|  |
| --- |
| **C2C Marketplace** |
| Architecture Design Document |
|  |
|  |
| **<<date>>** |
| **Nikhil Gupta** |

This document is an Architecture Design Document for developing **C2C Marketplace**.

Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| Version | Date | Author | Description |
| 0.1 | <<date>> | Nikhil Gupta | Initial document creation |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

[1. Overview 3](#_Toc516321189)

[2. Requirements 7](#_Toc516321190)

[2.1. Functional Requirements 7](#_Toc516321191)

[2.2. Non-functional Requirements 12](#_Toc516321192)

[2.3. Quality Attributes 13](#_Toc516321193)

[3. Architecture 14](#_Toc516321194)

[4. Modules 15](#_Toc516321195)

[Appendix 16](#_Toc516321196)

[A. Domain Model 17](#_Toc516321197)

[B. Quality Scenarios 18](#_Toc516321198)

[C. Quality Scenario Analysis 19](#_Toc516321199)

[D. Candidate Architectures 20](#_Toc516321200)

[E. Candidate Architecture Evaluation 21](#_Toc516321201)

[F. Architecture Design 22](#_Toc516321202)

[G. Architecture Evaluation(ATAM) 23](#_Toc516321203)

# Overview

// A1. System Definition

// C1-1. Is the defined system boundary clear?

// C1-2. Is there sufficient explanation of System’s operation and business environment as business drivers?

* 1. **Introduction**

A Customer-to-Customer (C2C) Marketplace is a platform that allows users to **safely buy and sell** both used and new products. It provides a digital space where individuals can easily list their items and buyers can discover items they want using advanced search. The Marketplace should ensure that all the activities in System are safe & secure.

* 1. **System Definition**

The purpose of this project is to design a Customer-to-Customer (C2C) Marketplace.

Below Figure 1 – depicts System Boundary and how C2C Marketplace will interact with the outside Components.

* System will provide interface for Actors like Buyer and Seller.
* System will also interact with an external interface which is
  + External Payment Service Provider
  + External Notification Service

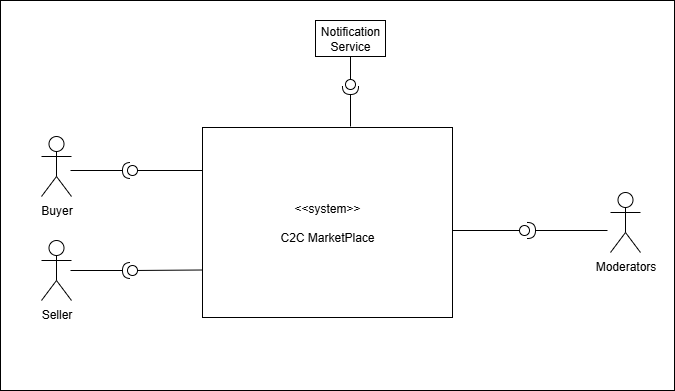


Figure 1a - **System boundary for C2C Marketplace**

Remark : mention what you have assumed is not my focus area

* 1. **Business Context & Drivers**

~~Our marketplace serves buyers and sellers across regions, devices, and network conditions. Inventory is user-generated and long-tail, with uneven titles, images, and metadata; demand is spiky and intent can fade quickly. Shoppers expect instant, relevant answers and smooth handoffs from search to chat to checkout.~~

~~The peer-to-peer nature also introduces real risks—counterfeits, scams, off-platform payments—that must be contained without adding friction. Success therefore hinges on surfacing the right items fast, keeping interactions responsive, and building enough trust for people to complete the deal. These realities lead directly to the following business drivers:~~

Our marketplace connects buyers and sellers across many regions, devices, and internet speeds. Since listings are created by users and often cover niche items, the titles, photos, and details are inconsistent. Also, demand can rise suddenly, and shopper interest drops quickly. Shoppers expect instant, relevant results and a seamless handoff from search to chat to checkout.

The peer-to-peer model also creates real risks, including counterfeits, scams, and attempts to pay off the platfo

rm. We must reduce these risks without adding any friction. Our success depends on showing the right items quickly, keeping every interaction responsive, and building enough trust for people to complete their purchase. These realities lead to the following business drivers.

1. **~~Speed & Responsiveness:~~** ~~Keep search and checkout interactions fast; ensure new listings index quickly.~~
2. **Relevance & Recommendations:** Return highly relevant results and personalized recommendations to boost discovery and intent.
3. **Trust & Safety:** Protect buyers/sellers with strong fraud prevention, content moderation, secure payments, and fair disputes.
4. **Conversion:** Maximize search-to-purchase completion by removing friction across discovery, negotiation, checkout, and fulfillment.

# Requirements

## Functional Requirements

// A2. Functional Requirement Specification

// C2-1. Is there sufficient functional requirement specification to affect System’s architecture?

// C2-2. Is the relationship between use cases clear?

// C2-3. Is the division of use cases explicit?

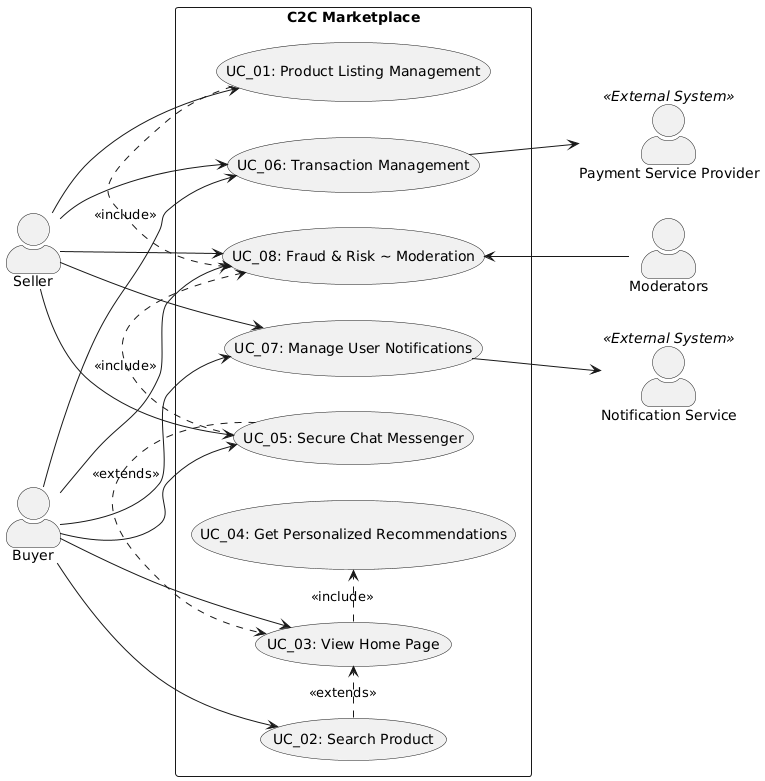


Figure 2: Use Case Diagram

Discussion Items :

1 chat & transaction(Seq & Status  – >payment ) now look similar

Checkpoints ( by what symbol to show external systems?

|  |  |
| --- | --- |
| **UC\_01** | Product Listing Management |
| Description | User can Create a new product listing & Update or Delete an existing product listing. |
| Actor | User (Seller) |
| Pre-condition | User is signed-in and authorized to make a new listing |
| Post-condition | New Listing is created in System. |
| Basic Flow | 1. User opens the new product Listing page.  2. User uploads images and enters common item details like Category, Title, Description, Price, Location, premium listing(Y/N) etc. (AF1)  3. Based on the Selected Category, System automatically shows additional fields related to the category selected by Seller.  4. System runs content moderation checks to validate the filled data. (AF2)  5. System opens the Preview Listing Page.  6. Seller validates the filled data and publishes the listing. |
| Additional Flow | AF1. System auto saves drafts regularly and lets the seller restore the last saved version.  AF2: If the policies are violated, system shows the issue to user and offers solutions or an option to submit for manual review. |

|  |  |
| --- | --- |
| **UC\_02** | Search Product |
| Description | Buyer can search for an Item by entering keywords & system returns the results by using semantic search on entered Keywords and location. |
| Actor | User (Buyer) |
| Pre-condition | 1. Listings are already created and are indexed  2. User location is available |
| Post-condition | Results returned with categorical breakdowns |
| Basic Flow | 1. Buyer enters search keywords and queries  2. System executes search query using all the inputs provided by user.  3. System returns most relevant results to the user. |
| Additional Flow | NA |

|  |  |
| --- | --- |
| **UC\_03** | Home Page |
| Description | User opens the homepage of app or web interface, homepage is loaded along with recommendations for the user |
| Actor | User |
| Pre-condition | Internet Connection should be present. |
| Post-condition | System will load homepage along with the recommendation data |
| Basic Flow | 1. User opens the homepage of the application or web interface.  2. System initializes the session context, checking for authentication, locale, and geo-location.  3. System will provide most relevant personalized recommendation(UC\_04) (AF1)  4. Using data populated above, System displays the final home page with Search functionality to the user. |
| Additional Flow | AF1: If the user is new or logged out, System has no personalization data. Instead of a personalized feed, it will return a generic feed consisting of trending items, location-based bestsellers, or manually curated recommendations. |

|  |  |
| --- | --- |
| **UC\_04** | Personalized Recommendations |
| Description | This use case describes how System provides proactive, context-aware product recommendations to users for various use cases |
| Actor | User (Buyer) |
| Pre-condition | User is logged in. |
| Post-condition | System displays a set of relevant personalized items to the user. |
| Basic Flow | Scenario A: Recommendations on the Home Page  1. User opens the home page.  2. System generates a personalized feed by selecting and ranking relevant products based on user data and system policies.  3. System also considers the targeted ads in the system and creates a final curated list of recommended items.  4. System displays the recommendations to the user on the home page.  Scenario B: Product Detail Page Recommendations  1. User opens the product detail page of a specific item.  2. System generates a recommendation of related Items for this item.  3. System shows these related Items to the user.   Scenario C: Recommendation to improve Search feature |
| Additional Flow | AF1. Cold start: For new users, use popular listings of user location as a fallback. |

|  |  |
| --- | --- |
| **UC\_05** | Secure Chat Messenger |
| Description | Users can communicate via secure-in-app chat to make offers (or receive counter offers). |
| Actor | User (Buyer & Seller) |
| Pre-condition | 1. Users are logged in.  2. A product listing must be active and available in the system. |
| Post-condition | 1. All messages are saved in system for future reference and auditing  2. When an offer is accepted, the system updates the item's status to 'Sold'. |
| Basic Flow | 1. User navigates to a product listing and initiates a chat.  2. User can send a formal offer that includes a specific price.  3. The user who receives the offer can choose to accept it, decline it, or send a counter-offer with a new price.  4. System sends a notification to the other user for each new message, offer, or response  5. This flow (steps 2-4) continues until an offer is accepted or one of the users ends the conversation. |
| Additional Flow | AF1: Automated Content Filtering: If a message contains content that violates policies, such as requests for off-platform payments or personal information, System automatically blocks the message to prevent frauds.  AF2: Spam Prevention: System monitors message frequency and will temporarily limit a user's ability to send messages if they are suspected of spam or abuse. |

|  |  |
| --- | --- |
| **UC\_06** | Order Management |
| Description | ~~This use case describes the process of managing a transaction after a buyer decides to purchase an item~~  ~~How will user land here,~~ |
| Actor | User (Buyer & Seller) |
| Pre-condition | 1. Buyer & Seller are authenticated.  2. A product listing must be active and available in System. |
| Post-condition |  |
| Basic Flow | 1. User submits a formal purchase request for an item.  2. System send a notification to the Seller informing them of the new purchase request.  3. System also immediately responds to the buyer, acknowledging that the request has been successfully submitted.  4. At a later time, the Seller reviews the purchase request and accepts it. (AF1)  5. System sends notification to the buyer to inform about seller’s action. |
| Additional Flow | AF1: If the Seller chooses to reject the purchase request, System cancels the order and sends a notification to the Buyer informing them of the rejection. |

Discuss if this is through third party, need to change it accordingly.

|  |  |
| --- | --- |
| **UC\_07** | User Notifications |
| Description | This use case describes System's event-driven notification feature, which sends timely and relevant alerts to users across multiple channels (push, in-app, email, SMS).  Link with how user will use it.  Like user will open received notifications. Then that will be interaction point. |
| Actor | User (Buyer/Seller) |
| Pre-condition | 1. User account exists with verified contact details (email & contact number).  2. User notification preferences and locale stored. |
| Post-condition | ~~1. The notification is sent (or scheduled) with delivery status recorded.~~  ~~2. System respects the user's preferences~~ |
| Basic Flow | 1. User click a notification event.  Take hjim to relevant screen    ~~An event occurs in another part of System (e.g., an offer is received, a price drops).~~  ~~2. Based on the event, System determines the correct notification format and channel (e.g., email, SMS).~~  ~~3. System then customizes the message with specific details like the user's name and the item's price, translating it into the appropriate language.~~  ~~4. System checks the user's preferences, such as opt-in status, quiet hours, and frequency limits, before queuing the notification.~~  ~~5. An external service provider sends the message via the selected channel (e.g., Email, SMS, Push Notification) to the user.~~  ~~6. System receives the status update (such as "delivered”, or "bounced”) from external service provider and records it.~~ |
| Additional Flow | AF1: Retry & failover: If sending a notification fails due to a temporary external service provider issue, System will automatically retry. |

|  |  |
| --- | --- |
| **UC\_08** | Fraud & Risk ~ Moderation |
| Description | This use case describes the proactive and reactive measures System takes to ensure trust and safety on the platform. It covers the automated and manual moderation of user-generated content (listings, messages), fraud detection during transactions, and the process for handling user-reported issues and disputes. |
| Actor | User (Moderators, Buyer & Seller) |
| Pre-condition | A user action has occurred that requires a safety check, such as submitting a new listing, sending a message, or a user reporting a piece of content. |
| Post-condition | The content or user action is either approved, rejected with a reason, or has been escalated for manual review. |
| Basic Flow | Scenario A: Proactive Content Moderation (New Listing) [UC\_01]  1. A seller posts product details for listing a new product.  2. System scans the content (text and images) for policy violations.  3. If the content is safe, it is approved and published automatically. (AF1)  ~~Scenario B: Reactive Moderation (User Report)~~  ~~1. A user reports a piece of content (e.g., a suspicious message, a counterfeit item) or another user to support the platform's trust and safety goals.~~  ~~2. System creates a case and adds it to the moderation review queue.~~  ~~3. A Moderator reviews the case, including the reported content and the users' histories.~~  ~~4. The Moderator takes an appropriate action, such as removing the listing, warning the user, or suspending the account.~~  ~~5. System notifies the user who made the report about the outcome.~~ |
| Additional Flow | AF1: If a policy violation is detected, the content is automatically rejected and System notifies the seller with the specific issue and offers fix options.  <<generalize>>  AF2: Appeals Process: A user whose content was rejected by the automated system can submit an appeal, which is then routed to a human Moderator for a final review. |

## Non-functional Requirements

// A5. Quality Requirement Specification

// C5-2. Is the specification of quality requirements appropriate?

// C5-3. Is quality requirement measurable?

// C5-4. Is the allowance of non-functional requirement clear?

|  |  |  |
| --- | --- | --- |
| **NFR\_01** |  |  |
| Description |  | |
| Environment |  | |
| Stimulus |  | |
| Response |  | |
| Measure |  | |
| Allowance |  | |

## Quality Attributes

// A5. Quality Requirement Specification

// C5-2. Is the specification of quality requirements appropriate?

// C5-3. Is quality requirement measurable?

|  |  |  |
| --- | --- | --- |
| **QA\_01** |  |  |
| Description |  | |
| Environment |  | |
| Stimulus |  | |
| Response |  | |
| Measure |  | |

# Architecture

// A8. Architecture Documentation

// C8-1. Is allocation of processes, etc. appropriate? (deployment)

// C8-2. Is grouping appropriate in terms of components? (component & connector)

// C8-3. Is the description of System architecture appropriate?

# Modules

// A9. Module Specification

// C9-1. Is component specification sufficient to develop?

// C9-2. Is grouping appropriate in terms of module?

// C9-3. Is it appropriate to design dependencies between modules?

// C9-4. Is the work assignment appropriate?

Appendix

[A. Domain Model 17](#_Toc516321204)

[B. Quality Scenarios 18](#_Toc516321205)

[C. Quality Scenario Analysis 19](#_Toc516321206)

[D. Candidate Architectures 20](#_Toc516321207)

[E. Candidate Architecture Evaluation 21](#_Toc516321208)

[F. Architecture Design 22](#_Toc516321209)

[G. Architecture Evaluation(ATAM) 23](#_Toc516321210)

1. Domain Model

// A3. Domain Model Design

// C3-1. Is domain model sufficiently sub-divided?

// C3-2. Does domain model reflect architecture decisions?

1. Quality Scenarios

// A4. Quality Scenario Elicitation

// C4-1. Is there sufficient scenario elicitation affecting the architecture?

// C4-2. Is there sufficient review of the quality related to performance?

// C4-3. Is there sufficient review of the quality related to modifiability?

1. Quality Scenario Analysis

// A5. Quality Requirement Specification

// C5-1. Is quality scenario analysis appropriate? (evidence)

1. Candidate Architectures

// A6. Candidate Architecture Design

// C6-1. Are quality analysis and solution candidate appropriate?

// C6-2. Are performance analysis and solution candidate appropriate?

// C6-3. Are modifiability analysis and solution candidate appropriate?

1. Candidate Architecture Evaluation

// A7. Architecture Design

// C7-1. Is comparison analysis of colliding candidates appropriate? (evidence)

// C7-2. Is there sufficient complement of the selected candidate?

1. Final Architecture

// A7. Architecture Design

// C7-3. Is there right integration into the final architecture?

// C7-4. Is there appropriate risk management of the final architecture?

1. Architecture Evaluation(ATAM)

// A10. Architecture Evaluation

// C10-1. Are there sufficient quality scenarios evaluating architecture?

// C10-2. Are there sufficient architectural decisions identified?

// C10-3. Is the analysis of design decisions appropriate? (evidence)

// C10-4. Are the mitigation plans to the risk factors appropriate?