LFF MAKETPLACE PLATFORM SOLUTION ARCHITECTURE

Module Development Plan for Land Fortune Marketplace (LFM)

Module 1: Core Identity & Membership Management System

This is the foundational module that gates access to all others.

● Sub-Module 1.1: User Onboarding & Registration

○ Details: Multi-step form capturing entity type (Individual Farmer, Corporate Farm, Buyer, Input Supplier, etc.), personal/business details, tax IDs, bank account information, and geographic location (integrated with GIS for mapping).

○ Function: KYC (Know Your Customer) verification checks, document upload (scans of ID, business licenses). Assigns a unique LFM Member ID.

● Sub-Module 1.2: Membership Tier Management

○ Details: System to manage the three tiers:

❑ Registered Member: Flags in DB granting access to basic marketplace features, loyalty programs, and member specials. No ZMX platform access.

❑ Clearing Member: Additional flags granting full privileged access to the ZMX trading platform (futures, spot trading). Requires signed LFM Membership Agreement and link to a Margin Account.

❑ Non-Member: Limited, read-only access to certain marketplace listings. No benefits.

❑ Loyalty Management: We need a dashboard were buyers/customers can select; Product, Items, Consultancy Service, Items from the product and consultancy services catalogue.

○ Function: Automated permission sets based on membership level. Upgrade/downgrade workflows.

- Sub-Module 1.3: Smart Card & Digital Profile Integration
- Details: A digital twin of the physical Fortune Smart Card. This sub-module stores and displays all data that would be on the card: Member ID, photo, transaction history, current Fortune $ balance, linked Warehouse Receipts, loan status and input allocation history.
- Function: QR code/barcode generation for the physical card. API endpoints for external systems (warehouses, banks) to validate the card and update transactions in real-time.

Module 2: Financial Engine & Fort$ Management

The economic circulatory system of the platform.

- Sub-Module 2.1: Fort$ (Fortune Dollar) Ledger
- Details: A secure, internal ledger system that manages the creation, transaction, and redemption of the virtual currency. Each member has a Fort$ account balance.
- Function: Records every Fort$ credit (e.g., from sale of goods) and debit (e.g., payment for inputs, services). Must be atomic (ensure transactions are all-or-nothing to prevent errors).
- Sub-Module 2.2: Fiat Currency Gateway
- Details: Integration with banks and mobile money providers (e.g., EcoCash) via APIs. Allows members to top up their Fort$ accounts with real currency and cash out Fort$ into real currency.
- Function: Processes deposits/withdrawals. Manages exchange rates between Fort$ and USD/ZWL. Handles transaction fees for LFF.
- Sub-Module 2.3: Margin Account Management

○ Details: Exclusive to Clearing Members. Interface with member banks to view and validate the balance in the member's designated Margin Account.

○ Function: The core of the "lock-in funds" requirement. Before a trade is placed, this system must receive confirmation (via API or secure upload) that sufficient funds are available and locked in the member's bank account.

● Sub-Module 2.4: Payment Processing & Settlement

○ Details: Orchestrates the end-of-trade financial settlement. When a trade is complete, it calculates the final amount, deducts LFF's fees, and initiates transfers.

○ Function: Instructs the Fort$ ledger to transfer Fort$ from buyer to seller. Or, via the banking gateway, instructs the bank to transfer fiat currency. Generates automated notifications to all parties.

Module 3: Marketplace & Trading Hub (ZMX Platform Integration)

The central nervous system for trading. This is the "ZMX Platform" mentioned throughout the document.

● Sub-Module 3.1: Product Listing & Catalog Management

○ Details: Allows sellers (and LFF itself) to list commodities (maize, cotton, livestock), inputs (seeds, fertilizer), and other sector goods (from construction to ICT). Fields must include: product type, grade, quantity, quality certifications, photos, and location (warehouse ID or farm location).

○ Function: Search and filter functionality for buyers. Inventory level management linked to the Warehouse Management System (WMS).

● Sub-Module 3.2: Contract Management System

○ Details: Digital creation, signing, and management of complex contracts.

❏ Forwards/Futures Contracts: UI to set commodity, quantity, quality, price, and specific future delivery date.

❏ Spot Trade Contracts: For immediate purchase and delivery.

○ Function: Automated alerts and notifications as contract maturity dates approach. Tracks contract fulfillment status.

● Sub-Module 3.3: Auction & Bidding Engine

○ Details: For commodities where price discovery is needed. Allows buyers to place bids, and sellers to accept the highest bid or set a reserve price.

○ Function: Real-time bid updating. Timer functionality. Automatic winner determination and contract generation.

● Sub-Module 3.4: Requisition & Order Management

○ Details: Manages the entire flow detailed in Figure 5. A "Purchase Requisition" is created by a buyer, triggering the fund lock-in process. Once funds are verified, it becomes an official "Order".

○ Function: Tracks the status of each requisition/order (e.g., Pending Funding, Approved, Awaiting Fulfillment, Completed). The core workflow engine for trades.

Module 4: Warehouse Management System (WMS) & Receipt System

Bridges the digital world with the physical inventory.

● Sub-Module 4.1: Stock-In Processing

○ Details: When a farmer delivers commodities to a CBP/Warehouse, the warehouse operator uses this interface. Records: Member ID (via Smart Card scan), commodity type, weight (from integrated scale), grade (from 3rd party inspector input), and moisture content.

○ Function: Creates a unique Lot ID for the received goods. This triggers the option to either pay the farmer immediately or generate a Warehouse Receipt.

● Sub-Module 4.2: Digital Warehouse Receipt (WR) Generator

○ Details: Generates a cryptographically secure, non-fungible digital receipt. The WR is a digital asset tied to a specific lot of commodities in a specific warehouse. It

contains: WR ID, Lot ID, Commodity Details, Grade, Weight, Warehouse Location, Issue Date, and Owner ID (Farmer's LFM ID).

○ Function: The WR can be digitally transferred (e.g., sold on the marketplace, used as collateral). Its status must be trackable (Issued, Pledged, Redeemed).

● Sub-Module 4.3: Stock-Out & Release Management

○ Details: When a buyer comes to collect goods, the warehouse operator scans the buyer's Smart Card and the digital WR from the trade.

○ Function: Verifies the buyer is the legitimate owner of the WR. Records the release, including final weight from weigh-bridge. Updates inventory levels. Changes WR status to "Redeemed".

● Sub-Module 4.4: Inventory Dashboard

○ Details: Real-time view for warehouse managers and LFF administrators of stock levels across all designated warehouses and silos, broken down by commodity, grade, and age.

○ Function: Essential for logistics planning, reporting, and preventing stockouts. Module 5: Logistics Management System (Fortune Logistics)

● Sub-Module 5.1: Transportation Booking & Management

○ Details: UI for members to request transport for goods from point A (farm) to point B (warehouse) or from warehouse to buyer. Includes details like commodity type, weight, volume, pickup/delivery locations and times.

○ Function: Automated pricing engine based on distance and commodity. Assigns shipments to available logistics partners via API integrations. Provides tracking numbers and real-time status updates (Picked Up, In Transit, Delivered).

● Sub-Module 5.2: Customs & Permits Management (For International Trade)

○ Details: A form-driven system to collect all necessary data for cross-border shipments. Integrates with official systems where possible, or provides printable,

pre-filled forms.

○ Function: Manages Incoterms 2010 selection (FOB, CIF, etc.) and automatically calculates responsibilities based on the chosen term.

Module 6: Data Management & Evaluation, Monitoring & Reporting (EMR)

The "big data" brain of the operation.

● Sub-Module 6.1: Geo-Tagging & GIS Integration

○ Details: Integrates with Area Extension Officers (AEOs) tablets. Allows AEOs to drop pins on a map for each farm, attach photos of crops, and input progress reports.

○ Function: Creates a visual, data-rich map of all registered farms, enabling monitoring of planting, growth, and harvest progress. Critical for crop forecasting and insurance assessment.

● Sub-Module 6.2: Analytics & Reporting Dashboard

○ Details: A powerful dashboard for LFF, financiers, and large buyers. Provides insights on: commodity price trends, regional production volumes, member trading activity, platform revenue, and logistics performance.

○ Function: Customizable reports. Data visualizations (charts, graphs). Ability to export data. This is a key sellable product to stakeholders.

● Sub-Module 6.3: API Gateway

○ Details: A secure set of APIs (Application Programming Interfaces) to allow controlled access to the DMS for partners: Banks, ZMX, Insurance companies, 3rd party inspectors.

○ Function: A bank's system can query a member's balance or WR ownership. An insurer can pull field data to assess a claim. This interoperability is critical.

Module 7: Value-Added Services Portal

● Sub-Module 7.1: Insurance Marketplace

- ○ Details: A curated portal within LFM where members can browse and purchase the listed insurance products (Agro, Health, Funeral, etc.) from partner providers.
- ○ Function: Secure checkout using Fort$ or linked payment methods. Application forms and digital policy issuance.
- ● Sub-Module 7.2: Inputs Acquisition & Credit Facility
- ○ Details: Digital catalog of inputs from suppliers. Farmers can apply for inputs on credit, which creates a loan obligation.
- ○ Function: Manages the entire workflow from Figure 2: application, eligibility check, approval, electronic notification to warehouse, and ultimately deducting the cost from the farmer's eventual sales proceeds.

Module 8: Notification & Communication Engine

- ● Details: A central system that triggers all automated communications.
- ● Function: Sends SMS, email, and mobile app push notifications for: trade confirmations, payment receipts, contract maturity alerts, warehouse receipt issuance, AEO visit schedules, and platform announcements. This is not a UI module but a critical backend service.

Module 9: Administration & Compliance Panel

- ● Details: A super-user panel for LFF staff to manage the entire platform.
- ● Function: User management, role-based access control, fee configuration, dispute resolution tools, audit logs, membership suspension/termination, and system health monitoring. Includes tools to enforce the detailed Trading Rules and Regulations (e.g., automatically blocking trades for members with overdue fees).

CORE WORKFLOWS FOR LFF MARKETPLACE APP

Work Item Type	Description	Key Microservices Involved
Order	Sale of commodities, livestock, or expert services.	lff-ecommerce-api, lff-payments-integration-api, lff-logistics-api, lff-warehouse-api, lff-commodity-livestock-api, lff-odoo-invoice-api
Permit / Collateral Request	Regulatory clearance or collateral pledge for certain commodities/livestock.	lff-perm-clearing-collateral-api, lff-user-compliance-api
Delivery / Shipment	Movement of goods or livestock to buyer.	lff-logistics-api, lff-tag-trace-api, lff-loconav-integration-api
Insurance Policy / Claim	Coverage of shipments or livestock.	lff-insurance-broking-api
Customer Account Lifecycle	Registration, KYC, roles, offboarding.	lff-user-compliance-api, lff-customer-management-api
Reward / Incentive Item	Loyalty points, discount coupons.	lff-customer-rewards-api, lff-smart-accounts-api
Payment Transaction	Multi-currency payments (ZiG/USD), refunds.	lff-payments-integration-api, lff-smart-accounts-api

Status	Definition
Draft	Work item created but not submitted; editable by originator.
Pending Verification	Awaiting compliance/KYC/permit or collateral checks.

Pending Payment	Awaiting full or partial payment confirmation.
Payment Failed	Payment attempt unsuccessful; retry allowed.
Payment Confirmed	Funds received and verified.
Awaiting Fulfilment	Ready for warehouse pick/packing or scheduling of livestock delivery.
In Transit	Logistics partner has collected; en route to destination.
Delivered / Completed	Item received by buyer and acknowledged.
Partially Fulfilled	Only part of order shipped/received (e.g., split shipments).
Cancelled	Cancelled by buyer or system before fulfilment.
Rejected	Compliance/permit failed; cannot continue.
Returned / Disputed	Buyer initiated return or dispute.
Closed	Financials reconciled; no further action allowed.
Expired	Timed out (e.g., permit not obtained, payment window lapsed).

Typical Status Transitions

Below is a general state diagram (per work item) that all microservices can

reference through lff-workflow-api

Draft

├─> Pending Verification ──> Pending Payment ──> Payment Confirmed

│ │

│ ├─> Payment Failed ──> Pending Payment (retry)

|

├─> Cancelled

└─> Expired

Payment Confirmed ──> Awaiting Fulfilment ──> In Transit ──>
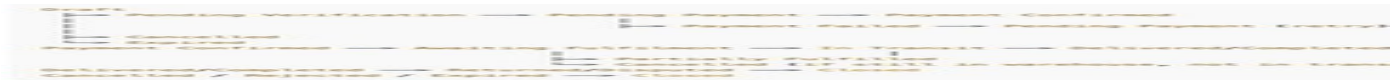
Delivered/Completed

| |

├─> Partially Fulfilled

└─> Cancelled (if still in warehouse, not in transit)

Delivered/Completed ──> Returned/Disputed ──> Closed

Cancelled / Rejected / Expired ──> Closed

Payment Failed → In Transit	Goods can't ship without confirmed payment.
Expired → Pending Payment	Expired items must be recreated, not reactivated.
Partially Fulfilled → Draft	Can only move to Awaiting Fulfilment (for remaining quantity) or Delivered.

| Returned/Disputed → In Transit | Returns/disputes are post-delivery only. |

The lff-workflow-api should centrally enforce these transition rules with role-based checks from lff-user-compliance-api.

Microservice Alignment

Microservice	Workflow Responsibilities
lff-workflow-api	Master state machine; publishes state-change events.
lff-notification-api	Sends SMS/Email/WhatsApp/Push for each significant state change.
lff-user-compliance-api	Validates KYC/AML before allowing "Pending Verification → Pending Payment".
lff-logistics-api / lff-tag-trace-api / lff-loconav-integration-api	Enforce "Awaiting Fulfilment → In Transit → Delivered".
lff-payments-integration-api / lff-smart-accounts-api	Control all payment-related transitions and reversals.
lff-customer-rewards-api	Triggers reward accrual at "Delivered/Completed".
lff-odoo-invoice-api	Auto-issues invoices at "Payment Confirmed".
lff-perm-clearing-collateral-api	Blocks order movement until permits/collateral verified.

Zimbabwe-Specific Considerations

- Currencies: ZiG & USD; support split payments and official exchange rates.

- Regulatory Holds: Certain agricultural exports need government permits. Add a "Regulatory Hold" sub-status inside Pending Verification.

- Insurance Compliance: Some livestock shipments may require insurance before In Transit.

Implementation Tips

- Event-Driven: Use Kafka topics for `order.status.changed` events consumed by all dependent services.

- Immutable Logs: `lff-workflow-api` must keep an append-only audit trail for ZIMRA/Reserve Bank compliance.

- Role-Based Guards: Integrate with `lff-user-compliance-api` to restrict who can execute transitions like "Cancel after Payment".

User Management Workflow

Status	Definition
Pending Registration	User submitted sign-up but email/phone not yet verified.
Verification Pending	Awaiting KYC/AML and ID checks (ZIMRA or national ID).
Active	Fully verified and allowed to transact.
Suspended	Temporarily disabled (fraud, inactivity, non-compliance).
Deactivated	User voluntarily closed account.
Deleted	Soft delete (GDPR/POPIA compliance).

Order Management Workflow

Allowed Transitions

```mathematica
Pending Registration ──> Verification Pending ──> Activ
```

Status	Definition
Draft	Cart saved, not submitted.
Pending Verification	Waiting for permit/collateral checks (e.g., livestock movement permit).
Pending Payment	Order verified, payment window open.
Payment Failed	Payment attempt unsuccessful.
Payment Confirmed	Funds received & matched.
Awaiting Fulfilment	Ready for warehouse pick/packing or expert service scheduling.
In Transit / Service In Progress	Shipment moving or expert service being performed.
Delivered / Completed	Buyer received goods or service finished.
Partially Fulfilled	Split shipments or partial service delivered.
Cancelled	Cancelled by buyer or system before fulfilment.
Rejected	Compliance or stock failure.
Returned / Disputed	Buyer initiated return or dispute.
Closed	Financials and any returns settled.
Expired	Payment or permit window lapsed.

Draft —> Pending Verification —> Pending Payment —> Payment Confirmed

Payment Confirmed —> Awaiting Fulfilment —> In Transit —>

Delivered/Completed —> Closed

Payment Management Workflow

Work Item Type: Payment Transaction (ZiG / USD / multi-method)

Status	Definition
Initiated	Payment request created.
Pending Authorization	Waiting for OTP, 3-D Secure, or bank approval.
Authorized	Bank/processor approved, funds not yet settled.
Captured / Settled	Funds received and posted.
Failed	Authorization or capture failed.
Refund Pending	Refund requested.
Refunded	Funds returned to payer.
Chargeback / Dispute	Buyer raised chargeback.
Closed	Fully reconciled.

Violations

Captured ⟶ Refund Pending ⟶ Refunded ⟶ Closed
Captured ⟶ Chargeback/Dispute ⟶ Closed

- Closed → /

- Failed → A

- Refunded

Microservices:

lff-payments-integration-api, lff-smart-accounts-api, lff-notification-api, lff-workflow-api.

Cross-Domain Guardrails

- Order–Payment Link:

Order cannot advance to "Awaiting Fulfilment" unless at least one related Payment

is "Captured/Settled".

- User–Order Link:

  Orders tied to Suspended/Deactivated/Deleted users auto-freeze in "On Hold" sub-status until user is Active again.

- Compliance Hold:

  If lff-user-compliance-api flags a KYC breach, transition to a Regulatory Hold status overrides all progress.

Integration Touchpoints

- Event-Driven: All services publish/consume status.changed events via Kafka (lff-workflow-api as source of truth).

- Notifications: lff-notification-api sends SMS/Email/WhatsApp/Push on each critical transition.

- Audit & Immutability: Append-only history maintained for ZIMRA and Reserve Bank of Zimbabwe compliance.

Domain	Key End States	Terminal?
User	Deleted, Deactivated	Yes
Order	Closed, Cancelled, Rejected	Yes
Payment	Closed, Failed, Refunded	Yes

Insurance Broking workflow

Below is a dedicated Insurance Broking workflow blueprint that fits naturally into your Zimbabwe-based agricultural e-commerce ecosystem and aligns with your other microservices and workflow APIs.

Work Item Type

Insurance Policy / Claim

Covers:

- Shipment Cover – protects commodities/livestock while in transit.
- Livestock Cover – mortality, theft, disease.
- Expert Services Cover – liability for agronomy/vet consultants.

Key microservices:

lff-insurance-broking-api, lff-payments-integration-api, lff-smart-accounts-api, lff-user-compliance-api, lff-notification-api, lff-workflow-api.

Insurance Policy Lifecycle & Status Definitions

Status	Definition
Quote Requested	Customer (or Order workflow) requests a policy quote.
Quote Provided	Underwriter returns pricing & terms.
Quote Accepted	Customer accepts terms; pending compliance & payment.
Pending Underwriting	Insurer performing detailed risk/permit checks.
Pending Payment	Awaiting premium payment confirmation (ZiG/USD).
Payment Failed	Attempted payment did not succeed.
Policy Active	Premium received; coverage in force.
Policy Lapsed	Renewal or instalment premium missed.
Policy Cancelled	Cancelled by customer or broker before term end.
Claim Filed	Customer submitted claim.
Claim Under Review	Adjuster investigating claim.
Claim Approved	Claim validated, ready for payout.

Claim Rejected	Claim denied (fraud or exclusion).
Claim Paid	Funds disbursed to claimant.
Closed	Policy term ended or claim fully resolved; no further action.

Allowed Transitions | Insurance Broking

Policy Creation Flow

Quote Requested → Quote Provided → Quote Accepted → Pending Underwriting → Pending Payment → Policy Active

Policy Active → Policy Lapsed → Closed

Policy Active → Policy Cancelled → Closed

Policy Active → Claim Filed → Claim Under Review

Claim Under Review → Claim Approved → Claim Paid → Closed

Claim Under Review → Claim Rejected → Closed

Transition Violations (Disallowed Paths) | Insurance Broking

From → To	Why Disallowed
Quote Requested → Policy Active	Must have quote, acceptance, and payment.
Policy Cancelled → Policy Active	Cancelled is final; needs new policy.
Closed → Any	Terminal state.
Claim Rejected → Claim Under Review	Requires new claim, not reopen.
Payment Failed → Policy Active	Must retry payment first.
Policy Lapsed → Pending Payment	Renewal creates a new cycle, not revert.

Integration Touchpoints | Insurance broking

Step	Microservice Actions
Quote generation	lff-insurance-broking-api calls external underwriter APIs.
Customer acceptance	lff-user-compliance-api checks KYC & agricultural permit obligations.
Premium payment	lff-payments-integration-api & lff-smart-accounts-api confirm funds.
Policy issuance & storage	Document stored via lff-odoo-invoice-api or Paperless-NGX (if used).
Status change notifications	lff-notification-api sends email/SMS/WhatsApp/Push to insured parties.
Claims	Adjusters update statuses through lff-insurance-broking-api; payouts triggered in lff-payments-integration-api.

Zimbabwe-Specific Considerations

- Regulatory – Policies must comply with IPEC (Insurance and Pensions Commission) rules; "Pending Underwriting" may include an IPEC Approval sub-status.
- Currency – Premiums and payouts in ZiG or USD with official RBZ exchange rates.
- Livestock Identification – Link lff-tag-trace-api data to claim validation for theft or loss.

Domain	Terminal Statuses
Insurance Policy	Closed, Policy Cancelled, Policy Lapsed
Claim	Claim Paid, Claim Rejected (both feed into Closed)

==========LFF Marketplace Project ||| FINAL Microservice API List==============

lff-notification-api (SMS, Email, Whatsapp, Push/ in-App)

lff-user-compliance-api (similar to PASA PDMS)

lff-logistics-api

lff-workflow-api

lff-customer-management-api

lff-perm-clearing-collateral-api

lff-trading-api

lff-insurance-broking-api

lff-evaluation-monitoring-api

lff-odoo-invoice-api

lff-warehouse-api

lff-ecommerce-api

lff-commodity-livestock-api

lff-tag-trace-api

lff-payments-integration-api

lff-ecommerce-api

lff-smart-accounts-api

lff-customer-rewards-api

lff-loconav-integration-api

lff-zmex-integration-api

lff-kube-cluster-configs

lff-mobile-app

lff-web-app

lff-commons

LFF Marketplace Key Modules Notes

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1.Ecommerce

-e-Store

-Abbatoir (selling of carcasses for various animals etc)

2.Rename Delivery to Logistics

3.LiveStock Tagging & Tracking

4.Invoicing [Integration with ODOO ERP] [Reconciliation]

5.Warehouse

6.Insurance Broking []

-Funeral

-Health

-Homeowners

-Commercial

-Sector Specific

-Umbrella

7.Trading

-Agricultral/Farming

-Construction

-Energy

-Engineering

-Equipment

-Fuels

-Food & Beverage

-ICT

-Irrigation

-Manufacturing

-Mining

-Power

-Service Sectors

-Water

8.LFF Customer Management

9.LFF Smart Accounts

10.LFF Customer Rewards

-Loyalty & Rewards

-Incentives, Discounts, Special Offers

11.Permits, Clearing & Collateral

12.Payments [Petros Muchato | Reconciliations]

13.Evaluation & Monitoring (Harvesting, Agric EXT workers etc)

14.User Management (Pending, Active, Revoke=[Misconduct, 3 Login Attempts, Suspended, User Roles)

15.Audit