

Software Requirements Specification (SRS)

Ntizo - Service Marketplace Platform

Document ID NTIZO-SRS-001

Version 1.0

Date 2026-01-15

Status Draft

Standard ISO/IEC/IEEE 29148:2018

1. INTRODUCTION

1.1 Purpose

This Software Requirements Specification (SRS) describes the functional and non-functional requirements for the **Ntizo Service Marketplace Platform** following ISO/IEC/IEEE 29148:2018 standard.

Intended Audience:

- Development team
- Project managers
- Quality assurance team
- Stakeholders and investors

1.2 Scope

Product Name: Ntizo

Description: Two-sided service marketplace connecting customers with verified service providers for task completion.

Objectives:

| ID | Objective |
|---------|---------------------------------------|
| OBJ-001 | Launch MVP in Mozambique |
| OBJ-002 | Onboard 1,000 providers in 6 months |
| OBJ-003 | Process 10,000 bookings in first year |
| OBJ-004 | Achieve 4.0+ average rating |
| OBJ-005 | Expand to 3 countries in 2 years |

In Scope:

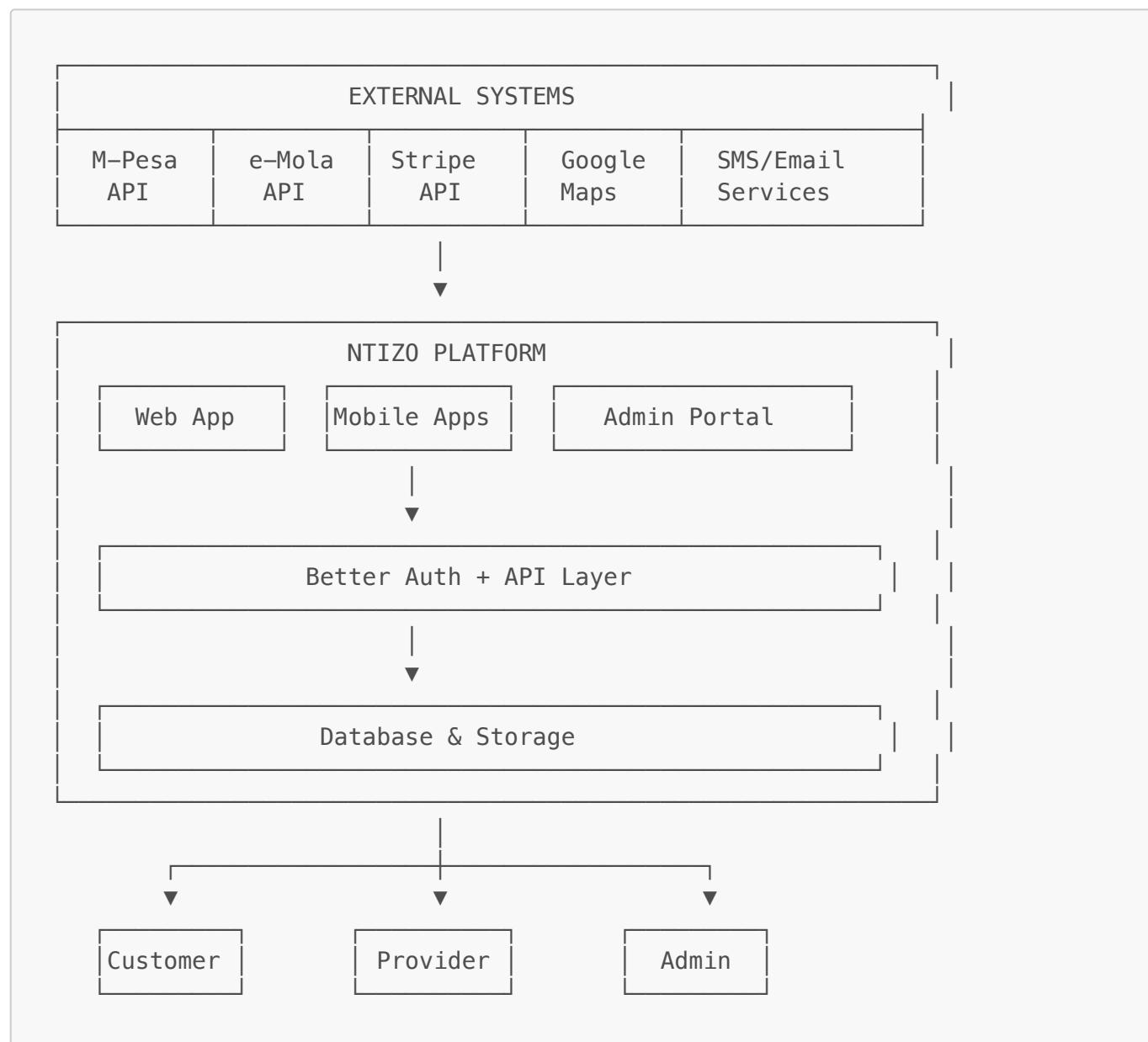
- User authentication (Better Auth)
- Service provider profiles and verification
- Service catalog and search
- Direct booking and task bidding
- In-app messaging
- Payments (M-Pesa, e-Mola, cards)
- Reviews and ratings
- Admin portal

Out of Scope:

- Physical logistics/delivery
- Employment relationships
- Financial lending
- Insurance provision

1.3 Product Overview

1.3.1 Product Perspective



1.3.2 Product Functions

| ID | Function | Description |
|-------|-----------------|----------------------|
| PF-01 | Authentication | Via Better Auth |
| PF-02 | User Management | Profiles |
| PF-03 | Service Catalog | Categories |
| PF-04 | Search | Discovery |
| PF-05 | Direct Booking | Book providers |
| PF-06 | Task Posting | Post for bids |
| PF-07 | Bidding | Provider proposals |
| PF-08 | Messaging | In-app chat |
| PF-09 | Payments | Process transactions |
| PF-10 | Payouts | Provider withdrawals |
| PF-11 | Reviews | Ratings |
| PF-12 | Verification | Provider ID |
| PF-13 | Administration | Platform management |

1.3.3 User Characteristics

| User | Description | Tech Level | Frequency |
|----------|-----------------------|-------------|-----------|
| Customer | Service seekers | Low-Medium | Weekly |
| Provider | Service professionals | Low-Medium | Daily |
| Admin | Operations staff | Medium-High | Daily |

1.3.4 Assumptions

| ID | Assumption |
|---------|---------------------------------------|
| ASM-001 | Users have Android 8+ or iOS 13+ |
| ASM-002 | Users have mobile money or bank cards |
| ASM-003 | Providers can provide valid ID |
| ASM-004 | Payment APIs available in Mozambique |

1.3.5 Dependencies

| ID | Dependency |
|---------|---------------------|
| DEP-001 | Better Auth library |

| ID | Dependency |
|---------|--------------------------|
| DEP-002 | M-Pesa API access |
| DEP-003 | e-Mola API access |
| DEP-004 | Cloud infrastructure |
| DEP-005 | Firebase Cloud Messaging |

1.4 Definitions

| Term | Definition |
|----------|---|
| Booking | Confirmed customer-provider arrangement |
| Bid | Provider proposal for a task |
| Customer | User seeking services |
| Escrow | Payment holding until completion |
| Payout | Provider withdrawal |
| Provider | User offering services |
| Task | Customer work request |

2. REFERENCES

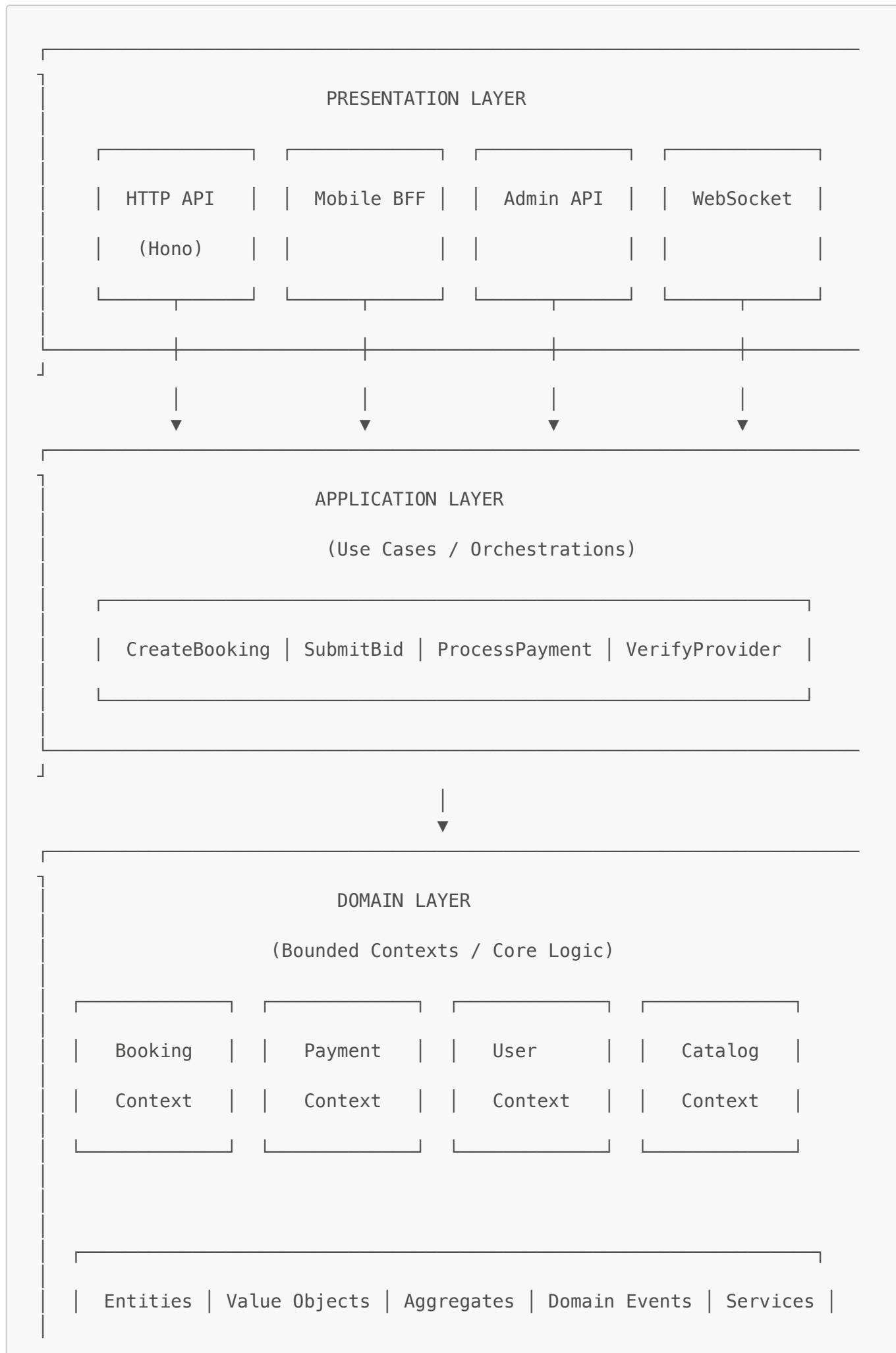
| ID | Document |
|---------|--|
| REF-001 | ISO/IEC/IEEE 29148:2018 |
| REF-002 | Better Auth Documentation |
| REF-003 | OWASP Top 10 (2021) |
| REF-004 | PCI DSS v4.0 |
| REF-005 | Onion-Lasagna Architecture (github.com/Cosmneo/onion-lasagna) |
| REF-006 | Domain-Driven Design (Eric Evans) |

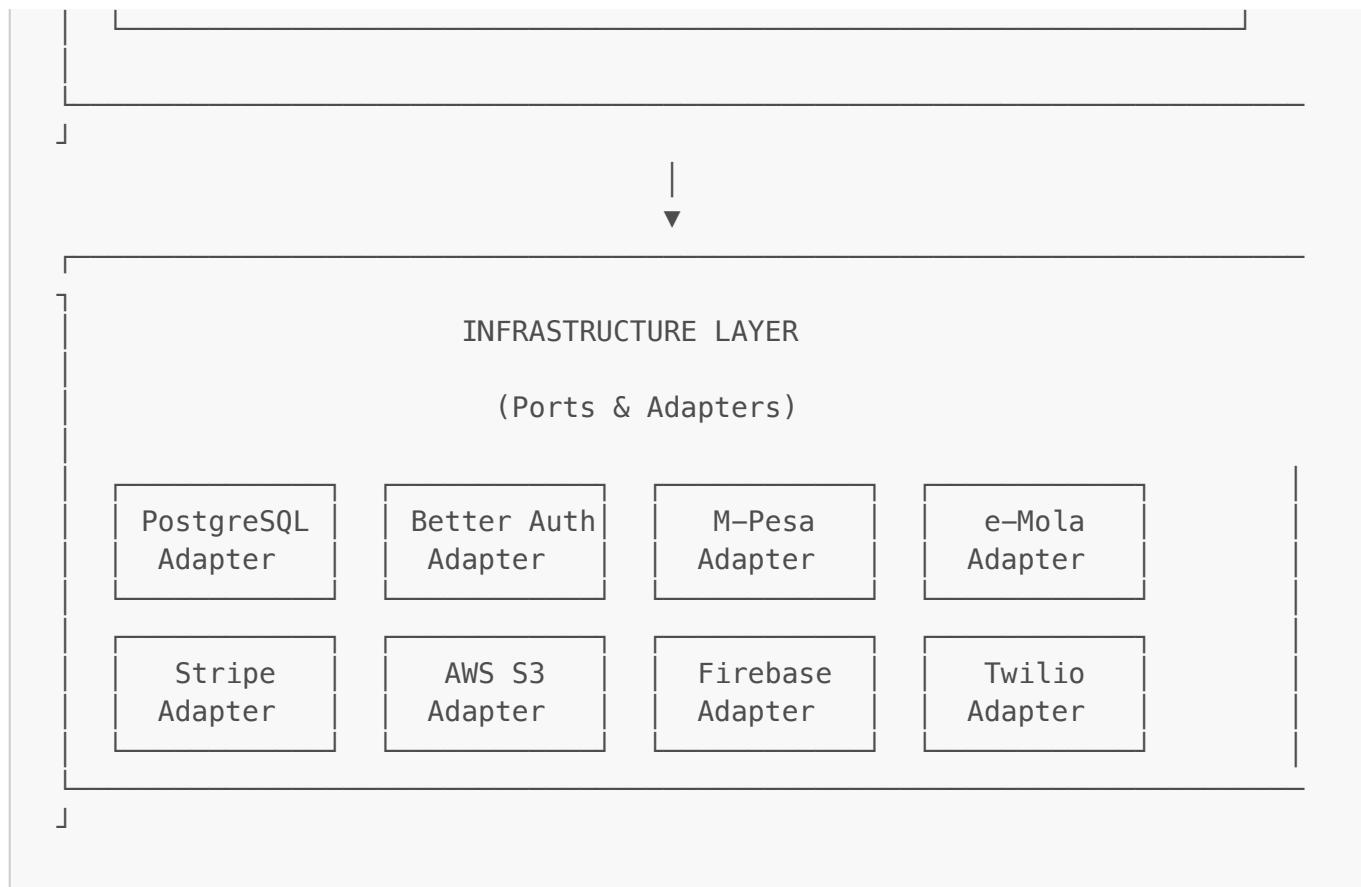
3. SPECIFIC REQUIREMENTS

3.0 Architecture Requirements

3.0.1 Architecture Pattern

The system shall implement **Hexagonal Architecture** (Ports & Adapters) using the **onion-lasagna** library, following Domain-Driven Design (DDD) principles.





3.0.2 Bounded Contexts

| Context | Responsibility | Key Aggregates |
|---------------|--|-------------------------------------|
| User | Authentication, profiles, verification | User, ProviderProfile |
| Catalog | Services, categories, search | ServiceCategory, Service |
| Booking | Bookings, tasks, bids, lifecycle | Booking, TaskPost, Bid |
| Payment | Transactions, escrow, payouts | Payment, Payout, Wallet |
| Communication | Messaging, notifications | Conversation, Message, Notification |
| Review | Ratings, reviews | Review |

3.0.3 Domain Model

Aggregates

| Aggregate | Root Entity | Entities | Value Objects |
|-----------|-------------|-----------------|---|
| User | User | ProviderProfile | Email, Phone, UserId, Name |
| Booking | Booking | - | BookingId, BookingStatus, Location, Money |
| TaskPost | TaskPost | Bid | TaskId, BidId, Budget |
| Payment | Payment | - | PaymentId, PaymentMethod, Money, Currency |

| Aggregate | Root Entity | Entities | Value Objects |
|-----------------|-----------------|----------|---------------------------|
| Payout | Payout | - | PayoutId, PayoutMethod |
| Conversation | Conversation | Message | ConversationId, MessageId |
| Review | Review | - | ReviewId, Rating |
| ServiceCategory | ServiceCategory | Service | CategoryId, ServiceId |

Value Objects (using onion-lasagna built-ins)

| Value Object | Type | Validation |
|--------------------|--------|---|
| UserId | UUID | onion-lasagna UUID |
| Email | Email | onion-lasagna Email |
| Phone | Text | +258 format, validated |
| Money | Custom | Amount + Currency (MZN) |
| Location | Custom | Address + Lat + Lng |
| Rating | Number | 1-5 range |
| BookingStatus | Enum | pending, confirmed, in_progress, completed, cancelled, disputed |
| PaymentStatus | Enum | pending, processing, completed, failed, refunded |
| VerificationStatus | Enum | pending, verified, rejected |

Domain Events

| Event | Trigger | Handlers |
|------------------|--------------------------|-----------------------------------|
| UserRegistered | New user created | Send welcome email, create wallet |
| ProviderVerified | Admin approves provider | Update profile, send notification |
| BookingCreated | Customer creates booking | Notify provider, hold payment |
| BookingConfirmed | Provider accepts | Block calendar, notify customer |
| BookingStarted | Provider marks started | Update status, notify customer |
| BookingCompleted | Provider marks done | Start confirmation timer |
| BookingCancelled | Either party cancels | Process refund, update calendar |
| PaymentProcessed | Payment succeeds | Update booking, send receipt |
| PaymentFailed | Payment fails | Notify customer, cancel booking |
| PayoutRequested | Provider requests payout | Process payout |
| PayoutCompleted | Payout succeeds | Update wallet, notify provider |

| Event | Trigger | Handlers |
|-----------------|----------------------|---------------------------------|
| TaskPosted | Customer posts task | Notify matching providers |
| BidSubmitted | Provider bids | Notify customer |
| BidAccepted | Customer accepts bid | Create booking, reject others |
| ReviewSubmitted | User submits review | Update ratings, notify reviewee |
| MessageSent | User sends message | Push notification |

3.0.4 Application Layer (Use Cases)

User Context

| Use Case | Input | Output | Events |
|-----------------------|-----------------------------|---------------------|------------------|
| RegisterUser | email/phone, password, name | User | UserRegistered |
| LoginUser | credentials | Session | - |
| UpdateProfile | userId, profileData | User | - |
| CreateProviderProfile | userId, providerData | ProviderProfile | - |
| SubmitVerification | providerId, documents | VerificationRequest | - |
| ApproveVerification | providerId, adminId | ProviderProfile | ProviderVerified |
| RejectVerification | providerId, adminId, reason | ProviderProfile | - |

Booking Context

| Use Case | Input | Output | Events |
|---------------------|---------------------------------|----------|------------------|
| CreateDirectBooking | customerId, providerId, details | Booking | BookingCreated |
| ConfirmBooking | bookingId, providerId | Booking | BookingConfirmed |
| DeclineBooking | bookingId, providerId, reason | Booking | BookingCancelled |
| StartBooking | bookingId, providerId | Booking | BookingStarted |
| CompleteBooking | bookingId, providerId | Booking | BookingCompleted |
| ConfirmCompletion | bookingId, customerId | Booking | PaymentReleased |
| DisputeBooking | bookingId, customerId, reason | Dispute | BookingDisputed |
| CancelBooking | bookingId, userId, reason | Booking | BookingCancelled |
| PostTask | customerId, taskData | TaskPost | TaskPosted |
| SubmitBid | taskId, providerId, bidData | Bid | BidSubmitted |

| Use Case | Input | Output | Events |
|-------------|-------------------|---------|-----------------------------|
| AcceptBid | bidId, customerId | Booking | BidAccepted, BookingCreated |
| WithdrawBid | bidId, providerId | Bid | - |

Payment Context

| Use Case | Input | Output | Events |
|------------------|----------------------------|-------------|------------------|
| AuthorizePayment | bookingId, paymentMethod | PaymentAuth | - |
| ProcessPayment | paymentAuthId | Payment | PaymentProcessed |
| RefundPayment | paymentId, amount, reason | Refund | PaymentRefunded |
| AddTip | bookingId, amount | Payment | TipAdded |
| RequestPayout | providerId, amount, method | Payout | PayoutRequested |
| ProcessPayout | payoutId | Payout | PayoutCompleted |

Communication Context

| Use Case | Input | Output | Events |
|------------------|-----------------------------------|--------------|-------------|
| SendMessage | conversationId, senderId, content | Message | MessageSent |
| GetConversation | conversationId, userId | Conversation | - |
| MarkAsRead | conversationId, userId | - | - |
| SendNotification | userId, notification | Notification | - |

Review Context

| Use Case | Input | Output | Events |
|-----------------|-----------------------------------|--------|-----------------|
| SubmitReview | bookingId, reviewerId, reviewData | Review | ReviewSubmitted |
| RespondToReview | reviewId, providerId, response | Review | - |
| ReportReview | reviewId, reporterId, reason | Report | - |

3.0.5 Infrastructure Ports (Interfaces)

Repository Ports

```
// Domain defines these interfaces (ports)
interface UserRepository {
    findById(id: UserId): Promise<User | null>
    findByEmail(email: Email): Promise<User | null>
    findByPhone(phone: Phone): Promise<User | null>
```

```

    save(user: User): Promise<void>
    delete(id: UserId): Promise<void>
}

interface BookingRepository {
    findById(id: BookingId): Promise<Booking | null>
    findByCustomer(customerId: UserId, pagination: Pagination): Promise<Booking[]>
    findByProvider(providerId: UserId, pagination: Pagination): Promise<Booking[]>
    save(booking: Booking): Promise<void>
}

interface PaymentRepository {
    findById(id: PaymentId): Promise<Payment | null>
    findByBooking(bookingId: BookingId): Promise<Payment | null>
    save(payment: Payment): Promise<void>
}

```

External Service Ports

```

interface AuthService {
    register(data: RegisterData): Promise<User>
    login(credentials: Credentials): Promise<Session>
    logout(sessionId: string): Promise<void>
    verifyOTP(phone: Phone, otp: string): Promise<boolean>
}

interface PaymentGateway {
    authorize(amount: Money, method: PaymentMethod): Promise<PaymentAuth>
    capture(authId: string): Promise<PaymentResult>
    refund(paymentId: string, amount: Money): Promise<RefundResult>
}

interface PayoutService {
    sendMPesa(phone: Phone, amount: Money): Promise<PayoutResult>
    sendEMola(phone: Phone, amount: Money): Promise<PayoutResult>
    sendBank(account: BankAccount, amount: Money): Promise<PayoutResult>
}

interface NotificationService {
    sendPush(userId: UserId, notification: PushNotification): Promise<void>
    sendEmail(email: Email, template: EmailTemplate): Promise<void>
    sendSMS(phone: Phone, message: string): Promise<void>
}

interface StorageService {
    upload(file: File, path: string): Promise<string>
    delete(path: string): Promise<void>
    getUrl(path: string): Promise<string>
}

```

```
interface LocationService {
    geocode(address: string): Promise<Coordinates>
    reverseGeocode(coords: Coordinates): Promise<Address>
    calculateDistance(from: Coordinates, to: Coordinates): Promise<number>
}
```

3.0.6 Infrastructure Adapters

| Port | Adapter | Technology |
|---------------------|---------------------------|-----------------------------|
| AuthService | BetterAuthAdapter | Better Auth |
| UserRepository | PostgresUserRepository | PostgreSQL + Drizzle/Prisma |
| BookingRepository | PostgresBookingRepository | PostgreSQL |
| PaymentGateway | MPesaAdapter | M-Pesa API |
| PaymentGateway | EMolaAdapter | e-Mola API |
| PaymentGateway | StripeAdapter | Stripe API |
| PayoutService | MPesaPayoutAdapter | M-Pesa B2C API |
| PayoutService | EMolaPayoutAdapter | e-Mola API |
| NotificationService | FirebaseAdapter | Firebase Cloud Messaging |
| NotificationService | TwilioAdapter | Twilio SMS |
| NotificationService | SendGridAdapter | SendGrid Email |
| StorageService | S3Adapter | AWS S3 |
| LocationService | GoogleMapsAdapter | Google Maps API |

3.0.7 Error Hierarchy (onion-lasagna)

| Error Type | HTTP Status | Example |
|---------------------|-------------|--|
| NotFoundError | 404 | User not found, Booking not found |
| ConflictError | 409 | Email already registered, Bid already exists |
| ValidationError | 422 | Invalid email format, Price out of range |
| UnauthorizedError | 401 | Invalid credentials, Session expired |
| ForbiddenError | 403 | Not your booking, Provider not verified |
| DomainError | 400 | Cannot cancel completed booking |
| InfrastructureError | 500 | Database connection failed |

3.0.8 Project Structure

```
ntizo/
  └── apps/
    ├── api/                                # Main API (Hono/Elysia)
    │   └── src/
    │       ├── routes/                      # HTTP route handlers
    │       └── middleware/                 # Auth, logging, error handling
    │           └── index.ts
    └── package.json
    ├── admin/                               # Admin portal (React/Next)
    ├── mobile/                             # Mobile app (React Native)
    └── web/                                # Customer/Provider web app

  └── packages/
    └── domain/                            # Domain layer (framework-agnostic)
      └── src/
        ├── user/                           # Entities, Value Objects, Events, Port interfaces
        │   ├── entities/
        │   ├── value-objects/
        │   ├── events/
        │   └── repositories/    # Port interfaces
        │       └── index.ts
        ├── booking/
        ├── payment/
        ├── catalog/
        ├── communication/
        ├── review/
        └── package.json

    └── application/                      # Application layer (use cases)
      └── src/
        ├── user/
        │   ├── register-user.ts
        │   ├── create-provider-profile.ts
        │   └── index.ts
        ├── booking/
        ├── payment/
        └── ...
      └── package.json

    └── infrastructure/                  # Infrastructure layer (adapters)
      └── src/
        ├── database/
        │   ├── schema/
        │   ├── repositories/
        │   └── migrations/
        ├── auth/
        │   └── better-auth-adapter.ts
        ├── payment/
        │   ├── mpesa-adapter.ts
        │   ├── emola-adapter.ts
        │   └── stripe-adapter.ts
        ├── notification/
        └── storage/
```

```

    └── location/
        └── package.json

    ├── contracts/          # Shared API contracts (onion-lasagna)
    │   └── src/
    │       ├── user.contract.ts
    │       ├── booking.contract.ts
    │       └── ...
    └── package.json

    └── shared/             # Shared utilities
        └── src/
            ├── value-objects/
            ├── errors/
            └── utils/
        └── package.json

    └── turbo.json           # Turbo monorepo config
    └── package.json
    └── bun.lockb

```

3.0.9 Technology Stack

| Layer | Technology | Rationale |
|----------------------|---------------------|------------------------------|
| Runtime | Bun | Fast, TypeScript-native |
| Monorepo | Turborepo | Build optimization |
| API Framework | Hono | Lightweight, edge-compatible |
| Validation | Zod | Runtime type checking |
| Database | Neon PostgreSQL | Serverless, auto-scaling |
| ORM | Drizzle | Type-safe, performant |
| Auth | Better Auth | Full-featured, TypeScript |
| Architecture | onion-lasagna | DDD building blocks |
| Mobile | React Native | Cross-platform |
| Web | Next.js | SSR, React |
| State | TanStack Query | Server state management |
| Deployment | Vercel / Cloudflare | Serverless, edge |
| Cache | Upstash Redis | Serverless Redis |
| Queue | Inngest / QStash | Serverless background jobs |
| Storage | Cloudflare R2 / S3 | Object storage |
| WebSockets | Ably / Pusher | Real-time messaging |

3.1 External Interfaces

3.1.1 User Interfaces

| ID | Interface |
|--------|-----------------------------------|
| UI-001 | Customer Mobile App (iOS/Android) |
| UI-002 | Provider Mobile App (iOS/Android) |
| UI-003 | Customer Web App |
| UI-004 | Provider Web App |
| UI-005 | Admin Portal |

3.1.2 Software Interfaces

| ID | Interface | Purpose |
|--------|-----------------|--------------------|
| SW-001 | Better Auth | Authentication |
| SW-002 | M-Pesa API | Mobile money |
| SW-003 | e-Mola API | Mobile money |
| SW-004 | Stripe API | Card payments |
| SW-005 | Google Maps API | Location |
| SW-006 | Firebase CM | Push notifications |
| SW-007 | Twilio | SMS |
| SW-008 | SendGrid | Email |
| SW-009 | AWS S3 | File storage |

3.2 Functional Requirements

3.2.1 Authentication (Better Auth)

| ID | Requirement | Priority |
|-------------|--|----------|
| FR-AUTH-001 | The system shall implement Better Auth for authentication | High |
| FR-AUTH-002 | The system shall allow email registration | High |
| FR-AUTH-003 | The system shall allow phone registration | High |
| FR-AUTH-004 | The system shall support social login (Google, Facebook, Apple) | Medium |
| FR-AUTH-005 | The system shall send OTP for phone verification | High |
| FR-AUTH-006 | The system shall send email verification | High |
| FR-AUTH-007 | The system shall require password min 8 chars with letter and number | High |

| ID | Requirement | Priority |
|-------------|---|----------|
| FR-AUTH-008 | The system shall support passwordless OTP login | Medium |
| FR-AUTH-009 | The system shall lock account after 5 failed attempts | High |
| FR-AUTH-010 | The system shall support password reset via email/SMS | High |
| FR-AUTH-011 | The system shall manage sessions via Better Auth | High |
| FR-AUTH-012 | The system shall expire sessions after 7 days inactivity | High |
| FR-AUTH-013 | The system shall invalidate sessions on logout | High |
| FR-AUTH-014 | The system shall implement RBAC (customer, provider, admin) | High |

3.2.2 User Profile

| ID | Requirement | Priority |
|-------------|--|----------|
| FR-PROF-001 | The system shall allow profile creation with name and photo | High |
| FR-PROF-002 | The system shall allow multiple verified phones | Medium |
| FR-PROF-003 | The system shall allow multiple verified emails | Medium |
| FR-PROF-004 | The system shall allow setting primary contact | Medium |
| FR-PROF-005 | The system shall allow profile updates | High |
| FR-PROF-006 | The system shall resize images to max 1MB | High |
| FR-PROF-007 | The system shall support account deletion (30-day retention) | High |

3.2.3 Provider Profile

| ID | Requirement | Priority |
|-------------|---|----------|
| FR-PROV-001 | The system shall allow provider registration | High |
| FR-PROV-002 | The system shall require bio (min 50 chars) | High |
| FR-PROV-003 | The system shall allow portfolio images (max 10) | High |
| FR-PROV-004 | The system shall allow service category selection | High |
| FR-PROV-005 | The system shall allow hourly or fixed pricing | High |
| FR-PROV-006 | The system shall allow service area definition | High |
| FR-PROV-007 | The system shall allow availability schedule | High |
| FR-PROV-008 | The system shall allow date blocking | Medium |
| FR-PROV-009 | The system shall allow instant booking toggle | Medium |
| FR-PROV-010 | The system shall display average rating | High |

| ID | Requirement | Priority |
|-------------|---|----------|
| FR-PROV-011 | The system shall display completed task count | High |
| FR-PROV-012 | The system shall display verification badges | High |

3.2.4 Provider Verification

| ID | Requirement | Priority |
|------------|--|----------|
| FR-VER-001 | The system shall require government ID upload | High |
| FR-VER-002 | The system shall accept BI, passport, license | High |
| FR-VER-003 | The system shall accept front and back images | High |
| FR-VER-004 | The system shall encrypt stored documents | High |
| FR-VER-005 | The system shall queue for admin review | High |
| FR-VER-006 | The system shall notify verification status | High |
| FR-VER-007 | The system shall allow admin approve/reject | High |
| FR-VER-008 | The system shall allow re-submission if rejected | High |
| FR-VER-009 | The system shall display "Verified" badge | High |

3.2.5 Service Catalog

| ID | Requirement | Priority |
|------------|---|----------|
| FR-CAT-001 | The system shall support hierarchical categories | High |
| FR-CAT-002 | The system shall allow admin CRUD on categories | High |
| FR-CAT-003 | The system shall support category icons and order | Medium |
| FR-CAT-004 | The system shall allow enable/disable categories | High |

Service Categories:

| Category | Subcategories |
|---------------|---|
| Home Cleaning | Regular, Deep, Move-in/out |
| Repairs | Plumbing, Electrical, General, Painting |
| Assembly | Furniture, TV mounting, Appliances |
| Moving | Home, Office, Delivery |
| Gardening | Lawn, Garden, Trees |
| Personal | Assistant, Errands, Shopping |
| Events | Planning, Catering, Photography |

| Category | Subcategories |
|--------------|--------------------------------|
| Beauty | Hair, Makeup, Massage |
| Tutoring | Academic, Language, Music |
| Technology | Computer, Tech support, Web |
| Professional | Accounting, Legal, Translation |
| Automotive | Washing, Repairs, Driver |

3.2.6 Search and Discovery

| ID | Requirement | Priority |
|-------------|--|----------|
| FR-SRCH-001 | The system shall allow keyword search | High |
| FR-SRCH-002 | The system shall allow category browsing | High |
| FR-SRCH-003 | The system shall allow location filter | High |
| FR-SRCH-004 | The system shall allow distance filter | High |
| FR-SRCH-005 | The system shall allow price range filter | Medium |
| FR-SRCH-006 | The system shall allow rating filter | Medium |
| FR-SRCH-007 | The system shall allow verification filter | Medium |
| FR-SRCH-008 | The system shall allow availability filter | Medium |
| FR-SRCH-009 | The system shall support sorting | Medium |
| FR-SRCH-010 | The system shall paginate (20/page) | High |

3.2.7 Direct Booking

| ID | Requirement | Priority |
|-------------|--|----------|
| FR-BOOK-001 | The system shall allow direct booking from profile | High |
| FR-BOOK-002 | The system shall display availability calendar | High |
| FR-BOOK-003 | The system shall allow date/time selection | High |
| FR-BOOK-004 | The system shall allow location entry | High |
| FR-BOOK-005 | The system shall allow GPS location | High |
| FR-BOOK-006 | The system shall allow saving addresses | Medium |
| FR-BOOK-007 | The system shall allow task description (1000 chars) | High |
| FR-BOOK-008 | The system shall allow image attachments (max 5) | Medium |
| FR-BOOK-009 | The system shall calculate total price | High |

| ID | Requirement | Priority |
|-------------|--|----------|
| FR-BOOK-010 | The system shall display price breakdown | High |
| FR-BOOK-011 | The system shall require payment authorization | High |
| FR-BOOK-012 | The system shall send to provider for confirmation | High |
| FR-BOOK-013 | The system shall allow accept/decline (24h) | High |
| FR-BOOK-014 | The system shall auto-cancel on timeout | High |
| FR-BOOK-015 | The system shall notify booking status | High |
| FR-BOOK-016 | The system shall block calendar on confirmation | High |

3.2.8 Task Posting and Bidding

| ID | Requirement | Priority |
|-------------|--|----------|
| FR-TASK-001 | The system shall allow task posting | High |
| FR-TASK-002 | The system shall require title (100 chars) | High |
| FR-TASK-003 | The system shall require description (20-2000 chars) | High |
| FR-TASK-004 | The system shall require category | High |
| FR-TASK-005 | The system shall require location | High |
| FR-TASK-006 | The system shall allow optional date/time | High |
| FR-TASK-007 | The system shall allow optional budget range | Medium |
| FR-TASK-008 | The system shall allow images (max 5) | Medium |
| FR-TASK-009 | The system shall publish to matching providers | High |
| FR-TASK-010 | The system shall allow providers to browse tasks | High |
| FR-TASK-011 | The system shall allow bid submission | High |
| FR-TASK-012 | The system shall require bid price | High |
| FR-TASK-013 | The system shall require bid message (20 chars) | High |
| FR-TASK-014 | The system shall allow alternative date in bid | Medium |
| FR-TASK-015 | The system shall notify customer of bids | High |
| FR-TASK-016 | The system shall display all bids | High |
| FR-TASK-017 | The system shall allow accepting one bid | High |
| FR-TASK-018 | The system shall reject others on acceptance | High |
| FR-TASK-019 | The system shall convert accepted bid to booking | High |
| FR-TASK-020 | The system shall allow closing without accepting | Medium |

| ID | Requirement | Priority |
|-------------|---|----------|
| FR-TASK-021 | The system shall auto-expire after 7 days | Medium |
| FR-TASK-022 | The system shall allow bid withdrawal | Medium |

3.2.9 Booking Lifecycle

| ID | Requirement | Priority |
|-------------|--|----------|
| FR-LIFE-001 | The system shall track status: pending, confirmed, in_progress, completed, cancelled, disputed | High |
| FR-LIFE-002 | The system shall allow marking "started" | High |
| FR-LIFE-003 | The system shall record start timestamp | High |
| FR-LIFE-004 | The system shall allow marking "completed" | High |
| FR-LIFE-005 | The system shall record completion timestamp | High |
| FR-LIFE-006 | The system shall require customer confirmation (24h) | High |
| FR-LIFE-007 | The system shall auto-confirm after 24h | High |
| FR-LIFE-008 | The system shall release payment on confirmation | High |
| FR-LIFE-009 | The system shall allow dispute within 24h | High |
| FR-LIFE-010 | The system shall allow cancellation before start | High |
| FR-LIFE-011 | The system shall apply cancellation policy | High |
| FR-LIFE-012 | The system shall allow provider cancellation | High |
| FR-LIFE-013 | The system shall track cancellation rate | Medium |
| FR-LIFE-014 | The system shall send reminders (24h, 1h) | Medium |

Cancellation Policy:

| Time Before | Refund | Provider Penalty |
|--------------------|---------------|-------------------------|
| 24+ hours | 100% | None |
| 12-24 hours | 75% | None |
| 2-12 hours | 50% | None |
| < 2 hours | 0% | None |
| Provider cancels | 100% | Rate impact |

3.2.10 Communication

| ID | Requirement | Priority |
|-------------|--|-----------------|
| FR-COMM-001 | The system shall provide in-app messaging | High |
| FR-COMM-002 | The system shall create conversation on confirmation | High |
| FR-COMM-003 | The system shall allow text (2000 chars) | High |
| FR-COMM-004 | The system shall allow images (5MB) | Medium |
| FR-COMM-005 | The system shall display timestamps | High |
| FR-COMM-006 | The system shall show read status | Medium |
| FR-COMM-007 | The system shall send push for messages | High |
| FR-COMM-008 | The system shall preserve history 12 months | High |
| FR-COMM-009 | The system shall support dispute evidence | High |
| FR-COMM-010 | The system shall warn on contact sharing | Medium |
| FR-COMM-011 | The system shall allow reporting messages | High |

3.2.11 Payments

| ID | Requirement | Priority |
|------------|---|-----------------|
| FR-PAY-001 | The system shall support M-Pesa | High |
| FR-PAY-002 | The system shall support e-Mola | High |
| FR-PAY-003 | The system shall support Visa/Mastercard | High |
| FR-PAY-004 | The system shall allow saving payment methods | Medium |
| FR-PAY-005 | The system shall process in MZN | High |
| FR-PAY-006 | The system shall hold in escrow | High |
| FR-PAY-007 | The system shall release on completion | High |
| FR-PAY-008 | The system shall deduct platform commission | High |

| ID | Requirement | Priority |
|------------|--|----------|
| FR-PAY-009 | The system shall apply configurable commission | High |
| FR-PAY-010 | The system shall display earnings breakdown | High |
| FR-PAY-011 | The system shall support tipping | Medium |
| FR-PAY-012 | The system shall pass 100% tips to provider | Medium |
| FR-PAY-013 | The system shall process refunds per policy | High |
| FR-PAY-014 | The system shall generate receipts | High |
| FR-PAY-015 | The system shall maintain transaction history | High |

3.2.12 Provider Payouts

| ID | Requirement | Priority |
|-------------|--|----------|
| FR-POUT-001 | The system shall track balance (pending/available) | High |
| FR-POUT-002 | The system shall move to available on completion | High |
| FR-POUT-003 | The system shall allow payout requests | High |
| FR-POUT-004 | The system shall support M-Pesa payouts | High |
| FR-POUT-005 | The system shall support e-Mola payouts | High |
| FR-POUT-006 | The system shall support bank payouts | Medium |
| FR-POUT-007 | The system shall enforce minimum threshold | High |
| FR-POUT-008 | The system shall process within 2 business days | High |
| FR-POUT-009 | The system shall notify on processing | High |
| FR-POUT-010 | The system shall provide payout history | Medium |

3.2.13 Reviews and Ratings

| ID | Requirement | Priority |
|------------|---|----------|
| FR-REV-001 | The system shall prompt review after completion | High |
| FR-REV-002 | The system shall allow 1-5 star rating | High |
| FR-REV-003 | The system shall allow text review (500 chars) | High |
| FR-REV-004 | The system shall allow aspect ratings | Medium |
| FR-REV-005 | The system shall allow provider to rate customer | Medium |
| FR-REV-006 | The system shall limit to 7 days after completion | High |
| FR-REV-007 | The system shall display on profile | High |

| ID | Requirement | Priority |
|------------|--|----------|
| FR-REV-008 | The system shall calculate average rating | High |
| FR-REV-009 | The system shall allow provider response | Medium |
| FR-REV-010 | The system shall allow reporting reviews | Medium |
| FR-REV-011 | The system shall not allow editing reviews | High |

3.2.14 Notifications

| ID | Requirement | Priority |
|------------|--|----------|
| FR-NOT-001 | The system shall send push for critical events | High |
| FR-NOT-002 | The system shall send email for bookings | High |
| FR-NOT-003 | The system shall send SMS (optional) | Medium |
| FR-NOT-004 | The system shall allow preferences | Medium |
| FR-NOT-005 | The system shall maintain notification center | High |
| FR-NOT-006 | The system shall track read/unread | Medium |

Notification Matrix:

| Event | Push | Email | SMS |
|--------------|------|-------|-----|
| New booking | ✓ | ✓ | ✓ |
| Confirmed | ✓ | ✓ | ✓ |
| Cancelled | ✓ | ✓ | ✓ |
| New message | ✓ | - | - |
| New bid | ✓ | ✓ | - |
| Bid accepted | ✓ | ✓ | ✓ |
| Task started | ✓ | - | - |
| Completed | ✓ | ✓ | - |
| Payment | ✓ | ✓ | - |
| Payout | ✓ | ✓ | ✓ |
| New review | ✓ | ✓ | - |
| Verification | ✓ | ✓ | ✓ |
| Reminder | ✓ | - | ✓ |

3.2.15 Administration

| ID | Requirement | Priority |
|------------|---|----------|
| FR-ADM-001 | The system shall provide dashboard with metrics | High |
| FR-ADM-002 | The system shall display KPIs | High |
| FR-ADM-003 | The system shall allow user search/view | High |
| FR-ADM-004 | The system shall allow user suspension | High |
| FR-ADM-005 | The system shall allow reactivation | High |
| FR-ADM-006 | The system shall allow deletion (soft) | Medium |
| FR-ADM-007 | The system shall provide verification queue | High |
| FR-ADM-008 | The system shall allow approve/reject | High |
| FR-ADM-009 | The system shall allow category management | High |
| FR-ADM-010 | The system shall allow booking viewing | Medium |
| FR-ADM-011 | The system shall provide dispute queue | Medium |
| FR-ADM-012 | The system shall allow dispute resolution | Medium |
| FR-ADM-013 | The system shall allow payout management | High |
| FR-ADM-014 | The system shall allow configuration | Medium |
| FR-ADM-015 | The system shall maintain audit log | Medium |
| FR-ADM-016 | The system shall support admin roles | Medium |

3.3 Usability Requirements

| ID | Requirement | Target |
|-------------|----------------------------------|---------|
| NFR-USE-001 | Registration time | < 3 min |
| NFR-USE-002 | Booking time | < 5 min |
| NFR-USE-003 | Consistent navigation | - |
| NFR-USE-004 | Standard UI conventions | - |
| NFR-USE-005 | Clear error messages | - |
| NFR-USE-006 | Session during connectivity loss | - |

3.4 Performance Requirements

| ID | Requirement | Target |
|--------------|--------------------|---------|
| NFR-PERF-001 | App load (3G) | < 3s |
| NFR-PERF-002 | API response (p95) | < 500ms |

| ID | Requirement | Target |
|--------------|--------------------|-----------|
| NFR-PERF-003 | Search results | < 2s |
| NFR-PERF-004 | Payment processing | < 10s |
| NFR-PERF-005 | Concurrent users | 10,000 |
| NFR-PERF-006 | API requests/sec | 1,000 |
| NFR-PERF-007 | Push delivery | < 5s |
| NFR-PERF-008 | Image upload (5MB) | < 10s |
| NFR-PERF-009 | Database scale | 1M+ users |

3.5 Database Requirements

3.5.1 Data Entities

| Entity | Retention |
|--------------------|--------------------|
| User (Better Auth) | Lifetime + 30 days |
| ProviderProfile | Lifetime |
| ServiceCategory | Permanent |
| Service | Lifetime |
| TaskPost | 2 years |
| Bid | 2 years |
| Booking | 7 years |
| Payment | 7 years |
| Payout | 7 years |
| Message | 12 months |
| Review | Lifetime |
| Notification | 90 days |

3.5.2 Entity Definitions

```

USER (Better Auth)
└── id, email, emailVerified, phone, phoneVerified
└── name, image, role
└── createdAt, updatedAt

PROVIDER_PROFILE
└── id, userId, bio, hourlyRate
└── serviceAreas, skills, portfolioImages
  
```

```
    └── idDocumentUrl, verificationStatus
    └── averageRating, totalReviews, totalCompletedTasks
    └── instantBooking, createdAt, updatedAt

SERVICE_CATEGORY
└── id, name, nameEn, description
└── iconUrl, parentId, isActive, sortOrder
└── createdAt, updatedAt

SERVICE
└── id, providerId, categoryId
└── title, description, priceType, price
└── durationEstimate, isActive, createdAt

TASK_POST
└── id, customerId, categoryId
└── title, description, location (address, lat, lng)
└── preferredDate, preferredTime, budget (min, max)
└── images, status
└── createdAt, updatedAt, expiresAt

BID
└── id, taskId, providerId
└── proposedPrice, message
└── proposedDate, proposedTime, status
└── createdAt, updatedAt

BOOKING
└── id, customerId, providerId
└── serviceId, taskId, bidId
└── scheduledDate, scheduledTime, durationHours
└── location (address, lat, lng), description, images
└── totalAmount, platformFee, providerEarnings, tipAmount
└── status, startedAt, completedAt, customerConfirmedAt
└── cancelledAt, cancellationReason, createdAt

PAYMENT
└── id, bookingId, payerId
└── amount, currency, paymentMethod
└── providerReference, status
└── paidAt, refundedAt, createdAt

PAYOUT
└── id, providerId, amount, currency
└── method, destination, status
└── processedAt, failureReason, createdAt

MESSAGE
└── id, conversationId, senderId, receiverId
└── bookingId, content, imageUrl
└── isRead, readAt, createdAt

REVIEW
└── id, bookingId, reviewerId, revieweeId
```

```

    └── rating, punctualityRating, qualityRating
    └── communicationRating, comment
    └── response, respondedAt, createdAt

NOTIFICATION
└── id, userId, type, title
└── message, data, isRead
└── readAt, createdAt

```

3.6 Design Constraints

| ID | Constraint | Rationale |
|-------------|--|----------------------------------|
| NFR-CON-001 | Hexagonal Architecture (onion-lasagna) | Clean separation, testability |
| NFR-CON-002 | Domain-Driven Design patterns | Complex domain modeling |
| NFR-CON-003 | Bun runtime | Performance, TypeScript-native |
| NFR-CON-004 | Turborepo monorepo | Build optimization, code sharing |
| NFR-CON-005 | Hono API framework | Lightweight, edge-compatible |
| NFR-CON-006 | Better Auth for authentication | Full-featured, TypeScript |
| NFR-CON-007 | Zod for validation | Runtime type checking |
| NFR-CON-008 | PostgreSQL (serverless) + Drizzle ORM | Neon/Supabase/PlanetScale |
| NFR-CON-009 | React Native for mobile | Cross-platform |
| NFR-CON-010 | Next.js for web | SSR, React ecosystem |
| NFR-CON-011 | Serverless deployment | No container management |
| NFR-CON-012 | Edge-first architecture | Low latency, global |
| NFR-CON-013 | PCI DSS compliance | Payment security |

3.6.1 Serverless Infrastructure

| Component | Service Options |
|------------|--|
| API | Vercel Functions, Cloudflare Workers, AWS Lambda |
| Database | Neon (PostgreSQL), Supabase, PlanetScale |
| Storage | Cloudflare R2, AWS S3, Supabase Storage |
| Auth | Better Auth (self-hosted on serverless) |
| Queue/Jobs | Upstash Qstash, Inngest, Trigger.dev |
| Caching | Upstash Redis, Vercel KV |

| Component | Service Options |
|------------|--------------------------|
| WebSockets | Ably, Pusher, PartyKit |
| Email | Resend, SendGrid |
| SMS | Twilio |
| Push | Firebase Cloud Messaging |

3.7 System Attributes

3.7.1 Reliability

| ID | Requirement | Target |
|-------------|---------------------------|----------|
| NFR-REL-001 | Uptime | 99.9% |
| NFR-REL-002 | MTTR | < 1 hour |
| NFR-REL-003 | Graceful failure handling | - |
| NFR-REL-004 | Auto failover | - |

3.7.2 Security

| ID | Requirement |
|-------------|------------------------------|
| NFR-SEC-001 | TLS 1.2+ for transit |
| NFR-SEC-002 | AES-256 at rest |
| NFR-SEC-003 | Better Auth password hashing |
| NFR-SEC-004 | Better Auth sessions |
| NFR-SEC-005 | Rate limiting |
| NFR-SEC-006 | Input validation |
| NFR-SEC-007 | CSRF protection |
| NFR-SEC-008 | SQL injection prevention |
| NFR-SEC-009 | Auth logging |
| NFR-SEC-010 | Admin audit logging |
| NFR-SEC-011 | OWASP Top 10 compliance |

3.7.3 Scalability

| ID | Requirement |
|-------------|--------------------|
| NFR-SCL-001 | Horizontal scaling |

| ID | Requirement |
|-------------|------------------------|
| NFR-SCL-002 | Database read replicas |
| NFR-SCL-003 | Redis caching |
| NFR-SCL-004 | CDN for assets |
| NFR-SCL-005 | Multi-region support |
| NFR-SCL-006 | Message queues |

3.7.4 Maintainability

| ID | Requirement |
|-------------|--------------------------|
| NFR-MNT-001 | > 80% documentation |
| NFR-MNT-002 | Comprehensive logging |
| NFR-MNT-003 | Semantic versioning |
| NFR-MNT-004 | Feature flags |
| NFR-MNT-005 | Zero-downtime migrations |
| NFR-MNT-006 | > 70% test coverage |
| NFR-MNT-007 | CI/CD pipeline |

3.8 Localization

| ID | Requirement |
|-------------|---------------------------------|
| NFR-LOC-001 | Portuguese (pt-MZ) primary |
| NFR-LOC-002 | English secondary |
| NFR-LOC-003 | MZN currency |
| NFR-LOC-004 | Format: X.XXX,XX MZN |
| NFR-LOC-005 | Timezone: Africa/Maputo (UTC+2) |
| NFR-LOC-006 | Date: DD/MM/YYYY |
| NFR-LOC-007 | Time: 24-hour |
| NFR-LOC-008 | Phone: +258 XX XXX XXXX |

4. VERIFICATION

4.1 Methods

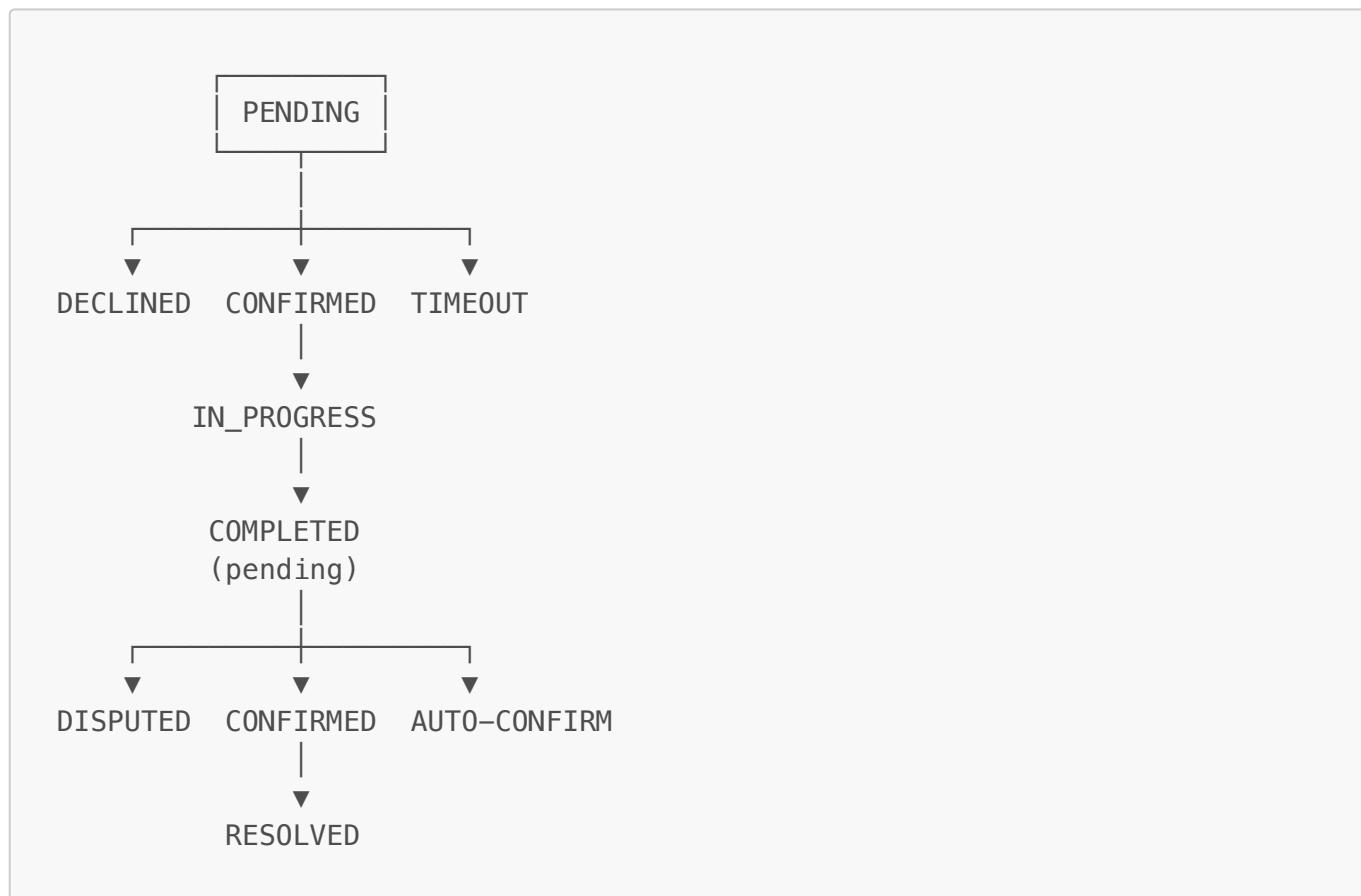
| Method | Description |
|---------------|--------------------|
| Test | Execute test cases |
| Inspection | Manual review |
| Analysis | System evaluation |
| Demonstration | Operational demo |

4.2 Acceptance Criteria

1. All **High** priority requirements verified
2. $\geq 95\%$ of **Medium** requirements verified
3. 99% uptime during acceptance
4. Performance benchmarks met
5. No critical security vulnerabilities
6. $\geq 90\%$ user satisfaction

5. APPENDICES

5.1 Booking State Diagram



5.2 Open Issues

| ID | Issue | Owner |
|-----------|-------------------|----------|
| ISSUE-001 | API Documentation | John.Doe |

| ID | Issue | Owner |
|-----------|---------------------------|-----------|
| ISSUE-001 | Commission percentage | Business |
| ISSUE-002 | Minimum payout threshold | Business |
| ISSUE-003 | Cancellation time windows | Business |
| ISSUE-004 | M-Pesa API credentials | Technical |
| ISSUE-005 | e-Mola API credentials | Technical |
| ISSUE-006 | Better Auth configuration | Technical |

Document End

| Role | Name | Date | Signature |
|----------|------|------------|-----------|
| Prepared | | 2026-01-15 | |
| Reviewed | | | |
| Approved | | | |