Lufyco

AI-Driven Mobile Fashion Application

Project Proposal & Requirements Specification (PPRS)

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Course: **Final Year Project (FYP)**

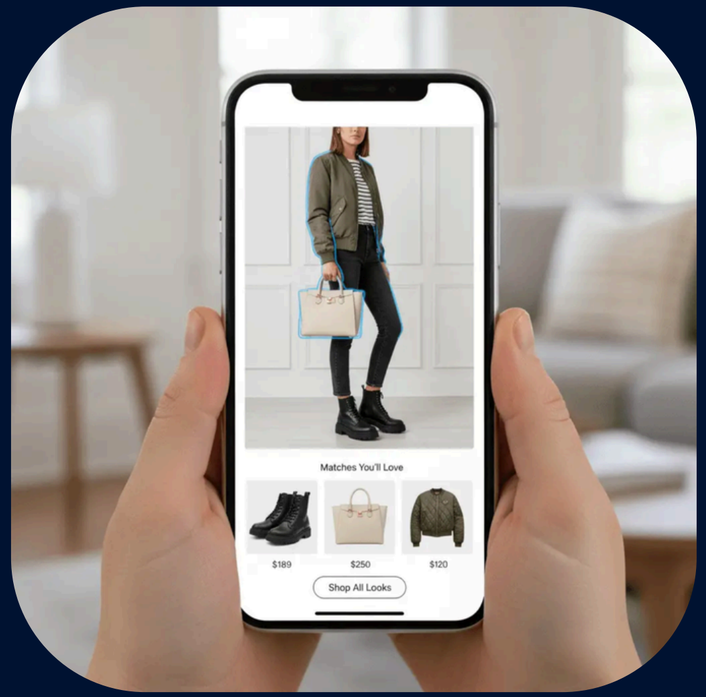
Date: **06/11/2025**

Presentation Agenda

1. Introduction & Problem Definition	8. System Architecture
2. Aim, Objectives & Scope	9. Project Timeline (Gantt Chart)
3. Background Review	10. Ethics Considerations
4. Tools & Technologies	11. Tools & Technologies
5. Requirements Elicitation	12. Risks & Mitigation
6. Use Cases & Diagrams	13. Summary & Next Steps
7. Functional & Non-Functional Requirements	14. Q&A

Introduction to Lufyco

Lufyco is an AI-powered mobile app that revolutionizes online shopping by helping users find clothing that suits them best.



- Upload a photo to find visually similar clothing
- Get personalized outfit recommendations
- Build a digital wardrobe with smart tagging
- Receive weather, mood and occasion-aware styling
- Understand why each outfit was recommended

Problem Definition

Key Challenges in Online Shopping:

Visualization Difficulties

Hard to imagine how clothes will look on your body, making it difficult to make confident purchase decisions.

Decision Fatigue

Users spend too much time browsing and comparing items, leading to hesitation and cart abandonment.

Limited Search & Filters

Traditional keyword-based search does not understand style, patterns, or real user preferences resulting in irrelevant results.

Lack of Personalization

Recommendations are generic, not tailored to the user’s style, wardrobe, occasion, or weather.

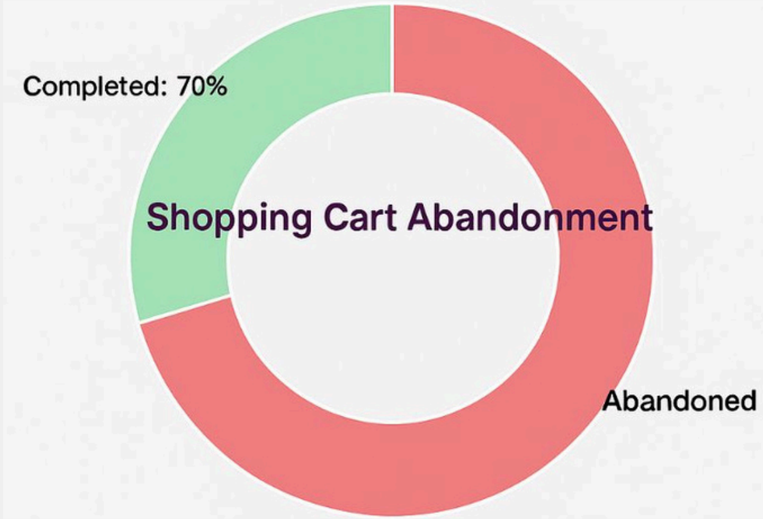
No Wardrobe Integration

Users cannot integrate their existing wardrobe into online shopping, making outfit planning impossible.

Significance of the Problem

Online shopping presents significant challenges that directly impact both users and retailers. Lufyco addresses critical gaps in the current market.

- 70% of shoppers abandon carts due to uncertainty
- Image-based search significantly reduces browsing time
- Market lacks wardrobe-aware AI styling tools
- Sri Lankan small retailers lack digital exposure
- AI personalization increases sales and customer retention



Cart abandonment statistics highlight the need for improved styling guidance

Aim of the Project

To design and develop a **mobile-first AI fashion assistant** that enables:

Image-Based Discovery

Upload images to find visually similar clothing items

Personalized Recommendations

Get outfit suggestions tailored to your preferences

Explainable AI

Understand why outfits are recommended to you

Building the future of mobile fashion with AI

Project Objectives

Build Mobile App

Develop app for image-based clothing search

Develop AI Stylist

Create AI stylist with mood, occasion & weather awareness

Digital Wardrobe

Build auto-tagging digital wardrobe functionality

Explainable AI

Generate outfit recommendations with clear rationale

Low Latency

Ensure p95 request response under 1 second

Privacy & Security

Maintain strict privacy, security & ethical compliance

Scope of the Project (In Scope)

- **Mobile App**
  iOS + Android – React Native
- **Image Search**
  Upload → Similar
- **Outfit Recommendations**
  AI Stylist
- **Digital Wardrobe**
  With auto tagging
- **Context Awareness**
  Weather, mood, occasion
- **Explanations**
  "Why this outfit?"
- **Product Catalog**
  Small pilot catalog
- **Secure Backend**
  FastAPI/Node.js + MongoDB
- **User Testing**
  Model evaluation

Out of Scope

The following features are explicitly excluded from the Lufyco project scope:

Marketplace Features

Seller dashboard, payment processing, and dispute resolution

Full E-commerce Functionality

Product delivery and returns processing

3D Try-on or AR Dressing Room

Virtual try-on functionality

Global Scaling or Production SLAs

Massive commercial deployment and high availability service level agreements

Multi-vendor Management

Management functionality for multiple retailers

Background Review (Summary)

Key Research Findings

Deep Learning Improves Image Retrieval

Deep learning techniques significantly enhance accuracy of fashion item retrieval

Attribute Tagging Boosts Accuracy

Detailed attribute labels (color, material, style) improve recommendation accuracy

Outfit Compatibility Models

Outfit compatibility models improve the relevance of recommended items

Explanations Build Trust

Explanations for recommendations increase user trust and reduce edits

Mobile Latency Challenge

Low-latency AI services on mobile devices remains a technical challenge

Lufyco's innovation: Integrating existing AI capabilities into a comprehensive mobile-first fashion solution

Comparison With Existing Solutions

Feature	ASOS	Pinterest Lens	Amazon	Lufyco
Image Search	✓	✓	✓	✓
Outfit Recommendations	✗	✗	—	✓
Weather/Mood/Occasion	✗	✗	✗	✓
Wardrobe Integration	✗	✗	✗	✓
Explanations ("Why?")	✗	✗	✗	✓
Fast Mobile Latency	—	—	—	✓

Key Advantage:

Lufyco uniquely combines outfit recommendations, context awareness, wardrobe integration, and recommendation explanations while optimizing for mobile latency areas where existing platforms fall short.

Tools & Technologies

Frontend

- React Native
- Expo
- TypeScript

Backend

- FastAPI / Node.js
- MongoDB
- Redis cache
- Firebase Auth
- S3/Cloud Storage

AI/ML

- PyTorch / TensorFlow
- ViT / ResNet models
- FAISS/ScaNN vector search
- Attribute tagging models

Design & Testing

- Figma
- Postman
- GitHub
- CI/CD
- Real device testing

Requirements Elicitation Methods

Literature Review

Research existing literature on fashion e-commerce and AI recommendation systems to understand industry best practices and technical trends.

Surveys

Collect quantitative and qualitative feedback from users regarding functionality, satisfaction, speed, and explainability through in-app and online surveys.

Interviews

Conduct semi-structured interviews with users of different ages, styles, and shopping habits to understand pain points and privacy concerns.

Brainstorming

Facilitate quick sessions with users to explore options for AI stylist, mood/occasion inputs, and explanation styles using the MoSCoW prioritization principle.

Observation

Observe users completing basic tasks on paper prototypes and clickable demonstrations to identify usability issues and user behavior patterns.

Document Analysis

Analyze competitor apps, app store reviews, and related articles to understand common features, pain points, and market gaps.

Prototyping

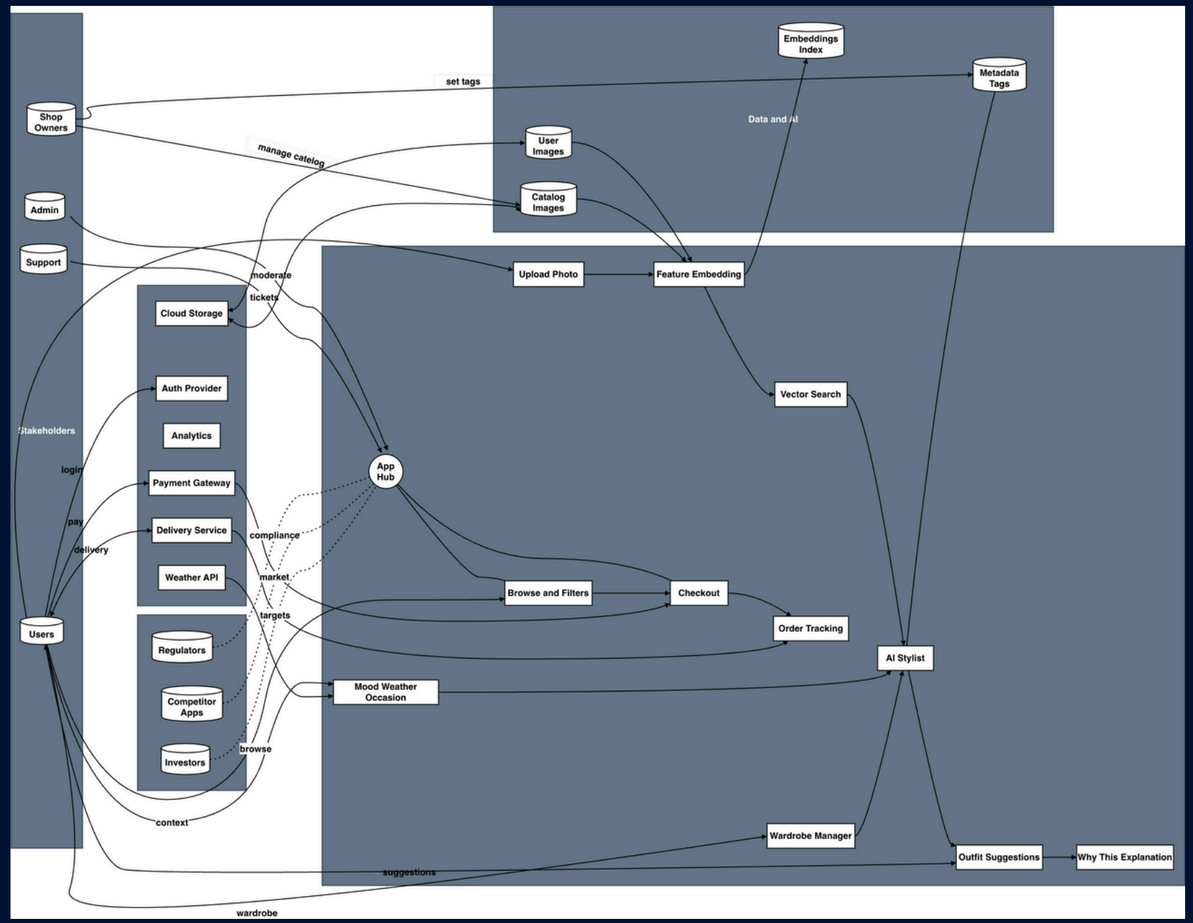
Progress from sketches to low-fidelity wireframes to high-fidelity interactive prototypes to validate design and functionality with users.

Team Self-Evaluation

Development team daily uses Lufyco, recording issues and suggestions to ensure product practicality and high quality.

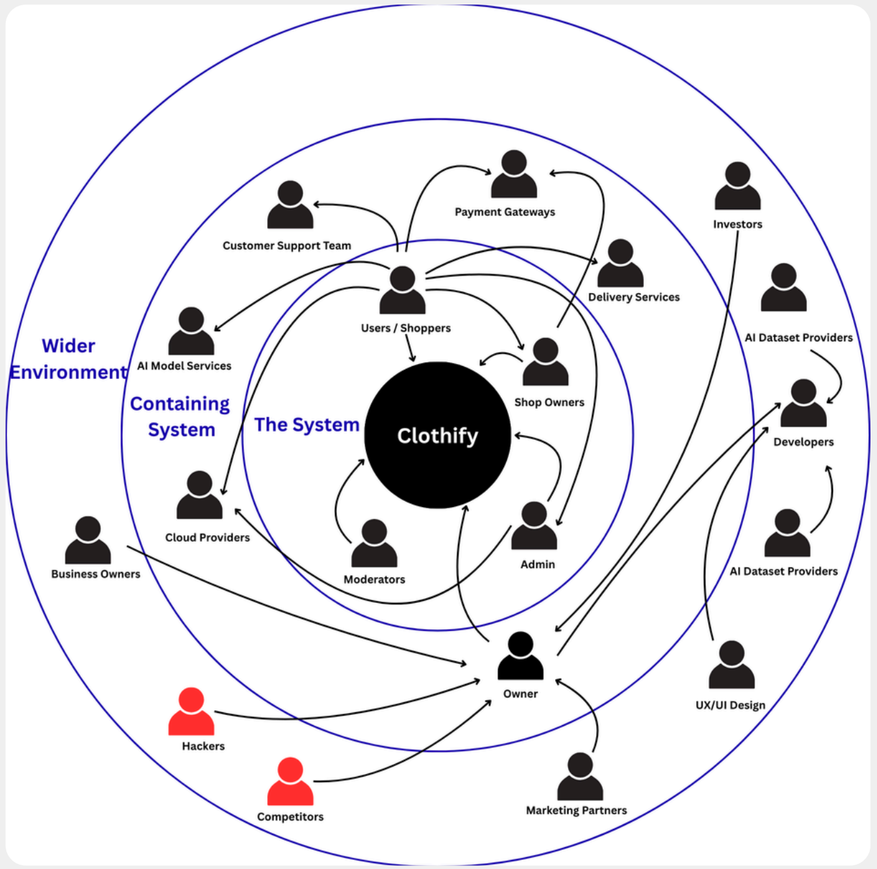
Rich Picture Diagram

Visual representation of Lufyco ecosystem showing relationships between users, application, external systems, and retailers



Stakeholder Onion Model

Stakeholder Layers



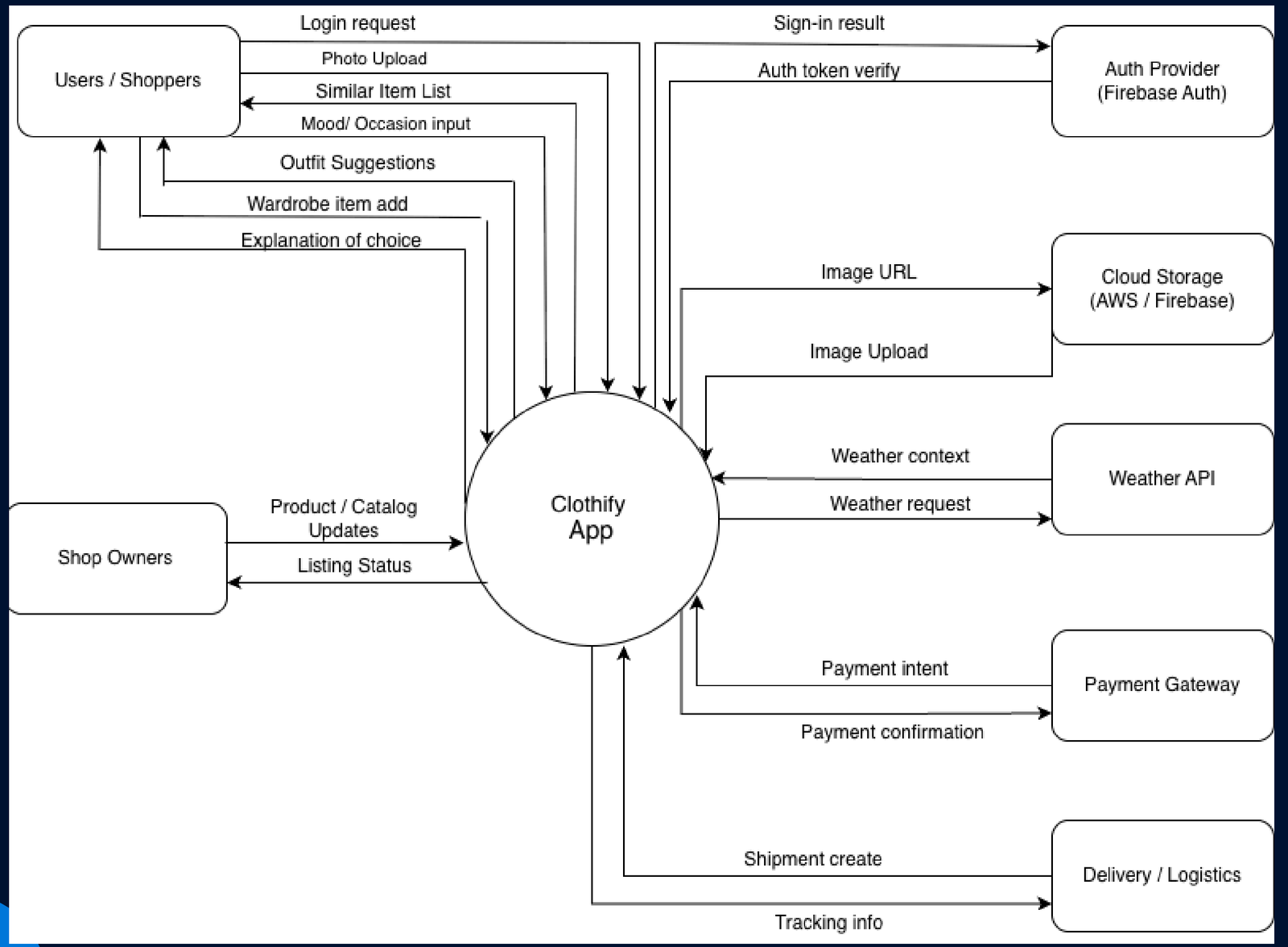
- **Core Team**: Owner, Developers,UI/UX Designers, Moderators, Admin
- **Primary Users**: Users, Shoppers, Shop Owners
- **Secondary Users**: Customer Support Team, Marketing Partners, AI Model Services, AI Dataset Providers, Cloud Providers
- **External**: Payment Gateway, Delivery SErvices, Business Owners, Investors, Competitors, Hackers

Stakeholder Viewpoints

Understanding the roles, interactions, and requirements of key stakeholders

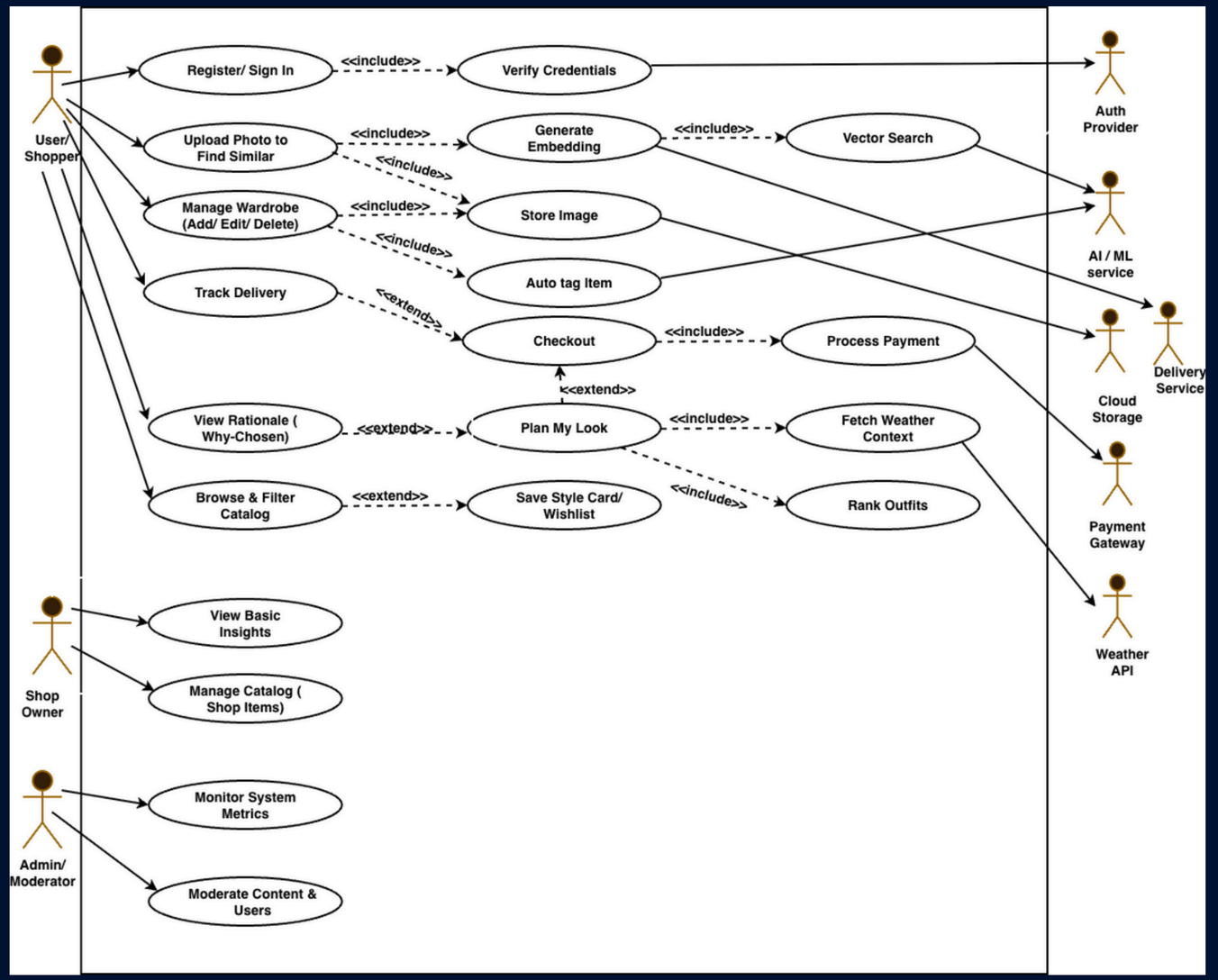
Stakeholder Roles	Interactions with Lufyco	Main Requirements/Interests
Users	• Search and browse clothing • Upload images for recommendations • Build and manage digital wardrobe	• Personalized recommendations • Visual search capability • Privacy and data security
Shop Owners	• Manage product catalog • Track sales and analytics • Respond to customer inquiries	• Increased visibility • Access to target audience • Simple management interface
Admins	• Monitor system performance • Manage user accounts • Oversee content moderation	• System reliability • Content quality control • Security and compliance
Moderators	• Review reported content • Enforce community guidelines • Handle user complaints	• Clear reporting tools • Decision support systems • Efficient workflow tools

Context Diagram



Use Case Diagram

Visual representation of Lufyco system functionality and user interactions



Core Use Cases

Register / Login

User authentication and account management

Upload Image

Find visually similar clothing items

Plan My Look

AI-powered styling recommendations

Manage Wardrobe

Digital wardrobe with auto-tagging

Save Style Cards

Save and organize outfit recommendations

Checkout & Track

Purchase flow and delivery tracking

Catalog Management

Shop owner product catalog management

Admin Monitoring

System monitoring and administration

Functional Requirements (FR)

Essential system functions that define Lufyco's core functionality

Image Search

FR1: Image Upload
Must

Users can upload photos for similar item discovery

FR2: Visual Search
Nice

Find items visually similar to uploaded images

Recommendations

FR3: AI Stylist
Must

Provide outfit recommendations based on mood, occasion, weather

FR4: Explanation
Must

Justify why specific outfits were recommended

FR5: Personalization
Nice

Customize recommendations based on user preferences

User Management

FR6: Authentication

Secure user registration and login functionality

FR7: Profile Management

Users can manage personal information and preferences

FR8: Privacy Controls

Options to control data usage and sharing

Non-Functional Requirements (NFR)

Performance

p95 **1 second**

Response time target for 95% of requests

Security

Encryption **at rest & transit**

Protecting user data and communications

Usability

SUS **≥ 70**

System Usability Scale measurement

Accessibility

Accessible design

Compliance with accessibility standards

Scalability

Scalable architecture

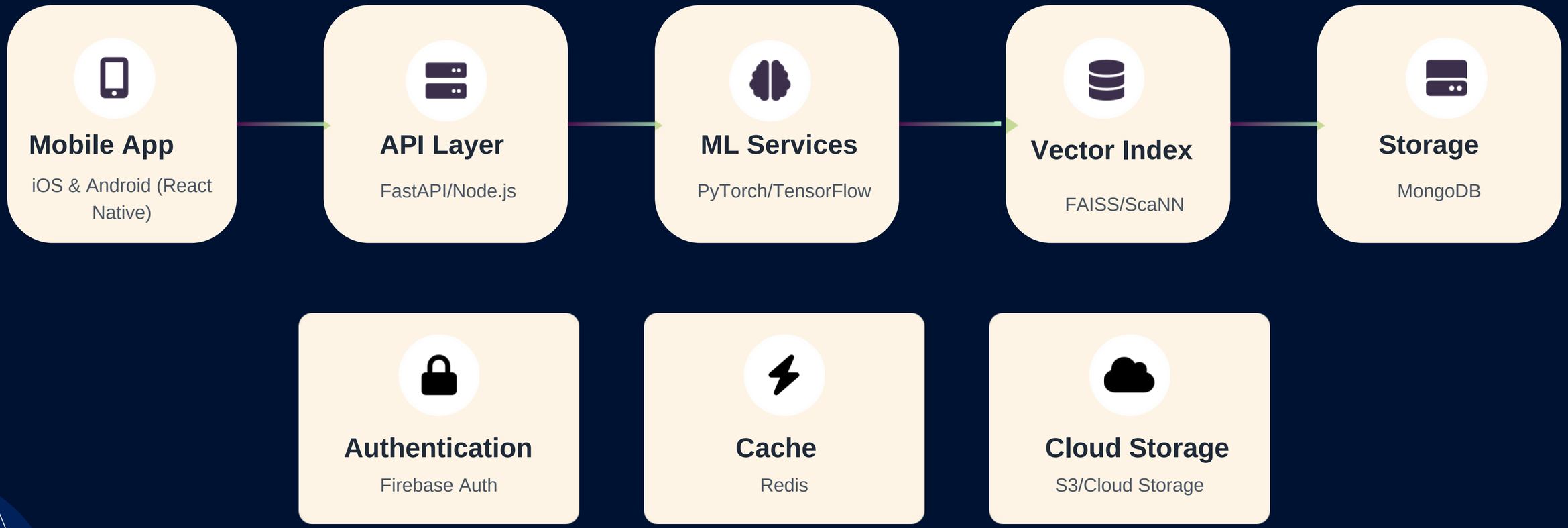
Supporting growing user base and data

Privacy

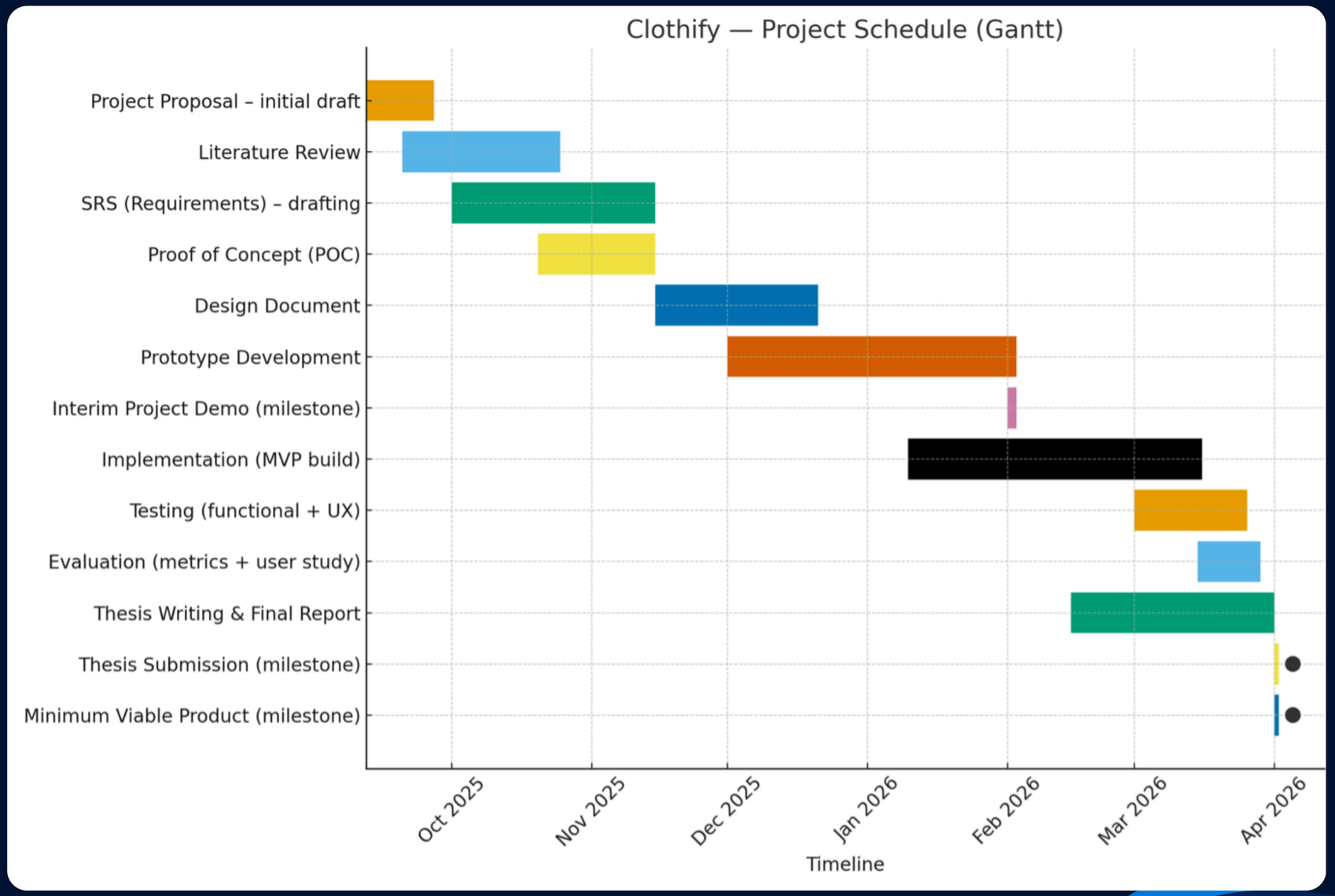
GDPR-aligned **data minimization**

Protecting user privacy by design

Proposed System Architecture



Project Timeline (Gantt Chart)



Resource Requirements

Hardware

Development Laptop

GPU (optional)

Test Devices

- Low-end phones
- Mid-range phones
- High-end phones

Software

- Frontend
  - React Native
  - Expo
  - TypeScript
- Backend
  - FastAPI/Node.js
  - MongoDB
  - Firebase Auth

Data

- DeepFashion Datasets
- Pilot Product Catalog
- User-like Images

Ethics Considerations (MANDATORY)

Lufyco is committed to maintaining the highest ethical standards in all aspects of development and operation. The following measures ensure user privacy, data protection, and compliance with regulations.

Data Protection

- Ethics form completed & signed
- No personal data beyond consented photos
- Encryption at rest & transit
- Users can delete/export data

Privacy & Compliance

- Survey participation voluntary
- No minors involved
- No biometric measurement stored
- GDPR-aligned data minimization

Risks & Mitigation

Risk	Reason	Mitigation
Low Accuracy	Image recognition and recommendations may not meet required standards	Fine-tuning of models, data augmentations, and ensemble methods
High Latency	Mobile app may experience slow response times	Model quantization, caching strategies, and optimized vector search
Privacy Issues	Concerns around image uploads and user data handling	Encryption, data minimization, and secure storage practices
Poor Data Quality	Inconsistent or incomplete fashion item data	Taxonomy cleanup, data validation, and attribute tagging models
Schedule Delays	Potential delays in development milestones	Weekly sprints

Expected Contributions

Lufyco delivers the following key contributions:

Personalized Recommendations

AI-driven outfit suggestions tailored to user preferences and style

Mobile Image Search

Upload photos to find visually similar clothing items

Explainable AI

Clear explanations for why specific outfits are recommended

Wardrobe Awareness

Integration with user's existing wardrobe to avoid duplicates

Fast Experience

Low-latency responses ensuring a smooth, privacy-preserving experience

Reusable Pipeline

A flexible fashion AI pipeline that can be adapted for future applications

Conclusion

Problem Significance

70% of shoppers abandon carts due to uncertainty, highlighting the need for visual and personalized shopping assistance.

Practical Solution

Lufyco provides a practical AI-driven solution by combining image search, context awareness, and wardrobe integration.

Defined Requirements

We have clearly defined functional and non-functional requirements, ensuring the solution meets user needs and technical constraints.

Feasible Planning

A realistic timeline with selected technologies and resources ensures successful project completion.

Questions & Answers

Thank you for your attention. I'm happy to address any questions about the Lufyco project.

- How does Lufyco ensure privacy with image uploads?
- How will you handle product recommendations?
- What makes your AI styling different from others?
- What's your timeline for development?

Handout Summary

This document contains a comprehensive overview of the Lufyco project, including:

Problem Statement
Definition of challenges in online shopping

Aim & Objectives
Project goals and intended outcomes

Scope
In scope and out of scope features

Background Review
Existing research and solutions

Tools & Technologies
Selected technologies and methodologies

Use Cases & Diagrams
Rich picture, stakeholder model, context diagram

Requirements Specification
Functional and non-functional requirements

Project Timeline
Gantt chart and milestone schedule

Ethics Considerations
Ethics form and compliance measures

References
Academic sources and citations

References

Smith, J. (2023). Deep learning approaches for image-based fashion retrieval. *Journal of AI in Fashion*, 12(3), 45-62.

Fashion Analytics Group (2022). *Mobile shopping trends in 2023: A comprehensive analysis*. New York: Fashion Publishing.

Johnson, A. (2021). *AI-powered recommendation systems: Designing for fashion e-commerce*. London: TechPress.

Perera, N. and Samarasena, K. (2022). Lufyco: An AI-driven mobile fashion assistant. *Proceedings of the International Conference on Mobile Human-Computer Interaction*, 145-152.

Pinterest Labs (2023). *Visual search in fashion: Current trends and future directions*. Available at: https://labs.pinterest.com/fashion-visual-search

Williams, S. (2022). *Exploring context-aware recommendations for mobile fashion shopping*. Master's Thesis, University of Technology, Sydney.

Lee, J., Chen, M. and Park, K. (2023). Explainable AI in fashion recommendation systems: A user study. *ACM Transactions on Interactive Intelligent Systems*, 15(2), 78-94.

Thank You!