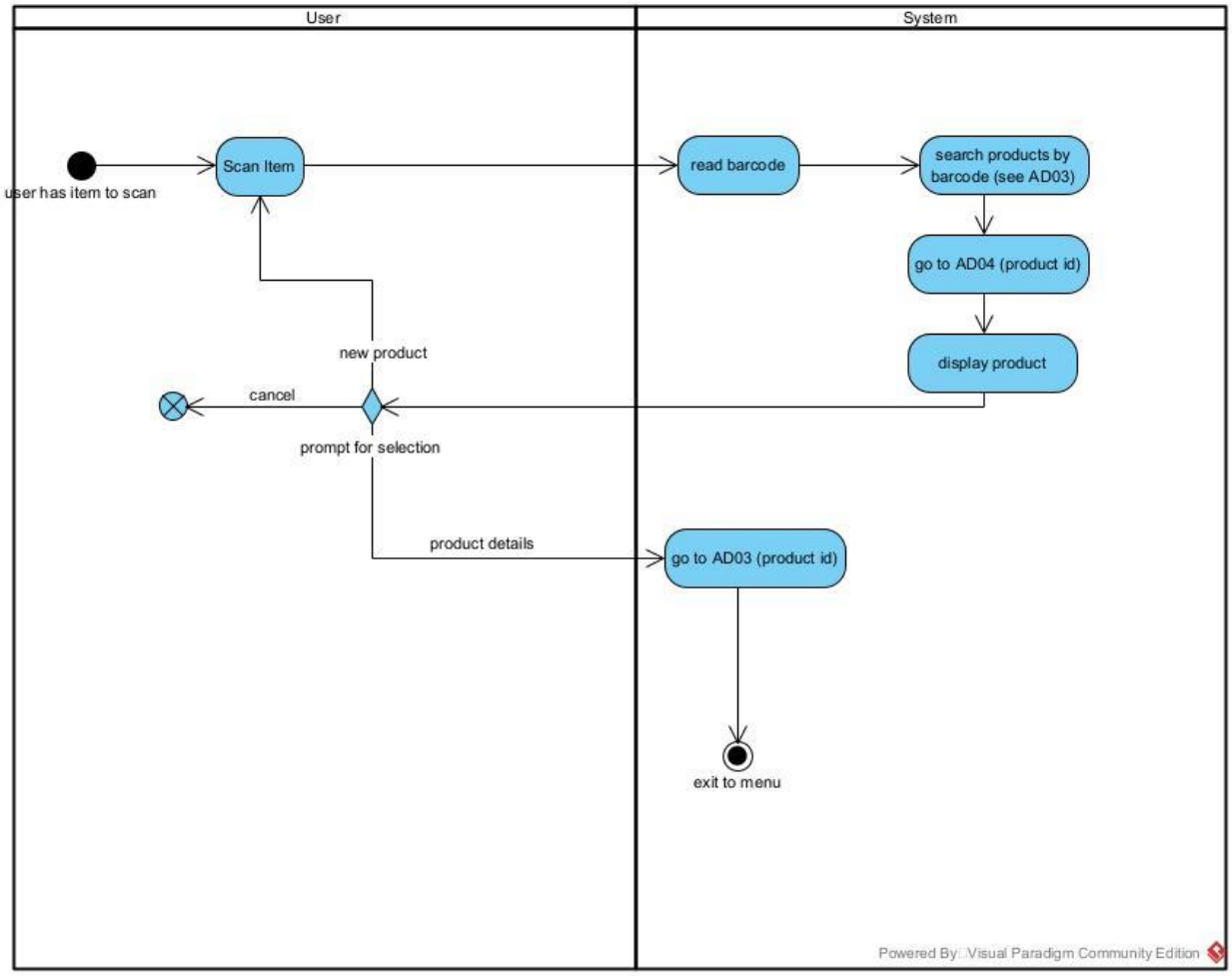
		1.Search products database by product/brand name 2.Return data
	S3	Search with Filter
		1.Search products database, apply filter and restrictions 2.Return Data
Business Rules		BR1: barcode legible BR2: always maintain database integrity
Non-Functional Requirements		Data returned is reliable and accurate
Exception Conditions	User aborts	

Use Case Name	Manage User Data	Id	4	Priority	High
Triggering Event	User modifies personal data	Level		KITE	
Brief Description	A context container for user data, primarily handling what products they have seen				
Actors	User				
Preconditions	User preforms action that modifies existing data				
Post Conditions	Changes are saved and persisted				
Relation	Association: Uses case 2S2, 2S1				
Basic Path	1	User interacts with App, causing call for change in personal data			
	2	User history requested Execute sub-flow s1 If user preformed a search Execute sub-flow s2 If user requests removal of history object Execute sub-flow s3			

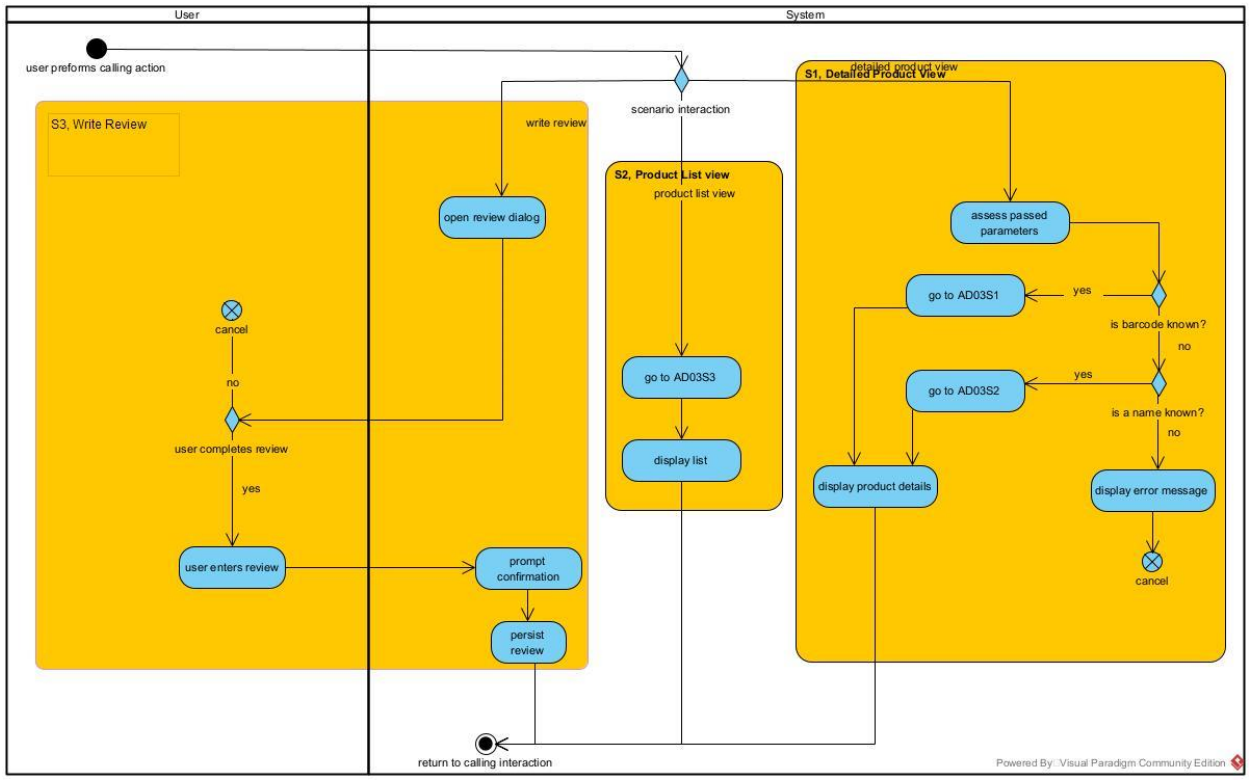
		If user alters favorite status Execute sub-flow s3
	3	Persist changes
Sub-flows	S1	View History List
		1.execute use case 2S2, passing user history as parameter(s) 2.Return Data
	S2	Add Product to history
		1.retrive user history 2.confirm product not already present 3. add product to user history.
	S3	Remove Product from history
		1.retrive user history 2.confirm product is present 3. remove product from user history.
	S4	Manage Favorite Product
		1.retrive user favorites 2. If product is present, remove product from favorites. If product is not present, add product to favorites.
Alternate Paths	S1A. User history is empty, return empty list	
Business Rules	BR3: Minimize null returns	
Non-Functional Requirements		
Exception Conditions	User aborts	

3.3 Activity Diagrams

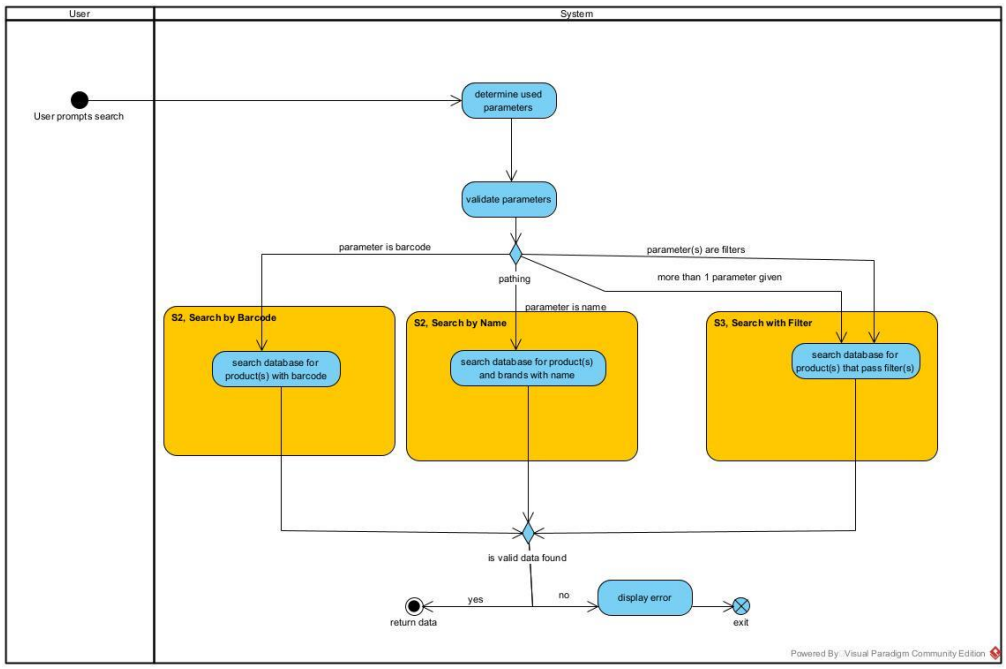
AD01


User
System
user has item to scan
Scan Item
read barcode
search products by barcode (see AD03)
go to AD04 (product id)
display product
new product
cancel
prompt for selection
product details
go to AD03 (product id)
exit to menu
Powered By: Visual Paradigm Community Edition

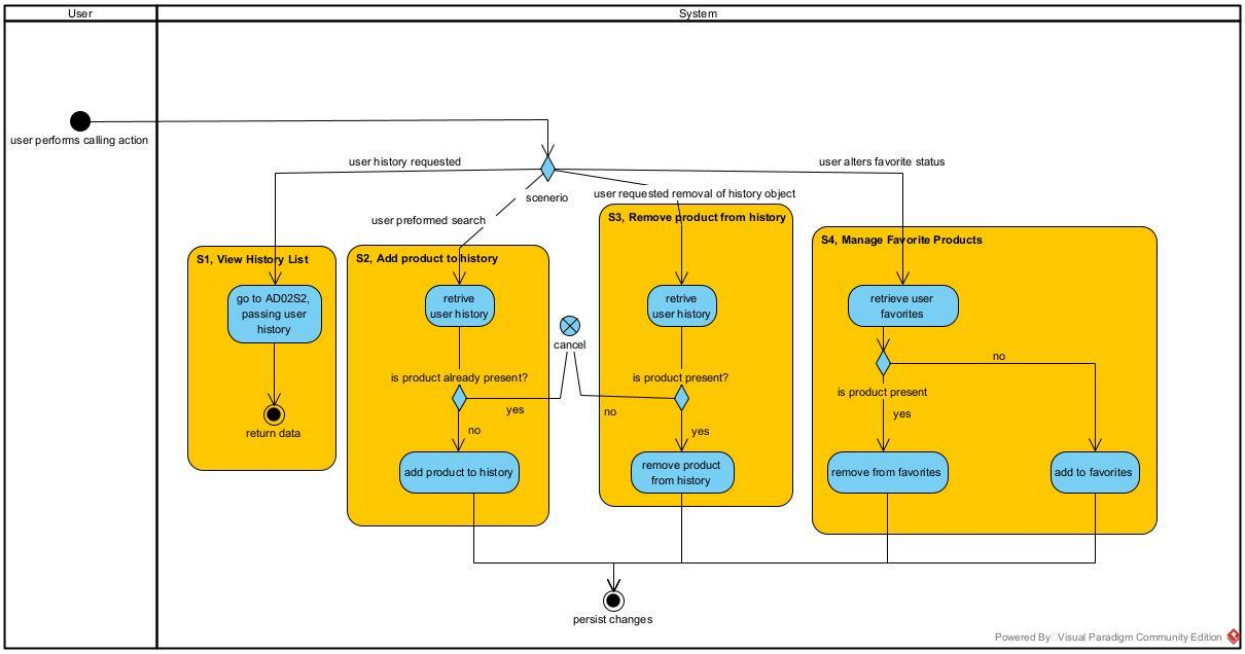
AD02


User
System
user preforms calling action
scenario interaction
detailed product view
S1, Detailed Product View
S3, Write Review
write review
open review dialog
S2, Product List view
product list view
assess passed parameters
go to AD03S1
yes
is barcode known?
no
cancel
no
go to AD03S3
go to AD03S2
yes
is a name known?
no
user completes review
display list
display product details
display error message
yes
user enters review
prompt confirmation
persist review
cancel
return to calling interaction
Powered By: Visual Paradigm Community Edition

AD03


User
System
User prompts search
determine used parameters
validate parameters
parameter is barcode
parameter(s) are filters
pathing
more than 1 parameter given
parameter is name
S2, Search by Barcode
search database for product(s) with barcode
S2, Search by Name
search database for product(s) and brands with name
S3, Search with Filter
search database for product(s) that pass filter(s)
is valid data found
yes
no
display error
return data
exit
Powered By: Visual Paradigm Community Edition

AD04



3.4 Business Rules

Business Rule #	Description	Activity Diagram	Related UCS	UI Mock-up
BR1	barcode legible	AD01	UC1	
BR2	always maintain database integrity	AD01 ,AD02, AD04	UC1, UC2, UC4	
BR3	Input's cannot be blank	AD03	UC3	
BR4		AD3	UC3	
BR5		AD5	UC4	
BR6		AD6	UC5	
BR7		AD7	UC6	
BR8		AD8	UC7	

Section 4 – Domain Class

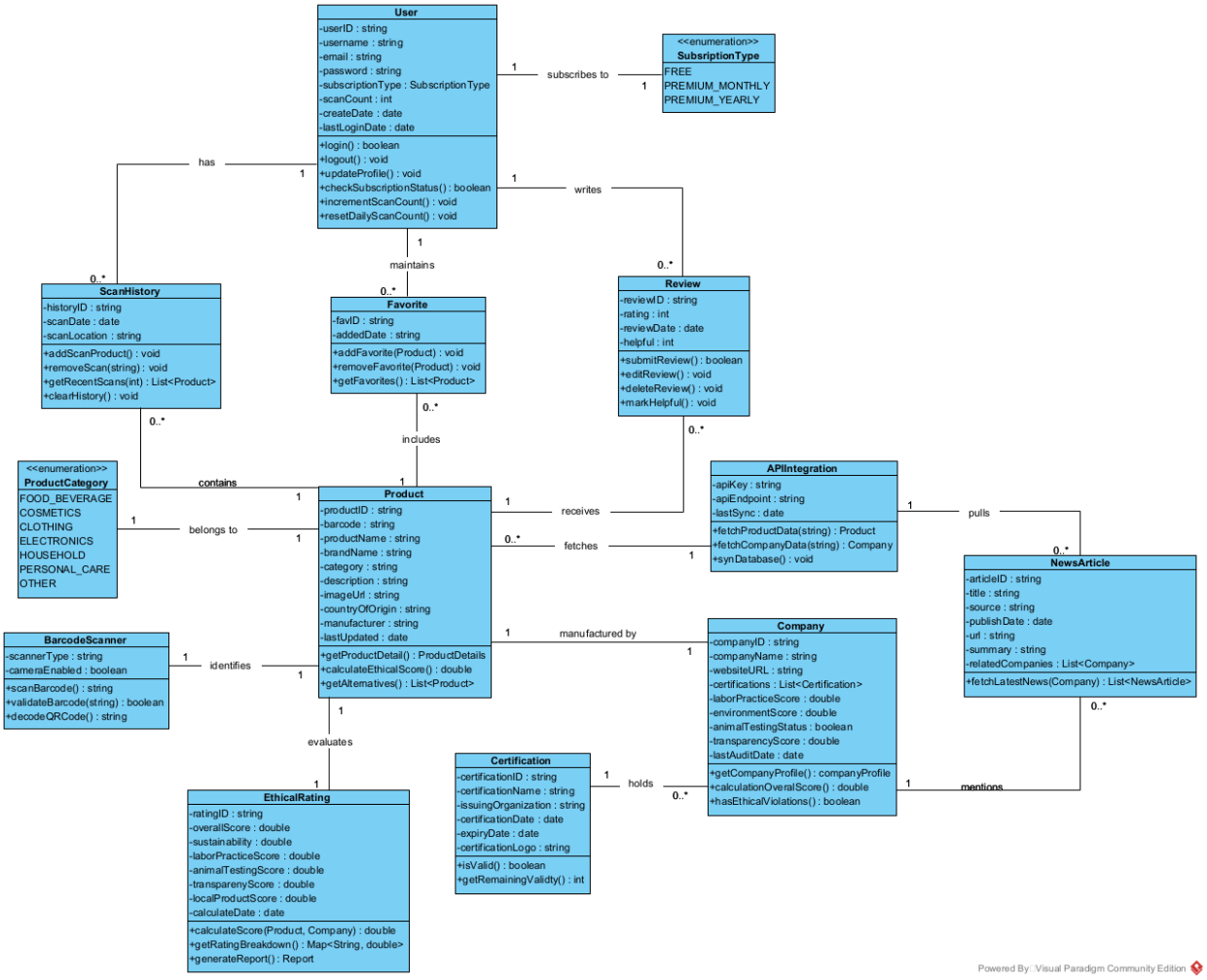
4.1 Overview

The TruLabel domain model represents the core entities and their relationships within the ethical consumer product scanning application. This domain class diagram illustrates the key business objects,

their attributes, operations, and associations that support the application's functional requirements. The domain model is organized around six primary entity groups:

- User Management (User, SubscriptionType)
- Product Information (Product, ProductCategory)
- Company Data (Company, Certification)
- Ethical Evaluation (EthicalRating, NewsArticle)
- User Interactions (ScanHistory, Favorite, Review)
- System Integration (APIIntegration, BarcodeScanner, Alternative)

4.2 Domain Class Diagram



4.3 Core Domain Classes

4.3.1 User

The User class represents registered application users who scan products and access ethical information.

Key Attributes:

- `userId: String` - Unique identifier for each user
- `username: String` - Display name for the user
- `email: String` - User's email address for authentication and communication
- `password: String` - Encrypted password for secure authentication
- `subscriptionType: SubscriptionType` - Current subscription level (FREE, PREMIUM_MONTHLY, PREMIUM_YEARLY)
- `scanCount: int` - Number of scans performed in the current period
- `createdDate: Date` - Account creation timestamp
- `lastLoginDate: Date` - Most recent login timestamp

Business Rules:

- Free users limited to specific number of daily scans
- Premium users have unlimited scanning privileges
- User accounts must have unique email addresses
- Passwords must meet minimum security requirements

4.3.2 Product

The Product class represents individual items that can be scanned and evaluated by users.

Key Attributes:

- `productId: String` - Unique identifier for each product
- `barcode: String` - Standard barcode number (UPC, EAN, etc.)
- `productName: String` - Commercial name of the product
- `brandName: String` - Brand or trademark name
- `category: String` - Product classification (food, cosmetics, clothing, etc.)
- `description: String` - Detailed product information
- `imageUrl: String` - Link to product image
- `countryOfOrigin: String` - Where the product is manufactured or assembled
- `manufacturer: String` - Company responsible for production
- `lastUpdated: Date` - Timestamp of last data update

Business Rules:

- Each product must have a valid barcode
- Products must be associated with a verified company
- Product information must be updated regularly through API integration
- Country of origin must be clearly specified

4.3.3 Company

The Company class represents manufacturers and brands that produce the products in the database.

Key Attributes:

- `companyId: String` - Unique identifier for each company
- `companyName: String` - Official company name
- `headquarters: String` - Location of company headquarters

- `website: String` - Official company website URL
- `certifications: List<Certification>` - List of ethical and quality certifications
- `laborPracticeScore: double` - Rating for employee treatment and working conditions
- `environmentalScore: double` - Rating for sustainability and environmental impact
- `animalTestingStatus: boolean` - Boolean indicating if company tests on animals
- `transparencyScore: double` - Rating for corporate transparency and disclosure
- `lastAuditDate: Date` - Date of most recent ethical audit

Business Rules:

- Companies must be verified before products can be associated
- Ethical scores must be recalculated when new information becomes available
- News articles must be from credible sources
- Certifications must be validated for authenticity

4.3.4 EthicalRating

The EthicalRating class encapsulates the ethical evaluation methodology and scores for products and companies.

Key Attributes:

- `ratingId: String` - Unique identifier for each rating
- `overallScore: double` - Aggregate ethical score (0-100)
- `sustainabilityScore: double` - Environmental impact rating
- `laborPracticeScore: double` - Worker treatment rating
- `animalTestingScore: double` - Animal welfare rating
- `transparencyScore: double` - Corporate disclosure rating
- `localProductScore: double` - Support for local/Canadian manufacturing
- `calculatedDate: Date` - Timestamp of rating calculation
- `methodology: String` - Description of rating algorithm version

Business Rules:

- Ratings must use transparent, documented methodology
- All score components must be weighted appropriately
- Ratings must be recalculated when underlying data changes
- Users must be able to view rating methodology

4.3.5 ScanHistory

The ScanHistory class maintains a record of products scanned by each user.

Key Attributes:

- `historyId: String` - Unique identifier for each history entry
- `scanDate: Date` - Timestamp of when product was scanned
- `scanLocation: String` - GPS coordinates or general location

Business Rules:

- History entries must include timestamp
- Users can view and manage their own history
- History can be cleared by user for privacy

- Recent scans should be accessible offline

4.3.6 Favorite

The Favorite class represents products that users have marked for easy access.

Key Attributes:

- `favoriteId: String` - Unique identifier for each favorite
- `addedDate: Date` - Timestamp when product was favorited

Business Rules:

- Users can favorite unlimited products
- Favorites persist across sessions
- Users can quickly access favorite products
- Duplicate favorites are prevented

4.3.7 Review

The Review class captures user-generated feedback and ratings for products.

Key Attributes:

- `reviewId: String` - Unique identifier for each review
- `rating: int` - Numerical rating (1-5 stars)
- `comment: String` - Text feedback from user
- `reviewDate: Date` - Timestamp of review submission
- `helpful: int` - Count of users who found review helpful

Business Rules:

- Users can review products they have scanned
- Reviews must include rating and optional comment
- Users cannot review the same product multiple times
- Inappropriate reviews can be flagged and removed

4.3.8 Certification

The Certification class represents third-party ethical certifications held by companies.

Key Attributes:

- `certificationId: String` - Unique identifier
- `certificationName: String` - Name of certification (e.g., Fair Trade, B-Corp)
- `issuingOrganization: String` - Organization that granted certification
- `certificationDate: Date` - Date certification was awarded
- `expiryDate: Date` - Date certification expires
- `certificationLogo: String` - Image file for display

Business Rules:

- Certifications must be from recognized organizations
- Expired certifications should not be displayed
- Certification logos must link to verification
- Only verified certifications are accepted

4.3.9 NewsArticle

The NewsArticle class represents news and media coverage related to companies.

Key Attributes:

- `articleId: String` - Unique identifier
- `title: String` - Article headline
- `source: String` - News organization or publication
- `publishDate: Date` - Article publication date
- `url: String` - Link to full article
- `summary: String` - Brief article synopsis
- `relatedCompanies: List<String>` - List of companies mentioned

Business Rules:

- News must be from credible sources
- Articles should be recent (last 2-3 years)
- Links must be valid and accessible
- Negative news impacts ethical ratings

4.3.10 APIIntegration

The APIIntegration class manages connections to external data sources.

Key Attributes:

- `apiKey: String` - Authentication credential
- `apiEndpoint: String` - Base URL for API requests
- `lastSync: Date` - Timestamp of last synchronization

Business Rules:

- API calls must respect rate limits
- Data must be validated before storage
- Failed API calls should be logged and retried
- Authentication credentials must be secured

4.3.11 BarcodeScanner

The BarcodeScanner class handles the device camera and barcode recognition.

Key Attributes:

- `scannerType: String` - Type of barcode being scanned (UPC, EAN, QR)
- `cameraEnabled: boolean` - Status of camera permission

Business Rules:

- Camera permission must be granted by user
- Barcode must be legible and properly formatted
- Scanner should provide feedback for successful/failed scans
- Multiple barcode formats must be supported

4.4 Conclusion

The domain model prioritizes **reliability**, **maintainability**, and **usability** as specified in the non-functional requirements. It provides a solid foundation for implementation in the next semester, with clear separation of concerns, well-defined relationships, and extensibility for future enhancements.

Section 5 – Database

Section 6 – Project Management

6.1 Work Breakdown Structure

6.2 Milestones & Acceptance Criteria

Section 7 – Product Backlog & Implementation Schedule

Section 8 – Client/Faculty Sign-off

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