



LAND TRADING SYSTEM

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Software Requirements Specification (SRS)

1. Introduction

1.1 Purpose

Define functional and non-functional requirements for an online marketplace and transaction platform that lists land parcels, supports search, due diligence, negotiation/offer flows, optional auctions, escrowed payments, and closing with title transfer.

1.2 Intended Audience

This Software Requirements Specification (SRS) document is intended for the following audiences:

1. Project Advisers and Instructors

- To review the scope, design, and completeness of the system for academic assessment.
- They will use this document to evaluate how well the system meets software engineering and database design principles.

2. Developers / System Implementers

- To serve as a technical reference during system design, coding, and testing.
- They will rely on detailed functional, non-functional, and database specifications to guide implementation.

3. Project Researchers / Team Members

- To maintain consistent understanding of the project requirements, objectives, and boundaries throughout the development cycle.

4. Future Maintainers / Developers

- To understand the system's structure, database design, and functionality for future updates, debugging, or enhancements.

5. End Users (Buyers, Sellers, Admins)

- To gain a clear overview of the system's purpose, features, and constraints, ensuring that user needs are properly addressed during development.

1.3 Scope

In scope (MVP): Web-based apps for discovery and transactions – User portals to list and manage sales - Due diligence data presentation (maps, zoning, titles uploaded/linked) - Offer & counter-offer workflow, purchase agreements - Escrowed payments, milestone releases, invoicing/receipts - Compliance checks (KYC/AML), digital signatures, audit logs - Admin console for onboarding, moderation and dispute handling.

1.4 Definitions & Acronyms

- **GIS:** Geographic Information System
- **KYC/AML:** Know Your Customer / Anti-Money Laundering
- **PSA:** Purchase and Sale Agreement

2. Overall Description

2.1 Product Perspective

TERRATRADE is a two-sided marketplace with a transaction layer. It integrates with mapping services, identity/KYC providers, payment gateways/escrow, e-signature, and (optionally) land registry APIs for title verification and transfer status.

2.2 User Classes & Characteristics

- **Guest:** Browse listings, view public data, create/register account.
- **Registered User's(Seller/Buyer):** Save searches, participate in escrow, sign documents, Create and manage listings, accept offers, counter, sign PSA, receive funds.
- **Surveyor/Consultant (Optional):** Upload reports, site plans.
- **Admin/Compliance:** Onboard users, review flagged content, monitor KYC/AML, manage disputes.

- **Escrow/Payouts:** Extend escrow functionality to support payout instructions and settlement records.
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2.3 Operating Environment

□ **Client Side (End Users):**

- The system will be accessible through modern web browsers (e.g., Google Chrome, Microsoft Edge, Safari, Mozilla Firefox) on **Windows** and **macOS** operating systems.
- The application interface will be responsive and accessible across desktops, laptops, and mobile devices.

□ **Server Side (System Backend):**

- The backend will operate in a **cloud-native environment**, supporting deployment on various operating systems (e.g., Linux, Windows Server, or containerized platforms).
- The system will use either **containerized microservices** or a **modular monolith** architecture, allowing flexibility in deployment and scalability.

2.4 Design & Implementation Constraints

• **Electronic Signatures:**

- Must comply with the **Electronic Commerce Act of 2000 (Republic Act No. 8792)**, which legally recognizes electronic documents and e-signatures in the Philippines.

• **Payment Processing:**

- Must follow **Bangko Sentral ng Pilipinas (BSP) regulations** for digital payments and electronic money (e.g., BSP Circulars on e-payments).

- Third-party payment processors must be **PCI-DSS compliant**, and escrow services must comply with Philippine trust/escrow regulations.
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- **Data Privacy & PII (Personally Identifiable Information):**
 - Storage and processing of personal data must comply with the **Data Privacy Act of 2012 (Republic Act No. 10173)** and guidelines from the **National Privacy Commission (NPC)**.
- **Geospatial Features:**
 - Mapping components must efficiently handle **large land parcel polygons** and **high-zoom map tiles**, especially in integration with **Philippine cadastral and land use datasets** (e.g., from DENR-LMB or NAMRIA).

2.5 Assumptions & Dependencies

- **Land Records & Documentation:**
 - It is assumed that **land title documents and ownership records** will be provided by the seller or made accessible through authorized government agencies (e.g., **Registry of Deeds / LRA APIs**, if available).
- **Data Availability:**
 - The system depends on the availability and accuracy of **government or third-party land data sources**, such as property boundaries, lot details, and cadastral information.
- **Payment & Escrow Services:**
 - The system depends on a **third-party payment/escrow provider** that supports secure transactions, including disbursements to sellers and refunds to buyers, in compliance with BSP regulations.

- **Internet & Hosting Services:**

- Assumes stable **internet connectivity** for end users and reliable **cloud/hosting infrastructure** for system uptime and performance.

3. Requirements Specifications

Priority Legend: M (Must), S (Should), C (Could), W (Won't now)

3.1 Functional Requirements

Accounts & Identity

- **(M):** Email/OAuth sign-up, 2FA optional.
- **(M):** KYC for buyers and sellers (government ID, liveness, sanction list checks) prior to monetary actions.
- **(S):** Business entity verification (documents, beneficial ownership).

Listings & Catalog

- **(M):** Create listing with fields: title, description, coordinates/polygon, area (sqm/ha), land use/zoning, allowable uses, topography, access/road frontage, utilities (water/power/sewer), environmental constraints, tenure/ownership type, asking price, accepted terms (cash/installments/owner financing), photos/videos/documents.
- **(M):** Listing status: draft, published, under offer, sold.
- **(M):** Attach due-diligence documents: title/TCT, tax declarations, survey plan, flood/soil maps, right-of-way, liens/encumbrances.

Search, Filters, and GIS

- **(M):** Map-based and list search; draw-a-shape AOI (area of interest) filter; search by address, coordinates.

- **(M):** Filters: price range, area, zoning/land use, slope/topography, utilities, road type, distance to POIs (schools, highways, CBD), listing status, date listed.
- **(S):** Layers: flood hazard, slope, soil, zoning overlays; toggle visibility; legend with data sources.

Inquiries, Offers & Negotiation

- **(M):** Private inquiry/chat channel per listing with file sharing (watermarked).
- **(M):** Make offer: price, earnest money, contingencies (financing, survey, title, environmental), closing date, inclusions/exclusions.
- **(M):** Counter-offer workflow; versioned offer history.
- **(S):** Sealed bid and timed auction modes (reserve price, bid increments, anti-sniping extension).

Contracts & Signatures

- **(M):** Generate PSA from accepted offer using templates with merge fields; support jurisdiction-specific clauses.
- **(M):** E-signature with sequential/parallel signing; identity certificate, timestamp, IP, hash recorded.
- **(C):** Notary appointment scheduling and remote online notarization (where legal).

Payments & Escrow

- **(M):** Collect earnest money and subsequent milestones into escrow; display ledger with deposits, fees, releases.
- **(M):** Escrow release rules tied to milestones: title cleared, survey accepted, deed executed, registry confirmation.
- **(S):** Installment/owner financing schedule with auto-debit; late-fee rules.

- **(M):** Refunds on failed contingencies per contract terms.

Title & Closing

- **(M):** Title verification checklist: title document upload/registry lookup, encumbrances, liens; approval by seller's counsel or platform verifier.
- **(M):** Closing checklist with roles & due dates: tax clearances, deed of sale, transfer taxes/fees, registration appointment.
- **(S):** Integration with land registry API for status polling and digital title issuance (if available).
- **(M):** Final settlement and disbursement to seller upon closing confirmation; issue receipts and completion certificates.

Reviews, Ratings & Disputes

- **(S):** Rate brokers/sellers; surface service quality.
- **(M):** Dispute ticketing linked to listing/transaction; evidence upload; resolution workflow.

Notifications & Reporting

- **(M):** Real-time notifications (email/SMS/push) for offers, counters, payments, deadlines.
- **(S):** Analytics dashboards: inventory, lead funnel, offer conversion, average days on market, price heatmaps.

Admin & Compliance

- **(M):** RBAC roles: admin, compliance_officer, seller, broker, buyer.
- **(M):** Audit logs for listing edits, offer decisions, payment events, signatures.
- **(M):** KYC/AML screening with sanctions/PEP lists; risk scoring and manual review queue.

- **(S):** Policy engine for region-specific rules (e.g., foreign ownership limits, agricultural land caps).

3.3 Non-Functional Requirements

Security & Privacy (NFR)

- **NFR-SEC-001:** OAuth2/OIDC auth, strong hashing, optional 2FA, device checks for high-risk actions.
- **NFR-SEC-002:** Encrypt PII and contracts at rest; TLS 1.2+ in transit.
- **NFR-SEC-003:** Fine-grained access control to listings (drafts), transaction rooms, escrow.
- **NFR-SEC-004:** Comprehensive audit trail and tamper-evident logs (hash-chained).
- **NFR-PRIV-001:** Consent and purpose limitation; data subject rights handling.

Performance & Reliability (NFR)

- **NFR-PERF-001:** P95 search ≤ 600 ms (excluding third-party latencies); map tile load ≤ 300 ms.
- **NFR-PERF-002:** Handle 100k+ listings with spatial indexes (R-tree/Geo indexes) and caching.
- **NFR-REL-001:** Availability $\geq 99.9\%$ /month; RPO ≤ 15 min; RTO ≤ 60 min.
- **NFR-REL-002:** Graceful degradation if maps or payments degrade; read-only mode for maintenance.

Usability & Accessibility (NFR)

- **NFR-UX-001:** WCAG 2.1 AA; keyboard-navigable map controls; screen reader labels for layers.

- **NFR-UX-002:** Plain-language legal summaries alongside full contract PDFs.

Scalability & Maintainability (NFR)

- **NFR-OPS-001:** Modular services: listings, geospatial, offers, contracts, escrow, KYC, notifications.
- **NFR-OPS-002:** IaC deployments; blue-green/rolling releases; observability (metrics, tracing, logs).

3.3 External Interface Requirements

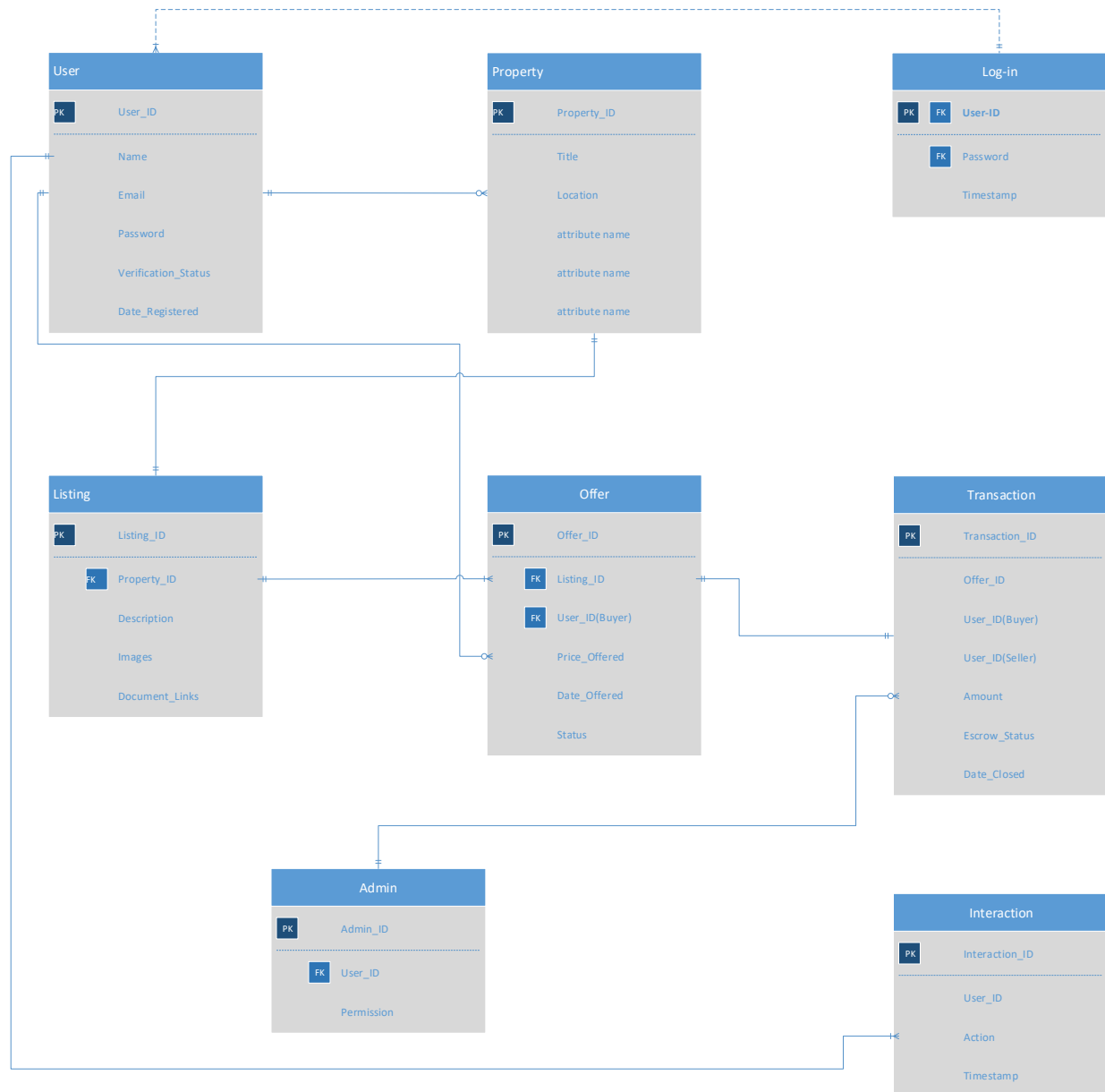
User Interfaces

- **Marketplace App:** Map-first layout with list toggle; card views; saved searches; compare tool; sticky offer CTA.
- **Seller/Broker Portal:** Listing editor with GIS polygon draw/upload (GeoJSON/KML), document manager, offers board, pricing tools.
- **Transaction Room:** Timeline of milestones, escrow ledger, documents & signatures, chat, closing checklist.
- **Admin Console:** Onboarding/KYC, moderation queue, audit/event viewer, dispute console, configuration.

3.4 System Models

Entity Relationship Diagram (ERD)

The following ERD shows the core data model and relationships within the system:



Data Flow Description

User Authentication Flow

1. **USER** registers or logs into the system
2. **LOGIN** table records session information
3. **INTERACTION** tracking begins upon successful authentication

Administrative Access Flow

1. Selected **USER** accounts are granted **ADMIN** privileges
2. **ADMIN** users have elevated access to system functions
3. **Transactions** tracking monitors administrative activities

Property Management Flow

1. Authenticated **USER** creates property **LISTING**
2. **INTERACTION** records are created for listing activities
3. **Transactions** logs track user navigation and actions

Relationship Descriptions

The **Entity Relationship Diagram (ERD)** illustrates how data entities in the TerraTrade Land Trading System are related. Below are the relationship descriptions for each entity:

1. **USER – PROPERTY Relationship**

- **Type:** One-to-Many
- **Description:** Each user (seller) can create and own multiple property records, but each property belongs to only one user.
- **Example:** A seller may list several land parcels, each stored as a unique property record.

2. **PROPERTY – LISTING Relationship**

- **Type:** One-to-One
- **Description:** Each property is associated with one listing record that contains detailed descriptions, photos, and supporting documents.
- **Example:** Property “Lot 123” corresponds to Listing “#A1023.”

3. **LISTING – OFFER Relationship**

- **Type:** One-to-Many
- **Description:** A single listing can receive multiple offers from different buyers, but each offer is linked to only one listing.
- **Example:** Listing “#A1023” may receive offers from multiple interested buyers.

4. OFFER – TRANSACTION Relationship

- **Type:** One-to-One
- **Description:** Once an offer is accepted, it results in a single transaction record representing the sale.
- **Example:** Offer “#O2025” leads to Transaction “#T2025,” which handles the escrow and closing process.

5. USER – OFFER Relationship

- **Type:** One-to-Many
- **Description:** Each buyer (user) can make multiple offers across different listings, but each offer is made by a single buyer.
- **Example:** Buyer “John Smith” may place offers on multiple properties.

6. TRANSACTION – ADMIN Relationship

- **Type:** Many-to-One
- **Description:** Multiple transactions can be monitored by one admin for compliance and dispute management.
- **Example:** Admin “L. Santos” oversees several ongoing land sales for verification.

7. USER – LOGIN Relationship

- **Type:** One-to-Many
- **Description:** Each user can have multiple login sessions, each recorded separately with timestamp.
- **Example:** A user logs in from desktop and mobile—both sessions are tracked individually.

8. USER – INTERACTION Relationship

- **Type:** One-to-Many
- **Description:** A user can perform multiple actions in the system, such as viewing listings, creating offers, or messaging. Each activity is stored in the Interaction table.
- **Example:** User “Jane D.” views listings, edits her profile, and sends an inquiry—all logged as separate interactions.

Database Diagram