RETAIL INNOVATIONS LTD

Task 1A(ii): Proposal

Retail Innovations Ltd — Digital Solution

DPDD Occupational Specialism — Set Task

Document Version 1.0 | January 2025

1. Project Overview

Retail Innovations Ltd wants to improve how retailers and customers interact with its platform by creating a modern digital solution. The main goals are to simplify the shopping experience for online customers, provide useful analytics for retail businesses, and improve customer retention through standard loyalty programmes.

The proposed system will include:

- Enhanced Product Search and Filter that offers an easy-to-use search and filter function to help customers find products quickly.
- A Retail Analytics Dashboard that provides retailers with essential data on sales, customer behaviour, and inventory in a simple, easy-to-understand format.
- Standard Loyalty Programmes that allow retailers to implement loyalty programmes with predefined reward structures.

These features are designed to meet Retail Innovations Ltd's objectives and improve the experience for both retailers and their customers. The company currently provides e-commerce platform development, retail analytics services, and manual customer loyalty discounts — this digital solution will modernise and automate these existing services.

2. Problems Identified

Problem 1 — Difficult Product Discovery: Currently, customers browsing the platform have limited ways to find specific products. There is no real-time search functionality and no dynamic filtering by category, price, or availability. Customers must scroll through long product lists or rely on basic page navigation to find what they need. This makes the shopping experience slow and frustrating, especially for customers who know what they want but cannot find it quickly. As a result, customers may leave the platform without making a purchase, reducing sales and engagement.

Problem 2 — No Accessible Analytics for Retailers: Retail Innovations Ltd currently provides analytics services, but these are delivered manually rather than through an interactive dashboard. Retailers cannot quickly see key metrics like total sales, customer counts, or inventory levels without requesting a report. This means decisions about stock, pricing, and marketing are made without up-to-date data. The lack of visual analytics (charts, graphs) makes it harder for non-technical business owners to understand their performance at a glance.

Problem 3 — Manual Loyalty Discounts with No Structure: The company currently handles customer loyalty discounts manually, which is time-consuming and inconsistent. There is no automated system for tracking customer points, no tiered reward structure, and no way for customers to see their progress towards rewards. This means loyal customers do not feel recognised or rewarded, which reduces their motivation to return. The manual process is also prone to errors and does not scale as the customer base grows.

3. Proposed Solutions

Solution to Problem 1 — Real-time product search with category filtering: Build a search feature that filters products instantly as the customer types, matching by product name or product code (SKU). Add a dynamic category dropdown that automatically populates from the database so retailers do not need to maintain a separate filter list. Display products in a clear table with thumbnail images, prices, stock levels, and status badges so customers can compare options easily. This approach is based on research into how platforms like Amazon present product results with visual information alongside search functionality.

Solution to Problem 2 — Visual analytics dashboard with KPI cards and charts: Create a dashboard that calculates and displays key metrics automatically from the database. Show four KPI stat cards (Total Products, Total Customers, Total Orders, Total Revenue) as large, clear numbers that update in real-time. Include a bar chart showing product distribution by category (inventory overview) and a donut chart showing customer distribution by loyalty tier (customer behaviour). This follows the approach used by Shopify's admin dashboard, where information is presented visually for non-technical users.

Solution to Problem 3 — Automated loyalty programme with tiers and predefined rewards: Implement a four-tier loyalty system (Bronze, Silver, Gold, Platinum) based on accumulated points, similar to the Boots Advantage Card model identified in research. Allow retailers to create, edit, and manage rewards with four predefined types: percentage discount, fixed discount, free product, and free shipping. Each reward has a configurable point cost. Track all point changes in a transactions table for audit purposes. Display the tier system visually with colour-coded cards so customers can see their progress.

4. Decomposition of Solutions

Enhanced Product Search and Filter

- Design a search bar and category dropdown that are easy to find and use at the top of the products page.
- Store all product data in a database table with fields for name, SKU, category, price, stock, image URL, and active status.
- Load all products into a local cache when the page loads, so filtering happens instantly on the client side without additional server requests.
- Implement a filter function that matches the search text against product name and SKU (case-insensitive) and filters by the selected category.
- Display results in a table with thumbnail images, formatted prices (£X.XX), stock quantities, and colour-coded status badges (Active/Inactive).
- Dynamically populate the category dropdown from unique categories in the database so it always reflects the actual product data.
- Add admin-only controls for creating, editing, and deleting products with form validation to prevent incomplete data.
- Test the search and filter with real users to check that results are accurate and the experience is fast.

Retail Analytics Dashboard

- Design four KPI stat cards that display the most important business metrics: product count, customer count, order count, and total revenue.
- Calculate all KPI values from the database in real-time so the dashboard always shows current data.
- Build a bar chart that groups products by category and shows the count for each, helping retailers understand their inventory distribution.
- Build a donut chart that shows customer distribution across loyalty tiers, helping retailers understand their customer base.
- Format all output consistently: currency with £ symbol and 2 decimal places, dates in DD/MM/YYYY format, numbers with thousand separators.
- Show different information depending on the user’s role: admin users see totals for all data, while customer users see only their own orders and spend.
- Keep the charts simple and visual so non-technical retailers can understand them without training.
- Test the dashboard calculations against the raw database data to make sure the numbers are accurate.

Standard Loyalty Programmes

- Design a four-tier system (Bronze, Silver, Gold, Platinum) with clear point ranges for each tier.
- Store loyalty points and tier information on each customer record in the database, with constraints to prevent points going below zero.
- Create a rewards table where retailers can define different reward types (percentage discount, fixed discount, free product, free shipping) with configurable point costs.
- Record every point change (earned or spent) in a transactions table with a reason and optional link to the order that triggered it.
- Display the tier structure visually using colour-coded cards with emoji icons and point ranges, so customers understand the progression.
- Show the rewards in a table format with type, value, points required, and active/inactive status.
- Add admin-only controls for managing rewards (create, edit, delete) with validation.
- Test the loyalty system to make sure points are tracked correctly and tier labels match the expected ranges.

5. Client and User Needs

Retail Innovations Ltd's main goals are to simplify the shopping experience for online customers, provide useful analytics for retail businesses, and improve customer retention through standard loyalty programmes. The digital solution also needs to support different types of users who will access the platform.

Retail business owners (admin users) need a clear dashboard that shows their key metrics at a glance without requiring technical knowledge. They need to manage products, customers, orders, and rewards easily through simple forms. They also need role-based access so their staff can see relevant information without being able to change sensitive data.

Online customers need to find products quickly using search and filter tools. They need to see clear pricing, stock availability, and product images so they can make informed purchasing decisions. They also need to understand the loyalty programme — how many points they have, what tier they are in, and what rewards are available.

Users with limited technical skills may need simple navigation with clear labels, large buttons, and helpful error messages that explain what went wrong. They should not be expected to understand technical terms or complex interfaces.

Users with disabilities need the platform to be accessible. This includes readable text sizes, good colour contrast between text and background, keyboard navigation for users who cannot use a mouse, and semantic HTML so screen readers can interpret the page correctly.

Mobile users need the platform to work well on smaller screens. This means responsive layouts that stack vertically on phones, touch-friendly buttons, and input fields that trigger the correct mobile keyboard (e.g., numeric keyboard for prices, email keyboard for email fields).

By including these considerations, the proposed solution ensures that the platform works for all users regardless of their technical ability, device, or accessibility needs.

6. User Function Table

The following table shows what each type of user can do on the platform:

Function	Admin User	Customer User	Unauthenticated User
Register an account	✓	✓	✓ (becomes customer)
Log in / Log out	✓	✓	✗
View Dashboard (all data)	✓	✗	✗
View Dashboard (own data)	✗	✓	✗
Search and filter products	✓	✓	✗
View product catalogue	✓	✓	✗
Create / Edit / Delete products	✓	✗	✗
View all customers	✓	✗	✗
Create / Edit / Delete customers	✓	✗	✗
View all orders	✓	✗	✗
View own orders only	✗	✓	✗
Create orders	✓	✓	✗
Edit / Delete orders	✓	✗ (own pending only)	✗
Change order status	✓	✗	✗
View loyalty rewards	✓	✓	✗
Create / Edit / Delete rewards	✓	✗	✗
View loyalty tier cards	✓	✓	✗
See analytics charts	✓	✗	✗

This table shows that admin users have full access to all features, while customer users can browse products, manage their own orders, and view the loyalty programme. Unauthenticated users can only access the registration page. This separation protects sensitive business data while giving customers access to the features they need.

7. Mitigating Potential Risks

To make sure the Retail Innovations platform is safe, reliable, and works as expected, it is important to identify any possible risks and plan how to reduce them. Below are the key risks, their impacts, and how they will be managed.

1. Risk: Users Forget Their Passwords

Impact: If users forget their password, they may not be able to log in and could become frustrated or stop using the platform. This would reduce customer engagement and could lead to lost sales.

Solution: Use Supabase Auth which provides a built-in password reset feature via email. Users can request a reset link, receive it in their inbox, and set a new password securely. Supabase handles the entire process including token generation and expiry.

Justification: This helps users get back into their accounts quickly without needing to contact support. Using a built-in feature from Supabase means the reset process is secure and does not require custom development.

2. Risk: Unauthorised Access to Admin Features

Impact: If a regular customer could access admin features such as editing products, viewing all customer data, or deleting orders, it could cause data loss, privacy breaches, and legal issues.

Solution: Implement role-based access control at two levels. First, the user interface hides admin-only elements from customer accounts using CSS classes. Second, the database uses Row Level Security (RLS) policies that check the user's role before allowing any data operation. Even if someone modifies the client-side code, the database will reject unauthorised requests.

Justification: Dual-layer security ensures that even if the client-side protection is bypassed, the server-side protection remains in place. This is a defence-in-depth approach that follows industry best practice.

3. Risk: Data Breach or Loss of Personal Information

Impact: If customer data such as emails, names, or order history is accessed without permission, it could lead to legal penalties under GDPR, loss of customer trust, and reputational damage to Retail Innovations Ltd.

Solution: Use Supabase's built-in security features: all data is transmitted over HTTPS, passwords are hashed using bcrypt (never stored in plain text), and JWT tokens are used for session management. Row Level Security policies ensure customers can only access their own data. All destructive actions (delete) require explicit confirmation.

Justification: These measures protect personal data at multiple levels: in transit (HTTPS), at rest (bcrypt), and during access (RLS). This meets the security requirements of GDPR Article 32 and reduces the risk of data breaches.

4. Risk: Cross-Site Scripting (XSS) Attacks

Impact: If a malicious user enters JavaScript code into a form field (e.g., a product name), it could execute in other users' browsers when the data is displayed. This could steal session tokens, redirect users, or deface the platform.

Solution: Implement an HTML escaping function that sanitises all user input before it is displayed on the page. This function converts special characters like < and > into harmless text representations (< and >) so they are displayed as text rather than executed as code.

Justification: XSS is one of the most common web security vulnerabilities. Sanitising output is a well-established prevention method recommended by OWASP (Open Web Application Security Project). This protects all users from malicious input.

5. Risk: Application Errors or Data Loss

Impact: If the application encounters an unexpected error (e.g., network failure, database timeout), the user could lose unsaved work or see a confusing error screen.

Solution: Wrap all database operations in try-catch error handling and display user-friendly toast notifications explaining what happened. Use Supabase's cloud-hosted database which includes automatic backups and high availability.

Justification: Proper error handling ensures the application never crashes silently. Toast notifications keep the user informed, and cloud hosting provides data durability without manual backup management.

8. Justification of Risk Decisions

The risks identified above were prioritised based on their likelihood and potential impact:

Risk	Likelihood	Impact	Priority	Justification
Forgotten passwords	High	Medium	High	Very common issue for all web platforms. Affects user retention directly.
Unauthorised admin access	Medium	Critical	Critical	Could expose sensitive data. Must be prevented by design, not just UI.
Data breach	Low–Medium	Critical	Critical	Legal and financial consequences under GDPR. Requires strongest protections.
XSS attacks	Medium	High	High	Common web vulnerability. Can affect all users if one malicious input is not caught.
Application errors	Medium	Medium	Medium	Affects user experience but not security. Mitigated by error handling.

The two critical-priority risks (unauthorised access and data breach) are both addressed by Row Level Security, which provides database-level protection that cannot be bypassed from the client side. This single technology decision mitigates the two most serious risks simultaneously, which is a key reason Supabase was chosen as the backend platform.

9. Addressing Relevant Regulations and Legal Requirements

Regulation 1 — UK GDPR (General Data Protection Regulation)

Why it Applies: The platform will collect personal information such as customer names, email addresses, and order history. Under UK GDPR, this data must be processed lawfully, stored securely, and kept only as long as necessary.

Justification: GDPR ensures customer information is stored and used safely and legally. The platform addresses this through: data minimisation (collecting only necessary information), secure storage (bcrypt hashing, HTTPS, RLS), right to erasure (CASCADE delete on user profiles), and lawful basis (consent through registration). Following GDPR protects customer privacy, builds trust, and helps Retail Innovations Ltd avoid fines.

Regulation 2 — Equality Act 2010

Why it Applies: The platform will be used by many different customers, including those with disabilities. The website must not discriminate against any user.

Justification: The Equality Act requires the platform to be accessible to everyone. This includes features such as clear layouts, readable text with good colour contrast (WCAG 2.1 AA minimum 4.5:1 ratio), keyboard navigation, semantic HTML for screen readers, and visible focus indicators. Meeting this regulation improves user experience for all customers and ensures legal compliance.

Regulation 3 — Consumer Rights Act 2015

Why it Applies: The platform displays product prices and processes orders. Customers have a right to clear, accurate pricing information.

Justification: All product prices are displayed clearly with the £ currency symbol and consistent formatting. Order status tracking provides transparency. These measures ensure the platform meets the Consumer Rights Act requirement for clear pricing and service information.

Regulation 4 — Intellectual Property and Licensing

Why it Applies: The platform uses third-party assets including fonts, images, and a JavaScript library that must be properly licensed.

Justification: All fonts are from Google Fonts (SIL Open Font License — free for commercial use). All product images are from Unsplash (free for commercial use without attribution). The Supabase JavaScript client is MIT Licensed (permissive open-source). Using properly licensed content prevents copyright problems and ensures all digital content is used legally.

10. Functional and Non-Functional Requirements

Functional Requirements (What the system should do)

FR1 — User Accounts: The system should allow users to create an account, log in securely, and log out. User profiles should store role information (admin or customer) to control access. Justification: This allows the platform to identify users, manage permissions, and personalise the experience based on role.

FR2 — Product Catalogue: The system should display all products in a table with name, image, SKU, category, price, stock, and status. Admin users should be able to create, edit, and delete products. Justification: The product catalogue is the core of the shopping experience and meets the brief's objective of simplifying online shopping.

FR3 — Product Search and Filter: The system should provide a search bar that filters products in real-time by name or SKU, and a category dropdown that filters by product category. Justification: This directly implements the brief's key feature of 'Enhanced Product Search and Filter' to help customers find products quickly.

FR4 — Analytics Dashboard: The system should calculate and display KPIs (product count, customer count, order count, revenue) and visual charts (bar chart for categories, donut chart for tiers). Justification: This directly implements the brief's key feature of 'Retail Analytics Dashboard' providing data on sales, customer behaviour, and inventory.

FR5 — Order Management: Admin users should be able to view, create, edit, and delete all orders. Customer users should be able to view their own orders and create new ones. Justification: Order management is essential for any e-commerce platform and supports the shopping experience objective.

FR6 — Loyalty Programme: The system should implement a four-tier loyalty system with configurable rewards. Admin users should manage rewards (create, edit, delete). Point changes should be recorded in a transactions table. Justification: This directly implements the brief's key feature of 'Standard Loyalty Programmes' with predefined reward structures.

FR7 — Role-Based Access Control: Admin users should have full CRUD access to all entities. Customer users should only access their own data. Admin-only features should be hidden from customer accounts. Justification: Protects sensitive business data and ensures customers only see relevant information.

Non-Functional Requirements (How the system should perform)

NFR1 — Performance: Pages should load within 2 seconds. Search filtering should respond instantly (under 100ms) because it operates on cached data. Justification: Slow loading causes frustration and makes customers leave. The brief says 'easy-to-use' which implies fast interaction.

NFR2 — Usability: The platform should be easy to use on desktop, tablet, and mobile devices. Navigation should be clear with no more than 2 clicks to reach any feature. Justification: A simple and clear layout helps all users find what they need, supporting the brief's objective of simplifying the shopping experience.

NFR3 — Security: All personal data must be encrypted in transit (HTTPS) and at rest (bcrypt for passwords). Row Level Security must enforce access control at the database level. Justification: Protects customer data and meets GDPR Article 32 requirements for security of processing.

NFR4 — Accessibility: The platform should meet WCAG 2.1 Level AA standards. Text must have a contrast ratio of at least 4.5:1. All interactive elements must be keyboard accessible. Justification: Ensures users with disabilities can access the platform and meets the Equality Act 2010 requirements.

NFR5 — Compatibility: The platform should work correctly on Chrome, Firefox, Edge, and Safari on both desktop and mobile. Justification: Customers use different browsers and devices. Cross-browser compatibility ensures no user is excluded.

NFR6 — Maintainability: Code should be clearly commented, follow consistent naming conventions, and use separation of concerns (HTML/CSS/JS/SQL in separate files). Justification: Makes the codebase easier to understand, debug, and extend in future development.

11. Key Performance Indicators (KPIs)

KPIs help measure how well the digital solution meets the client's objectives. Each KPI includes a definition, how it will be measured, and the target to achieve.

KPI 1: Product Search Success Rate — Definition: Measures how often users find the product they are looking for using search. Measurement: During user testing, track how many search tasks result in the user finding the correct product. Target: At least 90% of users should find the target product within 30 seconds.

KPI 2: Dashboard Comprehension Rate — Definition: Measures whether users can correctly interpret the dashboard KPIs and charts. Measurement: During observation, ask users to explain what the dashboard shows and check their understanding. Target: At least 80% of users should correctly describe the key metrics without assistance.

KPI 3: Loyalty Programme Understanding — Definition: Measures whether users understand the tier system and available rewards. Measurement: During observation, ask users to explain the loyalty tiers and how rewards work. Target: At least 75% of users should correctly explain the tier progression.

KPI 4: Task Completion Rate — Definition: Measures whether users can complete core tasks (register, search, create product, view dashboard, view rewards) independently. Measurement: During observation testing, track task completion without assistance. Target: 100% task completion rate across all observed users.

KPI 5: Page Load Speed — Definition: Measures how quickly the platform loads for users. Measurement: Use Chrome DevTools to record load time on first visit and subsequent navigation. Target: All main views should load in under 2 seconds.

KPI 6: User Satisfaction Score — Definition: Tracks how satisfied users are with the platform overall. Measurement: Collect feedback through post-testing survey with Likert scale (1–5). Target: Achieve an average satisfaction score of at least 4 out of 5.

12. User Acceptance Criteria

User Acceptance Criteria are the checks that the client will use to decide if the final system meets Retail Innovations Ltd's needs and objectives. These criteria must be clear, testable, and focused on the final outcome.

UAC for Enhanced Product Search and Filter

- Users should be able to type a product name or SKU into the search bar and see matching results appear instantly.
- Users should be able to select a category from the dropdown and see only products in that category.
- Users should be able to combine search and category filter together.
- Product results should show the name, image, SKU, category, price, stock, and active status clearly.
- The search and filter should work on desktop, tablet, and mobile devices.

Justification: These criteria ensure the search feature is fast, accurate, and displays the right information. This supports Retail Innovations Ltd's objective of simplifying the shopping experience and matches the brief's key feature of offering an 'easy-to-use search and filter function'.

UAC for Retail Analytics Dashboard

- The dashboard should display KPI cards showing total products, customers, orders, and revenue.
- The bar chart should show product distribution by category.
- The donut chart should show customer distribution by loyalty tier.
- All numbers should be formatted clearly (currency with £, dates in DD/MM/YYYY, numbers with thousand separators).
- Admin users should see data for all records; customer users should see only their own data.

Justification: These criteria ensure the dashboard provides accurate, well-presented analytics that retailers can understand. This matches the brief's requirement for 'essential data on sales, customer behaviour, and inventory in a simple, easy-to-understand format'.

UAC for Standard Loyalty Programmes

- The loyalty programme should display four tiers (Bronze, Silver, Gold, Platinum) with clear point ranges.
- Admin users should be able to create, edit, and delete loyalty rewards.

- Rewards should have configurable types (discount percentage, discount fixed, free product, free shipping) and point costs.
- The rewards table should show reward name, type, value, points required, and active status.
- Customer loyalty points should be tracked accurately in the database.

Justification: These criteria ensure the loyalty system is structured, manageable, and transparent. This matches the brief's requirement of allowing retailers to 'implement loyalty programmes with predefined reward structures'.

13. Site Map / Hierarchy Diagram

The following site map shows the structure of the Retail Innovations platform and how users navigate between sections. Because the application is a Single Page Application (SPA), all sections are accessed via tab navigation from a single HTML page rather than separate page URLs.

Site Hierarchy

```
Retail Innovations Platform
│
├── Authentication Screen (default view)
│   ├── Supabase Connection Config
│   ├── Login Form
│   └── Register Form
│
└── Main Application (after login)
    ├── Tab: Dashboard
    │   ├── KPI Stat Cards (4)
    │   ├── Bar Chart (categories)
    │   └── Donut Chart (tiers)
    │
    ├── Tab: Products
    │   ├── Search Bar + Category Filter
    │   ├── Product Data Table
    │   └── [Modal] Add/Edit Product Form
    │
    ├── Tab: Customers (Admin Only)
    │   ├── Tier Visual Cards (4)
    │   ├── Search + Tier Filter
    │   ├── Customer Data Table
    │   └── [Modal] Add/Edit Customer Form
    │
    ├── Tab: Orders
    │   ├── Status Filter
    │   ├── Order Data Table
    │   └── [Modal] Add/Edit Order Form
    │
    └── Tab: Loyalty
```

```
        ├── Rewards Data Table
        └── [Modal] Add/Edit Reward Form
```

The site map shows that all main sections are accessible from the tab bar in one click. Each section contains its own search/filter tools, data table, and modal forms for CRUD operations. The Customers tab is only visible to admin users. This flat hierarchy means no user is ever more than two interactions away from any feature (one click on tab + one click on action).